

# जागृत्कीकरण आणि लेकसाहित्य

संपादक

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# पशुपालक भटक्या जाती जमातीचे सामाजिक सांस्कृतिक अनुबंध

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वेदकाळापासून पशुपालन करणाऱ्या भटक्या आदिवासी जाती जमातीची विपूल संख्या भारतातील विविध राज्यांत आहे. यापैकी गोपाळ, गोळा, गवळी या व यांच्या जाती-उपजातींची संख्या खूप जास्त प्रमाणात असून या जमातीत परस्पर रोट्टी व्यवहार होतो. परंतु बेटी व्यवहार होत नाही. या जमातींचा प्रमुख व्यवसाय म्हणजे पशुपालन करणे, पशुंचा व्यापार दुधाचा व्यावसाय, डोंगराच्यात शेळी, मेंढी, पालन करणे दुध व पशुंचा व्यापार करणे असे व्यवसाय असले तरी या लोकांना विशिष्ट असे एकच नाव, ओळख राहिलेली नाही. महाराष्ट्रात व देशाच्या विविध राज्यातून हा समाज आलेला आहे. तसेच काही पशुपालन करणाऱ्या जमाती मुळ महाराष्ट्रातील आहे. या सर्व पशुपालक भटक्या जाती व तत्सम जमातींचा अभ्यास संशोधन काही प्रमाणात प्रा. डॉ. प्रभाकर मांडे प्राचार्य डॉ. धोंडीराम वाडकर प्रसिद्ध लेखक व सशोधक के. ओ. गिन्हे यांनी या जमातीचा सामाजिक, सांस्कृतिक अनुबंधाच्या माध्यमातून गोपाळ, गोळा गवळी, तत्सम जमाती यांचे लोकजीवन पद्धती परंपरा, जात पंचायत विवाह, देवदेवता परसिर, श्रद्धा, अंधश्रद्धा यांच्या माध्यमातून लेखन संशोधन केले आहे.

प्राचार्य डॉ. धोंडीराम वाडकर हे गोळा जमातीचे आहेत त्यांनी गोळा जमातीचा लोकसाहित्य आणि लोकलीवनाचा सखोल अभ्यास केलेला आहे. त्यामुळे गोपाळ गोळा गवळी आणि पशुपालन करणाऱ्या आणि दुध व्यवसायासंबंधी व्यवसाय करणाऱ्या एकूण ३६ तत्सम जमातीचा सखोल अभ्यासत्यांचा आहे. त्यांनी पशुपालन भटक्या जमातीचे जीवनमान एक तौलनिक अभ्यास हा गोपाळ, गोळा गवळी व तत्सम जमातीचा तुलनात्मक अभ्यास लघुशोध प्रकल्पाच्या माध्यमातून अतिशय चांगला मार्गदर्शक स्वरूपात मांडला असून या पशुपालक जमातीचा व तत्सम जमातीचा सामाजिक, सांस्कृतिक अनुबंध कसा आहे याचा शोध याठिकाणी घेण्याचा प्रयत्न केला जात आहे.

भारत हा कृषीप्रधान देश असून या देशात मानवी जीवनाच्या विकासाच्या प्रारंभीच्या काळी म्हणजे शेती हा व्यवसाय प्रमुख असण्याच्या प्रारंभी, रामायण,



महाभारत काळात गायी गुरे, पाळणे, दुग्ध व्यवसाय व त्यासंबंधीच्या व्यवसाय यावर कोणाकडे किती गायी, पशु आहेत यावर श्रीमंती गणली जात असे व सर्व कुटुंब याच व्यवसायावर अवलंबून होते. कालांतराने काही वर्ग शेतीवर काम करू लागले. तसेच समाजातील काही घटक, गायीचे पालन करू लागला हा समाज स्वतःला श्रीकृष्णाचा वंशज मानू लागले आहेत या प्रमुख जमातीपैकी गोपाळ आणि तत्सम जमाती, गोळा तत्सम आणि गवळी जमातीच्या ३६ अशा असंख्य जमाती दुग्ध व्यवसाय करणाऱ्या असून यापैकी असंख्य जमाती विविध राज्य प्रदेश, काही जिल्हानिहाय हे असून यांचे रूपात परस्पर खूप श्रेष्ठ कनिष्ठतेची भावना यापैकी काही जमाती शहर ग्रामीण भागात स्थिर असून प्रगतशील आहेत. तर काही जमाती आजही अस्थिर जीवन जगत असून शिक्षणाच्या प्रवाहापासून परिवर्तनाचा प्रवाह त्यांना माहित नाही. गोपाळ जमातीचे प्रमुख दैवत श्रीकृष्ण असले तरीही पाथर्डी जवळचे मढी येथील कानिफनाथ कुलदैवत मानले जाते. संपूर्ण भारतात हा समाज विखुरलेला आहे. मराठवाडा, तेलंगण, गुजरात, विदर्भ खानदेश, मावळप्रांत या जमातीचे लोक आजही भटकंती करीत आहेत.

### गोपाळ :

गोपाळ जमातीत हिंदु धर्म, सण-उत्सव दिवाळी, गोकुळाष्टमी, होळी, नागपंचमी असे सण आणि लोकगीतामधून ही सुगी, गाय, म्हैस, सासर, माहेर आणि बाराही महिन्यातील सणांचे वर्णन त्या स्त्रिया करतात. गोपाळ जमातीत जातपंचायतीत कधी-कधी लाच दिली जायची पण सत्य बाहेर यायचे लाच घेणारांना योग्य शिक्षा झालेल्या आहेत. या जमातीत शकुन-अपशकुन प्राणीकथा, नितीकथा बोधकथा भरपूर प्रमाणात या लोककथांचे संकलन को. ओ. गिन्हे यांनी केले आहे. गोपाळ जमात सतत भटकंती करणार असून सण, विवाह, अत्यसंस्कार, जातपंचायत हे केवळ तीन दिवसात पूर्ण करीत असत.

पुणे कडील बागडी गोपाळ हे स्थिर झालेले गोपाळाची स्वतःला श्रेष्ठ समजणारी तत्सम जमात आहे. गोपाळ समाजात जातपंचायत असते. प्रत्येक व्यक्ती जातपंचायतीचा आदर करतो. के.ओ. गिन्हे यांनी या जातपंचायतीचे वर्गीकरण केले आहे. त्यात थळाची पंचायत, ग्रामपंचायत, मढीची पंचायत, जातीतले वाद मिटविण्यासाठी पैशाच्या स्वरूपाचे दंड गावपंचायत करीत असत. या जातपंचायतीचे स्वरूप मोठे असून याचा खर्च वादी-प्रतिवादी करीत असत. पूर्वी गोपाळ जमातीमध्ये बाजार, विवाहस्थळ याठिकाणी ही जातपंचायत भरत असे आता ते बंद झाले आहे.

मढीच्या यात्रेतील कानिफनाथ देवस्थान येथील जातवंश विविध गट आणि राजकारणामुळे जवळपास बंद झाली आहे. गोपाळ जमातीमध्ये स्त्रीने गांधर्व केल्यास



स्त्रीचे सासू-सासरे तिचे केस भादरत, विधवेला अनैतिक माध्यमातून मूल झाल्यास १०० पर्यंत दंड करीत व पंचाने लाच घेतल्यास त्यास खुट्याला बांधीत. जातपंचायतील पंच बोधकथेचा, कोड्यातल्या संवादाचा वापर करीत असत. त्यामुळे ज्याच्यावर अन्या झाला किंवा बाजू मांडणारेही कोड्यातील संवाद, लोककथेचा वापर करीत असत.

गोपाळ समाज भटकंती करत पशुपालन करणे, पशुचे खरदी विक्री व्यापार करणे याकडे जनावरे घेऊन मोठे करणे, विकणे. पुरुषप्रधान समाज असून स्त्रियांना दुय्यमस्थान आहे गोपाळ समाज स्वतःला श्रीकृष्णाचा वंशज मानतो तो दंशाच्या विविध प्रदेशात गेला तेथे जावून या जमातीत सण, उत्सव, रुढी परंपरा आचार विचार विधी जपवणूक करतो. गो + प = गायीचा पालक गोपाळ कुणबी, धनगर, वंजारी जातीच्या संकरातून ही जमात बनल्याचे सांगितले जाते.

गरेपाळ समाज कसरतीचे खेळ करणे महारांचे पुरोहित म्हणून काम करणे, या जमातीत खूप पोटभेद असून यांच्या विवाहत ब्राम्हण पुरोहित असतो. या जमातीत जाधव लोणारे माळी, गिन्हे, गायकवाड, गव्हाणे इत्यादी आडनावे आहेत. महाराष्ट्रात हा समाज आढळतो, पशुपालन करणे याबरोबर मोलमजूरी कोंबडी, बकरी पाळणे, भिक्षा मागणे ब्राम्हण समाजाने विविध जातीच्या संकरातून जमातीचा उदय झाला असे म्हटले असले तरी हा समाज श्रीकृष्णाचा वंशाचे आहेत असे यांची धारणा आहे.

गोपाळ जमातीचे चार प्रकार असून गायी म्हशी पाळणारे, विविध कसरतीचे खेळ करणारे, गवळी गोपाळ स्वतःला श्रेष्ठ मानतात ते दुग्ध व्यवसाय करतात तर भिल्ल गोपाळ कोकण परिसरात असून ते पशुपालन बरोबर मासे, मच्छिमारी व्यवसाय काही प्रमाणात करतात यांची संख्या खूप मर्यादित आहे.

गोपाळ भटकंती करणारा, केवळ तीन दिवस एकागावी पूर्वी राहण्याची परवानगी होती, आज हे लोक काही प्रमाणात स्थिर झालेले आहेत.

**गोल्ला :**

गोल्लाचे मूळ वस्तीस्थान मथुरेच्या आसपास असले भारतात व महाराष्ट्राच्या विविध विभागात हा समाज आजही पारंपरिक लोकजीवन जगणे या जमातीस गवळी, गोल्ल गोल्लेवार, गोळवर, यादव गोल्ला अशी नावे आडनावे आहेत इतर जमातीप्रमाणे यांच्याही साडेबारा तत्सम जमाती आहेत. थरागोल्ला, पूजा गोल्ला, भुकटी गोल्ला, सभू गोल्ला, तेलार गोल्ला, यरा गोल्ला, मंदा गोल्ला किंवा पिचकुटले, मंदा गोल्ला, पाकनाटी गोल्ला, मुष्टी गोल्ला, डोमाटे गोल्ला, भंदा गोल्ला किंवा पिचकुटले, मंदा गोल्ला, ही भिक्षूक उपजमात असून बाकीचे प्रापंचिक आहेत या सर्वांची आडनावे निरनिराळी आहेत. गोल्ला हिंदु धर्मीय आहे सर्व सण-उत्सव साजरे होता श्रीकृष्ण जन्माष्टमीस खूप महत्त्व आहे.



हे लोक डोंगरात कौलारु घरे करुन राहतात थोडा प्रपंच विभक्ती कुटुंबे मराठी माणसासारखे राहणी, वीडी, गांजा, सिंधी यासारखे व्यसने आहे. गोत्रा बाहेर विवाह करतात. विवाह तेलगू भाषेत गोळ जमातीत दोन-तीन दिवस विवाह होत असत. मराठी भाषेत ओवीगीते, विवाहगीते, गोळ जमातीच्या विचारानुसार बहीण-भावाच्या नात्यामध्ये वैवाहिक संबंध होत नसत. पुरुषांना विशेष कारणाशिवाय दुसरा विवाह करता येत नाही. घरजावाई होऊ शकतो. पिरसरापुसार जेवण मराठी माणसाप्रमाणे शेवटी विवाह तयारी असते. सत्यनारायण, डोहाळे जेवण, बाळ जन्मले की पाळणे हे विधी गोळा जमातीत करतात.

गोळा जमातीत विधवाविवाहास मान्यता आहे. तसेच घटस्फोट समोपचारने मान्य केले असते. त्याचप्रमाणे प्राणी पूजेला महत्व असून त्यात गाई, बैल, वसुबारस, कुत्रा, नाग, खंडोबा यांची पूजा केली जाते. गोळा जमातीमध्ये वाघ्या सोडण्याची परंपरा आहे. दार वाघे भिक्षा मागतात. घरातील प्रत्येक मोठा मुलगा औरंगाबाद विभागात वाघ्या म्हणून सोडण्याची पध्दत गोळा जमातीत आहे. जागरण करणे, श्रीकृष्णाच्या संबंधाची लोकगीते या समाजात गायली जातात. गोळा जमातीत व्यभिचार, पर स्त्रीहरण, नियमबाह्य वर्तन, खून, दरोडे, लाभविषयक, मुलांच्या पाचवीचे जेवण, मृत्यूचा दिवस या बाबतीत जात पंचायतीमध्ये निर्णय होवून समाजातील लोकांना दंड करतात. गोपाळ व गोळा जमातीत आक्षाड पांजी म्हणजे लक्ष्मीआईची पूजा बकऱ्याचा बळी देवून सामुहिक पध्दतीने एकत्र येवून जेवण करतात. वाळीत टाकलेल्यांना पंगतीत जेवण दिले जात नाही. जालना जिल्ह्यातील सकलादी बाबाला या जमातीचे लोक बोकडाचा बळी देतात. विवाहानंतर जमातीतील लोकांनी दर्शनाला जाण्याची परंपरा गोपाळ व गोळा जमातीमध्ये आहे.

गोपाळ गोळा जमातीत जपविधी, पाचवी, जावळ काण्याची प्रथा असून लोकांना या कारणामुळे जेवण द्यावे लागते. नसता जातपंचायत बसून जमातीतील लोकांना दंड दिला जातो. या समाजामध्ये अंधश्रद्धेचे प्रमाण खूप मोठ्या प्रमाणत आहे. गोळा, गोलवार ही एक भटकी जमात भारतातील विविध राज्यात आहे. मराठी गोळा जमात मराठवाड्यातील नांदेड उस्मानाबाद, औरंगाबाद, जालना, बीड परिसरात आहेत. या जमातीस गोळा, गोलक, गोळेवार, गोळूम, गोळा या जमातीचे राजे होते असे मानले जाते. परंतु ही जमात गायी, म्हशी मेंढपाळणे, गोपालक असल्यामुळे या जमातीला गोळ हे नाव पडले असावे.

गोळ समाजातले लोक परंपरेने असे मानतात की, चार हजार वर्षापूर्वी नंदगोप व त्याची बायको यशोदा गोकुळात राहत. कंसापासून श्रीकृष्ण रक्षण करण्यासाठी नंद



गवळ्याच्या घरी श्रीकृष्णाला लपविले. नंद हे गोपालन करणारे असून गवळी आहेत. अन या गवळ्याच्या पत्नीचा पुढील वंश गोळाचा असावा असे मत या जमातीच्या अभ्यासकांचे आहे.

**गवळी :**

भारतातील सर्वच राज्यात पशुपालक गवळी समाजाच्या जाती उपजातीचा संख्या ही खूप प्रमाणात असून त्यात लिंगायत गवळींचे प्रमाण भरपूर प्रमाणात आहे वीरशैव, लिंगवंत, लिंगधर, यासारख्या नाव्याने भारताच्या विविध राज्यात असून लिंगायत हे द्रविड भारतीय मूलनिवासी आहेत गोकुळाष्टमी साजरी करतात.

भारतीय राष्ट्रीय स्वातंत्र्याच्या चळवळीत व छत्रपती शिवाजी महाराजांना अनेक प्रसंगी गवळी जमातीने मदत केल्याचे दाखले इतिहासात सापडतात. लिंगायत गवळी समाज भटका समाज असून पाणी व्यवस्था लाकूड फाटा मिळेल तेथे या जमातीने आपली वस्ती स्थापन केली आहे. महाराष्ट्रातील विविध डोंगर दऱ्या, किल्ले परिसरात गवळी वाडे आहेत. शत्रुना घाबरे करण्यास गायींचे तांडे उभारले जात असत महाराष्ट्रात अनेक ठिकाणी गवळी समाजाची वस्ती आहे. लिंगायत धर्मातील लिंगायत गवळी समाजात कोणत्याही पोट जाती नाहीत लिंग धारणा करणारा लिंगायत गवळी असा हा एक संघ समाज आहे. पण जातीभेद मानणे लिंगायत तत्त्वानुसार निषिद्ध मानले आहे.

महाराष्ट्रात हिंदू गवळी समाजाच्या प्रमुख उपजाती, यदुवंशी, यादवगवळी, अहिर गवळी, धनगर गवळी, गोळा गवळी, गोपल गवळी, कृष्णा गवळी, नंदगवळी, गायगवळी, मराठा गवळी, राजपूत गवळी, गवलान गवळी, पांगुळ गवळी, लाड गवळी, मुसलमान गवळी, कोकणी गवळी, कुणबी गवळी, महाराष्ट्रात विविध परिसरात, विविध भागात या गवळी जमातीच्या तत्सम जमाती भरपूर प्रमाणात असून या विविध भागातच असल्यामुळे तत्सम जमातीचा परिचय समाजाला नाही. या जमातीचे अभ्यासक, संशोधक प्राचार्य डॉ. धोंडीराम वाडकर म्हणतात, यांच्यात केवळ व्यवसायिक साम्य असून यापैकी सर्वच तत्सम जमातीचे लोक हे श्रीकृष्णाला आपला मुळ वंश मानतात. या गवळी जमातीत लिंगायत गवळी भिन्न आहेत. या गवळी जमातीत कानडे गवळी, धनगर कानडे, हटवट कानडे हे दुग्ध व्यवसाय करणाऱ्या जमातीना गवळी हे नाव पडले आहे.

लिंगायत गवळी हे असे मानतात की, श्रीकृष्ण आमच्यात आनंदात वावरले आहेत याचा अर्थ श्रीकृष्णाच्या ही पूर्वी लिंगायत गवळी असे मत निर्माण होते. या जमातीत स्वतंत्र विवाह, मृत्यू राहणीमान याच्या पध्दती आहेत. या जमातीची स्वतंत्र जातपंचायत असून लिंगायत गवळी जमातीत जातपंचायतीचे प्राबल्य भरपूर काळ होते.

महाराष्ट्रातील विविध परिसरात गवळी जमातीच्या तत्सम जमाती असून त्यांनी



त्यांचे स्वतंत्र अस्तित्व ठेवले आहे. लाड गवळी हे हिंगोली, जालना, नाशिक, बीड या जिल्ह्यातील शहरी भागात दुग्ध व्यवसाय करणारी व ग्रामीण भागात शेतीसारखे व्यवसाय करणारी जमात आहे.

अहिर गवळी समाज ही बहुतेक शहरी भागात असून यांच्या स्त्रियांचा पदर उलटा असून घरातील भाषाही हिंदी आहे महाराष्ट्राबाहेरील मध्यप्रदेश बिहार, राजस्थानमधून हा समाज आलेला असावा. तसेच यादव गवळी हे पश्चिम महाराष्ट्रात असून बहुतेक शहरी भागात दुग्ध व्यवसाय हे करतात. काही प्रमाणात हा समाज संघटीत आहे. नंद गवळी हा गवळी जमातीची तत्सम जमात असून गायीचे कळप पाळणे डोंगरात राहणे, खानदेशातील डेंगराळ भागात पारंपारिक व्यवसाय करणारी जमात आहे. मुलसमान गवळी हे अंबाजोगाई, बीड भागात असून श्रीकृष्णाला व इतर गवळी जमातींना ते जवळचे मानतात. दुग्ध व्यवसाय करतात. गोपालन करणारी, दुग्ध व्यवसाय करणारी गावळी, लिंगायत गवळी, नंदगवळी, अहिर गवळी, लाड गवळी या बोलताना परस्परासंबंधी जवळचे मानतात तसा रोट्टी व्यवहार आहे पण बेटी व्यवहार करीत नाही. भटक्या विमुक्त जमातींच्या सवलती घेत असले तरीही यांच्यात शिक्षणाचे प्रमाण खूप कमी आहे. पारंपारिक व्यवसाय हा इतर लोकांनी स्कारल्यामुळे शेती, नसणारा हा समाज हालाखीचे जीवन जगत असून इतर व्यवसायाला स्विकार ते करीत आहे.

**पशुपालक भटक्या जाती जमातीचे सामाजिक, सांस्कृतिक अनुबंध काही निष्कर्ष:**

गोपाळ महाराष्ट्राच्या अनेक परिसरात गाय म्हशी पाळणे, खेळ करणे, उडी मारणे, भिक्षा मागणे, लोकांच्या शेतात सुगीच्या काळात शेतकऱ्यांना काढणीची मदत करणे, गायी, म्हैस पाळणे त्यांना वाढविणे आणि त्यांचा व्यापार करणे. मढीचा कानिफनाथ हे त्यांचे दैवत आहे असे हे लोक मानतात.

स्त्रियांना गोपाळ जमातीत कोणतेही मानो स्थान नाही विधवा विवाह नाही, जातपंचायतीत व असंख्य प्रसंगी त्यांचा अपमान केला जातो. अनैतिक संबंधाचे आरोप होऊन असंख्य वेळी अपमान होतो. जापंचायतीचा पगडा या जमातीवर असून पारंपारिक लोकजीवन जगतात थोड्या प्रमाणात स्थिर स्थायिक होत असून थोडे शिक्षण घेत असले तरीही यांना नोकरी नाही या जमातीत के. ओ. गिन्हे अनाबाई गिन्हे यांनी भरपूर प्रमाणात समाजाच्या संबंधी लेखन केले आहे.

**संदर्भ:**

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# Densities, Viscosities, Excess Molar Volumes and Excess Gibbs Free Energy of Activation of Binary Mixtures of Propionaldehyde with Methanol Over the Entire Range of All Compositions at 298.15, 308.15 and 318.15 K

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## ABSTRACT

Densities and viscosities of the binary mixtures of propionaldehyde with methanol, ethanol n-propanol and n-butanol at 298.15, 308.15 and 318.15 K over the entire range of all compositions have been studied in this paper. Viscosity deviations ( $\Delta\eta$ ), molar volumes  $V_m$ , excess molar volumes  $V_E$  and excess free energies of activation of viscous flow  $\Delta G^*E$  have been determined by using experimental data. Viscosity deviations, excess molar volumes and excess free energies of activation of viscous flow have been calculated and correlated with Redlich-Kister polynomial equation.

**Keywords:** Density, Viscosity, Viscosity deviation, Excess molar volume, Binary system, propionaldehyde.

## I. INTRODUCTION

It is general finding that there is a little information of the viscosity of binary mixtures propionaldehyde with methanol and effect of temperature on it. Study of effect of temperature on the viscosity of a liquid is important and has been studied by some researchers. However, study of the effect of temperature on viscosity and density of binary liquid mixtures of propionaldehyde with methanol is rarely reported. Therefore, the main aim of this study was to produce the data on the effect of temperature on the viscosity of binary liquid mixtures. Further, the thermo-physical properties of binary liquid mixtures and their analysis in terms of interpretative models constitute a very interesting subject [1-2]. The characterization of mixtures through their thermodynamic and transport properties is important from the fundamental viewpoint of understand their mixing behavior [3-7]. Liquid mixtures consisting of aldehydes and alcohols are of great importance in the field of industries such as in Petrochemical, Pharmaceutical and Dye [8, 9]. A thorough knowledge of transport properties of non-aqueous solutions is essential in many chemical and industrial applications [10]. The studies of excess properties such as deviation in viscosity, excess molar volume, excess Gibbs free energy of activation of viscous flow molecular interactions of binary mixtures are useful in understanding the nature of intermolecular interactions between two liquids [11-12]. Binary liquid mixtures due to their unusual behavior have attracted considerable attention



due to their importance from both theoretical and practical point of view because these mixtures are used in titration, calorimetry and reaction calorimetry, among other uses [14].

In this present paper, density ( $\rho$ ) and viscosity ( $\eta$ ) of binary mixtures of propionaldehyde methanol are reported at various temperatures i.e. 298.15, 308.15 and 318.15 K. Deviation in viscosity ( $\Delta\eta$ ), molar volume ( $V_m$ ), excess molar volume ( $V^E$ ) and excess Gibbs free energy of activation of viscous flow ( $\Delta G^*E$ ) have been calculated from the density ( $\rho$ ), and viscosity ( $\eta$ ), data. Calculated deviation in viscosity and excess functions were fitted to the Redlich-Kister polynomial equation and the results analyzed in terms of molecular interactions.

## II. EXPERIMENTAL METHODS

The chemicals such as propionaldehyde and methanol used for the current investigation were obtained from SD fine chemicals India. Propionaldehyde and methanol used were of analytical grade (AR) of minimum purity of 99.9 %. The purities of propionaldehyde and methanol were cross checked by density determination at different temperatures. The densities of pure propionaldehyde & methanol and their binary mixtures were measured by using a single-arm pycnometer which was calibrated at the working temperatures with doubly distilled water. The sensitivity of the pycnometer corresponded to a precision in density of  $1 \times 10^{-3} \text{ gm cm}^{-3}$ . The binary liquid mixtures of different known concentrations were prepared in stopper measuring flasks. The weight of the sample was measured using electronic digital balance with an accuracy of  $\pm 0.0001 \text{ gm}$ . An Ubbelohde viscometer (of 20 ml capacity) was used in the viscosity measurement and efflux time was determined using a digital clock to within  $\pm 0.01 \text{ Sec}$ . The experimental temperature was controlled using kinematic viscosity bath with an accuracy of  $\pm 0.10 \text{ K}$ .

## III. RESULTS AND DISCUSSION

The variations in viscosity of different binary mixtures of propionaldehyde with methanol with temperature and calculated data of deviation in viscosity ( $\Delta\eta$ ), molar volume ( $V_m$ ), excess molar volume ( $V^E$ ) and excess Gibbs free energy of activation of viscous flow ( $\Delta G^*E$ ) are given in tables below.

Propionaldehyde with Methanol at 298.15, 308.15 and 318.15 K.

Table: 1-a At 298.15:

x1	P (g cm <sup>-3</sup> )	H (mPa.s)	$\Delta\eta$ (mPa.s)	$V_m \text{ cm}^3 \text{ mol}^{-1}$	$V^E \text{ cm}^3 \text{ mol}^{-1}$	$\Delta G^*E \text{ J.mol}^{-1}$
0	0.7864	0.5549	0	40.7426	0	1512.201
0.0590	0.7883	0.5378	-0.0225	42.5960	0.0123	1662.324
0.1237	0.7902	0.5189	-0.0396	44.6260	0.0184	1822.321
0.1945	0.7915	0.5019	-0.0505	46.8817	0.0235	1972.254
0.2736	0.7941	0.4848	-0.0543	49.3210	0.0289	2121.354
0.3610	0.7961	0.4692	-0.0525	52.0566	0.0348	2268.214
0.4587	0.7979	0.4491	-0.0487	55.1281	0.0326	2382.254
0.5687	0.7998	0.4326	-0.0388	58.5760	0.0278	2462.254
0.6932	0.8017	0.4178	-0.0291	62.4840	0.0177	2317.258
0.8356	0.8037	0.3912	-0.0207	66.9421	0.0112	2117.365
1	0.8056	0.3765	0	72.0953	0	2011.354



Table: 1-b At 308.15:

x <sub>1</sub>	$\rho$ (g cm <sup>-3</sup> )	$\eta$ (mPa.s)	$\Delta\eta$ (mPa.s)	V <sub>m</sub> cm <sup>3</sup> mol <sup>-1</sup>	VE cm <sup>3</sup> mol <sup>-1</sup>	$\Delta G^*E$ J.mol <sup>-1</sup>
0	0.7764	0.4782	0	41.6391	0	1569.436
0.0590	0.7779	0.4647	-0.0189	43.4925	0.0186	1719.559
0.1237	0.7793	0.4515	-0.0361	45.5225	0.0247	1879.556
0.1945	0.7808	0.4392	-0.0469	47.7782	0.0298	2029.489
0.2736	0.7823	0.4251	-0.0507	50.2175	0.0352	2178.589
0.3610	0.7837	0.4125	-0.0489	52.9531	0.0411	2325.449
0.4587	0.7852	0.3982	-0.0451	56.0246	0.0389	2439.489
0.5687	0.7867	0.3859	-0.0352	59.4725	0.0341	2519.489
0.6932	0.7881	0.3736	-0.0255	63.3805	0.024	2374.493
0.8356	0.7896	0.3604	-0.0171	67.8386	0.0175	2174.612
1	0.7913	0.3461	0	72.9918	0	2068.589

Table: 1-c At 318.15:

x <sub>1</sub>	$\rho$ (g cm <sup>-3</sup> )	$\eta$ (mPa.s)	$\Delta\eta$ (mPa.s)	V <sub>m</sub> cm <sup>3</sup> mol <sup>-1</sup>	VE cm <sup>3</sup> mol <sup>-1</sup>	$\Delta G^*E$ J.mol <sup>-1</sup>
0	0.7711	0.4195	0	42.5803	0	1642.088
0.0590	0.7720	0.4083	-0.0146	44.4337	0.0273	1792.211
0.1237	0.7730	0.3965	-0.0317	46.4637	0.0334	1952.208
0.1945	0.7739	0.3823	-0.0426	48.7194	0.0385	2102.141
0.2736	0.7748	0.3704	-0.0464	51.1587	0.0439	2251.241
0.3610	0.7758	0.3591	-0.0446	53.8943	0.0498	2398.101
0.4587	0.7767	0.3472	-0.0408	56.9658	0.0476	2512.141
0.5687	0.7777	0.3348	-0.0309	60.4137	0.0428	2592.141
0.6932	0.7786	0.3217	-0.0212	64.3217	0.0327	2447.145
0.8356	0.7795	0.3098	-0.0128	68.7798	0.0262	2247.252
1	0.7805	0.3041	0	73.933	0	2141.241

To investigate the molecular interaction between Propionaldehyde and the alcohols, (methanol, ethanol, n-propanol and n-butanol), viscosity deviation, excess molar volumes and excess Gibbs free energy of activation of viscous flow have been evaluated from experimental density and viscosity using equations 1 and 2 respectively.

$$V^E = \frac{x_1 M_1 + x_2 M_2}{\rho_m} - \left( \frac{x_1 M_1}{\rho_1} + \frac{x_2 M_2}{\rho_2} \right) \quad \text{----- (1)}$$

$$\Delta\eta = \eta_m - (x_1 \eta_1 + x_2 \eta_2) \quad \text{----- (2)}$$



where  $x_1$  and  $x_2$  are the mole fractions calculated from mass fractions.  $M_1$  and  $M_2$  are molar masses,  $\rho_1$  and  $\rho_2$  are densities,  $\eta_1$  and  $\eta_2$  are the viscosities of pure components 1 and 2 respectively.  $\rho_m$  and  $\eta_m$  are the density and viscosity of the mixture.

The excess Gibbs free energy of activation of viscous flow was obtained from equation 3.

$$\Delta G^*E = RT[\ln \eta_m V_m - (x_1 \ln \eta_1 V_1 + x_2 \ln \eta_2 V_2)] \quad (3)$$

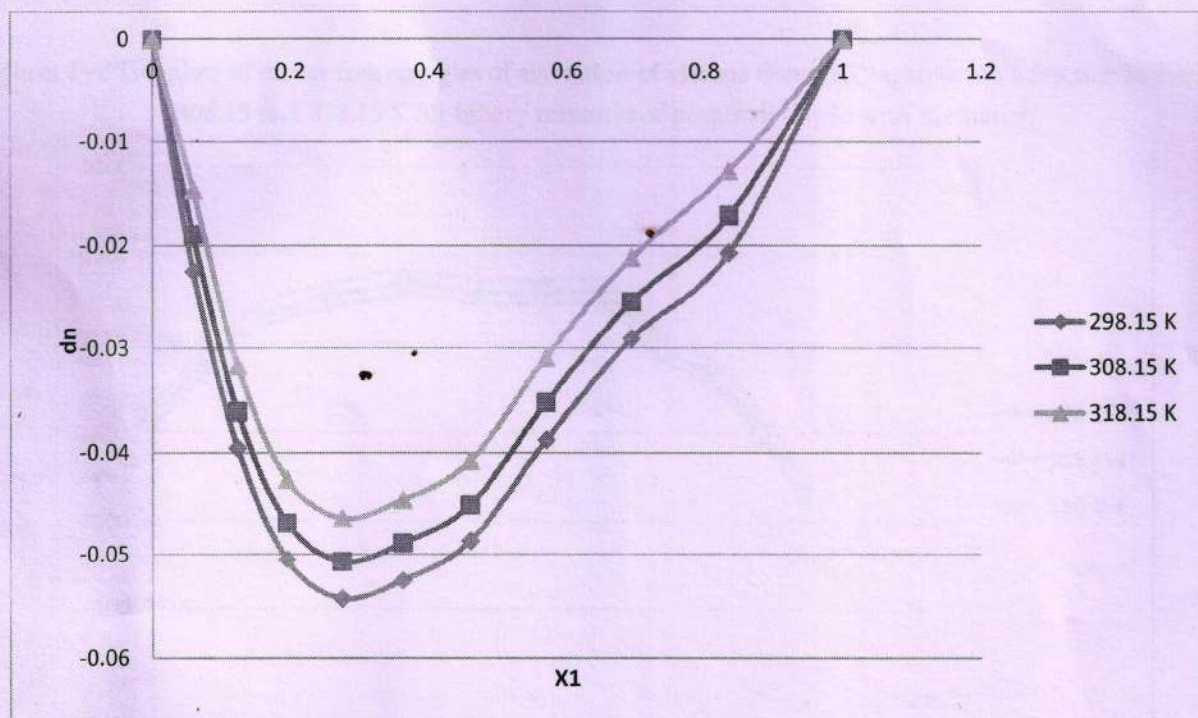
where  $R$  is the universal constant of gases,  $T$  is the absolute temperature,  $V_1$  and  $V_2$  are the molar volumes of component 1 and 2,  $x_1$  and  $x_2$  represents the mole fraction of component 1 and 2.

$V_m$  is obtained from equation 4 below.

$$V_m = \frac{x_1 M_1 + x_2 M_2}{\rho_m} \quad (4)$$

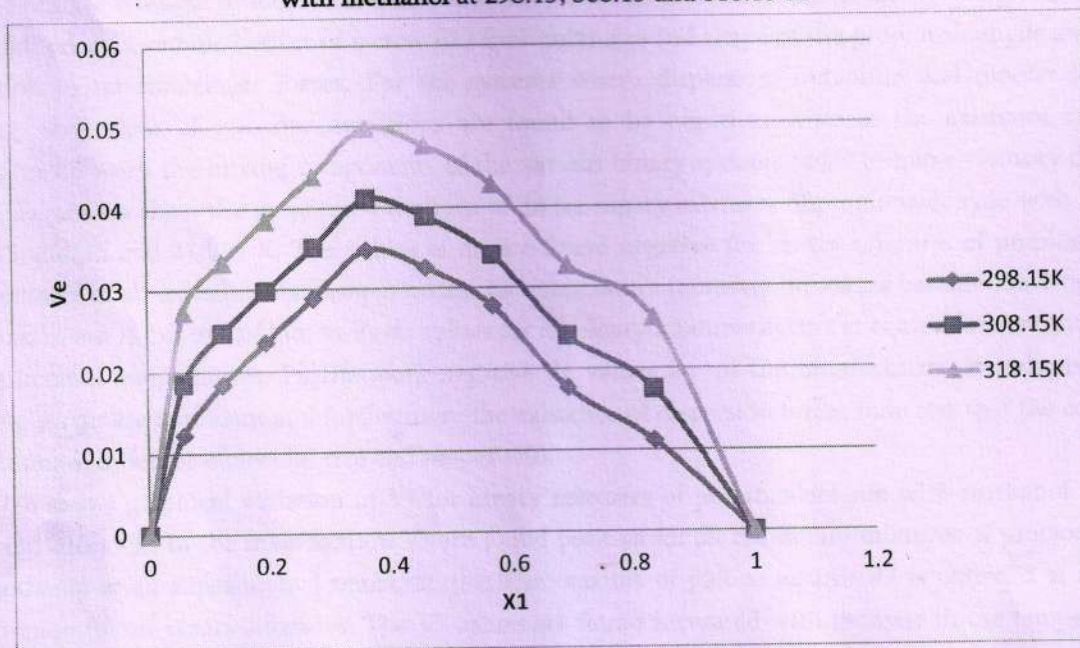
Where  $\eta_1$ ,  $\eta_2$  and  $\eta_m$  are the viscosity of component 1 and 2 and mixture respectively

**Figure 1-a:** The plots of deviation in viscosity against mole fraction at 298.15, 308.15 and 318.15 K for binary mixtures of Propionaldehyde with methanol.

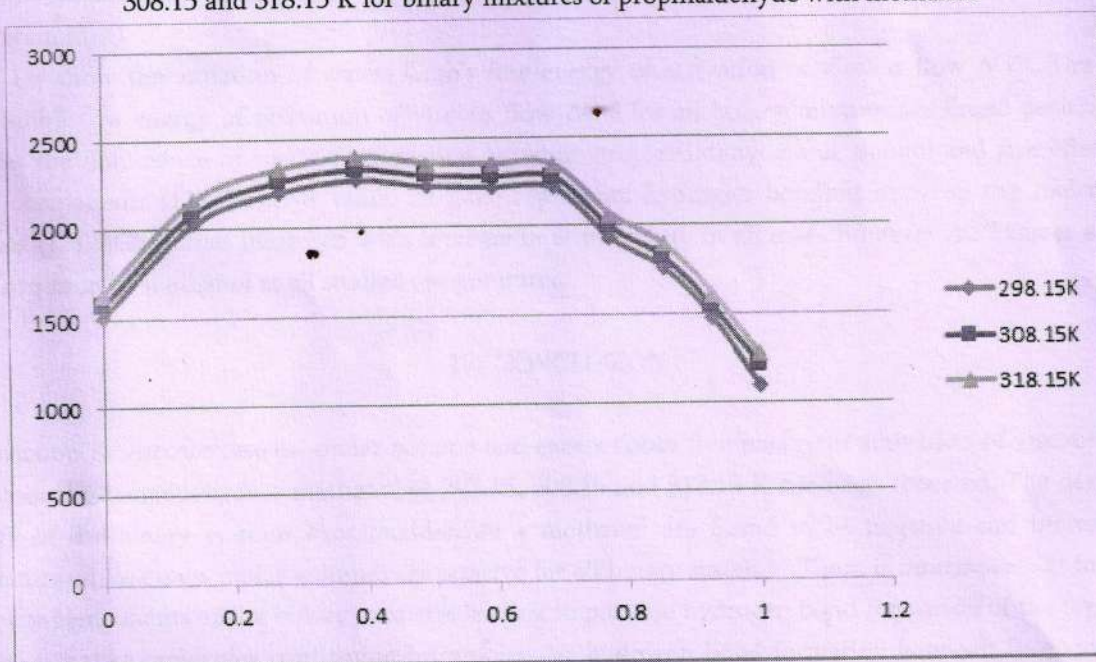




**Figure: 1-b.** The plots of excess molar volumes against mole fraction for binary mixtures of Propionaldehyde with methanol at 298.15, 308.15 and 318.15 K.



**Figures 1-c:** The plots of excess free energies of activation of viscous flow,  $\Delta G^*E$  against mole fraction at 298.15, 308.15 and 318.15 K for binary mixtures of propionaldehyde with methanol.



The experimental values of densities and viscosities of studied binary mixtures of propionaldehyde with methanol at 298.15 K, 308.15 K and 318.15 K over the entire composition range expressed by mole fraction  $x_1$  of propionaldehyde are listed in Tables -(a-c). The densities and viscosities of the studied binary mixtures are found decreased with increasing temperature and increased with increasing of mole fraction of propionaldehyde. Qualitative explanation for the behavior of binary mixtures with the change in mole fraction



can be suggested from the experimental data obtained under study. Deviations in viscosity can be explained by means of relative strength of molecular interaction between like and unlike molecules. The sign and extent of  $d\eta$  depends on the combined effect of factors like molecular size and shape of the propionaldehyde and alcohol in addition to intermolecular forces. For the systems where dispersion, induction and dipolar forces are operating, the values of viscosity deviations are found to be negative, whereas the existence of specific interactions between the mixing components of the various binary systems tends to make viscosity deviations positive. Figure 1-a show the graphical variations of  $d\eta$  for binary mixtures of propionaldehyde with methanol at 298.15, 308.15 and 318.15 K. The values of  $d\eta$  are found negative for binary mixtures of propionaldehyde with methanol at all experimental temperatures. As temperature increases  $d\eta$  values became more negative in case of methanol. A minima of plot  $x_1$  Vs  $d\eta$  values for all binary mixtures occurs at equimolar concentrations at all experimental temperatures. Furthermore negative  $d\eta$  values for all the binary mixtures indicate that the dispersion forces are dominant and furthermore the existence of dispersion forces indicates that the component molecules have different molecular size and shapes (10).

Figure 1-b shows graphical variation of  $V^E$  for binary mixtures of propionaldehyde with methanol at 298.15, 308.15 and 318.15 K. In the investigation  $V^E$  are found positive for all the binary mixtures of propionaldehyde with methanol at all experimental temperatures. The maxima of plot  $x_1$  against  $V^E$  is obtained at equimolar concentration for all binary mixtures. The  $V^E$  values are found increased with increase in the temperature for all binary mixtures. As the temperature increases  $V^E$  also increases because of inconvenient interstitial accommodation due to thermal agitations among propionaldehyde and alcohol. The positive values of  $V^E$  in the present investigation are resultant of specific interactions formation of hydrogen bonds resulting in positive contribution (3, 4).

Figures 1-c show the variation of excess Gibbs free energy of activation of viscous flow  $\Delta G^{*E}$ . The values of excess Gibbs free energy of activation of viscous flow  $\Delta G^{*E}$  for all binary mixture are found positive which attributes the dominance of specific interaction between propionaldehyde and alcohol and size effect of the mixing components (11). Positive values of  $\Delta G^{*E}$  represents hydrogen bonding between the molecules are dominant (13).  $\Delta G^{*E}$  values increased with increase in temperature in all cases however  $\Delta G^{*E}$  values are found almost constant for methanol at all studied temperatures.

#### IV. CONCLUSION

The deviation in viscosity, excess molar volume and excess Gibbs free energy of activation of viscous flow for the systems Propionaldehyde + methanol at 298.15, 308.15 and 318.15 K has been reported. The deviation in viscosity of the binary systems Propionaldehyde + methanol are found to be negative and increases with temperature while excess molar volumes are positive for all binary systems. There is intermolecular interaction among the components of the binary mixtures leading to possible hydrogen bond formation of the type  $\ddot{O} \cdots H-O$  between unlike molecules confirming intermolecular hydrogen bond formation between Propionaldehyde and the alcohol mixtures (14-20).

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# AN ASSESSMENT OF AQUATIC PHYTOPLANKTON AND THEIR SEASONAL VARIATION FROM HISTORICAL “KHAJANA VIHIR” DIST.BEED

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## ABSTRACT

The investigation was done to study and have an assessment of phytoplankton biodiversity from Khajana vihir in Beed district of Maharashtra. From June 2018 to 2019 the study was carried out. Phytoplanktons are most abundant autotrophic element of aquatic ecosystem. They serve as the basic unit of the aquatic food web. The abundance of phytoplanktons observed 46 species of the following Bacillariophyceae, Chlorophyceae, Euglenophyceae and Myxophyceae. The population density of phytoplankton shows variation during study period. The dominating group of phytoplankton was Myxophyceae and lowest Euglenophyceae. In present study revealed that the water body of Khajanavihir contaminated due to human activities but it is useful for irrigation and drinking purpose.

## INTRODUCTION

Khajana vihir (well) is a historic well situated approximately 6 km south of the township of Beed. It was constructed in 991 AD (1583) by a Jagirdar of Beed in the period of Murtaza Nizam Shah of Ahmednagar named Salabat Khan. It is believed, the level of water in this well remains constant even in driest of seasons. Three water currents from the well irrigate the land around the town. The well is constructed using stones and lime mortar. Total depth of well is 7.0 meter. The inner diameter of the well is around 19.0 meter up to the depth of 4.7 meter and below this depth it is 12.6 meter. On this offset of 6.4 meter between these diameters, a lime concrete is laid to form a nice platform.



Khajanavihir (well) acts as a source of land irrigation as well as drinking water for people and animals. Due to the pollutants as well as entry of sewage waste water and matter and interaction in between all these factors, some significant changes were recorded in the ecosystem. This water body is eco-biologically active, having a variety of flora. Biodiversity of fresh water phytoplanktons were studied in marathwada region earlier by Kamat(1962, 1979,1980 and 1983) Sarode and Kamat (1984 )Ashtekar( 1980) and Talekar (2009). The phytoplanktons are the main autotrophic constituent of aquatic ecosystem. Moreover, numbers and species of phytoplankton's can be used to determine the quality of waterbody in which they are collected. That is why, the present investigations was decided.

### Material and Methods

The samples from the well, Khajana Vihir were collected at monthly intervals during the period of one year July 2018 to June 2019 for the investigation. The samples were preserved and stored in 4% formalin for further study. The standard texts, relevant monograph and recent available literature were used to identify the phytoplankton(Agarwal 1990;Desikacharya,1950;Edmondson,1959;Mrugan,1998; Fritch,1956; Patel and Wadgaonkar, 1981 ;Kamat 1962,1963,1974; Philipose,1967). Many published work on aquatic environment and biodiversity of phytoplankton in fresh water are available, Dixit (1936), Yogesh Shashtry *et,al.*(1999) More and Nandan (2003) and also such type of work done by other researchers.

### RESULT AND DISCUSSION

In present investigation the phytoplanktons of biodiversity in Khajanavihir waterbody is full of four major groups of which 11 species belong to Myxophyceae, 9 species to Bacillariophyceae, 23 species of Chlorophyceae and 8 species belong to Euglinophyceae. The Density of phytoplanktons ranged maximum from 260x118/l in the month of April and observed minimum 48x5/l in month of August. LGradual increase in the total density of population observed January to April. The annual mean percentage of these four groups was observed about (42.76) Myxophyceae , (26.70) Chlorophyceae, (27.00), (42.78) Bacillariophyceae and(5.70) of Euglinophyceae.

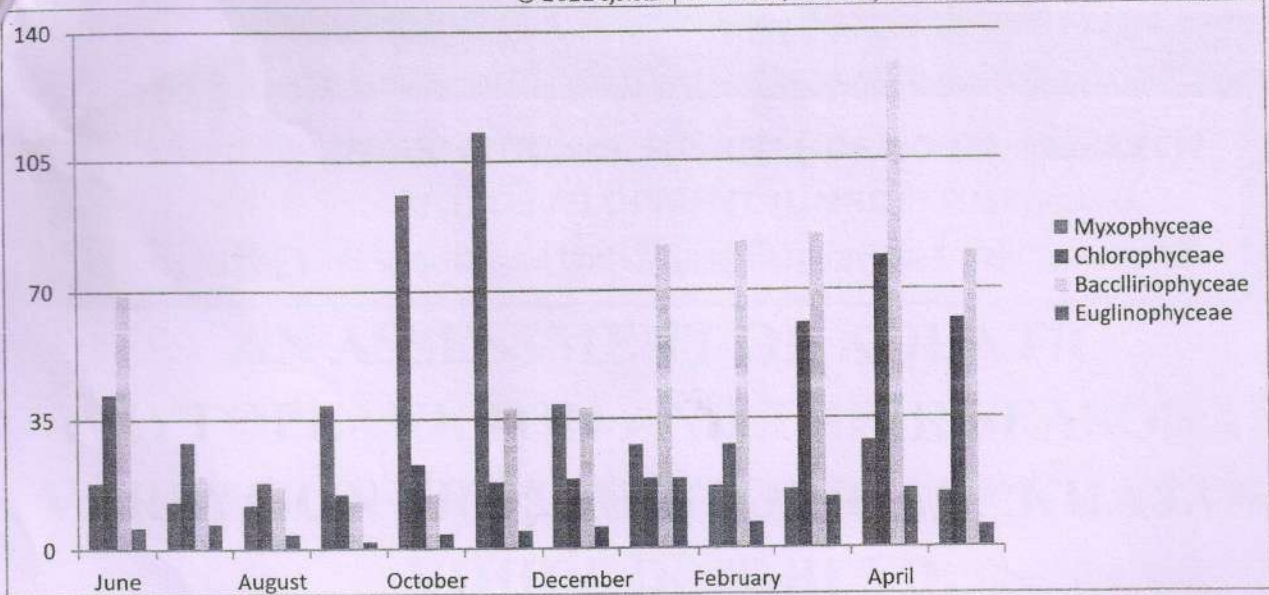
The total number of phytoplankton and their species of the water body and monthly average of qualitative and quantitative identified species are given in



Table no.1

Month	Class Myxophyceae	Class Chlorophyceae	Class Bacillariophyceae	Class Euglinophyceae	Total
June	18	42	69	6	135
July	13	29	20	7	69
Aug	12	18	17	4	51
Sep	39	15	13	2	69
Oct	96	23	15	4	138
Nov	113	18	38	5	174
Dec	39	19	38	6	102
Jan	28	19	82	19	148
Feb	17	28	83	7	135
Mar	16	61	85	14	176
Apr	29	79	131	16	255
May	15	62	80	6	163
Total	417	371	602	90	1480
%	35.83	33.33	51.83	8.08	





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# The Impact of Global Climate Changes on the Aquatic Environment

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**Abstract:** Change in the global environment which alter the capacity of the Earth to sustain life called as global climatic changes which includes climate alterations, land productivity, water resources including oceans, atmospheric chemistry etc. Climatic changes are most drastic variables interacting with all live aspects of the world's developments equations. This definition defined in the 1990 by Global change Research Act (GCRA), U.S. Some Interactivity variables are the melting glaciers sea level rise, coastal erosions, increase in ocean acidity, & global warming, increased biological invasions and deteriorated biodiversity. The climatic changes are the transcontinental issue. Consequences of climatic changes was primarily originated from the hydrologic changes in global water that slowly moved forward towards the land this continuous process ongoing of coastal land erosions. Such climatic changes ultimately lead to great impact on the aquatic biodiversity are the inland aquaculture, eutrophication. Therefore, without creative international initiative to save the ecosystem from climatic changes there will be possible endangering effects on all living creatures on the earth plane.

**Key Words:** Global warming, Climatic changes, Biodiversity, Aquatic plants.

## Introduction:

Climatic changes are known for their destroying impact on the biodiversity, growth, biodiversity of aquatic, terrestrial and aerial plants (1). Throughout the two decades the word "global warming" is using in the increased temperature levels of the earth climatic system and its related effects. Now forgetting the fact that the environment is not only a thermal but also constitutes a large scale of integrating factors such as a gaseous emission, chemical effluents and deforestation (2). The major climatic changes showed in marine ecosystem because of overexploitation of fishing resources, pollution and climatic change (3,4). In fresh water ecosystem includes modifications and use of watersheds, human contamination of water resources, altered hydrology and invasive species (3,5). Many assessments have recognized climatic change can occur. Over evolutionary and ecological time scales as a result of natural and anthropogenic causes (1).

As an essential life component of these creatures that were deeply impacted with the fact of rapidly developing worldwide climatic changes aquatic plants, animals mostly suffering from the creatures (7). Therefore, the most urgent need for investigating the causes which affects directly to the disaster of global climatic change demands of the structural components of the environment. In this study, the most of the integrating causes of the global climatic changes and their impact on the aquatic environments were deeply discussed. Our final goal therefore is to know the devastating effects of the global climatic changes on the survival, growth and prosperity of the aquatic environment with subsequent impact on the world's human development.

## Materials and Methods:

The specific research framework is planned for this paper focusing on the methodologies commonly used in climate change researches based on the papers published in web of science (WS), springs link (SL) and science direct (SD). The process ultimately half the fellow researchers to select the appropriate methodologies in the climate change researchers with their specific research objective and focuses. The specific research objectives and focuses could be related climate change policies at the national and local level or assessment and analysis of climate risks. The literature review defining the research theme and inclusion/exclusion criteria are the initials steps of the systematic reviews followed by the published papers based on abstracts that leads to evaluation and analysis of selected papers and results interpretation and discussion.

## Results and Discussions:

Climatic change is predicted to have wide range on aquatic ecosystem many aquatic species to be under the category of endangered, threatened or extinct species was mainly motivated by the devastating impact of global climatic changes. Sea level rise with the coastal erosion, increase in



ocean acidification is a detrimental factor for the large number of fishes. Global warming affects the sex ratio among the marine animals. Thereby, there is an urgent need for policy integration throughout government sectors as coastal planning, river basin management agriculture, fisheries and health where climate change risks react.

### Discussion:

- 1) **Increased sea level-** Due to accelerated melting of glaciers and thermal expansion of sea water the level of the sea likely to be rise by about by half a meter by 2100. A considerable number of aquatic species will be threatened with the continuous increase in the sea level to a degree that some of them will be listed under the category of threatened or extinct species by the end of century (10).
- 2) **Effects of Manmade Dams-** Humans have constructed dams for water storage, flood prevention, electricity generation, irrigation, navigation and recreation (18,19). There is significant drawback of dams which is the negative impact on local ecosystems. Dams may interfere with the natural process of food allocation of habitat and mates. Majority of the rivers have faced dramatic changes inflow, reducing their natural ability to adapt to and absorb disturbances. Given predicted changes in global climate and water needs this may create severe problems, including loss of native biodiversity and risks to ecosystems and humans from increased flooding or water scarcities (16).
- 3) **Effects of Food abundance-** Food abundance and availability studies show that the global food reserve is in a state of continuous decline. The distribution of food production will dramatically change from certain geographical area to the another mainly because of the uprising shortage of water availability. The effects of climatic change on ecosystem are affected the nature of interaction among species between phytoplankton and zooplankton can be disrupted by the increase in water temperature of a certain water body. There is a well-established fact that the diatom blooms and other aquatic life are drastically affected by the global warming induced mismatched in water temperature (20). This in turn will you have severe consequences for resource flow to upper tropic levels (17).
- 4) **Thermal Effects-** Due to volcanic eruptions, variations from the heat of sun and other natural phenomenal changes involving earth, sea and air the average air temperature near the earth's surface shows a lot of variability (20). One major cause is the increased emission of carbon dioxide gas which is rise the world temperature. Most effect of global warming is the changes in sex ratios in animals. 2.5-degree celcius temperature represents about half an 'ice-age' in terms of climatic change, considered a very rapid change.
- 5) **Gaseous Emission-** The earth absorbs heat energy of sunshine mainly at the surface to maintain a steady temperature a balancing amount of energy\*is then radiated upwards from the surface at longer, infrared, wavelength. Some of the gases in atmosphere which are present naturally, mainly, water vapour, carbon dioxide and methane absorbs of this infrared radiation so acting as 'Blankets' over the surface (19). A reduction in pH will have impacts on the entire oceanic system, with high latitude cold water oceans than warm water oceans. The fact that increased Co2 affects species differentially means that it is likely to drive substantial changes in the species composition and dynamics of all terrestrial and aquatic ecosystem (13).
- 6) **Effects on marine and estuarine environment-** Climatic change may results in sea level rise, water temperature increase and deviations from present wind and water circulation. Estuaries may loss of breeding areas disturbance of marine waters and associate organisms, changes in circulation models that affect maintenance of some native species.
- 7) **Increased rate of evaporation-** The gradually rise in earths temperature leading into water evaporation. The serious problem due to the unregulated human interferences in the nature. There will be more common more floods or droughts (13) cause more mortalities, catastrophes and economic collapse than any other type of disaster. Any increase in their occurrence could be the most destructive impacts of global climatic changes.

### Conclusions and Challenges:

Climatic change is predicted to have wide range on aquatic ecosystem many aquatic species to be under the category of endangered, threatened or extinct species was mainly motivated by the devastating impact of global climatic changes. Sea level rise with the coastal erosion, increase in ocean acidification is a detrimental factor for the large number of fishes. Global warming affects the sex ratio among the marine animals. Thereby, there is an urgent need for policy integration throughout government sectors as coastal planning, river basin management agriculture, fisheries and health where climate change risks react.



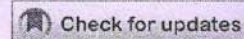
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(RESEARCH ARTICLE)



## Algal flora of sugarcane fields in paundul area of shirur kasar taluka in beed district (M. S.) India

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### Abstract

In Paundul area Narayangad Dam is constructed on Eidrupa river which is tributary of Sindphana river. The major crops in the Beed districts are Sugarcane, Cotton, Soybean, Wheat, Jawar, Bajara, Tur and Udied bean. The Sugarcane is most important cash crop of study area. The present investigation was carried out during the period of March 2022 to December 2022 and rivals that the algal flora sugarcane fields of Paudul area are very rich infancy. A total of 50 algal taxa were encounter under 24 genera belongs to three classes Cyanophyceae 31 species of 15 genera Fowled by Cholorophyceae 12 taxa of 7 genera and Bacillariophyceae 7 species of 4 genera.

**Keywords:** Sugarcane; Narayangad dam; Bacillariophyceae; Eidrupa

### 1 Introduction

The Beed is one of the most important district of Marthwada region situated at north latitude 18°28" and 19°28" and east longitude between 74°48" and 76°45". The main source of water is Godavari, Manjra, Sindphana and Sina rivers and dams on same rivers and its tributaries. The major crops in the Beed districts are Sugarcane, Cotton, Soybean, Wheat, Jawar, Bajara, Tur and Udied bean. In Paundul area Narayangad Dam is constructed on Eidrupa river which is tributary of Sindphana river. The major crop of study area is Sugarcane and no reports on soil algal flora of Paundul area hence we decide work algal flora of Sugarcane fields in Paundul Area of Shirur Kasar Taluka in Beed district (M. S.) India.

### 2 Material and methods

Algal samples were collected from moist soil surface of sugarcane fields at monthly intervals in acid washed bottles. After collection, algal samples were brought immediately to the Laboratory. The algal samples were preserved in 4% formalin for further taxonomic investigations. The sun dried soil samples were also collected for their algal components in order to culture by petri plate method. 1 gram of pulverized soil was poured and spread uniformly into the petri plates cantoning agarized bolds basal medium (Bold 1942). Liquid nutrient medium was poured into plated at the time of keeping for incubation and frequently supplemented for the same. The petri plates incubated under the UV tube lights in algal culture chamber. The growth algal colony and preserved sample observed under the microscope and identified with standard literature on algae (Prescott 1951, Desikachary 1959, Sarode and Kamat 1984, Scott and Prescott 1961).

### 3 Results and discussion

The present investigation was carried out during the period of March 2022 to December 2022 and rivals that the algal flora sugarcane fields of Paudul area are very rich infancy. A total of 50 algal taxa were encounter under 24 genera

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belongs to three classes Cyanophyceae 31 species of 15 genera followed by Chlorophyceae 12 taxa of 7 genera and Bacillariophyceae 7 species of 4 genera (Table 2 and Graph 1). Similar kind of observation made by Gadewar and Lambat 2011 observed the Xanthophyta is represented by single genus while three genus in Euglenophyta and 04 genus in Bacillariophyta. This shows that Cynophyceae members are dominant in the cultivated fields. Out of the 87 spp of algal forms 21 spp of Cynophyceae member is nitrogen fixing forms. Only 16 spp were found in regularly cultivating sugarcane field. Out of the 16, 10 were of Cynophyceae member, 03 Chlorophyceae members, 01 Xanthophyceae member and 02 Bacillariophyceae members. Wagh S.G. and Jadhav M.J. 2017 observed that a total 33 species under the 19 genera belongs to Chlorophyceae, Bacillariophyceae and Cyanophyceae. Yadav 2022 studied soil algal flora of sugarcane field of Renapur tehsil a total of 166 algal forms were identified from the soils of Renapur tehsil in which 91 belongs to Cyanophyceae, 65 forms to Chlorophyceae and 10 forms belongs to Bacillariophyta. Among the 166 forms of Cyanophyceae belongs to 27 genus, while the Chlorophyceae represented by 26 genus and the Bacillariophyceae is represented by its 10 genus.

**Table 1** Algal taxa of Sugarcane fields in Paundul Area of Shirur Kasar Taluka in Beed district of Maharashtra

Sr. No.	Name of Algal Taxa	Sr. No.	Name of Algal Taxa
Chlorophyceae		6.	<i>Aphanocapsa nivalis</i>
1.	<i>Chlamydomonas mucicola</i>	7.	<i>Oscillatoria acuminata</i>
2.	<i>Chlorococcum humicola</i>	8.	<i>Oscillatoria acuta</i>
3.	<i>Ankistrodesmus falcatus</i>	9.	<i>Oscillatoria obscura</i>
4.	<i>Scenedesmus arcuatus</i>	10.	<i>Oscillatoria princeps</i>
5.	<i>Scenedesmus dimorphus</i>	11.	<i>Oscillatoria salina</i>
6.	<i>Protococcus viridis</i>	12.	<i>Oscillatoria tenuis</i>
7.	<i>Oedocladium indicum</i>	13.	<i>Phormidium abronema</i>
8.	<i>Oedogonium acerosum</i>	14.	<i>Phormidium bohneri</i>
9.	<i>Closterium acerosum</i>	15.	<i>Phormidium jenkeliianum</i>
10.	<i>Closterium acutum</i>	16.	<i>Phormidium molle</i>
11.	<i>Closterium venus</i>	17.	<i>Phormidium tenue</i>
12.	<i>Cosmarium granatum</i>	18.	<i>Lyngbya allorgei</i>
Bacillariophyceae		19.	<i>Lyngbya hieronymusii</i>
1.	<i>Synedra affinis</i>	20.	<i>Lyngbya lachneri</i>
2.	<i>Navicula clavata</i>	21.	<i>Lyngbya martensina</i>
3.	<i>Navicula grivillei</i>	22.	<i>Symploca muscorum</i>
4.	<i>Cymbella cymbiformis</i>	23.	<i>Microcoleus acutissimus</i>
5.	<i>Nitzschia dissipata</i>	24.	<i>Microcoleus subtorulosus</i>
6.	<i>Nitzschia gracilis</i>	25.	<i>Nostoc commune</i>
7.	<i>Nitzschia vermicularis</i>	26.	<i>Nostoc linckia</i>
Cyanophyceae		27.	<i>Plectonema gracillimum</i>
1.	<i>Microcystis stagnales</i>	28.	<i>Plectonema tomasinianum</i>
2.	<i>Chroococcus minor</i>	29.	<i>Scytonema hofmanni</i>
3.	<i>Gloeotheca palea</i>	30.	<i>Microchacte tenera</i>
4.	<i>Gloeotheca samoensis</i>	31.	<i>Calothrix marchica</i>
5.	<i>Aphanothece nidulans</i>		



Table 2 Class wise percentage composition of Algal taxa in Sugarcane fields of study area.

Class	Genera	Species	% Composition
Chlorophyceae	07	12	24
Bacillariophyceae	04	07	14
Cyanophyceae	15	31	62
Total	26	50	100

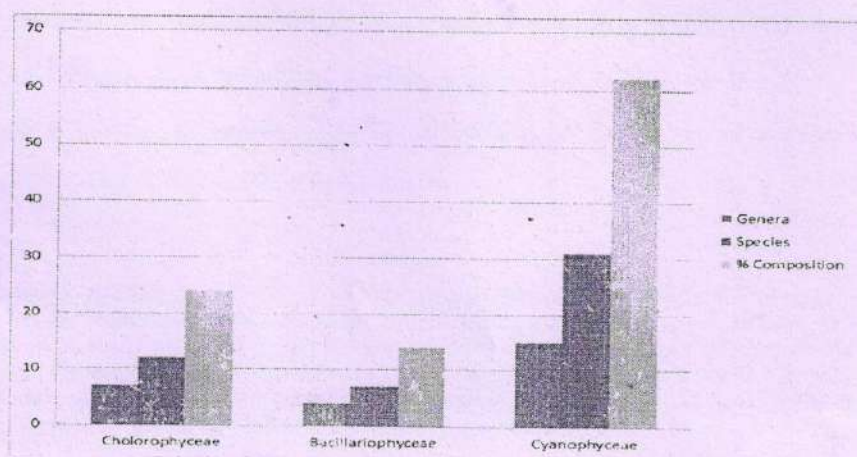


Figure 1 Class wise abundances and percentage composition of Algal taxa in Sugarcane fields of study area

#### 4 Conclusion

The present investigation is beneficial to know the algal flora of sugarcane fields. The dominance of cyanobacteria indicates health of soil and heterocyst's bearing cyanobacteria are the nitrogen fixing bacteria are beneficial to the sugarcane yield.

#### Compliance with ethical standards

##### Acknowledgments

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## Effect of chemical and physical mutagens on pollen sterility in Horse gram (*Macrotyloma uniflorum* (Lam.)

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### Abstract:

In present investigation effect of ethyl methane sulphonate (EMS), sodium azide (SA) and Gamma rays on pollen fertility were studied in two horse gram (*Macrotyloma uniflorum* (Lam.) Verde) cultivars namely; Phule Sakas and Man. The effect of all mutagenic treatments on pollen sterility increased with increase in dose of three mutagens irrespective of the genotype. The pollen sterility of control plants was 4.25% in Phule Sakas and 6.56% in Man both the Horse gram cultivars.

Increasing trend of pollen sterility with increasing concentrations/doses of all the mutagens could be noticed in both the varieties. Maximum pollen sterility was induced by Gamma rays 10kR treatments in Phule Sakas and EMS 0.15% treatments in MAN.

**Key words:** Horse gram, pollen sterility, EMS, SA and Gamma rays.

### Introduction

Horse gram belongs to family *Fabaceae* is a potential grain legume having excellent nutritional and remedial properties with better climate resilience to adapt harsh environmental conditions (Kumar, 2007). It is one of the most important unexploited food legumes being grown in almost all over the world including temperate and sub-tropical regions encompassing the countries in East and Northeast Africa, Asian countries particularly, India, China, Philippines, Bhutan, Pakistan, Sri Lanka and Queensland in Australia (Durga, 2012; Krishna, 2010).

Horse gram has long history as traditional medicine to cure many diseases, still it is neglected for its remedial potential. As per *Charak Samhita*, the seed of horse gram are useful for the cure of piles, hiccup, and abdominal lump, bronchial asthma, in causing and regulating perspiration and in the *Sushruta Samhita* it is mentioned that the seed powder is useful in stopping excessive perspiration.



Improvement in either single or few economic traits and quality characters can be achieved with the help of induced mutations within the shortest possible time (Manjaya and Nandanwar, 2007). Induced mutation is a powerful tool of creating new and useful variability for qualitative and quantitative traits (Senapati *et al.*, 2008). Grain legumes found to be well suited for genetic improvement through mutation breeding. Improvement in nutritional quality of some legume was attempted through mutation.

### Material and Methods

The experimental seeds of horse gram (*Macrotyloma uniflorum* (Lam.) Verdc) cultivar two varieties namely; Phule Sakas and Man were obtained from Mahatma Phule Krishi Vidyapeeth, Rahuri Dist: Ahmednagar (M.S.) India. Both the varieties were released from AICRP on DLA, Solapur and Mahatma Phule Krishi Vidyapeeth Rahuri, Ahmednagar MS.

For present investigation the 300 seeds from each variety were treated with chemical and physical mutagens with different concentrations/Doses. The seeds sown in field following randomized block design (RBD), with three replications along with controls for raising the  $M_1$ -generation. The distance between two rows and two plants was 30 X 15 cm and the distance between two adjacent plots was one meter.

Pollen sterility was determined from 10 randomly selected plants per treatment, along with control. The pollen grains from freshly dehiscent anthers were stained with acetocarmine (1%). Pollen grains stained as uniform deep red colour was counted as fertile and others as sterile.

### Result and Discussion

#### Pollen sterility (Table.01-02)

In present study the effect of EMS, SA and Gamma rays treatments on pollen sterility increased with increase in dose of three mutagens irrespective of the genotype. The pollen sterility of control plants was 4.25% in Phule Sakas and 6.56% in Man both the Horse gram cultivars.

In EMS mutagenic treatments, pollen sterility values were found to be 10.31%, 14.29% and 31.64% in Phule Sakas variety, while 7.91%, 17.97% and 33.18% sterility values could be recorded in Man at 0.05%, 0.10% and 0.15% concentrations respectively.

In SA mutagenic treatments, pollen sterility values found 12.76%, 17.94% and 31.15% in Phule Sakas, while 8.64%, 21.54% and 31.56% in Man at 0.02%, 0.04% and 0.06% concentrations respectively.

In case of Gamma rays treatments, the pollen sterility values were found 8.70%, 17.32 and 33.50% in Phule Sakas and from 8.27%, 21.28 and 31.66 % in Man at 10kR, 20kR and 30kR doses respectively.

The variety Man has been noted as more sensitive to the all three mutagens as compared with Phule Sakas. Less induction of pollen sterility could be recorded in Man varieties in EMS 0.05% treatments as compared to SA and Gamma rays. Lowest sterility (7.91%) was recorded in Man varieties in EMS 0.05%. As compared to Phule Sakas, maximum induction of pollen sterility could be detected (33.50%) in 10kR dose in variety Phule Sakas.



Increasing trend of pollen sterility with increasing concentrations/doses of all the mutagens could be noticed in both the varieties. Maximum pollen sterility was induced by Gamma rays 10kR treatments in Phule Sakas and EMS 0.15% treatments in MAN.

A gradual decrease in pollen fertility percentage was reported earlier in *Vigna radiata* and in *Lens culinaris* (M. R. Wani and S. Khan, 2003), in *horse gram* (Kulkarni Ganesh, 2011) and in pigeon pea (Sangle Sunil *et.al.*, 2011). EMS has been reported to reduce the reproductive capacity of the plants. The sterility of the pollen may be due to physiological and genetic changes or may be due to meiotic aberrations.

**Table: 01.** Effect of mutagens on pollen sterility in  $M_1$  generation of Horse gram (*Macrotyloma uniflorum* (Lam.) Verde). Variety: Phule Sakas

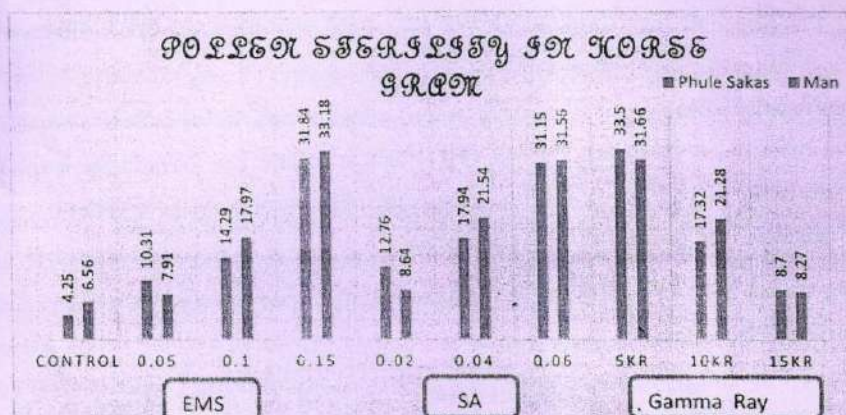
Treatment	Concentration / Dose	Pollen sterility	+SE
Control	Control	4.25	0.45
EMS (%)	0.05	10.31	1.55
	0.10	14.29	1.46
	0.15	31.84	1.12
SA (%)	0.02	12.76	0.87
	0.04	17.94	1.03
	0.06	31.15	3.30
Gamma rays	5kR	33.50	1.31
	10kR	17.32	0.95
	15kR	8.70	0.32

**Table: 02.** Effect of mutagens on pollen sterility in  $M_1$  generation of Horse gram (*Macrotyloma uniflorum* (Lam.) Verde). Variety: Man

Treatment	Concentration / Dose	Pollen sterility	+SE
Control	Control	6.56	1.24
EMS (%)	0.05	7.91	0.81
	0.10	17.97	1.77
	0.15	33.18	2.59
SA (%)	0.02	8.64	0.96
	0.04	21.54	3.21
	0.06	31.56	3.42
Gamma rays	5kR	31.66	0.97
	10kR	21.28	2.15
	15kR	8.27	1.60



Graph: Effect of mutagens on pollen sterility in  $M_1$  generation of Horse gram (*Macrotyloma uniflorum* (Lam.) Verdc)



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## INTERNATIONAL JOURNAL OF CURRENT SCIENCE (IJCSPUB)

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### Systematic Enumeration of some selected Algae

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#### ABSTRACT

The geographical location of Beed district is north latitude  $18^{\circ}28''$  and  $19^{\circ}28''$  and east longitude between  $74^{\circ}48''$  and  $76^{\circ}45''$  with many water bodies like river, dams and lakes. Algae are the most important autotrophic element of water ecosystem. The present study reveals that the systematic enumeration of some selected algal taxa during the period of June 2022 to December 2022 viz. *Chara excels*, *Ulothrix zonata*, *Spirogyra subsalsa*, *Hydrodictyon reticulatum* and *Nostoc punctiforme*, *Gloeotrichia intermedia*.

**Keywords:** Longitude, Latitude, Autotrophic and Ecosystem.

#### INTRODUCTION

The Beed district is situated flanked by Aurangabad and Jalna districts in the north, Parbhani in the east, Latur in the south east, Osmanabad in in south and Ahmednagar district in the west and southwest. It is bounded by north latitude  $18^{\circ}28''$  and  $19^{\circ}28''$  and east longitude between  $74^{\circ}48''$  and  $76^{\circ}45''$ . The major part of the district comes under Godavari basin. Godavari, Manjra, Sindphana and Sina are the major rivers that drain the district along with their tributaries.

Ecologically Algae plays an important role as food source, indicator for pollution, used to make fertilizers and source of oxygen. The algae are source of food for fishes and aquatic animals and also it contain a high concentration of nutrients to make fertilizer. The minerals found in algae are also very beneficial to create flame-resistant plastics and artificial fibers. Algae can also be used to create medicines. As a result, algae are not only ecologically significant but also economically significant. Algae are present in different habitats such as aquatic algae (water), terrestrial algae (land) and they also grow as an epiphyte, endophyte. The present research work represents systematic enumeration of some selected algae during the period of June 2022 to December 2022. The selected algae are used for further research to study the role of algae as a fertilizer to observe the productivity, yield, seed quality and nutrients in the Black Gram (*Vigna Mungo* (L.) HEPPER).



## MATERIAL AND METHOD

The sample of algae were collected randomly from different locations from Beed districts i.e. Sautada area. Patoda area Majara river, Pali area Bindusara river, Mahasagvi Dam outlet Manjara Dam Dhanegaon, Bindusara river Beed City and Narayngad area in acid wash collection bottles. All the collected samples were brought to laboratory. Algae sample was preserved in 4% formalin. The specimens were observed directly under the microscope and picture are clicked by digital camera. The identification of the Algae was made with the help of Prescott 1951, Desikachary 1959.

## SYSTEMATIC ENUMERATION

### *Chara excelsa* Allen

Prescott 1951, Pl. 81, Figs. 7-10, P.338

Plants 6-14 cm. high; stems bearing 7-8 leaves and a double whorl of stipulodes of which the upper row is longer than the lower; cortication of the internode diplostichous, the primary cortical cells larger and more prominent than the secondary laterals; 2-3 cells at the tip of the leaves uncorticated, sex organs monoecious, produced on the same node, oogonia 0.8-1.5 mm. long, investing cells showing 7-10 turns; bracts subtending the oogonium longer than the fruit; antheridia 0.32-0.35 mm. in diameter.

**Habitat:** Narayngad area.

### *Ulothrix zonata* (Weber & Mohr)

Prescott 1951, Pl. 6, Fig. 14, P. 97

Filaments attached, usually long, variable in diameter in the same plant mass. Cells elongate-cylindric, slightly swollen, with constrictions at the cross walls. Cell walls thick, especially near the base of the filament. Cells 20-45, in diameter, 21-60 $\mu$  long. Chloroplast a complete circular band in the mid region of the cell, with several pyrenoids.

**Habitat:** Mahasagvi Dam outlet.

### *Spirogyra subsalsa* Kuetzing

Prescott 1951, Pl. 73, Figs. 1-3, P.321

Filaments of slender cells 26-28 $\mu$  in diameter, 35-148 $\mu$  long, with plane end walls; chloroplast solitary, Conjugation by tubes from both gametangia; fertile cells becoming slightly swollen. Zygospores ellipsoid; median spore wall wrinkled, irregularly reticulate, and brown; 18-35 $\mu$  in diameter, 30-59 $\mu$  long.

**Habitat:** Pali area Bindusara river.

### *Hydrodictyon reticulatum* (L.) Lagerheim

Prescott 1951, PL. 47, Fig. 1, P.219

The cells up to 200 $\mu$  in diameter, as much as 1 cm. long when fully enlarged, forming a net up to 2 dm. in length; chloroplast a much diffused reticulum, light yellow-green color in the plant mass, especially at maturity. The plant which prefers quiet water and is found in lakes where there is little wave action. Its rapid rate of reproduction (daughter nets formed within each cell of the parent net) makes it possible for *Hydrodictyon* to develop luxuriant growths in favorable habitats. Thick floating mats often result. In some



sections it becomes an obnoxious weed, clogging filters, drains, etc. It is so definitely confined to hard water that it may be used as an index organism for a high pH.

**Habitat:** Patoda area Majara river.

***Arthrospira platensis* (Nordst.) Gomont**

Desikachary 1959, Pl. 35, Fig. 2, P.190

Thallus blue green; trichomes slightly constricted at the cross-walls, 6-8  $\mu$ m broad, not attenuated at ends more or less regularly spirally coiled; spirals 26-36  $\mu$ m broad, distances between the spirals 43-57  $\mu$ m; cells nearly as long as broad, 2-6  $\mu$ m long, cross walls granulated; end-cells broadly rounded.

**Habitat:** Bindusara river Beed City.

***Nostoc punctiforme* (Kütz.)**

Desikachary 1959, Pl. 69, Fig. 1, P.374

Thallus sub-globose up to 2 mm diam., scattered or confluent, attached; filaments flexuous, densely entangled; sheath delicate, hyaline, mucous; tri-chome 3-4 broad, cells short barrel-shaped or ellipsoidal, blue-green; heterocysts 4-6.5  $\mu$  broad; spores subspherical, or oblong, 5-6 broad and 5-8 long, episore thick and smooth, heterocysts 2.6 broad, spore subspherical 3.9-6.6  $\mu$  diam.

**Habitat:** Sautada area.

***Gloeotrichia intermedia* (Lemm.) Geitler**

Desikachary 1959, Pl. 116, Fig. 8, P.560

Thallus spherical, soft, 3-7 mm diam., filaments less densely packed, slightly pressed together; sheath close to the trichome, colourless; trichome ending in a hair which is many times coiled or bent 5.5-8  $\mu$  broad; cells longer than broad, seldom quadrate, blue-green; heterocysts spherical or elongate, usually single, rarely in pairs, 8.6-11.5  $\mu$  long; spores cylindrical, with smooth outer walls, with sheath 14-17  $\mu$  broad, without sheath 12-15  $\mu$  broad, 55-66  $\mu$  long, sheath 0.8-1  $\mu$  thick.

**Habitat:** Manjara Dam Dhanegaon .

## DISCUSSION

The systematic enumeration and taxonomic study of algal taxa were made by several earlier researches; Astekar 1980 systematically studied 670 algal taxa , Magar 2008 reported systematic account of 364 algal taxa from girna dam of Nashik district, Andhale 2008 recorded 215 species of algae and made there systematic account from Jayakwadi Bird Sanctuary Paithan tehsil of Aurangabad district and Talekar 2009 encounter 205 algal taxa under 72 genera and made their characterization from Manjara river and its reservoir from Beed district of Maharashtra.



## CONCLUSION

The present investigation of algal taxa is useful for the further research in biotechnology and agricultural researches. The purpose of research work for the study role of algae as a fertilizer to observe the productivity, yield, seed quality and nutrients in the Black Gram (*Vigna Mungo* (L.) HEPPER).

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## PLATE 1



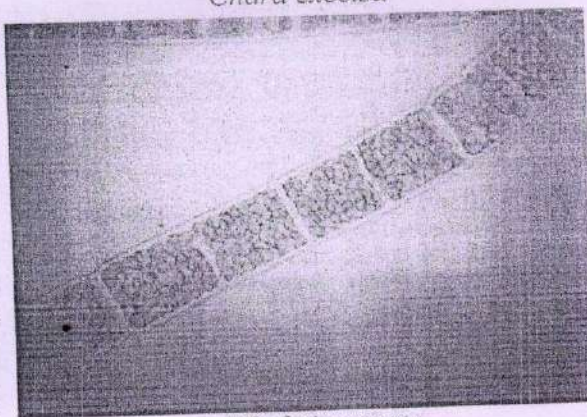
Habitat of *Chara excelsa*



*Chara excelsa*



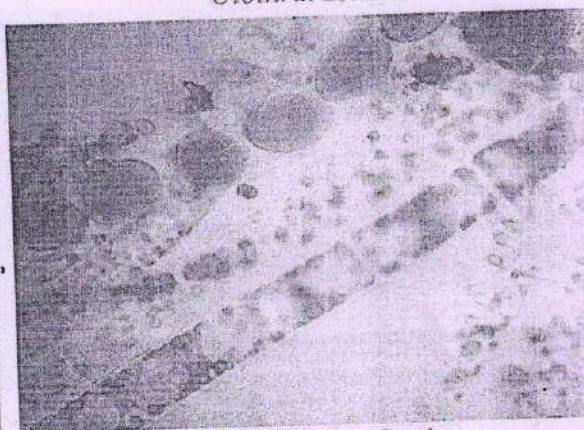
Habitat *Ulothrix zonata*



*Ulothrix zonata*



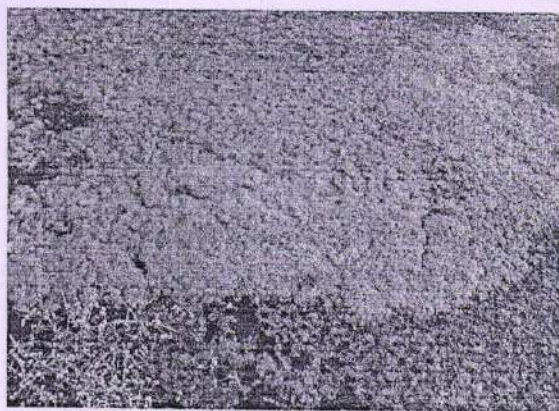
Blooms of *Spirogyra subsalsa*



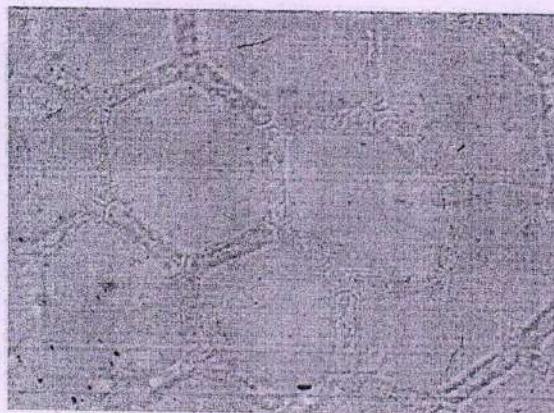
*Spirogyra subsalsa*



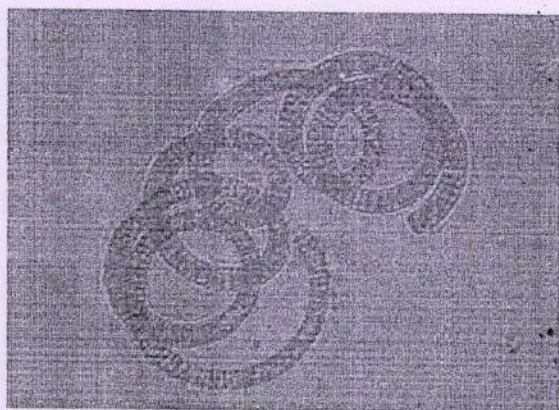
## PLATE 2



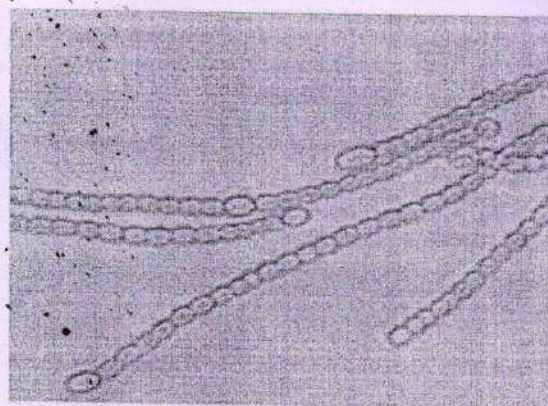
Matta of *Hydrodictyon reticulatum*



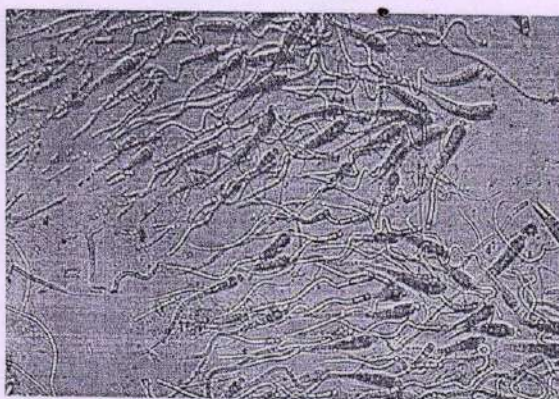
*Hydrodictyon reticulatum*



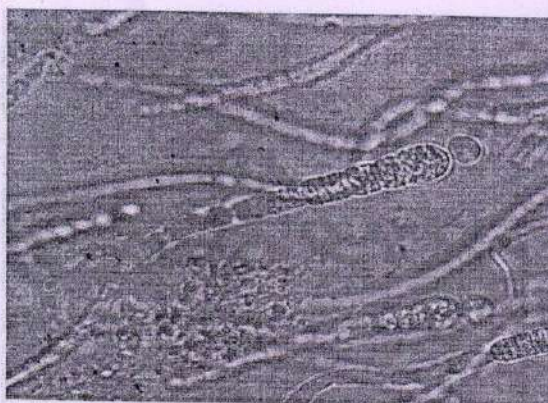
*Arthrospira platensis*



*Nostoc punctiforme*



Colony of *Gloeotrichia intermedia*

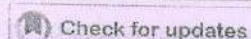


*Gloeotrichia intermedia*





(RESEARCH ARTICLE)



## Anthracnose intensity and per cent pod infection of cowpea in Beed district

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### Abstract

The importance of pulses has been realized due to their high protein, better nutritional food, and fodder and soil enrichment qualities. Pulses have been considered as an integral part of our diet from time immemorial and have also found their reference in ancient scriptures such as Puranas and Mahabharata. The major fungal diseases of cowpea anthracnose caused by *Colletotrichum destructivum*. In this study all the botanicals, bioagents and fungicides tested against anthracnose disease of cowpea during Kharif 2013 and Kharif 2014 were found effective and significantly reduced the mean disease intensity and pod infection over unsprayed control. Anthracnose intensity and pod infection slightly increases in Kharif 2014 as compared to Kharif 2013.

**Keywords:** Colletotrichum; Cowpea; Bioagents; Anthracnose

### 1. Introduction

India is an agriculture-based country and its growth, development and economy mainly depends upon agriculture. Presently, contribution of agriculture about one third of the national GDP (Gross Domestic Product) and provides employment to over 70 % of Indian population in agriculture and related activities. The importance of pulses has been realized due to their high protein, better nutritional food, and fodder and soil enrichment qualities. In India during 2013-2014 total area under pulses is about 25.2 million ha with total production of 19.3 million tonnes and average yield about 764 kg/ha (Anonymous 2014-2015).

The various pulses grown in India, Cowpea (*Vigna unguiculata* (L.) Walp) is an important vegetable pulses crop and is popularly known as 'Chowli'. It probably originated in Asia, Africa and even South America. Central Africa is considered to be the original home of cowpea plant. Vavilov (1949) considered India is the main center of origin of this crop. The major fungal diseases of cowpea anthracnose caused by *Colletotrichum destructivum* is one of the most destructive diseases of cowpea that cause a great reduction in cowpea yield (Allen et al. 1998, Latunde-Dada et al. 1999). In India the disease was first reported by Prassana (1985). The pathogen attacks on all aerial parts of plant and symptoms usually appear in the form of irregular brown sunken lesions on leaves, lesions merging to girdle stems and petioles. If conditions are ideal, disease development is rapid causing severe economic losses up to range from 40 to 50 % (William 1975).

### 2. Material and methods

The survey was conducted in cowpea growing areas during Kharif 2013 and 2014 in the eleven tahsils of Beed district viz. Beed, Georai, Majalgaon, Parali, Ambajogai, Kaij, Dharur, Wadwani, Shirur (Ka), Patoda and Ashti to know anthracnose intensity and pod infection. Observations on anthracnose intensity were recorded on ten randomly selected cowpea plants per field survey, applying standard 0-9 grade disease rating scale where, 0 = No infection, 1 = 1-10 % infection, 3 = 11-25 % infection, 5 = 26-50 % infection, 7 = 51-75 % infection and 9 = > 75 % infection before

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harvesting given by Mayee and Datar (1986). Based on numerical ratings or scale observed per cent disease intensity (PDI) was calculated by using following formula given by McKinney (1923).

### 3. Results and discussion

Results revealed that all the botanicals, bioagents and fungicide tested against anthracnose disease of cowpea during Kharif 2013 and 2014 were found effective and significantly reduced the mean disease intensity and pod infection as compared to control. Among botanicals tested (at 10 %), Neem was found most effective and recorded least mean disease intensity and pod infection 22.24 and 16.65 % in Kharif 2013 and 24.34 and 23.60 % in Kharif 2014, respectively and there by caused highest reductions in the mean disease intensity and pod infection to the tune of 46.42 and 57.66 % in Kharif 2013 and 47.33 and 50.17 % in Kharif 2014 respectively over unsprayed control. Drumstick was found comparatively least effective and recorded highest mean disease intensity and pod infection 31.31 and 32.72 % in Kharif 2013 and 33.38 and 39.56 % in Kharif 2014, respectively and there by caused lowest reductions in the mean disease intensity and pod infection to the tune of 19.96 and 16.68 % in Kharif 2013 and 25.72 and 16.44 % in Kharif 2014, respectively over unsprayed control.

Among bioagents tested (at 0.5 %), *T. harzianum* was found most effective and recorded least mean disease intensity and pod infection 22.78 and 18.34 % in Kharif 2013 and 26.58 and 25.58 % in Kharif 2014, respectively and there by caused highest reductions in the mean disease intensity and pod infection to the tune of 44.57 and 53.32 % in Kharif 2013 and 42.15 and 45.97 % in Kharif 2014, respectively over unsprayed control. Whereas, *P. fluorescens* was found comparatively least effective and recorded highest mean disease intensity and pod infection 26.69 and 24.87 % in Kharif 2013 and 31.72 and 35.66 % in Kharif 2014, respectively and there by caused lowest reductions in the mean disease intensity and pod infection 34.24 and 36.66 % in Kharif 2013 and 29.83 and 24.67 % in Kharif 2014, respectively over unsprayed control.

The treatment of fungicide (Carbendazim 12% + Mancozeb 63 %) tested (at 0.1%) was found comparatively more effective than the botanicals and bioagents in respect of reducing the disease intensity and pod infection as compared to unsprayed control. Carbendazim 12% + Mancozeb 63 % (at 0.1%) was recorded least mean disease intensity and pod infection 20.53 and 13.55 % in Kharif 2013 and 21.56 and 15.41 % in Kharif 2014, respectively and there by caused highest reductions in the mean disease intensity and pod infection to the tune of 50.42 and 65.45 % in Kharif 2013 and 53.79 and 67.67 % in Kharif 2014, respectively over unsprayed control.

**Table 1** Tahsilwise anthracnose intensity (PDI) and per cent pod infection (PPI) of cowpea in the tahsils of Beed district during Kharif 2013 and 2014

Tahsils of Beed District	No. of Locations	Anthracnose intensity(PDI)		Per cent pod infection(PPI)	
		Kharif 2013	Kharif 2014	Kharif 2013	Kharif 2014
Beed	5	28.77	36.38	32.51	39.10
Georai	4	28.35	31.90	32.00	34.68
Majalgaon	5	34.30	31.58	37.67	34.60
Parali	3	34.12	35.35	36.72	38.72
Ambajogai	5	30.82	37.01	35.16	39.52
Kaij	3	35.17	31.22	38.71	33.79
Dharur	5	32.34	24.32	36.05	27.15
Wadwani	4	29.70	37.07	33.20	41.11
Shirur (K)	3	33.62	42.32	36.32	45.34
Patoda	5	27.44	23.30	30.79	27.00
Ashti	4	26.10	36.30	29.75	39.00
Mean (%)	46.00	30.97	33.34	34.44	36.36



Thus all the botanicals, bioagents and fungicides tested against anthracnose disease of cowpea during Kharif 2013 and Kharif 2014 were found effective and significantly reduced the mean disease intensity and pod infection over unsprayed control. But anthracnose intensity and pod infection slightly increases in Kharif 2014 as compared to Kharif 2013 (Table 1 and Graph 1). Efficacy of botanicals, bioagents and fungicides in controlling anthracnose disease of cowpea were reported earlier by several workers (Obi 1991, Emechebe and Florini 1997, Awurum et al. 2005, Enyiukwu and Awurum 2012 and Mogle 2013).

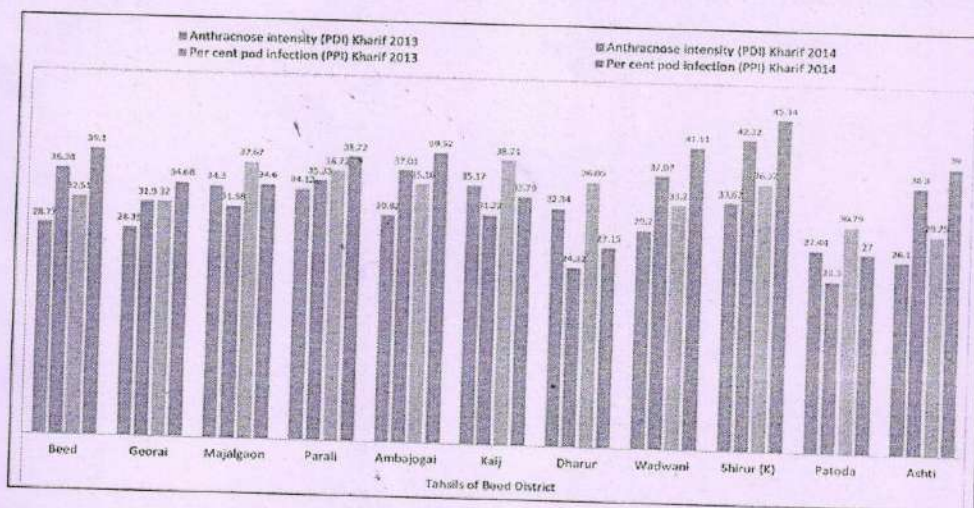


Figure 1 Tahsilwise anthracnose intensity (PDI) and per cent pod infection (PPI) of cowpea in the tahsils of Beed district during Kharif 2013 and 2014

#### 4. Conclusion

The present research work is very useful to increase the productivity and yield of cow pea through bio-control of the botanicals and bio-agents tested against anthracnose disease of cowpea. This applications are useful to increase the economy and cost benefit ratio to the regular agricultural activity for cowpea production.

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## RESEARCH PAPER IN BOTANY

## Abstract:

*Sclerotium rolfsii* Sacc, the most destructive phytopathogen of many plants belonging to different families. The *Sclerotium* resting structures can survive for long period in critical atmospheric conditions. Chemical control of pathogen of Stem Rot disease can provide certain degree of control but it also has side-effects on beneficial soil micro-organisms, human health and environment. The use of fungal biological control agents is a promising strategy developing in recent years. Specifically, *Trichoderma* is commonly used as the biological control agent against variety of phytopathogen including *S. rolfsii*. *Trichoderma* spp carries mycoparasitism, antibiosis, induced resistance against pathogen and competing it for nutrients and space to blocks the growth of *Sclerotium rolfsii*. These *Trichoderma* spp. *T. amazonicum*, *T. taxi*, *T. evansii*, *T. martiale*, *T. theobromicola*, and *T. stromaticum* are known to have good impact on the phytopathogens.

**Keywords:** *Trichoderma* spp, *Sclerotium rolfsii* Sacc, bio-control agent.

## Introduction:

*Sclerotium rolfsii* Sacc is the most destructive pathogen of plants. Resting structures of *Sclerotium* (Sclerotia) are capable of sustaining the adverse environmental conditions such as high and low temperature. In India, among the soil borne fungal diseases, diseases caused by *Sclerotium rolfsii* are potential threats for the various crops.

*Sclerotium rolfsii* is especially severe on legumes, Solanaceous plants, cucurbits and other vegetables grown in rotation with beans (Hall, 1991). The fungus affects nearly 500 plant species comprising Composite and Leguminosae, Gramineous species are less susceptible (Mehen *et al.* 1995).

Traditional control measures for *Sclerotium rolfsii* are the use of chemical fungicides which has ill-effects on the soil micro-organisms, human health and environment. Due to excessive use of chemical fungicides, the beneficial micro-organisms present in soil are also affected and ultimately it shows the effect on health of soil fertility also.

To deal with these adverse effects of chemical fungicides, the use of biological control agents is a good strategy now a days. *Trichoderma* spp. are known to possess the fungal biocontrol agent property. *Trichoderma* is also a growth promoter for plants.

**Biological control of phytopathogen using *Trichoderma* species:**

*Trichoderma* species are one of the most promising fungal antagonists being extensively used in disease suppression and act as effective antagonist against various soil borne pathogens (Chet *et al.*, 1991; Singh *et al.*, 2009; Ram and Singh 2017). They are primary producers of cell-wall-degrading enzymes which target pathogenic fungi, the phenomenon that makes them best suited for biological control in agriculture (Woo *et al.*, 2006). The *Trichoderma* spp. parasitizes phytopathogenic fungi through antibiosis, mycoparasitism, competition for nutrients, and induction of resistance. Moreover, it leads to the production of various secondary metabolites which aid in disease resistance against phytopathogens. These prominent features make them the most popular fungal biocontrol agent.

The biocontrol capability of *Trichoderma* was first reported by Weindling (1932), who studied the role of *T. lignorum* in the biocontrol of *Rhizoctonia solani*, causing disease in citrus seedlings. From this pioneer work, several literatures have reported on successful biocontrol by *Trichoderma* spp. Among different species of *Trichoderma*, *T. harzianum*, *T. virens*, and *T. viride* are the most popular ones exhibiting biological control (Singh *et al.*, 2009). They efficiently control root rots/wilt and foliar diseases in a wide range of crops and are antagonistic to a number of soil borne fungi like *Pythium*, *Phytophthora*, *Sclerotinia*, *Sclerotium*, *Rhizoctonia*, *Fusarium*, *Macrophomina*, etc. and even the root knot nematode *Meloidogyne* spp. The first report on its mycoparasitism ability was made by Cole-Smith *et al.* (1971), who through microtome sections demonstrated that medulla of infected sclerotia of *Sclerotium*

*delphintii* was wholly replaced by hyphae of *T. hamatum* on agar plates. Likewise, Henis *et al.*, (1978) reported mycoparasitism of *Trichoderma* spp. against *S. rolfsii*, where within the infected fungal sclerotia chlamydospores were produced abundantly in place of conidia. With passage of time, various *Trichoderma* spp. have been found to demonstrate antagonistic effects against *S. rolfsii* in different crops.

Owing to their inherent property as plant growth promoters and bio control agents, these fungi have been widely studied and commercially marketed as biopesticides, biostimulators, as well as soil amendments (Harman 2000; Lorito *et al.*, 2004; Khan and Mohiddin 2018). Now a days in the market, the commercial products of *Trichoderma* are available in various forms. *Trichoderma*-based products are booming in the agricultural market with more than 250 formulated products registered worldwide, which alone occupy 60% of the bio fungicide market (Singh *et al.*, 2012). All these products are being sold to farmers for disease control and in turn enhance their yield (Woo *et al.*, 2006).

Manjula *et al.*, (2004) evaluated 13 isolates of *Trichoderma* spp. for their antagonistic activity against *Sclerotium rolfsii*. The antagonists were selected based on their ability to inhibit the external growth of *S. rolfsii* from infected groundnut seeds. *T. viride* were identified as potent antagonists of *S. rolfsii*. *T. viride* produced extracellular chitinase and parasitized the mycelium of *S. rolfsii*.

Deng, *et al.*, (2007) isolated endophytic *Trichoderma longibrachiatum* EF5 from rice and demonstrated that *T. longibrachiatum* EF5 inhibits the growth of *S. rolfsii* pathogens by direct interaction as well as via the production of the microbial volatile organic compounds (mVOCs). The mVOCs also reduced mycelial growth and inhibited the production of sclerotia by altering the mycelial structure.

A study conducted by Yaqub & Shahzad, (2008), revealed that the disease of seed rot, damping off, root rot of sunflower and mugbean caused by *Sclerotium rolfsii* was prevented as well as the plant growth was enhanced when plants were treated with the conidial suspensions of *Trichoderma* spp. Similarly, the conidial suspensions of microbial antagonists prepared either in water or 10% sugar solution effectively suppressed root colonization by *S. rolfsii* and significantly enhanced plant growth as compared to control.

**Mechanism of *Trichoderma* bio-control action:**

*Trichoderma* spp. possess different mechanism to control phytopathogens which are as follows

**Mycoparasitism:**

One of the salient features of members of the genus *Trichoderma* is their ability to parasitize other fungi. Mycoparasitism is regarded as one of the most typical mechanisms exhibited by *Trichoderma* species for the management of *Sclerotium rolfsii* (Howell 2003; Vinale *et al.*, 2008). This process involves a chemotrophic growth of the antagonist on the host, followed by attachment and coiling around the pathogen hyphae (Chet *et al.*, 1990; Woo and Lorito 2007). The



breakdown of the hyphal cell walls of *Sclerotium rolfsii* is done by various enzymes, such as chitinases, proteases, and  $\beta$ -1, 3-glucanases (Cruz *et al.*, 1992; Khetan 2001).  $\beta$ -1, 3-glucanases have the ability to degrade the cell wall and inhibit the growth of host mycelium and spore germination (Lin *et al.*, 2007). Proteases usually degrade the cell walls and *Sclerotium rolfsii* hyphal membranes of the host. The mycoparasitic activity of *Trichoderma* has been reported by many researchers against several pathogens (Mustafa *et al.*, 2009; Khan *et al.*, 2011a, b, c; Kotze *et al.*, 2011). Several physiological and biochemical factors facilitate the process of mycoparasitism. Omann *et al.*, (2012) explicated that G-protein-coupled receptor Gpr1 plays an important role in mycoparasitism. Similarly, Kumar *et al.*, (2010) recognized the role of mitogen-activated protein kinase (MAPK) in biocontrol activities. Deletion of the MAPK gene affects the biocontrol potential of *T. virens*, and the mutants were reported to be less efficient (Mukherjee *et al.*, 2012).

#### Antibiosis:

Antibiosis usually refers to the inhibition of targeted phytopathogen by volatile compounds or antibiotics produced by the antagonist (Irtwange 2006; Viterbo *et al.*, 2007; Haggag and Mohamed 2007). Many instances of successful biocontrol by *Trichoderma* species have been credited to the mechanisms of mycoparasitism and/or antibiosis. *Trichoderma* species is one of the several biological control agents producing various types of antibiotics (Lewis *et al.*, 1989; Handelsman and Stabb 1996). Volatile compounds like 6-pentyl-2H-pyran-2-one (6-PP) produced by *T. atroviride* play a vital role in *Trichoderma*-host-pathogen interactions (Lorito *et al.*, 2004). Apart from rhizospheric ones, a few endophytic species of *Trichoderma*, such as *T. amazonicum*, *T. taxi*, *T. evansii*, *T. martiale*, *T. theobromicola*, and *T. stromaticum*, also have biocontrol property and can protect plants from phytopathogens through modulation at omics level (Bailey *et al.*, 2006; Bae *et al.*, 2009; Druzhinina *et al.*, 2011). Not all of *Trichoderma* spp. are registered as biocontrol agents, although they are commercially available as plant growth promoters.

#### Competition:

*Trichoderma* competes with other phytopathogens for space and nutritional requirements (Wells 1988). Competition allows the biocontrol agent to displace the pathogen from the targeted zone. *Trichoderma* spp. shows excellent competition with other fungi for food and nutrients in the rhizospheric zone (Chet *et al.*, 1990; Irtwange 2006). It was reported that *T. viride* displaces *Chondrostereum purpureum*, the silver leaf pathogen of plum trees, by competing for nutrients (Corke and Hunter 1979). Similarly, *T. harzianum* checks the growth of *Fusarium oxysporum* by competing for both nutrients and rhizosphere colonization (Tjamos *et al.*, 1922). *Trichoderma* spp. is known to be an efficient producer of siderophore, which quenches iron from the soil and thus renders it unavailable for the pathogen. It modifies the rhizosphere through soil acidification, which becomes unsuitable for the growth of the target pathogen (Benitez *et al.*, 2004). Apart from iron and zinc, competition for carbon is also a deciding factor in determining the antagonism potential of different strains of *Trichoderma* spp. (Sivan and Chet 1989; Viterbo *et al.*, 2007). Few strains have the ability to colonize their rhizospheric zone throughout their lifetime. In a study, it was found that maize plant treated with *T. harzianum* strain had a twofold increment in root development in comparison with control (Harman *et al.*, 2004). Secondary metabolites such as koniginin A (Ram *et al.*, 2015) and 6-pentyl-alpha-pyrone act as plant growth regulators (Cutler *et al.* 1986, 1989). Whereas, citric and gluconic acids lower soil pH and facilitate solubilization of micronutrients and other mineral components (Harman *et al.*, 2004; Benitez *et al.*, 2004; Vinale *et al.*, 2008).

#### 4. Induced Resistance:

Often to defend plants from pathogenic invasion, biocontrol agents induce local and systemic resistance in host plants to counter the attack of the pathogen. It emerged as a vital tool by which selected

bio control agents build up their defence against a broad range of phytopathogens (Ram *et al.*, 2015). Plants generate induced resistance as a result of an interaction by a pathogen, upon the colonization of the roots by biocontrol agents or even after treatment with a specific chemical (Singh *et al.*, 2012). The first report of induced resistance with *T. harzianum* strain disclosed that on soil treatment, bean leaves were given induced resistance against diseases caused by pathogens such as *B. cinerea* and *C. lindemuthianum* (Bigirimana *et al.*, 1997). Jasmonic acid and ethylene are the principal components of induced systemic resistance. Certain strains of *Trichoderma* penetrate root tissues and induce a chain of biochemical and morphological alterations to trigger resistance responses in the host (Singh *et al.* 2011; Singh *et al.*, 2013b). Induced resistance has been reported to be effective in several monocots and dicots, against infection caused by fungi (*Phytophthora* spp., *R. solani*, *Alternaria* spp., *Colletotrichum* spp., *B. cinerea*, *Magnaporthe grisea*, etc.) and bacteria (*Pseudomonas syringae*, *Xanthomonas* spp., etc.), and even in some viruses like cucumber mosaic virus (CMV) (Waghunde *et al.*, 2016).

#### Conclusion:

*Trichoderma* spp. are good bio control agent for the management of phytopathogen including *Sclerotium rolfsii* Sacc which cause tremendous loss in crop production.

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## TRICHODERMA SP. AS A BIOCONTROL MEASURE FOR PLANT DISEASES MANAGEMENT

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### ABSTRACT

Harmful chemical fungicides as well as fertilizers which are being applied today for increasing crop production, creates very serious hazardous health problems to human beings and ecosystem as a whole. To overcome all these disadvantages caused by excessive use of chemical fungicides for controlling disease, a new approach evolved that uses micro-organisms for the control of phytopathogens i.e., biocontrol of disease. The antagonistic potential of *Trichoderma* species which has been long known to control various soil-borne fungal pathogens in biological way have been utilized. The faster growth rates with which it competes with fungal pathogen mainly brings upon their antagonistic characteristics. According to literature, it is revealed that *Trichoderma* spp are good for future practice as a biocontrol agent for controlling various plant pathogens.

**Keywords:** Plant disease, Chemical fungicides, Biocontrol agents and *Trichoderma* spp.

### Introduction

Disease in plants, in a simple way defined as the series of invisible and visible responses of plant cells and tissues to a pathogenic organism or environmental factor that result in adverse changes in the form, function, or integrity of the plant and may lead to partial impairment or death of plant parts or of the entire plant (Agrios, 2005). Similarly, Plant diseases, by their presence prevent the cultivation of growth of food plants in some areas; or food plants may be cultivated and grown but plant diseases may attack them, destroy parts or all of the plants, and reduce much of their produce i.e., food, before they can be harvested or consumed (Agrios, 2005).

The losses produced due to plant diseases are usually lower in the developed countries and higher in the developing countries i.e., countries that need food the most. It is been estimated that of the 36.5% average of total losses, 14.1% are caused by diseases. Considering that 14.1% of the crops are lost to plant diseases the total annual worldwide crop loss from plant diseases is about \$220 billion (Agrios, 2005).

The agents that cause disease in plants are the same or very similar to those causing disease in humans and animals. They include pathogenic microorganisms, such as viruses, bacteria, fungi, protozoa, and nematodes, and unfavourable environmental conditions, such as lack or excess of nutrients, moisture, and light, and the presence of toxic chemicals in air or soil (Agrios, 2005). Because it is not known whether plants feel pain or discomfort and because, in any case, plants do not speak or otherwise communicate with us, it is difficult to pinpoint exactly when a plant is diseased.

### Traditional Plant Disease Management

Methods of plant disease management vary considerably from one disease to another, depending on the kind of pathogen, the host, the interaction of the two, and many other variables. In controlling diseases, plants are generally treated as populations rather than as individuals, although certain hosts (especially trees, ornamentals, and, sometimes, other virus-infected plants) may be treated individually. Control measures are generally aimed at saving the populations rather than a few individual plants (Agrios, 2005).



Traditionally the plant disease management can be classified as regulatory, cultural, biological, physical, and chemical, depending on the nature of the agents employed. Regulatory control procedures aim at excluding a pathogen from a host or from a certain geographic area. Most cultural control methods aim at helping plants to avoid contact with a pathogen, creating environmental conditions unfavourable to the pathogen or avoiding favourable ones, and eradicating or reducing the amount of a pathogen in a plant, a field, or an area. Finally, physical, and chemical methods aim at protecting the plants from the pathogen inoculum that has arrived, or is likely to arrive, or curing an infection that is already in progress (Agrios, 2005).

In general, excluding or reducing the initial inoculum is most effective for the management of monocyclic pathogens. Controls such as crop rotation, removal of alternate hosts, and soil fumigation reduce the initial inoculum. With polycyclic pathogens, the initial inoculum can be multiplied many times during the growing season. Therefore, a reduction in the initial inoculum must usually be accompanied by another type of control measure (such as chemical protection or horizontal resistance) that also reduces the infection rate. Many controls, e.g., excluding a pathogen from an area, are useful for both monocyclic and polycyclic pathogens (Agrios, 2005).

The physical agents used most in controlling plant diseases are temperature (high or low), dry air, unfavourable light wavelengths, and

various types of radiation. Chemical agents are generally used to protect plant surfaces from infection or to eradicate a pathogen that has already infected a plant. A few chemical treatments, however, are aimed at eradicating or greatly reducing the inoculum before it encounters the plant. They include soil treatments (such as fumigation), disinfestation of warehouses, sanitation of handling equipment, and control of insect vectors of pathogens (Agrios, 2005, Mahmood *et al.*, 2016).

The traditional agricultural practice employed to control the plant disease have severe disadvantage that it is not effective to check the pathogen and is not eco-friendly. However, excessive use of chemical fungicides in agriculture has led to deteriorating human health, environmental pollution, and development of resistance in pathogen to fungicide (Dalvi and Rakh 2017, Bolognesi and Merlo, 2019).

#### *Trichoderma* spp. as Emerging Biocontrol Practice

*Trichoderma* species can antagonize and control a wide range of economically important plant-pathogenic fungi and have been known as biocontrol agents against soil-borne, foliar and postharvest phytopathogenic fungal pathogens and can also control viruses and bacteria (Sivan and Chet 1992; Herrera-Estrella and Chet 1998; Yedidia *et al.* 2003; Harman 2006).

Table1: *Trichoderma* spp showing biocontrol action against some plant pathogenic diseases

<i>Trichoderma</i> spp	Host	Disease	Reference
<i>T. harzianum</i> & <i>T. hamatum</i>	Cucumber plant		Abd-El-Moity <i>et al.</i> (2003)
<i>T. virideae</i>	Groundnut	Stem rot	Karthikeyan <i>et al</i> (2006)
<i>T. virideae</i>	Ground nut	Stem rot	Manjula <i>et al</i> (2004)
<i>T. longibrachiatum</i>			Deng <i>et al</i> (2007)
<i>T. harzianum</i>	Ground nut	Stem rot	Ganesan <i>et al</i> (2007)
<i>T. spp</i>	Sunflower	Root rot	Yaqub & Shahzad (2008)
<i>T. harzianum</i>	Sugarbeet	Root rot	Rawat & Tiwari (2010)
<i>T. hamatum</i>	Groundnut	Collar rot	Bagwan (2011)
<i>T. virideae</i>	Ground nut	Macrophomina phaseolina (collar rot)	Doley & Jite (2012)



### Mechanism of *Trichoderma* Bio Control

#### Action: -

*Trichoderma spp.* possess different mechanisms to tackle the plant pathogens in lab as well as in the farm which are listed as follows:

#### Competition

One of the mechanisms that is shown by *Trichoderma spp.* as biocontrol agent is competition through rhizosphere competence. Rhizosphere competence is important because a biocontrol agent cannot compete for space and nutrients if it is unable to grow in the rhizosphere. *Trichoderma* species, either added to the soil or applied as seed treatments, grow readily along with the developing root system of the treated plant. This can be shown by simply plating surface sterilized root segments from treated plants on an agar medium. After incubation period, the fungus grows from all parts of the root. The difficulty in viewing competition through rhizosphere competence as a major mechanism in biological control is that strains of *T. koningii* that are excellent root colonizers exhibit little or no biocontrol activity against *R. solani* on cotton seedlings (Howell, 2003).

#### Mycoparasitism or Hyperparasitism

One of the salient features of members of the genus *Trichoderma* is their ability to parasitize other fungi. It is therefore not surprising that Weindling (1932) described biocontrol by *T. lignorum* of citrus seedling disease, incited by *Rhizoctonia solani*, to mycoparasitism. Weindling described the mycoparasitism of *R. solani* hyphae by the hyphae of the biocontrol agent, including coiling around pathogen hyphae, penetration, and subsequent dissolution of the host cytoplasm. This phenomenon occurred regardless of the supply of external nutrients to the host or mycoparasite. Although he considered the possibility that under certain circumstances *T. lignorum* might act as a competitor for nutrients with *R. solani*, he much favoured mycoparasitism as the principal mechanism for biocontrol (Howell, 2003).

#### Enzymes

More recent research into the possible mechanisms involved in biological control by *Trichoderma species* has led to several alternative explanations for successful biocontrol. One idea that has been advanced is that enzymes such as chitinases and/or glucanases produced by the biocontrol agent are responsible for suppression of the plant pathogen. These enzymes function by breaking down the polysaccharides, chitin, and  $\beta$ -glucans that are responsible for the rigidity of fungal cell walls, thereby destroying cell wall integrity (Howell, 2003).

Similarly, Metcalf and Wilson (2001) described the colonization of onion roots, infected with *Sclerotium cepivorum*, by *T. koningii*. Hyphae of the biocontrol agent penetrated into infected epidermal and cortical tissue of the root to destroy the hyphae of the pathogen, with little or no damage to uninfected plant tissue. The authors ascribed this biocontrol phenomenon to production of endo- and exo-chitinases by *T. koningii* (Howell, 2003).

#### Antibiotic mediated suppression

Many instances of successful biocontrol by *Trichoderma* species have been credited to the mechanisms of mycoparasitism and/or antibiosis. In 1983, Howell and Stipanovic isolated and described a new antibiotic, gliovirin, from *Gliocladium (Trichoderma) virens* (GV-P) that was strongly inhibitory to *Pythium ultimum* and a *Phytophthora* species, but not to *R. solani*, *Thielaviopsis basicola*, *Phymatotrichum omnivorum*, *Rhizopus arrhizus*, or *Verticillium dahlia*. Gliovirin also was not inhibitory to the bacteria *Bacillus thuringiensis* and *Pseudomonas fluorescens*. They demonstrated that mutants unable to synthesize the antibiotic lost the capacity to control *Pythium* damping-off of cotton. A mutant (GV-1) with enhanced gliovirin production was no more effective than the wild type in controlling the disease (Howell, 2003).

#### Induction of systemic resistance

Another mechanism proposed to explain biocontrol activity by *Trichoderma* species is that of induction of resistance in the host plant



by treatment with the biocontrol agent. This concept is supported by the work of Yedidia *et al.*, (1999) who demonstrated that inoculating roots of 7-day-old cucumber seedlings in an aseptic hydroponic system with *T. harzianum* spores to a final concentration of  $10^5$  per ml-initiated plant defence responses in both the roots and leaves of treated plants. They also demonstrated that hyphae of the biocontrol fungus penetrated the epidermis and upper cortex of the cucumber root. The plant response was marked by an increase in peroxidase activity (often associated with the production of fungitoxic compounds), an increase in chitinase activity, and the deposition of callose-enriched wall appositions on the inner surface of cell walls. Increased enzyme activities were observed in both roots

and leaves. Interestingly, the plant defence became muted with time and began to resemble a symbiotic mycorrhizal association (Howell, 2003).

### Conclusion

These literatures support that *Trichoderma spp* are good for future practice as the bio control agent for the management of various plant pathogens which cause loss in crop production.

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Research Note

## Genetic variation in seed germination and survival of plant in horse gram (*Macrotyloma uniflorum* L.) through induced mutation breeding

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**Abstract:** In the present investigation the seeds of horse gram (*Macrotyloma uniflorum* L.) varieties Phule Sakas and Man were treated with different concentrations of physical and chemical mutagens. The physical mutagen gamma rays with 05kR, 10kR and 15kR dose while chemical mutagens, namely EMS and SA. The different chemical mutagens concentrations used for treatment were 0.05%, 0.10% and 0.15% for EMS and 0.02%, 0.04% and 0.06 % for SA, respectively. Seed germination and survival of plants at maturity was observed and percentage calculated. Most of the mutagenic treatments caused decrease in seed germination and survival of plants at maturity.

**Keywords:** Genetic variation, horse gram, seed germination, plant survival.

**1. INTRODUCTION**

Horse gram (*Macrotyloma uniflorum* (Lam.) locally known as *hulga* or *kulthi* is one of the important minor, rained pulse crops of Maharashtra. This crop having drought tolerant and good nitrogen fixing ability, but receives a low priority in cropping system, soil types etc. it supplies the protein supplement in human diet, as well as it has medicinal value. It also furnishes concentrated feed for cattle and domestic animals. It is grown both in *kharif* and *rabbi* seasons as main crop, or as a mixed crop with other pulses and cereals crops.

Mutations have been important in evolution that at one time these were considered to be the chief source of origin of new species. It is now well established that ultimate source of new variation is mutation



which coupled with hybridization leads to creation of new genetic variation that is essential for the improvement as well as evolution of crop plants. During the past about eight decades more than 2500 varieties have been released world wide that have been derived either as direct mutants or from their progenies<sup>[1]</sup>.

## 2. MATERIAL AND METHOD

The experimental seed material of two varieties of horse gram (*Macrotyloma uniflorum* L.) for present investigation namely Phule Sakas and Man procured from the 'Mahatma Phule Agricultural University' Rahuri, Ahmadnagar India. (MS)

In the present investigation both the varieties of horse gram Phule Sakas and Man were treated by three mutagens. viz. physical mutagen, gamma rays and two chemical mutagens namely Ethyl methanesulphonate (EMS) and Sodium azide (SA). The number of seeds showing emergence of the radical was counted from the seeds kept in petriplates lined with moist filter paper and expressed as percentage.

Survival percentage was calculated by scoring the total number of plants attaining maturity (45 DAS) in each treatment and expressed as percentage over the control. The data were summarized as the means of three replicates with standard deviation as the measures of variability. One-way ANOVA test was performed to determine significant differences due to various treatments.

## 3. RESULTS

**3.1. Seed germination:** In horse gram the maximum number of seeds germinated on 7<sup>th</sup> day after sowing in both the varieties, namely Phule Sakas and Man. In control the germination percentage was found to be  $86 \pm 09.27$  in Phule Sakas and  $83 \pm 09.47$  % in Man, respectively.

Gamma ray treatment revealed a gradual decreasing trend in germination from lower to higher doses in both the varieties. The germination ranged from  $82 \pm 10.05\%$  to  $76 \pm 04.72\%$  in variety Phule Sakas and  $80 \pm 08.62\%$  to  $67 \pm 03.87$  % in variety Man of horse gram.

After EMS treatment seed germination indicated an inhibitory feature at all the three concentrations of the mutagen. In variety Phule Sakas germination percentage ranged from  $84 \pm 03.84\%$  to  $74 \pm 02.47\%$  and in variety Man  $74 \pm 08.02$  % to  $65 \pm 03.68\%$  respectively.

In SA mutagenic treatments seed germination percentage decreased due to increase in concentrations. In variety Phule Sakas germination decreased from  $82 \pm 0.27\%$  to  $70 \pm 0.54\%$ ; while in variety Man  $71 \pm 01.07\%$  to  $62 \pm 0.54\%$  respectively.

This result indicates that, percent seed germination decreased with increasing doses/ conc. of GR, EMS and SA in horse gram. This clearly indicates that the mutagens have exerted an inhibitory effect on seed germination. Similar results regarding inhibitory effect on seed germination reported earlier by, Bolbhat,<sup>[2]</sup> Awte and Bolbhat<sup>[3]</sup> Shirsat, *et al.*<sup>[4]</sup>, Rudraswami<sup>[5]</sup>, Datir *et al.*<sup>[6]</sup> in horse gram, Jamdade and Kashid<sup>[7]</sup> in Sunflower and Nagargoje and Kashid<sup>[8]</sup> in Chickpea.

The reduction in germination may be due to genetic as well as physiological processes inhibited by the mutagens resulting in cell maturity. Presoaking of seeds increases the sensitivity to chemical mutagens. EMS and GR are potent mutagens well known for their action in inducing point mutations, chromosomal aberrations and enzyme inhibitions.



**Table 1:** Effect of mutagens on seed germination and plant survival at maturity in  $M_1$  generation of horse gram. Variety: Phule Sakas

Mutagen	Dose	Germination (%)	Plant survival at maturity (%)
Control	Control	86 $\pm$ 09.27	78 $\pm$ 03.87
Gamma rays	05 kR	82 $\pm$ 10.05	74 $\pm$ 05.96
	10 kR	80 $\pm$ 02.58	64 $\pm$ 05.94
	15 kR	76 $\pm$ 04.72	54 $\pm$ 02.54
EMS%	0.05	84 $\pm$ 03.84	69 $\pm$ 03.54
	0.10	79 $\pm$ 03.81	58 $\pm$ 04.56
	0.15	74 $\pm$ 02.47	56 $\pm$ 07.64
SA%	0.02	82 $\pm$ 0.27	72 $\pm$ 0.62
	0.04	76 $\pm$ 0.33	68 $\pm$ 0.38
	0.06	70 $\pm$ 0.54	61 $\pm$ 0.46

**3.2. Survival of plants at maturity:** The results of survival of plants at maturity in control observed 78  $\pm$  03.87% in variety Phule Sakas and 82  $\pm$  0.72% in variety Man respectively. The survival % was decreased than the control in all mutagenic treatments and both varieties of horse gram namely Phule Sakas and Man.

**Table 2:** Effect of mutagens on seed germination and plant survival at maturity in  $M_1$  generation of horse gram. Variety: Man

Mutagen	Dose	Germination (%)	Plant survival at maturity (%)
Control	Control	83 $\pm$ 09.47	82 $\pm$ 0.72
Gamma rays	05kR	80 $\pm$ 08.62	78 $\pm$ 2.47
	10 kR	75 $\pm$ 04.72	74 $\pm$ 1.62
	15 kR	67 $\pm$ 03.87	69 $\pm$ 3.54
EMS%	0.05	74 $\pm$ 08.02	73 $\pm$ 02.46
	0.10	71 $\pm$ 06.32	68 $\pm$ 01.18
	0.15	65 $\pm$ 03.68	63 $\pm$ 02.40
SA%	0.02	71 $\pm$ 01.07	70 $\pm$ 0.96
	0.04	68 $\pm$ 01.09	65 $\pm$ 0.24
	0.06	62 $\pm$ 0.54	61 $\pm$ 0.36



In variety Phule Sakas survival percentage of plants at maturity decreased as increased in concentration/dose in all mutagenic treatments. In Gamma rays' treatment survival percentage decreased from  $74 \pm 05.96\%$  to  $54 \pm 02.54\%$ . in EMS treatment it decreased from  $69 \pm 03.54\%$  to  $56 \pm 07.64\%$ , while in SA treatment  $72 \pm 0.62\%$  to  $59 \pm 0.46\%$  respectively.

In variety Man there was decrease in the survival % with increasing conc. /dose of GR, EMS, and SA. In gamma rays survival % decreased from  $78 \pm 2.47\%$  to  $69 \pm 3.54\%$ , in EMS treatment  $73 \pm 02.46\%$  to  $63 \pm 02.40\%$ , while in SA treatment  $70 \pm 0.96\%$  to  $61 \pm 0.36\%$  respectively.

In all mutagens reduced the rate of survival at maturity was recorded by Bolbhat<sup>[2]</sup>, Shirsat, *et al.*<sup>[4]</sup> in horse gram, Bolbhat, *et al.*<sup>[9]</sup> in black beans, Jamdade and Kashid<sup>[10]</sup> in Sunflower.

## DISCUSSION

In the present investigation it was found that the two varieties of horse gram responded to Gamma rays, EMS and SA treatments in respect of seed germination and plants survival at maturity. In the present investigation germination and plants survival at maturity percentage showed decreased as increased in dose/ concentrations in all mutagenic treatments in both the varieties of horse gram namely Phule Sakas and Man.

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## Analytical Solution of Linear Fractional Partial Differential Equation of Order $0 < \alpha \leq 1$ by Improved Adomian Decomposition Method

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### Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## Abstract

The paper aims to obtain exact analytical solution of linear nonhomogeneous space-time fractional order partial differential equation by improved Adomian decomposition method coupled with fractional Taylor expansion series. The solution of these equations are in series form may have rapid convergence to a closed-form solution. The effectiveness and sharpness of this method is shown by obtaining the exact solution of these equations with suitable initial conditions (ICs). With the help of this method, it is possible to investigate nature of solutions when we vary order of the fractional derivative. Behaviour of the solution of these equations are represented by graphs using Matlab software.

**Keywords:** Improved adomian decomposition method; fractional taylor expansion series; mittage-leffler function; caputo fractional derivative.

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## 1 Introduction

The study of nonlinear partial differential equations (PDEs) is a well developed research area. There are physical models governed by nonlinear fractional partial differential equations (FPDEs) in various sciences such as sciences of Mathematics, sciences of Physics, sciences of Chemistry, and sciences of Biology as well as in technologies [1, 2, 3, 4, 5, 6]. Several researchers have focused on the study of physical models directed by FPDEs. The difficulty of getting the exact solution of equations in such models is an important and attractive area of research. Not all nonlinear equations in physical models have an exact solution, therefore, many researchers have developed various methods of solving nonlinear FPDEs. The Adomian decomposition method (ADM) [7, 8] is a powerful tool to determine solution of fractional differential equations. In a present years, a numerous attention has been devoted to the study of the Adomian's Decomposition Method (ADM) [9, 7, 8]. Cherruault et al. [10], Adomian and Rach [11], Duan et al. [12], which permit us to survey the properties and solutions of a huge variety of ordinary and PDEs, as well as of FPDEs, which express several mathematical problems, or can be used to mathematically model diverse physical processes. From a historic view, the ADM was first introduced, and enormously used in the 1980's [13, 14, 15, 16], and afterward many mathematicians and scientists have constantly modified the ADM in an attempt to upgrade its accuracy and/or to widen the applications of the initial method. Duan, Rach and Wazwaz [17, 18, 19, 20, 21, 22, 23, 24] put in a lot of effort to improve ADM. The ADM procedure to solve linear or nonlinear boundary value problems using the Duan-Rach recursion [25, 26, 27], which is intrinsic to the ADM, does not itself require Green's functions, Dirac delta functions, and discretization techniques such as a finite-difference method or a finite element method. Also, it does not invoke the shooting method, special basis functions, guessing the starting term, linearization, perturbation, and so on. Importantly, fast, efficient, cost-effective and accurate solutions can be found without the need to resort to high performance computing. As the nonlinear terms are not ignored or crudely linearized, a much better appreciation of the physics of a particular problem ensues. This aspect of simulation is often lost in numerical methods. A key concept is that the Adomian decomposition series is any rearrangement of the Banach-space analog of the Taylor expansion series about the initial solution component function that permits solution by recursion, in which the aforesaid rearrangement is accomplished through the choice of the recursion scheme. The ADM yields a rapidly convergent sequence of analytic functions as the approximate solutions of the original mathematical model. The most important work about convergence has been carried out by Cherruault [28]. Further remarks about the convergence of the decomposition method are in [10]. Historical view of ADM given by Rach in [29]. Thus the ADM subsumes even the classic power series method while extending the class of amenable nonlinearities to include any analytic nonlinearity.

While Shawagfeh [30] has employed ADM for solving nonlinear fractional partial differential equations, Daftardar-Gejji and Jafri have obtained solution of numerous problems [31] by using ADM. Also Dhaigude and Birajdar [32, 33] extended the discrete ADM for obtaining the numerical solution of system of FPDEs. Chitalkar-Dhaigude and Bhadgaonkar in [34] have shown that the ADM is more convenient than the Charpit's method to solve first-order nonlinear PDEs. Sontakke and Pandit [35, 36] investigates the iterative solution of linear and NFPDEs using fractional ADM. Bhadgaonkar and Sontakke [37] obtained exact Solution of Space-Time FPDEs by ADM. El-Wakil and Abdou have discussed a new application of ADM on nonlinear physical equations in [38]. Az-Zo'bi improved the Laplace decomposition method to obtain approximate analytical solutions of linear and nonlinear differential equations and systems in [39] and also apply the modified decomposition method for the solution of isentropic flow of an inviscid gas model (IFIG) in [40]. Az-Zo'bi and Al-Khaled proposed a new convergence proof of the ADM for a mixed hyperbolic elliptic system of conservation laws in [41] and also Az-Zo'bi apply ADM to develop a fast and accurate algorithm for systems of conservation laws of mixed hyperbolic elliptic type in [42]. Az-Zo'bi et



al. [43] have modify the reduced differential transform method to be applicable for a wide range of nonlinear PDEs using Adomian polynomials, and new generalizations of transformed formulas are established.

Rach et al. [44] created a new modification of the ADM for solving ordinary differential equations (ODEs) using the Taylor expansion series for a nonhomogeneous term. N. Khodabakshi et al. [45], discussed the basic ADM method and extended the proposed method in [44] to solve time-fractional ODEs. As a result of these ideas, Dhaigude and Bhadgaonkar in [46] combined the ADM with a fractional Taylor expansion series and obtain an almost analytical solution of physical models such as Gas dynamics model, Advection model, Wave model, and Klein-Gordon model in nonlinear nonhomogeneous space-time fractional PDEs. The fractional Taylor expansion series used in this method is represented as a differential transform in the differential equations. The main aim of this paper is to implement improved ADM to solve the linear nonhomogeneous space-time fractional partial differential equation so we write proposed method in [46] for linear fractional PDE. The solution of this equation is calculated in the form of convergent series with easily computable components. The space-time fractional derivatives are described in the Caputo sense.

The paper is structured in this way: in section 2 few basic results about fractional calculus and related properties are given which are used in this paper, while in section 3 we clarify the steps of the improved ADM for solving nonlinear nonhomogeneous space and time fractional order PDEs in section 4. Section 5 is conclusions.

## 2 Basic Definitions

In this section, basic definitions on fractional calculus are discussed which are useful for further discussion.

[6] Let  $f \in C_\alpha$  and  $\alpha \geq -1$ , then Riemann-Liouville fractional integral operator (RLFIO) of  $w(x, t)$  with respect to  $t$  of order  $\alpha$  is indicated by  $I_t^\alpha w(x, t)$  and is explained as

$$I_t^\alpha w(x, t) = \frac{1}{\Gamma(\alpha)} \int_0^t (t - \tau)^{(\alpha-1)} w(x, \tau) d\tau, \quad t > 0, \alpha > 0. \quad (2.1)$$

[6] Let  $m - 1 < \alpha < m$ ,  $t \in R$  and  $t > 0$ . The Caputo fractional derivative operator (CFDO) for the function  $f \in H^1([a, b], \mathbb{R}_+)$  with order  $\alpha \geq 0$  is explained as

$$D_t^\alpha w(x, t) = \begin{cases} \frac{1}{\Gamma(m - \alpha)} \int_0^t (t - \tau)^{m-\alpha-1} \frac{\partial^m w}{\partial \tau^m} d\tau, \\ \frac{\partial^m w}{\partial t^m}, \end{cases} \quad \alpha = m \in N. \quad (2.2)$$

We have following properties of RLFIO and CFDO

$$D_t^\alpha t^\mu = \frac{\Gamma(\mu + 1)}{\Gamma(\mu - \alpha + 1)} t^{(\mu - \alpha)}, \quad (2.3)$$

$$I_t^\alpha t^\mu = \frac{\Gamma(\mu + 1)}{\Gamma(\mu + \alpha + 1)} t^{(\mu + \alpha)}, \quad \alpha > 0, \mu > -1. \quad (2.4)$$

Note that the relation between RLFIO and CFDO is given by:

$$I_t^\alpha D_t^\alpha w(x, t) = w(x, 0) - \sum_{k=0}^{m-1} w^{(k)}(x, 0) \frac{t^k}{k!}, \quad m - 1 < \alpha \leq m. \quad (2.5)$$



**Mittage-Leffler function (MLF):** The MLF for one parameter and two parameter is explained as follows

$$E_{\alpha}(t) = \sum_{n=0}^{\infty} \frac{t^n}{\Gamma(\alpha n + 1)}, \quad (\alpha \in \mathbb{C}, \operatorname{Re}(\alpha) > 0),$$

$$E_{\alpha, \beta}(t) = \sum_{n=0}^{\infty} \frac{t^n}{\Gamma(\alpha n + \beta)}, \quad (\alpha, \beta \in \mathbb{C}, \operatorname{Re}(\alpha, \beta) > 0).$$

When we apply CFDO on MLF we get

$$D_t^{\alpha} E_{\alpha}(at^{\alpha}) = aE_{\alpha}(at^{\alpha}), \quad (2.6)$$

where  $a$  is constant.

### 3 Analysis of Method

Consider the initial value problem (IVP) for space-time-FPDE of order  $0 < \alpha \leq 1$ ,

$$D_t^{\alpha} w(x, t) + D_x^{\alpha} w(x, t) = g(x, t), \quad (3.1)$$

$$w(x, 0) = h(x), \quad (3.2)$$

or equivalently

$$L(w(x, t)) = g(x, t), \quad (3.3)$$

$$w(x, 0) = h(x), \quad (3.4)$$

where  $w(x, t)$  is unrecognized function which we want to determined,  $t$  is time variable,  $x$  is the space coordinate,  $L(w(x, t))$  is fractional differential operator and  $g(x, t)$  is nonhomogeneous function. Now, applying the RLFO  $I_t^{\alpha}$  on both side of equation(3.1) and use the IC (3.2), we attain:

$$w(x, t) = w(x, 0) + I_t^{\alpha} [g(x, t) - D_x^{\alpha} w(x, t)]. \quad (3.5)$$

The unrecognized function  $w(x, t)$  can be expressed as an infinite series of the form

$$w(x, t) = \sum_{n=0}^{\infty} w_n(x, t) \quad (3.6)$$

Suppose that  $g(x, t)$  is analytic. Its fractional Taylor expansion series [48, 49, 47] is:

$$g(x, t) = \sum_{k=0}^{\infty} \sum_{h=0}^{\infty} G_{\alpha, \alpha}(k, h) x^{k\alpha} t^{h\alpha}, \quad (3.7)$$

where

$$G_{\alpha, \alpha}(k, h) = \frac{1}{\Gamma(k\alpha + 1)\Gamma(h\alpha + 1)} (D_x^{\alpha})^k (D_t^{\alpha})^h g(x, t)|_{x=t=0}$$

and  $(D_x^{\alpha})^k = D_x^{\alpha} D_x^{\alpha} \dots D_x^{\alpha}$ ,  $k$  times.

By using (3.6) and (3.7) in (3.5) we attain

$$\sum_{n=0}^{\infty} w(x, t) = h(x) + I_t^{\alpha} \left[ \sum_{k=0}^{\infty} \sum_{h=0}^{\infty} G_{\alpha, \alpha}(k, h) x^{k\alpha} t^{h\alpha} - D_x^{\alpha} \sum_{n=0}^{\infty} w_n(x, t) \right], \quad (3.8)$$



$$\begin{aligned} \sum_{n=0}^{\infty} w(x, t) &= h(x) + I_t^\alpha \left[ \sum_{k=0}^{\infty} G_{\alpha, \alpha}(k, 0) x^{k\alpha} t^{0\alpha} + \sum_{k=0}^{\infty} G_{\alpha, \alpha}(k, 1) x^{k\alpha} t^\alpha + \dots \right] \\ &\quad - I_t^\alpha \left[ D_x^\alpha \sum_{n=0}^{\infty} w_n(x, t) \right]. \end{aligned} \quad (3.9)$$

Taking term by term comparison on both side of equation (3.9), we set recursion scheme like:

$$\begin{aligned} w_0(x, t) &= h(x), \\ w_1(x, t) &= I_t^\alpha \left[ \sum_{k=0}^{\infty} G_{\alpha, \alpha}(k, 0) x^{k\alpha} t^{0\alpha} - D_x^\alpha w_0 \right], \\ w_2(x, t) &= I_t^\alpha \left[ \sum_{k=0}^{\infty} G_{\alpha, \alpha}(k, 1) x^{k\alpha} t^\alpha - D_x^\alpha w_1 \right], \\ w_3(x, t) &= I_t^\alpha \left[ \sum_{k=0}^{\infty} G_{\alpha, \alpha}(k, 2) x^{k\alpha} t^{2\alpha} - D_x^\alpha w_2 \right], \end{aligned}$$

and so forth. Then the solution  $w(x, t)$  of IVP (3.1) – (3.2) is

$$\phi_{m+1} = \sum_{n=0}^m w_n(x, t) \quad (3.10)$$

which gives

$$\lim_{m \rightarrow \infty} \phi_{m+1} = w(x, t). \quad (3.11)$$

## 4 Numerical Applications

The effectiveness and sharpness of the improved ADM can be demonstrated by applying it to space-time fractional nonhomogeneous linear partial differential equation.

**Example 4.1.** Consider the linear nonhomogeneous space-time fractional PDE,

$$\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w(x, t) + D_t^\alpha w(x, t) = \frac{x^\alpha}{\Gamma(\alpha+1)} t^\alpha E_{2\alpha, 1+\alpha}(t^{2\alpha}) + w, \quad 0 < \alpha \leq 1 \quad (4.1)$$

with initial condition

$$w(x, 0) = \frac{x^\alpha}{\Gamma(\alpha+1)}. \quad (4.2)$$

Applying  $I_t^\alpha$  on both sides of equation (4.1) and use initial condition (4.2), we have

$$\begin{aligned} w(x, t) &= w(x, 0) + I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w(x, t) + \frac{x^\alpha}{\Gamma(\alpha+1)} t^\alpha E_{2\alpha, 1+\alpha}(t^{2\alpha}) + w \right], \\ w(x, t) &= \frac{x^\alpha}{\Gamma(\alpha+1)} + I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w(x, t) + \frac{x^\alpha}{\Gamma(\alpha+1)} t^\alpha E_{2\alpha, 1+\alpha}(t^{2\alpha}) + w \right]. \end{aligned} \quad (4.3)$$

Here

$$g(x, t) = \frac{x^\alpha}{\Gamma(\alpha+1)} t^\alpha E_{2\alpha, 1+\alpha}(t^{2\alpha}).$$



By using (3.6) and (3.7) in (4.3) we have

$$\begin{aligned} \sum_{n=0}^{\infty} w_n(x, t) &= \frac{x^\alpha}{\Gamma(\alpha+1)} + I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha \sum_{n=0}^{\infty} w_n + \sum_{k=0}^{\infty} \sum_{h=0}^{\infty} G_{\alpha,\alpha}(k, h) x^{k\alpha} t^{h\alpha} + \sum_{n=0}^{\infty} w_n \right], \\ \sum_{n=0}^{\infty} w_n(x, t) &= \frac{x^\alpha}{\Gamma(\alpha+1)} + I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha \sum_{n=0}^{\infty} w_n + \sum_{n=0}^{\infty} w_n + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 0) x^{k\alpha} t^{0\alpha} \right. \\ &\quad \left. + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 1) x^{k\alpha} t^{1\alpha} + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 2) x^{k\alpha} t^{2\alpha} + \dots \right]. \end{aligned} \quad (4.4)$$

Here first few coefficients of  $G_{\alpha,\alpha}(k, h)$  are given in Table 1. Taking term by term comparison on

Table 1. The components of  $G_{\alpha,\alpha}(k, h)$

$G_{\alpha,\alpha}(k, h)$ <i>k</i> – varies vertically <i>h</i> – varies horizontally	$G_{\alpha,\alpha}(k, 0)$	$G_{\alpha,\alpha}(k, 1)$	$G_{\alpha,\alpha}(k, 2)$	$G_{\alpha,\alpha}(k, 3)$	$G_{\alpha,\alpha}(k, 4)$	...
$G_{\alpha,\alpha}(0, h)$	0	0	0	0	0	...
$G_{\alpha,\alpha}(1, h)$	0	$\frac{1}{\Gamma(\alpha+1)\Gamma(\alpha+1)}$	0	$\frac{1}{\Gamma(\alpha+1)\Gamma(3\alpha+1)}$	0	...
$G_{\alpha,\alpha}(2, h)$	0	0	0	0	0	...
$G_{\alpha,\alpha}(3, h)$	0	0	0	0	0	...
⋮	⋮	⋮	⋮	⋮	⋮	⋮

both sides of equation (4.4), we set recursion scheme as follows:

$$\begin{aligned} w_0(x, t) &= \frac{x^\alpha}{\Gamma(\alpha+1)}, \\ w_1(x, t) &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w_0 + w_0 + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 0) x^{k\alpha} t^{0\alpha} \right], \\ &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha \frac{x^\alpha}{\Gamma(\alpha+1)} + \frac{x^\alpha}{\Gamma(\alpha+1)} + 0 \right], \\ &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} + \frac{x^\alpha}{\Gamma(\alpha+1)} \right] = 0, \\ w_2(x, t) &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w_1 + w_1 + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 1) x^{k\alpha} t^{1\alpha} \right], \\ &= I_t^\alpha \left[ -0 + 0 + \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{1\alpha}}{\Gamma(\alpha+1)} \right], \\ &= \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{2\alpha}}{\Gamma(2\alpha+1)}, \\ w_3(x, t) &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w_2 + w_2 + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 2) x^{k\alpha} t^{2\alpha} \right], \\ &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha \left[ \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{2\alpha}}{\Gamma(2\alpha+1)} \right] + \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{2\alpha}}{\Gamma(2\alpha+1)} + 0 \right], \\ &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{2\alpha}}{\Gamma(2\alpha+1)} + \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{2\alpha}}{\Gamma(2\alpha+1)} \right] = 0, \\ w_4(x, t) &= I_t^\alpha \left[ -\frac{x^\alpha}{\Gamma(\alpha+1)} D_x^\alpha w_3 + w_3 + \sum_{k=0}^{\infty} G_{\alpha,\alpha}(k, 3) x^{k\alpha} t^{3\alpha} \right], \\ &= I_t^\alpha \left[ -0 + 0 + \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{3\alpha}}{\Gamma(3\alpha+1)} \right], \\ &= \frac{x^\alpha}{\Gamma(\alpha+1)} \frac{t^{4\alpha}}{\Gamma(4\alpha+1)}, \end{aligned}$$



and so on. Then the exact solution of IVP (4.1)-(4.2) is

$$\begin{aligned} w(x, t) &= \sum_{n=0}^{\infty} w_n(x, t) = \frac{x^{\alpha}}{\Gamma(\alpha+1)} \left[ 1 + \frac{t^{2\alpha}}{\Gamma(2\alpha+1)} + \frac{t^{4\alpha}}{\Gamma(4\alpha+1)} + \dots \right], \\ &= \frac{x^{\alpha}}{\Gamma(\alpha+1)} \sum_{k=0}^{\infty} \frac{t^{2\alpha k}}{\Gamma(2\alpha k+1)}, \\ w(x, t) &= \frac{x^{\alpha}}{\Gamma(\alpha+1)} E_{2\alpha}(t^{2\alpha}). \end{aligned} \quad (4.5)$$

If  $\alpha = 1$  then IVP (4.1)-(4.2) is

$$xw_x + w_t = x \sinh(t) + w, \quad (4.6)$$

with IC

$$w(x, 0) = x. \quad (4.7)$$

the exact solution of given IVP is

$$w(x, t) = x \cosh(t). \quad (4.8)$$

If  $\alpha = \frac{1}{2}$  then IVP (4.1)-(4.2) is

$$2\sqrt{\frac{x}{\Pi}} D_x^{\frac{1}{2}} w(x, t) + D_t^{\frac{1}{2}} w(x, t) = 2\sqrt{\frac{xt}{\Pi}} E_{1, \frac{3}{2}}(t) + w, \quad (4.9)$$

with IC

$$w(x, 0) = 2\sqrt{\frac{x}{\Pi}}, \quad (4.10)$$

the solution of given IVP is

$$w(x, t) = 2\sqrt{\frac{x}{\Pi}} e^t. \quad (4.11)$$

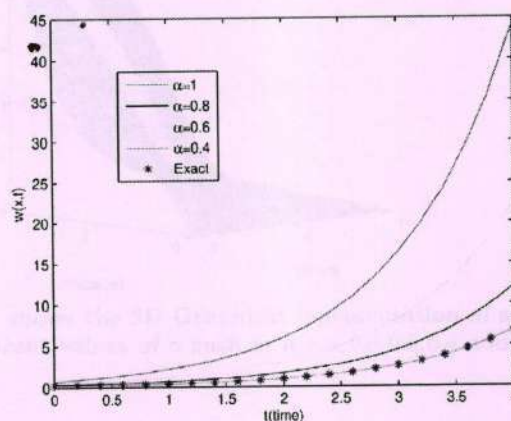


Fig. 1. 2D Graphical representation of solution (4.5) of IVP (4.1)-(4.2) for different values of  $\alpha$  such as  $\alpha = 1, 0.8, 0.6, 0.4$  and exact when  $x = 0.25$



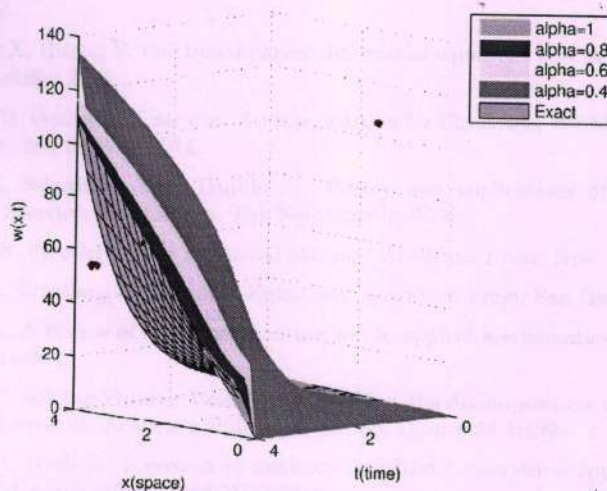
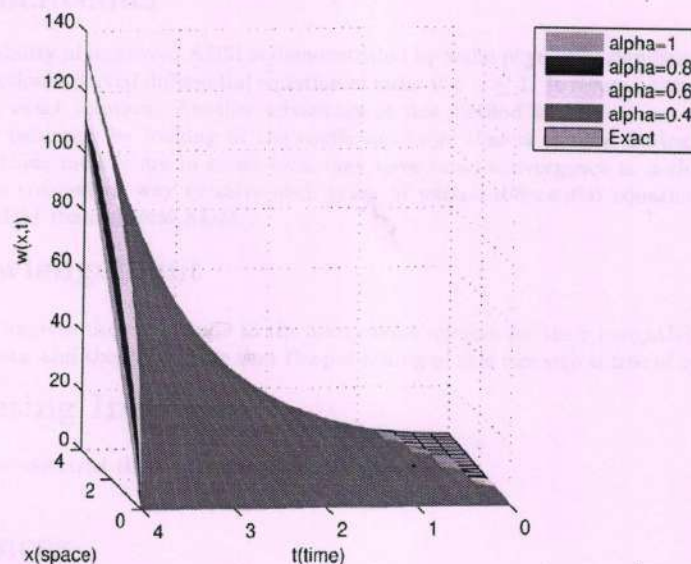


Fig. 2 and Fig.3. shows the 3D Graphical representation of solution (4.5) of IVP (4.1)-(4.2) for different values of  $\alpha$  such as  $\alpha = 1, 0.8, 0.6, 0.4$  and exact solution (4.8)

**Remark 4.1.** : Fig.1. is the graphical behaviour of improved ADM solution (4.5) for different values of  $\alpha$  such as  $\alpha = 1, 0.8, 0.6, 0.4$  and exact solution (4.8) when  $x = 0.25$ . 3D graphical representation of solution (4.5) of IVP (4.1)-(4.2) for different values of  $\alpha$  such as  $\alpha = 1, 0.8, 0.6, 0.4$  are given in Figure?? and Figure??. It is clear from Fig.1. Fig.2. and Fig.3 that, when the limit  $\alpha \rightarrow 1$ , the solution (4.5) approaches to the exact solution (4.8).



## 5 Conclusions

The applicability of improved ADM is demonstrated by some physically significant linear nonhomogeneous fractional partial differential equation of order  $0 < \alpha \leq 1$ . It returns either a fast convergent series or an exact solution. Another advantage of this method is that we can see where we want to stop the recursion by looking at the coefficient table that is created during the process. The solution of these models are in series form may have rapid convergence to a closed-form solution. It is a more convenient way to solve such types of partial differential equation with the help of improved ADM than general ADM.

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Authors have declared that no competing interests exist.

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# Concept of Feminism and its influence on the status of Woman in the modern society

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## **Abstract:**

In the past period women faced many barriers and problems. She had considered as secondary in the society. She was not treated as a member of the society and always insulted, neglected and mistreated. With the commencement of feminism a women got a separate identity. In the third world societies and in many religions she is not given a proper position. Even at present, she is treated as a showpiece, a sign of prestige. She always proves to be the victim of success in war an easy object to be captured and thought as only a toy. Feminism establishes the importance and significance of the women in the present society. This research examines how one changes her status after the rise of feminism. Many feminist writers have raised their voice against the evil practices in the society. After the arrival of feminism, the status of women has been changed.

**Keywords:** Feminism, Status, Discrimination, Racism, Rights, Gender bias, Equality etc.

## **Introduction:**

Women, since the ancient times has been treated as an object for pleasure or an animal to be tortured and beaten, a commodity that can be sold like a slave or a bonded labour tied

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with the rope of marriage her existence in all culture had been treated as either non entity or an dependent object on the male world.

The Greek, the Roman, the Egyptian and the Asian cultures fought wars among themselves and robbed the women of the defeated party. Even the Crucates, the rulers of different religions thought women as something to be taken away. The Black were the slaves sold like animals in the past. The women were thought inferior. Even to the slaves, servants and other labours. She was the first to be a victim and the last to be respected by the then society. Like Earth, She was born only to suffer. Feminists like Elaine Showalter and Kate Millett raised the voice for women. A woman has the greatest pleasure of motherhood and the easy prey of dominating male. She is always referred to as 'weaker or fairer sex'. Kate Millett painted the picture of women in which the eyes were shown as breasts and the lips as the private part these two feminists established the credentials of women as part of mankind. It is shocking that in the Western countries very recently the women were given power of voting it's only in India that since the commencement of the Constitution man and women were bestowed with one vote each.

The sense of quality the double standard of society and treatment of women as if they had only the physical existence and lack of physical or emotional power. The last class, caste and colour are treated as inferior species. It is womankind that was inferior even to the inferior in the world had been in the past. The political system of matriarchy whereas the interior world of women is ruled by masculinity. The women happen to be the first grower of crops as well as kids but they did not have any social position.

### **Research Questions:**

This research study tries to answer the following Questions,

1. What was the condition of women in the past?
2. What is a concept of feminism?
3. Is feminism beneficial for development of women?
4. Has feminism changed the life of women in the modern society?

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## **Research Objectives:**

The proposed research paper is to show the meaning, definition, origin, forms of development of feminism, issues and importance of feminism in the modern society. The purpose of the present study is to highlight the following objectives:

- 1.To find the meaning and origin of feminism.
- 2.To know the condition of women in the past.
- 3.To understand the changing status of women.
- 4.To stress significance of women in the present times.
- 5.To understand the importance of feminism movement in the modern society.

## **Research Methodology:**

The proposed research paper descriptive, comparative and evaluation methods are used as well as critically analyzed the existing information from secondary sources.

## **Discussion:**

Feminism is movement for women which raise the status of women in the society. After a long struggle the world of women are improved. Feminism has given an unending voice to women and the main purpose of the feminism movement is to solve women's problem and removing the evil practices in the society against women.

This research discusses basic concepts related to feminism, such as origin, definition, types and waves and how the status of women has changed in the modern society.

## **Definitions of Feminism:**

Many scholars define feminism in the following way,

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1. "Feminism is a theory as well as a political, cultural or Economical equal right and legal protection for women". (Longman Dictionary)

2. "The belief that women should be allowed the same rights, power and opportunity as men and be treated in the same way or the set of activities intended to achieve this state".

(Cambridge Dictionary)

3. Zara Huda Faris thinks:

"Women need feminism because it is a woman who suffers from injustice." "Women have traditionally been dehumanized by a male dominated society as patriarchy."

(Interview on 20 Jan. 2015)

## **Origin and Forms of Development of feminism:**

### **The Origin:**

The term feminism appeared in France at the end of the 1880 in HUNBURTINE AUCLERT's Magazine under the name La CITOYENNE La Feminite ,where she tried to criticize male domination and demand women's rights in addition to emancipation. The promise of french Revolution. The word feminism comes from the Latin word FEMINA, Which describes women's issue and status. The French Revolution started with the fall of Bastille on 14 july 1789. The principles of the French Revolution had been 'Liberty, Equality and Fraternity'. The tragedy is that there is still neither complete liberty nor equality for women.

### **Types of Feminism:**

There is different type of feminism in the course of time.

#### **1. Radical Feminism:**

Radical feminism was a movement with the belief that sexism is deep rooted in

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Society and there are problem of gender. The problems are men work outside and women work in house.

## **2.Liberal Feminism:**

It is related to equal pay for equal work and concept of healthcare and justice against sexual and domestic violence.

## **3. Socialist Feminism:**

Socialist feminism thinks of social equality. It is against capitalism .It focuses on economic and political aspects pointing out the difference based on the capital system.

## **4. Ecofeminism:**

Women are paidless than men for the same work. The women's rights are related to political, social, cultural and financial factors.

## **5. Cultural Feminism :**

In fact, women have higher virtues; They are kinder and gentler then men. If women were empowered they would change the world into a better place.

## **6.Global Feminism:**

There Should not be any difference among women in different nations different races and different classes. In fact, any woman in the world should be treated as an equal to any man. It is a long process to change the society completely but efforts should go on.

## **Waves of Feminism:**

There are different waves such as the first wave in the 19th Amendment of US Constitution in 1919 has given women all rights. The second wave was between 1960s-1980s that allowed equality and no discrimination. Betty Fridan in her book The Feminine Mystique in (1963) was a great eye-opener. The third wave feminism had been in 1990s as the second wave feminism was failed.

It is true that in spite of struggle for rights and cry against injustice had been development

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of feminism however even at present the women is treated as a secondary citizen and she is a victim of double standard. The great women in feminist movement had been Virginia Woolf (*On Women And Writing*) (1979), Ealine Showalter (*Speaking Of Gender*) (1989), Kate Millett (*Sexual Politics*) (1970), Julia Kristeva (*Desire In Language*) (1982), Abel Elizabeth (Writing and sexual difference) 1982, Adichie C. N. (*We Should All Be Feminist's*) (2014), De Beauvoir Simone, (*The Second Sex*) (1961), Betty Fridan (*The Feminine Mystique*) (1963), Kalpan Cora (*Sea Changes: Culture and Feminism*) (1986).

The result is Jhumpa Lahiri in the novel *Namesake* describes in details her delivery. Ic wacker describes father's rape on daughter and his careless description to his friend regarding the rape. Arundhati Roy writes about her mothers extramarital affairs in her *God of Small Things*. Similarly Kozsehe writes about his daughter's rape as the reaction of the Black Against The White. The women like Showalter and Millett write in harsh terms on the suffering of women. Feminism tries to hold the hands of male bent upon beating and ruining woman's lives. The great Anthropologist Malinovasky informs that all abuses are for the insult to women in general and mother in the particular the great Indian scholar R. D. Karve started a magazine regarding male female relationship.

Showalter compares Old Testament with New Testament and blames the religion for treating women as sinners. D.H.Lawrence praised Indian culture for sex is one of the Purusharthas in monolithic religions. One book one prophet and one way of prayer but Neolithic culture like India has no single prophet and no single book no single way of prayer. On the contrary it treats mother to be first respected calls the Nation as motherland. In Greek GiaMater (Great mother) is respected in Sanskrit. There are many proverbs about the respect for mother. Even in present times it is essential to think of woman as the greatest source of inspiration.

### Conclusion:

Feminism had created a new word for women. It influences the women all over the world and creates a sense of honour for women. The die- hard concept such as Man hater or woman hater (Even Womanizer) should be totally discarded. Feminism no doubt has helped female population however in the Western and the Eastern part of the world. There are different

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opinion about the rights of women. It is not proper to mention the names of religions which polygamy is allowed. Man and woman are made for each other. In old days the kings were allowed many marriages to create friendship among the countries. Feminism helps to develop the status of woman in the modern society.

At present, however in spite of the success of feminism, there are some loopholes, drawbacks and shortcomings in treating women in the true sense of the terms liberty and equity. It should not be forgotten that present the plight and predicament. The troubles and tortures and the trials and the tribulations of women are totally destroyed. One has to hope for the future and the welfare of women. In my view the modern women are efficient for handling all the responsibilities in all the field of life. She can work like man in effective manner. The status of woman has been completely changed in accordance with the increasing demand in various fields. It is only expected to prepare proper policies for the development and empowerment of women in the society.

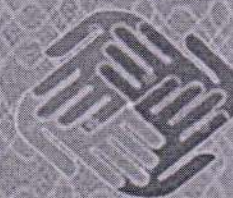
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## Causes and Impact of Labour Migration: A Case Study of Marathwada Region

Dr.Sidharth S.Jadhav  
Head & Research Guide  
Mrs.K.S.K. College, Beed

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### Introduction:

Migration is shift from a place of residence to another place for some length of time or permanently including different types of voluntary movements. It has great impact on economic, social, cultural and psychological life of people, both at place of emigration as well as of migration (Kaur, 2003). In India the labour migration is mostly influenced by social structures and pattern of development. Uneven development is the main reason of migration along with factors like poverty, landholding system, fragmentations of land, lack of employment opportunities, large family-size and natural calamities. The high-land man ratio, caste system, lawlessness and exploitation at native place speed up the breakdown of traditional socio-economic relations in the rural areas and people decide to migrate to relatively prosperous areas in search of better employment and income. Diversification of economy and increased land productivity in certain areas, rapid improvement in transport and communication means, improvement in education, increase in population pressure and zeal for improving living added momentum to the mobility of population in India (Roy, 2011). Those who migrate to new areas experience certain socio-psychological problems of adjustments with the residents of place of migration.

The relationship between migration and work has been transformed in recent decades. Between 1990 and 2017, international migration flows increased from 153 million to 258 million. Immigration to high-income countries, particularly for work-related purposes, has accounted for the majority of this growth (United Nations, 2017). While there are many drivers of these trends, they have been facilitated in part by labour migration policy changes including the growth of temporary and employer-sponsored visa schemes and the introduction and expansion of cross-border labour mobility zones (Castles et al., 2014). Nevertheless, compared to goods, services and capital, where cross-border trade and movement have been liberalised substantially, there remain considerably greater constraints upon the free movement of labour (McGovern, 2007). Changes to immigration policies, including changes enabling the expansion of migrant labour supply, have produced major political challenges. Policymakers in many countries have recently struggled to balance the perceived disruptive impacts on jobs and communities with the potential economic benefits. The pivotal role that negative public attitudes towards immigration played in Donald Trump's presidential election in the USA, the Brexit referendum in the UK and the ascent of far-right parties across Europe exemplifies this (Gumbrell-McCormick and Hyman, 2017).



Nonetheless, the institutionalist focus of an employment relations analytical lens brings key advantages for analysing migration and work issues. While these issues have been relatively neglected within employment relations research compared to other disciplines, several employment relations scholars have made important contributions to migration research in particular areas. These include understanding why migrant workers are channelled into particular workforce segments (e.g. Piore, 1979; Waldinger and Lichter, 2003); identifying the reasons for discrimination against migrants in workplaces and the labour market (e.g. Taksa and Groutsis, 2010; Yu, 2019); analysing particular types of management practices in workplaces and industries where migrant workers are concentrated (e.g. MacKenzie and Forde, 2009; Thompson et al., 2013); examining the strategies and policy positions of unions and employer associations towards migrant workers (e.g. Marino et al., 2017; Wright, 2017); and analysing state and community strategies to ensure that migrants' employment rights are enforced (e.g. Clibborn, 2019; Fine and Bartley, 2019).

#### **What explains the association between migrant labour and low-quality work?**

The workplace and labour market experiences of migrants are highly diverse. In virtually all countries, migrants are represented across all professional and occupational fields, all industries and all levels of seniority (Bauder, 2006). Human resource management and international business scholarship focuses particularly on highly skilled migrants who are either 'self-initiated expatriates' who move countries of their own volition or else are employed by multinationals and posted to international offices as 'assigned expatriates' (e.g. Andresen et al., 2014; Guo and Al Ariss, 2015; Zikic, 2015).

Since these groups of migrants tend to have a high degree of agency and individual bargaining power, the concerns of this scholarship relate mainly to core human resource management processes among highly skilled migrants, such as remuneration, training, recruitment and selection; outcomes relating to their job performance, employee satisfaction and organisational learning; and issues relating to workplace and social integration amongst workers moving across borders (e.g. Collings et al., 2009). While there are notable exceptions (e.g. Almeida et al., 2012; Turchick Hakak and Al Ariss, 2013), marginalisation and mistreatment of these workers are generally treated as secondary concerns within these fields.

#### **Three approaches to rethinking migrant labour and low-quality work**

To account for why migrant labour tends to be associated with low-quality jobs, we need to examine supply-side (or worker-centred), demand-side (or employer-centred) and policy- and institution-related (or state-centred) factors.

##### **Worker-centred accounts**

As noted earlier, economic scholarship, particularly that informed by orthodox theories, has dominated research on the intersection of migration and work (McGovern, 2007). Such theories have also had a considerable influence on labour migration policy outcomes, as discussed in the following. This body of research, however, is yet to provide a convincing account for the persistent vulnerability of migrant workers to mistreatment and



marginalisation. In recent years, reports of migrant workers being underpaid and poorly treated have increased in countries such as Australia, the USA and the UK (e.g. Berg and Farbenblum, 2017; Ram et al., 2017; Weil, 2018). Economic theories, and the policies they inform, tend to suggest that such outcomes are generally the result of an 'information asymmetry between temporary migrant workers and their employers' (Productivity Commission, 2016: 30). This assumes that migrants have less access to information about labour market conditions and their rights under employment law than their employers. From this perspective, addressing this information imbalance is the key to resolving problems of migrant work exploitation.

Theories from employment relations and related fields, such as political economy and socio-legal studies, suggest that there are several factors aside from access to information that affect migrants' working conditions and their position in the labour market. The particular professions and occupations that migrants are qualified for, and whether these qualifications are recognised in the host country, can affect their opportunities within the labour market (Groutsis, 2003). Migrants who possess specialised and recognised qualifications in demand tend to be more able to find high-quality and high-income employment, and thereby avoid precarious work scenarios unless constrained by other factors including immigration rules, skill recognition procedures, language barriers and discriminatory practices. By contrast, migrant workers without recognised sought-after qualifications tend to have fewer options in the labour market, which is likely to push them towards low-wage, poor-quality jobs (Bauder, 2006; Dauvergne, 2016; Walsh, 2014).

In this context, as Fine and Bartley (2019) discuss in this special issue, new forms of non-traditional collective representation, such as worker centres and community organisations, have emerged to connect with migrant workers in ways that traditional representative structures may inhibit (see also Alberti et al., 2013; Lopes and Hall, 2015). The success of these new organisational forms may be partly due to their resonance with a more diverse workforce who see their identities as constructed primarily through their communities outside of work, rather than at the workplace (Yilmaz and Ledwith, 2017). The article by Yu (2019) in this special issue examines how identity and the related concept of cultural conformity can impact on migrant workers' careers and their inclusion or exclusion at the workplace. There is scope for future research to examine how identity can be mobilised individually and collectively to improve migrant workers' position within the workplace and the labour market.

Piore's theory has influenced subsequent research on the working conditions of migrant workers (e.g. Krings et al., 2011; McCollum and Findlay, 2015; Waldinger and Lichter, 2003). However, Clibborn's (2018) study of international students in Australia identifies a 'third frame of reference' of the peer group of other migrant workers. In this third frame, the prevailing norms regarding acceptable wages and working conditions are not informed directly by those of either the home or the host country, but by what is deemed acceptable within the peer group. Further research is needed to examine whether additional



frames of reference exist among other categories of workers, and how these can be potentially identified and harnessed as part of efforts to improve migrant workers' position within the labour market.

#### **Employer-centred accounts**

While the characteristics of labour supply are important for understanding the susceptibility of migrant workers to mistreatment and marginalisation, so too are characteristics of demand. The following discussion focuses on three demand-related characteristics: control, perception and skills.

While useful for assessing supply-side issues, Piore's (1979) application of segmented labour market theory also provides an important perspective on why employers may develop a preference for hiring migrant workers. Piore finds employers who disproportionately recruit migrant workers develop preferences for workers whom they can control in order to reduce or contain unit labour costs. This control may be associated with numerical and temporal flexibility in terms of the ability to hire and fire migrant workers more easily and to adjust working hours in response to changes in production schedules. Migrant workers are more willing to tolerate these conditions, according to Piore, because of their relative lack of alternative options for employment, and because their frames of reference lead to lower expectations compared to other groups of workers, as discussed earlier (Piore, 1979; see also Clibborn, 2018). Subsequent studies have broadly supported Piore's arguments (e.g. Bauder, 2006; McDowell et al., 2008).

Addressing skills shortages is another common theme of research on why employers recruit migrant workers. This is particularly the case among studies of higher skilled migrant labour (e.g. Hawthorne, 2013; Khoo et al., 2007). These skills shortages are typically understood within scholarship and defined in visa regulations in terms of 'hard skills' or the qualifications required for particular professions. Research has also pointed to migrant workers' possession of superior 'soft skills' or interpersonal competencies, such as the ability to communicate or to work constructively with colleagues, to explain employer preferences (e.g. Moriarty et al., 2012).

Other studies indicate that the 'soft skills' employers use to account for their recruitment of migrant workers can be a smokescreen for a desire to recruit workers over whom they can exert control (Ruhs and Anderson, 2010). For instance, a recent study of the hospitality industry found that employer claims of the superior soft skills of migrant workers related to attributes created by the conditions of sponsored temporary visas. These conditions made it difficult for these workers to exercise voice or exit the employment relationship and led employers to perceive them as more loyal (Wright et al., 2019).

#### **State-centred accounts**

The state plays a critical role in mediating the intersection between migration and work. There is considerable cross-national variation in immigration selection rules and procedures established by governments that determine which migrant workers are permitted entry into a labour market (Boucher and Gest, 2018). The relative strength or weakness of



national employment laws, labour market institutions and enforcement regimes can be critically important for determining whether migrant workers enjoy the same rights and opportunities as citizens and permanent residents, or whether they are likely to be underpaid at work and marginalised in the labour market (e.g. Fudge, 2014; Lever-Tracy and Quinlan, 1988). The following discussion reviews research on the state's role in mediating the migration-work relationship in terms of the association between migrant labour and low-quality work. In particular, it examines the following themes: the trend towards demand-driven policy; visa rules and residency status; the enforcement of employment laws; the influence of labour market institutions; the gaps between policy objectives and outcomes; and the gendered dimensions of labour immigration policy.

### **Conclusions**

The study has revealed that most of the migrants were in the age of thirties and forties, belonged to general castes with faith in Hindu religion, were mostly illiterates and migrated in the first decade of 21st century. Nearly 62 per cent of the migrants were earning a monthly income of ` 3000-5000. Low wages and rain-fed agriculture in the native place have been found the economic factors leading to migration, while poverty, poor civic amenities, leading a poor life, high aspirations and demonstration effect were social and psychological factors resulting to migration. Before migration, about 23 per cent persons were unemployed and 60 per cent were getting less than 250 days employment per year, but after migration, 41 per cent got more than 300 days of employment and 31 per cent got employment for 250-300 days. As far as income is concerned, before migration 49 per cent migrants were earning less than ` 10000 per annum, while after migration 34 per cent could earn more than ` 50000 and 28 per cent could get between ` 40000 and ` 50000 per annum. Nearly 58 per cent long-term migrants sent 50-70 per cent of their income as remittances back home. A general perception of the farmers regarding migration of labour was that it has resulted in increased supply of labour, decreased wage rates and increased social tension, crime, drug menace and cultural invasion. Despite this, Marathwada farmers preferred migrant labour due to their timely availability, quality of work and low wages. Some farmers preferred local labourers due to their trust worthiness and adjustment for advance payments. Among various farm operations, migrant labourers were preferred for transplanting of paddy, while for harvesting, threshing, cattle tending, sowing, spraying, hoeing and tractor driving local labourers were preferred by most of the farmers. Also, with migration of labour there was a significant decline in the harvesting charges of wheat, transplantation charges of paddy and annual rates of contract of a permanent labourer.

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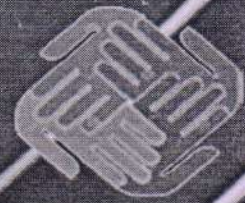


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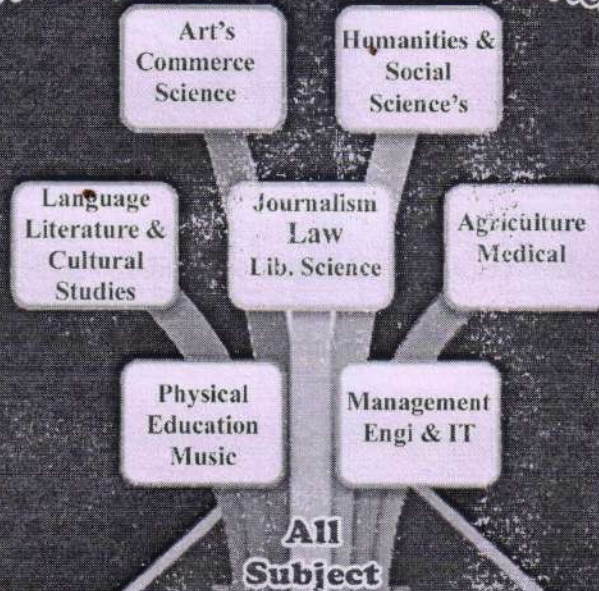
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**BARRIERS AND CHALLENGES IN IMPLEMENTATION OF LEARNING  
MANAGEMENT SYSTEM IN EDUCATIONAL INSTITUTES; AN INDIAN  
PERSPECTIVE**

**Dr.Sidharth S.Jadhav**  
Head & Research Guide  
Mrs.K.S.K. College, Beed

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**Abstract:**

During last decade booming of E-Learning is marked by introduction of new quality benchmarks and innovative ideas in Teaching Learning methodologies. The traditional teaching learning paradigms are rapidly being replaced by the IT Enabled Teaching and Learning methods. State of the Art ICT tools enabled teachers for making their teaching methodologies more innovative and student-centric.

Present paper deals with the implementation and challenges being faced during execution of Learning Management System called MOODLE. It has been successfully implemented in all institutes of Anjuman Ishat-e-Taleem Beed i.e. Primary School to PG College. An attempt has been made to illustrate the adopted methodology for it. Moodle system of every institutes has been migrated on cloud, more than 1500 logins/users have been created for students to access the uploaded contents and activities. Similarly 200 teachers' logins have been enabled with respective privileges to upload the contents and manage students. The system is currently available online and running successfully with a wide range of features.

**Keywords:** Learning Management System, LMS, Moodle, ICT, Cloud Computing, Open source.

**Introduction:**

Leading institutions always enthusiastic for adopting recent technologies in Teaching Learning Process and performing new experiments in this domain. The effort of educational institution for implementing new technologies in teaching learning process has skyrocketed. But in India many educational institutes are not capable enough to put such advanced methods into practice and, hence lagging behind due to a range of infeasibilities. Some of these infeasibilities are unfamiliarity of teachers, students, parents and non-teaching staff with ICT gadgets. Advances in E-Learning and Learning Management system require skills of interaction with such software and hardware. Due to technical infeasibilities it becomes more challenging to adopt globally approved solution in IT Enabled education.

Present paper deals with such experiments and faced challenges faced during implementation of Learning Management System called MOODLE in various educational units of Anjuman Ishat-e-Taleem Beed's Milliyya Campus. Initially the focus was on IT based infrastructural development of each unit, every institution has developed the Digital Class Rooms, Advanced Computer Labs and other devices required for ICT based teaching learning process. Than a complete Learning Management System called Moodle has been implemented by providing training to all the stockholders of institute.

**About Moodle:**



Moodle is an open source Learning Management System that assists teachers to create powerful, flexible, and gives online learning experiences. The word Moodle was originally an acronym for Modular Object-Oriented Dynamic Learning Environment, which is mostly useful to programmers and education theorists [1,2]. It is the open source software and freely available online. A Moodle community [3] is always available online to assist if any help is required by its user. In India many leading institutes like IIT, universities are using Moodle for interactive learning by Learning Management System. Moodle offers the login facilities to all stockholders of education with their privileges. So teachers, course coordinator and principle can monitor the progress of students. Using Moodle any institution can develop an interactive learning environment, which can be made available online. Globally many institutions and researchers have implemented Moodle as LMS. In an attempt Shulamit Kotzer et. al.[4] have presented work based on Learning and teaching with Moodle-based E-learning environments in fields of Math and Science & Technology.

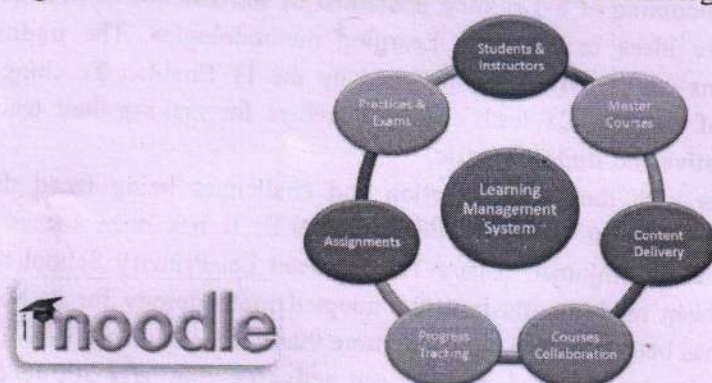


Fig. 1 – (a) Logo of Moodle (b)Features of Moodle LMS

ad resources and activities. Resource may be any teaching e-content like ppt, video, pdf, images etc., which teacher wants to share with students. On the other hands activities are questionnaires, assignments, survey etc. to involve and evaluate students. Moodle offers most of the features of a typical Learning management System; figure illustrates the key features of LMS.

#### Implementation Methodology:

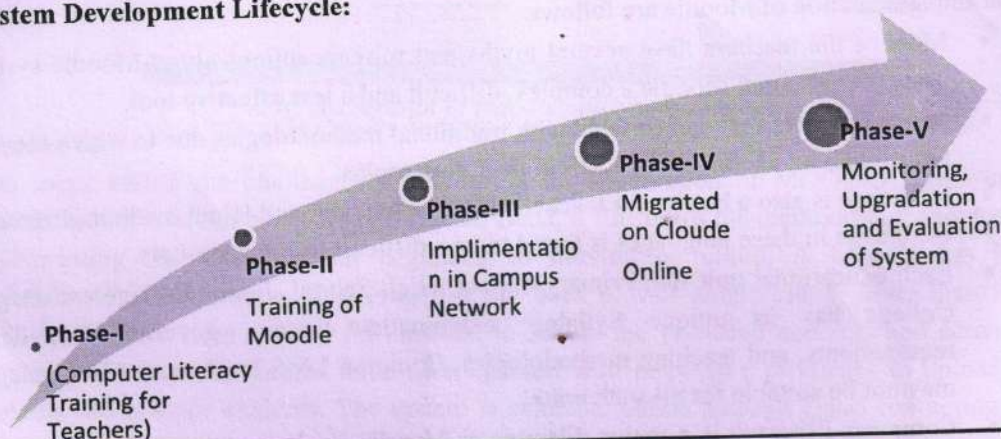
After providing ICT infrastructure to teaching staff of each unit, the implementation of E-learning was a big challenge. Initially teachers were trained to use smart boards, projectors etc. during their class session. But the key objective of project was to find a robust E-Learning solution and it was possible by LMS i.e. learning management system. The first dilemma was to find a suitable and affordable LMS, hence a study of open source and commercially available Learning Management System was done. With the help of visionary patrons of institute and experts it was decided to implement Moodle as Learning Management System. After successful launching of Moodle LMS solution, first requirement was to provide training to teaching staff and make them familiar with Moodle. Training sessions were organized for selected resource persons from each unit and it was expected that these recourse persons will trained the teaching staff of each unit to use Moodle.



But Computer illiteracy is always a major dilemma in execution of such projects. If teacher is unable to handle the computer efficiently then it is impracticable to achieve such I.T. enabled projects. It was observed that most of the teaching staff is not expertise even in computer handling. It gave a new diversion to project implementation. The statistical data has been collected to understand the status of computer literacy in teaching staff. Based on it teaching staff is categorised into Computer Familiar and Unfamiliar. First the training was provided to the teachers who were unfamiliar with ICT.

While training it was aimed to trained teachers to get familiar with computer and ICT and its applications in daily teaching methodologies. Later it helped them to use Moodle tool effectively to enhanced teaching methods. For continuous evaluation of teachers' home assignment and testing methods were adopted. Based on various skill tests teachers were categorized slow learners and fast learners and specific syllabus was designed accordingly.

#### System Development Lifecycle:



- The Phase-I of project was based on training of teachers for handling computer efficiently so they could have expertise in dealing with LMS and E-Learning.
- During Phase-II Moodle has been implemented with selected teachers and students only, it simplified the dilemma of I.T. infrastructural infeasibilities.
- In Phase-III Moodle has been installed on Local Area Network in campus of Milliyya to trained teaching staff for handling Moodle before moving on cloud.
- Instead of compulsion of Moodle to every teacher and each unit only selected expert teachers were invited to learn and upload their contents. From each unit a batch of 20 students selected as sample.
- In presence of President and Secretary of Milliyya, a debate was arranged in each unit, where teaching staff illustrated whether Moodle is suitable for their unit or not? If suitable, then which implementation strategy should be adopted at their unit? It helped them to understand exact problem and technical experts assisted them to correct their myths and misunderstanding.
- In Phase-IV Moodle is migrated online on cloud from institute's LAN.
- Phase-V is based on periodical Monitoring, Evaluation, fault finding and Reengineering for successful implementation of the project.
- Moodle portals of all units of Milliyya campus are now available online and can be accessed through following links.



Name of Institute	Link Moodle migrated online
Milliya Arts, Sci. & Management Sci. College	<a href="http://moodle.milliyasrcollege.org">http://moodle.milliyasrcollege.org</a>
Milliya Junior College of Arts, Sci. Vocational	<a href="http://moodle.mjrcb.org">http://moodle.mjrcb.org</a>
Milliya Urdu D.T.Ed College	<a href="http://moodle.milliyaurdudedcollege.com">http://moodle.milliyaurdudedcollege.com</a>
Milliya Primay, High School, Beed, Ambajogai, Parli, Dharoor	<a href="http://milliyaschool.org">http://milliyaschool.org</a>
Department of Computer Science	<a href="http://cms.milliyasrcollege.org">http://cms.milliyasrcollege.org</a>

#### Findings during Moodle implementation:

Success of project implementation strongly depends on the adopted strategy and paradigms for system development. Analysis of existing system and understanding requirements of proposed system is very first step in SDLC. The observations and findings after implementation of Moodle are follows.

- Most of the teachers have several myths and misconceptions about Moodle system. They pre-assumed Moodle a complex, difficult and a less effective tool.
- Many Teachers feel comfortable with traditional methodologies due to which they are not sure about usefulness of LMS in their classrooms.
- Language is also a barrier for teachers of Urdu, Marathi and Hindi medium. Preparing e-contents in these languages is found to be a difficult task for teachers.
- Each educational unit like Primary School, High School, Junior College and Degree College has its unique Syllabus, examination pattern, government policies, requirements, and teaching methodologies. Common LMS implementation strategies may not be suitable for all such units.
- Computer illiteracy is a major dilemma in Moodle implementation. If teacher is not able to handle the computer efficiently then it's not possible to implement such I.T. enabled projects in Schools and Colleges.
- Electricity power cut and Lab maintenance are also one of the barriers in this respect. Un-maintained Computer Labs, Electricity power cut issues and poor server security are few of the key reasons behind slow progress of E-Learning in India.
- Routine job schedule and exhaustive daily responsibilities of teaching staff influence badly on progress of E-Learning project implementation. As a result project couldn't be completed within deadline.
- Another myth of teachers is that slow typing speed is a hurdle for them, due to which they are frustrated and not enthusiastic to prepare e-content and questionnaires.
- Large strength of student requires more IT-infrastructure like Computer Labs, Tablet and Internet facilities. For example, a School with more than 1000 students can't manage LMS with a Lab of 25 computers. It raises some unanswered questions like, 'how the students will access Moodle?' Accessing Moodle is even not possible for all teachers during limited school hours.



- Easy and uninterrupted access of 4G network, electricity and ICT gadgets will overcome most of the mentioned challenges and dream of Digital India can be achieved.

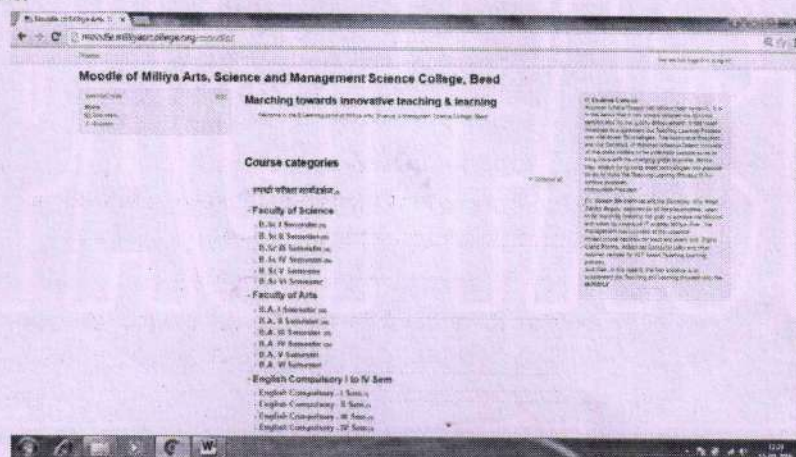


Fig. Screenshot of moodle.milliyasrcollege.org

#### Conclusion:

This paper enlists the challenges faced during implementation of MOODLE LMS in all educational units of Anjuman Ishat-e-Taleem Beed. It illustrates the methodology adopted for implementing the Moodle from beginning to moving on cloud. A Moodle has been implemented in local network afterward it has been moved online cloud. More than 1500 logins/users have been created for students to access the uploaded contents and activities. Similarly 200 teachers' logins have been enabled with respective privileges to upload the contents and manage students. The system is available online through cloud computing and running successfully.

#### Acknowledgements:

The authors would like to thank the secretary and the president of Anjuman Ishat-e-Taleem, Beed for their kind support during implementation of Moodle project.

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(दृश्य एवं प्रदर्शनकारी कला की शोध पत्रिका)

अंतर्राष्ट्रीय सम्मेलन विशेषांक



मिथिलांचल संगीत परिषद्

स्नातकोत्तर संगीत एवं नाट्य विभाग

ललित नारायण मिथिला विश्वविद्यालय

कामेश्वरनगर, दरभंगा (बिहार)



# Puppets as Pedagogical Tool in Formal Education

Ms. Anagha Deshpande\*, Dr. Sanjay Patil Devlankar\*\*

## Abstract

This research was conducted at 'Nirmala Institute of Education (NIE) - Goa, in the academic year 2021-2022, based on use of glove puppet as a pedagogical tool in formal education. The purpose of this research is to systematically train teacher trainees to use glove puppets skillfully, to teach their respective subject method, and report the benefits and possibilities of the use of puppets in lesson planning. The steps followed were as follows:

- Conducting a workshop on 'Puppet making',
- Skilful utilization of puppets,
- Data collection of utilization of puppets for each available subject pedagogy by S.Y. B.Ed. students (Teacher Trainees) at NIE and,
- Survey of the research thus available.

As a result, various ways of utilisation of puppets were observed in four major sections of lesson planning. Conclusion thus derived includes:

- Various kinds of utilisation techniques,
- Benefits to learners.

Puppets can be used in teaching most of the subjects in numerous ways. It is helpful in teaching grammar concepts, character sketches, introduction to concepts, role plays, storytelling, to assign creative assignment for students, classroom management, establishing routines and teaching vocabulary. The students become more attentive in the classroom and understand the content easily. Use of puppets makes the lesson interesting and engages the students throughout the lesson.

**Key Words:** Puppets, Lesson, Glove-puppet, Education, Pedagogy.

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tool have been a part of ritualistic celebrations and entertainment all over the world. In ancient Indian literature including *Mahabharata*, there are references to puppets. Upadhyaya K.S. points to the Classical Indian Drama tradition as documented by Sage Bharat in the '*Natyashastra*' (c.2 B.C.E.), where the term *Sutradhar* is used in the context of 'stage manager' and/or 'production controller'. The word literally means 'one who holds (and manipulates) strings'. Apparently the term has been taken from the String Puppetry technique. There were four types of puppets that were and still are used in India: *String Puppets*, *Rod Puppets*, *Leather Puppets* and *Glove Puppets*.<sup>[1]</sup>

Costume as an aspect of *Aharya Abhinaya* as categorised in the *Natyashastra* (NS), plays an important role in a creative approach towards all kind of puppets where they are imparted an identity by treating them as 'characters'. The puppets are required to be adorned by costumes, ornaments, headgears, other accessories and are a part of the surrounding settings. Along with the puppets, the puppeteer also needs to wear a corresponding costume.

In most of the classical theatre forms, the use of voice modulation, songs and music becomes very important in puppet shows. Their

Awasthi Suresh, "In the context of ancient and rich puppet tradition in India, the situation in modern puppetry is most depressing".<sup>[2]</sup> However in sectors other than the entertainment, since the middle of 20<sup>th</sup> century, puppets became a medium of social awareness and education. In India, puppets are used by a number of theatre groups and social welfare organizations.<sup>[3]</sup>

Several experiments have taken place in health, education, environmental and social sectors to create awareness using the puppet as a tool.

This particular research was conducted at NIE - Goa, in the academic year 2021-2022, where 'glove puppets' were used as a pedagogical tool in formal education. Its purpose was to systematically train teacher trainees to use glove puppets skillfully in teaching their respective subject methods and report the benefits and possibilities of the use of puppets in 'lesson planning'.

## 1. Methodology:

### 1.1. Step I – Puppetry Workshop:

In order to use puppets as a pedagogical tool, the researcher felt it important to train teacher trainees to create their own puppets as per their requirement. The researcher through the IQAC of NIE - Goa, in association with the National School of Drama (NSD), New Delhi, organised and



and Teacher Trainees. Mr. Arun Kumar Mallik, Assistant Professor at the NSD, New Delhi was the resource person for this online workshop held from 23<sup>rd</sup> August to 25<sup>th</sup> August 2021. The participants actively participated and sent photographs and videos of the puppets created in the process. Mr. Mallik while encouraging the use of easily available household items to create the puppets also suggested a list of alternate materials that could be utilised. Herein, all the 97 teacher trainees of S.Y. B.Ed. at NIE learnt and prepared their own puppets.

### 1.2. Step II – Skilful Utilisation of Glove Puppets:

Once all the students learned to make their own glove puppets, the researcher gave them a brief introduction on *Aharya Abhinaya*, which becomes very important to create a character of the puppet. Since the dress and ornaments play an important role in the extraneous representation which goes under the aspects of *Aharya Abhinaya*.<sup>[4]</sup> In the process, the trainees comprehended the concept of the *Aharya* in NS.

Practical sessions were then held for voice training and hand movements according to the character of each one's puppet. Considering the guidelines around Covid-19 pandemic, a few sessions were held online and few were offline. After

began experimenting with voice modulation and different tonal qualities which could suit the character of the puppet they had.

### 1.3. Step III – Application:

As a part of the assignment, each student was instructed to explore the possibilities to use their own glove puppets in their respective subject pedagogy during their collaborative lessons and internship at schools. A few students used the online mode of teaching while some opted for the offline mode. Some of the students extended their creative teaching abilities and conducted Puppet making sessions for students as well as for teachers. A few of them also prepared a performance incorporating their puppets on social awareness during the Art Day at NIE.

### 2. Data of Utilisation:

Following data was collected from the S.Y. B.Ed. Teacher Trainees at NIE after their experiment of utilising puppets for each of their available subject pedagogy.

#### 2.1. Use of Puppets in Science Pedagogy:

- Puppets were used to spread awareness amongst children about various diseases (like COVID-19, Malaria) and inform them about the Do's and Don'ts.

- To create awareness on social issues like cleanliness, hygiene, pollution, water conservation, segregation of waste, environmental issues etc.
- Conversation between a snake and human puppet were used to show the importance of snakes in the ecosystem
- Role play was carried out by making use of two puppets like any 2 animal puppets for acting out and discussing habitats. For example:
  - a. used puppets of cow, lion to explain about herbivores and carnivores,
  - b. to show how animals and plants coexist and various other topics related to them,
  - c. lifecycles of organisms like the butterfly and frogs,
  - d. mode of nutrition in animals,
  - e. showing certain wild animals that are difficult to bring into the classroom.
- Teaching the concept of electricity, to explain the stars and Solar system, to explain the food chain and photosynthesis
- For set induction: It depicted how darkness hampered one student's learning due to no light while the other character was the inventor, who invents the electric bulb.

of deforestation and then asking the students to state the causes or solutions.

#### 2.2. Use of Puppets in Math Pedagogy:

- Puppets were used to explain properties of different basic geometrical shapes.
- State theorems or proofs in mathematics where students could comprehend easily
- Set induction to introduce the topic.
- To teach more advanced skills like problem solving, sharing, and simple addition and subtraction.
- Explain rules of ratio and numbers. Sing songs about the rules of ratios, identities in math, various formulas etc.
- Conversation between mother puppet and children puppet discussing about the area of children's bed in relation to the size of parent's bed.
- Teach topics like fractions, basic geometry at lower level.
- Revision by asking questions in the form of riddles with reference to different polygons.
- Creating a market scenario involving profit, loss and discounts.



loans, simple interest, compound interest and also in teaching values such as sharing along with the mathematics pedagogy.

- Puppets were also used to demonstrate various geometric shapes, equations and number lines.

### 2.3. Use of Puppets in History Pedagogy:

For history lessons, Puppets were used in the following ways;

- To enact a Civics lesson such as judiciary.
- To describe stories or problems of people, talk about Gram Sabha meetings, Panchayat Raj, discussions in a rural area, explaining stereotypes, discrimination in Civics class.
- To narrate a story/historical incident.
- To enact the scenes or to discuss current affairs and political science to introduce certain events.
- In set induction to depict a forest scene conversation between two friends to explain Colonialism and forest laws.
- To show conversations regarding Harappan civilization, Forest laws and its effects, Pathshala and Schools in British India, Socio-

- In showing differences or similarities, causes and effects, of the content like World War or Indian freedom struggle and Goa liberation.

### 2.4. Use of Puppets in Geography Pedagogy:

- For lessons like solar system, types of vegetation, environment.
- Collaborative lessons to introduce the topic 'Life in the Sahara Desert'.
- Conversation between two puppets on water scarcity.
- Using individual puppets as characters of natives speaking monologues.
- A set induction for the topic on the solar system to depict a conversation between a mother and a daughter mesmerised looking at the objects in the night sky.
- To explain about resources and other environmental problems like waste segregation, water management techniques and also to explain about Celestial bodies and stars, planets, agriculture and crops, seasons, resources.
- Asking the students to frame dialogues between two puppets and voice them differently.

- Puppets were used to develop oral and language skills.
- To teach prose, poetry, phonics and grammar concepts like parts of speech and nouns.
- To teach a lesson named 'Stone Face' for standard VIII. The whole lesson was taught by using puppets with different characters like Grandpuppet, Brainy puppet,
- Techno puppets were made and used in the class.
- To convey a short story as set induction for teaching of a poem.
- To teach the poem 'The Ant and The Cricket' the puppet was used to narrate another fable to the students and later connect it with the poem.

### 2.6. Use of Puppets in Konkani Pedagogy:

- To show the conversation between two characters mentioned in the lesson.
- To teach the parts of speech and dialogue writing, topics like pronouns, tenses.
- To recite poems.
- In the lesson 'पर्यावरण', showed the tree as a puppet depicting her story on how they feel when they are cut down.
- Taught the students new vocabulary effectively. Telling

आपजीण where a doll depicts her own story.

### 2.7. Use of Puppets in Hindi Pedagogy:

- Puppets were used in teaching grammar and grammar related concepts while the students listened attentively.
- To teach Dialogues, that is 'संवादलेखन' like showing a conversation between puppets of two animals.
- To narrate the poem.

### 3. Research Survey

The survey was driven by the following research questions asked by the researcher:

- a. Was learning to make and use puppets benefit you as a teacher? If yes,
- b. How do you apply it as a pedagogy tool of teaching?
- c. According to you, for which levels of Education are the puppets useful?

All of the 97 Teacher Trainees of S. Y. B.Ed. (i.e.100%) participated in the practical survey and answered the questionnaire.

### 4. Analysis of Results:

#### 4.1. Beneficial for all the 97 students

Learning to make and use puppets was beneficial to all the teacher trainees i.e. the positivity was 100%.





Yes  
No

Figure 1

#### 4.2. Beneficial at steps of Lesson Plan

4.2.1. Teacher trainees used puppets at different steps of the lesson plan. These steps are the 'Herbart's five steps of lesson plan' [5]

Table I describes the use of puppets at different steps of lesson plan.

Table I. Puppets used at different steps

Step of lesson plan	Individuals made Choice	% Individuals made choice
Set Induction	38	38.7755102
Link Statement	0	0
Development	74	75.51020408
Closure	5	5.102040816
Assessment	13	13.26530612

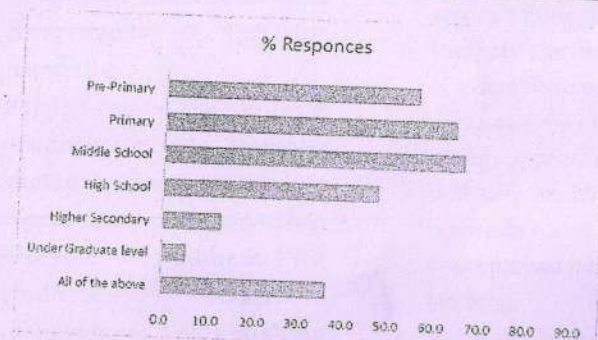


Figure 2: Puppets used to teach the other four stages of the lesson plan except Link Statement.

Table II - Choice of Teacher Trainees	
Teacher trainees Made Single Choice	67
Teacher trainees Made Multiple Choice	31

Teacher Trainees used puppets to teach part of the lesson:

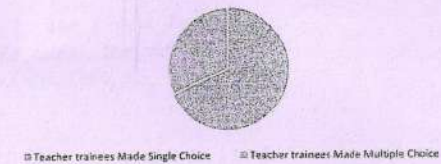


Figure 3. Use of Puppets in one or more parts of the lesson plan

4.2.3. According to teacher trainees, levels of education where puppets are useful are as shown in Table III.

Table III- Use of Puppets

levels	Responses	% Responses
Pre-Primary	54	55.7
Primary	62	63.9
Middle School	64	66.0
High School	46	47.4
Higher Secondary	12	12.4
Under Graduate level	5	5.2
All of the above	35	36.1

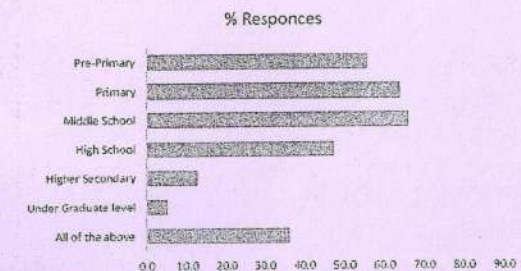


Figure 4: Use of puppets in different levels of formal education.



This survey was done with S. Y. B.Ed. teacher trainees of NIE, hence it covers the area of std V to std IX schools of the State of Goa. The subject pedagogy was limited to the subject methods available at NIE. Inferences drawn from the experiment shows:

- a. The use of Puppets are useful at Middle school and at High school levels and can thus assume that it may be useful for pre-primary to undergraduate levels of formal education in various ways as well.
- b. Puppets can be used as a tool to start the lesson as Set Induction, to teach the entire content as Development, to summarise the content as Conclusion and also to make Assessment or Revision interesting.
- c. Puppets can be used to teach grammar concepts, character sketches, introduction to concepts, role play, storytelling, creative assignment for students, classroom management, establishing routines and vocabulary.
- d. Teacher trainees observed the positive reactions and

while using the puppet as a tool.

## CONCLUSION:

The research conducted at NIE - Goa, in the academic year 2021-2022, where 'glove puppets' were used as a pedagogical tool in formal education brings forth certain results which make way for further experiments in this direction. The conclusions drawn are:

- Puppetry can be used during 'Set Induction' to grab students' attention and curiosity.
- The students become more attentive in the classroom and understand the content easily when puppets are used in 'Development' of lesson teaching.
- Use of puppets make the lesson interesting and engages the students throughout the lesson.
- Puppets can be used during 'Closure' to learn new scientific terms along with the spelling.
- Using puppets for 'Assessment' will help students in order to remember and recollect the concepts and motivate them in learning.
- It can also be used to make an abstract concept easy for students and to relate to it while learning.

reinforcement besides teaching the content.

Conflict of interest: Authors declare that they do not have any conflict of interest.

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- [5] <https://www.britannica.com/topic/Herbartianism>. As seen on 10<sup>th</sup> August 2021.



theatre, students are not asked to read the script; they are asked to perform as prompted by the teacher. Script reading is not done at the outset. However, once the dialogues are learnt, the students start reading the script aloud without help and gain confidence.

#### 4.8. Performance in rehearsals

There are three ways of performing. One is in front of the audience, where the reactions cannot be predicted. Another is performing in the rehearsal where the audience are co-artists and reactions are more controlled. During rehearsals, actors and the director sit and discuss the positives and improvement areas. The performer experiments and gets instant feedback from the team. The third type of performance is in front of the mirror while recording yourself to know how you sound. Children understand their voice and speech better and become ready to try out new things. This experimentation leads to improvement in next rehearsal until the desired result is achieved.

#### 5. Conclusion

Learning drama in early childhood is important. Drama rehearsals or a rehearsed play is all about experimen-

hand to explore possibilities in a secure environment, where rehearsals play a vital role. Although the impact cannot be measured in litres or kilograms, it can certainly be felt, realised and observed. Children show positive response and improvement in the expression of speech. Some students may not see much improvement if they are not taking interest and efforts. The teacher and script also play a key role. While the teacher has the control and command on how the activities are conducted, the script chosen must be interesting for children.

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## Theatre Education for School Teachers and Role of Theatre Teacher in Skill Development of Students

Sanket Shankar Khedkar\*, Dr. Sanjay Patil\*\*

#### Abstract

*The city of Ahmednagar in Maharashtra has a great heritage of Theatre culture but what is the situation of school theatre education in this city? What is the importance of Theatre education for teachers and students in school education? How should this education be given? Also What qualities should a theatre teacher have? In what way do teachers look at Theatre education in schools? This research paper is an attempt to find answers to these questions. Theatre curriculum is considered as an important subject in school education nowadays and efforts are made in this regard but are these efforts really useful? The reason for asking this question is that the theatre curriculum is viewed in two ways, first as a means of getting more marks and second as a means of entertainment. The researcher has qualitatively examined the experience of working as a trainer in some children's theatre workshops, by interviewing secondary school teachers, Teachers working with children with disabilities and presidents of amateur theatre organizations in Ahmednagar. The present research has discussed the main purpose, importance of theatre education in school education and the exact role and usefulness of the theatre teacher in this.*

**Keywords :** Theatre teacher, Student, Skill, Theatre in education

#### Introduction :

Literature, music and the art all are necessary for the development and flowering of a student to form an integrated total personality - Rabindranath Tagore [1]

Theatre as an art form is a confluence of many arts such as literature, music, acting, sculpture, dance, painting. People who work in theatre develop moral values, good habits, clarity of ideas and philosophy. In the book Kala Adhyapan, Prof.

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- Education should lead to adequate mastery of the basic tools of study.
- Observation and research attitude and self-study should be developed.
- Socio-cultural values should be cultivated.
- Socially and academically productive skills should be cultivated.
- Be aware of national and moral responsibilities.
- Study should be done in terms of physical, mental, intellectual and financial stability. [2]

The present research will discuss how theatre as an art form helps to fulfill the primary purpose of education and what the role of Theatre teacher will be. 'Organizations like Theatre In Education (TIE) in India mainly train teachers to teach theatre. In this the teachers are introduced to the basic learnings of theatre and take practical classes on it as well as the objectives of Theatre education, teaching formulas, skills, methods and tools'. [3] But only a few teachers are trained by such institutes, so what about the teachers who are teaching Theatre from numerous other schools in India? To know how they teach this subject to students, the researcher conducted this project in a small area of Ahmednagar city. Among these are Babasaheb Rahtal, teacher of

of Don Bosco Secondary School Ahmednagar, Shivanand Bhangre, teacher of Jankibai apte mukbadhir vidyalaya this Deaf School, Dr. Shyam Shinde, President of Saptarang Theatres, an amateur theater organization that has been working for 36 years. Interviews have been conducted. Also, the research student has collected information by working as a trainer in a children's theatre workshop.

**a) Educational Objectives of Theatre Education :** The educational objective of Theatre is to develop potential qualities inherent in students through creative mediums like theatre. This medium helps in personal development.

- Intellectual Development
- Physical Development
- Perceptual Development
- Emotional Development
- Social Development
- Aesthetic Development
- Creative Development [4]

The aim of theatre education in India is to make the society aware of its duties as much as or more strongly than the awareness of its rights after independence and to produce sensitive and intelligent citizens. In the theatre curriculum, the study of subjects such as memorization, sound, phonetics, dance, music, body, speech, communication, yoga, spontaneous

## **b) Significance of Theatre Education for students :**

1. Confidence, trust in each other, sense of cooperation, sense of not being overwhelmed by success or discouraged by failure, disappearance of shyness achieved by Theatre education.
2. While playing, the art of witnessing the dramatist and the personality of his role is achieved.
3. Practical ingenuity is the ability to understand how to live in the world.
4. Ability to understand others and convey your thoughts and feelings to others.

## **c) A Theatre teacher's method of teaching Theatre :**

1. Planning : The Theatre teacher should determine what the needs of the children are by focusing on the finer elements of the experience they want to provide and from that plan the experiences they want to provide, evaluate what happens and see the next lesson figures and appropriate opportunities for the children to come and decide. The additions should be used to build up the next section as students need to be convinced that they are really being involved in the study.

expectations are the way play is taught and there is closeness between the teacher and the children, with the teacher encouraging as much talking as possible. But while doing that, the teacher should make sure that we are going in the right direction and trying to give a meaningful twist to what the children suggest. Also, the children should also feel that the teacher's suggestions are appropriate in the given situation. Every teacher's rules may be different but each time he must ask himself whether the situation in which the lesson is being taken, the instructions given to the class, his attitude towards the play and the expectations of the students are interfering with that control.

## **3. Contemplation :**

Both the teacher and the students get the opportunity to discuss the theatre experience. As much skill is needed in theatre design, staging of the play, it takes skill to discuss with the children. Discussing the theatre experience taken and making general inferences from it, the children find a way to improve.

## **4. Analysis :**

The teacher should recheck the statements. Nothing new is learned because both of them have already guessed the content or the problem or the end of things that everyone in the



attitude should be permanently restrained, Options should be chosen so that new things will be learned. The teacher should decide which experience to give and why.

## 5. Evaluation

In general, theatre is evaluated on whether the lesson or the experiment is done well. But in educational drama, the internal experience means the classroom environment, the quality of the children's response, the level of emphasis they take, their perspective on the experience, etc. [5]

**d) Theatre Education for Deaf and Handicapped Children :** Theatre is used to some extent as a form of therapy for physically challenged children. In other words, as a supplement. Such children have to do certain types of exercise. Humans tend to avoid anything that requires effort. That's why exercise does not benefit disabled people. But through play these things are automatically achieved. Deaf, dumb, retarded people have different ways of teaching. Blind children have keen ears and tactile sense is good. And they can be reached mainly through tactile knowledge, physical acting has to be the main emphasis. Theatre makes such a difference as a disabled person. Increases concentration, imagination, perception. [6]

any systematic procedure devised to examine the content of recorded information" - Walizer & Wiener (1978) [7]

- Method : Qualitative Research Method

- Data Collection :

Primary sources - In depth interview and direct observation.

Secondary sources - Relevant books, journals, magazine, e-sources.

**Study Area :** Ahmednagar District

## Limitations :

1. It was not possible to interview teachers from all schools in Ahmednagar.
2. As there is no post of Theatre teacher in schools in Ahmednagar, teachers teaching other subjects have been interviewed.

## Results and discussions :

**a) Theatre Education in Secondary Schools :** The following general points emerged from the interviews with Babasaheb Rahtal a teacher of Madhyamik Vidyalaya Islak Nimblak Ahmednagar and Nitin Gaikwad, a teacher of Don Bosco Madhyamik vidyalay Ahmednagar.

- Theatre education is important for children in school life and will encourage children who are interested in the arts.
- There is no post of Theatre teacher for theatre education in

- Language teachers conduct drama performances by students on Independence Day, Republic Day and social gatherings and train the children for those performances.

- Teachers get information about play by using television, internet and also by watching actual play.

- There is a shortage of core subject teachers in the school, if that shortage is filled the teachers can take theatre training and use it to teach the students.

- Theatre training should not be compulsory for all teachers but it should be given to teachers who are interested in theatre.

- SCERT (State Council of Educational Research and Training, (MIEPA) Maharashtra Institute of Educational Planning and Administration, (DIET) District Institute of Education and Training. There is a provision of Theatre education through such institutions but it is not effectively implemented at the school level.

- Students who engage in theatre with amateur theatre organisations within and outside of school programmes

curriculum.

**b) Theatre Education in the Deaf School :** General issues that emerged from the interview with Shivanand Bhangre, an art teacher at Jankibai Apte Mook Badhir Vidyalaya, Ahmednagar.

- All the students studying in this school are deaf and dumb. While teaching each lesson, there is a need to teach in a dramatic manner by using physical movements as much as possible.
- Although there is no specific post of Theatre teacher in the school, every teacher gives drama education to the children through different means.
- On occasions like Independence day, Republic day, birth anniversary of great people, plays are performed by children and all children participate in these performances with great enthusiasm.
- Kanchan Sontakke of Natya School Mumbai for Teachers has taken the training classes and has noticed a positive change in the teacher's teaching style.
- These theatre training classes have made students more expressive, children who are not interested in reading and



education.

- Theatre education should be compulsory for all teachers.

#### c) Theatre education from

**Children's Theatre workshop :** Saptarang Theatre, Ahmednagar organized a children's theater workshop in June 2022, twelve children aged 6 to 14 years participated in this workshop, 5 were boys and 7 were girls, research students acted as theatre trainees, observations are as follows :

Positive change was seen in 6 out of 12 participants, Among these six participants, the proportion of girls was higher.

Positive changes are as follows :

- Increased ability to concentrate and listen
- Increased participation in workshop games
- The number of people coming forward to tell their own stories increased

The remaining 6 participants showed no significant change, Fifty percent of participants showed a positive change.

Observations on working as a theatre trainees :

- While working as a theatre coach, it is necessary to consider the age group, economic, social and family background of the children.

as a theatre coach ? What are the exact objectives and methods ? There should be clarity about this.

- Each day should be planned strictly. In theatre training classes many things have to be improvised by children's art without changing the purpose.
- Presentations and discussions at the end of the workshop are needed for evaluation to check the impact of the training given on the children or what they have learned from it.
- Specific measurements are needed to examine the long-term effects of Theatre training on children's school life.

**d) Theatre education in amateur theatre :** The general issues that emerged from the interview with Dr. Shyam Shinde, President of Saptaranga Theatre, Ahmednagar.

- Theatre education should be considered not only from the point of view of a career in theatre but also how it can be used for overall personality development.
- For teachers, the nature of Theatre education should not be complicated, philosophically informative, but very simple and fun with play, improvisation and short performances.

work and breaks down ----- destructive tendencies.

- Children should have at least one hour of drama class a week.
- Saptarang Theatre has seen positive changes in children who have been consistently working in children's theatre.

#### Conclusion :

This small-scale research found that teachers in general schools of Ahmednagar city know the importance of Theatre education but view it only as an extracurricular activity and entertainment. Overall development and value education of children through theatre education is not the aim because there is no awareness about it. On the contrary, teachers of deaf schools have taken theatre education and it is used for personality development of children. Positive changes have been noticed in the personality of the students working in play from amateur theatre organizations and in schools. While conducting the theatre training workshop, the researcher noticed that due to the lack of training on how to give theatre training, the researcher could not properly observe and

and implemented at the school level and educational policies to decide on Theatre education and theatre teachers. In order to bring about the overall development of every student studying in the school, it is necessary to give theatre education to every school teacher.

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## खान्देश का लोक कलाओं के माध्यम से कौशल विकास

### Skill Development Through Folk Arts In Khandesh

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#### परिकल्पना (Hypothesis)

1. खान्देश में बहुत सारी कलाएँ हैं। मगर भोंग-या बजार का होली नृत्य इस लोक कला के माध्यम से नये लोग, विद्यार्थी इस लोक कलाओं को पेश करने के लिये जुड़ रहे हैं।
2. भोंग-या बजार का होली नृत्य में प्रतिभागी होकर विद्यार्थी और अन्य लोग गाना और नृत्य सीख रहे हैं।
3. होली नृत्य में जो आभूषण पहने जाते हैं, उसे आदिवासी लोग बनाकर उसे बाजार में बेच कर अपना गुजारा भी कर रहे हैं। जिससे उनका विकास हो रहा है।
4. इन लोक कला में जो संबल, बांसुरी, ढोल, दिमडी ये वाद्य हैं उसे बजाने और बनाने का स्कूल के छात्रों को प्रशिक्षण दिया जा रहा है और इस कौशल से छात्र अपना विकास कर रहे हैं।

#### उद्देश्य (Objective)

1. खान्देश की आदिवासी संस्कृति की व्याख्या करके होली इस उत्सव को सिर्फ एक त्यौहार नहीं बल्कि अध्ययन के माध्यम से उजागर करना।
2. खान्देश का भोंग-या बजार का होली नृत्य इन लोक कला के माध्यम से सारे लोगों को जोड़ने का प्रयास करना।
3. खान्देश की इन कलाओं के माध्यम से स्कूलों में भी विद्यार्थियों को लोक कला सीखा कर उनमें नयी चेतना का भाव प्रकट करना।
4. भोंग-या, इंदल, तुरथाल, किंगरी, सोंगडया पार्टी जैसी विविध लोककलाओं के अपूर्व दर्शन करना।

**Keyword** जनजातीय संस्कृति, रीति-रिवाज, परंपरा, त्यौहार, गलतफहमी, अध्यापन क्षेत्र

#### परिचय (Introduction)

महाराष्ट्र के सामाजिक जीवन में लोककला का विशेष महत्व है। महाराष्ट्र में लोककला की गैलरी बहुत समृद्ध है। प्राचीन काल से, लोककलाओं ने तान और मनोरंजन का धारा

उठाया है। भारत एक कृषि प्रधान देश है और अधिकांश लोग गांवों में रहते हैं। इसलिए, गांवों में लोगों के मनोरंजन, ज्ञान और कौशल वृद्धि के लिए कलाओं का जन्म हुआ है। सूचना प्रसार के किसी भी आधुनिक साधन के अभाव

में, इन लोककलाओं ने सा वन में ज्ञान, सूचना, मनोरंजन, ज्ञानोदय और कौशल वृद्धि के मामले में प्रभावी ढंग से काम किया है।

खान्देश कपास, केले के लिए प्रसिद्ध प्रांत है। यह क्षेत्र अपनी समृद्ध लोककलाओं के लिए भी जाना जाता है। खान्देश के तीन जिलों में, जलगांव महत्वपूर्ण और सबसे बड़े जिलों में से एक है। जहाँ सबसे अधिक तालुके हैं। अहिरानी जलगांव जिले की प्रमुख भाषा है। इसके अलावा, इस जलगाँव में तावड़ी, लेवा पाटीदार, बंजारा, भील जैसी प्रमुख भाषाएँ बोली जाती हैं। खान्देश के पश्चिम में धुले जिला है। धुले, शिरपूर, शिंदखेड़ा, साकरी, नवापुर आदि तालुका इस जिले में शामिल हैं। अहिरानी भाषा धुले की प्रमुख भाषा है। त्यौहारों को पारंपरिक तरीके से मनाने की परंपरा है। आखाजी यानी अक्षय तृतीया इस जिले में मनाया जानेवाला सबसे बड़ा त्यौहार है। श्रावण मास में मनाया जानेवाला कानबाई पर्व लोगों में चेतना जगाने का काम करता है। नंदुरबार जिला गुजरात की सीमा पर स्थित है। हम इस जिले पर गुजरात का प्रभाव देख सकते हैं। यह पूरे देश में एक ऐसे जिले के रूप में जाना जाता है जो आदिम संस्कृति को उजागर करके आदिवासी संस्कृति को संरक्षित करता है।

आदिवासी जीवन की कला और संस्कृति यहाँ देखने को मिलती है। नंदुरबार जिले के काठी गांव में आयोजित होनेवाला होली का त्यौहार महाराष्ट्र का सबसे बड़ा लोक उत्सव है। भोंग-या, इंदल, तुरथाल, किंगरी, सोंगडया

करने और समाज से वंचित खान्देश की लोककलाओं को प्रकाश में लाने की मेरी तीव्र इच्छा है। इसलिए मैं यह शोध पत्र होली के लोकपर्व होली यानी भोंग-या बजार और इसकी विधि पर खान्देश के नंदुरबार में प्रस्तुत कर रहा हूँ।

#### साहित्य और पद्धति (Methodology)

मूल रूप से खान्देश के कई लेखकों ने नंदुरबार के आदिवासियों के होली समारोह को लिखा है। इसकी चर्चा मुख्य रूप से संतोष पवार के काव्य-संग्रह ढोल में की गई है। साथ ही प्रो. एन.डी. भामरे की जनजातियों का सांस्कृतिक इतिहास ने सबसे ज्यादा जानकारी जुटाई है। इसमें हम देख सकते हैं की, वह नंदुरबार में आदिवासी तांडो के पास गये और जानकारी जुटाई और उसका आयोजन किया। एक कोने में इस जानकारी के आधार पर इस शोध निबंध पर प्रकाश डालने और वास्तविक होली और इसकी परंपरा क्या है, यह जानने की मेरी एक अलग जिज्ञासा है। इसलिए ये थोड़ा-सा प्रयास कर रहा हूँ।

#### क्या है भोंग-या बजार अर्थात होली नृत्य की लोक कला (What is Bhongrya bajar & holi Dance Art?)

होली नृत्य अर्थात भोंग-या बजार—आदिवासी लोगों की एक परंपरा और त्यौहार भी है, जिसमें वे अपनी कमर के चारों ओर घंटियाँ बांधकर और ढोल के आवाज पर नृत्य करके अपनी खुशी मनाते हैं। यह एक परंपरा है जिसे आदिवासी लोग कई वर्षों से करते आ रहे हैं।



और उसमें आदिवासी लोग नृत्य करके अपने रीतिरिवाज निभाते हैं।

### कौशल (Skill)

भोंग-या बजार एक त्यौहार है और यह आदिवासी जनजातियों की एक लोकपरंपरा भी है, जिसमें आदिवासी विभिन्न प्रकार के हस्तशिल्प बनाकर अपनी जीविका चलाते हैं। ये लोग विभिन्न प्रकार की जड़ी-बूटियाँ, चादरें, आभूषण, बालों का तेल, स्वेटर, कपड़े, संगीत वाद्ययंत्र, जूते, लकड़ी के खिलौने बाजार में बेचकर पैसे कमाते हैं और इन वस्तुओं को पूरे खंड में बेचकर अपने कौशल को बढ़ावा देते हैं। और साथ में अपनी होली की नृत्य लोक कला का विकास भी करते हैं।

### कार्यक्षेत्र (Field Work)

घटना पिछले साल की है। नंदुरबार के लक्कड़कोट गांव को भोंग-या इस त्यौहार में प्रथम होने का गौरव मिला था। मैं म्हासावद गांव में भोंग-या गया। साथ में पाटिल, कारबारी और मैं भी 'गेर' के साथ था। वह बांसुरी बजाने में माहिर थे। उस समय रात के 12 बज चुके थे, सभी ढोल बजानेवाले एक खेत में जमा हो रहे थे। जल्द ही म्हासावद गांव के पास चिरडे गांव के लोगों ने अपने बाद्य यंत्रों को लेकर मेले की शुरुआत कर दी। म्हासावद गांव के लोगों ने सुना की चिरडे गांव के लोग मेला लगा रहे हैं और म्हासावद के सभी लोग हथियार लेकर उनकी ओर मारने के लिए भागने लगे। लेकिन पुलिस तुरंत आ गई। नहीं तो कोई बड़ी बहस हो सकती थी। कहने का अर्थ यह है की

है। हालांकि, कुछ गलत फहमियों और कुछ समझ के कारण कुछ लोग इस पर विश्वास नहीं करते हैं, इसलिए इस तरह के विवाद हो रहे हैं। जिससे दिग्गज और पुलिस निपट रही है।

'कुरर'...। काय रा मेलो काय गावो  
गावो उविने गीते,  
बारा मोयनाम आवली उवी बाय  
बारा मोयनाम आवे वो  
मेवू भोंग-यू लेती आवी उवी बाय  
मेवू भोंग-यू लेती आवे वो

अर्थ- 'कुरर' शब्द का प्रयोग नाचते, गाते समय किया जाता है। होली की महिमा-अतुलनीय है। 12 महीने बाद होली बाई आई। बारह महीने बाद होली बाई मेला भोंग-यू के साथ आई।

सातपुड़ा क्षेत्र में होली आदिवासियों का सबसे महत्वपूर्ण त्यौहार माना जाता है। मध्य प्रदेश, महाराष्ट्र, गुजरात और राजस्थान के आदिवासियों के जीवन में होली का त्यौहार केंद्रीय माना जाता है। एक और बात यह है कि आदिवासियों की होली हिंदू संस्कृति की होली नहीं है। आदिवासियों को प्रकृति के नियमों के अनुसार रहनेवाले समाज के रूप में जाना जाता है, जो प्रकृति के करीब रहते हैं। तो आदिवासी संस्कृति, जन्म, मृत्यु, त्यौहार, उत्सव हिंदू की तरह नहीं हैं। उनकी एक अलग जीवनशैली है। आदिवासी की होली सिर्फ नाच-गाने का नहीं बल्कि सांस्कृतिक वैभव और जीवन के लोकतांत्रिक मूल्यों से भरा त्यौहार है। आदिवासी पौराणिक कथाओं में आज भी

हुए समझ में आई। इस पौराणिक कथा में ज्ञात होता है की, होली की दो संतान भोंग-या और मेलदा हैं। कुल मिलाकर, इन मुद्दों को क्षेत्र का दौरा करने के बाद देखा गया था।

### अध्ययन क्षेत्र (Study Area -)

महाराष्ट्र के सातपुड़ा में स्थित खानदेश में कुल तीन जिले हैं। जलगांव, धुले और नंदुरबार। मुख्य रूप से नंदुरबार में आदिवासी गांव अधिक हैं, इसलिए ऐसा महसूस किया जाता है की, यहां के त्यौहारों और समारोहों की परंपरा भी अलग है। नंदुरबार के कुछ कस्बों को छोड़कर, आप यहां आदिवासी जीवनशैली देख सकते हैं। नंदुरबार जिले में कुल छह तालुके हैं। जिसमें शहादा, नवापूर, धडगांव, अक्कलकुवा, तलोदा और नंदुरबार शामिल हैं। मूल रूप से नंदुरबार शत-प्रतिशत आदिवासी है और त्यौहारों की परंपराएं अलग हैं, इसलिए इस पर शोधनिबंध करने का मेरा प्रयास है।

### चर्चा और परिणाम (Result & Discussion)

जब नंदुरबार के नागरिकों के साथ होली की चर्चा हुई, होली के पहले महीने में जब चंद्रमा दिखाई देता है, तो ढोल और मंडल को जोर-जोर से पीटकर होली का दांडा लगाया जाता है। उस महीने को आदिवासी दांडे का महीना कहा जाता है। दांडा महीने के एक महीने बाद होली मनाई जाती है। पता चला की होली तक कोई शादी और कोई दूसरा त्यौहार नहीं मनाया जाता है। घर नहीं बनाते हैं। होली में नृत्य करनेवाले

करनेवाले खटिया पर नहीं बैठते। यह अंधविश्वास भी है की एक महिला की छाया भी शरीर पर नहीं पड़नी देनी चाहिये, यह बाते सब मैंने चर्चा से सुनी है। ये गेर होली आने तक गांव के गेट के बाहर रहने चले जाते हैं। इस समय क्षेत्र में हर रात ढोल, मांडल, पविची के सूर का जाप किया जाता है। सातपुड़ा क्षेत्र के आदिवासी दुनिया के किसी भी कोने में चले जाये। मगर होली को वह अपने घर चले आते हैं। भोंग-या हाट साप्ताहिक बजार हाट है जो होली के त्यौहार से पहले होता है। जिसमें ढोल-नगाड़ों के साथ क्षेत्र के आदिवासी बड़ी संख्या में आते हैं। इस समय सभी सुख-दुख बांटे जाते हैं। नाट्यशास्त्र के माध्यम से देखा जाये तो इसका अध्ययन अगर विद्यार्थी करे तो बहुत अच्छा रंगमंचपर इसका आविष्कार हो सकता है।

### निष्कर्ष (Conclusion)

1. कुछ शहरी लोग, शिक्षाविद और प्रचार मीडिया भोंग-या बजार को रोमांस त्यौहार शब्द का उपयोग करके उसकी विकृत छवि बनाने की कोशिश कर रहे हैं।
2. कुछ लोग बता रहे हैं की, भोंग-या बजार यह विचार फैला रहा है की यह आदिवासियों का वेलेंटाइन डे है। लड़के-लड़कियों की शादी गुलाल से करने की धारणा बहुत गलत है।
3. एक गलत धारणा यह भी है की अगर कोई युवक किसी युवती को पसंद करता है और उसे गुलाल देता है, तो वह रोमांस के लिए राजी हो जाती है।



5. इन कलाओं का सही ढंग से अध्ययन करे तो इस कला को रंगमंच पर पेश किया जा सकता है।
6. कुछ लोग शिक्षाविद आदिवासी शिक्षा और सांस्कृतिक प्रथाओं को व्याभिचार के केंद्र के रूप में बदनाम करते हैं, आदिवासियों की गरिमा का अनजाने में उल्लंघन किया जा रहा है।
8. आदिवासीयों की पारंपरिक प्रथाओं को बदनाम करके आदिवासी संस्कृति को बिगड़ते हुए देखा जा रहा है। जिससे गरीब आदिवासी लोग जो बाजार में अपने वाद्ययंत्र बेचते हैं, उनके विकास पर परिणाम हो रहा है।
9. अगर भोंग-या को सही तरीके समझा जाए तो भोंग-यापर्व बदनामी से बच जाएगा।
10. आदिवासी संस्कृति बच जाएगी तो प्रकृति भी बचेगी। तभी आदिवासियों के मानवीय मूल्यों का संरक्षण, संवर्धन और कौशल में विकास और वृद्धि होगी और इन कला को एक सन्मान मिलेगा।

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## स्नातक स्तर के शिक्षा में कौशल वृद्धि के रूप में रंगमंच

### Theatre as Skill Enhancement in Graduate Level Education

रोहित कुमार

#### सार

उच्च शिक्षा में गुणवत्ता को कैसे उन्नत किया जा सकता है इस पर शिक्षाविदों ने नाट्यकला को भी महत्वपूर्ण कहा है। थिएटर इन एजुकेशन के माध्यम से स्कूल और हाई स्कूल शिक्षा में खूब कार्य हो रहे हैं लेकिन विज्ञान, कला और मानविकी विषय शिक्षण में स्नातक स्तर पर रंगमंच को कैसे पढ़ाया जाए इस पर भी ध्यान दिया जा सकता है। इन सभी विषयों के साथ शिक्षा में कौशल वृद्धि के रूप में रंगमंच को शामिल किया जा सकता है। रंगमंच के सैद्धांतिक एवं व्यावहारिक प्रक्रिया से गुजर कर उनके शैक्षणिक और सांस्कृतिक अनुभव को समृद्ध किया जा सकता है। आज के मौजूदा समय में जब कहा जा रहा है कि सभी पाठ्यक्रमों में चारों वेदों को रखा जाये तो उसमें पाँचवा वेद नाट्यशास्त्र क्यों नहीं? रंगमंच के बहुत सारे व्यावहारिक और तकनीकी क्रियाकलाप हैं जिनके तहत छात्रों का व्यक्तित्व का विकास सुचारु रूप से किया जा सकता है। स्नातक स्तर पर रंगमंच को कौशल वृद्धि के रूप में शामिल करते हैं तो छात्र अपने को पहचानने, जीवन की चुनौतियों का सामना करने और सकारात्मक दृष्टिकोण बनाने में सक्षम होंगे। स्नातक विषयों में कौशल वृद्धि के रूप में रंगमंच विषय को कम से कम दो छात्रों में रखकर पढ़ाया जा सकता है।

की वर्ड्स : औपचारिक शिक्षा, न्यू शिक्षा नीति, संस्कृति उद्योग।

#### प्रस्तावना

न्यू शिक्षा नीति से ज्ञान संचार के क्षेत्र में नये तरह के अनुशासन और अंतःविषय को शुरू करने की कोशिश की गई है। न्यू शिक्षा नीति में बहुवैषयिक शिक्षण संस्थानों की अवधारणा के तहत थिएटर विषय पर भी बल दिया गया है। नाट्यशास्त्र में लिखित है कि,

“कोई ज्ञान, कोई शिल्प, कोई विद्या, कोई कलाए कोई योग तथा कोई कर्म ऐसा नहीं है,

शिक्षा में रंगमंच के अंतर्गत विद्यार्थी अपने भाव-पक्ष तथा तर्क-पक्ष को सृजनात्मकता से जोड़कर ज्ञान प्राप्त कर सकते हैं। सर्वांगीण विकास शिक्षा का मूल उद्देश्य होता है। सर्वांगीण विकास का मतलब सामाजिक, शारीरिक एवं बौद्धिकता से है। इन्हीं सब की पूर्ति के लिए पाठ्यक्रम में रचनात्मक और सृजनात्मक पूर्ति के लिए रंगमंचीय गतिविधि जरूरी है। व्यक्तित्व के सृजन के विकास के लिए कॉलेज और





# मराठी रंगभूमी आणि आजचे वर्तमान

डॉ. सतीश पावडे  
मुख्य संपादक

डॉ. भूमिका वानखेडे  
कार्यकारी संपादक

डॉ. पी. जी. रोहणकर  
प्राचार्य तथा प्रबंध संपादक

चर्चासत्र : संयोजक





# मराठी रंगभूमी आणि आजचे वर्तमान

मुख्य संपादक  
डॉ. सतीश पावडे

कार्यकारी संपादक  
डॉ. भूमिका वानखेडे

प्रबंध संपादक तथा प्राचार्य  
डॉ. पी. जी. रोहणकर

संपादक मंडळ  
डॉ. नरेंद्र राईकवार

श्री. प्रफुल टाले

श्री. शाम गायकवाड

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चर्चासत्र : संयोजक

श्री जगदंब विणकर शिक्षण संस्था द्वारा संचालित

जगदंब महाविद्यालय



# मराठी रंगभूमीचा भक्कम पाया

- डॉ. संजय पाटील देवळाणकर

नाट्यशास्त्र विभाग प्रमुख तथा उपप्राचार्य

सौ के.एस.के. महाविद्यालय बीड.

मो. ९४२२२९५३१४

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मराठी रंगभूमी आजचे वर्तमान, चर्चा आणि चिंतन करताना मराठी रंगभूमीची चिंता करण्याची गरज नाही. मराठी रंगभूमी ही भक्कम खोलवर पाय रोऊन उभी आहे. तिच्यावर कितीही आक्रमणे झाली तरी ती डगमगणारी नाही. ज्यांनी ज्यांनी रंगभूमीचा अनुभव घेतला, अनुभूती घेतली त्यांच्यापासून रंगभूमी दूर जाऊ शकत नाही. रंगमंच अनुभवणे हा जीवनातील अतिउच्च आनंदाचा क्षण रंगकर्मीयांसाठी असतो. मराठी रंगभूमी एवढी अवाढव्य आहे, त्याचा अंदाज आपण करू शकत नाही. रंगभूमीवर आक्रमण करणारी अनेक माध्यमे आली, पण ती अतिशय मर्यादित आहे आणि ते तंत्रावर अवलंबून आहेत. आकाशवाणी, चित्रपट, दूरचित्रवाणी अनेक वाहिन्या, मोबाईलचा विचार करता जिवंत अनुभूती आपल्याला फक्त रंगमंचावर मिळते हे विसरून चालणार नाही.

मराठी रंगभूमी किती मोठ्या प्रमाणावर कार्यरत आहे याचा एक धावता आढावा आपण घेऊयात...

मराठी रंगभूमी बदल चिंतन करताना चर्चा करताना एक गोष्ट लक्षात येते की मराठी रंगभूमीचा आवाका, आयाम, आकार, मोठ्या प्रमाणावरती आपल्याकडे आहे. संस्कृत रंगभूमीपासून सुरू झालेला हा प्रवास पुढे मराठी रंगभूमी, आधुनिक मराठी रंगभूमी, मराठी संगीत रंगभूमी, लोक रंगभूमी, नागर रंगभूमी, लोकधर्मी रंगभूमी, नाट्यधर्मी रंगभूमी, प्रादेशिक रंगभूमी, बालरंगभूमी, शालेय रंगभूमी, प्रायोगिक रंगभूमी, हौशी रंगभूमी, व्यावसायिक रंगभूमी, धंदेवाईक रंगभूमी, कामगार रंगभूमी, दलित रंगभूमी, ग्रामीण रंगभूमी, पथनाट्य,

मुक्त नाट्य, लोकनाट्य, तमाशा, झांडीपट्टी रंगभूमी, त्याची व्यावसायिक गणित त्यांच्या संस्था, अशा अनेक रंगभूमींचा वावर आपल्या महाराष्ट्रामध्ये आहे. वर दिलेल्या प्रत्येक रंगभूमी संबंधी विस्तृत विवेचन केलं जाऊ शकत. प्रत्येकावरती स्वतंत्र चर्चासत्र होऊ शकतात, पुस्तके निघू शकतात.

जागतिक रंगभूमी दिन, मराठी रंगभूमी दिन, आम्ही साजरे करतो. मागील साठ वर्षांपासून महाराष्ट्र शासनाकडून हौशी नाट्य स्पर्धा, व्यावसायिक नाट्य स्पर्धा, हिंदी नाट्य स्पर्धा, संस्कृत नाट्य स्पर्धा घेण्यात येतात, त्यामध्ये सादर होणारी शेकडो नाटक आपल्या राज्यात होतात हे महाराष्ट्राचे वैभव आहे. संपूर्ण हिंदुस्थानात फक्त महाराष्ट्रातच शासन स्तरावर अशा स्पर्धा घेतल्या जातात, हे विशेष आहे. शिवाय नाट्यपरिनिरीक्षण मंडळ, व्यवसायिक नाटक अनुदान मंडळ, लोककला अनुदान मंडळ यांच्या माध्यमातून वितरित केले जाणारे अनुदान, वृद्ध कलावंत मानधन अशा अनेक योजना शासन स्तरावर कलावंतांसाठी राबवल्या जातात. त्याचबरोबर गेल्या १६-१७ वर्षांपासून बाल नाट्य स्पर्धा महाराष्ट्र शासन घेत आहेत. त्यामध्ये सादर होणारी हजारो बालनाट्य, शाळा महाविद्यालयात स्नेहसंमेलनातील नाटक, विद्यापीठातील युवक महोत्सवात सादर होणारी नाटके, स्किट, माईम, एकपात्री, मिमिक्री, शासनाव्यतिरिक्त महाराष्ट्रात होणाऱ्या तीन अंकी नाटकाच्या स्पर्धा अथवा महोत्सव आणि त्या महोत्सवात सादर होणारी नाटक, ही एक प्रचंड मोठी चळवळ महाराष्ट्रामध्ये आपल्याला पाहायला मिळते त्याच अनुषंगाने निर्माण होणारे लेखक, काही अन्य भाषेतील नाटककारांचे मराठीत भाषांतरित नाटके, नाटकाचा सर्वांगीण विचार करून नाटक बसवणारे दिग्दर्शक, ज्यांच्या माध्यमातून नाटक प्रेक्षकांपर्यंत पोहोचते असे कलावंत, तंत्रज्ञ, नाटकाच्या संपूर्ण व्यवस्थेसाठी असणारे व्यवस्थापक, मंचव्यवस्थापक, व्यावसायिक नाट्य कलावंत, हौशी नाट्य कलावंत व्यावसायिक तंत्रज्ञ मराठी नाटकाच्या जाहिराती, नाटकावरती चिकित्सकपणे आपली मत मांडणारे समीक्षक, मराठी रंगभूमी वरती काम करणाऱ्यांची मातृसंस्था म्हणून गेली अनेक वर्षे कार्यरत असलेली आमची अखिल भारतीय मराठी नाट्य परिषद, त्याच्या जवळपास ६५ शाखा, त्या शाखेचे पदाधिकारी कलावंत, महाराष्ट्रातील विविध नाट्य संस्था, निर्माता संघ, कामगार संघ, कलावंत संघ, बाल रंगभूमी परिषदेची चळवळ, त्यांच्या



जिल्हास्तरीय संस्था, गेल्या ९९ वर्षांची नाट्य संमेलनाची परंपरा, त्यामध्ये सादर होणारे नाटक, चर्चासत्र, परिसंवाद, नाट्यसंमेलनाध्यक्षांचे भाषण एकूणच नाटकाविषयी होणारे मंथन हे महाराष्ट्रासाठी आणि मराठी रंगभूमीसाठी फार महत्त्वाचे आहे.

मी या ठिकाणी मराठी रंगभूमीचा आढावा घेताना मराठी रंगभूमी ही कशी आपली पाळेमूळे खोलवर रुजवून आणि त्यांचे झालेले वटवृक्ष या अनुषंगाने चर्चा करत आहे.

भारतामध्ये एनएसडी सारखी संस्था ही नाट्य शिक्षण देणारी संस्था उपास आली, आणि त्याच धर्तीवर भारतातल्या अनेक विद्यापीठांमध्ये नाट्य प्रशिक्षणाची सोय झाली. महाराष्ट्रातही त्यावेळेचे मराठवाडा विद्यापीठ तर आत्ताचे डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ येथे नाट्यशास्त्राचे शास्त्रशुद्ध शिक्षण देण्यात येऊ लागलं. त्यानंतर महाराष्ट्रातल्या बहुतांश विद्यापीठांमध्ये नाट्य प्रशिक्षण देण्याचं काम सुरू झालं. यामध्ये पुणे विद्यापीठातील ललित कला केंद्र पुणे, थिएटर अकॅडमी मुंबई, लोककला अकादमी मुंबई, श्री शिवाजी विद्यापीठ कोल्हापूर, राष्ट्रसंत तुकडोजी महाराज विद्यापीठ नागपूर, संत गाडगे महाराज अमरावती विद्यापीठ अमरावती, स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ नांदेड, फेल्टम इन्स्टिट्यूट पुणे, एमआयटी युनिव्हर्सिटी पुणे, उत्तर महाराष्ट्र विद्यापीठ जळगाव, अहिल्यादेवी होळकर विद्यापीठ सोलापूर, महात्मा गांधी आंतरराष्ट्रीय हिंदी विश्वविद्यालय वर्धा, एमजीएम युनिव्हर्सिटी औरंगाबाद, डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठाचे उपकेंद्र उस्मानाबाद अशा अनेक संस्थांमधून नाट्य प्रशिक्षण देण्यात येऊ लागले त्याचबरोबर महाविद्यालयीन पातळीवरती सुद्धा नाट्य शिक्षण देण्याची एक परंपरा सुरू झाली. सरस्वती भुवन नाट्यशास्त्र विभाग औरंगाबाद, स्वामी रामानंद तीर्थ महाविद्यालय नाट्यशास्त्र विभाग अंबाजोगाई, सौ.केशरबाई सोनाजीराव क्षीरसागर महाविद्यालय नाट्यशास्त्र विभाग बीड, पंडित गुरु पाडीकर महाविद्यालय शिरसाळा या ठिकाणी तर नाट्यशास्त्र हा विषय अनुदानित आहे. तर असे अनेक महाविद्यालय आहेत जे विनाअनुदानित तत्त्वावरती नाट्य प्रशिक्षण देण्याचं काम केले जात आहे, यात एमजीएम

नाट्यशास्त्र विभाग औरंगाबाद, देवगिरी महाविद्यालय औरंगाबाद, बलभीम महाविद्यालय सावरकर महाविद्यालय बीड महाविद्यालयांची नाट्यशास्त्र विभाग एम जे कॉलेज जळगाव अशी कितीतरी नावे सांगता येतील की जे महाविद्यालयीन पातळीवर सुद्धा रंगकर्मी तयार करण्याचे काम करीत आहे. याचा आवाका एवढा मोठा आहे की आज हजारो विद्यार्थी नाट्य प्रशिक्षण घेऊन रंगभूमीची सेवा करत आहे.

या अनेक संस्थांमधून संशोधनाचे काम काही तज्ञ मंडळीकडून होत आहे. अनेक संशोधन मार्गदर्शक, संशोधक विद्यार्थी त्यांनी केलेले संशोधन पेपर, संदर्भ ग्रंथ हेही फार मोठ्या प्रमाणामध्ये काम मराठी रंगभूमीवरती होत आहे. महाराष्ट्रात सुट्यादरम्यान होणाऱ्या कार्यशाळा, अभिनय कार्यशाळा, सेमिनार, कॉन्फरन्सेस, अभिनय शिबिरे फार मोठ्या प्रमाणामध्ये आपल्याला बघायला मिळतात.

महाराष्ट्रात असणारी नाट्यगृह, त्या नाट्यगृहात होणारे नाटके, मराठी नाटकांच्या जाहिराती त्यावर होणारा व्यवसाय असे हे सगळं बघता मराठी रंगभूमी ही एक इंडस्ट्री आहे आणि या इंडस्ट्रीचा कच्चा माल म्हणजे प्रशिक्षण देणाऱ्या संस्था आहे.

आज बरेचशे रंगकर्मी हे इंजिनिअरिंग, मेडिकल व अन्य क्षेत्रातून रंगभूमीकडे वळताना दिसतात. ज्यांनी नाट्य प्रशिक्षण घेतलं नाही असे देखील रंगकर्मी आज रंगभूमीवर आपल्याला मोठ्या प्रमाणात यशस्वी झालेले बघायला मिळतात. मराठी रंगभूमी वरती विपूल प्रमाणामध्ये साहित्य निर्मिती झालेली आहे. पार भारताच्या नाट्यशास्त्रापासून नाटकाविषयी साहित्य उपलब्ध आहे. त्यामध्ये नवनवीन भर पडताना दिसती आहे. अनेक ग्रंथ अशी आहेत ज्यामध्ये आपला नाट्य इतिहास लिहिलेला आहे. तो प्रादेशिक, एककल्ली असेल कदाचित पण आहे. नाट्यकोषसारखे ग्रंथ आज उपलब्ध आहेत.

एकूणच मराठी रंगभूमी किती प्रगल्भ आणि विस्तारलेली आहे याचा अंदाज आपल्याला आला असेल. मराठी रंगभूमीविषयी चर्चा करताना चिंतन करताना एकच गोष्ट पुन्हा एकदा आवर्जून सांगतो मराठी रंगभूमीची चिंता करू नका ती सदैव रसिकांच्या सेवेत असणार आहे. तिचा पाया भक्कम आहे..!



## **SYNTHESIS AND CHARACTERIZATION OF MIXED LIGAND VANADIUM METAL COMPLEXES USING 2, 2'- BIPYRIDINE AND L-AMINO ACIDS AS LIGANDS**

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### **Abstract:**

Four new mixed ligand complexes of vanadium metal were synthesized using 2, 2'-bipyridine as primary ligand and some L-amino acids such as L-Phenyl Alanine, L-serine L-glycine and L-aspartic acid as secondary ligands respectively. The synthesized complexes were characterized by using IR spectra, elemental analysis, molar conductance and magnetic susceptibility measurement. All the synthesized complexes are proposed to have square pyramidal geometry based on the results obtained from IR spectra, molar conductance, elemental analysis and magnetic study of complexes.

**Keywords:** Mixed ligand complex, L-Amino acids, 2,2'-Bipyridine, Molar conductance and Magnetic property etc.

### **Introduction:**

Now a day's number of researchers has been focused on to synthesis of mixed ligand complexes of transition metals. Mixed ligand complexes are exhibited better biological activities as compare to simple complexes. This is due to more than one type of ligands coordinated to central metal atom [1, 2]. The literature survey about mixed ligand oxovanadium(IV) complexes which show modulating activities of various enzymes [3, 4]. Vanadium compounds with vanadyl ion having oxidation state +4 and +5 exist in the environment and in biological systems. These complexes also have biological activities such as antibacterial, antifungal, antiviral, and anticancer drugs [5-7]. The mixed ligand transition metal complexes with benzoheterocyclic rings and some L-amino acids have been the focus of a considerable number of investigations for their good coordination ability with metal atoms [8]. A large number of mixed-ligand complexes involving heterocyclic bases such as pyridine, 2,2'-bipyridine, o-phenanthroline, etc. were reported by many researchers due to their biological applications and thermal stability [9].

In this article we have reported the synthesis of four mixed ligand complexes of vanadium metal with 2, 2'-bipyridine and L-Phenyl Alanine, L-serine L-glycine and L-aspartic acid ligands respectively. All the synthesized complexes were characterized by using IR spectra, elemental analysis, molar conductance and magnetic susceptibility measurement. On the basis of spectroscopic results obtained, all the synthesized complexes were exhibited square pyramidal geometry.

### **Experimental Section:**

#### **Materials:**

All amino acids were purchased from S.D. fine chemicals, Mumbai, second ligand 2, 2' bipyridine and vanadylsulphate ( $\text{VO}_2\text{SO}_4$ ) were purchased from Babaji traders Parbhani. All the chemicals used were of AR grade. All the solvents were used after purified by the recommended method (Vogel, 1989. Textbook of Practical Organic Chemistry, 5th ed. Longman, London [10]).

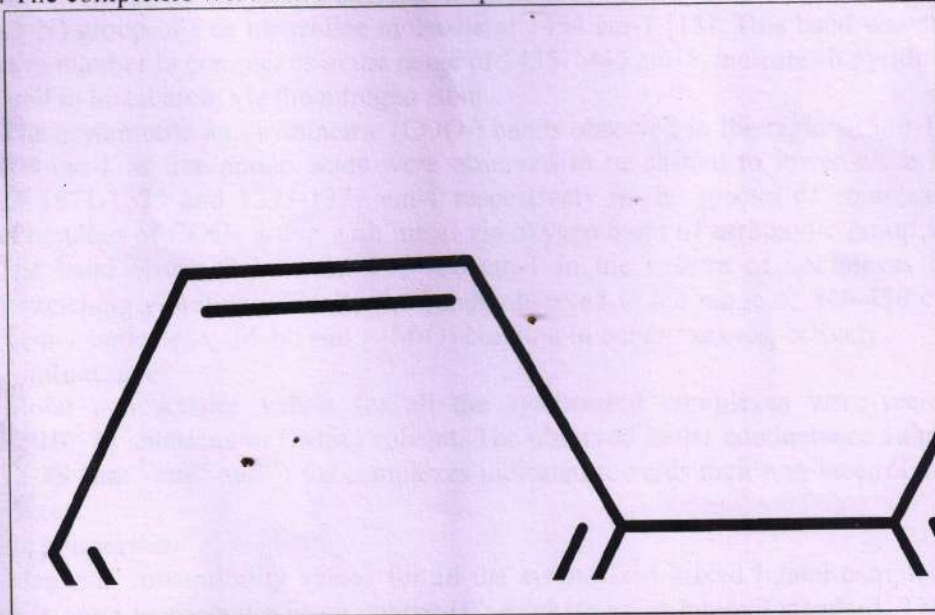


Melting points or decomposition temperatures of all the synthesized compounds were measured using a simple capillary tube method and are uncorrected. Molar conductance values of all the synthesized complexes were measured by preparing  $10^{-3}$  M solutions in DMF solvent using Equiptronics conductivity meter with an inbuilt magnetic stirrer (Model:Eq-664) at room temperature. Magnetic susceptibilities were determined on the SES Instrument's magnetic susceptibility Gouy's balance (Model: EMU-50) at room temperature using copper (II) sulphate as a standard. IR spectra of complexes were recorded as KBr pellets in the region of  $4000-400\text{ cm}^{-1}$  on a SHIMADZU Spectrophotometer.

#### Synthesis of Mixed ligand complexes:

##### General procedure:

To take aqueous solution (20 ml) of vanadylsulphate (1.63 gm 0.01 Mole), add ethanolic solution (20 ml) of 2,2'-bipyridine (1.56 gm 0.01Mole) was added drop wise with constant stirring. The mixer was stirred for 1 hrs at room temperature. To this reaction mixer add aqueous solution (20 ml) of amino acids (0.01 Mole) drop wise with constant stirring. The reaction mixer was stirred 5-7 hrs at room temperature and then coloured complexes were precipitated. Filter the complex and wash it with cold distilled water followed by ethanol. The complexes were dried at room temperature and used it for further study.



General scheme: synthesis of mixed ligand complexes

#### Result and Discussion:

##### Physicochemical data:

The physicochemical characterizations such as percentage yield, colour of complexes, decomposition temperature or melting point were recorded for all the complexes. The melting point of complexes was recorded by simple capillary tube method. All the complexes are found to be decomposed at more than  $260^{\circ}\text{C}$  temperature indicates thermally more stable complexes. The molecular weight and chemical formula are estimated for all the synthesized complexes using 'Chem Draw ultra 11.0' software. The solubility of all the synthesized complexes was checked with available solvents in laboratory. The complexes are insoluble in common organic solvents but purely soluble in DMSO and DMF. All the recorded data of synthesized complexes is represented in Table 1.



**Table-1: Colour, Elemental analysis, molar conductance and magnetic moments**

Complex	Molecular Weight	Percent age Yield(%)	Colour	C, H, N Analyses, found (calculated) (%)		
				C	H	N
Complex- C1	334.21	68	Faint Brown	50.17 (50.19)	4.53 (4.54)	13.50 (13.48)
Complex- C2	352.28	78	Black	45.49 (45.48)	4.11 (4.10)	12.24 (12.20)
Complex- C3	285.33	76	Black	48.52 (48.50)	4.89 (4.87)	11.32 (11.32)
Complex- C4	331.24	75	Faint Green	49.28 (49.26)	4.73 (4.72)	12.31 (12.30)

#### IR Spectra:

The FT-IR spectra of synthesized complexes were recorded and compared with free ligand molecules. The some major absorption bands are expressed here. The absorption band of the (C=N) group of free bipyridine molecule at 1454 cm<sup>-1</sup> [13]. This band was shifted to lower wave number in complexes in the range of 1435-1445 cm<sup>-1</sup>, indicates bipyridine ligand coordinated to metal atom via the nitrogen atom.

The asymmetric and symmetric (COO-) bands observed in the region 1580-1597 and 1402-1408 cm<sup>-1</sup> in free amino acids were observed to be shifted to lower wave numbers region of 1571-1575 and 1373-1377 cm<sup>-1</sup> respectively in the spectra of complexes. This indicates bonding of COO- group with metal via oxygen atom of carboxylic group of amino acids. The band observed between 940-950 cm<sup>-1</sup> in the spectra of complexes indicates  $\nu(\text{V}=\text{O})$  stretching vibrations. Finally the bands observed in the range of 440-450 cm<sup>-1</sup> and 620-635 cm<sup>-1</sup> indicates  $\nu(\text{M}-\text{N})$  and  $\nu(\text{M}-\text{O})$  bonding in complexes respectively.

#### Molar conductance:

Molar conductance values for all the synthesized complexes were recorded by preparing 10<sup>-3</sup> M solutions in DMSO solvent. The observed molar conductance values in the range (18-28 ohm<sup>-1</sup> cm<sup>2</sup> mol<sup>-1</sup>) for complexes indicated towards their non-electrolytic nature of complexes.

#### Magnetic properties:

Magnetic susceptibility values for all the synthesized mixed ligand complexes were recorded at room temperature using copper (II) sulphate as an internal standard. These were then converted into magnetic moment values using spin only formula. The Magnetic moment value of all four complexes in the range of 1.87 to 1.92 BM. It indicates oxidation state of vanadium in complexes is +4 correspond to the presence of one unpaired electron present in all these complexes [14]. Thus all the four complexes exhibited square planar geometry around the vanadium metal atom.

#### Conclusion:

The mixed ligand complexes of vanadium with bipyridine and L-amino acids as ligands have been prepared at room temperature. The elemental analysis data reveals that 1:1:1 (M:L:L) proportion in complexes. The decomposition temperature values of complexes were recorded and found to be more than 260 °C it indicates that, complexes are thermally more stable. The molar conductance, IR spectra and Magnetic moment values of complexes are reveals that vanadium metal having +4 oxidation state with one unpaired electron present in all these complexes with square pyramidal structural arrangement around vanadium metal atom.



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## Densities, Viscosities, Excess Molar Volumes and Excess Gibbs Free Energy of Activation of Binary Mixtures of Propionaldehyde with Methanol Over the Entire Range of All Compositions at 298.15, 308.15 and 318.15 K

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### ABSTRACT

Densities and viscosities of the binary mixtures of propionaldehyde with methanol, ethanol n-propanol and n-butanol at 298.15, 308.15 and 318.15 K over the entire range of all compositions have been studied in this paper. Viscosity deviations ( $\Delta\eta$ ), molar volumes  $V_m$ , excess molar volumes  $V_E$  and excess free energies of activation of viscous flow  $\Delta G^*E$  have been determined by using experimental data. Viscosity deviations, excess molar volumes and excess free energies of activation of viscous flow have been calculated and correlated with Redlich-Kister polynomial equation.

**Keywords:** Density, Viscosity, Viscosity deviation, Excess molar volume, Binary system, propionaldehyde.

### I. INTRODUCTION

It is general finding that there is a little information of the viscosity of binary mixtures propionaldehyde with methanol and effect of temperature on it. Study of effect of temperature on the viscosity of a liquid is important and has been studied by some researchers. However, study of the effect of temperature on viscosity and density of binary liquid mixtures of propionaldehyde with methanol is rarely reported. Therefore, the main aim of this study was to produce the data on the effect of temperature on the viscosity of binary liquid mixtures. Further, the thermo-physical properties of binary liquid mixtures and their analysis in terms of interpretative models constitute a very interesting subject [1-2]. The characterization of mixtures through their thermodynamic and transport properties is important from the fundamental viewpoint of understand their mixing behavior [3-7]. Liquid mixtures consisting of aldehydes and alcohols are of great importance in the field of industries such as in Petrochemical, Pharmaceutical and Dye [8, 9]. A thorough knowledge of transport properties of non-aqueous solutions is essential in many chemical and industrial applications [10]. The studies of excess properties such as deviation in viscosity, excess molar volume, excess Gibbs free energy of activation of viscous flow molecular interactions of binary mixtures are useful in understanding the nature of intermolecular interactions between two liquids [11-12]. Binary liquid mixtures due to their unusual behavior have attracted considerable attention



due to their importance from both theoretical and practical point of view because these mixtures are used in titration, calorimetry and reaction calorimetry, among other uses [14].

In this present paper, density ( $\rho$ ) and viscosity ( $\eta$ ) of binary mixtures of propionaldehyde methanol are reported at various temperatures i.e. 298.15, 308.15 and 318.15 K. Deviation in viscosity ( $\Delta\eta$ ), molar volume ( $V_m$ ), excess molar volume ( $V^E$ ) and excess Gibbs free energy of activation of viscous flow ( $\Delta G^*E$ ) have been calculated from the density ( $\rho$ ), and viscosity ( $\eta$ ), data. Calculated deviation in viscosity and excess functions were fitted to the Redlich-Kister polynomial equation and the results analyzed in terms of molecular interactions.

## II. EXPERIMENTAL METHODS

The chemicals such as propionaldehyde and methanol used for the current investigation were obtained from SD fine chemicals India. Propionaldehyde and methanol used were of analytical grade (AR) of minimum purity of 99.9 %. The purities of propionaldehyde and methanol were cross checked by density determination at different temperatures. The densities of pure propionaldehyde & methanol and their binary mixtures were measured by using a single-arm pycnometer which was calibrated at the working temperatures with doubly distilled water. The sensitivity of the pycnometer corresponded to a precision in density of  $1 \times 10^{-3} \text{ gm cm}^{-3}$ . The binary liquid mixtures of different known concentrations were prepared in stopper measuring flasks. The weight of the sample was measured using electronic digital balance with an accuracy of  $\pm 0.0001 \text{ gm}$ . An Ubbelohde viscometer (of 20 ml capacity) was used in the viscosity measurement and efflux time was determined using a digital clock to within  $\pm 0.01 \text{ Sec}$ . The experimental temperature was controlled using kinematic viscosity bath with an accuracy of  $\pm 0.10 \text{ K}$ .

## III. RESULTS AND DISCUSSION

The variations in viscosity of different binary mixtures of propionaldehyde with methanol with temperature and calculated data of deviation in viscosity ( $\Delta\eta$ ), molar volume ( $V_m$ ), excess molar volume ( $V^E$ ) and excess Gibbs free energy of activation of viscous flow ( $\Delta G^*E$ ) are given in tables below.

**Propionaldehyde with Methanol at 298.15, 308.15 and 318.15 K.**

**Table: 1-a At 298.15:**

x1	P (g cm <sup>-3</sup> )	H (mPa.s)	$\Delta\eta$ (mPa.s)	$V_m \text{ cm}^3\text{mol}^{-1}$	$V^E \text{ cm}^3\text{mol}^{-1}$	$\Delta G^*E \text{ J.mol}^{-1}$
0	0.7864	0.5549	0	40.7426	0	1512.201
0.0590	0.7883	0.5378	-0.0225	42.5960	0.0123	1662.324
0.1237	0.7902	0.5189	-0.0396	44.6260	0.0184	1822.321
0.1945	0.7915	0.5019	-0.0505	46.8817	0.0235	1972.254
0.2736	0.7941	0.4848	-0.0543	49.3210	0.0289	2121.354
0.3610	0.7961	0.4692	-0.0525	52.0566	0.0348	2268.214
0.4587	0.7979	0.4491	-0.0487	55.1281	0.0326	2382.254
0.5687	0.7998	0.4326	-0.0388	58.5760	0.0278	2462.254
0.6932	0.8017	0.4178	-0.0291	62.4840	0.0177	2317.258
0.8356	0.8037	0.3912	-0.0207	66.9421	0.0112	2117.365
1	0.8056	0.3765	0	72.0953	0	2011.354



Table: 1-b At 308.15:

x1	$\rho$ (g cm <sup>-3</sup> )	$\eta$ (mPa.s)	$\Delta\eta$ (mPa.s)	Vm cm <sup>3</sup> mol <sup>-1</sup>	VE cm <sup>3</sup> mol <sup>-1</sup>	$\Delta G^*E$ J.mol <sup>-1</sup>
0	0.7764	0.4782	0	41.6391	0	1569.436
0.0590	0.7779	0.4647	-0.0189	43.4925	0.0186	1719.559
0.1237	0.7793	0.4515	-0.0361	45.5225	0.0247	1879.556
0.1945	0.7808	0.4392	-0.0469	47.7782	0.0298	2029.489
0.2736	0.7823	0.4251	-0.0507	50.2175	0.0352	2178.589
0.3610	0.7837	0.4125	-0.0489	52.9531	0.0411	2325.449
0.4587	0.7852	0.3982	-0.0451	56.0246	0.0389	2439.489
0.5687	0.7867	0.3859	-0.0352	59.4725	0.0341	2519.489
0.6932	0.7881	0.3736	-0.0255	63.3805	0.024	2374.493
0.8356	0.7896	0.3604	-0.0171	67.8386	0.0175	2174.612
1	0.7913	0.3461	0	72.9918	0	2068.589

Table: 1-c At 318.15:

x1	$\rho$ (g cm <sup>-3</sup> )	$\eta$ (mPa.s)	$\Delta\eta$ (mPa.s)	Vm cm <sup>3</sup> mol <sup>-1</sup>	VE cm <sup>3</sup> mol <sup>-1</sup>	$\Delta G^*E$ J.mol <sup>-1</sup>
0	0.7711	0.4195	0	42.5803	0	1642.088
0.0590	0.7720	0.4083	-0.0146	44.4337	0.0273	1792.211
0.1237	0.7730	0.3965	-0.0317	46.4637	0.0334	1952.208
0.1945	0.7739	0.3823	-0.0426	48.7194	0.0385	2102.141
0.2736	0.7748	0.3704	-0.0464	51.1587	0.0439	2251.241
0.3610	0.7758	0.3591	-0.0446	53.8943	0.0498	2398.101
0.4587	0.7767	0.3472	-0.0408	56.9658	0.0476	2512.141
0.5687	0.7777	0.3348	-0.0309	60.4137	0.0428	2592.141
0.6932	0.7786	0.3217	-0.0212	64.3217	0.0327	2447.145
0.8356	0.7795	0.3098	-0.0128	68.7798	0.0262	2247.252
1	0.7805	0.3041	0	73.933	0	2141.241

To investigate the molecular interaction between Propionaldehyde and the alcohols, (methanol, ethanol, n-propanol and n-butanol), viscosity deviation, excess molar volumes and excess Gibbs free energy of activation of viscous flow have been evaluated from experimental density and viscosity using equations 1 and 2 respectively.

$$V^E = \frac{x_1 M_1 + x_2 M_2}{\rho_m} - \left( \frac{x_1 M_1}{\rho_1} + \frac{x_2 M_2}{\rho_2} \right) \quad \text{----- (1)}$$

$$\Delta\eta = \eta_m - (x_1 \eta_1 + x_2 \eta_2) \quad \text{----- (2)}$$



where  $x_1$  and  $x_2$  are the mole fractions calculated from mass fractions.  $M_1$  and  $M_2$  are molar masses,  $\rho_1$  and  $\rho_2$  are densities,  $\eta_1$  and  $\eta_2$  are the viscosities of pure components 1 and 2 respectively.  $\rho_m$  and  $\eta_m$  are the density and viscosity of the mixture.

The excess Gibbs free energy of activation of viscous flow was obtained from equation 3.

$$\Delta G^{*E} = RT[\ln \eta_m V_m - (x_1 \ln \eta_1 V_1 + x_2 \ln \eta_2 V_2)] \quad \text{----- (3)}$$

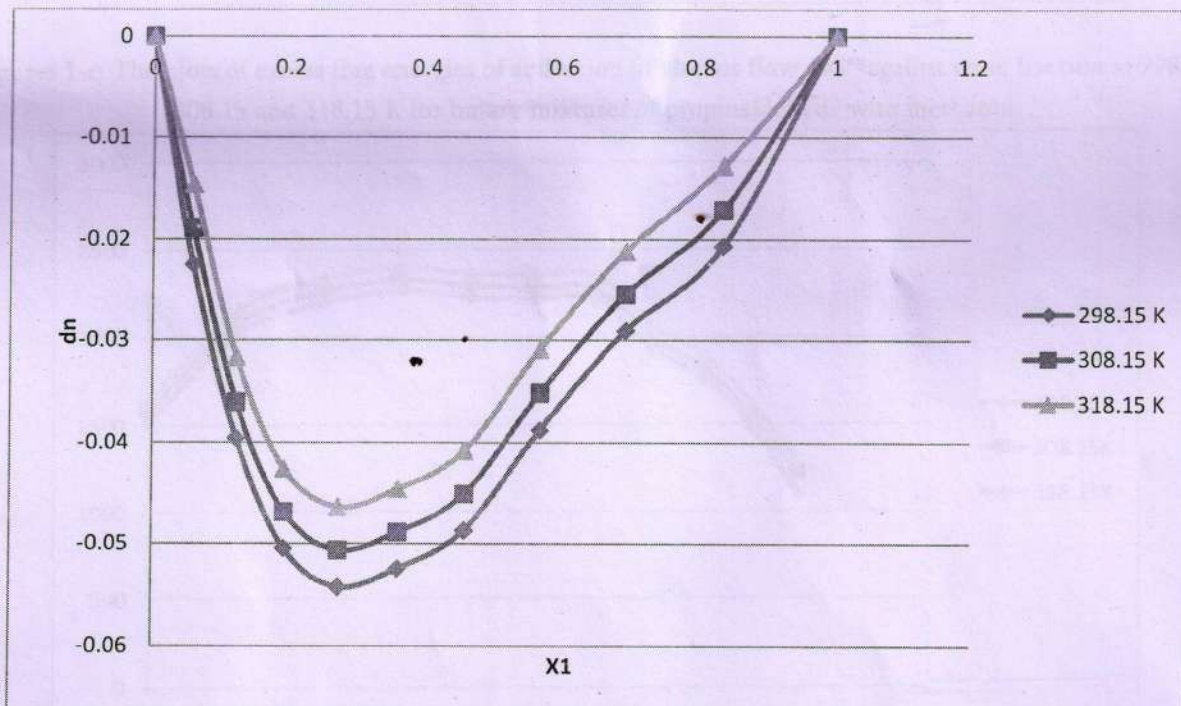
where  $R$  is the universal constant of gases,  $T$  is the absolute temperature,  $V_1$  and  $V_2$  are the molar volumes of component 1 and 2,  $x_1$  and  $x_2$  represents the mole fraction of component 1 and 2.

$V_m$  is obtained from equation 4 below.

$$V_m = \frac{x_1 M_1 + x_2 M_2}{\rho_m} \quad \text{----- (4)}$$

Where  $\eta_1$ ,  $\eta_2$  and  $\eta_m$  are the viscosity of component 1 and 2 and mixture respectively

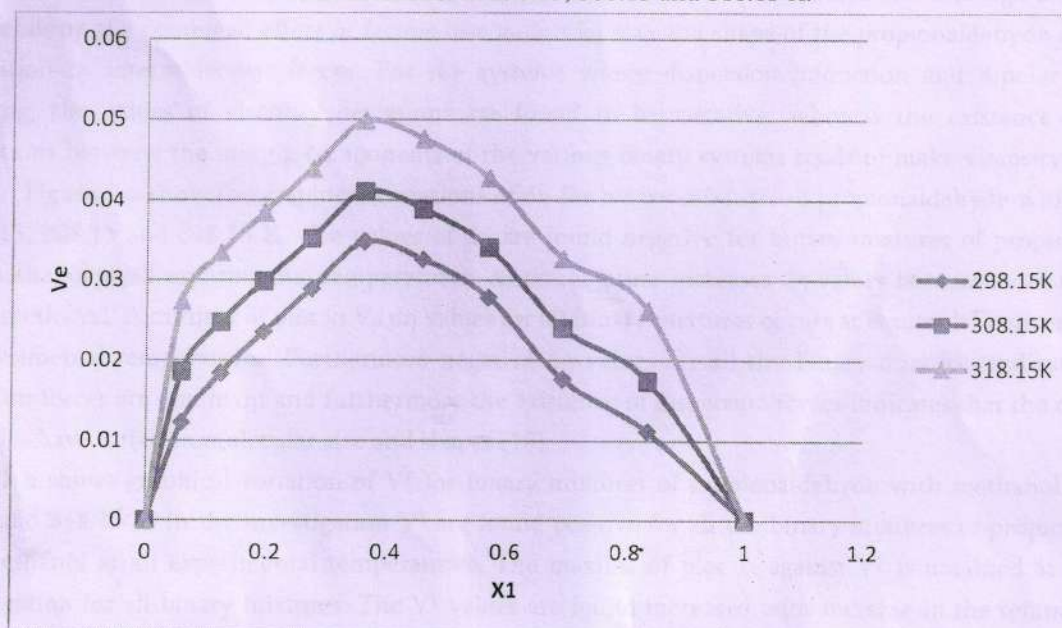
**Figure 1-a:** The plots of deviation in viscosity against mole fraction at 298.15, 308.15 and 318.15 K for binary mixtures of Propionaldehyde with methanol.



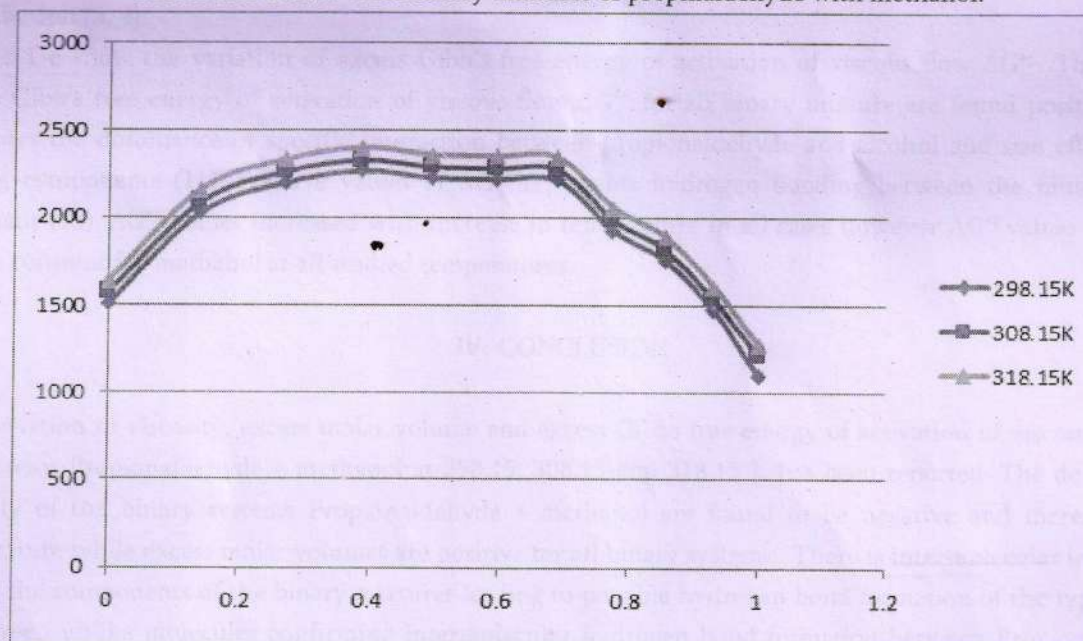
The experimental values of densities and viscosities of studied binary mixtures of propionaldehyde with methanol at 298.15 K, 308.15 K and 318.15 K over the entire composition range expected by mole fraction of propionaldehyde are listed in Tables 1-3. The densities and viscosities of the studied binary mixtures are found that with increasing temperature and increasing mole fraction of methanol, the density and viscosity of propionaldehyde-methanol mixture decrease.



**Figure: 1-b.** The plots of excess molar volumes against mole fraction for binary mixtures of Propionaldehyde with methanol at 298.15, 308.15 and 318.15 K.



**Figures 1-c:** The plots of excess free energies of activation of viscous flow,  $\Delta G^*E$  against mole fraction at 298.15, 308.15 and 318.15 K for binary mixtures of propionaldehyde with methanol.



The experimental values of densities and viscosities of studied binary mixtures of propionaldehyde with methanol at 298.15 K, 308.15 K and 318.15 K over the entire composition range expressed by mole fraction  $x_1$  of propionaldehyde are listed in Tables -(a-c). The densities and viscosities of the studied binary mixtures are found decreased with increasing temperature and increased with increasing of mole fraction of propionaldehyde. Qualitative explanation for the behavior of binary mixtures with the change in mole fraction



can be suggested from the experimental data obtained under study. Deviations in viscosity can be explained by means of relative strength of molecular interaction between like and unlike molecules. The sign and extent of  $d\eta$  depends on the combined effect of factors like molecular size and shape of the propionaldehyde and alcohol in addition to intermolecular forces. For the systems where dispersion, induction and dipolar forces are operating, the values of viscosity deviations are found to be negative, whereas the existence of specific interactions between the mixing components of the various binary systems tends to make viscosity deviations positive. Figure 1-a show the graphical variations of  $d\eta$  for binary mixtures of propionaldehyde with methanol at 298.15, 308.15 and 318.15 K. The values of  $d\eta$  are found negative for binary mixtures of propionaldehyde with methanol at all experimental temperatures. As temperature increases  $d\eta$  values became more negative in case of methanol. A minima of plot  $x_1$  Vs  $d\eta$  values for all binary mixtures occurs at equimolar concentrations at all experimental temperatures. Furthermore negative  $d\eta$  values for all the binary mixtures indicate that the dispersion forces are dominant and furthermore the existence of dispersion forces indicates that the component molecules have different molecular size and shapes (10).

Figure 1-b shows graphical variation of  $V^E$  for binary mixtures of propionaldehyde with methanol at 298.15, 308.15 and 318.15 K. In the investigation  $V^E$  are found positive for all the binary mixtures of propionaldehyde with methanol at all experimental temperatures. The maxima of plot  $x_1$  against  $V^E$  is obtained at equimolar concentration for all binary mixtures. The  $V^E$  values are found increased with increase in the temperature for all binary mixtures. As the temperature increases  $V^E$  also increases because of inconvenient interstitial accommodation due to thermal agitations among propionaldehyde and alcohol. The positive values of  $V^E$  in the present investigation are resultant of specific interactions formation of hydrogen bonds resulting in positive contribution (3, 4).

Figures 1-c show the variation of excess Gibbs free energy of activation of viscous flow  $\Delta G^{*E}$ . The values of excess Gibbs free energy of activation of viscous flow  $\Delta G^{*E}$  for all binary mixture are found positive which attributes the dominance of specific interaction between propionaldehyde and alcohol and size effect of the mixing components (11). Positive values of  $\Delta G^{*E}$  represents hydrogen bonding between the molecules are dominant (13).  $\Delta G^{*E}$  values increased with increase in temperature in all cases however  $\Delta G^{*E}$  values are found almost constant for methanol at all studied temperatures.

#### IV. CONCLUSION

The deviation in viscosity, excess molar volume and excess Gibbs free energy of activation of viscous flow for the systems Propionaldehyde + methanol at 298.15, 308.15 and 318.15 K has been reported. The deviation in viscosity of the binary systems Propionaldehyde + methanol are found to be negative and increases with temperature while excess molar volumes are positive for all binary systems. There is intermolecular interaction among the components of the binary mixtures leading to possible hydrogen bond formation of the type  $\ddot{O} \cdots H-O$  between unlike molecules confirming intermolecular hydrogen bond formation between Propionaldehyde and the alcohol mixtures(14-20).

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30	Development and Standardization of Soy Rasgulla	Tithi Das Dr. Swati Nakhale Khan Sumaiya	140
31	महिलांचे कुपोषण एक ज्वलंत सामाजिक समस्या	कु. छाया बालासाहेब बनसोडे	146
32	Development, Sensory and Proximal Evaluation of Gluten Free Multi-Millet Churros	Bin Hawail Nawal Saleh Dr. Swati Nakhale Khan Sumaiya	150



लिंगभाव विषमता आणि स्त्रि- एक समाजशास्त्रीय अभ्यास

प्रा. खेत्री एच. आर.  
समाजशास्त्र विभाग प्रमुख  
सौ. के. एस. के. महाविद्यालय, बीड

प्रस्तावना :-

स्त्री व पुरुष समाजाचे अविभाज्यघटक आहेत. समाजाच्या सर्वांगीन विकासासाठी स्त्री-पुरुष या दोघांच्या समान सहभागाची आवश्यकता आहे. स्त्री पुरुष यांच्यात जैविक भेद आहेत. स्त्री-पुरुषांमध्ये असणारे जैविक भेद हे सामाजिक, सांस्कृतिक व नैतिक पातळीवर आणले ते मानवानेच. मानवानिर्मित भेद आणि नैसर्गिक भेद याची इतकी सरमिसळ प्रत्येकाच्या मनात झालेली असते की अनेक मानवनिर्मित भेद देखील नैसर्गिक वाटू लागतात. यातूनच समाजात स्त्रियांना दुय्यम स्थान देण्यात आले. स्त्रियांचे हे दुय्यमत्व कसे नैसर्गिक आहे हे दाखवण्याचा नेहमी प्रयत्न केला गेला. स्त्री-पुरुष विषमतेत हे दुय्यमत्व कसे घडवले गेलं हे पाहणे आवश्यकता आहे.

अभ्यासाची उद्दिष्टे :-

- १) भारतीय समाजव्यवस्था आणि लिंगभाव यांच्या परस्पर संबंधाचा अभ्यास करणे.
- २) लिंगभाव विषमता आणि स्त्रि यांचा परस्पर संबंधाचा अभ्यास करणे.
- ३) लिंगभाव विषमता मागिल कारणांचा शोध घेणे.

भारतीय समाज व्यवस्था :-

कोणत्याही समाजाला स्वतःचे अस्तित्व टिकविण्याच्या दृष्टिने विशिष्ट सामाजिक व्यवस्था असावी लागते. त्या समाज व्यवस्थेत प्रचलित असलेले आचार-विचार, मूल्य, नियम, प्रमाणके त्या व्यवस्थेचे नियंत्रण करत असतात. भारतीय समाजव्यवस्था ही पुरुषप्रधान असलेली दिसते. त्यामुळे या व्यवस्थेचे मूल्य, प्रमाण, नियम हे अधिकांश पुरुषांना अनुकूल राहिले आणि त्यामुळे या पुरुष समर्थक मूल्यांचे सार्वत्रिकरण होऊन लिंगभेदास खतपाणी मिळतांना दिसते. समाजकारण, राजकारण, धार्मिक जीवन, अर्थव्यवस्था या सर्वांवर याचा परिणाम झालेला दिसतो.

पितृसत्ताक समाज व्यवस्था :-

पितृसत्ताक व्यवस्था एक अशी सामाजिक व्यवस्था आहे. ज्यामध्ये पिता किंवा इतर पुरुष कुटुंबातील सगळे सदस्य, संपत्ती व इतर आर्थिक संसाधनावर नियंत्रण ठेवतो. वंश व वारसा पुरुषांच्याच नावाने चालतो. पुरुषांचा दर्जा स्त्रियांपेक्षा उच्च मानला जातो. पितृसत्ताक समाजव्यवस्थेची अशी मान्यता आहे की स्त्रियांनी पुरुषांच्या आधीन आणि नियंत्रणात राहिले पाहिजे. या व्यवस्थेनं स्त्रियांना पुरुषांच्या संपत्तीचा एक भाग मानले. इतपर्यंत की स्त्रियांच्या शरीरावर देखिल पुरुषांचाच अधिकार मान्य केला. स्त्रियांनी केव्हा आणि कोणाबरोबर लैंगिक संबंध ठेवावे, कधी मुलांना जन्म द्यावा. मुलाला जन्म द्यावा की मुलींना हे सगळे निर्णय पुरुष प्रधान व्यवस्थेचे असतात. तिचे स्वतःचे नाही. या पार्श्वभूमी वर पितृसत्ता समाज व्यवस्थेची निर्मिती कशी झाली व त्या अगोदरही अशीच समाजव्यवस्था अस्तित्वात होती की. त्यात काही बदल होता हे पाहणं महत्त्वाचं ठरते.

आदीम समाज व्यवस्था :-



आदीम समाज व्यवस्थेत स्त्री-पुरुष टोळ्या करून रहात होते. एका ठिकाणाहून दुसऱ्या ठिकाणी अन्नाच्या शोधात भटकत होते. या भटक्या अवस्थेतून मानवी समाजाची निर्मिती व विकास झाला.

भटक्या अवस्थेत मानवाला निसर्गातील सर्वच बाबींबाबत कुतूहल, भीती होती. जन्म-मृत्यू ह्या घटनांमागील कारणपरंपरा स्पष्ट करण्याइतपत ज्ञान त्यांना नव्हते. प्रासंगिक नेतृत्वाला महत्त्व दिले जात, त्यात स्त्री-पुरुष दोघांचाही समावेश होता. स्त्री-पुरुषांमध्ये मुक्त लैंगिक संबंध अस्तित्वात होते. जन्माला आलेल्या मुलांची काळजी व सांभाळ करण्याची जबाबदारी समुहावर असे तसेच इतरही कार्यांमध्ये स्त्री-पुरुष असा भेदभाव केला जात नव्हता. त्या नंतर त्यांच्या संबंधात निश्चिंतता येत गेली व त्यातून कुटुंबसंस्थेची निर्मिती झाली.

कुटुंबसंस्था अस्तित्वात आल्यानंतर मुलांना आईच्याच नावाने ओळखण्यात येई, कारण कोणाचीही आई निश्चित असे पण पिता कोण हे कोणासही माहित नसे त्यामुळे प्रथम आईची सत्ता मान्य करणारी मातृसत्ताक कुटुंब व्यवस्था निर्माण झाली. यामध्ये कुटुंबाची सत्ता व अधिकार प्रामुख्याने वयाने मोठ्या असलेल्या स्त्रीकडे होते. तिच्या मृत्यूनंतर वारसा हक्काचे हस्तांतर आईकडून मुलीकडे होत.

हळूहळू पशुपालन, शिकार, अन्न गोळा करणं या सोबतच शेतीचा विकास झाला. ज्यावर आजची सारी मानवजात जगते आहे. त्या शेतीचा शोध स्त्रियांनीच लावला. पुरुष फक्त शिकार करण्यात व्यस्त होते. त्यांना शेतीवर जुंपून त्यांची भटकंती थांबवून स्थिर केले व नागरी जीवनाचा पाया घातला तो स्त्रियांनीच यांमुळे स्त्रियांसाठी घराबाहेरील कामाला पुरक घरातील कामाची संख्या वाढत गेली. स्त्रियांना गरोदरपणा, मातृत्व यासाठी एका जागी ठेवणे सोयीस्कर होते. त्यामुळे घरातील कामं स्त्रियांची तर बाहेरील कामे पुरुषांची अशी त्यांच्यात कामाची विभागणी झाली. ही विभागणी टरवून झाली नाही तर व्यवहार्य होती म्हणून झाली.

जस-जशी अर्थव्यवस्था बदलत गेली तसे स्त्री पुरुषांच्या दर्ज्यामध्ये बदल होत गेलं. स्थिर शेती व पशुपालनाला सुरुवात झाली त्याचबरोबर खाजगी संपत्तीचा उगम झाला व वारसाहक्काचा प्रश्न उभा राहिला. खाजगी संपत्ती कायम राखण्यासाठी पुरुष संतती कडेच ती संक्रमित करणे आवश्यक वाटू लागलं. त्यातून आपला मुलगा कोण हे ठरवण्यासाठी स्त्रियांच्या लैंगिकतेवर व प्रजोत्पादन शक्तीवर नियंत्रण ठेवण्यात येवू लागले त्यासाठी स्त्रियांना बंदिस्त केल्या गेले. त्यातूनच मातृसत्ता डावलून वडिलांचा अधिकार प्रस्थापित झाला. म्हणजेच पितृसत्ताक समाज व्यवस्थेची निर्मिती झाली.

नव्याने उगम पावलेल्या या समाजव्यवस्थेने सत्ताधारी सांपत्तिक वर्गातील पुरुषाचे हितसंबंध जोपासले व स्त्रियांच्या पाया अधिक भक्कम केला. त्याचबरोबर पुरुषप्रधान व्यवस्थेच्या प्रतिष्ठेचा भौतिक पाया देखिल भक्कम होत गेला. त्याद्वारे

१. स्त्रियांच्या उत्पादन व श्रमशक्तीवर नियंत्रण
२. स्त्रियांच्या प्रजोत्पादन शक्तीवर नियंत्रण
३. स्त्रियांच्या लैंगिकतेवर नियंत्रण
४. संपत्ती व इतर आर्थिक संसाधनावर नियंत्रण
५. सामाजिक, सांस्कृतिक आणि राजकीय संस्थांवर नियंत्रण ठेवल्या गेले.

पितृसत्ताक समाजव्यवस्थेने स्त्रियांना अनेक बंधनांमध्ये बंदिस्त करून ठेवले व त्याला धार्मिकतेचा ओलावा चढवला. स्त्रियांच्या या उत्पादक आणि पुनरुत्पादक श्रमाचे अग्नहरण व त्यावर आलेले नियंत्रण हा स्त्रियांच्या दुय्यमत्वाचा पाया ठरला. म्हणजेच मानवी



इतिहासाच्या वाटाचालीत स्त्री म्हणून स्वतंत्र अस्तित्व न मानता तिच्याकडे पुरुषकेंद्रीत दृष्टीकोणातून पाहिलं गेले. त्यामळे संस्कृतीच्या प्रगतीमध्ये स्त्रियांना दुय्यम स्थान मिळाले. पुढे-पुढे सवय होऊन सर्वांनाच ते नैसर्गिक व योग्य वाटू लागले.

लिंगभेदाचा स्त्री- पुरुषावर झालेले परिणाम

१. स्त्रियांना दुय्यम दर्जा : पुरुष व्यवस्थेचे स्त्रियांवर सर्व नियंत्रण प्रस्तापित झाल्यानं, स्त्रिया त्यांच्या मालमत्तांचा केवळ एक भाग बनल्या. सर्व समाजव्यवस्थेत स्त्रियांना दुय्यम दर्जा प्राप्त झाला. या दुय्यमतेतून त्यांच्यावर अनेक अन्याय अत्याचार लादले जावू लागले. स्त्रीला पुरुषाची अर्धांगिनी समजले जात असले तरी समाजात तिला शारीरिक व बौद्धिक दृष्ट्या कमकुवत व दुर्बल घटक मानून कौटुंबिक, सामाजिक, राजकीय व सांस्कृतिक क्षेत्रात कायदेशीर समान हक्कापासून वंचित केले गेले. तिचे स्वतंत्र अस्तित्व अमान्य केले. दुय्यम म्हणून तिची नेहमीच हेटाळणी केली जावू लागली. तर याऊलट पुरुष श्रेष्ठ अशा प्रतिमा निर्माण केल्या गेल्या.

२. मुलींना फुलण्याची, विकाची संधी मिळत नाही :

समाजात मुला-मुलींना सारखी वागणूक मिळत नाही. वंश-परंपरा चालू ठेवण्यासाठी मुलाच्या जन्माला अधिक महत्व प्राप्त झालं. मुला-मुलीच्या जन्मापासूनच त्यांच्यामध्ये भेद केला जातो. मुलाच्या खाण्यापिण्याकडे, शिक्षण, आरोग्याकडे अधिक लक्ष दिले जाते तर मुलींना ती केवळ एक मुलगी आहे म्हणून अनेक संधीपासून वंचित ठेवले जाते. याचाच एक परीणाम म्हणजे जन्मतः मुलीमध्ये जीवंत राहण्याची क्षमता मुलापेक्षा जास्त असतांना देखील तिच्या खाण्यापिण्याकडे व आरोग्याकडे पुरेसे लक्ष न दिल्याने होणाऱ्या बालमृत्युत मुलीचं प्रमाण अधिक असलेले दिसते. मुलीवर खर्च करणे म्हणजे शेजारच्या फळबागेला पाणी घातल्यासारखं आहे असे मानले जाते. तिला नेहमीच ही जाणीव करून दिली जाते, नोकरी व्यवसाय करायचा, कुटुंबाची आर्थिक जबाबदारी सांभाळायची असल्याने त्याच्यावर खर्च करतांना कोणताही विचार केला जात नाही. या वागणूकीमुळे मुलीमध्ये क्षमता, योग्यता असून देखील त्यांना फुलण्याची विकासाची संधी मिळत नाही.

३. मुलीचा जन्म नाकारला जावू लागला :

पितृसत्ताक समाज व्यवस्थेमध्ये वारसा ब्रडीलांकडून मुलाकडे जात असल्याने मुलाला वंशाला दिवा मानले गेले. तर मुलीचा जन्म नाकारला जावू लागला. स्त्रियांना मिळणारा दुय्यम दर्जा, समाजात निर्माण झालेल्या हुंड्यासारख्या अनिष्ट प्रथा तसंच अनेक अन्याय, अत्याचारकारक प्रथा यामुळे मुलींचा जन्म पाप मानला जावू लागला. याचा परिणाम दिवसेंदिवस समाजात मुलींचे प्रमाण कमी-कमी होत आहे.

आज देखील भ्रूण हत्येच्या प्रमाणात वाढ झालेली दिसते. पहिले मुलींना जन्मानंतर मारले जात तर आज विकसित तंत्रज्ञानाच्या निर्माणामुळे मुलींना जन्माला येण्याच्या आधिच नष्ट केले जाऊ लागलं. मुलींचं हे समाजातील नष्टहोत जाणे समाजाला आज अनेक विकृतीकडे घेऊन जाताना दिसत आहे.

४. स्त्रियांमध्ये आत्मविश्वास निर्माण होत नाही :

समाजात निर्माण झालेल्या या लिंगभेदात्मक भूमिकामुळे स्त्रियांना नेहमीच दुय्यमतेची वागणूक दिली जाते. त्यांच्यावर अनेक बंधने लादली जातात. त्यामुळे स्त्रियांचा आत्मविश्वास नाहीसा होतो. स्वतःची प्रतिमा तिलाच दुबळी, असाहय वाटू लागते. दुय्यमतांच्या घालून दिलेल्या चौकटीबाहेर पडायचा प्रयत्न केल्यास स्त्रिवानाच दोष दिले जातात, अगाऊ समजले जाते. त्यामुळे स्त्रिया देखील त्या बंधनात राहण्याचा प्रयत्न करतात. तसेच स्त्री ही दुबळी असल्यानं तिला निसर्गतः संरक्षणाची गरज आहे असे बिंबवले



गेल्याने स्त्रियांना देखील पुरुषांच्या संरक्षणात राहणेच सुरक्षित वाटते. त्यामुळे त्यांच्यात आत्मविश्वास निर्माण होत नाही. त्याचबरोबर स्त्रियांना एक व्यक्ती म्हणून सन्मान मिळत नाही. त्यांच्या आरोग्यावर ही विपरीत परिणाम होतो. मनाची घुसमट, भावनांचा कोंडमारा होतो. अनेक अन्याय-अत्याचाराला तोंड द्यावे लागते. याच्या स्त्रियांवर परिणाम होऊन मानवी जीवनाचा निखळ आनंद उपभोगने त्यांना शक्य होत नाही.

थोडक्यात पितृसत्ताक समाजव्यवस्थेने घडवलेल्या लिंगभेदाचे परिणाम स्त्री-पुरुष या दोघांवरही होत गेले आणि त्यातून समाजात विषमता निर्माण झाली. समाजातील कुटुंब, धर्म, कायदा, राजकीय, शैक्षणिक, सांस्कृतिक, आर्थिक संस्था, प्रसारमाध्यमे व इ. आनव्यवस्था हे सर्व पितृसत्ताक संरचनेचे आधारस्तंभ मानले गेले आणि या खोलवर मुळे रूजवलेल्या भक्कम व्यवस्थेमुळे ही पितृसत्ता अभेद्यच नव्हे तर नैसर्गिक भासते. असे असले तरी जातीव्यवस्था व वर्गव्यवस्था ज्याप्रमाणे समाजातील शोषणाच्या व्यवस्था म्हणून ओळखल्या जातात. त्याचप्रमाणे पुरुषप्रधान व्यवस्था ही देखील समाजातील शोषणाची व्यवस्था आहे. ही नैसर्गिक नाही किंवा स्त्री - पुरुषांच्या जैविक, भिन्नतेमुळे / शारीरिक रचनेमुळे ती उगम पावली नाही. तसे असते तर मानवी समाजाच्या इतिहासात मातृसत्ताक गण उभे राहिले नसते. या पार्श्वभूमीवर जैविकतेमुळे किंवा शरीररचनेमुळे स्त्रिया दुय्यम ठरल्या जातात असे म्हणणे अनैतिहासीक ठरेल.

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### आपत्तीचे नियोजन चक्र

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लोकप्रशासन विभाग प्रमुख  
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#### प्रस्तावना:-

विकसित राष्ट्र असो वा विकसनशील राष्ट्र असो, ज्या राष्ट्रावर नैसर्गिक आपत्ती कोसळते त्या राष्ट्राचे अपरिमित नुकसान होते किंबहुना देशाच्या अर्थव्यवस्थेवर ही दूरगामी परिणाम होत असतो. पृथ्वीतलावरील भौगोलिक परिस्थितीनुसार तसेच वातावरणातील बदलानुसार वेगवेगळ्या प्रकारच्या आपत्ती ह्या वेगवेगळ्या प्रदेशांमध्ये उद्भवत असतात. तसेच देशाचा विकास घडवून आणण्यासाठी विकासात्मक नियोजनाचा अभाव दिसून येतो यामुळे देखील आपत्तीची निर्मिती होताना दिसून येते. वाढत्या शहरीकरणाच्या गरजा पूर्ण करण्यासाठी मानव हा निसर्गावर अतिक्रमण करत असतो यामुळे देखील काही नैसर्गिक आपत्ती मानव स्वतःहून आपणावरती ओढवून घेत असतो.

दुसऱ्या बाजूला आपत्ती निवारण कार्यामध्ये म्हणावं तशा गांधीयाने व्यक्ती व सरकार सहभाग घेताना दिसून येत नाही. ज्यावेळी आपत्तीचे निर्मिती होते त्यावेळी त्या आपत्तीतून बाहेर येण्यासाठी प्रयत्न केले जातात परंतु आपत्ती येण्यापूर्वीची खबरदारी म्हणून करावयाची कार्य ही गांधीयाने कोणाकडूनही केली जात नाहीत. यामुळे आपत्तीचे नियोजन या विषयाकडे आधुनिक काळात गांधीयाने पाहण्याची आवश्यकता आहे. आपत्ती व्यवस्थापन कायदा 2005 अन्वये भारतातील प्रत्येक राज्याचे राज्यातील प्रत्येक जिल्ह्याचे स्वतःचे असे आणीबाणी कृती केंद्र तसेच आपत्कालीन व्यवस्थापन आराखडा असणे आवश्यक आहे. परंतु अनेक शहरांमध्ये आपत्कालीन व्यवस्थापनाचे स्वतंत्र विभाग स्थापित झालेले नाहीत. आपत्कालीन व्यवस्थापनाच्या नियोजन प्रक्रियेमध्ये कार्यरत असलेल्या अधिकाऱ्यांना शासकीय कार्यपद्धतीची माहिती असणे आवश्यक आहे जेणेकरून आवश्यकतेनुसार ते समन्वयकाचे काम करतील. आपत्कालीन व्यवस्थापन शास्त्रोक्त पद्धतीने करायचे असेल तर सर्वात महत्त्वाचे म्हणजे योग्य यंत्रणांशी समन्वय साधणे होय, परंतु असे होताना दिसून येत नाही.

#### आपत्ती संकल्पना:-

##### १.IFRC:

A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins. A disaster occurs when a hazard impacts on vulnerable people. The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster.

##### 2.Ball (1979):

Thus, it is clearly necessary to distinguish between the occurrence of a natural phenomenon, such as lack of water leading to a drought, and a disaster. In the latter case, the natural phenomenon combines with other factors to create the situation in which large numbers of people and some portion of their environment are permanently or temporarily disabled.

##### 3.Britton (1986) :

Disaster is a social product. The propensity for disaster is dependent upon the interplay between humans and their use of the physical and social world. Within this perspective disaster can be seen in broader ecological terms to be an expression of the vulnerability of human society.6



- 4) वेबस्टर:- आपत्ती म्हणजे ज्या संकटामुळे राष्ट्राची किंवा समाजाची मोठ्या प्रमाणात जीवित, आर्थिक आणि सामाजिक हानी होते तसेच त्या राष्ट्रावर किंवा समाजावर तिचे दूरगामी परिणाम होतात अशा संकटाला साधारणता आपत्ती असे म्हणतात.
- 5) यशदा:- आपत्ती म्हणजे सर्वनाश करणारी गंभीर घटना होय आपत्तीची सर्वसामान्य स्वीकारलेली व्याख्या म्हणजे अचानक अथवा कोणतीही पूर्व सूचना न देता मानवी जीवन विस्कळीत करणारी अथवा तशी शक्यता निर्माण करणारी दुर्घटना होय.
- 6) अर्चना चौधरी :- सजीव सृष्टीवर अचानक ओढावलेली संकटे किंवा विशिष्ट अपघात किंवा दुःखद घटना महापूर, भूकंप व ज्वालामुखी उद्रेक, वादळ-वारा, बॉम्बस्फोट, युद्ध, वीज कोसळणे, रोगराई, अवर्षण, जलप्रलय आणि वायुगळती इत्यादी म्हणजे आपत्ती होय.

**आपत्तीचे प्रकार:-** साधारणपणे आपत्तीचे अ) नैसर्गिक आपत्ती ब) मानवनिर्मित आपत्ती असे दोन प्रकार आहेत.

अ) नैसर्गिक आपत्ती:- भारत देश हा नैसर्गिक आपत्ती येणारा जगातील सर्वात मोठा देश समजला जातो अंदाजे भारतात दरवर्षी 50 टक्के भागात भूकंप 30% भागात दुष्काळ आणि दहा टक्के भागात पूर येत असतो तसेच विविध प्रकारच्या जातीय दगडी दहशतवाद आणि आगी या सुद्धा वारंवार घडताना दिसतात भूकंप, महापूर, चक्रीवादळ आणि अतिवृष्टी या सर्व घटना नैसर्गिक आपत्तीमध्ये मोडणाऱ्या आहेत.

ब) मानवनिर्मित आपत्ती:- मानवाने त्याच्या उत्पत्तीपासून आजपर्यंत हजारो वर्षांच्या प्रवासात अनेक नवनवीन शोध लावून क्रांती घडवून आणलेली आहे. यातून झालेल्या अमलाग्र बदलास तोच कारणीभूत ही ठरला आहे. पण या सर्व गोष्टींना सामोरे जात असताना तो दरवेळेस एकच चूक करत गेला ती म्हणजे निसर्गाच्या विरोधात जाणे आणि स्वतःची इच्छा पूर्ण करून घेणे. त्यातून निष्पन्न झालेल्या गोष्टी म्हणजे महापूर, भूकंप आणि ज्वालामुखी यासारखी आपत्ती होय. या अगोदर या सर्व आपत्ती नैसर्गिक आपत्ती म्हणून ओळखल्या जायच्या पण माणसाच्या स्वार्थी प्रवृत्तीमुळे त्याच आता मानवनिर्मित आपत्ती (Man-Med Disasters) म्हणून ओळखल्या जाऊ लागल्या.

#### आपत्तींची वर्गवारी:- (Classification of Disasters)

निसर्गनिर्मित किंवा मानवनिर्मित आपत्तींचे वेगवेगळे प्रकार आहेत आपत्तींची कारणे त्यांचे परिणाम स्वरूप आणि वैशिष्ट्ये हे सर्व भिन्न भिन्न स्वरूपाचे असतात, तसेच त्यावर प्रतिबंधाचे मार्ग उपश्रयमनाची कारवाई आणि त्यावरील प्रतिसाद ही भिन्नभिन्न स्वरूपाची असतात या सर्वानुसार आपत्तींची वर्गवारी केली जाते भारतात गेल्या शतकापर्यंत आपत्तीला समोर जाण्याची प्रणाली केवळ प्रतिसादात्मक स्वरूपाची होती परंतु 1999 मध्ये ओडिशा राज्यात भरलेल्या चक्रीवादळाने अतोनात हानी झाल्यानंतर आपत्ती विरोधक सर्वसामावेशक प्रणाली बनविण्याची आवश्यकता प्रकर्षाने जाणवली आणि भारत सरकारने तिची मांडणी करण्याचा निर्धार केला त्यानुसार के.सी पंत यांच्या अध्यक्षतेखाली एक वरिष्ठ समिती स्थापन करण्यात आली समितीने आपत्तींची वर्गवारी केली आणि त्या वर्गवारीत प्रत्येक आपत्तींना सक्षमपणे तोंड देण्यासाठी शासनापुढे अनेक प्रस्ताव ठेवले त्यानुसार नैसर्गिक आणि मानवनिर्मित गटांचे पाच उपघटक करण्यात आले ते पुढील प्रमाणे आहेत.

- 1) उपगट 1:- पाणी आणि वातावरणाशी निगडित आपत्ती:- या वर्गात महापूर, चक्रीवादळे, ढगफुटी गारपीट, उष्णतेची - थंडीची लाट, भूस्खलन आणि वीज कोसळणे इत्यादी आपत्तींचा समावेश केला गेला.
- 2) उपगट 2:- भुगर्भाशी संबंधित आपत्ती:- या वर्गात भूस्तराची घसरण, दरड कोसळणे, भूस्खलन, भूकंप आणि भूकंपामुळे उद्भवलेला त्सुनामी इत्यादी आपत्तींचा अंतर्भाव केला गेला.



- 3) उपगट 3:- रासायनिक , आण्विक आणि औद्योगिक आपत्ती:- या वर्गात औद्योगिक अपघात (उदा.भोपाळ शहरातील युनियन कार्बाइड कंपनीतील वायू गळती), आण्विक परिक्षणादरम्यान किंवा अणुभट्टीसंबंधी अपघात (उदा.रशियातील चेर्नोबिल अणुभट्टीचा अपघात), विद्युत अपघात, स्फोटकांचे अपघात आणि पायाभूत सुविधांच्या अभावामुळे उद्भवलेले अपघात (उदा. 2016 मध्ये महाराष्ट्रातील महाड तालुक्यातील सावित्री नदीवर पूल कोसळून झालेला अपघात) इत्यादी आपत्ती मोडतात.
- 4) उपगट 4 :- विविध अपघात :- या वर्गात रस्त्यावरील अपघात, रेल्वे अपघात,बोटीचे अपघात, अवकाशीय अपघात, खाणीतील अपघात,आग, जंगलातील वनवा,बॉम्बस्फोट, इमारती कोसळणे, दंगल, चेंगराचेंगरी, दहशतवाद आणि युद्ध इत्यादी आपत्तींचा समावेश आहे.
- 5) उपगट 5:- जैविक आपत्ती:- या उपगटात सार्थीचे आजार, पशुवैद्यकीय आजारांच्या साथी, अन्न विषबाधा आणि रोग उत्पादक हल्ले यांचा अंतर्भाव केला गेला.

### आपत्ती व्यवस्थापनाचे उद्दिष्टे:-

१)आपत्ती काळात मानवी समाजावर ओढवलेली जीवित हानी दूर करणे. व त्यातून लोकांची सुटका करणे. २)जीवनावश्यक वस्तूंची आपत्तीग्रस्ताना योग्य पद्धतीने पुरवठा करून आपत्तीची तीव्रता व आपत्तीनंतर येणारे दुःख दूर करणे. ३)आपत्तीग्रस्त मानवी जीवनात पुन्हा सुरळीतपणा निर्माण करून त्या प्रदेशातील मानवी जीवन पूर्वस्थितीत आणणे ४.) आपत्तीमुळे नुकसान झालेल्या नागरिकांचे पुनर्वसन करणे ५) आपत्तीग्रस्त भागातील नागरिकांना वैद्यकीय मदत उपलब्ध करून देणे .

### आपत्ती व्यवस्थापन( Disaster Management)

आपत्ती व्यवस्थापन हा अत्यंत मोठा विषय आहे. Prevention is better than cure ही बाब आपणा सर्वांना मान्य आहेच. कोणताही अपघात घडण्यापूर्वी तो अपघात घडूच नये यासाठी घेतली जाणारी खबरदारी,काळजी ही हीतवहच असते.. आपत्ती व्यवस्थापन म्हणजे आपत्ती पासून उद्भवणारी जीवित हानी वित्तहानी आणि सामाजिक आणि अशा सर्वच पातळीवरील दुष्परिणाम अभ्यासून शक्य तेवढ्या प्रमाणात होणारी हानी कमी करण्यासाठी योजले जाणारे विविध उपाय आणि उपाययोजना होय. आपत्ती व्यवस्थापनात पुढील तीन घटकांचा समावेश होतो

#### 1) आपत्ती प्रतिबंध:- (Disaster Prevention)

यामध्ये जिल्ह्यातील आणि शहरातील संभाव्य आपत्तीचे वर्गीकरण करणे,धोके जोखमीचे संकलन करणे कोणत्या आपत्तीमुळे किती नागरिक प्रभावित होतील याबाबतचे निश्चित आराखडे तयार करणे इत्यादींचा समावेश होतो.

2) आपत्तीचे उपमशन:- (Disaster Mitigation) यामध्ये आपत्ती उद्भवू नये यासाठी निश्चित उपाययोजना करण्यात येतात या उपाययोजनेमुळे होणारी संभाव्यित व जीवितहानी कमीत कमी राखता येते तसेच उत्कर्ष योजना व कृती यामुळे आपत्तीचे उपशमन लवकरात लवकर करणे शक्य होते.

3) आपत्तीसज्जता:- (Disaster Preparedness) आपत्ती सजतेचा मुख्य उद्देश म्हणजे येणाऱ्या आपत्तीमध्ये जीवित वा वित्तहानी कमीत कमी करणे होय. सज्जता असल्यास आपत्तीनंतर तात्काळ उपाययोजना अंमलात आणणे, नागरिकांना त्यांच्या जबाबदाऱ्या माहीत असल्याने तात्कालीक आणि दूरगामी आपत्तीनिवारण कार्यात यशस्वी हातभार लागणे शक्य होते. प्रत्यक्ष व अप्रत्यक्ष अशा दोन प्रकारच्या सज्जतामध्ये मुख्यतः आपत्ती विमचन पुस्तिका तयार करणे, जीवनावश्यक वस्तूंची जंत्री करणे, त्यांच्या उपलब्धतेची माहिती तयार ठेवणे, तसेच अशा कार्यासाठी मनुष्यबळ सज्ज ठेवणे, सर्वांगाने परिपूर्ण असा आपत्ती व्यवस्थापन आराखडा तयार करणे, संवेदनशील तसेच धोकादायक बाबींचे संतुलन राखणे, आवश्यक आपत्कालीन कर्मचाऱ्यांचा ताफा योग्य प्रशिक्षण देऊन तयार करणे आणि प्रतिसाद कार्याकरिता आवश्यक यंत्रसामग्री तयार करणे इत्यादी बाबी येतात. नैसर्गिक आपत्ती किंवा इतर आपत्ती असो यामुळे जीवित वित्त हानी होण्याची शक्यता असते. आपत्ती काळात



स्वतःचा, कुटुंबाचा, समाजाचा व गावांचा बचाव करायचा असेल तर योग्य ती पूर्वतयारी आणि सक्षम मानसिकता तयार करणे आवश्यक वाटते. यासाठी आपत्कालीन नियोजन चक्रातील प्रमुख घटकांची माहिती घेणे क्रम प्राप्त ठरते.

**आपत्कालीन नियोजन चक्रातील घटक** - प्रतिबंध, विमोचन, सज्जता, आपत्तीचा आघात, प्रतिसाद, पूर्ववतता व पुनरुत्थपण असे प्रमुख घटक आहेत.

- प्रतिबंध या घटकातील सर्व कृती या आपत्ती टाळण्याच्या दिशेने आखल्या जातात. तसेच आपत्ती घडल्यास त्याचे परिणाम कमीत कमी कसे होतील या दिशेनेही नियोजन करण्यात येते.
- विमोचन या विभागातील सर्व कृती अशा तऱ्हेने असलेल्या असतात की येऊन गेलेल्या पतीचा कमीत कमी परिणाम देशावर व लोकांवर होईल.
- सज्जता यामध्ये आखणी केली जाते की कोणत्याही आपत्तीला त्वरित व प्रभावी प्रतिसाद द्यायला शासन प्रशासन आणि नागरिक तयार होतील.
- आपत्तीचा आघात या चक्रातील टप्प्याचे नाव सर्व गोष्टींचा खुलासा करते ज्यावेळेस आपत्ती कोसळते ती वेळ म्हणजेच आपत्तीचा आघात होय.
- आपत्तीला प्रतिसाद आपत्ती व्यवस्थापन चक्रातील या टप्प्याचे अस्तित्वच या गोष्टीची सतत आठवण करून देते की, आघाताची तीव्रता प्रत्येक आपत्तीमध्ये भिन्न भिन्न स्वरूपाची असते व ती त्या आपत्तीच्या तीव्रतेच्या सापेक्ष असते. या टप्प्यावरच बाकीचे सर्व व्यवस्थापन अवलंबून असते. आघाताला प्रतिसाद हा आघात होण्यापूर्वी व झाल्यानंतर तात्काळ द्यावाच लागतो. केवळ मांडणीच्या सोयीसाठी या क्रमात तो आपत्तीच्या आघाताच्या टप्प्यानंतर लगेच ठेवलेला आहे. कारण ही वेळच अशी असते की संपूर्ण प्रतिसाद यंत्रणा कामाला. या टप्प्याला आपत्कालीन प्रतिसाद असेही म्हणतात. हा टप्पा हेच दर्शवतो की, आपत्तीचे विमोचन आणि निवारण लवकरात लवकर होण्याकरिता आपत्कालीन उपाय निवास अथवा पुनर्वसना करिता अवलंबलेले जातात. आपत्तीच्या तीव्रतेवर ते प्रतिसाद अवलंबून असतो म्हणजेच तीव्रता अधिक असेल तर वेळप्रसंगी शासन आणीबाणी किंवा युद्ध सदृश्य परिस्थिती म्हणून जाहीर करते व युद्ध पातळीवर प्रतिसादात्मक उपायाचे आयोजन केले जाते.
- पूर्ववतता या चक्रामध्ये आघातानंतर त्याच्या तीव्रतेनुसार जनजीवन विस्कळीत होते, काही प्रसंगात गावेच्या गावे किंवा संपूर्ण शहरे उद्ध्वस्त होतात. अशा वेळेस जनजीवन पूर्ववत होण्यास म्हणजेच आपत्तीपूर्व जसे होते तसे होण्यास जो काळ लागतो त्यास पूर्ववतता असे म्हटले जाते.
- पुनरुत्थान आपत्तीग्रस्त भागातील नागरिकांना आपत्तीपूर्वकाळात उपलब्ध असणाऱ्या सेवा सुविधा उपलब्ध करून देण्यावर भर दिला जातो.

**आपत्ती व्यवस्थापन चक्रातील कार्यवाहीचे भाग -**

■ **आपत्तीपूर्व कार्यवाही-**

संभाव्य धोक्यांचा आढावा घेऊन त्या धोक्यांची हानिकारकता आणि स्वरूप यांचा आढावा घेणे. धोका टाळण्यासाठी प्रतिबंधात्मक कार्यवाही करणे. जिथे प्रतिबंधात्मक कार्यवाही शक्य नसेल तिथे हा निश्चित हानि कमी होईल असे उपाय योजून तिचे उपक्षमन करणे. आपत्ती पूर्वतयारी करणे यात सरकारी यंत्रणा धोक्याचे इशारे देणारी यंत्रणा आपत्ती दरम्यान लागणारी सामग्री बिगर सरकारी यंत्रणा आणि सामान्य नागरिक या सर्वांच्या अंतर्भाव होतो.

■ **आपत्ती दरम्यानची कार्यवाही -**

धोक्याचा इशारा देणे, जीविताचे रक्षण आणि बचाव कार्य करणे, लोकांना आणि प्राण्यांना सुरक्षित स्थानी पोहोचवणे, मालमत्तेची सुरक्षा आणि तात्काळ वैद्यकीय आणि इतर मदत पोहोचवणे.



■ आपत्ती नंतरची कार्यवाही-

विस्थापितांचे पुनर्वसन आणि त्यांचे जीवन पूर्ववत सुरळीत व्हावे म्हणून त्यांचे पुनरुत्थान करणे. नुकसान भरपाई देऊन त्यांना समाजाच्या मुख्य प्रवाहात संलग्न करून घेणे आणि त्यांच्या निर्वाहाची सोय करून देणे..आपत्तीमुळे शेती पोहोचलेल्या सर्व बांधकामांची इमारतींची पुनर्बांधणी आणि विकास करणे.विकास कामे करीत असताना भविष्यातील धोक्यांमुळे परत हानी होऊ नये याची काळजी घेणे.

सारांश-

अनंत काळापासून पृथ्वीतलावर आपत्ती कोसळत आले आहेत. यापैकी काही नैसर्गिक असतात तर काही मानवनिर्मित असतात. आपत्तीमुळे होणारी जीवित आणि वित्तीय हानी टाळण्यासाठी किंवा त्याचे प्रमाण कमी करण्यासाठी आपत्ती व्यवस्थापन प्रणाली अलीकडील काळात सगळ्याच देशांनी स्वीकारलेली दिसून येते. आपत्ती व्यवस्थापन चक्र हे आपत्ती व्यवस्थापनाच्या प्रणाली मधील एक महत्त्वाचे आणि मूलभूत तत्व आहे. आपत्तीमुळे होणारे हानी टाळायचे असेल तर आपत्ती उद्भवते अगोदरपासून आपत्तीचा अंदाज घेणे आपत्ती विरोधी प्रतिबंधात्मक उपाय योजने आपण त्यांचे उपशमन आणि आपत्ती दरम्यान योग्य बचावासाठी कार्यवाही हाती घेणे इत्यादी गोष्टी महत्त्वाच्या ठरतात. आपत्ती व्यवस्थापन चक्र आणि त्यात अंतर्भाव केलेली कार्यप्रणाली ही सातत्याने अमलात आणणे अपेक्षित असते. सरकारी यंत्रणा या पत्ती व्यवस्थापनात महत्त्वाच्या वाटेकरी असतात पण सामान्यजणांची जबाबदारी तेवढीच महत्त्वाची असते. थोडक्यात आपत्ती व्यवस्थापन ही समाजाच्या सर्व घटकांचा समावेश असलेली सुनियोजित संघटनात्मक कृती आणि समन्वय साधून आपत्तींना समर्थपणे तोंड देण्यास कटिबद्ध असलेली प्रणाली आहे.

संदर्भ -

१. रवी सिन्हा, आपत्ती व्यवस्थापनात भारत, २६ ऑगस्ट, २०१८, महाराष्ट्र टाइम्स
२. ए.पी.चौधरी,अर्चना चौधरी,२०१६, आपत्ती व्यवस्थापन, प्रशांत प्रकाशन, जळगाव .
- ३.चावला पी. एस.२००८ Natural Hazards and Disaster Management
४. मराठे प्र. प्र. आणि गोखले व्ही.जे, आपत्ती व्यवस्थापन संकल्पना आणि कृती २०१० ,पुणे डायमंड पब्लिकेशन.
५. मुसमाडे अर्जुन व मोरे ज्योतीराम, २०१४, आपत्ती व्यवस्थापन भूगोल, डायमंड पब्लिकेशन पुणे
६. चौधरी जवाहर, नैसर्गिक आपत्तीचा भूगोल कैलास पब्लिकेशन औरंगाबाद २०१६.



Dr. Khakre P.R.



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# Application of Carboxylic Acid in Organic Synthesis of Nano Technology

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## ABSTRACT

Carboxylic acid are versatile organic compounds carboxylic acid in a different area as organic synthesis nanotechnology. The application Carboxylic acid in these areas are obtained of small molecules macro molecules synthetic modifications surface of nanoparticles metallic modification surface of nanostructure such as carbon nanotubes and graphene, nanomaterials, medical field pharmacy etc. Carboxylic acid can be natural and synthetic can be extracted present chemical structure highly polar active in organic reaction, substitution, elimination, oxidation, coupling etc. In nanotechnology the use of acid Carboxylic as surface modifier to promote the dispersion and incorporation of metallic nanoparticles the importance of Carboxylic acid in different area highlighting the area of organic synthetic nanotechnology its application

## 1. INTRODUCTION

Carboxylic acids are compounds with excellent chemical and physical properties. The most particular characteristics of this type of organic compounds is high solubility in polar solvent as water or alcohol, methanol, ethanol etc chemical structure contains a Carboxylic functions( $>C=O$ ) as a hydroxy group( $OH$ ). These groups interact easily with polar compounds the carbonyl group( $>C=O$ ) is considered one of the most functional group involved in many important reaction this type of organic compounds can be obtained by different routes, Carboxylic acids, citric acid, lactic acid or fumaric acid are produced formed by fermentation, most of this type of Carboxylic acids are applied in the food industries. Carboxylic acids are different synthetic reactions such as reaction of oxidation from alcohol in this the presence of strong oxidants such  $KMnO_4$  oxidation of aromatic compounds.[1]

Derivatives of Carboxylic acids, as alkali halides, Ester and amide present different and important application in diverse area. the reaction between Carboxylic acids and alcohol in presence of an acid catalyst  $H_2SO_4$  with heat, this type of reaction is known as Esterification. In the in the case of amides, it is obtained in the presence of amines may be primary and secondary with Carboxylic acids in this reaction also can be used catalyst and heat to accelerate the reaction. Their chemical and physical characteristics this type of organic compounds present in numerical applications in the different areas medicine, pharmacy, organometallic, food among other. To study Carboxylic acids in the area organic synthesis in 2008 Lazzarato et al. reported the use of Carboxylic acids.



salicylic acid type of aspirin like molecules obtained through a novel approach, where phenol reactions to Nitro oxy-acyl these molecule present pharmaceutical properties [2].

## II. ORGANIC SYNTHESIS

The use of Carboxylic acids in organic synthesis is very wide area and the chemical transformation of this type to other have made it very versatile functional group. this chemical transformation have seen improvement when they carry out through green chemistry process. These methods to aim for energy efficiency to make reaction under microwave irradiation this methodology was an esterification reaction with Carboxylic acids and alcohol obtaining high yield in the short reaction [3]. new direct amidation reaction is important [4,5] one of those direct methodology of amide formation is by reaction amides with the Carboxylic acids using toluene solvent Radio frequency heating under neat conditions [6]. these reagents free pathway has limitation in the substance scope. Lonigon et.al reported the methodology in which they used the simple borate Ester that are different reagents for the direct synthesis of amide using a variety of Carboxylic acids and amides [7]. this reaction can be carried out openly to the air under acetonitrile flux. the amidation products can be purified in very simple way in the most cases, it only needs simple filtration procedure using commercial availability resins giving excellent yield [fig.1]

Ojeda-parras et al [8] describe a green methodology from direct amidation of Carboxylic acids and amines using silica gel as a solid support [fig.2] An example is the reaction between an oxazolidine an isocyanide and a Carboxylic acid to provide N-acyl oxy ethyl amino acid derivatives [fig.3][9] it can be completed with those structures that are produced by the will established a reaction and they allow the generation of chemicals Carboxylic acids can be used in organocatalytic reactions in this case Carboxylic acid can be used directly to obtain the alpha hydroxy phosphonates the reaction was carried out in the simple way with a variety of aldehydes and ketones with a trimethyl phosphate in the presence of catalytic amount of pyridine 2,6-di Carboxylic acid in water as a solvent these generated a low cost and environmentally friendly methodology [fig.4][10]

Carboxylic acid present important applications on in the pharmaceutical area due to their chemical structure different methods have been developed for their detection in medicine in cosmetics in food additives. in 2015 Soham et al reported a selective chromogenic system which not only can discriminate Maleic acid vs fumaric acid but can also differentiate maleic acid among diverse Carboxylic acid the detection of this type of organic acid is very important

## III. NANO TECHNOLOGY

Carboxylic acid have been extensively due to their important application in petrochemical, food industries, dyes stabilizer and currently on nanotechnology[11] one of the most important application today of the Carboxylic acid is the surface modification of the nano part particles, this because during this synthesis of the nanoparticles by any methodology this tends to agglomerate due to the Vander walls forces and the absence of repulsive forces in this sense in 2008 yong et al obtained nanoparticles of  $Fe_3O_4$  with a of 6-13 nm using olic acid as a surfactant this group of researchers functionalized the nanoparticles with Carboxylic acids obtaining acid catalyst for the hydrolysis of carbohydrates being able to observe that the acid functionalization can have large advantages in producing more active catalyst and thus an application in green process[12]



Hojjati et.al modifier  $\text{TiO}_2$  nanoparticles with carboxylic acid followed by edition with acrylic acid to obtain a well dispersed nanoparticle in polyacrylic acid [13] the chemical modification of nanoparticles  $\text{TiO}_2$  with Carboxylic acid by the thermal methods finding improvement in the photovoltaic performance of the  $\text{TiO}_2$  nanoparticle despite being coated with carboxylic acid[14]

In other studies it has been shown that this use of carboxylic acid as a surface modifier of nanoparticles can be easily we redispersed in diverse matrix also or solvent and improves properties as antibacterial activity[15] in recent years inorganic nanoparticles have been widely studied due to the excellent properties that they provide due to their large surface area emphasizing applications such as optical, catalytic, electrical sensing, transport, magnetic, thermal conductivity, electromagnetic these properties are the result of the large surface area that they possess metals such as gold, silver, palladium and copper have been used to make inorganic nanoparticles of various shapes and size. A wide variety of methods have been developed to synthesize metallic nanoparticles with different method chemical method, physical and biological methods.

chemical methods are the most used, due to their ease of climbing [16] the chemical reduction of metal salts in the solution the most commonly used method [17]. In aqueous the reducing agent is added or generated among the most commonly used reducing agents or sodium borohydride, hydrazine and dimethyl formamide, however in the recent years monotoxic and equally effective substances have been used sodium citrate and glucose[18] non-aqueous system, the solvent can also act as a reducing agent such solvent can be alcohols such as a polyethylene glycol, glycerol and ethylene glycol through which colloidal nanoparticles obtained. physical methods included electrochemical method laser ablation, thermolysis, microwave irradiations and Sonochemistry for example the decomposition of solid at a high temperature through this process it is a possible to obtain particles smaller than 5nm. biological methods are developed using a metal salt and a reducing agent, which may be micro-organism enzyme or plant extract [19]

The nanoparticles can also be functionalized with the organic molecules with the biological functions example lipids, vitamins, peptides and sugars in addition to their other macromolecules such as the proteins, enzymes, DNA and RNA the combinations of inorganic nano particles and biomolecules allows the use of these in biological system because they combine unique properties for applications such as molecular recognition [20]. organic molecules such as acrylic acid, pyrrole and styrene have been used in a plasma to modify nanoparticles of zinc oxide, alumina and carbon nanofibers by this process it is possible to form a thin layer ranging from 1 to 3 nm in thickness silver nanoparticles are recognized with antifungal and antibacterial properties and have application in biosensing antiviral agents HIV-1, in water purification system and paint products. In case Au nanoparticles these are used in cancer diagnosis and therapy, antiviral and antibacterial MRI, biosensing application.

carboxylic acids are currently used as a surface modifiers in carbon based nanostructure, carbon nanotube, single wall and multiple wall graphene, nano fibres etc this type of superficial modification can be carried out through different alternative making use of green chemistry which recommend the use of sustainable activation energies such as ultrasound, microwaves, plasma, that helps to reduce the energy consumption and decrease the time of reaction in the surface modification.

#### IV. CONCLUSION

The carboxylic acid have been widely applied in different areas highlighting organic synthesis nanotechnology have been used basic application anti relevant application in organic synthesis, carboxylic acid can act as



organic substrate reagent in the reaction one step which are considered green reaction are used as a catalyst in substitution, addition, condensation, polymerization reaction. organic synthesis is directed towards green reactions easy fast economical, sustainable process. the carboxylic acids highly reactive due to the chemical nature of carbonyl group.

In nanotechnology the carboxylic acids are used as modifier substrate in the surface modification of the nanostructure of carbon. the chemical nature of the carboxylic acid allows to carry out this type of application of the carboxylic acids is due to nature chemical, specifically by hydrophilic characteristic provided by the functional group. The research on the carboxylic acids, is very interesting described some recent report. there are still challenges with in this field that remain to explored.

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# “RECENT ADVANCES IN THE NANOTECHNOLOGY IT'S FUTURE SCOPE”

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## ABSTRACT:

Nanotechnology is gaining importance rapidly as a most powerful technology. It immense potential promises the possibility of significant changes in near term future to understand and manipulate matter at the molecular and atomic levels promise wave of significant new technologies. Nanotechnology is the future of advanced development. It is every things today from clothes to foods there are every sector in it's range we should promote it more for our future and more development in air among life. Today the product made using nanomaterial having general as well as special application like treating cancer, energy harvesting for self-powered nanosistion, batteries, aerospace materials. The research in the area of carbon. Nanotubes, nano-polymers, nano crystal, nano particles, nano tubes, nano wires etc. Various risk involved in using nano technology are also discussed because it is believed that the most disruptive future changes may occurs as a result of molecular manufacturing, an advanced form of nanotechnology.

## INTRODUCTION:

A nanometer (nm) is one billionth of a meter, for comparison purpose, the width of an average hair is 100.000 nanometers. The human blood cells are 2,000 to 5,000 nm long a stared of DNA has a diameter of 2.5 nm, and a line of ten hydrogen atom is one nm. Manipulation of matter on an atomic, molecular and supramolecular with atleast one dimension sized from 1 to 10 nm.

The present nanotechnology has begun to blossom in the last ten years, this largely due to the development of new instruments that allow researchers to observe manipulate matter at the nano level. Scientists find two nano-size structure of particular interest nanowires and carbon nano tubes. Nano wires are wires with a very small diameter, sometimes as small as 1 nanometer to use transistors for computer chips and other electronic devices. A carbon nanotube is a nanosize cylinder of carbon atoms. Imagine a sheet of carbon atoms. If you that sheet into a tube you have carbon nanotube. Carbon nano tube properties depend on how you roll the sheet all carbon nano tube are made of carbon, they can be very different from one another based on how you align the individual atom.

## THE PROGRESSION OF NANOTECHNOLOGY:

- 1) **PASSIVE NANOSTRUCTURE:** The first period products will take advantage of the passive properties of nanomaterials, including nanotubes and nanolayers. For ecample Titanium dioxide is often used in sunscreens because it absorbs and reflects ultra-violet light. When broken down into nanoparticles it becomes transparent to



visible light, eliminating white cream appearance associated with traditional sunscreens with a nanolayer of material can be woven into stain resistant clothing's, these products taken advantage of the unique property of a material, when it is manufactured at a nanoscale, however, in each case the nanomaterial it self remains static once it is encapsulated into product.

2) **ACTIVE NANOSTRUCTURE:** A nanoelectromechanical device embedded into construction materials could sense when the material is under strain and release an epoxy that repairs any rupture. A products in this phase require a greater understanding of how the structure of nanomaterial determines its properties and a corresponding ability to design unique materials.

3) **NANOSYSTEM:** A challenge is to get the main components to work together within a network, possibly exchanging information in the process, proteins might assemble small batteries. Nanostructures could self-assemble into lattice on which bone or other tissues could grow. Smart dust strewn over an area could sense the presence of human beings and communicate their location. At this stage human beings and communicate their location at this stage significant advancements in robotics, biotechnology and new generation information technology will begin to appear in products.

4) **MOLECULAR NANOSYSTEM:** This stage involves the intelligent design of molecular and atomic devices, leading to unprecedented understanding and control over the basic building blocks of all natural and non-made things. Research will occur on the interaction between light and matter, the machine-human interface and atomic manipulation to design molecules. The multifunctional molecules, catalysts for synthesis and controlling of engineered nanostructure, sub-cellular interventions and biomimetics for complex system dynamics and control. The initial scientific foundations for these technologies are already starting to emerge from laboratories. Nanoparticles regularly applied to a field might search out and transform hazardous materials and mix a specified amount of oxygen into the soil. Nanodevices could roam the body. Fixing the DNA of damaged cells, monitoring vital conditions and displaying data in a readable form on skin cells in a form similar to a tattoo, computers might operate by reading the brain waves of the operator.

#### **NANOMATERIALS:**

1) **Nanoceramic powder:** Nanoceramic Powders constitute an important segment of the whole nanostructure materials. Constitute more than 50% of the total nanostructure materials.

2) **Nano tubes:** Conductors or Semiconductors, strong materials with good thermal conductivity.

3) **Nano composites:** Generally polymer based with nanosized fillers. Nanoceramics are available commercially in the form of dry powders or liquid dispersions. The most commercially important nanoceramic materials are simple metal oxides silica, titania, alumina, iron oxide, zinc oxide, silica and iron oxide, nano particles have a commercial history spanning half a century or more of increasing importance are the mixed oxides and titanates. The nanocrystalline titania, zinc oxide other oxides have more recently entered the market place.

**APPLICATIONS :** Nanotechnology begins an interdisciplinary field nanoelectronic, nanomaterials and nanobiotechnology which find application in materials, electronics, environment health care information technology, pharmaceuticals, agriculture, construction transport and food processing and storage.

A) **Electronics :** The semiconductor industry has been to improve the performance of electronic system for more than four decades and downscaling semiconductor industry has been to improve the performance of electronic



system for more than four decades y downscaling silicon based devices approach will soon encounter its physical and technical limits with increasing requirements for performance functionality alternate materials to silicon, carbon nanotubes and one dimensional carbon nanotubes and two dimensional which electrical properties for fabrication of faster and more power efficient electronics.

**1) Graphene transistor:** The first time a single sheet of carbon atom packed in a honeycomb crystal lattice can be isolates from graphite and is stable at room temperature. Electron to move at an extra-ordinary high speed, together with it's intrinsic nature of being one atom thick, can be exploited to fabricate field-effect transition.

**2) Carbon nanotube electronics:** When a layer of grapheme is rolled into a tube a sigle walled carbon nanotube is formed. Inherit the attractive electronic properties of grapheme but their cylindrical structure makes them a more readily available option for forming the channel in field effect transistors as on electron mobility superior to their silicon based counterfort and allow larger current densities while dissipating the heat generated from their opertation more efficiently. Carbon nanotubes based device advanced beyond single transistors to include more complex system. Such radio-frequency components.

**3) Carbon-based nanosensors:** In addition to the exceptional electrical properties of grapheme and carbon nanotubes. Thermal conductivity, high mechanical robustness and very large surface to volume ratio them superior materials for fabrication of electromechanical and electrochemical sensors with higher sensitivities, lower limits of detection and faster response time.

**4) Nano-electro mechanical system:** All electronic tools have one thing in common an integrated circuit acting as their brain, nanoelectron mechanical system have evolved during the last 10 year to make this dream come true by creating sensors and actualators at the some scale as nanoelectronic. Syntheisis of nanomaterials with excellent electrical and mechanical properties have extended the boundaries of nano electromechanical system to include more advanced devices as the non-volatile nano-electro-mechanical memory. Where information is transferred and stored through a series of electrical and mechanical actions at the nanoscale.

**B) Nano Technology and medical application:** Development of newer drug delivery system based on nanotechnology method is being tried for conditions like cancer, diabetes, fungal, infections, and viral infections in gene therapy. Nanotechnology has also found its use diagnostic medicine as constrostagents. Fluarscent dyes and magnetic nano particles.

**1) Carbon based nano materials:** Carbon nanotubes are essentially elongated molecule, formed entirely from carbon atoms. Their ability to elongate in suitable electrolytes under very low voltages which may render them very useful sensors in a variety of medical devices.

**2) Nanowires:** Nanowires differ from nanotubes in that they have no inner cavity, semiconducting silicon based nanowires are showing promise for the detection of viruses in solution and their capabilities in such application may exceed those of other methods.

**3) Nanoporous materials:** Carbon-silicon-ceramic based materials, with holes in the region of 100nm have greatly increased surface area and can have extremely useful catalytic adsorbent properties.

**4) Nano coated surgical blades:** It means nanoparticulate costing on to specially prepared hard metal substrates ex. polished diamond nanolayers. It is possible to manufacture surgical blades of extreme sharpness and low friction that are highly suited to optical and neurosurgery.



5) **Needles:** Nanocoated needles are now available for very fine suturing in demanding application needles have good ductility, exceptional strength and corrosion resistance.

**C) Nanotechnology in Textiles and clothing:** The wave of nanotechnology has shown a huge potential in the textile and clothing industry which is normally very traditional. Coating is a common technique used to apply nano-particles on to textiles. Nanoparticles have a large surface area to volume ratio and high surface energy. Due to nanotechnology can provide high durability for fabrics the use of nanotechnology allows textiles to become multifunctional and produce fabrics with special functions including antibacterial, UV protection easy clean, water and stain repellent and anti-odor.

**D) Nanotechnology in food science:** The scientific challenges in the food and bioprocessing industry for manufacturing high quality and safe food through efficient and sustainable means can be solved through nanotechnology, used agriculture and food production to form nanosensors for monitoring crop growth and pest control by early identification of plant diseases. Bacteria identification and food quality monitoring using biosensors, intelligent, active and smart food packing system. The food packaging by placing anti-microbial agents directly on the surface of the coated film.

**E) Nanotechnology in catalysis:** The essential application of metal nanoparticles. Nanomaterials show a great potential because of the large surface area of the particles many chemists suggest that metal colloids are very efficient catalysis because of a great ratio of atoms remaining at the surface, and so available to chemical transformation of substances. There are different types of nanomaterials which are used as catalysts. The activity of catalyst can also be described by the turn over number and the catalytic efficiency by the turn over frequency. The turn over number is the number of reactant molecule that 1 gm of catalyst can convert into products. There are two types of catalyst heterogeneous catalysis and homogeneous catalysis. Heterogeneous catalysis acting different phase than the reactant where as homogeneous catalysts function acts in the same phase as the reactants.

#### **VARIOUS NANOTECHNOLOGY PRODCUTS:**

a) **Nanocream -Nano aluminium oxide Fibers:** Nano structural aluminium oxide fibers provide added strength and improved performance to metals, plastics, polymers and composite material. The large number of hydroxyl groups available on the nanofibers generates a positive charge in water solution such that it will attract and retain negatively charged particles including bacteria, virus, organic & non-organic colloids and negatively charged macromolecules.

b) **Nano filtration:** Use in purification of water for medical and dental purposes. Filter sterilization of medical serum biological fluids and other pharmaceutical products.

c) **Nanoporous silica filled composite:** It is fairly new material proven to increase wear resistance in posterior application. The monomer to inter-penitrate it through a capillary force. The monomer is draw in and out of the filler, reinferering the composite and increasing the durability of the bowing between the two phases. The organic monomer into the pres and adding a light cure system solid organic nanostructure is formed.

d) **Nanoadhesive poss:** Polyhedral aligomeric silesquior enables the design of additives that make plastics that are unusually lightweight, durable, heat-tolerant and environment friendly. The organic and in organic materials in molecule with on average diameter of 1.5 nanometers. In addition it has been shown that poss materials are much more resistant to radiation damage and erosion than conventional polymers.



## RISKS IN NANOTECHNOLOGY:

They are relatively cheap and can be manufactured in large quantities. They are already used in consumer products. Their properties can be very different to the larger forms of the material they are made from, they can be highly reactive. The particles often have unknown toxicity. Their toxicity can be difficult to quantify. They can disperse easily in air or water. The importance of nano particles being considered as the most potentially hazardous type may change in future other form of nanotechnology become more common and nanoparticles better understood. There are several ways that nanoparticles can enter the body. These include inhalation, ingestion, absorption through the skin and direct injection for medicinal purposes. Once particles are in the body they may be transported throughout the body before they are ejected. The blood brain barrier, which protects the brain from harmful chemical in the blood, can be no barrier at all to certain nanoparticles.

## CONCLUSIONS:

The advantage of quantum level properties molecular nanotechnology allow for unprecedented control of the materials world at the nanoscale, providing the means by which system and materials can be built with exacting specification and characteristics. The use of nanotechnology is continuously transforming daily use products making consumers goods plentiful, inexpensive and highly durable, it has potential application in many sectors including points and coatings, textiles, clothing, cosmetics, food science, catalysis. In addition, nanotechnology present new opportunities to improve how we measure, monitor, manage. Nanotechnology has emerged as growing and rapidly changing field. New generation of nano-materials will evolve, with new and possibly unforeseen issues. Nanotechnology is the future of advanced development. It is everything today from clothes to foods there are every sector in all ranges we should promote it more for our future and for more developments in our current life.

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## SYNTHESIS AND CHARACTERIZATION OF MIXED LIGAND VANADIUM METAL COMPLEXES USING 2, 2'- BIPYRIDINE AND L-AMINO ACIDS AS LIGANDS

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### Abstract:

Four new mixed ligand complexes of vanadium metal were synthesized using 2, 2'-bipyridine as primary ligand and some L-amino acids such as L-Phenyl Alanine, L-serine L-glycine and L-aspartic acid as secondary ligands respectively. The synthesized complexes were characterized by using IR spectra, elemental analysis, molar conductance and magnetic susceptibility measurement. All the synthesized complexes are proposed to have square pyramidal geometry based on the results obtained from IR spectra, molar conductance, elemental analysis and magnetic study of complexes.

**Keywords:** Mixed ligand complex, L-Amino acids, 2,2'-Bipyridine, Molar conductance and Magnetic property etc.

### Introduction:

Now a day's number of researchers has been focused on to synthesis of mixed ligand complexes of transition metals. Mixed ligand complexes are exhibited better biological activities as compare to simple complexes. This is due to more than one type of ligands coordinated to central metal atom [1, 2]. The literature survey about mixed ligand oxovanadium(IV) complexes which show modulating activities of various enzymes [3, 4]. Vanadium compounds with vanadyl ion having oxidation state +4 and +5 exist in the environment and in biological systems. These complexes also have biological activities such as antibacterial, antifungal, antiviral, and anticancer drugs [5-7]. The mixed ligand transition metal complexes with benzoheterocyclic rings and some L-amino acids have been the focus of a considerable number of investigations for their good coordination ability with metal atoms [8]. A large number of mixed-ligand complexes involving heterocyclic bases such as pyridine, 2,2'-bipyridine, o-phenanthroline, etc. were reported by many researchers due to their biological applications and thermal stability [9].

In this article we have reported the synthesis of four mixed ligand complexes of vanadium metal with 2, 2'-bipyridine and L-Phenyl Alanine, L-serine L-glycine and L-aspartic acid ligands respectively. All the synthesized complexes were characterized by using IR spectra, elemental analysis, molar conductance and magnetic susceptibility measurement. On the basis of spectroscopic results obtained, all the synthesized complexes were exhibited square pyramidal geometry.

### Experimental Section:

#### Materials:

All amino acids were purchased from S.D. fine chemicals, Mumbai, second ligand 2, 2' bipyridine and vanadylsulphate ( $\text{VOSO}_4$ ) were purchased from Babaji traders Parbhani. All the chemicals used were of AR grade. All the solvents were used after purified by the recommended method (Vogel, 1989. Textbook of Practical Organic Chemistry, 5th ed. Longman, London [10]).

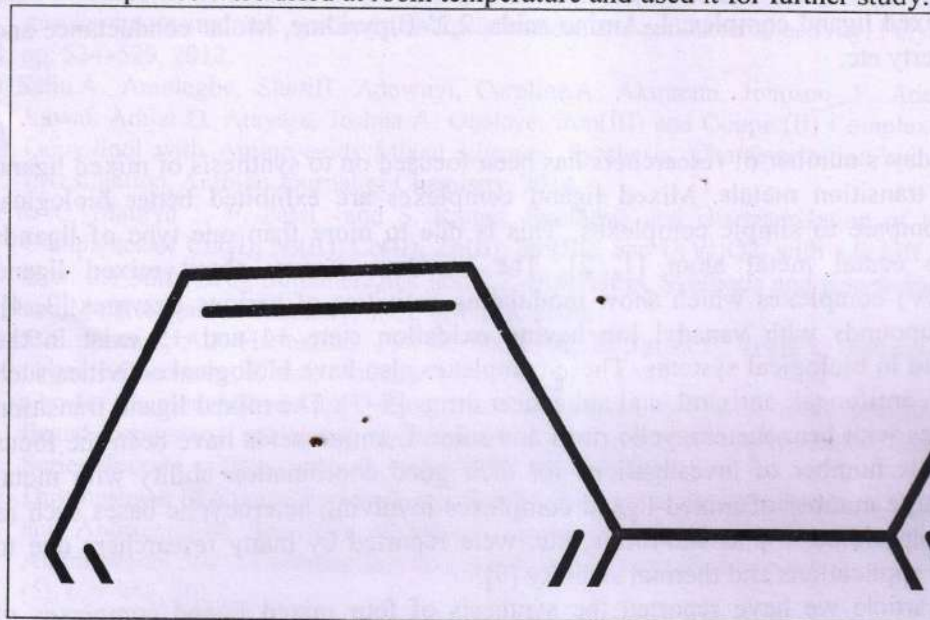


Melting points or decomposition temperatures of all the synthesized compounds were measured using a simple capillary tube method and are uncorrected. Molar conductance values of all the synthesized complexes were measured by preparing  $10^{-3}$  M solutions in DMF solvent using Equiptronics conductivity meter with an inbuilt magnetic stirrer (Model:Eq-664) at room temperature. Magnetic susceptibilities were determined on the SES Instrument's magnetic susceptibility Gouy's balance (Model: EMU-50) at room temperature using copper (II) sulphate as a standard. IR spectra of complexes were recorded as KBr pellets in the region of  $4000-400\text{ cm}^{-1}$  on a SHIMADZU Spectrophotometer.

#### Synthesis of Mixed ligand complexes:

##### General procedure:

To take aqueous solution (20 ml) of vanadylsulphate (1.63 gm 0.01 Mole), add ethanolic solution (20 ml) of 2,2'-bipyridine (1.56 gm 0.01Mole) was added drop wise with constant stirring. The mixer was stirred for 1 hrs at room temperature. To this reaction mixer add aqueous solution (20 ml) of amino acids (0.01 Mole) drop wise with constant stirring. The reaction mixer was stirred 5-7 hrs at room temperature and then coloured complexes were precipitated. Filter the complex and wash it with cold distilled water followed by ethanol. The complexes were dried at room temperature and used it for further study.



General scheme: synthesis of mixed ligand complexes

#### Result and Discussion:

##### Physicochemical data:

The physicochemical characterizations such as percentage yield, colour of complexes, decomposition temperature or melting point were recorded for all the complexes. The melting point of complexes was recorded by simple capillary tube method. All the complexes are found to be decomposed at more than  $260^{\circ}\text{C}$  temperature indicates thermally more stable complexes. The molecular weight and chemical formula are estimated for all the synthesized complexes using 'Chem Draw ultra 11.0' software. The solubility of all the synthesized complexes was checked with available solvents in laboratory. The complexes are insoluble in common organic solvents but purely soluble in DMSO and DMF. All the recorded data of synthesized complexes is represented in Table 1.



**Table-1: Colour, Elemental analysis, molar conductance and magnetic moments**

Complex	Molecular Weight	Percent age Yield(%)	Colour	C, H, N Analyses, found (calculated) (%)		
				C	H	N
Complex- C1	334.21	68	Faint Brown	50.17 (50.19)	4.53 (4.54)	13.50 (13.48)
Complex- C2	352.28	78	Black	45.49 (45.48)	4.11 (4.10)	12.24 (12.20)
Complex- C3	285.33	76	Black	48.52 (48.50)	4.89 (4.87)	11.32 (11.32)
Complex- C4	331.24	75	Faint Green	49.28 (49.26)	4.73 (4.72)	12.31 (12.30)

#### IR Spectra:

The FT-IR spectra of synthesized complexes were recorded and compared with free ligand molecules. The some major absorption bands are expressed here. The absorption band of the (C=N) group of free bipyridine molecule at 1454 cm<sup>-1</sup> [13]. This band was shifted to lower wave number in complexes in the range of 1435-1445 cm<sup>-1</sup>, indicates bipyridine ligand coordinated to metal atom via the nitrogen atom.

The asymmetric and symmetric (COO-) bands observed in the region 1580-1597 and 1402-1408 cm<sup>-1</sup> in free amino acids were observed to be shifted to lower wave numbers region of 1571-1575 and 1373-1377 cm<sup>-1</sup> respectively in the spectra of complexes. This indicates bonding of COO- group with metal via oxygen atom of carboxylic group of amino acids. The band observed between 940-950 cm<sup>-1</sup> in the spectra of complexes indicates  $\nu(\text{V}=\text{O})$  stretching vibrations. Finally the bands observed in the range of 440-450 cm<sup>-1</sup> and 620-635 cm<sup>-1</sup> indicates  $\nu(\text{M}-\text{N})$  and  $\nu(\text{M}-\text{O})$  bonding in complexes respectively.

#### Molar conductance:

Molar conductance values for all the synthesized complexes were recorded by preparing 10<sup>-3</sup> M solutions in DMSO solvent. The observed molar conductance values in the range (18-28 ohm<sup>-1</sup> cm<sup>2</sup> mol<sup>-1</sup>) for complexes indicated towards their non-electrolytic nature of complexes.

#### Magnetic properties:

Magnetic susceptibility values for all the synthesized mixed ligand complexes were recorded at room temperature using copper (II) sulphate as an internal standard. These were then converted into magnetic moment values using spin only formula. The Magnetic moment value of all four complexes in the range of 1.87 to 1.92 BM. It indicates oxidation state of vanadium in complexes is +4 correspond to the presence of one unpaired electron present in all these complexes [14]. Thus all the four complexes exhibited square planar geometry around the vanadium metal atom.

#### Conclusion:

The mixed ligand complexes of vanadium with bipyridine and L-amino acids as ligands have been prepared at room temperature. The elemental analysis data reveals that 1:1:1 (M:L:L) proportion in complexes. The decomposition temperature values of complexes were recorded and found to be more than 260 °C it indicates that, complexes are thermally more stable. The molar conductance, IR spectra and Magnetic moment values of complexes are reveals that vanadium metal having +4 oxidation state with one unpaired electron present in all these complexes with square pyramidal structural arrangement around vanadium metal atom.



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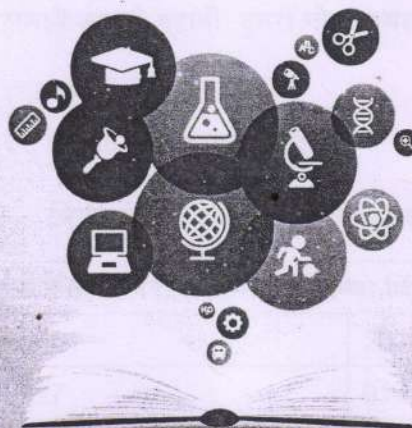
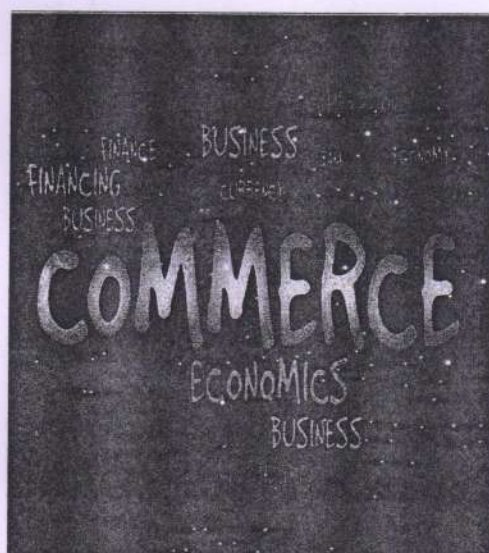
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**महिलांसाठी कायदे व योजना आणि महिला सक्षमीकरण**

प्रा.डॉ.आसाराम दि.चव्हाण

सौ.के.एस.के.महाविद्यालय, बीड

सारांश : भारतामध्ये महाराष्ट्रासारख्या प्रगत राज्यात मुलींची संख्या कमी होत आहे. ही चिंताजनक बाब आहे. महाराष्ट्रात 1991 मध्ये दर 1000 मुलांमागे मुलींचे प्रमाण 946 होते, ते प्रमाण 2001 मध्ये ३३ ने कमी होऊन 913 झाले व 2011 च्या जनगणनेनुसार मुलींचे प्रमाण आणखी 30 ने कमी होऊन ते 883 एवढे झाले आहे. आज मुलगी जन्माला येण्याचा हक्कच हिरावून घेतला जात आहे. आधुनिक तंत्रज्ञानाचा उपयोग (दुरुपयोग) करून जन्माआधीच मुली मारल्या जात आहेत, ही बाब अतिशय गंभीर आहे. त्यामुळे भविष्यात अनेक सामाजिक अडचणी निर्माण होणार आहेत.

प्रस्तावना पुरोगामी महाराष्ट्राने देशात सर्वात प्रथम म्हणजे 1988 मध्येच लिंग निवडीस प्रतिबंध करणारा कायदा केला होता, त्यानंतर केंद्र शासनाने 20 सप्टेंबर 1994 मध्ये हा कायदा केला. सन 2003 मध्ये या कायद्यात सुधारणा करण्यात आली. या कायद्यांतर्गत गर्भलिंग निदान करणाऱ्यावर प्रतिबंध केला आहे म्हणूनच या संवेदनशील विषयाबद्दल, समाजातील सर्व स्तरांमध्ये जागृती व्हावी. दुसरी गोष्ट कायद्याची कठोर अंमलबजावणी होणे आवश्यक आहे.

बीजसंज्ञा:- महिला, जन्मदर, मृत्युदर, वयोगट, वर्ष, कायदे, अनुदान.

**लिंगगुणोत्तर प्रमाण - भारत व महाराष्ट्र**

अ.क्र.	देश/राज्य	0 ते 6 वर्षे वयोगटातील बालकांच्या लिंग गुणोत्तर प्रमाणाचा तक्ता	
	वर्ष	2001	2011
1.	भारत	927	914
2.	महाराष्ट्र	913	883

स्त्री-पुरुषांच्या समानतेचा पुरस्कार सध्या सगळ्या (सामाजिक, राजकीय, शैक्षणिक इ.) क्षेत्रात होताना दिसतो. पण प्रत्यक्षात वस्तुस्थिती मात्र फारच वेगळी दिसते.

देशाच्या सन 2011 च्या जनगणनेचा आढावा घेतला असता 0-6 वर्षे वयोगटामधील लिंग गुणोत्तर, सन 2001 मध्ये 927 व सन 2011 मध्ये 914 असे झालेले आहे. सन 2001 पासून हे प्रमाण 2011 पर्यंत 13 अंकांनी कमी झालेले आहे. 2011 च्या जनगणनेनुसार ६ वर्षांखालील बालिकांचे प्रमाण 30 अंकांनी कमी झाल्याचे धक्कादायक बाजू पुढे आलेली आहे. महाराष्ट्रातील 6 वर्षांखालील बालिकांचे दर हजार बालकांशी प्रमाण 2001 मधील 913 पासून 2011 मध्ये 883 पर्यंत म्हणजे 30 अंकांनी कमी झाले आहे. ही अतिशय गंभीर व चिंताजनक बाब आहे. सर्व साधारणपणे लिंग गुणोत्तर 952 असावे. हा दर गृहित धरला तर 2011 च्या जनगणनेनुसार 0 ते 6 वर्षे वयोगटातील असलेल्या 883 या लिंग गुणोत्तरानुसार गेल्या दहा वर्षात राज्यात अंदाजे 468680 इतक्या स्त्री भ्रूणहत्या झालेल्या आहेत.



महाराष्ट्र राज्यातील जिल्ह्यांमध्ये लिंग गुणोत्तराचा आढावा घेतला असता त्यामध्ये सुद्धा विविधता दिसून येते. जिल्हानिहाय आकडेवारी पाहता 2001 जनगणनेशी तुलना करता बीड जिल्ह्यामध्ये हे प्रमाण सर्वात जास्त म्हणजेच 93 अंकांनी घसरले असून गडचिरोली जिल्ह्यामध्ये सर्वात कमी म्हणजेच 10 अंकांनी घसरले आहे. राज्यातील फक्त 4 जिल्ह्यामध्ये हे प्रमाण काही अंकांनी वाढले आहे. ते जिल्हे सातारा (3 अंक), कोल्हापुर(6 अंक), सांगली (11 अंक) व चंद्रपुर (6 अंक) असे आहेत.

- गृहितके:-
1. महिला आरक्षणांमुळे महिलांचा विकास होतो.
  2. स्त्री नेतृत्वावर पुरुष प्रधान संस्कृतीचा पगडा दिसून येतो.

- उद्देश:-
1. महिला समुहाच्या माध्यमातून संघटीत करणे.
  2. समुहातील महिलांमध्ये आत्मविश्वास निर्माण करणे.
  3. समाजातील लैंगिक भेदभाव नष्ट करून स्त्री-पुरुष समानता निर्माण करणे.

संशोधन पद्धती:- सदर निबंधांचा अभ्यास करतांना द्वितीय साधन सामुग्रीचा आधार घेतलेला आहे. त्यामध्ये जिल्हा न्यायालय, महिला व बालविकास अधिकारी कार्यालय, विविध बँकामधील बचतगट, महिला तक्रार निवारण कार्यालय, पोलीस अधिक्षक कार्यालय या सर्व शासकीय कार्यालयातील दुय्यम प्रकारची माहिती घेतलेली आहे.

जिल्हा निहाय महाराष्ट्र राज्यातील तुलनात्मक लिंग गुणोत्तर:-

0 ते 6 वर्षे वयोगटातील बालकांचे लिंग गुणोत्तर प्रमाण (जनगणना 2001, 2011)

अ. क्र.	जिल्हा वर्षे	0 ते 6 वर्षे वयोगटातील बालकांचे लिंग गुणोत्तर प्रमाण		2001 ते 2011 मधील फरक
		2001	2011	
1	ठाणे	931	918	-13
2	रायगड	939	924	-15
3	रत्नागिरी	952	940	-12
4	सिंधुदुर्ग	944	910	-34
5	नाशिक	920	882	-38
6	धुळे	907	876	-31
7	जळगाव	880	829	-51
8	अ.नगर	884	839	-45
9	पुणे	902	873	-29
10	सोलापूर	895	872	-23
11	सातारा	878	881	3
12	कोल्हापूर	839	845	6
13	सांगली	851	862	11
14	औ.वाद	890	848	-42
15	जालना	903	847	-56





16	परभणी	923	866	-57
17	हिंगोली	927	868	-59
18	लातूर	918	872	-46
19	उ.बाद	894	853	-41
20	बीड	894	801	-93
21	नांदेड	929	897	-32
22	अकोल	933	900	-33
23	वाशिम	918	859	-59
24	अमरावती	941	927	-14
25	यवतमाळ	633	915	-18
26	बुलढाणा	908	842	-66
27	नागपूर	942	926	-16
28	वर्धा	928	916	-12
29	भंडारा	956	939	-17
30	गोंदिया	958	944	-14
31	चंद्रपुर	939	945	6
32	गडचिरोली	966	956	-10
33	मुंबई (उप)	923	910	-13
34	मुंबई	922	874	-48
महाराष्ट्र राज्य		913	883	-30

स्त्रियांना संरक्षण देणारे भारतीय दंड विधानातील विशेष कायदे

अ. क्र.	अपराधाचे स्वरूप	कलम भा.दं.वि.	अधिकाधिक शिक्षा
1	स्त्रीकडे पाहून अश्लिल किंवा असभ्य हातवारे करणे	294	तीन महिन्याची सजा किंवा दंड
2	हुंडाबळी	304 बी	जन्मठेप
3	स्त्रीच्या संमतीशिवाय गर्भपात	313	जन्मठेप किंवा 10 वर्षे सजा
4	अल्पवयीन मुलींना विवाहासाठी पळवणे	366 अ	10 वर्षे सजा व दंड
5	बलात्कार	376	7 ते 10 वर्षे सजा किंवा दंड
6	अवैधरित्या दुसरी पत्नी करणे	495	7 वर्ष सजा किंवा दंड

महिला विकासासंबंधी विविध शासकीय योजना

1. निराश्रित महिलांसाठी शासकीय संरक्षणगृहे.
2. व्यावसायिक प्रशिक्षण घेणाऱ्या मुलींना विद्यावेतन.
3. देवदासी अनुदान,
4. निराधार, निराश्रित व विधवा महिलांच्या मुलींच्या विवाहाकरिता अनुदान
5. कामधेनू योजना,
6. हुंडा निर्मुलन
7. नोकरी करणाऱ्या महिलांसाठी बसतीगृहे.





8.राष्ट्रीय महिला कोष. 9.अनैतिक व्यापारातून महिला व अल्पवयीन मुलींचे लैंगिक शोषण थांबवण्यासाठी पथदर्शी प्रकल्प. 10. रॉकेल विक्रीचे नवीन किरकोळ परवाने. 11. शिधावाटप/रास्तभाव दुकानाचे वाटप. 12.सावित्रीबाई फुले कल्याण योजना. 13 महिलांसाठी व्यवसाय शिक्षणाचे प्रशिक्षण. 14. महिला महाविद्यालय. 15. तंत्रनिकेतने व अभियांत्रिकी महाविद्यालये.

केंद्र शासनाच्या योजना:

1. स्वयंसेवी संघटनांना सर्वसाधारण अनुदान
2. रस्त्यावरील मुलांच्या कल्याणाची योजना.
3. राष्ट्रीय शिशू कक्ष निधी योजना. (पाळणाघर)
4. बालगृह/ विशेष बालगृहे
5. बालसदन
6. बालकाश्रम

महिला सक्षमीकरण:-

प्राचीन कालखंडापासून महिला अन्याय अत्याचाराला बळी पडत आहे. तिला नेहमीच चार भिंतीच्या आत कुटुंबाच्या गोतावळ्यात डांबून ठेवण्याचा प्रयत्न करण्यात आलेला आहे. राजकारण आणि महिला यांचा काहीही संबंध असू शकत नाही अशी समज असतांना महिलांना राजकारणातील आरक्षणामुळे महिला सर्व बंधने जुगारून राजकारणात आलेल्या आहेत. अनेकवेळा पर्याय नसल्यामुळे महिलांना राजकारणामध्ये सहभागी करून घ्यावे लागते किंवा अनेक पदावर महिलांची नेमणूक करावी लागते. त्यामुळे निश्चित महिलांचा राजकीय सहभाग वाढलेला आहे. महिला आता सत्ताधारेत आल्या आहेत. त्यामुळे पुरुषांशी चर्चा करणे, सल्ला विचारणे, निर्णय घेणे, पुरुषाबरोबर विविध समित्यांवर काम करणे. ह्या सर्व बाबींमध्ये महिला सहभागी होऊ लागल्या आहेत. सभेमध्ये भाषण करणे, चर्चा करणे, निर्णय प्रक्रियेमध्ये भाग घेणे, आपले मत मांडणे इत्यादी. एकंदरीतच महिला आरक्षणामुळे महिला राजकीय दृष्ट्या सक्षम होतांना दिसून येतात.

संदर्भ ग्रंथ सूची:-

1. महाराष्ट्र शासन – 2001-2011 जनगणना.
2. लोकसंख्या भूगोल - एस.एल.कयास्ता, जयपूर.
3. लोकसंख्या भूगोल – डॉ.विठ्ठल धारपुरे.



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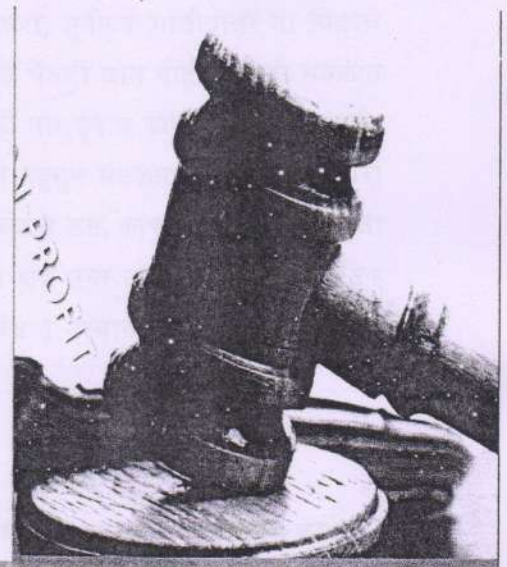
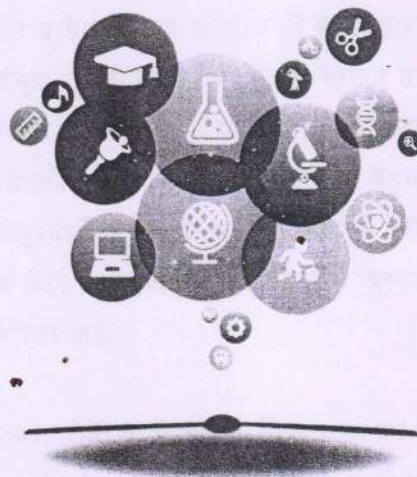
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**उस्मानाबाद तालुक्यातील पिक प्रारुपाचा भौगोलिक अभ्यास****डॉ.आसाराम दि.चव्हाण**

सौ.के.एस.के.कॉलेज, बीड

**सारांश :-**

शेती व्यवसायात वेगवेगळ्या पिकांची लागवड व पिक क्षेत्राचा विस्तार हे घटक अत्यंत महत्वाचे आहेत. विविध पिकांची लागवड ही त्या प्रदेशातील हवामान, भूपृष्ठरचना, मृदा यांच्यावर अवलंबून असते. प्रस्तुत निबंधात उस्मानाबाद तालुक्यातील पिक प्रारुपाचा 2009-10 आणि 2014-15 या दोन वर्षांच्या संदर्भात अभ्यास केलेला आहे. 2009-10 या वर्षात कमी विविधता ढोकी या महसूल मंडळात तर सर्वात जास्त पिक विविधता केशेगाव या महसूल मंडळात आहे. 2014-15 या वर्षात केशेगाव महसूल मंडळात सर्वात जास्त पिक विविधता व सर्वात कमी तेर या महसूल मंडळात दिसून येते.

**प्रस्ताविक :-**

उस्मानाबाद जिल्ह्यातील आठ तालुक्यांपैकी उस्मानाबाद तालुका एक महत्वाचा आहे. उस्मानाबाद तालुक्यात बाजरी, गहू, भुईमुग, ज्वारी, पिवळी भेंडी, कापूस, तुर, ऊस, हरभरा, सुर्यफुल भाजीपाला या पिकांचे उत्पादन घेतले जाते. तालुक्यातील प्रत्येक महसूल मंडळात ही सर्व प्रकारचे पिके घेतली जात नाहीत. काही मंडळात बाजरी, कापूस, ऊस, ज्वारी, भुईमुग, तुर ही मुख्य पिके घेतली जातात तर काही तालुक्यात कापूस, भुईमुग, ज्वारी, तुर, भाजीपाला अशा पिकांची निवड केली जाते. पुर्वेकडील पाडोळी, बेंबळी या महसूल मंडळात तुर, बाजरी, ज्वारी ही पिके घेतली जातात. तर पश्चिमेकडील ढोकी, तेर, उस्मानाबाद या महसूल मंडळात ऊस, कापूस, ज्वारी, भाजीपाला इत्यादी पिके घेतली जातात. तालुक्यातील विविध भागात पिकांची निवड व क्षेत्र त्या त्या प्रदेशातील प्राकृतिक रचना, आर्थिक घटक, सामाजिक घटक यांना अनुसरून केली जाते. प्रस्तुत निबंधात उस्मानाबाद तालुक्यातील पिक विविधता प्रारुप यांचा अभ्यास केलेला आहे.

**उद्दिष्टे :-**

1. प्राकृतिक रचना व जलसिंचनाच्या सोयी या घटकांमुळे पिक-प्रारुप बदलते हे अभ्यासणे.
2. 2009-10 ते 2014-15 या पाच वर्षांच्या काळात पीक उत्पादनात काय-काय बदल झाला याचा अभ्यास करणे.

**बीज संज्ञा :-** पिक विविधता निर्देशांक, जलसिंचन, जलप्रणाली, मृदा प्रकार, पिके.

**अभ्यास क्षेत्र :-** उस्मानाबाद जिल्ह्यातील आठ तालुक्यातील उस्मानाबाद हा एक तालुका असून त्याच्या पुर्वेस लातूर, पश्चिमेस सोलापूर जिल्ह्यातील बारशी तालुका, दक्षिणेस तुळजापूर व लोहरा तालुका व उत्तरेस कळंब असून ग्रामीण क्षेत्रफळ 1283.34 चौ.कि.मी व नागरी क्षेत्रफळ 11.5 चौ.कि.मी.आहे. (1991) तालुक्याचा अक्षवृत्तीय विस्तार  $17^{\circ} 35'$  ते  $18^{\circ} 40'$  उत्तर अक्षांश व रेखावृत्तीय विस्तार  $75^{\circ} 16'$  ते  $76^{\circ} 40'$  पुर्व रेखांश असा आहे. 2011 च्या जनगणनेनुसार उस्मानाबाद तालुक्यात एकूण 127 गावे 08 महसूल मंडळे असून उस्मानाबाद तालुक्याची लोकसंख्या 3,59,235 एवढी आहे. लोकसंख्येची घनता दर चौ.कि.मी. ला 277 एवढी आहे. तर स्त्री पुरुष गुणोत्तर दर हजारी 920 एवढे आहे. या तालुक्याचा अधिकतर भूभाग तेरणा, भोगवती, सीनता, बोरी, चांदणी, खैरी, बाणगंगा नद्यांच्या खोऱ्यांनी व्यापलेला असून वालुकामय व गाळाची काळी मृदा आढळून येते. या तालुक्यातील सरासरी पर्जन्यमान 532 मि.मी.आहे. उस्मानाबाद तहसील बालाघाट डोंगररांगांच्या कुशीत असून बराच भाग खडकाळ व उर्वरीत सपाट आहे. समुद्र सपाटीपासून सरासरी उंची 600 मीटर आहे. येथील हवामान उष्ण व कोरडे असून पावसाचे प्रमाण अतिशय कमी व अनियमित आहे.





सांख्यिकी व संशोधन पद्धती :- प्रस्तुत निबंधाचा अभ्यास दुय्यम आकडेवाडीवर आहे. उस्मानाबाद तालुक्यातील प्रत्येक महसूल मंडळातील पिकाखालील क्षेत्राची आकडेवारी प्राप्त आहे. जिल्हा सामाजिक व आर्थिक समालोचन, जिल्हा जनगणना, तहसीलदार, कृषी अधिकारी, मंडळ निरीक्षक, ग्रामसेवक, तलाठी, कृषी वृत्तपत्रे, मासिके, वार्षिक अंक इ.मधून घेतलेली आहे.

विवेचन :- पीक विविधता काढण्यासाठी अनेक शास्त्रज्ञांनी त्यांच्या सुत्राचा वापर केला. त्यात प्रामुख्याने भाटीया (1965) व गीब मार्टीन (1974) यांनी वेगवेगळ्या प्रदेशातील पिक विविधता काढण्यासाठी स्वतः शोधून काढलेल्या सुत्राचा वापर केला. भाटीया (1965) यांनी पिक विविधता काढण्यासाठी स्वतःचे सुत्र संशोधित केले. त्यासाठी त्यांनी 10 प्रतिशत किंवा त्यापेक्षा जास्त क्षेत्र असणारी पिके विचारात घेतली भाटीया आपले सुत्र पुढीलप्रमाणे मांडले. अभ्यास क्षेत्रातील पीक विविधता आकृतीबंधाच्या निर्देशांक मूल्य तक्ता व नकाशावरून असे स्पष्ट दिसून येते की 2009 साली पिकांची निवड व पिक स्पर्धा उत्तरेकडील भागात कमी आहे. पिकांची सर्वात जास्त विविधता केशेगाव (15.50) व जागजी (15.30) या महसूल मंडळात दिसते. 2015 वर्षाची तुलना केली असता पश्चिमेकडील मंडळात पीक विविधता कमी आढळते. तुलनात्मक दृष्ट्या पुर्वेकडील महसूल मंडळात पीक विविधता जास्त आढळते.

पीक विविधता प्रदेश :-

1. अतिउच्च पीक विविधता प्रदेश :- (निर्देशांक 20 पेक्षा कमी)

2009-10 आणि 2014-15 या वर्षाचा पिक विविधतेचा अभ्यास केला असता केशेगाव (15.2), जागजी (15.30) या महसूल मंडळात दिसते. 2015 वर्षाची तुलना केली असता पश्चिमेकडील मंडळात पिक विविधता कमी आढळते. तुलनात्मक दृष्ट्या पुर्वेकडील महसूल मंडळात पीक विविधता जास्त आढळते.

तक्ता क्र.1 उस्मानाबाद तालुका पिक विविधता प्रारूप 2009-10

अ.क्र.	पिक विविधता मूल्य (निर्देशांक)	परिणाम	महसूल मंडळ
1	20 पेक्षा कमी	अति उच्चतम	केशेगाव, उस्मानाबाद ग्रामपंचायत
2	21 ते 25	उच्चतम	पाडोळी, तेर
3	26 ते 30	निम्न	जागजी ग्रामीण, बेंबळी
4	30 पेक्षा अधिक	निम्नतम	ढोकी, उस्मानाबाद

तक्ता क्र.2 पिक विविधता प्रारूप 2014-15

अ.क्र.	पिक विविधता मूल्य (निर्देशांक)	परिणाम	महसूल मंडळ
1	20 पेक्षा कमी	अति उच्चतम	पाडोळी, ढोकी
2	21 ते 25	उच्चतम	तेर, बेंबळी
3	26 ते 30	निम्न	उस्मानाबाद ग्रामीण व शहर
4	30 पेक्षा अधिक	निम्नतम	केशेगाव, जागजी

2) उच्चतम पीक विविधता प्रदेश (निर्देशांक 21 ते 25)

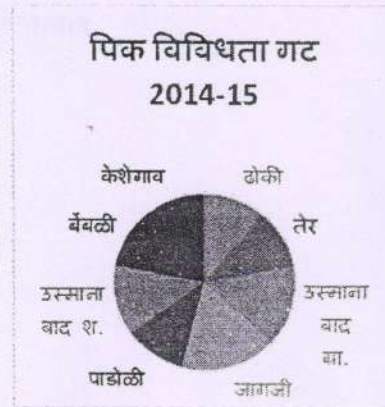
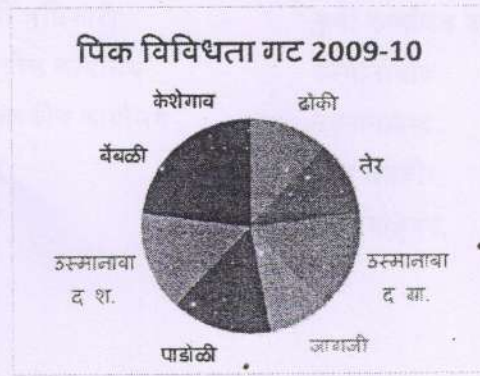
उच्चतम पीक विविधतेच्या तौलनिक अभ्यास केला असता 2009-10 या वर्षी ढोक व तेर 2014-15 या वर्षी बेंबळी व पाडोळी या महसूल मंडळात उच्चतम पिक विविधता आढळते. ढोकी या मंडळात जलसिंचनाच्या सोयी व सरकारी अनुदान, त्यामुळे भाजीपाला, डाळींब, ऊस, गहु इत्यादी पिके घेतली जातात. तेर या महसूल मंडळात रब्बी व खरीप पिके, बाजरी, भूईमुग, कापूस या पिकांत स्पर्धा आहे.





तक्ता क्र.3 उस्मानाबाद तालुक्यातील पिक विविधता मुल्य  
(महसूल मंडळ निहाय)

अ.क्र.	महसूल मंडळ	पिक विविधता गट (मूल्य)	
		2009-10	2014-15
1.	ढोकी	19	19
2.	तेर	17	18
3.	उस्मानाबाद ग्रामीण	24	26
4.	जागजी	15	28
5.	पाडोळी	25	19
6.	उस्मानाबाद शहरी	24	23
7.	बेंबळी	23	18
8.	केशेगाव	15	18



### 3. निम्नतम पीक विविधता प्रदेश (निर्देशांक 26 ते 30)

निम्नतम पीक विविधता तुलनात्मक अभ्यास केला असता 2009-10 या वर्षी उस्मानाबाद ग्रामीण व बेंबळी महसूल मंडळात आढळते. तर 2014-15 या वर्षी उस्मानाबाद ग्रामीण व शहरी महसूल मंडळात आढळते. जलसिंचन सुविधा यामुळे ऊस, भाजीपाला या पिकांचा वाढता कल हा निम्न पीक विविधतेला कारणीभूत ठरलेला घटक आहे. ढोकी महसूल मंडळात पाटाच्या सहाय्याने व विहीरीच्या सहाय्याने जलसिंचन सुविधा उपलब्ध झालेली आहे. काळी जमीन व ढोकी साखर कारखाना यामुळे ऊस उत्पादनाकडे जास्त कल दिसून येतो.

### 4. निम्नतम पीक विविधता प्रदेश (निर्देशांक 30 पेक्षा जास्त)

निम्नतम पीक विविधता क्षेत्र हे 2009-10 या कालावधीत पाडोळी व उस्मानाबाद शहरी या महसूल मंडळात आढळते. तर 2014-15 वर्षी जागजी व केशेगाव या महसूल मंडळात दिसून येते. अलीकडच्या काळात जलसिंचन सुविधा वाढल्यामुळे ऊस, कांदा, कापूस, भाजीपाला इ. पिकांचे उत्पादन घेतले जाते.

निष्कर्ष :

2009-10 आणि 2014-15 या वर्षातील पिकांच्या विविधता क्षेत्राच्या विश्लेषणावरून असे दिसून येते की, उस्मानाबाद तालुक्यातील उस्मानाबाद ग्रामीण, केशेगाव, जागजी या महसूल मंडळात पिवळी भेंडी, ज्वारी, गहू,





बाजरी, कापूस या सर्व पिकात पीक निवड व क्षेत्र विस्तारासंबंधी स्पर्धा आहे. तर ढोकी, तेर, बेंबळी, उस्मानाबाद शहरी या महसूल मंडळात ऊस, कापूस, तुर, गहु व भाजीपाला या सर्व पिकांत स्पर्धा आहे.

तसेच उस्मानाबाद ग्रामीण व शहरी, ढोकी, तेर या महसूल मंडळात भाजीपाला, फळे, सुर्यफुल कापूस ज्वारी या पिकांत स्पर्धा आहे. तर केशेगाव, जागजी या महसूल मंडळात बाजरी, ज्वारी, कडधान्य, गवत या पिकांत स्पर्धा चालते. हवामानानुसार उस्मानाबाद तालुक्यातील शेतीचे तीन विभाग पडतात. उत्तरेकडील कमी पावसाचा प्रदेश, पश्चिमेकडील अधिक पावसाचा प्रदेश, जलसिंचन सुविधा असलेला मध्य भाग यामुळे पीक निवड क्षेत्र विस्तार यात स्पर्धा दिसून येते.

2009-10 या वर्षामध्ये सर्वात कमी पिक विविधता जागजी (15.2) तर सर्वात जास्त पिक विविधता (25.3) या महसूल मंडळात आढळते. तसेच 2014-15 या वर्षात सर्वात कमी पीक विविधता ढोकी (19.2) तर सर्वात जास्त पिक विविधता जागजी (28.2) या महसूल मंडळात दिसून येते. उस्मानाबाद तालुक्याचा पिक विविधतेवर मान्सून पाऊस, जलसिंचनाच्या सोयी, ढोकी साखर कारखाना व मानवी प्रवृत्ती यांचा परिणाम झालेला असून परंपरागत पिकांऐवजी ऊस, कापूस, कांदा, भाजीपाला इत्यादी पिके दिसून येतात.

संदर्भ सुची :-

- |                               |   |                           |
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| 2. तालुका तहसील कार्यालय      | - | उस्मानाबाद.               |
| 3. जिल्हा सांख्यिकीय कार्यालय | - | उस्मानाबाद.               |
| 4. शेती भूगोल                 | - | सिंग जसवीर.               |
| 5. शेती भूगोल                 | - | अली मोहमंद.               |



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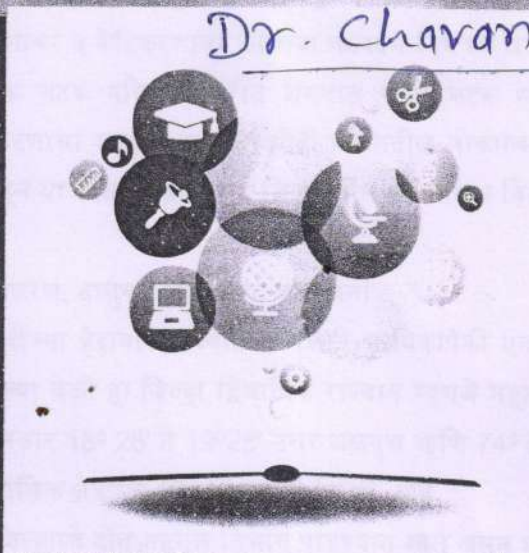
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**बीड जिल्ह्यातील लोकसंख्या वाढ व वितरणाचा भौगोलिक अभ्यास****प्रा.डॉ.आसाराम दि.चव्हाण**

सौ.के.एस.के.महाविद्यालय, बीड

सारांश : बीड जिल्ह्यातील लोकसंख्या वितरणावर भौगोलिक घटकाशिवाय इतरही घटकांचा प्रभाव दिसून येतो. एखाद्या प्रदेशातील लोकसंख्या साधन संपत्तीच्या वितरणाचे अभिक्षेत्रीय स्वरूप माहिती करून घेण्यासाठी आपणास लोकसंख्या वितरणाचा अभ्यास उपयुक्त ठरतो. ज्या प्रदेशाचा विकास अधिक झालेला असतो त्या प्रदेशात दाट लोकसंख्या असते. तसेच लोकसंख्येच्या राहणीमानावरून किंवा त्यांच्या व्यावसायिक स्वरूपावरून लोकसंख्येचे ग्रामीण व नागरी लोकसंख्येत विभागणी करणे सहज शक्य होते. नागरी भाग जास्त विकसीत होत असल्याने लोकसंख्येचे केंद्रीकरण हे नागरी भागात अधिक आढळून येते. प्रस्तुत अभ्यासासाठी भारत जनगणना 2001 व जनगणना 2011 जिल्हा सामाजिक व आर्थिक समालोचन जिल्हा बीड यामधून आकडेवारी घेण्यात आलेली आहे. सदरचा अभ्यास लोकसंख्या नियोजनामध्ये काही महत्वाची भूमिका बजावेल.

प्रस्ताविक : लोकसंख्या वितरणावर व केंद्रिकरणावर कोणत्या घटकांचे नियंत्रण असते हे समजून घेणे आवश्यक आहे. लोकसंख्या वितरणावर अनेक घटक परिणाम करीत असतात व हे घटक स्थान-कालपरत्वे बदलतात तसेच लोकसंख्येचे वितरण व केंद्रिकरणाचा अभ्यास हा कोणत्याही प्रदेशातील लोकसंख्या वितरण समजण्यासाठी अत्यंत महत्वाचा आहे. या दृष्टीकोनातून या शोधनिबंधात बीड जिल्ह्यातील लोकसंख्या वितरणाचा अभ्यास करण्याचा प्रयत्न केलेला आहे.

बीजसंज्ञा : लोकसंख्यावाढ, वितरण, तालुका, केंद्रिकरण, जनगणना

अभ्यासक्षेत्र : बीड जिल्हा पूर्वीच्या हैद्राबाद राज्यातील मराठी भाषिकांपैकी एक जिल्हा आहे. सन 1956 साली द्विभाषिक राज्याच्या स्थापनेच्या वेळी हा जिल्हा द्विभाषिक राज्यात म्हणजे महाराष्ट्रात समाविष्ट करण्यात आला. बीड जिल्ह्याचा भौगोलिक विस्तार  $18^{\circ} 28'$  ते  $19^{\circ} 28'$  उत्तर अक्षवृत्त आणि  $74^{\circ} 54'$  ते  $76^{\circ} 57'$  पूर्व रेखावृत्ताच्या दरम्यान असून जिल्ह्याचे भौगोलिक क्षेत्रफळ 10640.35 चौ.कि.मी. आहे.

प्रशासकीय सोयीच्या दृष्टीने जिल्ह्याचे दोन महसूल विभाग पाडण्यात आले असून एक उपविभाग बीड येथे असून या अंतर्गत बीड,गेवराई, पाटोदा, आष्टी, शिरूर हे तालुके येतात. दुसरा उपविभाग अंबाजोगाई येथे असून त्याखाली अंबाजोगाई, केज, माजलगाव, धारूर, परळी, वडवणी हे तालुके येतात.

2011 च्या जनगणनेनुसार जिल्ह्यात एकूण 1430 गावे आहेत. एकूण 1070 ग्रामपंचायतीपैकी 910 स्वतंत्र व 160 गट ग्रामपंचायती आहेत. हवामानाच्या दृष्टीने तीन भाग पडतात जून ते सप्टेंबर या महिन्यात हवा उष्ण व पावसाळी वातावरण असते. ऑक्टोबर व फेब्रुवारी या महिन्यात हवा कोरडी व थंड असते. नोव्हेंबर ते जानेवारी महिन्यात काही दिवस थंडीची लाट येते. मार्च ते मे महिन्यात हवामान उष्ण व कोरडे असते. बीड जिल्ह्याची मृदा भिन्न प्रकारची असून जिल्ह्यातील गेवराई व माजलगाव तालुक्यातील गोदावरी काठाची जमीन खोल काळी असून शेतीस चांगली आहे. बाकीच्या तालुक्यातील जमीनी पातळ थराच्या व खडकाळ आहेत. जिल्ह्यात खरीप व रब्बी ही दोन पिके घेतली जातात.

उद्दिष्टे : 1) तालुकानिहाय लोकसंख्या वाढीचे विश्लेषण करणे

2) जिल्ह्यातील ग्रामीण व नागरी केंद्रिकरणाचे विभाग शोधून त्याचे भौगोलिक विश्लेषण करणे





3) बीड जिल्ह्यातील लोकसंख्या वाढ व वितरणाचा अभ्यास करणे.

संशोधन पद्धती : प्रस्तुत अभ्यासासाठी द्वितीयक आकडेवारीचा आधार घेतलेला आहे. लोकसंख्या वितरण केंद्रिकरणाच्या विश्लेषणासाठी 2001 व 2011 (जनगणना) आकडेवारीचा आधार घेतलेला आहे. काही सांख्यिकीय माहिती जिल्हा सामाजिक व आर्थिक समालोचन जिल्हा बीड, अर्थ व सांख्यिकी संचलनालय महाराष्ट्र शासन या पुस्तकातून घेतलेली आहे.

विषय विवेचन : कोणत्याही देशातील लोकसंख्या ही इतर नैसर्गिक उत्पादक घटकाइतकीच महत्वाची असते. लोकसंख्या वाढ आणि आर्थिक प्रगती यांचाही अत्यंत घनिष्ठ संबंध असतो. कारण कोणत्याही देशाची आर्थिक प्रगती उत्पादनासाठी लागणारे नैसर्गिक उत्पादक घटक व ते वापरले जाण्यासाठी लागणारी लोकसंख्या यावर अवलंबून असते. लोकसंख्येवर भौगोलिक घटकांचा अधिकाधिक प्रभाव पडत असल्याने लोकसंख्येची विभागणी ही असमान स्वरूपाची होतांना आढळून येते. लोकसंख्येच्या वितरणातील विषमता हाच घटक परिणामकारक ठरतो आणि भविष्यातील विकास योजना आखण्याकरिता लोकसंख्येच्या वितरणाचा अभ्यासास महत्व आहे. ज्या प्रदेशात भौगोलिक घटक मानवी जीवनाकरिता अनुकूल आहेत. त्याठिकाणी लोकसंख्येच्या विकासाचा चालना मिळते आणि आर्थिक विकास जेथे वेगाने होतो तेथे लोकसंख्या मोठ्या प्रमाणात वाढते. ग्रामीण भागाच्या तुलनेत शहरी भागात लोकसंख्या वाढीच्या वेग अधिक असल्याचे दिसून येते. प्रस्तुत शोध-निबंधात 2001 व 2011 या काळातील लोकसंख्येची वाढ व वितरण याचा अभ्यास केलेला आहे.

#### सारणी क्र.1

##### बीड जिल्ह्यातील ग्रामीण व नागरी लोकसंख्येचे वितरण

अ.क्र.	तालुके	2001			2011		
		एकूण	ग्रामीण	नागरी	एकूण	ग्रामीण	नागरी
1	आष्टी	2,06,666	2,06,666	0	2,43,607	2,31,635	11,972
2	पाटोदा	95,738	95,738	0	1,25,081	1,25,081	0
3	शिरूर का.	1,03,698	1,03,698	0	1,28,583	1,28,583	0
4	गेवराई	2,62,540	2,34,048	28,492	3,38,610	3,05,048	33,562
5	माजल गाव	2,14,997	1,70,968	44,029	2,55,181	2,05,728	49,453
6	वडवणी	68,467	68,467	0	87,685	87,685	0
7	बीड	4,14,518	2,76,322	1,38,196	4,81,195	2,77,955	2,03,240



8	केज	2,18,520	2,18,520	0	2,43,832	2,13,128	30,704
9	धारुर	99,497	81,159	18,338	1,22,110	1,01,693	20,417
10	परळी	2,34,987	1,46,450	88,537	2,87,208	1,96,233	90,975
11	अंबाजो गाई	2,41,662	1,72,144	69,478	2,71,957	1,97,982	73,975
	एकूण	21,61,250	17,74,180	3,87,070	25,85,049	20,70,751	5,14,298

स्रोत : जिल्हा जनगणना अहवाल (2001 व 2011)

लोकसंख्येचे वितरण (2001 व 2011) :

बीड जिल्ह्यात 2001 या काळात सुमारे 21,61,250 इतकी लोकसंख्या ही वास्तव्यास आहे. त्यापैकी ग्रामीण लोकसंख्या ही 17,74,180 इतकी असून नागरी लोकसंख्या ही 3,87,070 एवढी आहे. या जिल्ह्यात नागरी लोकसंख्येपेक्षा ग्रामीण लोकसंख्येचे प्रमाण अधिक आहे. बीड जिल्ह्यामध्ये 2011 मध्ये एकूण लोकसंख्या 25,85,049 एवढी असून त्यापैकी ग्रामीण लोकसंख्या 20,70,751 एवढी आहे व नागरी लोकसंख्या ही 5,14,298 एवढी वाढल्याचे निदर्शनास येते म्हणजेच बीड जिल्ह्यात काळाच्या ओघात ग्रामीण लोकसंख्येचे वितरण हे कमी तर नागरी लोकसंख्येचे वितरणात वाढत होतांना दिसते. बीड जिल्ह्यातील तालुकानिहाय ग्रामीण व नागरी लोकसंख्येचे वितरण सारणी क्र.1 व आकृती क्र.1 मध्ये सविस्तर दिलेले आहे.

बीड जिल्ह्यातील एकूण तसेच ग्रामीण व नागरी लोकसंख्येच्या वितरणाचा सविस्तर अभ्यासासाठी लोकसंख्येचे पुढील गटानुसार वर्गिकरण करण्यात आलेले आहे.

गट अ): एकूण लोकसंख्येचे वितरण (2001-2011)

बीड जिल्ह्यातील एकूण लोकसंख्येचा तालुकानिहाय अभ्यास केला असता असे दिसते की, 2001 व 2011 या काळात सर्वाधिक लोकसंख्येचे वितरण (2 लाखापेक्षा जास्त) हे आष्टी, गेवराई, माजलगाव, बीड, केज, परळी व अंबाजोगाई या तालुक्यात झालेले आहे तर सर्वात कमी लोकसंख्या वितरण (1 लाखा पेक्षा कमी) हे फक्त वडवणी तालुक्याचे दिसून येते तर उर्वरित तालुक्यामध्ये लोकसंख्येचे वितरण हे मध्यम (1 लाख ते 2 लाख) स्वरूपाचे असून त्यामध्ये पाटोदा, शिरूर, धारुर हे तालुके येतात.

म्हणजेच संशोधन क्षेत्रात लोकसंख्या काळाच्या ओघात एकूण लोकसंख्येत वाढ झालेली असलेली तरीही 2001 च्या तुलनेत 2011 मध्ये लोकसंख्येच्या वितरणच्या वर्गवारीत तालुक्यांच्या संख्येत फारसा बदल झालेला नाही.

गट ब : ग्रामीण लोकसंख्येचे वितरण (2001-2011)

बीड जिल्ह्यातील ग्रामीण लोकसंख्येचा तालुकानिहाय अभ्यास केला असता असे निदर्शनास येते की, 2001 व 2011 या कालावधीत सर्वाधिक लोकसंख्येचे वितरण (2 लाखापेक्षा जास्त) हे आष्टी, गेवराई, माजलगाव, बीड, केज या तालुक्याचे असून सर्वात कमी ग्रामीण लोकसंख्येचे वितरण (1 लाखापेक्षा कमी) हे वडवणी, पाटोदा व धारुर





या तालुक्यात दिसते. तर उर्वरित तालुक्यामध्ये लोकसंख्येचे वितरण हे मध्यम (1लाख ते 2 लाख दरम्यान) स्वरूपाचे आहे.

गट क : नागरी लोकसंख्येचे वितरण (2001 व 2011)

बीड जिल्ह्यातील नागरी तालुकानिहाय अभ्यास केला असता असे दिसते की, 2001 या काळात सर्वाधिक नागरी लोकसंख्येचे वितरण (१ लाखापेक्षा जास्त) हे फक्त बीड तालुक्याचे असून 2011 मध्ये सुद्धा नागरी लोकसंख्येचे वितरण (2 लाखापेक्षा जास्त) हे बीड तालुक्याचेच आहे तसेच नागरी लोकसंख्येचे मध्यम वितरण (50 हजार ते 1 लाख) हे परळी व अंबाजोगाई तालुक्याचे दिसून येते. तर सर्वात कमी नागरी लोकसंख्येचे वितरण (50हजारापेक्षा कमी) हे आष्टी, गेवराई, माजलगाव, केज, धारूर तालुक्याचे आहे.

निष्कर्ष :

- 1) संशोधन क्षेत्रातील बहुतांश तालुक्यात एकूण लोकसंख्या व ग्रामीण लोकसंख्या वितरणामध्ये सर्वाधिक लोकसंख्या ही बीड,गेवराई, केज, परळी, अंबाजोगाई, आष्टी या तालुक्याची दिसून येते. 2001 च्या तुलनेत 2011 मध्ये लोकसंख्येच्या वितरणाच्या वर्गवारीमध्ये तालुक्याच्या संख्येत फारसा बदल झालेला दिसून येत नाही.
- 2) अभ्यास क्षेत्रामध्ये 2001 च्या तुलनेत 2011 मध्ये सर्वाधिक लोकसंख्येचे वितरण असलेल्या तालुक्याच्या संख्येत वाढ झालेली नाही. सर्वाधिक लोकसंख्या ही बीड व गेवराई या तालुक्याची दिसून येते.
- 3) बीड जिल्ह्यातील आष्टी, पाटोदा व शिरूर कासार तालुक्यामध्ये नागरीकरणाचा अभाव असल्या कारणाने येथे 2001 व 2011 या काळात नागरी लोकसंख्या नसल्याचे निदर्शनास येते.
- 4) अभ्यास क्षेत्रातील बीड,गेवराई, परळी व अंबाजोगाई हे तालुके नॅशनल हायवेला असल्यामुळे व सर्वच सेवा सुविधा उपलब्ध असल्याने आसपासच्या तालुक्यातून अधिकांश लोकसंख्या नोकरी व शिक्षणाकरिता येत असल्याने एकूण लोकसंख्येची वाढ इतर तालुक्याच्या तुलनेत सर्वाधिक असल्याचे दिसून येते.

संदर्भ ग्रंथ :

- 1) जिल्हा सामाजिक व आर्थिक समालोचन -बीड जिल्हा
- 2) जिल्हा जनगणना अहवाल- 2001 व 2011 बीड जिल्हा
- 3) सुरेश चंद बंसल (2015)- जनसंख्या भूगोल, नई दिल्ली प्रकाशन
- 4) डॉ.धारपुरे - लोकसंख्या भूगोल



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## Histopaathological study of New Cestode *Cotugniamohekarae* from *Columba Livia Intermedia*

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Research Paper - Zoology

### ABSTRACT

*The present communication was a new species of cestode Cotugniamohekarare is found in intestine of Pigeon, columbalivia intermedia for histopathological study. This parasite brought about several histopathological changes in the infected intestine of the host. It includes larvae emerging out from cyst, floating inner wall of mucosa, and attach to intestinal villi. Scolex deeply penetrate and pad formation for absorb nutrients. Parasite maintain good balance of protein, carbohydrates and lipids.*

**Key words :** *Cotugniamohekarare* n. sp, *columbalivia intermedia*, histopathology

### Introduction :

Interaction and relationship between the host and parasite is refers to histopathology. Cestode lives in in a very haphazard environment as there is a continuous movement of the gut lining. The food present in gut and the nature of its related glands, hence they require the organ of attachment for the survival.

The extensive study on the host parasite relationship has been carried out by Nandkal, Mohandas, John and Simon (1974), in *Railletina* (R.) *tetragona*. Histopathology of *Amoebotaenia indiana* was studied by Mitra and Shinde (1979), Jurasek, V. Ovis Diaz, D. (1979) studied on domestic fowl. Bailey (1951), worked on *H. nana*, Chincholikar and Shinde 1976 in *C. celebesensis*, Befus (1982) studied





mechanism of the host resistance at the host resistance at the mucosa parasite interface. Kishor, N and Sinha DP, histopathological and histochemical studies on *Dicranotaeniaplathyrhynca* I fowl. Sinha and Sinha (1986) observed the mode of attachment of *Raillietina* (R.) *tetragona* (Molin, 1858) of domestic fowl. Kumar and Lal (1988) studied effect of implantation of *Stilesia globipunctata* scolex of the host intestine and Murlidhar and Shinde (1987) observed histopathology of *Acanthobothrium uncinatum* from a fish *Rhynchobatus djeddensis*. Large number of scientists worked well on helminth parasites, some of them are Malhotra and Capoor (1983), Jha et al (1981), Jadhav et al., (1994, 2003), Kharade and Shinde (1995), Shinde et al., (1999) and Thorat (2011). The present communication was undertaken to study the histopathology of new cestode *Cotugniamohekarae*.

#### Material and Method :

Six intestines of the Pigeon, *Columba livia intermedia* at AUSA, Dist. Latur, Maharashtra, India were dissected and observed, to see the degree of infection of cestode parasites, some of intestine were heavily infected with the cestode parasites. Few worms were collected for the taxonomic study. The remaining, pieces of intestine along with attached worms were fixed in fixative, Bouin's fluid taking care that the intact parasites were not disturbed, for the histopathological study.

After the taxonomic observations the worm turned out to be *Cotugniamohekarae* n. sp. The preserved material from Bouin's fluid were removed, washed and dehydrated through graded alcohol, cleared in xylene and embedded in the paraffin wax MP 58 - 600 C.

Sections were taken on microtome by adjusting the 7µ thickness, slide were stained with Mallory's triple stain. Best slides were selected and observed under microscope.

#### Observation and Result :

Morphological studies of *Cotugniamohekarae* n. sp. were medium in size, scolex large, quadrangular in shape, broader than long and measure 0.776 - 1.039 in length and 0.776 - 0.898 in breadth. Rostellum is large, oval in shape, transversely elongated with double row of hooks. The suckers are medium arranged in two pairs, not overlap to





each other. Neck short and wide.

Mature segment are broader than long, each with a double set of reproductive organs. Testes are 175 - 185 (180) in number and oval to round in shape, situated posterior half of the segment. Cirrus pouch medium, anteriorly directed, situated anterior of segment, cirrus is thin and coiled. The vas deference long coiled run anteriorly and turn posteriorly. A pair of ovaries medium, bilobed and crescentic in shape, slightly posterior of the segment. Vagina is thin, run transversely and turn posteriorly and open into ootype. Ootype small and oval, vitelline gland medium, oval and post-ovarian.

Microscopical observation of worm show that, it has penetrative type scolex with four suckers and rostellum, which help them to adhering to the intestine of host.

Microscopical observations revealed that, larvae are emerging out from the cyst. Some larvae floating in inner living of mucosa layer, and trying to attaches to the intestinal villi.

Further it is also observed that, scolex of immature worm deeply penetrate in the mucosa, completed pad formation and absorb the nutrition from the host. Due to this, necrosis of the host tissue is observed in the mucosal wall and inflammatory reaction of the worm is also observed.

It has been observed histochemically that the host tissue is rich in proteins, glucose and lipids. To obtain their nourishments, the parasite tries its level best to go deep inside the tissue and hence it seem the help of its level best to go deep inside to the tissue and hence it seeks the help of its scolex. When histochemical studies of the parasite was carried out it brought intopicture the existence of proteins, fat and glycogen in the scolex region, tegument of the segments.

#### **Conclusion :**

It can be concluded that, the parasite finds the food material and other favorable necessary requirement for its nourishment and growth.



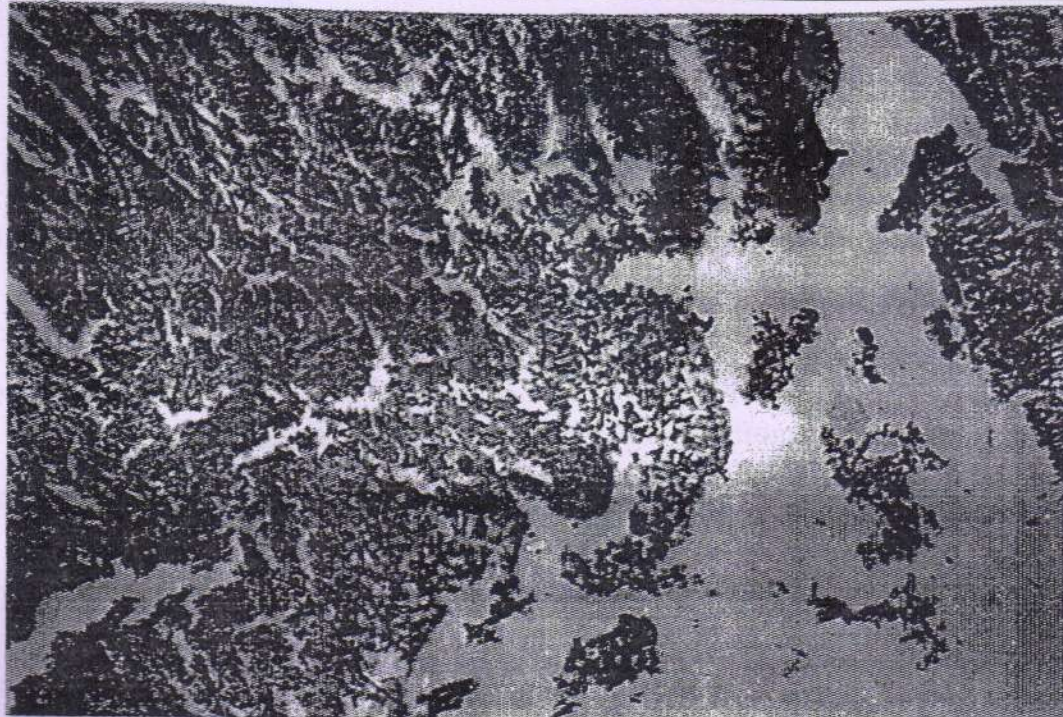


Fig. - The immature worms firmly attached to mucosal wall and started pad formation

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# संशोधन पत्रिका संशोधनधारा

वर्ष १५ वे, अंक १ ला

डिसेंबर-२०२२



Dr. Shelke A.N

मुख्य संपादक

प्राचार्य प्रो. डॉ. आबासाहेब हांगे



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# BIOLOGICAL CONTROL OF MOSQUITOES

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## Introduction :

India is considered to be one of the richest centers of biodiversity in the world, Particularly because of the large number of ecosystems. Mosquitoes are diversified taxonomical group of insects Taxonomical biodiversity of mosquitoes is important aspect of medical science. Mosquitoes are responsible for causing dreaded diseases to human being. Malaria, Filariasis. Dengue etc are the common diseases caused by mosquitoes, which are fatal to human being According to Stone et al (1992) there are about 2700 species of mosquitoes in the world. Anopheles Culex and Aedes are important genera of mosquitoes medical importance. Malaria is caused by Anopheles species, Filariasis is caused by Culex species while. Dengue is caused by Aedes species Mosquitoes are characterized by small size 3.00 6.00 mm in body length; delicate and slender bodied, covered with hair and scales. They are black or brown, often spotted white and have piercing and sucking type of mouth parts for sucking the blood of animal or cell sap of plants. The larvae of mosquitoes are elongate wriggles and aquatic in habitat. The pupae are also aquatic and capable of swimming by paddle like movements of the abdomen. The larvae breed in all kinds of fresh water and in the brackish water. The larvae feed mostly on minute algae and other organic matter floating in the water.

The control of mosquitoes through pesticide is difficult task due to the development of resistance in mosquitoes. Secondly, pesticides lead to serious problems such as air, water and pollution, killing of beneficial organisms health hazards, secondary pest outbreak, pest resurgence, destruction of ecological balance and living weapon over chemical control.

## Biological Control of Mosquitoes Through fishes :

In past several workers (Brown, 1927; Sweetman 1958 Kalra et al. 1967, Greathead 1971 Rao et al, 1971 Siogren, 1972. Legner et al. 1974: 1975 ab Sathe and Bhoje 2000 and Sathe and Girhe 2002 etc.) have attempted the work related to control of mosquitoes using fishes. Several insectivorous fishes are scattered in tropical and temperate regions in both fresh and brackish waters. In biological pest control of mosquitoes, the most important, effective and widely utilized fish species belong primarily to the family poeciliidae and a lesser degree to the cyprinodontidae. Sweetman (1958) listed mosquito controlling species of fishes.

According to Greathead (1971) laboratory experiments in 1972 in Seychelles Islands gave strong indications of the value of *Pachypanchax playfairi* (Gunther) as a



predator of Mosquitoes. Field trials were not taken to the above region. However, the fish species gave very encouraging results for mosquito control in wells and with clear water in East Africa Zanzibar.

*Gambusia affinis* Baird and Girard and *Poecilia reticulata* Peters are commonly used fish for anti mosquito work. *G. affinis* is commonly called the mosquito fish which reaches its breeding size within 2, 3, month after its birth. It has maximum of 200 progeny per brood. The number of broods per year varies with the localities, but 4-6 broods annually reported.

According to Sweetman (1958) *P. reticulata* is more prolific than *Gambusia* sp. However *G. affinis* is now considered ubiquitous, as has been distributed and established throughout the world since early in the twentieth century.

The earliest introduction of *G. affinis* was in 1905 in Hawaii for control of mosquitoes (Legner et al 1974), within 2 month planing 2500 5000 fishes per ha achieved complete mosquito suppression. Hoy and Reec 1971) reported high-level suppression of *Culex tarsalis* Coquillett by releasing 250-500 gravid females of *G. affinis* per ha in paddy field of California, While (1973) reported 60% suppression of *Anopheles quadrimaculatus* Say by introducing *Gambusia* in southern USA in 1920 *Gambusia* was an important factor for suppressing *Anopheles* population in Malagasy, particularly in open water habitats (Grethead, 1971) Likely, the genus *Epiplatys* was also a potential suppression of population of mosquitoes on Africa (Brows, (1973) in Iran species of *Anopheles* were successfully suppressed by introducing over 15 million *Gambusia* and Guppy. Legner et al (1975) studied the efficiency of the desert pupfish, *Cyprinodon maculatus* Baird and Girard on *Culex* mosquitoes. They reported that in shallow ponds of large size, desert pupfish caused mosquito breeding to cease within four weeks after their introduction.

Legner et al (1975) reported that in some tropical areas. *P. reticulata* was preferred to *Gambusia* because of its superiority in pollution tolerance (Siggrén, 1972) In Sri Lanka. *P. reticulata* was preferred to *Gambusia* because of its superiority in pollution tolerance (Siggrén, 1972) in Sri Lanka *P. reticulata* has been preferred to release for successful control of *Anopheles* mosquitoes (Rao et al. 1971) A successful suppression of *Culex pipiens fatigans* Wied in a canal carrying sullage waste was noted by Rao et al. (1971) in Southern India They also reported that the fish was established in fresh and brackish waters of Southern India. Kalara et al. (1971) studied *Lebistes reticulata* Peters with respect to mosquito control in Nagpur India with good success.

Grethead (1971) reviewed the successful establishment of *P. reticulata* in Senegal and successful suppression was successfully used in several countries in mosquito control (Coppel and Martins, 1977)



Sathe and Bhoje. (2005) recently reported that *Preticulata* showed more preference *Anopheles* than *Culex* mosquitoes and has great potential of biocontrol mosquitoes by performing 79.6% predation in *Anopheles* 58.8% in *Culex* mosquitoes. However, it is crystal size and top feeding habits preference for mosquito Larve adaptability and pollution toleras capacity Guppy shows all above features hence ideal in biological. Pest control programme of mosquitoes.

#### **Biological control of mosquitoes through dragonflies :**

According to Corbet (1999) there are two approaches to the biological control of pest namely inculation and inoundulation of augmentative release (AR). Both approaches are useful for mosquito control. Under inoculative release natural enemies of pests are introduced into an environment where they are not already present, during which enemies multiply naturally Until they reach a level such that either eliminate the pest or keep the pest population down to a level deemed acceptable to humans. However, this method has limited success. Augmentative release can be highly successful since this method entails prior estimation of the number of natural enemies needed to active suppression to required level and then realizing sufficient number into a closed system. Augmentative release is practiced routinely in several countries for suppression of pests in green house, close environment from which neither biocontrol agent nor pest can disperse. Odonata in general are predators of several insects. Amongst their prey, houseflies and mosquitoes are prominently predated (Metcalf and Flint, 1979). Thomas et al. (1988) studied predatory efficiency of nymphs of *Bradinophya jainata* and *Brachythemis contaminata* on mosquito larvae. They found that these Odonates were good predators of mosquito larvae.

In Cuba, Santhamarina and Mijares (1986) made field and laboratory observations to study the efficacy of nymphs of anisopterans such as *Pantallallavescens*, *Trame abdominalis* and proved them good predators of *Culex quinquefaviatus*.

#### **Birds of Control of Mosquitoes :**

A Bird less country would be most desirable place for insects. However bird mosquito predatory prey index is not available. It observed that Wagtail bird was largely subsisting on adult mosquito diet and thus acted as good biocontrol agent of mosquitoes in Kolhapur (Sail Girhe 2002) there is extreme need of preparing predatory prey index of birds and mosquito in India.

#### **Conclusion :**

- 1) It seems that the programme of biological control mosquitoes has great future since it is ecofriendly.
- 2) Further study is needed on survey of species of above important groups of biocontrol agents.



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# Biodiversity Hotspots in India.

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***Biodiversity is the way, so don't let nature go astr.***

Biodiversity is the collection of flora and fauna of a place. Biodiversity is a prime location for the existence of rich biodiversity but also destruction. It is a place that needs our immediate and constant attention to thrive in the future as well.

This idea of identifying hotspots was put forth by Norman Myers in 1988. 35 biodiversity hotspots have been identified out of which most of them are forests. Almost 2.3% of the land surface of Earth is represented by hotspots, which also comprise around 50% of the world's most common plant species and 42% of the world's vertebrates prevalent. Sadly, these biodiversity hotspots have been degraded and some of which are still on the verge of extinction due to severe climate change and human intervention.

**To be called a hotspot, a region has to be able to fulfill at least two of the following criteria including:**



1. It should comprise at least 1500 species of vascular plants i.e. more than 0.5% of the world's total plants.

2. It should have lost greater than or equal to 70% of its original habitat.

India has always been on the list of the richest countries in the world for its biodiversity which can easily be seen in the demography of its land. Though biodiversity and demographic diversity are two completely different topics, the human population has been dependent on biodiversity forever in numerous ways. Also, as a result of exponential growth in the human population, their survival pressure has increased tremendously on biodiversity.

### **Rich Biodiversity of India**

As it has been already mentioned, India is a country rich in biological diversity. It is situated in the Indomalaya ecozone and comprises of 2 out of the 35 biodiversity hotspots in the world. The third one, that is, Indo Burma lies partially in North-East India.

In India, there are

In India, there are approximate-

- 350 mammals which make up 7.6% of world species
- 1224 birds which make up 2.6% of the world species
- 197 amphibians which make up 4.4% of the world species
- 408 reptiles which make up 6.2% of the world species
- 2546 fishes which make up 11.7% of the world species
- 15000 flowering plants which make up 6% of the world species

### **History**

India originally belonged to Gondwana from where many of the Indian species (descendants of taxa) originated. Due to the collision of Peninsular India with the Laurasian landmass, there was a mass exchange of species that took place. However, what caused the most turmoil was the eruption of volcanoes and climate change 20 million years ago which led to the extinction of many Indian forms. After this, mammals were seen entering India from Asia through the Himalayas as a result of which out of the Indian species, there were 12.6% mammals and 4.5% birds which were endemic and 45.8% reptiles as well as 55.8% amphibians.

### **Four Biodiversity Hotspots in India**

Some of these biodiversity hotspots are present in India which includes:



These hills are present along the western edge of peninsular India. Since they are situated near the ocean, they are likely to receive a good amount of rainfall. Most of the deciduous, as well as rainforests, are present in this region. Around 77% of the amphibians and 62% of the reptiles found here cannot be spotted elsewhere in the world. Sri Lanka in the South of India is a country that is rich in species too.

There are more than 6000 vascular plants here which belong to more than 2500 genus. 3000 plants out of these are endemic. Most of the spices found in the world such as black pepper and cardamom all are believed to have originated in the Western Ghats. Most of the species are however present in the Agasthyamalai Hills situated in the extreme South. The region is also home to around 450 species of birds, 140 mammals, 260 reptiles and 175 amphibians. Such diversity is quite beautiful as well as rare but now lies on the verge of extinction. The vegetation in this region was originally spread over 190,000 square kilometres but has reduced to 43,000 square kilometres today. Only 1.5% of the original forest is still prevalent in Sri Lanka.

## 2. The Himalayas

This region comprises Bhutan, Northeast India, and Southern, Central and Eastern Nepal. These Himalayan Mountains are the highest in the world and abode some of the highest peaks of the world including Mount Everest and K2. Some of the major rivers in the world originate from the Himalayas. The Himalayas comprise more than 100 mountains beyond 7200 meters.

There are almost 163 endangered species in this region including one-horned rhinoceros, wild Asian water buffalo and as many as 45 mammals, 50 birds, 12 amphibians, 17 reptiles, 3 invertebrates and 36 plant species. One such endangered species found here is the relict dragonfly whose only other species is found in Japan. Himalayan Newt is also present in this region. Coming to the fauna, there are 10,000 species of plants in the Himalayas a third of which are endemic and cannot be located anywhere else in the world. Some of the threatened ones include Cheer pheasant, Western Tragopan, Himalayan quail, Himalayan vulture, White-bellied heron and the like. Mammals too can be spotted here with over 300 species such as Asiatic wild dogs, sloth bears, snow leopard, black bear, blue sheep and wild water buffalo. Namadapha flying squirrel is, however, a mammal that is almost on the verge of extinction and therefore needs immediate attention.

## 3. Indo-Burma Region

This region consists of numerous countries including North-Eastern India (to the south of the Brahmaputra River), Myanmar, and China's Yunnan provinces southern part, Lao, People's Democratic Republic, Vietnam, Cambodia, and Thailand. It is spread over a distance of 2 million square kilometres.



Although this region is quite rich in its biodiversity, it has been worsening over the past few decades. Six species of mammals have been discovered in this region recently including large-antlered muntjac, Annamite Muntjac, grey-shanked douc, leaf deer, saola and Annamite striped rabbit. Other species such as monkeys, langurs, and gibbons can be found here with a population of less than a hundred. Freshwater turtle species found in the region are however endemic. 1300 species of birds too can be spotted here including the white-eared night-heron, Gray-crowned crocias, and orange necked Partridge most of which are endangered. Almost 13,500 plant species can be spotted in the region half of which are endemic and cannot be found in any other place in the world.

#### 4. Sundaland

This region lies in South-East Asia and includes Thailand, Singapore, Indonesia, Brunei, and Malaysia. The Nicobar Islands represent India. These islands were declared as the world biosphere reserve in 2013 by the United Nations. These islands have a rich terrestrial as well as marine ecosystem including mangroves, sea grass beds, and coral reefs. Species such as dolphins, whales, turtles, crocodiles, fishes, prawns, lobsters and seashells comprise marine biodiversity. In case the marine resources are over-used, it can pose a serious threat to biodiversity.

#### Major Reasons for Loss of Biodiversity in Hotspots

These include:

1. Destruction of habitats
2. Pollution and environmental degradation
3. Poachings
4. Climate Change

It is high time to step up and start taking measures to protect our natural biodiversity before time actually runs out.

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Dr. Khan A.S

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## Multiple Themes in Rohinton Mistry's: A Fine Balance

\* Romaan Abdul Aleem Siddiqui \*\* Dr. Ansarullah Shafiullah Khan

### Introduction:

Rohinton Mistry is a dynamic diasporic writer. Whenever there is going to be a conversation at National or International level it is but obvious that the name of Rohinton Mistry will come into limelight. He belongs to a genre of those writers, who left their native land and got settled at foreign land, but continues to miss their native place. This is what is depicted in the literary works of Rohinton Mistry. He was born in Zoroastrian or Parsi Family in Mumbai, India in the year 1952. He graduated from St. Xavier's college, Mumbai, and shortly after that he immigrated to Canada in 1975. In the very year i.e. 1975, he got married also to Fenry Elavia. Then as a student he completed his Bachelor's Degree in English and Philosophy from the University of Toronto, Canada. While studying in Toronto, he got a taste and an inclination towards English Literature, and he started marching toward becoming one of the finest writers of English. He has won numerous literary awards for his literary work for his credit towards literature. He has received Honorary Doctorates from University of Toronto, York University and the prestigious institutions like University of Ottawa. The novels of Mistry discourse upon the social problems in India. It is also quite possible that he is making an attempt in exposing numerous social issues, and trying to reform the society. *A Fine Balance* is his second novel, written in the year 1995. It is primarily based upon the National

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Emergency declared by the Prime Minister of India, 1984-1987. There are multiple themes in this novel and that is why it is honored with prestigious awards like: *Giller Prize* and *Los Angeles Times Book Prize*. The title of this novel signifies simply maintaining equilibrium or balance in life between hope and hopelessness. This shortlisted novel revolves around the four major characters: *Dina Dalal* (A widow), *Maneck* (17 years old boy), *Ishwar* (Om's Uncle) and *Om* (Ishwar's nephew). There are multiple themes in this novel which a researcher is going to bring into the consideration. As this targeted novel is filled with multiple problems and themes, the readers cannot resist from reading the entire novel.

**The Multiple Themes present in *A Fine Balance* are:**

**Impacts of National Emergency in India as Theme:**

The National Emergency in India was declared during the 1984 and continued up till 1987. Mistry heavily criticizes the Prime Minister of India and the failure of the government. Emergency severely impacted the lives of common and poor people. In this novel it is portrayed that during the time Of Emergency people especially the poor people face the problem of corruption, poverty, homelessness, forced labor, forced sterilization operation in the name of Family Planning, demolition of slums and houses of poor people, political turmoil, increase in crime and many more. During the time of emergency Mistry has mentioned that the people were forcefully tucked into the trucks and buses for public gathering, in return they were promised that they would get snacks, breakfast and would be offered some amount of money but all the people didn't get these things. If they were not ready to gather, they would be punished and beaten up and even jailed for no reason. As the police during that time got all the rights, and they oppressed the poor people. Once the tailor duo i.e. Ishwar and his nephew Omprakash were forced to join the crowd of twenty thousand slum dwellers and were waiting for the speech of Prime Minister, and wasted their time. Moreover, they were not offered with breakfast and money. In this selected novel Mistry is able to highlight the horrible situation during the time of Emergency. Mistry indirectly criticizes the Prime Minister by writing:

Lots of lies have been spread about the emergency which had been declared specially for the people's benefit... whenever the Prime Minister goes, thousands gather from nieces around to see her. (Mistry 9)



Mistry in this fiction has shown that people during that time were forcefully made to do sterilization operation, *Nasbande* with or without their will. They were picked up and made to undergo the surgery. All this was done in order to control the population of India. Doctors were given daily or weekly targets, and if they fail to achieve their target their salary was deducted. The people who used to sleep on roads were arrested and were brutally punished. During the time of Emergency there was poverty and the poor didn't have much to eat and Ration Card was provided only one condition: that was to have certificate of undergone the sterilization surgery. During that time huts or slums of the poor were bulldozed in the name of beautifying the city as a result many lost their dwellings. On the other hand Prime Minister in her speech in this novel tells that the poor will not be affected and only the criminals, smugglers and mafia will be affected. They people were fooled by the government as the Prime Minister in her speeches in this novels tells that enough food will be provided, cloths will affordable at low cost, hospitals and schools will be built and lot many more fake assurances. Mistry has unmasked the hypocrisy of the government of that time and of the Prime Minister through this novel. Mistry has intellectually criticized the Prime Minister without mentioning her name and beautifully narrated the problems during Emergency time in the form of historical fiction i.e. *A Fine Balance*.

#### **Caste Problems as theme:**

The caste problem in India is present since a long time and still it exists in the contemporary time. The Indian society is divided into four Vernas: *Brahmans shatriyas, vaish* and *Shudras*. These *Shudras* are the people of lower caste and they are oppressed by the people of upper caste. People of lower caste didn't have right to education, using public well or tap, they didn't have access to enter the temple, they were forced to do to only odd jobs, they couldn't walk on the road used by caste people and lot many atrocities were done on them. If they didn't follow these rules they were ill treated. Mistry in his novel through the story of Ishwar and Omprakash brings into limelight the harsh treatment which people of lower caste underwent. Ishwar and Omprakash were from village and came to city in order to earn their bread and butter. Dukhi was father of Ishwar and Narayan and their mother's name was Roopa. Omprakash was the son of Narayan. They belonged to *Chamar Jati* which means they were cobblers. The

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Thakur was the member of upper caste and did atrocities on the people of lower caste. Dukhi and his wife Roopa underwent lots of atrocities during their lives. During the childhood days Dukhi read scriptures regarding crimes and ill treatment on the people of lower caste and all this stuff got permanently stored in his head. Dukhi was cobbler but he wanted his sons to become tailors but it was not accepted by the society of that time. He was objected to do it by upper class. In this novel it is shown that the women of lower caste were raped and molested by the people of upper caste. Roopa wife of Dukhi was raped. Once she went into the farm for taking oranges for her children, she was caught and raped by the watchman of upper caste.

People of lower caste were not at all allowed to vote. They just have to put the thumb impression and the Thakur (upper caste) will decide their vote on the ballot paper. Narayan was an educated person, wanted his right and wanted to vote as per his wish, and by seeing him many wanted their right to vote. It was not all accepted by Thakur. After the election he wanted to take revenge and continue atrocities on lower caste people. Mistry writes about Thakur's atrocities when people of lower class want their right to vote:

Thakur Dharami's gondas, freed now from their election duties, were turned loose upon lower caste. "I want that achhoot jatis to learn a lesson," he said distributing the liquor to his men before the next assignment. "I want to be like the old days, when there was respect and discipline and order in our society. And keep an eye on that Chammar- tailor's house, make sure no one gets away" (Mistry 168)

When the elections were over Thakur's men did inhuman treatment with lower caste people. Regarding this Mistry writes:

The goondas began working their way towards untouchable quarter. They beat up individuals at random in the streets, stripped some women, raped others, burned few hut. (Mistry 168)

The men of Thakur burned alive the family of Dukhi, and only Onprakash and Ishwar managed to escape. This is how Mistry depicts the problem of lower caste in this novel.

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Mistry shows all these problems which were happening in post-independent India. On one the government made strict rules for abolishing caste system, laws for removing untouchability from Indian societies, and the on other hand tyrannies continued on lower caste people. In this novel Mistry tells about the government, through the character of Narayan. Narayan says:

Government passes new laws says no more untouchability, yet everything is same. The upper caste bastards, still treat worse the same.(142)

#### **Violation of Human Rights as the Theme:**

As per United Nation, Human Rights are those basic right which every human being is entitled irrespective to his/her caste, religion nationality, sex, gender and social status. In this novel Mistry has shown violation all human rights. Right to Live is the human right of every human being but in this novel it is depicted that the government during the time of Emergency was doing sterilization operation of anyone whether he had will or not. When Ishwar and Omprakash returned to their village Thakur in order to take revenge from them, made them to undergo sterilization. Omprakash underwent castration and Ishwar underwent sterilization. Due this surgery Ishwar got infection in his legs, and he lost his legs permanently because of unsterilized surgical instruments were used by the surgeons. In the name of beautification of the city the slums were bulldozed. Poor people came on road and the nation became lawless. Police was given all the rights. The cops could arrest whoever they want and could tuck them for gathering. Police at that time did lots of atrocities on poor people, and an environment of lawlessness was created at that time.

Human Rights give right to equality to all human beings but in this novel we see that the ill treatment is done on the downtrodden people. People became victims of caste system. Furthermore, upper caste community did tyrannies and all sorts of atrocities on lower caste. Secondly, in this novel it is portrayed that people in the cities were discriminated on basis of class. Also it is depicted that students of lower class didn't have right to education and they were not treated equally. Another violation shown in this novel is right to vote. Lower class people didn't enjoy this fundamental right, and when they demanded they were murdered, killed, raped and faced all sorts of inhuman treatment.

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Maneck Kohlah who came to city to study was ragged and this made him to shift into Dina's apartment.

**Oppression of Women as the Theme:**

In this novel Mistry depicts the incidences of oppression of women. Dina who wanted to become a doctor like her father but after her father's death, she had to give up, and had to leave on the mercy of her brother. Her brother considered her as his maid and it is portrayed that she or humiliate her. Dina got married to Rustom but their marriage didn't last long and her husband died. After that she wanted to establish her own identity. She took sewing orders from a firm but this was not accepted by her landlord and she was turned out from rented apartment. Again she had no other choice but to face same humiliations, insult and ill treatment by her brother. In this novel it is also depicted that women of lower class were raped by people of upper caste. The wife of Dukhi, Roopa once went to collect some oranges to landlord's farm, but to her bad luck she was caught and raped by the watchman of upper caste. She couldn't raise her voice for justice also as there was no justice for women of lower class. After the election men of Thakur stripped many women of lower caste and raped them.

**Displacement as the Theme:**

In this novel Mistry has shown the displacement of characters of this novel. Ishwar and Omprakash came to city from a village to get the job of tailor. Maneck came from mountains of Himalayas to city to do a course refrigerator and AC repairing. Mistry even shows multiple times the displacement of Dina. First she got displaced to her husband's house from her brother's house. After the death of her husband she was displaced to a rented apartment. After that her landlord made her vacant the apartment and once again she was displaced to her brother's house.

**Psychological Pressure as the Theme:**

Mistry has shown all the characters under psychological pressure. As the period shown in this novel is the Period of National Emergency and the life of people was turned horrible. Dina was under the Psychological pressure in her mind regarding establishing her own identity. Ishwar and Omprakash had already faced multiple problems in their

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village and in the city they came in a mental pressure due the activities which were going on in the city. Maneck was ragged and was under psychological pressure, and that's why he shifted to Dina's apartment. When he returned from Dubai he couldn't stand the conditions of his friends and due to outburst of psychological stress he committed suicide.

#### **Conflict as the Theme:**

The two types of conflicts which are depicted by Mistry in this literary work are: Caste Conflict and Class Conflict. Caste conflict is depicted through the past events of Ishwar and Omprakash. This novel has shown the different sorts of atrocities done on lower class by upper caste. In this historical fiction there many events of caste conflict are shown like oppression by Thakur in his village and all sorts of tyrannies done by him. Class conflict is basically shown in the city as people in the city were discriminated on the basis of class. Poor people in the city faced problems like forced labor, demolition of slums, forced sterilization surgeries and they were forced to be present in the gatherings.

#### **Establishing identity as the Theme:**

All the four central characters in this novel wanted to establish their own identity, but it was comparatively more in Dina. Firstly she wanted to be a doctor but had to give up her studies due death of father and started living with her brother. After the death of her husband she wanted to establish her own business due fate didn't support her and she was again back to her brother's house.

#### **Conclusion:**

There are other so many themes also present in the novel because every time the reader finds a new layer of meaning. The researcher has attempted to give as many themes as possible by going throw critical thematic analysis of this text.

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# INSIGHT

Research Analysis

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व

मूर्ती व शिल्प संशोधन संस्था, औरंगाबाद

यांच्या संयुक्त विद्यमाने

दोन दिवसीय राष्ट्रीय अधिवेशन

## "Sculpture, Art and Architecture"

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\* आयोजक \*

इतिहास विभाग

सौ. केशरबाई सोनाजीराव क्षीरसागर उर्फ काकू

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**तिसरे राष्ट्रीय चर्चासत्र**

\* संपादिका \*

डॉ. अनिता शिंदे



## गुंफावास्तुकला आणि शिल्पकला

डॉ. अनिता शिंदे

इतिहास विभाग प्रमुख

सौ. केशरबाई सोनाजीराव क्षीरसागर उर्फ काकू  
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### प्रास्ताविक :-

भारतीय कलेचा वारसा अतिशय प्राचीन आहे. हा वारसा शैलगृहांचे खोदकाम, तसेच मंदीरवास्तुकला शिल्पकला, मूर्तिकला, धातुकरना, चित्रकला, अशा विविध स्वरूपात व्यक्त झाला आहे. यापैकी शैलगृहाचे खोदकाम (Rock Cut Cave Architecture) त्यातील शिल्पकाम हे भारतीय कलेचे एक महत्वाचे वैशिष्ट्य आहे. यालाच गुंफावास्तुकला, गुंफामंदिरे किंवा लेण्या असे म्हणतात. मोठमोठे डोंगर फोडून विविध ठिकाणी या लेण्या खोदण्यात आल्या. प्राचीन काळापासून मध्ययुगापर्यंत ही गुंफामंदिरे भारतातील विविध प्रांतात खोदली गेली. भारतातील या प्राचीन शैलगृहाचे खोदकाम, त्यामधील सजावट, शिल्पकाम, मूर्तिकाम कशा प्रकारे केले गेले. असावे, त्यासाठी जागेची निवड, दगडाची निवड कशा प्रकारे केली गेली असावी इ. अनेक गोष्टीबद्दल आजच्या काळातील समाजात विलक्षण कुतूहल आहे.

एकोणिसाव्या शतकाच्या पूर्वार्धात ब्रिटीशांनी भारत देश पादाक्रांत केल्यानंतर येथील परंपरागत व्यवसाय व उद्योगधंदे हळूहळू नष्ट झाले. सन १७६० च्या सुमारास प्रथमतः इंग्लंडमध्ये व मग नंतर संपूर्ण युरोपात घडून आलेल्या औद्योगिक क्रांतीमुळे (Industrial Revolution) हातमाग मागे पडून यंत्रयुग अवतरले. त्याचबरोबर तेथील सामाजिक सुधारणेची (Renaissance) व धर्मसुधारणेची (Reformation) चळवळ मोठ्या जोमाने सुरु झाली. सर्वच क्षेत्रातील नवनवीन विचारीचा प्रसार सुरु झाला. त्याचा अपरिहार्य परिणाम एतद्देशीय समाजाच्या आचारपद्धतीवर व विचारपद्धतीवर घडून आला. साहजिकच अव्वल इंग्रजीच्या काळात भारतीय जीवनपद्धतीवर तत्कालीन युरोपीयन शैलीचा प्रभाव पडला. त्यामुळे एका परीने आत्मविस्मृत अशी आपल्या समाजाची अवस्था इ पाली. कारण शैलगृहाच्या खोदकामादी अनेक गोष्टीच्या निर्मितीसाठी कोणते तंत्र वापरले जात होते, तसेच अशा प्रकारची निर्मिती का होत होती हे भारतीय समाजाच्या स्मृतिपटलावरून पुसले गेले. त्यामुळे कलेचा हा वारसा (Cultural legacy) कसा निर्माण झाला.



अशा प्रकारे तत्कालीन समाजातील धार्मिक चालीरिती समजुती प्रथा परंपरा आचारविचार या प्रत्येक गोष्टीचा कलापरपरेच्या जडणघडणीवर परिणाम झाला आहे. या क्षेत्रात कायकाय घडामोडी घडत होत्या, त्यातील अंतःप्रवाह कसेसे वहात होते याचे आकलन इ गालेले नसेल तर गुफाबास्तुकला वगैरे कलीचा अन्वयार्थ लावून त्यांचा आस्वाद घेणे कदापि शक्य होणार नाही. भारतीय कलेचा हा वारसा चिरंतन टिकणारा आहे. ही कला अजरामर आहे.

संदर्भ साहित्य :-

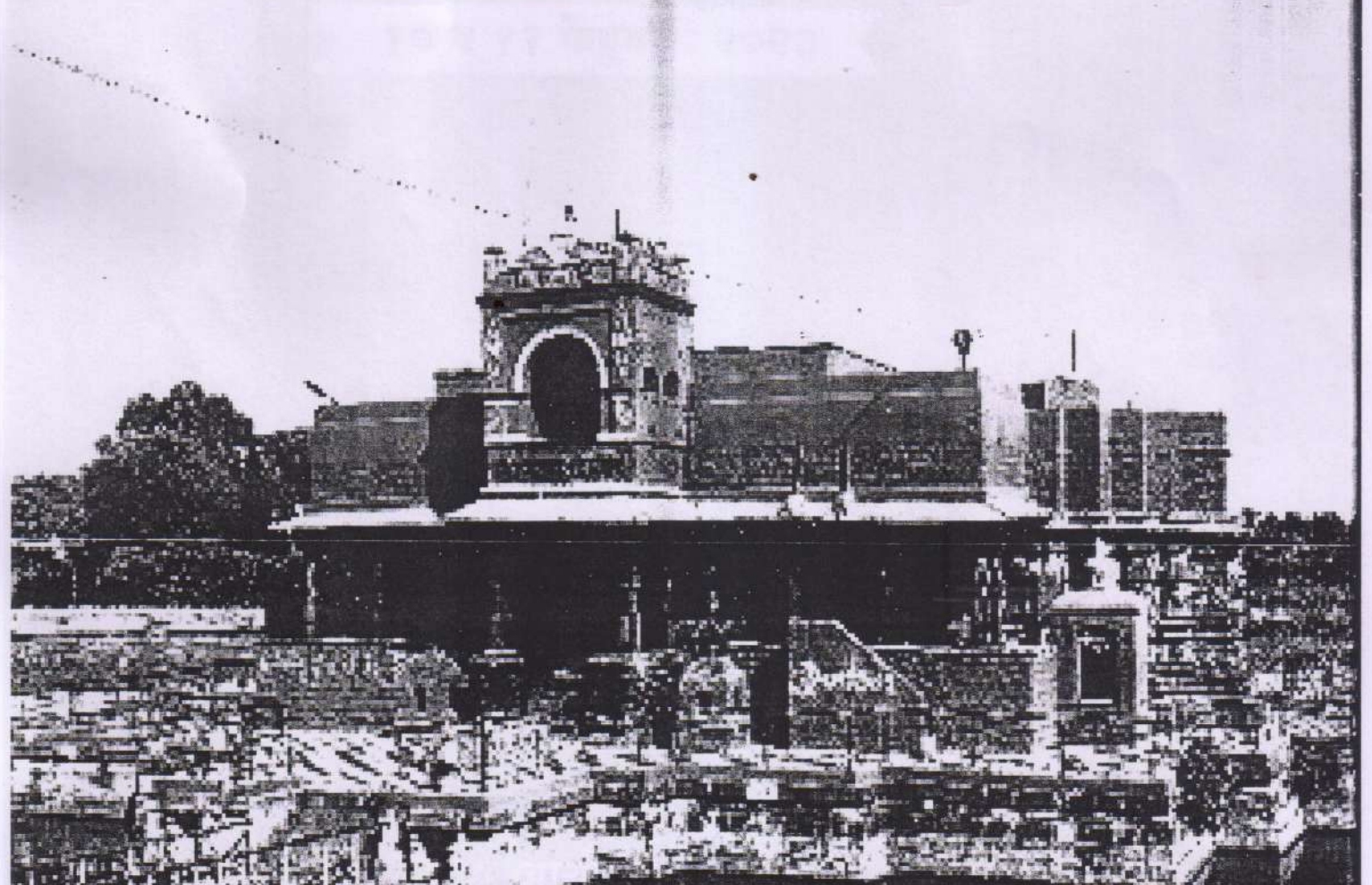
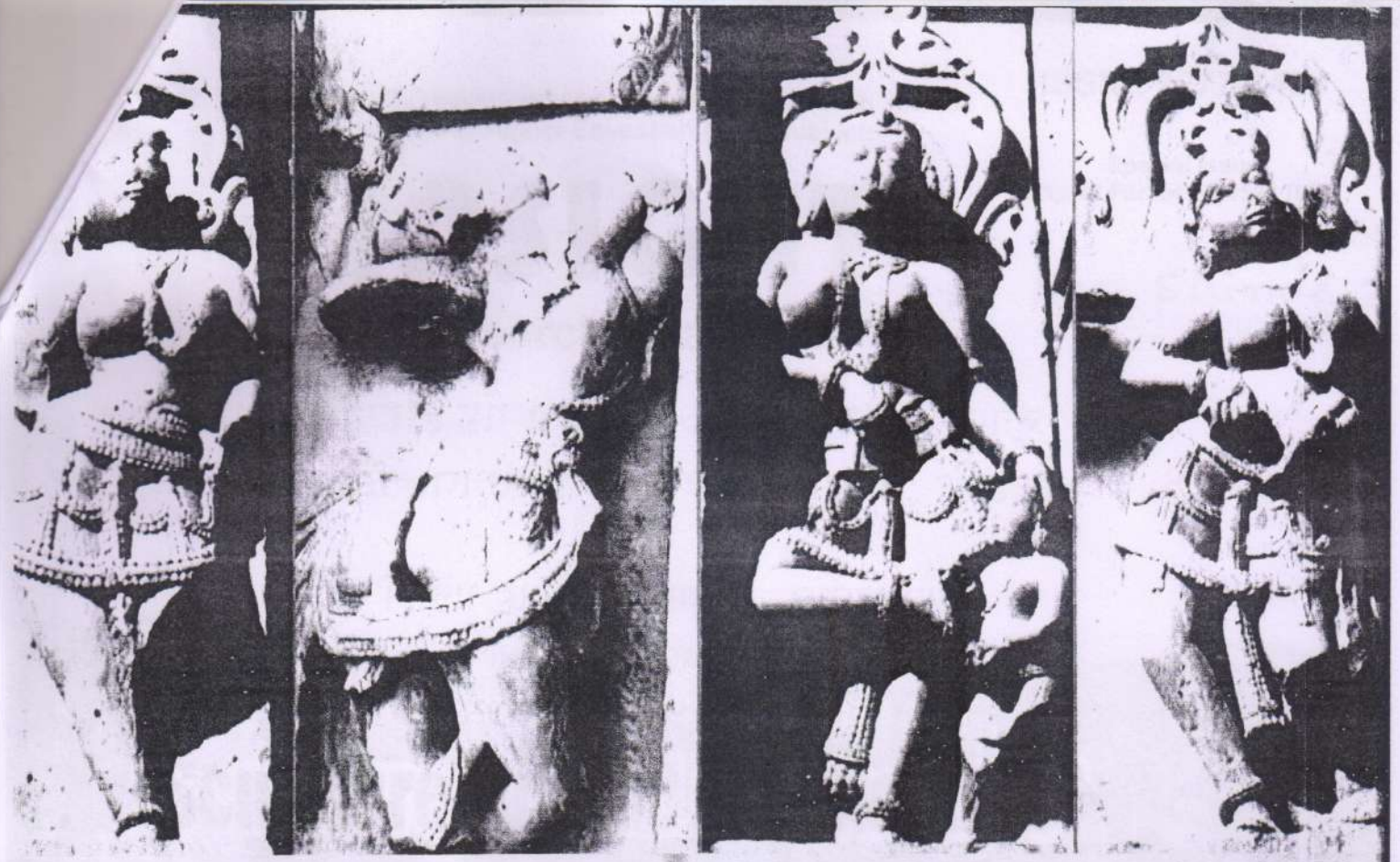
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# अखिल महाराष्ट्र इतिहास परिषद

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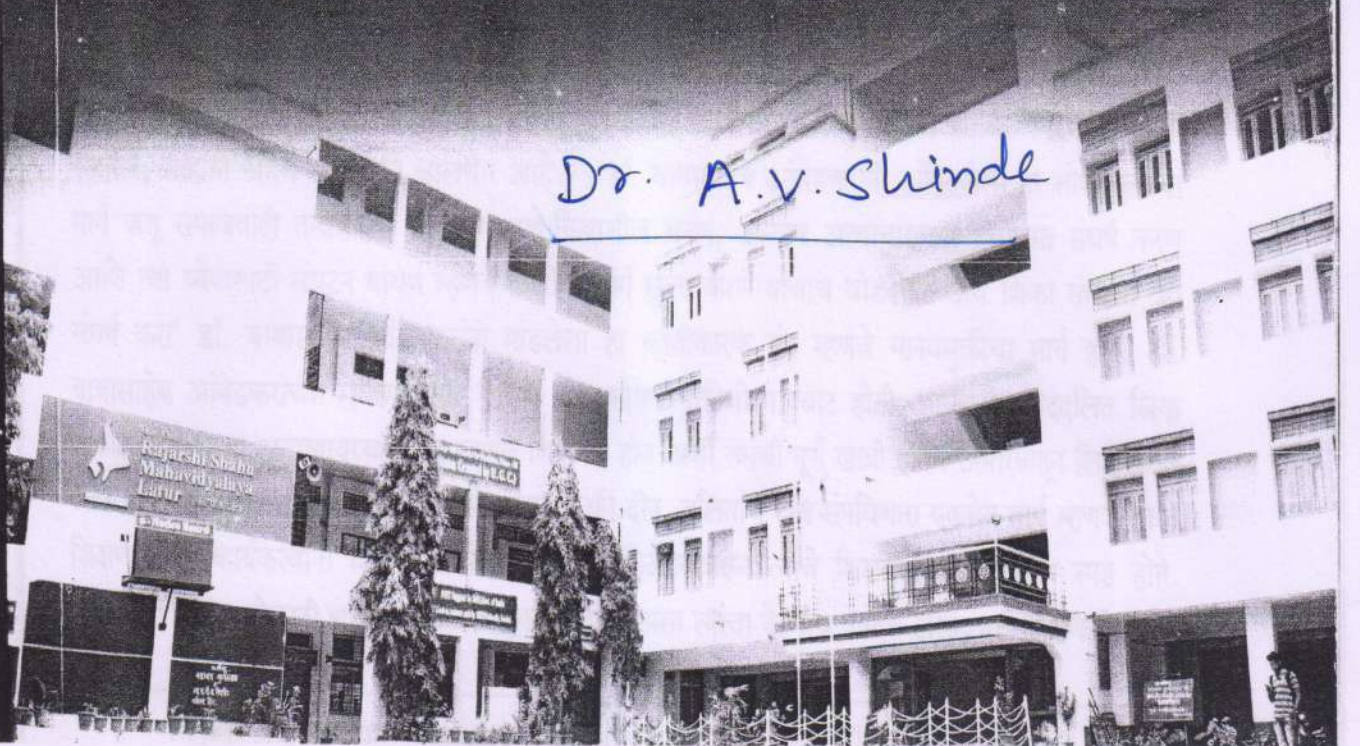
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प्राचार्य डॉ. महादेव गव्हाणे

कार्यकारी संपादक

डॉ. सतीश कदम

Dr. A.V. Shinde





## डॉ. बाबासाहेब आंबेडकरांचा शिक्षण विषयक दृष्टीकोन-एक नवा दृष्टीक्षेप

डॉ. अनिता व्यंकटराव शिंदे  
सौ. के. एस. के. महाविद्यालय, बीड

भारताच्या इतिहासातील गेली शंभर वर्षे म्हणजे भारतीय अस्पृश्य समाजाची हजारो शतकांच्या सामाजिक, संस्कृतिक गुलामगिरीतून मुक्तता करणार म्हणून जागतिक गुलामगिरी मुक्तीच्या इतिहासामध्ये सुवर्णाक्षरांनी ते लिहले जाईल यामध्ये दुमत नाही. याबाबतीत सामाजिकशास्त्र अभ्यासकांमध्ये वाद असूच शकत नाही. इतकं हे निर्मळ सामाजिक सत्य आहे. भारतातील दलितांचे प्रश्न सोडविण्यासाठी अनेक चळवळी झाल्या डॉ. बाबासाहेब आंबेडकरांनी दलीतांद्धारासाठी केलेल्या चळवळी या सर्वश्रुत आहेतच. हजारो वर्षात जे घडू शकलं नाही ते महत्वपूर्ण कार्य आंबेडकरी चळवळीने केल्याचे दिसून येते. डॉ. बाबासाहेब आंबेडकरांनी जे महत्वपूर्ण बदल घडवून आणले त्यापैकी त्यांनी केलेला शैक्षणिक बदल हा एक आहे.

भारताचा प्राचीन इतिहास पाहिलातर जातीव्यवस्थे विरुद्ध सर्वप्रथम गौतमबुद्धाने आवाज उठवला, त्यानंतर चार्वाक, संत कबीर, महात्मा फुले यांनी आपापल्या परीने जातीव्यवस्थेवर हल्ला करून जातीव्यवस्था नष्ट करण्याचे कार्य केले १. या सर्व विचारवंतांचे विचार भारतीय लोकजीवनात परिवर्तनाचे वलय घेवून आजतागायत आपले कार्य करीत आहेत. ज्ञान म्हणजे प्रकाश अशी ज्ञानाची व्याख्या बुद्धांनी केली आहे. बुद्धांच्या हयाच तत्वाचे अनुसरण डॉ. बाबासाहेब आंबेडकरांनी केलेले दिसून येते. डॉ. बाबासाहेब आंबेडकरांनी आपली संबंध हयात अस्पृश्यता आणि जातीयता यांच्या निर्मुलनाच्या संघर्षासाठी घालवली. भारतीय समाजाची समग्र पुनर्घटना झाली पाहिजे असा त्यांचा आग्रह होता. त्यासाठी शिक्षणाकडे बघण्याचा त्यांचा दृष्टीकोन विधायक आणि रचनात्मक होता. शिक्षण हा सामाजिक, आर्थिक, राजकीय कांतीचा मूलाधार आहे असे त्यांचे म्हणणे होते. तुमचा उद्धार करण्यास आता एकच मार्ग आहे आणि तो म्हणजे राजकारण. कायदा करण्याची शक्ती, पोटभर अन्न, राहण्यास जागा व द्रव्यार्जनाचे साधन मिळत नाही. याला कारण देव किंवा दैव दोन्ही नाही तुम्हाला अन्न, वस्त्र, निवारा आणि शिक्षण देणे हे या देशातील कायदे करणा-या सत्तेचे कार्य आहे व त्या सत्तेचा कारभार तुमच्या संमतीने, साह्याने आणि सामर्थ्याने चालणार आहे २'. डॉ. बाबासाहेब आंबेडकरांनी सांगितलेला हा शोषणमुक्तीचा मार्ग जणू समाजवादी तत्वज्ञानेच नवे रूप आहे. किर्याशील बनणं, अन्याय अत्याचाराच्या विरोधात संघर्ष करण आणि त्या ध्येयासाठी संघटन बांधणं म्हणजे कांतीचा मार्ग खुला करणे याचाच थोडक्यात अर्थ शिका संघटीत व्हा संघर्ष करा' डॉ. बाबासाहेब आंबेडकरांनी मांडलेला हा कांतीकारक मंत्र म्हणजे मानवमुक्तीचा मार्ग होय. डॉ. बाबासाहेब आंबेडकरांच्या म्हणण्यानुसार शिक्षण हीच शोषण मुक्तीची पायवाट होती. भारतातील पददलित स्त्रिया यांच्यावर होणाऱ्या अन्यायावरचा उपाय म्हणजे शिक्षणच होय अशी त्यांची पूर्ण खात्री होती. अमेरिकेहून लिहिलेल्या एका पत्रात ते आपल्या वडीलांच्या मित्राशी म्हणतात की दीन. दलितांचे दैन्य संपविणारा एकमेव मार्ग म्हणजे त्याच शिक्षण होय. कार्यकर्त्यांनी शिक्षणप्रसारासाठी झटले पाहिजे यावरून त्यांचे शिक्षण विषयक धोरण स्पष्ट होते. शिक्षणाची संधी प्रत्येकांनी द्यावी प्रत्येकांनी शिकलं पाहिजे असा त्यांचा नेहमीच उपदेश असायचा. शिक्षण घेतल्याने



दिला. प्रथम सर्वांनी शिकले पाहिजे. शिकून संघटीत झाले पाहिजे आणि संघटित होऊन विधायक कार्यासाठी लोकांच्या आडचणीसाठी संघर्ष केला पाहिजे, हे सारे कधी शक्य होईल तर हे शिक्षणाने शक्य होईल. त्यामुळे डॉ. बाबासाहेब आंबेडकरांनी भारतात शैक्षणिक चळवळ उभी केली आणि त्या शैक्षणिक चळवळीच्या माध्यमातून समाजातील तळागाळातील लोकांना शिक्षण मिळावे यासाठी विविध उपक्रमांच्या माध्यमातून शिक्षणाचा प्रसार केला डॉ. बाबासाहेब आंबेडकरांनी आपल्या भाषणाव्दारे शिक्षणामुळे होणारे फायदे सर्वांना सांगितले गुलामगिरीतून मुक्तता हवी असेल तर शिक्षण घेतले पाहिजे. शिक्षणामुळे सामाजिक समानता प्रस्थापित होईल असा त्यांचा दृढ विश्वास होता.. शिक्षण हे बाघिनीचे दूध आहे. जो ते दुध प्राशन करेल तो गुरगुरल्या शिवाय राहणार नाही. असे आपल्या भाषणाच्या माध्यमातून ते लोकांना सांगत असत त्यामुळे शिक्षणाचे महत्त्व लोकांना पटू लागले. शिक्षणाचा प्रचार करण्यासाठी त्यांनी अस्पृश मुलांसाठी वसतिगृहे बांधली अनेक शैक्षणिक संख्या स्थापन केल्या ज्यांच्या माध्यमातून समताधिष्ठित नैतिक मूल्ये जपणारे शिक्षण दिले जाऊ लागले. स्थापन केलेल्या शैक्षणिक संस्थांच्या माध्यमातून त्यांनी शिक्षणा बरोबरच अस्पृशोध्दाराचे कार्य केले. त्यांनी शिक्षणा संदर्भात केलेल्या व्याख्या त्यांनी केलेले भाष्य हे शिक्षण क्षेत्रात मोलाचे व भरीव कामगिरी करणारे ठरले. प्रत्येक गोष्टीसाठी शिक्षणाचा फायदा होतो. शिक्षणाने मानवाचे दुःख, दारिद्र्य व सामाजिक विषमता नष्ट होते. इत्यादी महत्त्व त्यांनी पटवून दिल्याचे दिसून येते.

डॉ. बाबासाहेब आंबेडकरांचे शिक्षण विषयक विचार तपासताना सावित्रीबाई फूले यांच्या काव्याची आठवण येते. 'शूद्रांना सांगण्याजोगा आहे एकच मार्ग हा शिक्षणाने मनुष्यत्व, पशुत्व तूटते पहा'

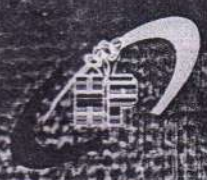
डॉ. बाबासाहेब आंबेडकरांनी सुरू केलेली शैक्षणिक चळवळ ही आंबेडकरी चळवळीतील सर्वात मोठे कांतीकारी पाऊल म्हणावे लागेल कारण डॉ. बाबासाहेब आंबेडकर यांच्या शैक्षणिक चळवळीमुळे भारतीय समाजातील दीन दलीत, अस्पृश व समाजातील तळागाळातील लोकांपर्यंत शिक्षणाचे महत्त्व पोहचवून लोक शिक्षित झाले हे बाबासाहेब आंबेडकरांच्या शैक्षणिक चळवळीमुळेच शक्य झाले.

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- 27) गढ़वाली लोकगीतकार नरेंद्र सिंह नेगी के गीतों में राष्ट्रीय चेतना  
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## संत कबीरदास के काव्य का मुल्यांकन

प्रो. डॉ. आबासाहेब राठोड

हिंदी विभाग प्रमुख,

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महात्मा कबीर एक ऐसे महामानव थे, जिन्होंने मध्ययुग के अंधकारमय वातावरण में धर्मसूर्य की तरह तेजोमयी रश्मियों द्वारा समाज सुधार के मार्ग का निर्देशन किया। संत कबीर का युग संघर्ष का युग था। समाज अनेक बुराइयों तथा सामाजिक, धार्मिक, रीति-रिवाजों उपासना, छूआछूत, अंधविश्वास, रुढ़िवादिता और पाखंड का बोलबाला था। हिंदू-मुस्लिम दोनों में धार्मिक पाखण्ड के कारण दोनों का समाज इन मिथ्याचारों से त्रस्त था। यह दो जातियाँ आपस में झगड़ते थी तथा इनमें धार्मिक संघर्ष हमेशा रहता था। धर्म के ठेकेदार अपने स्वार्थ के लिए धर्म के नाम पर सामान्य जनता को ठग रहे थे। धार्मिक संकीर्ण विचारों के कारण समाज की एकता का पतन हो गया था। कुरीतियों एवं कुप्रथाओं के कारण समाज में विषमता बढ़ रही थी। ऐसे ही संक्रांति युग में संत कबीर का प्रादुर्भाव हुआ। कबीर जी ने अपने युग के बाह्याडंबर, मिथ्याचारों, रुढ़ियों और धार्मिक पाखंड को समाज से दूर करने का प्रयास किया है। कबीर ऐसे समाज सुधारक थे, जिन्होंने समाज को सचेत करके उसके दोषों को प्रकट किया। समाज को मंगलकारी पथ पर ले जाने का प्रयास किया। कबीर ने सदाचरण का उपदेश देते हुए समाज में सामाजिक समता की स्थापना करने का कार्य किया है।

युग के महापुरुष होने के कारन उन्होंने अपनी वाणी के बल पर समाज में क्रांति फैलाने की जबरदस्त कोशिश की थी। संत कबीर के समय की सामाजिक स्थिति बहुत खराब थी। मुसलमानों में पर्दा प्रथा,

बालविवाह, बहुविवाह, गुलामी तथा अन्य सामाजिक कुरीतियों का प्रचलन बढ़ रहा था। हिन्दुओं में वर्णाश्रम व्यवस्था के नाम पर समाज में विषमता, अज्ञान, भेदभाव, अंधविश्वास आदि विघातक तत्वों ने घर कर लिया था। हिन्दू समाज रुढ़िवादी, मूर्तिपूजा में विश्वास करनेवाला तथा जादू-टोने पर भरोसा करने वाला बन गया था। शिक्षा का अभाव जीव हिंसा, मांसभक्षण, मद्यपान, वेश्यागमन आदि कई बुरे तत्वों ने समाज को घेर लिया था। निरंतर होनेवाले आक्रमणों तथा धार्मिक बाह्याडम्बरों के कारण तत्कालीन समाज का जिना बेहाल हो गया था। ऐसे में कबीर जैसे मस्त-मौला फक्कड क्रांतिकारी समाजसुधारक महात्मा ने अंधकार की खाई में जानेवाले समाज को अपनी वाणी के द्वारा प्रकाश देकर जनता को बचाने का महत्वपूर्ण कार्य किया है। आदर्श जीवन, व्यापक मानवतावाद तथा एकेश्वरवादी भक्ति की संजीवनी देकर समाज को नये सिरे से अपना जीवन शुरू करने की प्रेरणा प्रदान की। उन्होंने अपने जीवन में सामाजिक विकृतियों का पर्दाफाश किया था। उन्होंने अपने जीवन में समाज सुधार को प्रण किया ताकि समाज आपसी भेद भाव मिटाकर अपने जीवन को सार्थक बनाने में जुट जाए।

संत कबीर युग दृष्टा थे। वे वर्ण व्यवस्था के विरोधी थे। उनकी लोक कल्याण और आत्मकल्याण भावना प्रबल थी। कबीर ने गरीबों को अपनाया। कबीर असत्य को मिटाकर सत्य का प्रदर्शन कर रहे थे। कबीर को पाखंडवाद से घृणा थी। कबीर सत्य के शोधन एवं अन्वेषक थे। मानवतावादी साधक, भक्त, ज्ञानी एवं कवि थे। कबीर को मानवीय मूल्यों की अवहेलना उन्हें स्वीकृत नहीं थी। अतः वे दृढतापूर्वक उसका खण्डन करते हैं। उन्होंने अंधविश्वासों की अपेक्षा अनुभव, सिद्धान्त एवं बुद्धि को महत्व दिया है। उन्हें किसी राजनीतिक, सामाजिक या धार्मिक वाद से बाँधना बराबर नहीं है। वे ऐसे रचनाकार हैं सन्त हैं, कवि हैं, समाजसुधारक हैं जो अपने युग तथा समाज को विघटित करने वाले मूल्यों, विरोधाभासों, अंधविश्वासों, रुढ़िगत, मान्यताओं के विरुद्ध खड़े होकर ललकारते हैं। कबीर ने अपने समय की समाज की स्थिति मान्यताओं, विकृतियों, रुढ़ियों आडम्बरों का विद्रोही



स्वर से विरोध किया है। उन्होंने समाज को स्वतंत्रता, समता, बन्धुता का अमर संदेश दिया है। उनका निम्नलिखित दोहा इस बात को दर्शाता है:  
कबिरा खड़ा बाजार में सबकी माँगे खैर ।  
ना काहु से दोस्ती, ना काहु से बैर,

समाज में जो चेतनाशून्य एवं सोये हुए जो लोग है उन्हें जगाने का तथा उन्हें ब्रम्हज्ञान देने का काम कबीर ने किया है । चेतनाशून्य समाज को वे जगाने का प्रयास करते रहे। सुखिया सब संसार है, खाये अरु सोवे । दुखिया दास कबीर है, जो जागे अरु रोवै । उस समय की तत्कालिन समाज की समस्याओं के बारे में सोचते थे । वे अपनी वाणी के विभिन्न अंगों के अंतर्गत व्यक्तिगत जीवन, पारिवारिक, सामाजिक—सम्बन्धों, आर्थिक, राजनीतिक, परिस्थितियों से धर्म साधना और अध्यात्म क्षेत्र के मूल्य—बोध को अनेक स्तरों पर अनेक रूपों तथा अन्यान्य आयामों में अभिव्यक्त करते थे। उन्होंने सम्पूर्ण मानव जीवन को अपने अनुभव का क्षेत्र स्वीकार किया। जाति पाँति तथा सम्प्रदायों के आग्रह को छोड़कर मध्यम मार्ग अपनाने के लिए कबीर जनता को प्रेरित करते थे ।

उँचे कुल क्या जनमियों, जो करणी उँच न होई ।  
सोवन कलस सुरे भरया, साधु निघा सोई ॥

अपने आपको ज्ञानी और विद्वान समझनेवाले साधुओं और महाराजों की संख्या इस देश में अनगिनत है। संत कबीर के जमाने में भी ऐसे भ्रष्ट साधु संतों की संख्या अत्याधिक थी । आज तो अनेक साधु शराबी, अफिम, चरस, गांजा, भांग ब्राउन शुगर जैसे अनेक नशिले पदार्थों का सेवन करते हैं। अपने ही स्त्री भक्तों को अपने जाल में फंसाकर उनका शारीरिक शोषण करते हैं। इसी कारण अनेक साधु—संत जेल की हवा खाकर आये और कुछ जेल में हैं । आज देश में प्रामाणिक संत इनेगीने ही हैं। कबीरजी ने इन ढोंगी साधु—संतों तथा महाराज के विरोध में विद्रोह किया है। वे शोषित जनता के शोषण के विरोध में विद्रोह करने का संदेश देते हैं। वे यह जानते थे कि जब तक शोषित जनता संघटित होकर शोषण के विरोध में संघर्ष नहीं करेगी, इनपर होनेवाला अन्याय रूकेगा नहीं । उनको यह आशा थी कि एक न एक दिन शोषित

जनता जाग जायेगी और संघटित होकर संघर्ष करेगी। वे लिखते हैं।

माटी कहे कुम्हार से, तू क्या रैंदे मोहि ।  
एक दिन ऐसा आएगा, मैं रैंदूगी तोय ॥

संत कबीर जी आम जनता को पीड़ित देखकर दुःखी रहते थे। वे संवेदनशील होने के कारण वे अस्वस्थ हो जाते थे। आम जनता को पीड़ा से मुक्त करने के लिए रात—दिन प्रयास करते थे। किन्तु जो शोषण करते थे और जिनका शोषण हो रहा था वे दोनों भी सोये हुए थे। कबीरजी कहते हैं,  
यह संसार कागज की पुडियाँ, बूँद पर जल जाना है ।  
यह संसार झाड और झाखंड, आगि लगे जरि जाना है।  
कहत कबीर सुनो भाई साधों, सतगुरु नाम ठीकाना है।

लोग अपने मनुष्य जीवन को व्यर्थ ही गवा देते हैं । इस अनमोल जीवन में कोई विधायक कार्य नहीं करते। केवल अपने लिए ही जीते हैं । उनके जीवन का अधिक से अधिक समय तो सोने में निकल जाता है और शेष समय निरर्थक कामों में । ऐसे लोगों को मरने के बाद घर के लोग भी याद नहीं करते। कबीर कहते हैं, इस जीवन में ऐसा काम करना चाहिए जिसे सदियों तक लोग याद करे। कबीरजी ने अपना समग्र जीवन जनता के कल्याण में ही बिताया। जनता का अज्ञान दूर करने में बिताया । जनता को अपने हक दिलाने के लिए संघर्ष किया, इसीलिए उनके मरने के हजारों सालों बाद भी उनको याद किया जाता है और जब तक धरती पर सूरज—चाँद रहेगा कबीर जी को याद किया जाता रहेगा । कबीर कहते हैं,  
रात गवायें सोय के, दिवस गवायें खाय ।  
हीरा जन्म अमोल था, कौडी बदलो जाय ॥

मनुष्य का यह स्वभाव रहा है कि वह हमेशा दूसरों की गलतियाँ निकालता रहता है। दूसरों पर फब्तियाँ कसता रहता है। दूसरों को बुरा कहता रहता है । पर वह अपने अंतर मन में झाँककर कभी नहीं देखता कि वह कैसा है । मनुष्य ने अपने अंतरमन में झाँककर देखना चाहिए। अपने आप को पहचानना चाहिए। दूसरों को बुरा कहने के पहले अगर हम अपने अंतरमन में झाँके तो पता चलता है कि हम कैसे बुरे हैं । जब मनुष्य को अपनी गलती का, अपनी बुराइयों



का अहसास होता है तब वह उसे दूर करने का प्रयास करता है। कबीर ने ऊँच-नीच का भेदभाव मिटाने के लिए सब को समान स्तर पर समझने का प्रचार किया। कबीर के लोक पक्ष के दो रूप हैं। व्यक्ति पक्ष और समाज पक्ष इन दोनों पक्षों की दृष्टि से कबीर ने व्यक्ति के अहंकार को दूर करने का उपदेश दिया। अहंकार इस बात का मूल है कि मैं बड़ा हूँ। जब व्यक्ति अपने को बड़ा समझता है तो वह निश्चित ही दूसरे को छोटा समझेगा और सामाजिक संघर्ष बढ़ेगा। उस समय धर्म के नाम पर यह संघर्ष अत्यंत तीव्र गति से समाज में फैला हुआ था। अतः कबीर ने धर्म के संकुचित और साम्प्रदायिक रूप का विरोध करके एक लोक धर्म की स्थापना पर बल दिया उन्होंने लघुता को प्रभुता से महान बताया।

प्रभुता से लघुता मनि, प्रभुता से प्रभु दूर।  
चीटी ले शक्कर चली, हाथी के सिर धूर ॥

व्यक्ति पक्ष से आगे आकर कबीर समाज के पक्ष में सभी गतिरोधों को दूर करने की बात कहते हैं। सबसे बड़ा गतिरोध जाति-पाँति का था। कबीर ने जाति-पाँति का विरोध किया। उन्होंने इस बात पर बल दिया कि जाति का निर्माण ईश्वर ने नहीं मनुष्य ने किया है। वे कुरीतियों की जड़ तक जाते व उन्हें समाप्त करने का उपाय खोजते थे। इतना ही नहीं तो वे दलित-उपेक्षित वर्ग के संघर्षों का पक्ष निर्भयता पूर्वक लेते थे। कबीर मात्र समन्वयवाद के समर्थक नहीं थे तो इस समन्वय में उनकी क्रांतीचेतना भी जगी हुई थी। इसी कारण वे लोकनायक थे। चूँकि कबीर समाज का आमूल परिवर्तन करना चाहते थे। इसलिए समाज के अप्रगतिशील, मशत व रूढ़ तत्वों का साथ कभी नहीं देते थे, उनसे समझौता करना तो दूर की बात है। संत कबीर कहते हैं:

साई इतना दीजिए, जामै कुटूम समाय।  
मैं भी भूखा न रहूँ, साधू न भूखा जाय।

कबीर ने मानव हित को महत्व दिया था। इस युग के गांधीजी ने भी मानवता को महत्व दिया। इतना ही नहीं तो विश्व के सभी विद्वानों ने मानव धर्म को महत्व दिया है। कबीर के विचार समाज के लिए अत्यंत उपयुक्त हैं। वह अत्यंत प्रासंगिक हैं। ऐसे

साहित्य को हम जितनी बार पढ़ें वह नया ही लगता है। हम अखबार रोज पढ़ते हैं लेकिन समय बीतने के बाद अखबार की खबरे व्यर्थ हो जाते हैं वह अप्रासंगिक हो जाता है। लेकिन साहित्य रचनाएँ कभी अप्रासंगिक नहीं होती। हम उन्हें जितनी बार पढ़ते हैं, उतना ही श्रेष्ठ लगता है। उसमें से नवीन अर्थबोध होता है। उतनाही रुचिकर होता है। इसलिए साहित्य सदैव शाश्वत होता है। वह सार्वकालिक, सार्वभौमिक है। इसलिए किसी देश के कवि या साहित्यकार केवल उस देश के लोगों को ही प्रिय नहीं होते बल्कि वे विश्व के प्रत्येक सहृदय जनता को प्रभावित करते हैं। साहित्यकार देश काल की सीमा से बंधा नहीं होता इसलिए वह प्रत्येक व्यक्ति को अपनी रचना के माध्यम से चेतनारत करता है। कबीर ऐसे ही सार्वकालिक कवि हैं। जिनकी रचनाएँ कभी काल के प्रवाह में बह नहीं जायेगी। वह हमेशा के लिए मानव जीवन की दिशा दर्शक रहेगी। कबीर की रचनायें मानव जीवन के लिए दिशा दर्शक होंगी।

आज हमारे समाज में जो विश्रृंखलता दिखायी देती है, तथा हम लोग जिस धार्मिक विद्वेष के माहौल में जीवन जी रहे हैं, उसमें कबीर दास की शिक्षाएँ अधिक प्रभावी भूमिका का निर्वाह कर सकती हैं। नैतिक मूल्यों का न्हास तथा पतन जिस तीव्रता से हो रहा है तथा मानवीय मूल्यों का जो विघटन समाज में दिखाई देने लगा है उसके विषाक्त प्रभाव को कम करने के लिए, कबीर की अमृतवाणी की आवश्यकता बराबर अनुभव की जा रही है।

दुःख में सुमिरन सब करे, सुख में करे न कोय  
सुख में सुमिरन जो करें, काहे को दुःख होय।

कुलमिलाकर संक्षेप में हम यह कह सकते हैं कि संत कबीरदास के काव्य में यही स्थिति आज भी दृष्टिगत हो रही है, आज व्यक्ति भौतिकतावादी दौड़ में अपने हृदयगत भावनाओं से हीन होता जा रहा है। आज के आधुनिक भौतिकतावादी परिवेश में सुख सुविधाओं की अन्धी दौड़ में मनुष्य के लिए कबीर का यह सन्देश है कि क्षणिक जीवन के लिए मनुष्य भोग विलास के प्रति इतना लालायित क्यों रहता है। मानव की समस्त दुःख पीड़ा का कारण उसकी अदम्य



इच्छाएँ है। अगर वह अपनी समस्त इच्छाओं को संतुलित कर ले तो वह कभी भी दुःखी नहीं रहेगा—चाह मिटी चिन्ता गयी मनवा बेपरवाह जिसको कुछ नहीं चाहिए वह शाहन के शाह।

कबीर एक ओर तो सामाजिक समस्याओं, प्रश्नों और उलझनों से टकराते हैं और दूसरी ओर लौकिक तथा भौतिक धरातलों से ऊपर उठकर आत्मा, परमात्मा, ज्ञान और मुक्ति की बातें करते और कहते हैं। कबीर के काव्य में जिस सत्य का प्रकाशन है वह प्रत्येक युग के लिए अनुकूल रहेगा। कबीर का ज्ञान और अनुभव अत्यन्त व्यापक था जिसके कारण वे समस्त स्थितियों और लोगों की मानसिकता को समझ सकें। जातीय आधार पर हरिजन ब्राह्मण, हिन्दू—मुस्लिम, हिन्दू—सिक्ख आदि के बीच साम्प्रदायिक विवाद आज इतना भीषण रूप लेते जा रहे हैं कि इससे देश की जनतांत्रिक व्यवस्था खतरे में पड़ गयी है। इसकारण संत कबीरदास की भावना को बढ़ावा देने का कार्य करते हैं। मनुष्य—मनुष्य में समानता और कथनी करनी में समानता स्थापित करना ही कबीर का उद्देश्य था। कबीर भारतीय समाज के ऐसे प्रकाश स्तंभ हैं जो सदियों तक मानवता का पथ प्रदर्शक बना रहेगा उनके काव्य में धार्मिक मूल्य, सत्य, अहिंसा, शील, क्षमा, दया, उदारता, प्रेम आदि की प्रचूर मात्रा में है। जो किसी भी देशकाल वातावरण में उपयोगी है। इसी लिये कबीर के द्वारा स्थापित किए गए आदर्शों के बुनियाद पर भारत के भव्य भवन के निर्माण का कार्य किया जा सकता है।

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## वर्तमान परिदृश्य में छात्र राजनीति, चुनौतियां एवं संभावनाएं

अंकित साहू  
शोध छात्र

डॉ. किशन यादव  
शोध निर्देशक, प्रोफेसर एवं विभागाध्यक्ष,  
राजनीति विज्ञान विभाग,  
BKD, झांसी (उत्तर प्रदेश)

\*\*\*\*\*

### सारांश

भारत एक अत्यंत विशाल देश है जहां पर युवा आबादी सर्वाधिक है। यह युवा आबादी संपूर्ण भारतीय राजनीति में एक महत्वपूर्ण भूमिका निभाती है। इस युवा आबादी का और उनकी कर्तव्यनिष्ठा का कई राजनीतिक दल मुख्य रूप से आगामी भविष्य के लिए लाभ लेते हैं और उन्हें अपनी विभिन्न विचारधाराओं एवं नीतियों के साथ जोड़ते हैं। भविष्य की परिपाटी को प्रस्तुत करती हुई यह युवा राजनीति मुख्य रूप से उस क्षेत्र से प्रारंभ होती है जहां पर चारों दिशाओं से आये हुए छात्र—छात्राओं रूपी छोटी नदियां विशालकाय समुद्र रूपी विश्वविद्यालयों एवं महाविद्यालयों में आकर मिलती है, जहां पर अलग—अलग वर्गों का अलग—अलग संघर्ष होता है। भविष्य रूपी विराट शिखर पर पहुंचकर अपने नाम का सर्वस्व परचम फहराने के लिए एवं भविष्य की युवा पीढ़ी के समक्ष प्रस्तुत करने के लिए छात्र राजनीति दिन प्रतिदिन बढ़ती जा रही है। भारत के संपूर्ण स्वतंत्रता संग्राम में विभिन्न छात्र राजनेताओं एवं छात्र जीवन के महत्वपूर्ण विचारों का सराहनीय योगदान है। सरदार भगत सिंह, पंडित जवाहरलाल नेहरू, मोतीलाल नेहरू, चंद्रशेखर आजाद जैसे युवा क्रांतिकारियों ने अपने जीवन से ज्यादा सम्मान इस भारत राष्ट्र की धरा एवं माटी पर मिटने वाले अपने जैसे युवाओं को दिया था। अब चाहे वह १९७५ का जयप्रकाश नारायण का देशव्यापी



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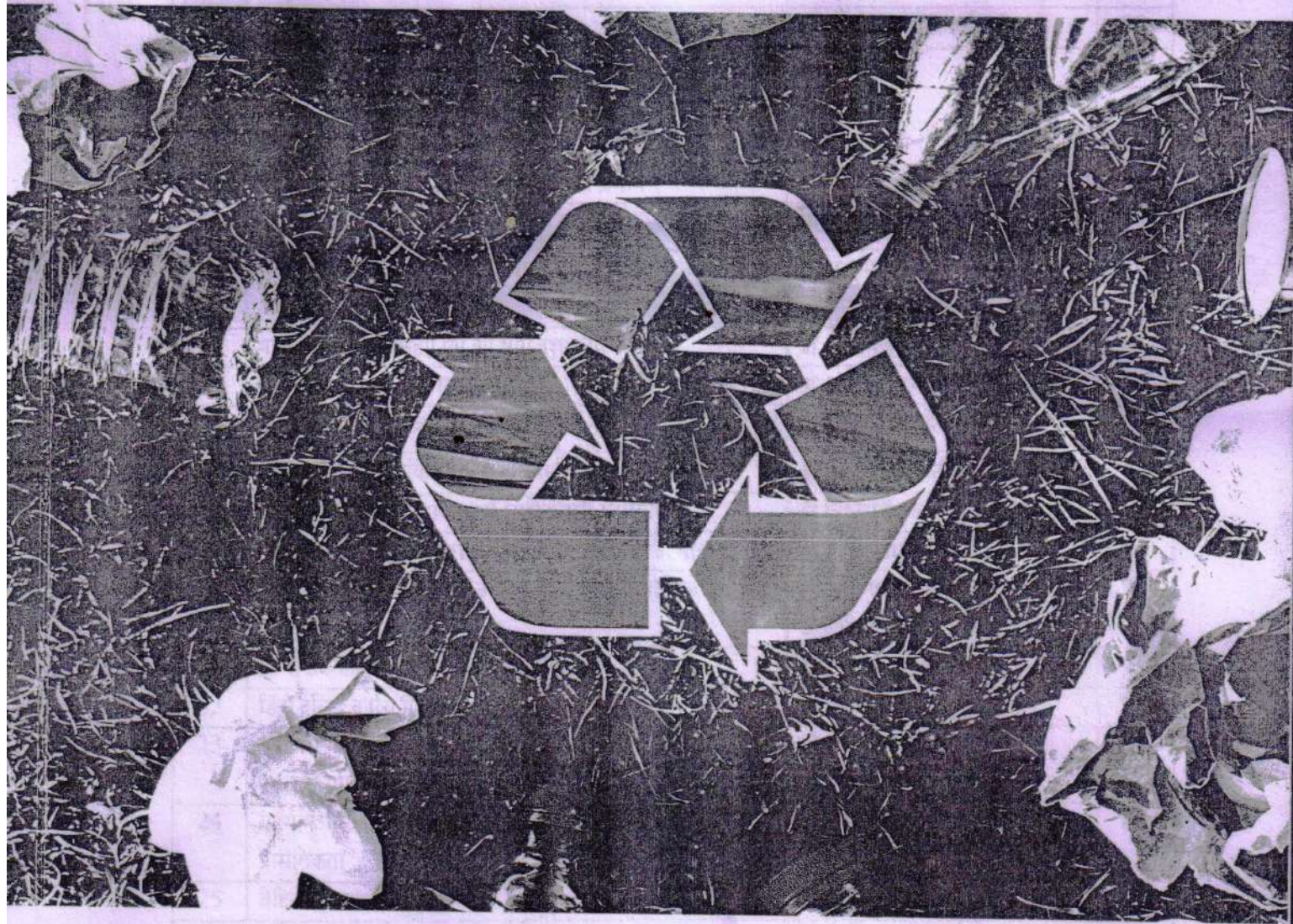
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## प्रेमचंद के उपन्यासों के पात्र पर गांधीवाद का प्रभाव

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20 वीं शताब्दी के आरंभिक पाँच दशकों तक गांधीजी भारत के एकमात्र ऐसे महानायक थे जिन्होंने अपने विचार दर्शन तथा कार्यक्रमों से एक ऐसी हलचल उत्पन्न की जिसके कारण टैगोर, टॉलस्टॉय, बरनार्ड शॉ, अल्बर्ट आइंस्टाइन जैसी महान प्रतिभाओं ने भी उनकी विशिष्टता को स्वीकार किया। प्रेमचंद को गांधी जी से मिलने का अवसर वर्धा में मिला जब हंस पत्रिका को गांधी जी ने अपनी देखरेख में लिया। उनकी पत्नी शिवरानी देवी ने अपनी पुस्तक 'प्रेमचंद घरमें' विस्तार से इसका जिक्र किया है। प्रेमचंद ने अपने अनुभव के बारे में पत्नी से कहा 'जितना मैं महात्मा जी को समझता था उससे कहीं ज्यादा वे मुझे मिले। महात्मा जी से मिलने के बाद कोई ऐसा नहीं होगा जो बगैर उनका हुए लौट आए, या तो वे सबके हैं या वे अपनी और सब को खींच लेते हैं। मैं महात्मा गांधी को दुनिया में सबसे बड़ा मानता हूँ। उनका उद्देश्य है कि मजदूर और काश्तकार सुखी हो, वे लोगों को आगे बढ़ाने के लिए आंदोलन चला रहे हैं। मैं लिख कर उनको उत्साह दे रहा हूँ।'

जब गांधी और प्रेमचंद में एकत्व होता है। तो रंगभूमि, कर्मभूमि, गोदान आदि उपन्यासों में पाठक के मन में दासता से मुक्ति और स्वराज्य की प्राप्ति का महा भाव उत्पन्न करती है। गांधी और प्रेमचंद दोनों की चिंता गांव की मूल संस्कृति को बचाने की है, बस अंतर यह है कि गांधी ग्रामोत्थान एवं रामराज्य की कल्पना करते रहे हैं और प्रेमचंद हमें गांव की जिंदगी के यथार्थ का साक्षात्कार कराते हैं। जब गांधी और प्रेमचंद का साथ साथ चलना हिंदी साहित्य में एक महान उपलब्धि का समय है। यह उपलब्धि मार्क्स और गांधी के संगम से संभव नहीं थी, क्योंकि कोई भी विदेशी विचार कुछ को प्रभावित कर सकता है संपूर्ण जनता को नहीं। इस कारण भी प्रेमचंद गांधी के हमराही बनते हैं, क्योंकि वह मार्क्सराज नहीं रामराज चाहते हैं और राम भारतीय धर्म, संस्कृति, नीति, न्याय और सुशासन के प्रतीक हैं। गांधी के बाद हिंदी साहित्य ही नहीं, भारतीय साहित्य में ऐसा राष्ट्रीय मानवीय संघर्ष एवं उत्कर्ष दिखाई नहीं देता तो इसका शायद यही कारण है कि है कि उसके बाद कोई गांधी पैदा नहीं हुआ और इस कारण कोई प्रेमचंद भी नहीं बन पाया। प्रेमचंद के उपन्यास के कथानक तथा उनके पात्र गांधीदर्शन की बाह्य हलचलों को लेकर चलते हैं - जिसे युगीन परिवेश की अभिव्यक्ति के रूप में देखा जा सकता है। अतः यहाँ हम उन पात्रों की बात करेंगे जो गांधी विचारधारा से प्रभावित हैं।

1) **अमरकान्त** : प्रेमचंद के उपन्यास 'कर्मभूमि' (1932) का पात्र जो एक अच्छा विद्यार्थी होने के बावजूद भी उच्च शिक्षा प्राप्त नहीं कर पाता है। वह अपने परिवार से असंतुष्ट है। युगीन परिस्थितियों को देखते हुए उसका व्यक्तित्व राष्ट्रीय भावों से परिपूर्ण है, किन्तु वह क्रांतीकारी न होकर गांधी की तरह सुधारवादी है। साथ ही वह आदर्शवादी एवं सहिष्णु है। क्रियाशील, परिश्रमी और उदार होने के साथ वह सेवा-भाव से पूर्ण और वैधानिक रीति से स्वराज्य प्राप्त करने का पक्षपाती है। व्यक्तिगत जीवन में वह मानवतावादी है। वह खादी बेचने का व्यापार करता है। गांधीजी के स्वच्छता अभियान से भी वह प्रभावित है। हरिद्वार के पास रहने वाले मुर्दाखोर और अछूत कहे जानेवाले और किसान लोगों में जाकर वह शिक्षा तथा सफाई का प्रचार-प्रसार करता है। कृषकों की समस्या सुलझाने के लिए भी वह पहल करता है किन्तु असफल होता है। अतः लगान बंदी आंदोलन छेड़ देता है जिसमें उसका मित्र सलीम (आई.सी.एस. अधिकारी) उसे पकड़ लेता है। अन्त में सेठ धनीराम की मध्यस्थता से एक सरकारी कमिटी नियुक्त होती है, जिसमें अमरकान्त भी एक सदस्य है। इस प्रकार गांधीजी के 1930 के किसान आंदोलन का प्रभाव अमरकान्त के चरित्र में पाया जाता है।

2) **दारोगा कृष्णचंद्र** : प्रेमचंद के उपन्यास 'सेवा सदन' का पात्र है। दारोगा के रूप में कृष्णचंद्र ने गांधीजी की तरह सदैव दूसरों के साथ भलाई की और निस्पृह भाव से अपने कर्तव्य का पालन किया। वह रसिक उदार और सज्जन मनुष्य है। उसने कभी रिश्तत नहीं ली, वह निर्लोभ है किन्तु बच्चों और स्त्री के आराम के लिए कभी किरायापट्टाशरी न की। दहेज प्रथा के कारण वह परेशान है। अतः युगीन समस्या से ग्रस्त हो रिश्तत ले लेता है और पश्चातापदग्ध होकर अपना दिमागी संतुलन खोकर गंगा की लहरों में समा अपना जीवन समाप्त कर लेता है। इस प्रकार दारोगा के चरित्र में सज्जनता निर्लोभपन तथा दहेजप्रथा को लेकर जो बातें दिखाई देती हैं वह गांधीवाद से ही संपृक्त हैं।

3) **खन्ना** : प्रेमचंद के 'गोदान' (1936) उपन्यास का पात्र है। जो मिल मालिक खन्ना के नाम से जाना जाता है। वह पूंजीपतियों का प्रतिनिधित्व करनेवाला पात्र है। प्रेमचंद ने गांधीवाद से प्रभावित होकर खन्ना के चरित्र को दो रूप में चित्रित किया है। एक और वह



स्वार्थ, विलास और प्रभुता का भक्त था तो दूसरी और त्याग, जन सेवा और उपकार का। मिल में आग लग जाने के बाद उसके चरित्र में परिवर्तन आता है। दौलत से मिलने वाला सम्मान अब उसे खोखला लगने लगता है। खन्ना का अर्थ पर आधारित आत्मसेवा, भोग और विलास में लिप्त, अर्थपरायण जीवन अब गांधीवादी उंचे और पवित्र मार्ग का अवलम्ब करता है। अब वह आत्मिक, बौद्धिक और शारीरिक शक्तियों के सामंजस्य को वास्तविक धन समझने लगता है।

4) गोबर : प्रेमचंद के उपन्यास 'गोदान' (1936) का पात्र गोबर नयी पीढ़ी के किसान युवक का प्रतीक है। उसमें तेजी, स्पष्टवादिता तथा महाजनों के हथखण्डे समझने की शक्ति है किन्तु इसे निपटाने की कोई सुस्पष्ट योजना नहीं है। यह केवल विद्रोह और असंतोष प्रकट करना जानता है। महात्मा गांधी का मंत्र 'ग्रामो की तरफ चलो' का नारा उसपर लागू होता है। शहर में जाकर वह चाय का ठेला चलाता है किन्तु वहाँ उसे रास नहीं आता। अतः फिर लौट आता है। गाँव आकर उसमें बुद्धि का विकसित रूप पाया जाता है। वह कहता है कि 'अपना भाग्य खुद बनाना होगा कोई देखता और गुप्त शक्ति उनको मदद करने न आवेगी। उदण्डता और गरूर के स्थान पर उसमें संवेदना सजग हो उठती है, वह अपना कर्तव्य समझने लगता है और नम्र तथा उद्योगशील हो जाता है। उसे पिता के प्रति किए अपने पहले दुर्व्यवहार पर पछतावा भी होता है।

5) चक्रधर : प्रेमचंद कृत उपन्यास 'कायाकल्प' का पात्र जो सुशील गम्भीर और सिध्दांतप्रिय है। चक्रधर आत्मा को धन से उपर समझनेवाला व्यक्ति है। वह निर्भिक और साहसी है, जिसका परिचय आगरे के हिंदू-मुस्लिम दंगे तथा ठाकुर विशालसिंह के तिलकोत्सव में मजदूरों के विद्रोह करने पर देता है। उसमें आत्मीयता और वात्सल्य की भी कमी नहीं है। वह पीड़ित जनों के प्रति सहानुभूति रखता है और उसी कारण जेल यातना सहन करता है। वास्तव में चक्रधर राष्ट्र प्रेमी और जन प्रेमी तो है किन्तु उसकी मानसिक अवस्था से उसका जीवन असन्तुलित हो जाता है। इस प्रकार चक्रधर में गांधीवादी विचारधारा के अंश छुट-पुट रूप में अवश्य मिलते हैं।

6) देवीदीन : प्रेमचंद के 'गबन' उपन्यास का पात्र। यह पूर्ण रूप से गांधीवादी विचारधारा से प्रभावित पात्र है। वह अल्पशिक्षित और श्रमजीवि है किन्तु उसने एक उन्नत विशाल और उदार हृदय पाया है। वह मनुष्य को मनुष्य के रूप में देखता है और अपने आचरण तथा त्याग से मनुष्यत्व का आदर्श स्थापित करता है। वह दूसरों की सहायता के लिए सदैव तत्पर है। देवीदीन में अकर्मण्यता और उत्साह का मिश्रण है। उसमें उत्कट राष्ट्रीय भावना है। परिणामस्वरूप अपने दोनों पुत्रों को वह राष्ट्रीय सेवा में लगा देता है और उनकी मृत्यु होने पर भी वह निराश नहीं होता और ना ही राष्ट्रप्रेम का ढिडोरा पिटता फिरता है।

7) प्रेमशंकर : पूर्णतः गांधीवादी विचारों से प्रेरित 'प्रेमाश्रम' उपन्यास का आदर्शपात्र है। प्रेमचंद ने प्रेमाशंकर द्वारा मानो गांधीजी के चरित्र को प्रतिछाया के रूप में प्रस्तुत की है। वह अमेरिका (अर्थात् द. अफ्रिका) से अपने विचारों में परिवर्तन लेकर लौटा है किन्तु क्रांतीकारी न होकर समाज सुधारवादी है और अहिंसा तथा हृदय परिवर्तन में विश्वास करता है। वह विचार स्वातंत्र्य में विश्वास रखनेवाला, पीड़ित जनता के प्रति सहानुभूति तथा शान्त प्रकृतिवाला विचारशील व्यक्ति है। साहस और निर्भयता उसके जीवन के अंग है। इन्द्रिय-सुख का परित्याग, सेवा, संयम और साधना उसके जीवन का लक्ष्य है। वह हर एक व्यक्ति का उज्ज्वल पक्ष देखता है और अपने सम्पर्क से बुरे से बुरे व्यक्ति में भी अनन्त ज्योति का प्रकाश भर देता है। इसीलिये सब लोग उसे आदमी नहीं फरिश्ता (गांधी) मानते हैं।

8) मेहता : प्रेमचंद के उपन्यास 'गोदान' का पात्र जो युनिवर्सिटी में दर्शन शास्त्र का अध्यापक है। स्त्री को वह वफा और त्याग की मूर्ति समझता है। उसकी दृष्टि में जीवन आनन्दमय क्रिडा है, सरल, स्वच्छंद है, जहां कुत्सा, ईर्ष्या और जलन के लिए कोई स्थान नहीं। वह भूत और भविष्य की चिन्ता नहीं करता, उसके लिए वर्तमान ही सब कुछ है। वह अपनी सारी शक्ति मानव धर्म को पूरा करने में लगाना चाहता है। ईश्वर और मोक्ष के चक्कर पर उसे हंसी आती है। मानवता को पीस डालनेवाला ज्ञान, उसकी दृष्टि में ज्ञान नहीं है।

9) सूरदास : प्रेमचंद कृत 'रंगभूमि' उपन्यास का गांधीवादी विचारधारा से प्रेरित प्रमुख आदर्श पात्र है। सूरदास इन्सान नहीं फरिश्ता है। निर्भिक, धुन का पक्का, सत्यनिष्ठ न्यायप्रिय, निःस्पृह, शांत, सेवात्याग-परोपकारी, सूरदास की बाह्य दृष्टि बन्द थी, किन्तु अन्तर्दृष्टि खुली थी। वह दीन दुखियों की सहायता करनेवाला, शत्रु-मित्र सभी को एक दृष्टि से देखनेवाला और गीता के कर्म में विश्वास रखनेवाला व्यक्ति है। इसी लिए उसके शत्रु-मित्र भी उसकी साधुता और दार्शनिकता के कायल हैं। समझदार के लिए उसका एक एक शब्द विद्वानों के ग्रंथों से भारी है। उसमें वैमनस्य और प्रतिशोध की भावना नहीं है। वह खेल खेलने आया था और इस रंगमंच पर खेल खेलकर चला गया। उसकी झोपड़ी (गांधी आश्रम) का पत्र पुष्पों का स्थान बन गयी। उसकी मृत्यु पर क्लार्क (अंग्रेज तथा विरोधी) तक को अफसोस हुआ। इस प्रकार सूरदास के माध्यम से प्रेमचंद ने गांधीवादी विचारों को ही प्रेषित किया है।

10) होरी : प्रेमचंद के उपन्यास 'गोदान' का प्रमुख पात्र। प्रेमचंद जिस वक्त यह उपन्यास लिख रहे थे उस वक्त भारतीय किसान बड़ी ही दयनीय अवस्था में जीवन जी रहा था, उसे जमींदार, पुँजीपती तथा अंग्रेजी शासन द्वारा अनेक अत्याचार सहने पड़ रहे थे।



ग्रामजीवन यातनामय हो गया था। ऐसे वक्त गांधीजी ने किसानों के हित में आंदोलन छेड़ा, इसी आंदोलन और कृषक जीवन की दयनीय अवस्था का चित्रण जो गांधीयुगीन परिवेश से जुड़ा हुआ है। इसी का चित्रण होरी पात्र के माध्यम से करने की कोशिश हुई है। होरी बेलारी ग्राम का एक छोटा सा किसान है, यह दरिद्र है इसी लिए भारतीय किसानों का प्रतिनिधित्व करनेवाला पात्र है। गांधीयुगीन ग्राम्यजीवन को आर्थिक व्यवस्था के कारण वह बिसेसरसाहु, दुलारी सहुआइन, मगरू, नोखेराम, दातादीन आदि सबका कर्जदार हो जाता है। दरिद्र होते हुए भी उसमें आत्मसम्मान या सम्मान लालसा विद्यमान है। इसी लालसा के वशीभूत होकर वह गाय रखकर अपने जीवन की साथ पूरी करना चाहता है। होरी उदार और विशालहृदयी है। उसमें मानवमात्र के प्रति सहानुभूति है। वह कुलमर्यादा को प्राणों से भी अधिक मूल्यवान समझता है और सोभा तथा हीरा के प्रति पितृवत स्नेह रखता है। होरी का चरित्र सरल है। वह बेकार झगडा मोल लेने से कतराता है, जहाँ तक हो सके स्वयं दब जाना अधिक पसंद करता है। वह समाज और घर में मर्यादा पालन की ओर विशेष ध्यान रखता है। उसकी प्रकृति मनोविनोद की प्रवृत्ति भी है। होरी आदर्शवादी, धर्म, नीति, और स्वार्थ के बीच डूबने उतरनेवाला पात्र है। भारतीय किसान की सारी विशेषताएँ उसमें साकार हो उठी हैं। वह एक साधारण व्यक्ति है और अपना नेतृत्व स्वयं करता है। उसकी हार में भी विजय का उल्लास है। जीवन मार्ग पर वह स्वयं अप्रतिहत गति से चलता रहता है।

इस प्रकार प्रेमचंद उपन्यासों में पात्रों के चरित्र चित्रण को विशेष महत्व मिला है। वे लिखते हैं "मैं उपन्यास को मानव चरित्र का चित्र मात्र समझता हूँ। मानव चरित्र पर प्रकाश डालना और उसके रहस्यों को खोलना ही उपन्यास का मूल तत्व है।" (कुछ विचार प्रेमचंद पृष्ठ 47) प्रेमचंदजी ने गांधीजी के आहवाहन को समझा था। अतः उनके पात्रों में गांधीजी के विचार कूट कूटकर भरे नजर आते हैं। प्रेमचंदने जिन किसानों मजदूरी के दुःख दर्द के आँसू पाँछ है, वह गांधीजी के भारतीय किसान मजदूरों की स्थिति से उबारने का जो आवाहन किया था उसका ही परिणाम है। प्रेमचंदजी गांधीजी के विचारों से प्रभावित थे, इसलिए मानवता के पोषक और पूजारी थे। उनकी हार्दिक इच्छा थी कि हिंदू-मुसलमान सदा एक होकर साथ रहे। अंतः गांधीजी की हिंदू-मुसलमान एकता की नीति, स्वदेशी आंदोलन, श्रमिक आंदोलन, रामराज्य एवं खदर की स्थापना, जनतंत्रात्मक शासन स्थापित करने का प्रयास प्रेमचंदजी के अनेक पात्र करते नजर आते हैं। प्रेमचंदजी के पात्र ग्रामीण और शहरी दोनों वर्ग के हैं, वे शिक्षित और अशिक्षित भी हैं। इन पात्रों द्वारा प्रेमचंदजी ने गांधीजी के प्रभाव से समाज सुधार की भावना, नारियों की करुण स्थिति को सुधारने की प्रवृत्ति, तो कहीं राष्ट्रीय विचारधारा के रूप में अंग्रेजी सत्ता के विरोध की भावना को अभिव्यक्ति दी है। इसके अतिरिक्त एकता, दाम्पत्य प्रेम राष्ट्रभावना, नारियों का उद्धार, उच्चार समाज के कृषको, दलितों पीड़ितों और मजदूरों के दुःख दर्द को यथार्थ रूप में प्रस्तुत किया है।

प्रेमचंद साहित्य में अपनी सारी तत्कालीन आशाओं तथा निराशाओं और आकांक्षाओं सहित 1900 ई. और 1936 ई. के बीच का भारतीय जीवन और स्वातंत्र्य संग्राम में रत एक पतित एवं पराधीन देश का भावुकतापूर्ण आदर्श व्यक्त हुआ है। कला की दृष्टि से उसमें नवीनता है। विविध समस्याओं के बीच वे मानव की मानवता खोजते हैं, जो सेवा भाव, आत्मगौरव, प्रेम और अहिंसा पर आधारित है। इस मनोचित मार्ग से विचलित अपने प्रिय से प्रिय पात्र की भी वे तंबीह किये बिना नहीं रहते। अपने सभी पात्रों की दुर्बलताओं और सबलताओं के बीच उन्होंने उनमें छिपा हुआ मानव उभारकर रख दिया है। पतित से पतित और स्वार्थ साधना में लिप्त पात्र भी अन्त में कोई ठोकर खाकर अपना मानव रूप प्रकट करने लगता है, जो गांधीवाद का प्रभाव ही माना जाएगा।

**संदर्भ संकेत :**

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- 5) हरिजन बंधु 26 मार्च 1936
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प्रा. बालासाहेब विष्णू कटारे

मराठी विभाग, सौ. के. एस. के. महाविद्यालय, बीड

## प्रस्तावना :

ज्या, कादंबरी, कविता, लोकनाट्य, वगनाट्य, पोवाडा, लावणी अशा अनेक वाङ्मयप्रकारात अण्णा भाऊ साठे यांनी केलेली कामगिरी वादातिता आहे. निव्वळ अक्षरओळख होण्यापुरते शिक्षण घेतलेल्या अण्णाभाऊंच्या एकूण वाङ्मयीन कामगिरीवर नुसती नजर जरी टाकली तरी त्यांच्या जन्मजात प्रतिभेचा प्रत्यय आल्याशिवाय राहात नाही. अभिजात वाङ्मयीन गुणवैशिष्ट्यांनी ठासून भरलेल्या वाङ्मयातून अण्णा भाऊंनी अजरामर अशा पात्रांची उभारणी केलेली दिसते. 'फकिरा', 'भीमा', 'चित्रा', 'नागोजी', 'वैजयंता' अशा कितीतरी व्यक्तिरेखा याची साक्ष देतात. लेखक, कलावंत, वर्गीय विषमता आणि जातीय विषमतेविरुद्ध लढा देणारा बंडखोर कार्यकर्ता, एक सच्चा कम्युनिस्ट आणि कृतिशील विचारवंत असे अण्णा भाऊंच्या व्यक्तिमत्त्वाचे कितीतरी पैलू दिसून येतात. साम्यवादी विचार सरणीने अण्णाभाऊंचे व्यक्तिमत्त्व प्रभावित झाले होते, हेही त्यांच्या कर्तृत्वावरून अनेकदा स्पष्ट होते.

अठराविश्वे दारिद्र्य असलेल्या कुटुंबात जन्म घेऊन एवढे अफाट कर्तृत्व अण्णा भाऊंनी सिद्ध केले. इतकेच नव्हे तर कुठल्याशा निमित्ताने चालत आलेल्या परदेशवारीचे सोने करून रशियासारख्या बलाढ्य देशाचा दौराही केला. या रशियाच्या प्रवासदौऱ्याचे अनुभव शब्दबद्ध करून 'माझा रशियाचा प्रवास' नावाचे सुंदर प्रवासवर्णनपर पुस्तक लिहिले. अण्णा भाऊंच्या इतर कलाकृतींइतकेच सुंदर नि वाङ्मयीन जुगवैशिष्ट्यांनी नटलेले हे पुस्तक आहे. वरकरणी पृष्ठसंख्येच्या संदर्भात दीर्घकथा वाटावी असे जरी हे लेखन दिसत असले, तरी वैविध्यपूर्ण अंगभूत वैशिष्ट्यांमुळे ते वेगळे आणि महत्त्वपूर्ण ठरताना दिसते.

## निव्वळ पर्यटनाचा हेतू बाजूला ठेवून केलेला प्रवास :

जोणत्याही व्यक्तीने देशांतर्गत किंवा देशाबाहेर केलेल्या दूरच्या प्रवासाला 'देशाटन' किंवा 'परदेशागमन' असे म्हणतात. आणि अशा प्रवासाच्या हद्द आणि महत्त्वाच्या आठवणी कलात्मक पद्धतीने मांडणी करून केलेल्या लेखनाला 'प्रवासवर्णनपर' लेखन असे म्हणतात. अण्णा भाऊंनी रशियाचा प्रवास दौरा केलेला होता. त्यांनी या प्रवासादरम्यान आलेले अनुभव आणि आठवणी 'माझा रशियाचा प्रवास' या शिर्षकाखाली शब्दबद्ध केलेल्या आहेत.

वस्तुतः पाहू जाता कुठलाही व्यक्ती अनेकदा मनोरंजनाकरिता किंवा विरंगुळयाकरिताच प्रवास करताना आढळते. अण्णा भाऊंचा प्रवासही याला फारसा अपवाद ठरत नाही. असे असले तरी मात्र अण्णाभाऊंचा रशियाचा दौरा निव्वळ पर्यटनाचा हेतू समोर ठेवून केलेला नव्हता असे दिसून येते कारण, "आपण वाटेल ते करून एकवेळ सोवियत संघराज्य पहावे, असं मला फार फार वाटत होतं. ती आशा माझ्या मनात दिवसेंदिवस सारखी प्रबल होत होती. रशियातील ते कामगार-राज्य कसे असेल, ती नवी दुनिया, नवी संस्कृती, नवी सभ्यता कशी फुलत असेल, या विचारानं माझं मन भारावलं होतं. मी वेडाच झालो होतो." असे सूचन अण्णा भाऊंनी प्रवासवर्णनाच्या उपोद्घाताप्रसंगीच केलेले दिसते. यावरून अण्णा भाऊंचा प्रवासामागील दृष्टिकोन स्पष्ट होत जातो. सुखवस्तू सांसारिक गृहस्थासारखे परदेशात जायचे, फिरायचे, मौजमजा करायची आणि पुन्हा परत मायदेशी यायचे असा विचार अण्णाभाऊ करताना दिसत नाहीत. अण्णाभाऊ कॉम्रेड होते. व्यक्तित्वात अंतर्बाह्य सामाजिकता भिनलेली व्यक्ती होते. एका विशिष्ट विचारसरणीने प्रभावित होवून तिच्या सामाजिक उपयोजनासाठी जीवाचे रान करणारे हाडाचे कार्यकर्ते होते. अण्णा भाऊंनी केलेल्या रशियाच्या संबंध प्रवासातून त्यांचे रशियाविषयीचे सामाजिक, सांस्कृतिक, राजकीय आणि ऐतिहासिक आकलन त्यांनी या प्रवासवर्णनातून मांडलेले दिसते. या अंगाने रशियाचा प्रवास वेगळे लेखन ठरते.

अण्णाभाऊ रशियाच्या प्रवासातून लिहितात, "मी पुतळे, शाळा व अनेक बागा पाहिल्या, मला सर्वत्र शिक्षण दिसले. जागोजाग जे पुतळे उभे आहेत, ते सुद्धा एकप्रकारे शिक्षणच देत आहेत. निकामी वस्तूंचे तिथे विनाकारण प्रदर्शन जे लं जात नाही, असंच माझं मत झालं. त्या देशात प्रत्येक वस्तू म्हणजे जीवनाचा अलंकार असते." अण्णा भाऊंचे रशियाविषयीचे हे मत रशियाची प्रगती अधोरेखित करणारे ठरते. अण्णाभाऊ साम्यवादी विचारसरणीने प्रभावित झालेले व्यक्ती होते. साम्यवादामुळे झालेली रशियाची प्रगती अण्णाभाऊंच्या प्रवासवर्णनातून शब्दबद्ध केलेली दिसून येते. अण्णा भाऊंच्या रशियाच्या प्रवासामागचे कारणच मुळात हे होते. त्यांना प्रागतिक विचारसरणीच्या देशामध्ये कोणते सकारात्मक बदल होतात हे पाहायचे होते. तेच त्यांच्या रशियाच्या प्रवासाचे मुख्य प्रयोजन होते. निव्वळ मनोरंजनाच्या हेतूने केलेला तो प्रवास नव्हता. हे या प्रवासवर्णनाचे वेगळेपण ठरते.

## दीर्घकथा वाटावी असा आकृतीबंध :

वस्तुतः पाहू जाता प्रवासवर्णनाच्या पुस्तकाचे लेखन किमान शे-दोनशे पृष्ठांचे असावे असा संकेत आहे. मात्र अण्णाभाऊंच्या प्रवासवर्णनाकडे पाहिले म्हणजे वेगळेच चित्र दिसते. केवळ ३३ पृष्ठसंख्येतून अण्णाभाऊंनी हे लेखन केलेले दिसते. असे असूनही आशयात्मकदृष्ट्या त्यामध्ये कोणतीही उणीव अथवा कमीपणा दिसत नाही. एक दीर्घकथा वाटावी असे या प्रवासवर्णनाचे स्वरूप आहे. अशाप्रकारचे लेखन करून अण्णा भाऊप्रवासवर्णनपर लेखनाच्या प्रचलित कसोट्या मोडून नवा आकृतीबंध प्रस्थापीत करताना दिसतात.



**सोपीभाषा आणि ओघवती शैली :**

अण्णा भाऊंचे प्रवासवर्णनपर लेखन सहज आकलन होईल अशा सोप्या भाषेतून आणि ओघवत्या शैलीतून समोर येताना दिसते. अर्थवाही बोलीभाषेचा जिवंतपणा हे अण्णा भाऊंच्या लेखनाचे वैशिष्ट्य दिसते. "यावेळी मनात निराळ्याच भावना उचंबळून उठल्या होत्या. मी वयाच्या अकराव्या वर्षी मुंबईला आलो. त्यावेळी आमचे सारे कुटुंब दरमजल दरकोस करीत मुंबई जवळ करीत होतं. गाडीखर्च नव्हता म्हजून आम्ही मुंबईला पायी चालत निघालो होतो. चालून माझे पाय सुजले होते. दोनशे सत्तावीस मैलांचे अंतर कापायला आम्हाला दोन महिने लागले होते. आणि आता तोच मी मिनिटाला दहा मैल भरारी भारीत होतो. तीस हजारांपेक्षाही जास्त उंचीवरून आमचे विमान उडत होते. मी खाली पाहत होतो. तेंव्हा हिमालयाच्या मस्तकावर निसर्ग नुकताच हिमाचा वर्षाव करत होता आणि तो महान गिरिराज आमच्या सरहद्दीवर आपले अनंत बाहु पसरून ताठ उभा होता."<sup>3</sup> अशाप्रकारच्या लालित्यपूर्ण भाषेतून अण्णाभाऊंचे लेखन येताना दिसते.

**समतोल मांडणी :**

माझा रशियाचा प्रवास या लेखनाची अण्णाभाऊंनी अतिशय समतोल मांडणी केलेली दिसते. वस्तुतः पाहू जाता एखाद्या विशिष्ट विचारसरणीने प्रभावित झालेल्या लेखकाच्या लेखनामध्ये कळत-न-कळत त्या विचारसरणीचा प्रभाव पडत असतो. अण्णाभाऊ साम्यवादी विचारसरणीने प्रभावित झालेले व्यक्ती होते. स्वाभाविकपणे त्यांच्या त्या विचारांची छाप अण्णाभाऊंच्या लेखनावर पडणे अपरिहार्य होते. मात्र तसे होताना दिसत नाही. उलट अतिशय संयमाने आणि संतुलन राखून अण्णाभाऊ व्यक्त होताना दिसतात. या संदर्भात अण्णाभाऊंच्या साहित्याचे समीक्षक बजरंग कोरडे यांनी नोंदवलेले निरीक्षण महत्त्वाचे ठरते. ते म्हणतात, "अण्णाभाऊ हे स्वतः कम्युनिष्ट होते, तरीसुद्धा हे प्रवासवर्णन त्यांनी अगदी समतोलपणे लिहिलेले आहे. असे सुजाण वाचकांना जाणवते. त्यांच्याकाळी चालू असलेला रशिया विरोधी प्रचार हा पूर्णपणे खोटा व दिशाभूल करणारा होता हे सुद्धा अण्णाभाऊ या प्रवासवर्णनातून सिद्ध करण्याचा प्रयत्न करतात."<sup>4</sup> थोडक्यात, अण्णा भाऊंनी समतोल दृष्टीकोनातून या प्रवासवर्णनाचे लेखन केलेले दिसते.

**आत्मपरता, प्रांजळपणा व प्रत्ययकारी निवेदन :**

प्रवासवर्णनाचे लेखन जरणे हे तसे पाहता 'ललित बंध' लिहिण्यासारखे आहे. आत्मपरता, प्रांजळपणा, प्रत्ययकारी निवेदनशैली, प्रसंगपरत्वे जीवनभाष्य या गुणांचा अशा लेखनामध्ये समावेश असणे गरजेचे असते. याशिवाय हे लेखन उठावदार होत नसते. 'माझा रशियाचा प्रवास' अशा अनेक गुणांनी परिपूर्ण आहे. म्हणून ते माणसाच्या अंतःकरणाचा ठाव घेते. अण्णाभाऊंची आत्मपरता, त्यांचा प्रांजळपणा, त्यांना उपजत लाभलेली प्रत्ययकारी निवेदनशैली आदी विशेषणांमुळे प्रस्तुत लेखन अधिकच वाचनीय होताना दिसते. "अंतराळातून माझे विमान उडत होते. ते ढगांच्या राशीतून मार्ग काढीत होते. खाली निरनिराळी शहरे दिसत होती. म्हणजे अनंत दिव्यांच्या पुंजक्यांवर खाली एखादं शहर असावं, असं मी समजत होतो. माझं मन स्वदेशात घुटमळत होतं. विमानाने मुंबई ते मॉस्को या दरम्यान मी भरारी मारीत होतो. माझ्या चक्षुंपुढं मुंबई दिसत होती. माझ्या आईच्या प्रतिमेपुढं शांता नि शुकुंतला यांनी एक निरांजन लावले होते. ते मी परत येईपर्यंत जळणार होते"<sup>5</sup> अशाप्रकारचे जिवंत अनुभवाचा प्रत्यय देणारे उतारेच्या उतारे अण्णा भाऊंच्या प्रवासवर्णनातून येताना दिसतात. यामुळे लेखनाचे मोल आणखीच वाढत जाते.

**समारोप :**

समृद्ध आणि वैविध्यपूर्ण आशय, नव्या आकृतिबंधातून केलेली मांडणी, सोपीभाषा आणि ओघवती शैली, समतोल मांडणी, आत्मपरता, प्रांजळपणा, प्रत्ययकारी निवेदनशैली आणि प्रवासामागील उद्देशाचे वेगळेपण या वैशिष्ट्यांमुळे 'माझा रशियाचा प्रवास' चे लेखन अधिक प्रत्ययकारी आणि वाचनीय ठरत जाते. केवळ अक्षरओळख असणाऱ्या एका प्रतिभावान लेखकाचा प्रवास, एका हाडाच्या कॉम्प्रेडचा प्रवास, नशिबाने अठराविश्वे दारिद्र्य पदरात टाकलेल्या फाटक्या माणसाचा परदेशप्रवास या अंगानेही हे प्रवासवर्णन वेगळे ठरते.

**संदर्भ :**

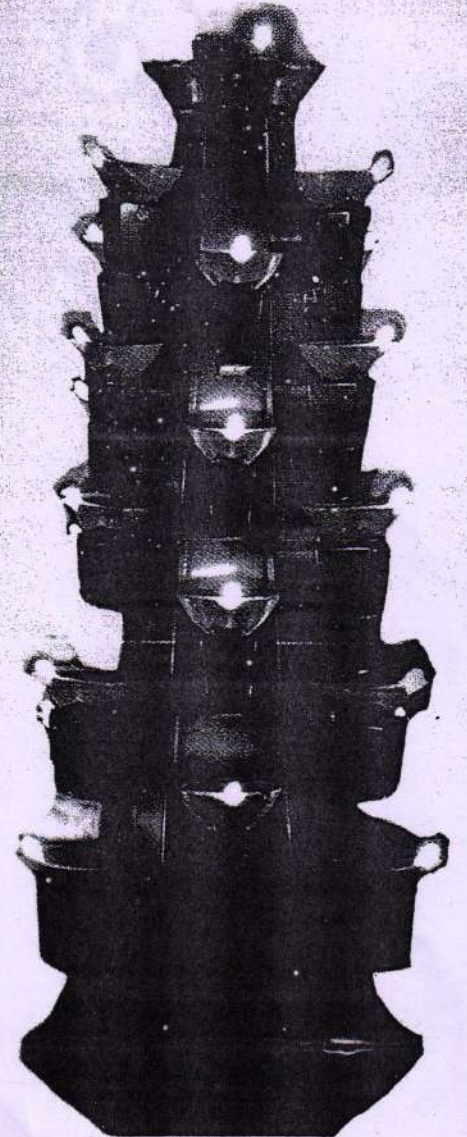
१. साठे अण्णा भाऊ, कविता व माझा रशियाचा प्रवास, श्रमिक प्रतिष्ठान कोल्हापूर, प्रथमावृत्ती मे २०११, पृ.क्र. ५५
२. तत्रैव, पृ.क्र. ७६
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Dr. Katre B.V.

प्राचार्य डॉ. दीपा क्षीरसागर गौरवग्रंथ...

# दीपस्तंभ





प्राचार्य डॉ. दीपा क्षीरसागर गौरवग्रंथ..

# दीपस्तंभ

संपादक

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कार्यकारी संपादक

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डॉ. बालासाहेब कटारे

डॉ. न.पु.काळे

श्री. योगेश पवार

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- \* अभिप्राय
- \* सचित्र दीपस्तंभ
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# प्राचार्य डॉ. दीपा क्षीरसागर यांचे वैविध्यपूर्ण साहित्यलेखन

— डॉ. बालासाहेब कटारे, बीड

## प्रस्तावना:

साधारणतः नवेदत्तरांच्या कालखंडामध्ये मराठवाड्यातील महत्त्वाच्या लेखिका म्हणून प्राचार्य डॉ. दीपा क्षीरसागर यांचे नाव समोर येताना दिसते. अध्यापन, प्रशासन, समाजकारण, राजकारण, कला, संगीत, नाट्य, क्रीडा अशा अनेक क्षेत्रात त्यांनी दिलेले योगदान अत्यंत मौलिक स्वरूपाचे आहे. मराठी साहित्यातील सुप्रसिद्ध लेखिका तथा अत्यंत संवेदनशील कवयित्री स्वर्गीय सुहासिनी इल्लेकर या दीपा क्षीरसागर यांच्या आई होत्या. स्वाभाविकपणे आईकडून मिळालेले लेखनसंस्कार आत्मसात करून दीपा क्षीरसागर यांनी अनेक वैविध्यपूर्ण ग्रंथांचे लेखन केलेले दिसते. 'संत ज्ञानेश्वर आणि संत मीराबाई यांची मथुराभक्ती', 'इवलेसे रोप लाविले द्वारी', 'आकाश', 'कॉलेज कॅम्पस', 'रंगवेध', 'आई मराठी कवितेतील', 'मागे वळून पाहताना', 'प्रवास उजळणाऱ्या वाटा' झाले मोकळे 'मैत्र जीवाचे' 'शब्दसागर अक्षरजागर', 'चिऊताई चिऊताई दार उघड', 'झुंज तिची पाचटाशी', यासारखे महत्त्वाचे ग्रंथ आणि वेगवेगळ्या निमित्ताने प्रकाशित करण्यात आलेल्या महत्त्वपूर्ण स्मरणिकांचे संपादन आदी ग्रंथांचा त्यात समावेश होतो.

दीपा क्षीरसागर यांच्या एकूण लेखनाचा विचार करू जाता संशोधनात्मक स्वरूपाचे लेखन, व्यक्तिचित्रणात्मक लेखन, राजकीय अनुभवकथन करणारे लेखन, सामाजिक जाणिवेतून केलेले लेखन, स्वतंत्र चिंतनात्मक पातळीवरून केलेले लेखन, काही शब्दांकने, वैविध्यपूर्ण आणि अस्पर्शित विषयांवरील संकलने आणि संपादने अशी त्याची वर्गवारी करता येते.

## संशोधनात्मक स्वरूपाचे लेखन :

दीपा क्षीरसागर यांच्या लेखनाची सुरुवात खऱ्या अर्थाने त्यांच्या पीएच.डी. साठी केलेल्या



संशोधनात्मक स्वरूपाच्या प्रबंधलेखनापासून झालेली दिसते. 'संत ज्ञानेश्वर आणि संत मीराबाई यांच्या मधुराभक्तीपर काव्याचा अभ्यास' या विषयावर त्यांनी पीएच.डी. चे संशोधन केलेले आहे. त्याच विषयामध्ये पुढे सखोल संशोधन करून त्यांनी 'संत ज्ञानेश्वर आणि संत मीराबाई यांची मधुराभक्ती' या महत्त्वपूर्ण ग्रंथाचे लेखन केलेले आहे. दोन भिन्न सांस्कृतिक, राजकीय, सामाजिक, कौटुंबिक पार्श्वभूमी असलेल्या आणि दोन भिन्न लिंगी व्यक्तिमत्त्व असलेल्या संतकवींचा 'मधुराभक्ती' या एकाच विषयाकडे पाहण्याचा दृष्टिकोन कसा असू शकतो, हे दीपा क्षीरसागर यांनी तौलनिक साहित्याभ्यासाच्या पद्धतीने साधार स्पष्ट केलेले आहे. या संशोधनातून त्यांनी मधुराभक्तीच्या संदर्भातील दोन संतकवींच्या दृष्टिकोनातील मूलभूत फरक लक्षात आणून देत मांडणी दिसते. साधर्म्य, वैधर्म्य, प्रभव आणि प्रभाव या मुद्याच्या अंगाने ही मांडणी केलेली आहे. तौलनिक साहित्याभ्यास पद्धती, विषय प्रतिपादनातील सुसुत्रता, वैशिष्टपूर्ण मांडणी, ससंदर्भ आणि सटीक विश्लेषण या गुणवैशिष्ट्यामुळे दीपा क्षीरसागर यांच्या प्रस्तुत लेखनाला संशोधनात्मक 'मूल्य' तर प्राप्त होतेच, शिवाय संत साहित्याच्या नवोदत्तरी नंतरच्या महत्वाच्या महिला समीक्षक म्हणूनही त्यांचे स्थान निश्चित होते. प्रस्तुत ग्रंथाची उपयोगिता, सध्याच्या काळातील महत्त्व आणि संशोधनमूल्य लक्षात आल्यामुळे त्याचे हिंदी भाषेमध्ये भाषांतरही झालेले दिसते. तसेच डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ औरंगाबादच्या मराठी विषयाच्या पदव्युत्तर अभ्यासक्रमामध्ये या ग्रंथाची संदर्भग्रंथ म्हणून निवड झालेली दिसते.

### वैविध्यपूर्ण संपादनात्मक लेखन :

दीपा क्षीरसागर यांनी केलेल्या लेखनामध्ये संकलन, संपादन आणि शब्दांकन हा भाग लक्षवेधी ठरतो. वेचक आणि वेधक आशय वैविध्यपूर्ण आणि अलक्षित विषयांची निवड, ओघवती आणि वाचनीय लेखनशैली, नेटकी आणि लक्षवेधी मांडणी या गुणवैशिष्ट्यांमुळे हे लेखन उठावदार होत जाताना दिसते.

'इवलेसे रोप लाविले व्दारी' हे बीड जिल्ह्याच्या लोकनेत्या माजी खासदार स्वर्गीय केशरबाई क्षीरसागर उर्फ काकू यांचे आत्मकथन आहे. या लेखनाचे शब्दांकन दीपा क्षीरसागर यांनी केलेले आहे. मागासलेल्या म्हणून ओळख असलेल्या भागातील एका सामान्य स्त्रीच्या असामान्य प्रवासावर प्रकाश टाकतो. केशरबाई क्षीरसागर यांचा सरपंच पदापासून सुरू झालेला राजकीय प्रवास खासदारकीपर्यंत कसा गेला, याचे विविध आयाम या लेखनातून ध्वनित होतात. काकूंचे कौटुंबिक, सामाजिक, राजकीय जीवन अशा सर्व अंगांनी प्रस्तुत लेखन महत्वाचे ठरते. कथनातील प्रांजळपणा, आत्मपरता, सचित्र आणि समतोल मांडणी, सोपी आणि ओघवती भाषाशैली, प्रत्ययकारी निवेदन पद्धती या गुणवैशिष्ट्यामुळे मूळ लेखनाएवढे महत्त्व या लेखनाला प्राप्त होताना दिसते. याचे सर्व श्रेय शब्दांकनकार या नात्याने निःसंदिग्धपणे दीपा क्षीरसागर यांच्याकडे जाते.



‘स्त्री’ आणि ‘स्त्रीचे भावविश्व’ हा विषय नेहमीच दीपा क्षीरसागर यांच्या चिंतनाचा आणि आस्थेचा राहिलेला दिसतो. हजारो वर्षांपासून स्त्री पुरुषसत्ताक व्यवस्थेच्या आणि रूढी-परंपरांच्या वर्चस्वाखाली जीवन जगत आलेली आहे. तिच्या वाट्याला आदिम स्वरूपाची चिरंतन वेदना आलेली आहे. अलीकडच्या आधुनिकतेच्या काळात कुठेतरी ती थोडेसे मोकळेपणाने जीवन जगताना दिसत आहे. आता कुठे तिच्या कर्तृत्वाला वाव मिळत आहे. मराठवाड्यातील स्त्रीदेखील याला अपवाद नाही. ही एकूण परिस्थिती लक्षात घेऊन दीपा क्षीरसागर यांनी ‘झाले मोकळे आकाश’ या संपादनात्मक स्वरूपाच्या ग्रंथाचे लेखन केलेले दिसले, समाज, साहित्य, संस्कृती, अभिनय, नृत्य, उद्योग, पत्रकारिता, प्रशासन, क्रीडा, वैद्यकीय क्षेत्र, आणि अन्य कितीतरी क्षेत्रांमध्ये मराठवाड्यातील स्त्रियांनी घेतलेली गरुड झेप दीपा क्षीरसागर यांनी प्रस्तुत ग्रंथातून शब्दबद्ध केलेली दिसते. डॉ. विमल मुंदडा, ना. रजनी पाटील, सुहासिनी इर्लेकर, अनुराधा वैद्य, रेखा बैजल, छाया महाजन, ललिता गादगे, मधू सावंत, वृषाली किन्हाळकर, विजयालक्ष्मी बर्जे आशालता करलगीकर, चित्ररेखा देशमुख, रश्मी देढिया, गोदावरी मुंडे, भाग्यश्री देशपांडे, प्रतिका लोणकर, अनुया दळवी, मिरा पाऊसकर, तारा परांजपे, शैला लोहिया, मुमताज देशपांडे, आशु दर्डा, निर्मल कांदळगावकर, रोहिणी काचोळे, राही भिडे, वर्षा ठाकूर, कीर्ती राऊत, शर्वरी कुलकर्णी, श्वेता जाधव, तेजस्विनी मुळे या स्त्रियांच्या आयुष्यातील खडतर संघर्ष आणि त्यानंतरची यशोगाचा हा संबंध प्रवास दीपा क्षीरसागर यांनी झाले मोकळे आकाश या ग्रंथातून शब्दबद्ध केलेला दिसतो.

‘आई मराठी कवितेतील’ हा दीपा क्षीरसागर यांचा अत्यंत महत्त्वाचा संपादित ग्रंथ आहे. हे ‘आई’ या विषयावरील कवितांचे संकलन-संपादन आहे. संत ज्ञानेश्वरांच्या कालखंडापासून अद्यापच्या कालखंडापर्यंत कितीतरी कवी-कवयित्रींनी आईविषयीच्या भावना स्वतःच्या कवितेतून व्यक्त केलेल्या आहेत. अशा आईविषयीच्या निवडक कविता या ग्रंथामध्ये समाविष्ट करण्यात आल्या आहेत. महानुभाव काव्यातील मातृ संकल्पना, संत काव्यातील विठ्ठमाऊली, लोकगीतातील आई, पंडिती काव्यातील मातृभाव, १८८५ ते १९४५ या कालखंडातील आई विषयीच्या कविता, मातृभूमिपर कविता, ग्रामीण कवितेतील आई, दलित कवितेतील आई, आदिवासी कवितेतील आई, मुस्लीम कवितेतील आई, आधुनिक कवितेतील आई अशा वर्गीकरणातून ही मांडणी केलेली दिसते. जवळपास सुमारे तिनशे-सव्वातिनशे आईविषयीच्या कवितांचे हे संकलन आहे. एखादा अपवाद वगळता अशा प्रकारचे संकलन मराठी साहित्यात एकमेव ठरते. आकर्षक मुखपृष्ठ, कवितांची अचूक निवड, अभ्यासपूर्ण आणि विस्तारित स्वरूपातील संपादकीय लेखन, प्रस्तुत संकलनामागचे उपयोगिता मूल्य या वैशिष्ट्यांमुळे प्रस्तुत ग्रंथ महत्त्वपूर्ण ठरतो.

‘मागे वळून पाहताना’ हा दीपा क्षीरसागर आणि डॉ. अलका चिडगोपकर या दोघींनी मिळून संपादित केलेला महत्त्वपूर्ण ग्रंथ आहे. हा ग्रंथ मराठी साहित्यातील सुप्रसिद्ध लेखिका



तथा 'कवयित्री स्वर्गीय सुहासिनी इर्लेकर यांच्याविषयी लिहिलेला आहे. सुहासिनी इर्लेकर यांच्या व्यक्तिमत्त्वाचे विविध आयाम उलगडून मान्यवर अभ्यासकांनी लिहिलेल्या अभ्यासपूर्ण लेखांचा यामध्ये अंतर्भाव होतो. पती यशवंतराव इर्लेकरांसोबत असलेले त्यांचे अनुभव, राष्ट्रसेवा दलाच्या प्रांगणातील सुहासिनी इर्लेकरांचे अनुभव, त्यांचे महाविद्यालयीन जीवनातील अनुभव, सुहासिनी इर्लेकरांचे साहित्यलेखन, सुहासिनी इर्लेकर यांचे आयुष्याच्या उत्तरार्धातील भवविश्व अशा प्रकारच्या लेखनातून या ग्रंथांमध्ये सुहासिनी इर्लेकर यांचे जीवन उलगडून दाखवण्याचा प्रयत्न केलेला आहे.

'मैत्र जीवाचे' हा दीपा क्षीरसागर यांनी संपादित केलेला आणखी एक नितांत सुंदर ग्रंथ. 'मैत्र' 'मित्रत्व', अथवा 'स्नेह' या बाबी वरकरक्ष जरी मानवी समाजापुरत्या मर्यादित वाटत असल्या, तरी मैत्रभावना ही वैश्विक बाब आहे. ती जशी मा नवांमध्ये असते तशीच ती मानवेत्तर प्राण्यांमध्ये किबहुना संबंध सृष्टीच्या चराचरामध्ये सुप्तावस्थेत असते. मैत्र, मित्रता है एक तत्त्व आहे. हे तत्त्व समग्र मानवी जीवनाचा अविभाज्य भाग आहे. कारण प्रेम हे या तत्त्वाचे मूलभूत अधिष्ठान आहे.

'मैत्र जीवाचे' या ग्रंथामध्ये दीपा क्षीरसागर यांनी 'मैत्री' या विषयावरील लेखांचे संकलन केले आहे. महाराष्ट्रातील सुप्रसिद्ध कवी, साहित्यिक, लेखक, सामाजिक कार्यकर्ते, विचारवंत, राजकारणाच्या क्षेत्रातील महत्त्वाच्या व्यक्ती, प्रशासकीय सेवेतील व्यक्ती, कलावंत, अभिनेते आदींनी हे लेख लिहिले आहेत. अत्यंत हृदयस्पर्शी लेखांचा संग्रह असणारा हा ग्रंथ नकळतपणे समकालीन महाराष्ट्राच्या साहित्य, समाज, संस्कृती, चित्रपट, राजकारण आदी महत्त्वपूर्ण क्षेत्रांवर भाष्य करतो. दीपा क्षीरसागर यांनी रामायण-महाभारताच्या पुराणकाळापासूनची उदाहरणे देत 'मैत्र' भावनेचे चिरंतनत्व स्पष्ट केले आहे. मैत्री ही भावना केवळ मानवांमध्येच नव्हे तर पशुपक्षांमध्येही असू शकते. पशुपक्षांशीही आपले आत्मीय बंध जुळतात ही दीपा क्षीरसागर यांची ठाम धारणा आहे. या ग्रंथातील प्रत्येक लेखातून त्याचा प्रत्यय येतो. महाराष्ट्रात विविध क्षेत्रात सुप्रसिद्ध असलेल्या व्यक्तींच्या जीवनात मैत्रीचे स्थान काय होते ? त्यांची मैत्रीविषयीची मत-मतांतरे, भावभावना काय होत्या, मैत्रीचे विश्व कसे होते या प्रश्नांची उत्तरे या ग्रंथातून मिळतात. मैत्रीविषयी लिहिलेला हा ग्रंथ वाचने निश्चितपणे आनंदायी अनुभव ठरतो.

'चिऊताई, चिऊताई दार उपड' हा दीपा क्षीरसागर यांनी संपादित केलेला मराठीतील निवडक बालकवितांचा संग्रह आहे. मराठी संत साहित्यातील बालसुलभ जाणिवांच्या कवितांपासून ते सद्यःस्थितीतील बालकवितांपर्यंत जवळपास सुमारे २५० निवडक बालकवितांचा समावेश या संग्रहात केलेला दिसतो. विशेषतः लहान मुलांच्या भावविश्वात बालकवितेला विशेष स्थान असते. बालकवितेमुळे लहान मुलांचे भावविश्व समृद्ध होत असते हाच दृष्टिकोन समोर ठेवून येणाऱ्या पिढ्यातील लहान मुलांसाठी हे संकलन दीपा क्षीरसागर यांनी केलेले



दिसते. सचित्र स्वरूपातील बालमनाला आकर्षित करणारे मुखपृष्ठ, सुंदर आणि सुलभ कवितांची निवड, प्रदीर्घ अभ्यासपूर्ण प्रस्तावना यामुळे हे संकलन दर्जेदार आणि अद्वितीय ठरलेले दिसते.

### **कलावंत व्यक्तींचा परिचय व व्यक्तिचित्रणात्मक लेखन :**

दीपा क्षीरसागर यांनी लिहिलेले 'रंगवेध' आणि 'कॉलेज कॅम्पस' हे ग्रंथ व्यक्तिविशेष तथा व्यक्ती परीचय करून देणारे आहेत. 'रंगवेध' या ग्रंथामधून त्यांनी महाराष्ट्राच्या नाट्य आणि चित्रपट क्षेत्रात कार्यरत असलेल्या आणि नावलौकिक कमावलेल्या बीड जिल्ह्यातील कलावंतांविषयीची माहिती दिलेली आहे. बीड जिल्ह्यामध्ये अनेक कलावंत आहेत. महाराष्ट्राच्या सिने-नाट्यसृष्टीत आणि एकूणच सांस्कृतिक क्षेत्रात बीड जिल्ह्याचे योगदान मोठे आहे. हे संबंध महाराष्ट्राला आणि महाराष्ट्राबाहेरील लोकांना ज्ञात व्हावे, बीडच्या नाट्य कलावंतांचा हा गौरवशाली- संघर्षमय इतिहास काळाच्या ओघात हरवून जाऊ नये, या उदात्त हेतूने दीपा क्षीरसागर यांनी प्रस्तुत ग्रंथाचे लेखन केलेले आहे. यामध्ये नाट्य परिषद बीड शाखेच्या संस्थापक डॉ. सुहासिनी इर्लेकर, राष्ट्रीय नाट्य प्रशिक्षण विद्यालय नवी दिल्लीचे माजी संचालक डॉ. वामन केंद्रे, कुलदीप धुमाळे, डॉ. दीपा क्षीरसागर, डॉ. सतीश साळुंके, भरत लोळगे, डॉ. संजय पाटील देवळाणकर, डॉ. सुधीर निकम, संपदा कुलकर्णी, प्रा. रा.द. अरगडे, अॅड. चौसाळकर, शैला लोहिया, कांतराव मांडवकर, राम मुकादम, ललिता मुकादम, आनंद जोशी, भाऊसाहेब नारनवणे, संतोष गळेवार, हेमंद बडवे, मिलींद शिंदे आदी बीड जिल्ह्यातील कलावंतांविषयीची माहिती दिलेली आहे. तसेच बीड जिल्ह्यातील एकूण नाट्य चळवळीवर प्रकाश टाकला आहे. यांनी केलेले हे काम निश्चितपणे बीड जिल्ह्याच्या सांस्कृतिक विकासाला हातभार लावणारे आहे.

दीपा क्षीरसागर यांना नेहमी मानवी नातेसंबंधामध्ये रस राहिलेला आढळून येतो. माणसांचे स्वभाव वाचायचे, माणसांची मनं जाणून घ्यायची, त्यांना बोलतं करायचं हा विलक्षण छंद त्यांना दिसतो. प्राध्यापक आणि प्राचार्य म्हणून अनेक वर्ष काम करताना प्राध्यापक, विद्यार्थी, पालक, इतर कर्मचारी, वेगवेगळ्या कार्यक्रमांच्या निमित्ताने निमंत्रित केलेले मान्यवर अतिथी अशा कितीतरी नानाविध स्वभावांच्या व्यक्तींशी आलेल्या संबंधातून 'कॉलेज कॅम्पस' हे पुस्तक आकाराला आलेले दिसते. महाविद्यालयात काम करत असताना प्राध्यापक, कर्मचारी, विद्यार्थी व पालक या सर्वांशी प्राचार्य या नात्याने माझा त्यांच्याशी संवाद होत असे. या सर्वांविषयी मला आलेल्या वैशिष्ट्यपूर्ण अनुभवांची कुठेतरी नोंद असावी या विचारातून हे लेखन आकाराला आले आहे, असे त्यांनी मनोगतातून म्हटले आहे. व्यक्तिचित्रणाच्या अंगाने जाणारे सदर लेखन विविध मानवी स्वभावाचे नमुने वाचकांसमोर सादर करते. मानवी चेहरे आणि मुखवटे यांच्यामध्ये मूळ स्वभाव नावाची गोष्ट असते. तो कितीही लपवायचा प्रयत्न केला तरी लपवता येत नाही, हेच या लेखनातून समोर येते.



### ‘राजकीय अनुभवकथन करणारे लेखन:

‘प्रवास उजळणाऱ्या वाटा’ हे दीपा क्षीरसागर यांचे राजकीय अनुभव सांगणारे महत्त्वपूर्ण पुस्तक आहे. प्राचार्य म्हणून काम करत असताना अनाहूतपणे बीड नगर परिषदेच्या नगराध्यक्ष पदावर काम करण्याची सुवर्ण संधी दीपा क्षीरसागर यांना लाभली. या संधीचे त्यांनी सोने तर केलेच, शिवाय आपल्यातील सुप्त प्रतिभासामर्थ्याने त्या संधीमध्ये त्यांनी लेखनाची बीजेदेखील शोधली. नगराध्यक्ष पदाचा कालखंड दीपा क्षीरसागर यांच्यासाठी आयुष्याच्या प्रवास उजळून टाकणाऱ्या वाटा ठरला, नगराध्यक्ष म्हणून काम करताना आलेले वैविध्यपूर्ण अनुभव दीपा क्षीरसागर यांनी या पुस्तकात शब्दबद्ध केले आहेत. नगराध्यक्ष म्हणून काम करत असताना राबविलेले महिला दरबार सारखे अनोखे उपक्रम, लोककल्याणकारी योजना, सामाजिक आणि राजकीय व्यक्तिसोबत काम करताना आलेले अनुभव अशा वेगवेगळ्या अंगांनी हे लेखन महत्त्वपूर्ण ठरते. अशा अशा प्रकारच्या राजकीय अनुभवांवर सुंदर पुस्तक होऊ शकते, हे समजायलाही माणसाकडे उपजत प्रतिमा आणि सूक्ष्म निरीक्षण असावे लागते. दीपा क्षीरसागर यांच्याकडे ते दिसते. म्हणून तर वरून रूक्ष दिसणाऱ्या विषयावर त्यांनी अशा प्रकारचे राजकीय अनुभव कथानात्मक लेखन केलेले दिसते. आजवर संबंध महाराष्ट्रात एकाही महिला नगराध्यक्षाने अशा प्रकारचे लेखन केलेले आढळत नाही. त्यामुळे ‘प्रवास उजळणाऱ्या वाटा’ हे लेखन संबंध महाराष्ट्रातील पहिल्या महिला नगराध्यक्षाने केलेले एकमेव राजकीय अनुभवांचे दर्शन ठरते.

### ललित आणि समीक्षणात्मक लेखन :

‘शब्द सागर अक्षर जागर’ या ग्रंथातून दीपा क्षीरसागर यांनी ललित आणि समीक्षणात्मक स्वरूपाचे लेखन केलेले आहे. एकाच ग्रंथात दोन उपग्रंथ असे प्रस्तुत ग्रंथाचे स्वरूप आहे. ‘शब्द सागर’ या भागात ललित लेखांचा समावेश करण्यात आलेला आहे. दीपा क्षीरसागर यांचा स्वभाव मुळातच चिंतनशील आहे. त्यामुळे त्या ललित लेखांना चिंतनाचे अधिष्ठान प्राप्त झालेले दिसते. कुटुंब, नातेसंबंध, मित्रत्व, समाज, निसर्ग यासारख्या महत्त्वपूर्ण विषयांवरील नितांत सुंदर ललित लेखांचा यामध्ये समावेश केलेला दिसतो. ‘बालपण दे गा देवा’, ‘चिऊ चिऊ ये’, ‘मैत्रीचे धागे’, ‘कन्या सासुराशी जाये’, ‘आई’, ‘माहेरचा गोतावळा हरवतोय’, ‘मंतरलेले दिवस’ यासारखे कितीतरी लेख भावस्पर्शी सुखद अनुभूती देतात. तर ‘नमस्कार महागला’ हा लेख दिवसेंदिवस वाढत चालेलेल्या नीतिमूल्यांच्या घसरणीवर भाष्य कातो. ‘हिरव्या निळ्या समुद्राची जादुई दुनिया’ हा अलौकिक निसर्ग सौंदर्याचा प्रत्यय देतो. लालित्यपूर्ण भाषा, प्रतिभा आणि प्रतिकांचा समर्पक वापर, निवेदनातील भावस्पर्शीत्व आणि प्रांजळपणा यामुळे प्रस्तुत लेखन हृदयस्पर्शी ठरते.

याच ग्रंथाचा अक्षर जागर हा दुसरा उपभाग आहे. यामध्ये प्रामुख्याने संत साहित्यावरील समीक्षणात्मक लेखांचा समावेश करण्यात आला आहे. चिंतनशीलता, ठाम वैचारिक बैठक,



मुद्देसूद विषय प्रतिपादन, विषयांची आणि आशयाची स्पष्टता, वस्तुनिष्ठता या वैशिष्ट्यांमुळे प्रस्तुत लेखनाला वस्तुनिष्ठ समीक्षणात्मक लेखनाचे मूल्य प्राप्त झालेले दिसते. संत ज्ञानेश्वर, संत नामदेव, संत एकनाथ, संत कबीर, दलित आणि दलितेतर कवितेतील मातृजाणिवा या सारख्या महत्त्वपूर्ण विषयावर प्रस्तुत ग्रंथातून भाष्य केलेले दिसते.

### सामाजिक जाणिवेतून केलेले लेखन :

ऊसतोड मजुरांचा जिल्हा म्हणून संबंध महाराष्ट्रभर बीड जिल्ह्याची ओळख आहे. गेली अनेक वर्षे बीड जिल्ह्याला हो ओळख मिटवता आलेली नाही. आजही ऊसतोड मजुरांचे प्रश्न जसेच्या तसे आहेत. आर्थिक दारिद्र्य, शिक्षणाचे प्रमाण कमी, बालविवाह, आरोग्याचे प्रश्न, प्रतिवर्षाचे स्थलांतरण, कारखानदार, मुकादम आणि गावातील सावकार यांच्याकडून वारंवार होणारे शोषण हे ऊसतोड मजुरांचे प्रारब्ध होउन बसलेले दिसते, या-ज्वलंत प्रश्नाविषयी कुणी बोलत नाही, असे नाही. यांच्या प्रश्नावर मोर्चे निघतात, आंदोलने होतात, परिसंवाद, चर्चासत्रे, भाषणे होतात. ऊसतोड मजुरांच्या मतांवर मोठे राजकारणही होते. वर्तमानपत्रामध्ये बातम्याही येतात, मात्र ऊसतोड मजुरांच्या जीवनामध्ये अद्यापपर्यंततरी आशेचा किरण उगवलेला दिसत नाही. हे सर्व बीड जिल्ह्यातील भयंकर वास्तव आहे. या विदारक वास्तवाने अस्वस्थ होऊन दीपा क्षीरसागर यांनी 'झुंज तिची पाचटाशी' या ग्रंथाचे लेखन केले आहे. या ग्रंथामध्ये त्यांनी ऊसतोडीसाठी जाणाऱ्या महिला मजुरांची दुःखद कहानी शब्दबद्ध केलेली आहे. ही सर्व ऊसतोड करणाऱ्या महिला मजुरांची वास्तवाधिष्ठीत अनुभवकथने आहेत. या ग्रंथातून येणाऱ्या सर्व महिला आणि मुलींची स्वतःची म्हणून एक दुःखद कहाणी आहे. कधी बालविवाह झालेला असतो, कधी गावातील गावगुंडाच्या वासनेची शिकार झालेली असते तर कधी सावकाराने किवा मुकादमाने तिचा भोग घेतलेला असतो, कधी तिच्या समोर उपासमारीचा प्रश्न आ वासून उभा असतो तर कधी ती कुठल्या तरी असाध्य रोगाला बळी पडलेली असते. कधी ती नवऱ्याच्या शारीरिक, मानसिक त्रासाला वैतागलेली असते तर कधी सासरच्या मंडळींनी तिची छळयात्रा आरंभिलेली असते. तिच्या दुःखाचे अनेक पदर आहेत. या तिच्या दुःखाने अस्वस्थ होऊन सहसंवेदनेच्या जाणिवेतून दीपा क्षीरसागर यांनी अशा पीडित मुलींच्या आणि महिलांच्या प्रत्यक्ष भेटी-गाठी घेऊन, मुलाखतीद्वारे त्यांना बोलते करून प्रस्तुत ग्रंथाचे लेखन केलेले आहे.

चंदना, पार्वती, शेवंता, लक्ष्मी, पारू, रुक्मिणी, सुगंधा, विमला, कमला, मंजुळा, सरस्वती, गंगी, सुलोचना, रत्ना अशा कितीतरी महिलांची मूक वेदना दीपा क्षीरसागर यांनी प्रस्तुत लेखनातून समाजासमोर आणलेली दिसते. वरकरणी या महिला जरी बीड जिल्ह्यातील असल्या तरी व्यापक अर्थाने या संबंध भारतातील ऊसतोड करणाऱ्या महिलांचे प्रतिनिधित्व करताना दिसतात. विशुद्ध सामाजिक बांधिलकीच्या भावनेतून दीपा क्षीरसागर यांनी केलेले हे लेखन



लेखकाचे सामाजिक उत्तरदायित्व अधोरेखित करताना दिसते.

### स्मरणिकांची संपादने :

दीपा क्षीरसागर यांनी महत्वाच्या ग्रंथांचे लेखन तर केलेले आहेच; शिवाय काही महत्वपूर्ण स्मरणिकांची संपादनेही त्यांनी केलेली आहेत. त्यामध्ये बीड येथे भरलेल्या एकोणनव्वदाव्या अखिल भारतीय मराठी नाट्य संमेलनाची रंगसंवाद ही स्मरणिका, बीड येथे भरलेल्या चौथ्या मराठवाडा लेखिका साहित्य संमेलनाची सुहासिनी ही स्मरणिका आणि बीड येथे भरलेल्या पहिल्या जिल्हास्तरीय बालसाहित्य संमेलनाची बालतरंग आदी स्मरणिकांचा त्यात समावेश होतो.

महत्त्वपूर्ण संस्मरणे, सचित्र आठवणी, अभ्यासपूर्ण लेख, आकर्षक मुखपृष्ठ आणि उत्कृष्ट संपादन कौशल्य या गुणवैशिष्ट्यांमुळे या स्मरणिका उत्तम संपादन कौशल्याचा वस्तुपाठ ठराव्यात अशा झाल्या आहेत.

### समारोप :

आईकडून मिळालेल्या जन्मजात लेखन संस्कारांचा आपल्या परिश्रमाने आणि व्यासंगाने विकास करून प्राचार्य डॉ. दीपा क्षीरसागर यांनी वैविध्यपूर्ण साहित्यनिर्मिती केलेली दिसते. व्यक्त होण्याच्या स्वाभाविक अनिवार उर्मीतून त्यांचे लेखन आकाराला आलेले आहे. वैविध्यपूर्ण आणि वैशिष्ट्यपूर्ण विषयांची जाणीवपूर्वक केलेली निवड, विषय प्रतिपादनामागे असलेले स्वतंत्र चिंतन, दुर्लक्षित आणि अस्पर्शित विषयांना दिलेला न्याय, सामाजिक बांधिलकेच्या जाणिवेशी ठेवलेली प्रतिबद्धता या गुणवैशिष्ट्यांमुळे त्यांचे एकूण लेखन एका विशिष्ट उंचीवर जाताना दिसते. जाणीवपूर्वक केवळ एकच विषय आणि एकच वाङ्मय प्रकार न हाताळता बहुविध विषय आणि वेगवेगळे वाङ्मय प्रकार त्यांनी हाताळल्यामुळे त्यांचे लेखन एकसुरी आणि एकमुखी वाटत नाही. लेखक म्हणून भूमिका घेताना त्या केवळ स्वान्तसुखाय लेखन करताना दिसत नाहीत. तर लहानमुले, महाविद्यालयीन विद्यार्थी, समाज, सांस्कृतिकक्षेत्र, राजकीयक्षेत्र या परिप्रेक्ष्यातील अनुभव शब्दबद्ध करणेही त्यांना महत्वाचे वाटते. एकूणात या सर्व गुणवैशिष्ट्यांमुळे दीपा क्षीरसागर नवदोत्तरीच्या कालखंडातील मराठवाड्यातील आघाडीच्या लेखिका म्हणून महत्वाच्या ठरतात.



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# **ONE DAY INTERDISCIPLINARY NATIONAL CONFERENCE**

**On 09<sup>th</sup> March 2023**

**Special Issue No.118**

**75 Years of Indian Independence**

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(HOD, Sociology)**



## Foreword

I feel very happy to express my presence at our campus. I will come all the delegates coming from all over the world. I know that you have traveled a lot to reach this place. I hope your stay will be comfortable and your stay will be a memory regarding 75 years of Indian Independence.

Many of you will be asked to write research papers for this conference. We try to get all of them in the souvenir to be brought out in conference. I also intend to publish a volume after having in depth deliberations. After incorporating suggestions and making necessary modifications, the papers will be incorporated in the volume with ISSN number.

I sincerely admit that this adventure would have not been possible without encouragement and blessing of our Honorable Mr. Kishor Paul, former MLA and President of our institution. I sincerely thank him.

My thanks are due to our enthusiastic principal Prof. Dr. Sumit

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## Editorial

*I feel very happy to organize this conference at our campus. I well – come all the delegates coming from various places of India. I know that you have traveled a lot to reach this beautiful place. I hope your stay will be comfortable and you will carry lot of memories regarding 75 years of Indian Independence.*

*Many of you taken sufficient efforts to write research papers for this conference. We tried to best to include all of them in the souvenir to be brought out in conference. I also intend to publish a volume after having in depth deliberations. After incorporating suggestions and making necessary modifications, the papers will be incorporated in the volume with ISBN number.*

*I sincerely admit that this adventure would have not been possible without encouragement and blessing of our Honorable Mr. Kishor Patil, former MLA and President of our institution. I sincerely thank him.*

*My thanks are due to our enthusiastic principal Prof. Dr. Sunita Shinde (Deshmukh) for her persuasion and guidance. I am grateful to all the office bearers of our college for their support and valuable guidance. Last but not the least, I thank to my colleagues in the college for their healthy co-operation.*

*I earnestly urge the delegates to tolerate any inconvenience regarding accommodation and other arrangements.*

*I sincerely thank Prof. Pramod Prakashrao Tandle, Publisher of the souvenir in a very short time. My special thanks to all teaching, non-teaching staff and known and unknown persons for timely co-operation.*

*I offer best wishes to all.*

*Thanks a lot.*

**Dr. Balaji M. Ekurkekar**



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## Status, Potential and New Methods in Organic Farming

Capt.Dr.B.T. Pote

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Email: [btote20june@gmail.com](mailto:btote20june@gmail.com)**Abstract :-**

*Necessity of ecologically sustainable organic farming towards crop production and mitigation of climate change is well understood. But the organic movement in the backdrop of global agriculture is insignificant despite considerable effort during the last few years. India also faces several bottlenecks with respect to growth of organic agriculture both at the production and marketing levels. Various issues have been discussed in this article regarding the major bottlenecks in organic agriculture as well as potential of sustainable growth of organic farming. New technologies, package for organic farming have also been discussed.*

**Introduction:-**

Food scarcity in the Sixties had led to the need and initiation of green revolution. However to augment crop production usage of chemical fertilizers in incremental dose over the years led to the deterioration of soil character, made the plants fertilizer sensitive and disturbed the pest-predator relationships, which automatically generated the necessity for application of pesticides. To further add to the dilemma crop productivity has been going downhill from the fertilizers following the 'Law of Diminishing Return'. Crop production system has become completely dependent on the external support system, at the same time input-output ratio is going low with time. Thus just after few decades of its incorporation, chemical farming has broken the equilibrium of millennia.

**Objectives:-** The main objective of this paper is to explain and highlight the status, potential and new methods in organic farming.

**Why Organic Farming ?**

Hence, enhancement and maintenance of system productivity and resource quality is essential for sustainable agriculture. It is believed that organic farming can solve many of these problems as this system is believed to maintain soil productivity and effectively control pest by enhancing natural processes and cycles in harmony with environment. Organic farming is defined as a production system which largely excludes or avoids the use of fertilizers, pesticides, growth regulators, etc. and relies mainly on organic sources to maintain soil health, supply plant nutrients and minimize insects, weeds and other pests. It was felt that organic farming may solve all these problems and has been considered as one of the best options for protecting/sustaining soil health, and is gaining lot of importance in present day agriculture.

**Present Status of Organic Farming:-**

India holds a unique position among 172 countries practicing organic agriculture: it has 6,50,000 organic producers, 699 processors,

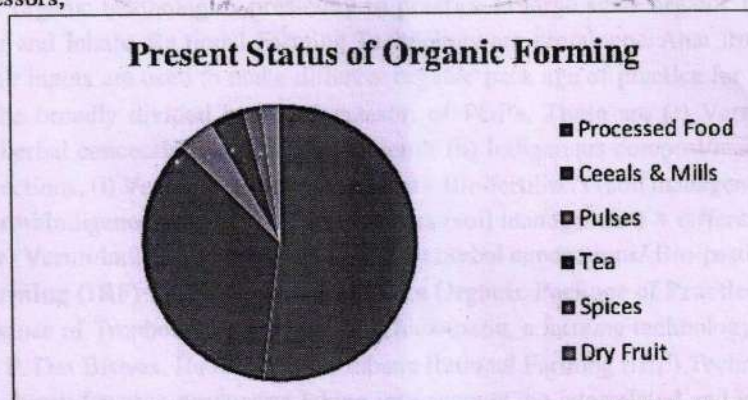


Fig 1: Export Share of Organic products in India :



669 exporters and 7,20,000 hectares under cultivation. But, with merely 0.4 per cent of total agricultural land under organic cultivation, the industry has a long journey ahead (Bordolo, 2016) India produced around 1.35 million MT (2015-16) of certified organic products which includes all varieties of food products. The production is not limited to the edible sector but also produces organic cotton fiber, functional food products etc. As per the latest available cross-country statistics, in the year 2015, India ranked first in terms of the number of organic producers among over 170 countries and ninth in terms of the area under organic agriculture. India ranked 11th in organic product exports in 2015. India is home to 30 per cent of the total organic producers in the world, but accounts for just 2.59 per cent (1.5 million hectares) of the total organic cultivation area of 57.8 million hectares. However, it has been observed that when it comes to the area under certified organic cultivation, India contributes only 2.59%, i.e., 1.5 million hectares of the total organic cultivation area of 57.8 million hectares. Thus, amongst the regions with the largest areas of organically managed agricultural land, India ranks 9th,

#### Emerging Challenges in Organic Farming:-

Organic Agriculture is not a new concept to India and traditionally Indian farmers were organic by default. But, gradually changed to chemical based cultivation since 1950's and chemicals were increasingly applied during the Green Revolution period. In this scenario, proliferation of sustainable organic farming practice or even effort towards reduction of chemical load has not been satisfactory. Lack of proper knowledge transfer has been a limiting factor towards large scale organic conversion or reduction in chemical load under conventional farming practice. At the same time farmer's participation in problem identification and solving is inadequate, consequently the technology and innovation uptake were also compromised (Hakiza et al, 2004). Besides this majority of agro-research does not prioritize/ focus on dissemination of research outcome at farmers' level. There are limitations like availability of practical guidelines, communication gap with small and marginal farmers and lack of comprehensive approach for integration or technological know-how, better marketing options etc. which led to lesser farmers' participation in large scale demonstration. But above all the single most criteria which was responsible for limited progress of sustainable farming practice is lack of comprehensive and economically viable packages which can offer easy adoptability for the farming community. India is poised for faster growth with the growing domestic market. Success of organic movement in India depends upon the growth of its own domestic markets. With the sizable acreage under naturally organic/default organic cultivation, India has tremendous potential to grow crops organically and emerge as a major supplier of organic products in the world's organic market. With this growing demand more and more technological innovation like IRF Technology and their implementation at farmers' field will ensure economically viable organic agriculture and help in its adoption by the common farmers even without any subsidy scheme or guaranteed premium price. Considering the increasing awareness about the safety and quality of foods, long term sustainability of the system and accumulating evidences of being equally productive, the organic farming has emerged as an alternative system of farming which can not only address the quality and sustainability concerns, but also ensure a debt free, profitable livelihood option

#### New Technologies/ Package of Practices in Organic Farming in India:-

There are few organic technologies presently in practice in large scale organic farming among which Biodynamic Farming and Inhana Rational Farming Technology are prominent. Apart from that in most of the cases different organic inputs are used to make different organic package of practice for different crops. These combinations can be broadly divided in 4 to 5 categories of POP's. These are (i) Vermicompost (soil management) + different herbal concoctions (plant management); (ii) Indigenous compost/manure (viz. FYM etc) + different herbal concoctions; (iii) Vermicompost/Indigenous compost + Bio-fertilizers (soil management) + different herbal concoctions; (iv) Vermicompost/Indigenous compost + Biofertilizers (soil management) + different herbal concoctions/ Bio-pesticides and (v) Vermicompost/Indigenous compost + different herbal concoctions/ Bio-pesticides.

#### Inhana Organic Farming (IRF) Technology-A Complete Organic Package of Practice:-

Taking the essence of Trophobiosis theory of F. Chaboussou, a farming technology was developed by an Indian Scientist, Dr. P. Das Biswas. He termed it as Inhana Rational Farming (IRF) Technology which provides a nature receptive pathway for crop production taking into account the interrelated and integrated relationships of all the components of the ecosystem. It blends ancient Indian wisdom with scientific knowledge and ensures



healthy plant and soil system which ultimately leads to a successful crop output without disrupting the ecological harmony. This farming technology has already been widely adopted in reputed tea estates in India and has shown its effectivity towards the reduction of chemical/ pesticide load and management of recurrent disease problem<sup>5</sup>. In the Agriculture Sector, the technology has been tried out in different crops like paddy, baby corn, green-gram, cabbage, okra, tomato, potato, brinjal etc. (Bera et al, 2014) and had turned out to be quite satisfactory. Thus in the backdrop of degrading soil fertility, worsening plant health leading to poor quality and productivity and prevalence of unsustainable agricultural practices, IRF Technology can become one of the weapons to contest against such adversities.

**Conclusion:-**

Organic farming is the pre-requisite enabling wider adoptability, secured livelihood and ensuring affordability at the consumer's end India has a long history of organic farming. At the same time increasing domestic market of organic food can provide the necessary support towards organic movement. Awareness, Training and dissemination programs will help to facilitate the movement but most importantly innovative organic farming technologies like Inhana Rational Farming (IRF) can popularize the practice even among the resource poor farmers by ensuring ecologically and economically sustainable organic crop production in a time bound manner. Case studies of IRF Organic POP also testify the corresponding GHG mitigation and adaptation potential, soil resource regeneration, high energy use efficiency as well as development of plant resilience; but the highlight remains its cost effectiveness and time bound results.

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(M.A.Mar.& Pol.Sci., B.Ed.Ph.D.NET.)

विद्येविना मति गेली, मतीविना नीति गेली  
नीतिविना गति गेली, गतिविना वित्त गेले  
वित्तविना शूद्र खचले, इतके अनर्थ एका अविद्येने केले

-महात्मा ज्योतीराव फुले

❖ विद्यावार्ता या आंतरविद्याशाखीय बहुभाषिक त्रैमासिकात व्यक्त झालेल्या भतांशी मालक, प्रकाशक, मुद्रक, संपादक सहमत असतीलच असे नाही. न्यायक्षेत्र:बीड



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India program, mere willingness to spend on infrastructure and attracting FDIs will not serve. The government needs to work on implementation. It should strive for better implementation of the decision policies. The problems on the grassroots level need to be understood and addressed.

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## Millet: Ancient Grains for a Healthy Future

Capt.Dr.B.T.Pote

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**Abstract:** Millets have been a part of the Indian food basket for hundreds of years. They are deeply ingrained in our food systems, culture, and traditions. They find mention in religious texts and are a part of many traditional Indian practices. Interactions with elders in the family and farmers throw light on their Consumption in older times. In the Indian subcontinent, millets were used as a staple in most households prior to the Green Revolution.

With 2023 being observed as United Nations International Year of Millets, there is a renewed interest in millets around the globe. Nations, institutions, businesses, and individuals are coming together to promote these miracle grains and give them a rightful place in the food basket. India has been a leader in the millet movement and is showing the way to the rest of the world promoting and showcasing the potential of millets. Research and work done on millets in India have also shown the positive impact and usefulness of millets in dealing with malnutrition, management of diseases like diabetes, heart conditions, anemia as well as their climate resilience and contribution to nutrition security. The vibrant millet startup ecosystem in India has come up with innovative and functional products with millets. This is extremely useful if we are to make them as popular as wheat and rice. Although significant strides have been made by many stakeholders



in the promotion of millets there are still several aspects that need to be strengthened from both the demand as well as supply aspects.

#### **Consumer Awareness: A retrospective and forward view :**

Millets have been a part of the Indian food basket for hundreds of years. They are deeply ingrained in our food systems, culture, and traditions. They find mention in religious texts and are a part of many traditional Indian practices. Interactions with elders in the family and farmers throw light on their usage in older times. In the Indian subcontinent, millets were used as staple in most households prior to the Green Revolution.

There are many old Indian sayings that highlight the climate resilience of millets. Even if it rains day and night, Sanwa (Barmyard Millet) and Saathi (a variety of rice) will grow in sixty days.

Millets also find mention in the Krishna-Sudama meeting in Srimad Bhagwat, a religious text, where on return from Dwarka, Sudama is surprised to find his home resplendent.

He reflects that, Earlier it was difficult for him to even afford grains like Kodo and Sanwa (Barmyard millet) but now they have all kinds of delicacies.

Another folk saying tells us about the ways of consumption of different types of millets.

Finger Millet with fish, Proso millet with curd and Kodo millet rice will best be digested with milk.

Apart from the above references, cultural customs also reflect the prevalence and usage of millets. Millets are used for fasting purposes, songs sung by women during sowing and harvest times mention millets and in many communities, they were also used to bless the bride and groom during marriage ceremonies.

Although these miracle grains were traditionally a part of our food platter across the length and breadth of the country, their pres-

ence in our food plates reduced significantly over the years due to a multitude of factors. Socio-economic dynamics resulting from the hardy nature of the crop, relegated them to be the grain of the poor. They could grow without much input and even in the worst of lands. As a result, they were looked down upon. With the growing support for wheat and rice and easy availability, people moved easily from them due to a desire for upward mobility. In fact, in many places millets have been systematically discouraged from cultivation. Kodo Kutki Hatuo Sovuhen Lagao (Remove Kodo and Little millet and grow Soyabean) was a famous slogan in unified Madhya Pradesh until the early 2000s directed towards millet farmers and encouraging them to move towards oilseeds. All of these factors led to the steady decline of millets from our diverse food plates.

In the post-Covid era, there has been a renewed interest in eating healthy and millets are increasingly finding favour amongst many. The last two years have seen an upswing in the interest and conversation around millets.

The Prime Minister of India in his recent address during the opening ceremony of the International Year of Millets 2023, highlighted how the availability of food is being impacted by climate change. He also spoke about the pandemic and stressed the importance of making millet a future food option due to its health benefits, climate resilience, and potential for food security.

Despite this, there is a significant need for work on awareness and consumption of millets, both within and outside the country. A study assessing Millets and Sorghum Consumption Behavior in Urban India in 2021<sup>1</sup> found that the major reason the respondents did not eat more millets was that it was not eaten at home (40%), followed by reactions such as not liking the taste (22%).

Myths and misconceptions about millets still continue to be widespread. The same study



found that there was a significant gap between people who were health conscious (91%) and those who were sure millets were healthy (40%). In rural India, the challenge continues to be the socio-economic view on consuming millets which discourages widespread consumption.

The incidence of gluten intolerance and celiac disease (CD) is on the rise in the European and American markets. In Europe, the incidence of CD is seen to be increasing by 7.5% per year over the past several decades. Millets being naturally gluten-free and nutritious are a perfect alternative and the availability of millets on the shelves is slowly increasing. However, the consumption is limited amongst people with CD, gluten intolerances, or also possibly the Indian diaspora.

To increase demand and make them a regular food option, mission mode campaigning is required which not only encourages people to move towards millets but also counters the myths and misconceptions as well as demystifies their cooking.

#### **Production & Processing of millets :**

Government, startups, hotels, chefs, and even home chefs have been instrumental in reviving the interest in millets. With the advent of the International Year of Millets, many more people are joining the movement.

To keep this momentum going another aspect that needs attention is the production side of millets. At present, production is limited because millets are being grown only in certain pockets. In addition to this, the processing facilities are also limited and largely present in the southern part of the country.

While major millets like Finger millet, Pearl millet and Sorghum are still easily available due to the ease of post-harvest processing, minor millets like Foxtail millet and Little millet need to be de-hulled before consumption. The prices of these millets become higher due to logistical and transportation issues to the rest of the country. Due to these factors, the supply

of millets, especially the minor millets is erratic thereby discouraging further value addition and consumption.

To address this, production as well as processing needs to be supported and encouraged in different states. This will uniformly increase supplies match the demands and also keep a check on the prices. Unless the cost of production and processing can be brought down, it will be difficult to increase the mass consumption of millets.

We can encourage farmers to grow millets by linking them to markets. Traditional farming across the Gangetic plains used to see millets being grown as the first crop of the Kharif season as it ready to harvest in 60 days and still leave time for another crop. Systems like the Barahnaja (Twelve Seeds) from Uttarakhand and other mixed cropping practices in different states not only contributed to food security & soil fertility but also to diet and nutrition diversity by including millets, legumes, and other nutritious crops in the basket.

- Through the revival of traditional methods and increased facilities available for post-harvest processing and the creation of primary processing clusters at the farm level, we can increase the production and supply of millets in all parts of the country.

India has made many leaps in the processing of millets. While traditionally, the minor millets were hand pounded, we now have specialised machines that can de-hull millets with ease thereby bringing down the drudgery and cost associated with it and also improving the quality. De-hulling machines are available for multiple scales of operations, ranging from large-scale de-hullers to tabletop ones, and can be deployed accordingly.

Gluten-free value-added products made from millet can be developed for the export market. However, startups & industries will need to ensure they eat the stringent regulations in North American & European markets towards la-



bellings of gluten-free food. Millets are also the right fit for consumers who are on a vegan, vegetarian, and gluten-free diet due to their high-nutritional value.

A number of studies over the last few years have also substantiated claims made regarding the healing powers of millets. Doctors, nutritionists, and the medical community can be made more aware of these. A study published in August 2021 concludes that consumption of millets reduces hyperlipidemia and hence hypertension, and raises the levels of HDL-C (good cholesterol), which can be beneficial for managing the associated risk of developing hypertension and atherosclerotic cardiovascular diseases in the future.

Another study published in October 2021 showed that millets can reduce Anemia caused due to iron deficiency.

#### Way Forward:

In order to make this sustainable and truly manifest the spirit of the International Year of Millets, it needs to become a mass movement. IYM 2023 places the agenda of millet promotion on an international stage. Millets will now re-enter the food platters both nationally and internationally. However behavioural change takes time. It has taken us many years to forget eating millets and we need to make sure that they are not just seen as a fad. To give them their rightful & continued place in the food basket, concerted & sincere efforts need to be made by all actors in the ecosystem.

#### Conclusion:

Supporting farmers, creating an enabling environment for industry and startups, and increasing awareness among consumers are key to the future of millets. A number of steps have already been taken toward this through India's visionary leadership and the international agenda set for this year. With this momentum, the 'International Year of Millets' is all set to provide a unique opportunity to increase global production, improve processing and promote the

consumption of these Indian superfoods.

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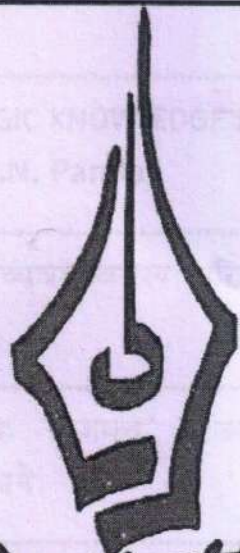
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## India's Wealth: Millet for Health

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**Abstract:** The Government of India has initiated the revival of millets in the past few years and declared 2018 as the "National Year of Millets" to raise awareness about its health benefits and boost millet production. They are labelled as "Nutri-cereals" due to their high nutrition quotient. Millets were included under Prime Minister's overarching scheme for holistic nutrition, POSHAN Abhiyan in the same year.

Under the leadership of the Prime Minister, the Government of India proposed at the United Nations for declaring 2023 as the International Year of Millets. India's proposal was supported by 72 countries and United Nations General Assembly declared 2023 as the International Year of Millets (IYM 2023) on 5th March 2021.

As India celebrated its glorious 76th Independence Day on 15th August 2022, in his speech from the ramparts of Red Fort, Prime Minister said that millets have been an integral part of India's legacy.

The celebration of 2023 as the International Year of Millets is a matter of immense pride for India and in particular for the farmer community. To take forward this declaration, the Government of India has decided to celebrate IYM 2023 by making it a peoples' movement or "Jan Andolan" to enhance awareness regarding millets as a healthy option for the food basket. Activities are also being taken up to propel demand creation of millets at both global and lo-

cal levels, for better remuneration to the farmers for its production, to provide protection of sources (soil and water), and creation of direct and indirect employment. India produces more than 170 lakh tonnes of millets per year and is the largest producer of millets in the world; accounting for 20% of global production and 80% of Asia's production. India's average yield of millets (1239 kg/hectare) is also higher than global-average yield of 1229 kg/hectare. Major millet crops grown in India and their percentage share of production are Pearl Millet (Bajra) - 61% share, Jowar (Sorghum)-27%, and Finger Millet (Mandua'Ragi) -10%.

In his addresses on various national and international forums, the Prime Minister has highlighted how India is honoured to be at the forefront of popularising millets that further nutrition, food security, and welfare of farmers. This also offers research and innovation opportunities for indigenous agriculture scientists and startup communities. Recently, in the popular talk show "Mann ki Baat", he mentioned that millets have been a part of our tradition, culture, and ancient civilisation, their relevance being cited in sacred texts such as Vedas, Puranas, and Tolkappiyam. From time to time, his addresses on millets have created an enthusiastic wave for the celebration of IYM 2023 in India.

### What are Millets?

Millets, popularly called "Mota Anaj" in Hindi, are a collective group of small-seeded annual grasses that are grown as grain crops, primarily on marginal land in dry areas of temperate, sub-tropical, and tropical regions. They are of the ancient foods dating back to the Indus Valley Civilisation, around 3000 BC. They are grown in almost 131 countries today. Currently, millets constitute the traditional food for 59 crore people across Asia and Africa.

In India, millets can be clubbed into major, minor, and pseudo categories.

**1. Major Millets:** Sorghum (Jowar), Pearl Millet



(Bajra), Finger Millet (Ragi/Mandua)

**2. Minor Millets:** Foxtail Millet (Kangani/Kakun). Proso Millet (Cheena), Kodo Millet, Barnyard Millet (Sawa/Sanwa/ Jhangora), Little Millet (Kutki)

**3. Pseudo Millets:** Buck-wheat (Kuttu) and Amaranth (Chaulai).

The top five states producing Millets are Rajasthan, Karnataka, Maharashtra, Uttar Pradesh, and Haryana.

**What is the importance of Millets?**

**Climate-friendly crop:**

A part from its health benefits, millets are resilient to climate change as they are pest free, adapted to a wide range of temperatures and moisture regimes, and demand less input of chemical fertilisers to grow; thus making them bio-diverse and climate- smart crops. These crops have low carbon and water footprints. Requiring minimum rainfall for their growth, they can even sustain in drought-prone areas.

**Viable options for small farmers:**

Due to the low investment needed for the production of millets, they millets prove to be a sustainable income source for small and marginal farmers.

**High in nutrition and health benefits:**

Millets are known to be a storehouse of nutrition as they are good sources of calcium, zinc, magnesium, phosphorous, copper, vitamin, iron, folate, carbohydrates, micronutrients, antioxidants and phytochemicals with nutraceutical properties.

They are gluten-free and are also considered good for celiac patients. The promotion of millets is now being seen as an effective strategy for tackling malnutrition in the country. The nutrition and health-packed millets hold special significance in today's times when people are gravitating to healthier options.

**Economic and food security:**

Once known as the 'poor man's food grain', millet have been cheaper in price in com-

parison to other food grains. Under India's National Food Security Mission the area, production of millets have increased. Over the years, the production of millets has increased from 14.52 million tonnes (2015-16) to 17.96 million tonnes in 2020- 21 (Department of Agriculture and Farmers Welfare). Its Exports are increasing exponentially as the demand for millets is increasing at a fast rate worldwide. With the growing demand for millets, it is creating more business opportunities for all stakeholders.

**Millet as a part of the Food basket**

The Government of India has initiated the revival of millets in the past few years and declared 2018 as the "National Year of Millets" to raise awareness about its health benefits and boost millet production. They are labelled as "Nutri-cereals" due to their high nutrition quotient. Millets were included under Prime Minister 'overarching nutrition, POSHAN Abhiyan in the scheme for holistic same year.

The Government of India also launched Mission POSHAN 2.0 in 2021 to tackle malnutrition and leverage traditional knowledge systems and popularise the incorporation of millets in local recipes in order to enhance the quality of supplementary nutrition.

Under the POSHAN Abhiyan every year, September is celebrated as Rashtriya Poshan Maah or National Nutrition Month across the country. The Ministry of Women and Child Development has further encouraged all States and Union Territories to incorporate millets in the recipes to enhance the nutritional quality of the meal provided under the Supplementary Nutrition Programme of Anganwadi Services. Millets are being mandatorily supplied at least once a week.

Balanced diets based on locally available low-cost nutritious foods and benefits of consuming millets are being shared with mothers' groups through the Anganwadis. Millets are being incorporated in supplementary nutrition in several States and Union Territories such



Odisha, Telangana, Chandigarh, etc.

### Initiatives towards making IYM 2023 a success

The Government has embarked on a nationwide Jan Andolan to enhance awareness and highlight the nutritional benefits of millets, positioning it as a modern-day healthy food that is easy to cook and quick to prepare. Various creative campaigns on several forums such as radio, print, social media, offline events, and activities are being taken up to break the stigma of millet being the "food of the poor", showcasing it as a superfood, combating misinformation, reviving lost recipes, thus making it as an essential part of the mainstream food basket. Millets have been showcased in various reputed events like India International Trade Fair, Dubai Expo and Surajkund Mela, etc.

Over 500 startups are working in millet value chain while the Indian Institute on Millet Research has incubated 250 startups under RKVY-RAFTAAR. More than Rs. 6.2 crores has been disbursed to over 66 startups while about 25 startups have been approved for further funding.

Food Safety and Standards Authority of India (FSSAI) is actively spreading awareness of the health benefits of the miracle crop by celebrating "Recipe Ravivar" every Sunday on social media platforms where each month is dedicated to a specific variety of millet. Over 100 Walkathons and Eat Right Melas have been organised in various cities across the country.

Besides this, under directions of the Union Minister of Health & Family Welfare, with a view to introducing healthier food options to people, Union Health Ministry has done away with fried food such as samosa, bread pakoras, and the like from its canteen menu in favour of healthier options such as millet roti, cheelas, etc.

The Government of India has launched a set of seven sutras in the run-up to IYM 2023 and has allocated different government departments for the same. The seven sutras outline areas in the enhancement of production, productivity, nutrition and health benefits, value addition, processing, and recipe development, entrepreneurship/startup, collective development, awareness creation-branding, labelling

and promotion, international outreach, and policy interventions for mainstreaming.

Of the seven sutras, nutrition and health benefits will focus on generating awareness regarding health and nutrition benefits by developing mass campaigns such as Eat Right Campaigns, enhancing steps to avail technology support for Indian Agricultural Research Institute (ICAR), SAUS and others like Indian Council of Medical Research (ICMR), National Institute of Nutrition (NIN), AYUSH, Indian Institute of Millets Research (IIMR), Central Food Technological Research Institute (CFTRI) and International Crops Research Institute for Semi-arid Tropics (ICRISAT) to research and collate evidence, promoting biofortification of millets, giving more focus on the digital publication of papers on millets, encouraging commissioning of studies by National/international reputed organisations, spreading awareness among mothers through Anganwadis. The Government also plans to establish Centres of Excellence on millets across the length and breadth of the country and link industries with these centres.

### Conclusion:

Due to various activities and efforts of different Departments and Ministries of Government of India and the states and UTs, momentum has kickstarted for popularising millets and turning it into a revolutionary movement. In line with Prime Minister's vision for a healthier India, time when the country is entering "Azadi Ka Amrit Kaal", there is a strong focus on Jan Bhagidari or people's movement to bring the spotlight on this superfood and for bringing this ancient food to the centre stage.

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**स्वातंत्र्योत्तर काळातील मराठी रंगभूमीचा प्रवास..**

**प्रा. डॉ. दुष्यंता देविदास रामटेके**  
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 सौ.के.एस.के महाविद्यालय बीड

**प्रस्तावना :-** १९४७ साली भारताला स्वातंत्र्य मिळाले. या काळात देशातील राजकीय, सामाजिक परिस्थिती अस्थिर होती. स्वातंत्र्य चळवळीतील अनेक अनपेक्षित घटनांमुळे संपूर्ण देश होरपळून निघाला होता. खुप मोठी मानसिक वैफल्यग्रस्त अवस्था समाजाची

झाली होती. डावे-उजवे यांचे देशातर्गत वाद, बेकारी, बेरोजगारी, अश्या अनेक समस्या देशात होत्या. जाता-जाता ब्रिटिशांनी भारतीय समाजामध्ये फूट पाडली होती. ठिकठिकाणी जातीय वाद आणि जातीय दंगली उसळत होत्या. जाळपोळ, दंगली, या घटना महाराष्ट्रातही घडत असल्याने येथील जनता निराशेच्या वातावरणात गुंतलेली दिसून येते. मराठी माणुस हा कलारसीक आहे. मात्र या अस्थीर परिस्थितीमध्ये कलाक्षेत्र देखील प्रभावीत झालेले होते. याचा परिणाम मराठी नाटक आणि मराठी रंगभूमीवरही पडल्याचे दिसते. एकीकडे या रंगभूमीवर पौराणिक, ऐतिहासिक नाटकांचे प्रमाण कमी होत चालले होते. चित्रपटांचा प्रभाव वाढत होता. अश्या

वेळी मराठी रंगभूमीला उतरती कळा लागल्यांचे चित्र निर्माण झाले होते. वास्तविक पाहाता खाडीलकरांसारखे प्रचितयश नाटककार, आणि बालगंधर्व, गोविंदराव टेंभे, बापुराव पेंढारकर, चिंतामणराव कोल्हटकर अशी मातब्बर नावे मराठी रंगभूमीवर गणल्या जात होती. मात्र स्वातंत्र्यानंतर हि परिस्थिती पार बदलून गेली होती. मराठी नाटकांना थिएटर उपलब्ध होत नव्हते. मराठी नाटकांना प्रेक्षक उपलब्ध होत नव्हते. परिणामी मराठी रंगभूमीचे चित्र विस्कळीत झाले होते. मराठी रंगभूमीला कलात्मक उर्जेची गरज भासू लागली होती. अश्यावेळी काही नाटककार आणि त्यांच्या नाटकांनी मराठी रंगभूमीला पूर्वपदावर आणल्याचे दिसून येते.

**उद्देश :-** भारतीय स्वातंत्र्यनंतर मराठी रंगभूमीची दुरावस्था, आणि उतरतीचा काळ यांचे अवलोकन करून, ज्या नाटकांनी आणि नाटककारांनी या पडत्या काळात मराठी रंगभूमीला जीवदान दिले, त्यांच्या नाटकांचा अभ्यास करणे आवश्यक आहे. या अटीतटीच्या काळात मराठी रंगभूमी कशी सावरत





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गेली याचे विस्तृत विवेचन शोध प्रबंधातून केलेले आहे.

**स्वातंत्र्योत्तर मराठी रंगभूमी :-** स्वातंत्र्य मिळाल्यानंतरही पाच सात वर्षे राजकीय परिस्थिती स्थिर होण्यात लागली. होती. या काळात अनेक आंदोलने चळवळी, सुरु होत्या. अशा काळात काही नाटककार आणि त्यांच्या आशय प्रधान नाटकांनी मराठी रंगभूमीला संजीवनी दिल्याचे दिसते. त्यात आचार्य अत्रे यांचा उल्लेख करावा लागेल. अत्र्यांनी स्वातंत्र्यापूर्वी म्हणजे १९३०-३१ पासूनच नाट्य लेखणाला सुरुवात केली होती. १९३३ ते १९४३ हे दशक तर अत्र्यांच्या नाटकांचे दशक होते. अत्रे हे कवी आणि विडंबनकार म्हणून मराठी माणसाला परिचित तर होतेच. मात्र त्यांच्या 'साष्टांग नमस्कार' या नाटकाने ते नाटककार म्हणूनही प्रसिद्ध झाले त्यांच्यातली विनोदबुद्धी या नाटकातून आपल्याला दिसून येते. या नाटकात 'सुर्य नमस्कार घालणे' या अतिशय सुंदर अशा संकल्पनेची जर अतिशयोक्ती झाली तर काय होऊ शकते, यांची विनोदपूर्ण मांडणी अत्रेनी केलेली आहे. स्वातंत्र्य लढयाच्या या मानसिक ताण तणावात असलेल्या मराठी रसीकांना अत्र्यांनी हसायला शिकवले असे म्हटले. तर ते चुकीचे ठरणार नाही. अत्र्यांनी वंदे भारतम्, मी उभा

आहे, लग्नाची बेडी, मोरुची मावशी, भ्रमाचा भोपळा अशी विनोदी अंगांनी जाणारी नाटके लिहीली. अत्र्यांनी या प्रकारे मोठ्या प्रमाणात विनोदी नाट्यलेखन करून रंगभूमीच्या माध्यामातून मराठी रसीकांचे मनोरंजन केलेले आहे. वि.भा.देशपांडे असे लिहीतात. कि, 'अत्रे यांनी जशी विनोदप्रधान नाटके लिहीली, तशीच गंभीर प्रकृतीची नाटके लिहीली.' उदयाचा संसार, घराबाहेर, जग काय म्हणेल? हि तीन नाटके मराठी नाट्यलेखन आणि रंगभूमीवर आपले स्थान राखून आहेत. याचे कारण जी केवळ गंभीर प्रकृतीची आहेत म्हणून नाही तर विषय, आशय, मांडणी, यांचे वेगवेगळेपण घेऊन आल्यामुळे आहेत. १) आपल्या लेखणाने अत्रे यांनी मराठी रंगभूमीला उब दिल्याचे दिसते. त्यानंतर आपल्या नाट्य लेखणाने मराठी रंगभूमी समृद्ध करणारे नाटककार म्हणजे मोतीराम गजानन रांगणेकर होय. रांगणेकरांनी लिहिलेल्या नाटकांनी मराठी रंगभूमीवर भरीव अशी कामगिरी केली. रांगणेकरांनी कुलवधू, नंदनवन, आशिर्वाद, मासे, घर, एक होता म्हातारा, रभां, कोणे एके काळी, भटाला दिली ओसरी अशी एकापेक्षा एक नाटके लिहीली. त्यांनी आपल्या नाट्य लेखणातून पौराणिक, ऐतिहासिक किंवा कल्पनारम्य असे विषय न निवडता, सामाजिक प्रश्नांना आपल्या नाटकातून



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मांडलेले दिसते. तात्कालीन सामाजिक व कौटुंबिक प्रश्नांची गुंफन रांगणेकराच्या नाटकातून पहायला मिळते. विशेषतः मध्यम वर्गीय मराठी माणसांचे प्रश्न हे रांगणेकराच्या नाटकाचे मुळ होते. रांगणेकरांनी 'नाटयनिकेतन' नावाची संस्था स्थापन केली होती. या संस्थेमार्फत नाटक सादर करताना रांगणेकरांनी आशय-विषया सोबतच नाटय तत्रांचा देखील आपल्या नाटकातून पुरेपुर वापर केल्याचे दिसते. याबाबत डॉ. रुस्तुम अचलखांब असे लिहीतात. की, 'रांगणेकराच्या नाटकांचे तंत्र विषयक निराळेपण केव्हाही वाखाणण्यासारखे होते. रांगणेकरांच्या आधिची नाटके प्रकृतीवर आधारलेली नव्हती तर ती समाजाच्या विकृतीवर आधारभुत होती. मात्र रांगणेकरांची नाटके सामाजाच्या विकृतीचा आश्रय न घेता समाजाच्या प्रकृतीचे दर्शन घडवीणारी ठरली. २) यावरून लक्षात येते की रांगणेकरांनी आपल्या नाटकातून वैशिष्ट्यपूर्ण आणि जीवंत व्यक्तिरेखा निर्माण करून मराठी रंगभूमीवर त्या अजरामर केल्या.

पुढच्या काळात म्हणजे १९६० ते १९९० मध्ये अनेक मराठी नाटककारांची फळी मराठी रंगभूमीवर आल्याचे आपल्याला दिसून येईल. त्यात शिरवाडकर, तेडूंगकर, जयवंत दळवी, महेश एलकुंचवार, प्रेमानंद गज्जी, सतीश आळेकर इत्यादी नाटककारांची नावे

घेता येतील. रत्नाकर मतकरी, अनिल बर्वे, आनंद म्हस्वेकर या नाटककारांनीही मराठी रंगभूमीसाठी मोलाचे योगदान दिले आहे. रंगभूमीच्या पडत्या काळात या नाटककारांनी मराठी रंगभूमीला सावरण्याचे कार्य केल्याचे दिसते. याच्या नाटकांनी मराठी रंगभूमीला नवी उर्जा मिळत होती. श्रीमंत, मधल्या भिंती, माणूस नावाचे बेट, किरवंत, गांधी आणि आंबेडकर, तनमाजोरी, देवनवरी, कावळ्यांची शाळा, गिधाडे, घाशीराम कोतवाल, सखाराम बाईंडर, पुरुष, कालचक्र, रंग उमलत्या मनाचे, मी माझ्या मुलांचा, वटवट सावित्री, ऐन यौवनात मी, सुर्यास्त, संध्याछाया, पाढरा बुधवार, रंगयात्री, काळोख देत हुंकार, छावणी, तो मी नव्हेच, रायगडाला जेव्हा जाग येते, अमलदार, ती फुलराणी, तीन पैशाचा तमाशा, तुझे आहे तुझ पाशी अश्या ऐतिहासिक, सामाजिक, कौटुंबिक नाटकांचे मराठी रंगभूमीवर उधाण आले. या सर्व नाटकांमुळे मराठी रंगभूमीला एक उर्जावस्था प्राप्त झाली होती. याच काळात इंग्रजी नाटकांचे भाषांतर करून मराठीतून सादर करण्यांची प्रथाच जणु सुरु झालेली होती. त्यात नट सम्राट, सुर्य पाहीलेला माणुस, एन्ड गेम, अजब न्याय वर्तुळाच्या, त्रीकोणाची चौथी बाजू अशी नाटक ही मराठी रंगभूमीवर आली आणि या सर्व नाटकांनी



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मराठी रंगभुमीला विदेशी रंगतत्रांशी जोडण्याचे काम केले. विदेशी नाटककार अभिनेते नाटय अभ्यासक इब्सेन, मोलीयर, जॉन्सन, शेक्सपीयर, बर्टोल ब्रेक्थ, मेअर होल्ड यांचा मराठी रंगभुमीवर प्रभाव जाणवू लागला. नार्वेमध्ये जन्माला आलेला जगप्रसिध्द नाटककार इब्सेन यांच्या नाटय लिखाणचा प्रभाव असलेली घोस्ट, डॉल्स हाऊस, वाइल्ड डक अशी नाटके आपल्याकडे पहायला मिळतील. एकूणच या काळात मराठी रंगभुमीने कात टाकल्याचे चित्र निर्माण झाले होते. आणि पुन्हा नव्या उर्जेने, नव्या उमेदीने मराठी रंगभुमी पुढे वाटचाल करू लागली आहे.

**समारोप :-** स्वातंत्र्योत्तर काळातील मराठी रंगभुमीला अभ्यास करताना आपल्या लक्षात येईल, कि या काळात मराठी रंगभुमीने सामान्य माणसांचे सामाजिक

प्रश्न आपल्या नाटकातून मांडले, आणि त्यांचबरोबर विनोदी व प्रहसन (फार्स) युक्त नाटकही रंगभुमीवर सादर झाले. मनोरंजना सोबतच प्रबोधनाचे कार्य देखील या काळात मराठी रंगभुमीने केलेली आहे. नवनवीन विषय, आशय असलेली नाटके या काळात मराठी रंगभुमीवर सादर झालेली आहे. म्हणूनच मराठी रंगभुमीचा हा प्रवास प्रेक्षकांना आकर्षित करण्यास यशस्वी झाला आहे. असे म्हणता येईल.

#### संदर्भ सुची :-

- १) वि.भा. देशपांडे - मराठी नाटक आणि रंगभुमी, व्हीनस, प्रकाशन पुणे, प्रथमावृत्ती, पृष्ठ क्र. ९१
- २) डॉ. रुस्तुम अचलखांब- मराठी रंगभुमीचे प्रारंभपर्व, वर्षा प्रकाशन औरंगाबाद. पृष्ठ क्र. ११५



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## पारंपारिक लोककला और आधुनिक नाटक- एक विवरण

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प्रास्ताविक :- मराठी नाटक रंगमंच का अगर हम इतिहास देखते हैं तो यह ध्यान में आता है की महाराष्ट्र के पारंपरिक लोकरंगमंच की तुलना में मराठी नाटक रंगमंच बिल्कुल नया है। लोकरंगमंच का शोध हमें बारहवीं शताब्दी तक लेकर जाता है। संत ज्ञानेश्वर महाराज के ज्ञानेश्वरी नामक ग्रंथ में हमें पारंपारिक लोककलाओं का (भारुड आदी) संदर्भ देखने को मिलता है। साथ ही नाथ महाराज के भारुड और संतो के लिखे गवलन भी सदीयों से चली आ रही है। लोकरंगमंच पर प्रस्तुत होनेवाले विधीनाट्य और लोकधर्मी नाटकों की भी प्राचीन परंपरा महाराष्ट्र भूमी में सदीयों से देखने को मिलती है। जागरण, गोंधल, भारुड हो या वारकरी कीर्तन, नारदीय कीर्तन हो, या फिर ईश्वर का नामजप करने वाले भजन हो, इनकी एक प्रदीर्घ परंपरा तो महाराष्ट्र में है ही, साथ में वासुदेव, भुत्या, पोतराज, जोगतीन, मसणजोगी, कुरमुड्या जोशी, बहुरूपी, और पिंगला जैसे लोककलाकार आज भी महाराष्ट्र के गांव गांव में देखने को मिलते हैं। इन में से कुछ लोककलाएं और लोककलाकार आज नामशेष हो रहे हैं फिर भी आज इन लोककलाओं की परंपरा ग्रामीण इलाकों में देखने को मिल जाती है।

इन लोककलाओं की तुलना में मराठी नाटक रंगमंच बिल्कुल ही नया है। इस १८४३ में विष्णुदास भावे ने 'सीता स्वयंवर आख्यान' नामक नाटक मराठी रंगमंच

पर खेला, और वही से मराठी रंगमंच का आरंभ हुआ। इस से पूर्व भी मराठी रंगमंच पर बहुत सारे नाटक खेले गये थे किंतु, १८४३ से ही मराठी रंगमंच की शुरुवात मानी जाती है। (१) वैसे मराठी रंगमंच पर कर्नाटकी नाटकों का प्रभाव रहा है। मराठी रंगमंच का उदय होने से पहले कर्नाटक से आनेवाले कुछ नाटक महाराष्ट्र के सातारा, सांगली जैसे शहरों में प्रस्तुत किये जाते थे। साथ की कोकण प्रदेश में कुछ दशावतारी नाटकों की प्रथा भी थी। इन्हीं नाटकों के देखकर विष्णुदास भावे को मराठी रंगमंच के लिए कुछ लिखने की प्रेरणा मिलती गयी। कर्नाटकी और दशावतारी नाटकों की तराह ही मराठी में भी नाटक होना चाहिए ऐसा उन्हें लगा। और इन नाटकों से प्रेरित होकर विष्णुदास भावे ने 'सीता स्वयंवर आख्यान' नामक नाटक की रचना की। यह एक काव्य नाटक होने की वजह से इसके सभी संवाद पद्यरूप में ही हैं। और मराठी रंगमंच की शुरुवात करने के लिए यह काफी था। उस समय भागवत मेले भी महाराष्ट्र में हुआ करते थे। इन सभी कला प्रकारों के प्रभाव से ही मराठी रंगमंच का जन्म हुआ है।

मराठी नाटक रंगमंच और मराठी लोकरंगमंच ने धिरे धिरे मराठी दर्शकों के मन में अपना स्थान बना लिया। इसने दर्शकों का मनोरंजन भी किया और साथ में प्रबोधन जैसा कार्य भी किया। किंतु समय के साथ साथ मराठी



नाटक रंगमंच और मराठी लोकरंगमंच में कौन से बदलाव हुए, और उसने आज के आधुनिक समाज को क्या प्रदान किया, इसका तुलनात्मक अभ्यास इस लघु शोध प्रबंध के माध्यम से हम जानेंगे।

आज का लोकरंगमंच :- लोकरंगमंच को हम प्राचीन रंगमंच कहते हैं फिर भी आज के लोकरंगमंच पर बहुत सारे बदलाव हमें देखने को मिलते हैं। हमारा लोकरंगमंच आज प्राचीनता से दूर होता नजर आ रहा है। पुरी रात चलने वाले जागरण और गोंधल जैसी कलाएँ आज दो ढाई घंटों में सीमित होकर रह गयी हैं। इसका कारण यह है की आज इन कलावों के लिए ज्यादा दर्शक उपलब्ध नहीं होते हैं। यजमान और कुछ गाव के बुजुर्ग ही दर्शकों के रूप में उपस्थित होते हैं। भजन कीर्तन जैसी कलाएँ भी कम समय में कम दर्शकों के सामने प्रस्तुत की जाने लगी हैं। दर्शकों के अभाव के कारण भारुड जैसी प्रबोधनकारी कला भी पिछड़ती जा रही है। इन सभी लोककलावों पर आज आधुनिकता का प्रभाव देखने को मिलता है। पारंपरिक ढंग से प्रस्तुत होनेवाले गण, गवलण, पौराणिक कथा, और उन में मौजूद अध्यात्मिक ज्ञान भी लोकरंगमंच से दूर होता नजर आ रहा है। इन लोककलावों में जो गीत प्रस्तुत किये जाते हैं, उन गीतों को भी आधुनिक मराठी हिंदी सिनेमा के प्रचलित गीतों की चाल दी जाती है। दर्शकों को आकर्षित करना ही इसका उद्देश्य होता है, किंतु इस कारण लोकगीतों को पारंपारिकता नष्ट होती नजर आ रही है। धर्मश्रद्धा का भाव रखने वाली कलाएँ और उसे प्रस्तुत करनेवाला कलाकारों की आज और भी गंभीर

स्थिती है। पिछी दर पिछी पारंपरिक लोककलावों का प्रस्तुतिकरण करनेवाले वासुदेव, पोतराज, जोगती-जोगतीन, भुत्या, मसणजोगी, बहुरूपी और पिंगला जैसे कलाकारों की दुर्दशा हो रही है। औद्योगिक क्रांती के बाद बहुत से गावों का शहरीकरण हुवा है। लोग नौकरी और व्यापार की तलाश में गाव से शहरों की ओर दौड़ रहे हैं। इसी कारण से इन लोककलाकारों को दर्शकों की कमी महसूस हो रही है। इन कलाकारों की कला ही उनका पेशा है, किंतु उनके परिवार के लिए आवश्यक आर्थिक उत्पन्न भी उन्हें नहीं होता। इसी कारण से इन कलाकारों में निराशा के भाव दिखाई देते हैं। कुछ कलाकार तो अपनी इस कला को त्यागकर अन्य व्यावसायिक करते नजर आ रहे हैं। लोकरंगमंच पर से चित्रकथी, नदी बैलवाला, बहुरूपी, बालसंतोस, और पिंगला जैसे कला प्रकार तो आज पुरी तराह खत्म हो गये हैं। और इन कलावों को प्रस्तुत करनेवाले कलाकार भी आज कहीं दिखाई नहीं देते।

'तमाशा' महाराष्ट्र का बहुत ही लोकप्रिय कला प्रकार है। किंतु आज तमाशा की भी लोकप्रियता नीचे गिरती दिखाई दे रही है। पठे बापूराव, भाऊ फक्कड, काळू बाळू, विठाबाई नारायणगावकर, चंद्रकांत ढवळपुरीकर जैसे कलाकारों ने तमाशा को जितनी उंचाई पर पहुँचाया, आज वो बात नहीं रही। 'पहले कलगी-तुरा, और सवाल जवाब के भाग तमाशा में होते थे, पारंपरिक गण, गवलण, और लावणी तमाशा में प्रस्तुत किये जाते थे। किंतु आज तमाशा के इन घटकों का स्थान फिल्मी आर्केस्ट्रा ने ले ली



है।' (२) आज भी रघुवीर खेडकर, मंगला बनसोडे, मालती इनामदार, संध्या माने, नितीन ढवळपुरीकर जैसे तमासगीरों ने तमाशा जैसी अद्भुत कला को जीवित रखा है। किंतु उसमें आज पारंपरिकता का अभाव देखने को मिलता है। ग्रामीण प्रदेशों में होनेवाले जत्रा उत्सव में तमाशा कला के प्रयोग प्रस्तुत किये जाते हैं। किंतु अंगप्रदर्शन, अश्लिल हावभाव, और उन्माद में तमाशा की पारंपारिक पवित्रता कहीं खोकर रहा गयी है। परिणामतः हम ऐसा कह सकते हैं की आज आधुनिकता के प्रभाव में महाराष्ट्र का लोकरंगमंच पिछड़ा हुआ लगता है।

आज का मराठी नाटक रंगमंच :- मराठी रंगमंच का आरंभ हुए देड शताब्दी से ज्यादा का समय हुआ है। इस काल में मराठी रंगमंच ने बहुत उतार चढ़ाव देखे हैं। पौराणिक रंगमंच और संस्कृत रंगमंच के साथ ही जब हिंदी, बंगाली, कानडा, गुजराती रंगमंच का विकास हुआ तब ही मराठी रंगमंच भी विकसित हुआ। और मराठी रंगमंच समृद्ध होता चला गया। इस रंगमंच ने एक जमाने में बालगंधर्व, काशिनाथ घाणेकर, प्रभाकर पणशीकर से लेकर डॉ श्रीराम लागू, मोहन आगाशे, लालन सारंग, विजया मेहता, और सयाजी शिंदे तक अनेक कलाकारों को उनके द्वारा प्रस्तुत की गयी व्यक्तिरेखाओं को बुलंदी पर पहुंचाया। भावे, किलोस्कर, कोल्हटकर, देवल, खाडिलकर, और गडकरी जैसे नाटककारों ने मराठी रंगमंच के लिए बहुत लेखन किया। आज अत्रे, तेंडूलकर, देशपांडे, आळेकर, गजवी जैसे नाटककारों ने मराठी रंगमंच पर सामाजिक भावनाओं को जागृत करने का

काम किया। और आज शफाआत खान, महेश एलकुंचवार, रामनाथ चव्हाण, वि वा शिरवाडकर, केदार शिंदे, चंद्रकांत कुलकर्णी ने मराठी रंगमंच को आधुनिकता का साज चढ़ाया। प्रस्तुतिकरण के संदर्भ में अगर चर्चा की जाये तो वाडा चिरेबंदी, तो मी नव्हेच जैसे नाटकों का नाम लिया जा सकता है। रंगमंच पर आधुनिक तंत्रज्ञान का प्रयोग कर के इन नाटकों का नेपथ्य बनाया गया था। तो मी नव्हेच नाटक में पणशीकर की चार चार भूमिकाएँ थी, और हर दृश्य में नेपथ्य बदल जाता था। इस नाटक में पहली बार घुमते हुए रंगमंच का प्रयोग किया गया था। जानता राजा, और रायगडाला जेव्हा जाग येते जैसे ऐतिहासिक नाटकों में आधुनिकता का अधिकतम प्रयोग हुआ है। ऐतिहासिक दृश्य, साज सज्जा और नेपथ्य की भव्यता हमें इस नाटक में देखने को मिलती है।

आधुनिक मराठी नाटक की चर्चा करें तो चाहूल, केस नं ९९, राहिले दूर घर माझे, कॉल मी कॅप्टन रॉबर्ट जैसे नाटकों में भी हमें नेपथ्य रचनाकारों की कल्पकता देखने को मिलती है। आधुनिक नाटकों में प्रायोगिक रंगमंच पर तो ऐसे प्रयास होते ही रहते हैं किंतु व्यावसायिक रंगमंच पर भी ऐसे कल्पक प्रयासों को देखा जा सकता है। व्यावसायिक नाटकों में पती सगळे उचापती, श्रीमंत दामोदर पंत, और सही रे सही अलग प्रवाह के नाटक हैं। इन नाटकों में नेपथ्य, संगीत, प्रकाश, रंगभूषा, वेशभूषा सभी देखने लायक हैं। आज की स्थिति में लैपटॉप पर संगीत का आयोजन किया जाता है, इसलिये उसमें शार्पनेस दिखाई देता है। सही रे सही नाटक का नेपथ्य,



दिवाणखाना, तीन बेडरूम, और एक ड्रॉइंग रूम इतना सब दिखाया गया है। इसके बावजूद अभिनय स्थान (acting area) में कोई कमी दिखाई नहीं देती। इस नेपथ्य में हमे निर्देशक और नेपथ्य रचनाकार के कल्पनाशक्ती का तर्क लगाया जा सकता है। आज मराठी रंगमंच पर अभिनय की बात करे तो नैसर्गिक अभिनय को आज अधिक महत्व दिया जाता है। पहले जैसी लंबे चौड़े संवादों में जो नाटकीयता होती थी, वह आज दिखाई नहीं देती है। मेलोड्रामाटिक नाटकों की संख्या भी कम होती नजर आ रही है। इन सभी से यह तर्क लगाया जा सकता है की आज का मराठी रंगमंच आधुनिक तंत्रज्ञान का उपयोग कर के अपनी कल्पकता के आधार पर विकसित हो रहा है। नये विषयों के नाटक, और उसके किये गये नये नये प्रयोग मराठी रंगमंच पर दिखाई दे रहे हैं।

गृहीतक

१) मराठी नाटक रंगमंच और मराठी लोक रंगमंच पर आज आधुनिकता का प्रभाव दिखाई देता है किंतु आधुनिकता का अत्याधिक प्रयोग नहीं होना चाहिए।

२) आधुनिकता और सिनेमा, टीव्ही, मोबाईल के कारण रंगमंच के दर्शकों की संख्या कम होती जा रही है।

३) बदलती स्थिति के अनुसार कला के क्षेत्र में भी बदलाव जरूरी है किंतु इसमें हमारी संस्कृति और परंपरा खोनी नहीं चाहिए।

निष्कर्ष :- इस अभ्यास से यह ज्ञात होता है की यहा कला की प्राचीन परंपरा रही है। किंतु संयुक्त के अनुसार उसमे कुछ बदलाव भी आले गये हैं। तंत्रज्ञान का प्रयोग कर के

हम सामाजिक स्तर पर मानवी संवेदनाओं को साथ लेकर अपनी कला का प्रदर्शन करना आवश्यक है। बदलाव स्वीकार कर के हमे आगे बढ़ना चाहिए।

संदर्भ सूची

१) रविंद्र लाखे - काल आज आणि उद्याचे मराठी नाटक, प्रकाशित लेख, रुची मे/जून २०२१

२) प्रा अनिल सहस्त्रबुद्धे - लोककला, आई प्रकाशन, प्रथम संस्करण, पृ. क्र. ६७.



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### प्रदर्शनकारी कलाओं में स्थित नाट्यत्मकता

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नाट्यशास्त्र विभाग, सौ. के. एस. के. कॉलेज, बीड

जो कलाएँ रंगमंच पर प्रस्तुत की जाती हैं उन्हें हम प्रदर्शनकारी कला या प्रयोग कला कहते हैं। उन कलाओं का प्रदर्शन या प्रस्तुतिकरण होता है, यानी उनका प्रयोग हो रहा होता है। इसीलिये इन्हें प्रयोग कला भी कहा जाता है। भरतमुनी ने अपने नाट्यशास्त्र ग्रंथ में संगीत, नृत्य, और नाट्य यह तीन प्रयोग कलाओं का विवेचन किया है। इन कला के विविध अंगों पर विचार गाभिर्य, तर्क दृष्टि, सूक्ष्म विवेचन और सहेतुक भाषा विलास से जानकारी देने से नाट्यशास्त्र का महत्व और उसका शास्त्रीत्व हमें दिखाई देता है। और उसमें सूक्ष्म निरीक्षण करके तर्कपूर्ण दृष्टि से भरतमुनी ने अपने विचार स्पष्ट किये हैं। उसने भरत ने नाटक और अन्य कलाओं के प्रदर्शन सहज रूप से होकर, उससे योग्य रस निष्पत्ती होने के लिये भरत ने अपने कुछ नियम/ कुछ विचार स्पष्ट किये हैं। भरत के यह नियम केवल संगीत, नृत्य और नाटक के लिए ही सीमित नहीं हैं, बल्कि रंगमंच पर प्रस्तुत होनेवाली सभी कलाओं के लिए हैं। इसमें लोकरंगमंच और खुला रंगमंच पर प्रस्तुत होनेवाली कलाएँ भी आती हैं। आज तक मराठी रंगमंच पर जो जो कलाएँ प्रस्तुत की जाती हैं उन कलाओं के मूल में नाट्य का होना अनिवार्य है। सभी कलाओं का मूल आधार नाट्य होता है, इसी कारण भरत ने जो नाट्य की व्याख्या बताई है, उसका विवेचन यहाँ किया गया है। साथ ही कुछ

प्रदर्शनकारी कलाओं में स्थित नाट्य धुँडने का प्रयास भी किया गया है।

**नाट्यकला :-** भरतमुनी जो नाट्यकला कहते हैं, वह नाट्यशास्त्र के नियमों से प्रेरित होकर प्रस्तुत की गयी नाटकला है। उससे बहुत बताते स्पष्ट हो जाती है। नाटककार जब कोई कहानी लिखता है, उसका नाट्य रूपांतर करता है, तब वह रंगमंच के मर्यादाओं का भी ध्यान रखता है। नाटककार का वह नाटक जब निर्देशक के पास आता है तब वह नाटककार के कहानी के भाव को सहज रूप से दर्शकों तक पहुँचाने के लिए नाटक के शास्त्र का आधार लेता है। और इसी प्रकार वह नट और रंगतंत्र के माध्यम से नाटककार के विचार दर्शकों के सामने रखता है। किंतु कथा के विचारों को दर्शकों के सामने लाने से पहले निर्देशक अपनी कल्पना से रंगसौंदर्य का भी विचार करता है। रंगमंच पर प्रस्तुत होनेवाली कला के लिए आवश्यक सौंदर्य दृष्टि उसके पास होती है। उसी दृष्टि से वह नाटककार के नाटक को रंगमंच को मर्यादाओं में बाँधकर उसे एक आकार देता है। उसके पश्चात् रंगमंच पर जो कला का अविष्कार होता है उसे ही वही प्रयोग कला के रूप में सिद्ध होती है।

नाटककार और निर्देशक को इसके लिए आवश्यकता होती है ऐसे अभिनेता की जो उस कहानी के पात्रों को न्याय दे सके। क्योंकि नट ही अपने अभिनय से नाटक के



पात्रों को जीवित कर सकता है। और नाटक का प्रत्येक दृश्य जीवित कर के दर्शकों के सामने प्रस्तुत कर सकता है। "नट नाटक को सफल या असफल बना सकता है, इसीलिये अभिनेता के अस्तित्व को मिटाकर पुर्णतः निर्देशक की रंगभूमी सजाने का प्रयास गार्डन क्रेग करता है।" (१) किंतु भारतीय रंगमंच पर हमें ज्यादातर अभिनेता की ही रंगभूमी देखने को मिलती है। खैर...। तो अभिनेता के पास ऐसा क्या गुण होता है जिससे वह अपनी कलाकृति को बदल सकता है या उस कलाकृति को अपनी शैली में प्रस्तुत कर सकता है? तो अभिनेता अपने अभिनय सामर्थ्य के माध्यम से उस पात्र को अपेक्षा से परे जाकर ऊंचाई प्रदान करता है, और उस नाट्यकृति को और भी शानदार ढंग से पेश करता है। अभिनेता का यही गुण नाट्यकला में रंग भरने का कार्य करता है। इसी कारण हम कह सकते हैं कि अभिनेता उन प्रायोगिक कला का सर्वेसर्वा होता है। देवेंद्र राज अंकुर अपने 'रंगमंच का सौंदर्यशास्त्र' ग्रंथ में विवेचन करते हुए कहते हैं कि, "प्रदर्शनकारी कलाएँ जिनमें मुख्यतः संगीत, नृत्य और नाट्य जैसे वे कलारूप हैं, जिनका माध्यम भी मनुष्य है, और रचीयता भी मनुष्य है। अर्थात् यहाँ साधन और साध्य एक ही तत्व हैं, और वह मनुष्य नामक जीवन्त तत्व है।" (२) इसका अर्थ, हम जिन्हें प्रदर्शनकारी कला या नाट्यकला कहते हैं, उन कलावों को जीवित रूप प्रदान करने के लिए अभिनेता आवश्यक तत्व है। और अभिनेता जिनके लिए यह कला प्रस्तुत करता है वे दर्शक होते हैं। इससे नाट्यकला के साधक और साध्य जीवित मनुष्य ही होते हैं यह सिद्ध होता है। इसी कारण उस

कलाकृति में नाट्य होता है, उससे ही नाटक में घटनाएँ घटित होती हैं। और दर्शकों को उस नाट्यकृति से सत्य का आभास होता है।

जब हम नाट्यकला में स्थित नाट्य का शोध करते हैं तब हमें अभिनेता, उसकी अभिनय शैली, नाटक के दृश्य और नाटक के अन्य घटकों का भी विचार करना पड़ता है। तब हमें ज्ञात होता है कि केवल एक घटक ही नाट्यकला में नाट्य का निर्माण नहीं कर सकता। ऐसी स्थिति में हमें रंगमंच के अन्य घटकों का भी गंभीरता से विचार करना आवश्यक हो जाता है। जब भी नाटक में अंतर्भूत शिल्प और संरचना की बात आती है तब तब हम नाटक के बाह्यअंग पर ही निर्भर रहते हैं, नाटक कैसा है, उसमें पात्र कितने हैं, उसमें अंक और दृश्य कितने हैं। ज्यादातर नाटक के पात्र, संवाद और अभिनय की चर्चा होती है। ये सभी तत्व उपर से अलग लगते हुए भी, प्रस्तुतिकरण के समय यह एकरूप हो जाते हैं। इन सभी तत्वों से मिलकर ही नाटक का मंचन होता है। इनको अलग अलग कर के हम नाट्य की अपेक्षा नहीं कर सकते। कोई भी कला जब उसके सभी तत्वों के साथ संमिश्र रूप से प्रस्तुत होती है तभी हमें नाट्य का अनुभव होता है। काल और अवकाश यह संकल्पनाएँ भी उसके लिए आवश्यक होती हैं। "नाटक ही एकमात्र दृश्य श्राव्य प्रयोग कला है, जो कालावकाश के साथ प्रस्तुत होती है। अन्य साहित्य के जैसे ही नाटक भी आशय प्रधान कला है, किंतु उसका ऐहिक और ससंवेदना से प्रस्तुत होना भी महत्वपूर्ण होता है। और इसी कारण नाटक में मौजूद काल और अवकाश का अभ्यास प्रयोग कालावो के आस्वाद रुची, और



आकलन के लिए आवश्यक बन जाता है। (3) जब रंगमंच पर नाटक खेला जाता है तब विषय, संवाद, दृश्य, प्रसंग, और पात्रों के साथ साथ रंगमंच का तंत्र जैसे नेपथ्य, प्रकाश, संगीत, वेशभूषा, रंगभूषा इनका भी उतना ही महत्व होता है। इन सभी नाट्य तत्वों का जब यथार्थ मिश्रण तैयार होता है, तब ही नाटक की कहानी अपने चरमबिंदू तक पहुँच पाती है। और नाटक के हर दृश्य में नाट्य निर्माण होने का आभास दर्शकों में उत्पन्न होता है। यह सत्य का आभास कभी कम कभी ज्यादा होने के कारण ही हम नाटक को प्रयोग कहते हैं। नाटक एक जीवन्त कला होने के कारण, हर बार अभिनेता की मानसिकता एक जैसी नहीं हो सकती। इसी कारण हर प्रस्तुतिकरण के समय यह अनुभूति कम या अधिक हो सकती है। इन सभी कारणों से रंगमंच पर घटित नाट्य, या नाटकीयता उत्कर्ष बिंदू तक ले जाने के लिए प्रत्येक अभिनेता प्रामाणिकता से कोशिश करता नजर आता है, यही कहा जा सकता है।

#### अन्य प्रयोगकला में स्थित नाट्य :-

नाटक की तरह ही संगीत और नृत्य भी इन प्रयोगकलाओं में अंतर्भूत होते हैं। इस लिए संगीत हो या नृत्य, उनमें मौजूद नाट्य भी उनके अन्य तत्वों पर ही आधारित होता है। सत्य का आभास निर्माण करने का प्रयास इन कलाओं में किया जाता है। नाट्य रंगमंच के जैसे ही लोक रंगमंच पर भी विविध कला प्रकारों का प्रस्तुतिकरण किया जाता है। महाराष्ट्र में लोक रंगमंच पर जागरण, गोधल, भारुड, भजन, कीर्तन जैसे विधीनाट्य के प्रकार धर्मश्रद्धा से जुड़े नजर आते हैं। तो अन्य प्रकार

जैसे वासुदेव, पोतराज, मसणजोगी, भुत्या, बहुरूपी, नंदी बैलवाला, पिगंला जैसे लोककला के प्रकार धर्मश्रद्धा और लोकश्रद्धा का अभिन्न अंग हैं। इन में जो विधीनाट्य है उन में गण, गवलण, आख्यान, कथरूप समुपदेशन को संगीत और नृत्य की सहायता से प्रस्तुत किया जाता है। इन में जो नाट्य होता है वह कथा के उत्कर्ष में ही देखने को मिलता है। इन सभी कलाओं के प्रस्तुतिकरण में दृश्य और घटना में ही नाट्य होता है। और यही नाट्यकला का प्रधान वैशिष्ट्य माना जाता है।

निष्कर्ष :-

भरतमुनी ने अपने नाट्यशास्त्र ग्रंथ में रंगमंच पर प्रस्तुत किये जाने वाली कलाओं को नाट्य के विशिष्ट बंधनों में बांधा है, इसलिये उस में अभिनय , नाट्य, उत्कर्ष और अपकर्ष भी दिखाई देता है। जब कोई कथा दृश्य रूप में रंगमंच पर प्रस्तुत की जाती है तब उस में नाट्य का शोध नाटककार, निर्देशक, अभिनेता और तंत्रज्ञ करते हैं। प्रयोगकला का हर दृश्य दर्शकों के मन पर आघात करता है। इन दृश्य और घटनाओं को सत्य में परिवर्तित करने के लिए नाट्यतंत्र का आधार लिया जाता है। जिस में रंगमंचीय सौंदर्यशास्त्र का प्रयोग किया जाता है। कोई भी नाटक जब नाट्यशास्त्र के नियमों का उलघन कर के प्रस्तुत किया जाता है तब उसमें नाट्य नहीं होता है, और वह प्रभावहीन लगने लगता है। जिससे दर्शकों में निराशा छा जाती है। और परमोच्च आनंद देनेवाली कला रसभांग कर सकती है। इसी लिए रंगमंच पर प्रस्तुत किये जाने वाली कला में नाट्य का होना अनिवार्य है, यह निष्कर्ष सामने आता है।



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### नाट्य अभिनय और संवाद - एक अभ्यास

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नाट्यशास्त्र विभाग, सौ. के. एस. के. कॉलेज, बीड

**प्रास्ताविक :-** जिस प्रकार राजकीय और सांस्कृतिक प्रेरणा से और धार्मिक मान्यताओं के कारण रशियन और जपानी रंगभूमी पर जिस प्रकार से क्रांती हुई है उसी तरह भारतीय रंगमंच पर भी अलग अलग काल में अलग अलग बदलाव देखने को मिलते हैं। इस अलग अलग काल में मराठी रंगभूमी भी प्रेरित होती नजर आ रही है। सूर्यास्त, नटसम्राट, एकच प्याला, भावबंधन, ती फुलराणी ऐसे बहुत सारे नाटक मराठी रंगमंचने प्रस्तुत किये, मराठी रंगमंचने सामर्थ्यपूर्ण रूप इन नाटकों का मंचन किया और मराठी दर्शकों को अपनी ओर आकर्षित किया। सूर्य पाहिलेला माणूस इस नाटक में डॉ. श्रीराम लागू के अभिनय की बहुत चर्चा हुई। इसके पिछे डॉ. लागू के अभिनेता के रूप में किये गये श्रम तो है की, साथ ही कड़ी तपस्या से कमाई हुई आवाज और अर्थपूर्ण संवादफेक भी महत्वपूर्ण भूमिका निभाती नजर आती है। कोई अभिनेता जब रंगमंच पर अभिनय करता है तब उसका अभिनय और उसकी संवाद शैली की अलग महत्त्व प्राप्त हो जाता है। मराठी रंगभूमी के शुरुवाती दौर में तो, जो गायन कला में प्रवीण होता था उसे ही उत्तम अभिनेता माना जाता था। आगे चलकर यह परिभाषा बदलती चली गयी, और अभिनेता को नाट्यअभिनय के साथ साथ

वाचिक अभिनय में अधिक प्रवीण होना आवश्यक हो गया। इसी कारण डॉ. लागू, प्रभाकर पणशीकर, काशिनाथ घाणेकर, श्रीकांत मोघे, और आज के निळू फुले, अशोक सराफ, भरत जाधव, विजय चव्हाण जैसे कलाकार अपनी खर्जभरी आवाज के दम पर अपने पात्र को जीवित करने में सफल रहे हैं। उनके द्वारा की गयी भूमिका दर्शकों के मनपटल पर जैसे छप गयी है। इसी से नाट्यअभिनय और संवाद का महत्त्व स्पष्ट रूप से सामने आता है।

**उद्देश :-** नाटक कला मनुष्य के व्यक्तिगत विकास को बढ़ावा देते हुए, मनुष्य को सरल रूप से जीवन जीने की प्रेरणा प्रदान करती है। वास्तविक रूप से यह सत्य है, किंतु नाटक करना क्या इतना आसान होता है? क्या नाटक कला इतने सहज रूप से आत्मसात की जा सकती है? तो इसका उत्तर नकारात्मक ही होगा। क्योंकि नाट्यकला को अवगत करने के लिए दिर्घ तपस्या की आवश्यकता होती है। अभिनेता को इसके लिए कड़ी साधना करनी पड़ती है। कुछ अभिनेताओं को यह कला जन्म से ही वरदान के रूप में मिलती है, किंतु उस वरदान को संभालने के लिए भी तपस्या ही करनी पड़ती है। रंगमंच पर या अभिनय करते समय नाट्यअभिनय और संवाद महत्वपूर्ण होते हैं। नई पिढी



के कालाकारों को नाट्यअभिनय और संवाद तंत्र और उसके बारकीयों को जानना आवश्यक है। इसी दृष्टी से यह चर्चा आवश्यक है। और यही इसका मुख्य उद्देश है।

**नाट्यअभिनय और संवाद :-** रंगमंच पर किये जानेवाले अभिनय को हम नाट्यअभिनय कहते हैं। मूल रूप से रंगमंच बहोत ही विस्तृत है। जहाँ नाटक प्रस्तुत किया जाता है उस भूमी को हम रंगभूमी या रंगमंच कहते हैं। किंतु विद्वान रंगमंच की संकल्पना को और भी विस्तृत ढंग से सामने रखते हैं। हर एक की रंगभूमी की अलग अलग व्याख्या है। हमारी दृष्टी से हम यह कह सकते हैं की, अगर कोई व्यक्ती किसी मंदिर के सामने मैदान में अपनी कला का प्रदर्शन करता है तो वह भी उसकी रंगभूमी बन जाती है। किसी विद्यालय के प्रांगण, किसी खुले मैदान, या सड़क के किनारे भी कोई अपनी कला का प्रदर्शन करता है तो वह जगह भी उसके लिए रंगभूमी का रूप ग्रहण कर लेती है। केवल नाट्यगृह को ही रंगमंच नहीं कहा जा सकता। इस रंगमंच पर जब कोई अभिनेता नाटक का प्रस्तुतिकरण करता है, उसमें अभिनय करता है तो उसे हम नाट्यअभिनय कहते हैं। नाटक यह रंगमंच की सीमाओं में किया गया कलाविष्कार होता है। कुछ पात्रों को लेकर, उन्हें जीवित कर के दर्शकों के सामने जो बोला जाये उसे संवाद कहते हैं। भरतमुनी के नाट्यशास्त्र ग्रंथ में अभिनय की पद्धतियों पर बहोत चर्चा की गयी है। भरत का मानना है की, अभिनय में

रसनिष्पत्ती का होना जरूरी है। एक श्लोक में भरतमुनी कहते हैं,

यतो हस्तस्ततो दृष्टी, यतो दृष्टिस्ततो मन।

यतो मनस्ततो भावः, यतो भावस्ततो रस। (१)

इसका अर्थ यह है की जहाँ हाथ जाये वहाँ दृष्टी का जाना आवश्यक है, जहाँ दृष्टी जाये वहाँ मन जाना चाहिए, जहाँ मन जायेगा वहाँ भाव उत्पन्न होगा, और जहाँ भाव उत्पन्न होगा, वही रस उत्पन्न होता है। इसे ही अभिनय कहा जाता है। शास्त्र में अभिनय के चार प्रकार अंगिक, वाचिक, सात्विक और आहार्य बताए गये हैं। अभिनेता जब रंगमंच पर अभिनय करता है तब वह इन चार अभिनय पद्धतियों का आधार लेता है। रंगमंच की अपनी एक दिखाई न देनेवाली प्रोसेनीयम आर्च (कांच की दिवार) होती है। उसी के भीतर अभिनेता अपनी भूमिका कर रहा होता है। रंगमंच पर अभिनय करते समय अभिनेता को कुछ बातों का ध्यान रखना पड़ता है। प्रथम रूप से अभिनेता जिस भूमिका के कर रहा होता है, उसी के अनुसार उसे अपने चाल ढाल, बोलने का ढंग, और हावभावों को करना पड़ता है। अपनी भूमिका का अभ्यास कर के, पात्र के अंतरंग को समझना, और उसके अनुसार अभिनय करना, अभिनेता का प्रथम कर्तव्य होता है। अपनी भूमिका में तल्लीन होने की इस प्रक्रिया को ही 'पर काया प्रवेश' कहा जाता है। जब अभिनेता स्वयं को भुलकर उस पात्र को आंतरिक रूप से अपना लेता है तो उसे परकाया प्रवेश कहा जाता है।



मराठी के नाट्य अभ्यासक त्र्यं वि सरदेशमुख अपने ग्रंथ में लिखते हैं की, ' नाटकात कार्यशील होण्यासाठी नटातील 'स्व' ला कलानिर्मितीने कल्पिलेले 'स्वत्व' आणि अंग धारण करावे लागते. अश्याने नट 'स्वाड:गे' विभक्त होतो. ही जी प्रतिभा किंवा शिवशक्ती नटापाशी असते, तिचे सौंदर्य तिची वेधकता सर्वकाळ जन्मानाला मोहवीत आलेली आहे.' (२) अर्थात उनका मानना ही की, अभिनेता के पास जो पर काया प्रवेश की शक्ती होती है, उसी कारण वह हमेशा दर्शको को मोहित कर सकता है। अभिनेता को दिये गये पात्र की भाषा, उसकी आवाज, उसका स्वभाव, उसकी मानसिक स्थिती का भी अध्ययन करना आवश्यक है। उस पात्र की तरह खुद को ढालकर ही अभिनेता अपनी भूमिका को और अपने पात्र को न्याय देने में सफल हो सकता है। इसलिये किसी भी भूमिका को साकार करते समय अभिनेता को इस बात का पुरा ध्यान रखना चाहिए।

संवाद भी नाट्यअभिनय का महत्वपूर्ण अंग है। इसी माध्यम से नाटककार की कथा को अभिनेता दर्शको तक पहुंचाता है। नाटक के संवाद अभिनेता के वाचीक अभिनय पर आधारित होते हैं। 'संवाद की पहली कड़ी है सांस। सांस, आवाज, शब्द, और संवाद। किसी भी चरित्र को समझने के लिए, उसकी सांस को समझना निहायत जरूरी होता है। सांस गयी तो आस गयी। हार्मोनियम की भांथी से जलदी हवा निकल जाती है। तो कहते हैं आस तो है ही नहीं, या

बहोत ही कम है। सांस के बिना शरीर मृत हो जाता है। जागृती की पहली कड़ी सांस है। सांस सही होगी तो शरीर सही होगा। इसप्रकार हर चरित्र की अलग अलग सांस होगी। भाग रहे हो, गा रहे हो, खुश हो या दुःखी हो। हर जागाह सांस की गती अलग होगी। हर वक्त अलग सांस, हर वक्त सांस के अनुरूप शरीर और हावभाव।' (३) इसपर हर अभिनेता का नियंत्रण होना भी जरूरी है। मराठी रंगमंच पर जब हम रायगडाला जेव्हा जाग येते, नटसम्राट और ती फुलराणी जैसे नाटको के संवाद सूनते हैं तो उसमें छुपे भाव जलदी हमारे मस्तिष्क में आ जाते हैं। इस का एक कारण संवाद और अभिनेता का उसे बोलने का ढंग यह भी है। इसके लिए अभिनेता को अपनी आवाज और सांसो पर नियंत्रण लाना जरूरी होता है। योग के माध्यम से यह अभ्यास किया जाता है। वाक्य के आरोह-अवरोह, विराम, लय भी जरूरी है। इसे अभ्यास से प्राप्त किया जा सकता है। इस अभ्यास के बाद अभिनेता द्वारा बोले गये संवाद में आत्मविश्वास दिखाई देता है। नाटककार की भावनाएं दिखाई देती हैं। और अभिनेता पूर्ण रूप से नाटककार की कथाणी दर्शको तक पहुंचाने में सफल हो जाता है। संवाद में छुपे गर्भित अर्थ को अभिनेता सहज रूप से प्रदर्शित कर पाता है। किंतु इसके लिए दीर्घ अभ्यास की आवश्यकता होती है। इसके लिए अलग अलग अभ्यास होते हैं। कुछ नाटक जैसे नटसम्राट जैसे नाटको के संवाद भी अभ्यास के रूप में उपयुक्त हैं।



इसका मूल उद्देश यह है की जब नाट्यअभिनय और संवाद का मिश्रण हो जाता है, और अभिनेता एकरूप होकर रंगमंच पर अपनी भूमिका करता है, तो वास्तविक रूप में रस और भाव उत्पन्न होते हैं। और दर्शको को भी अतिउच्च आनंद की प्राप्ति होती है। इससे यह सिद्ध होता है की नाट्यअभिनय और संवाद अलौकिक कलाविष्कार के लिये आवश्यक होता है।

आज के मराठी रंगमंच पर नैसर्गिक (नॅचरल) अभिनय की एक प्रथा देखने को मिलती है। लंबे और दिर्घ संवाद आज के नाटक में कम ही होते हैं। फिर भी अभिनेता को अभिनय और संवाद का अभ्यास करना ही पड़ता है। आज अभिनय के प्रस्तुतिकरण में कुछ बदलाव दिखाई देते हैं, किंतु उसका मूल (बेसिक) वही है। इसलिये उनका अभ्यास करना हर अभिनेता के लिए आवश्यक होता है।

### गृहीतक

१) रंगभूमी की अपनी कुछ सीमाएँ होती हैं, कुछ संकेत होते हैं, जिसका ज्ञान अभिनेता को होना जरूरी होता है।

२) आज रंगभूमी पर नई नई विचार धाराएँ देखने को मिलती हैं। मंच पर नये प्रयोग करके उत्क्रांती हो रही हैं। किंतु नाटककार, निर्देशक और अभिनेताओं को रंगभूमी की मर्यादाओं का भी ध्यान रखना जरूरी है।

३) नाटक के प्रस्तुतिकरण से दर्शको को सत्य की अनुभूति होती है। और अगर ऐसा नहीं होता है तो वह

प्रस्तुतिकरण सफल नहीं हो पाएगा, जिससे दर्शको का रसभांग होने की संभावना अधिक होती है।

### संदर्भ ग्रंथ सूची

१) डॉ ब्रजवल्लभ मिश्र - भरत और उनका नाट्यशास्त्र, इलाहाबाद प्रकाशन, प्रथमावृत्ति, पृ.क्र.९४

२) त्र्यं वि सरदेशमुख - नट नाटक आणि आपण, मौज प्रकाशन, प्रथमावृत्ति, पृ.क्र. ०७

३) रंग प्रसंग - राष्ट्रीय नाट्य विद्यालय का मुख्यपत्र, एप्रिल जून २०१९, पृ.क्र.१०६



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**An exploration of the contribution of women in  
various streams of theatre**

**Javed**

Dr. Babasaheb Marathwada University, Aurangabad,

Guide

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Women in the theatre are a legacy in themselves.

Although much of the history of women has been distorted or forgotten, we can be sure that women have always played a strong role in the history of the performing arts. Amid controversies, triumphs, and occasional public backlash, women of the theatre have continued to shine throughout the centuries.

In the western context:

The theatre originated more than two millennia ago in ancient Greece. However, since goddesses represented Greek society, the role of women in Greek theatre was forbidden. Women were strictly forbidden to be on stage, as it was considered "too dangerous" to give them such a prominent platform. Even the most famous characters, such as the tragic heroine Antigone, were played by male actors. In the centuries that followed, there were few reports of women's participation in the theatre. One notable exception was a nun named Hrosvitha, who wrote comedies in the tenth century. Hrosvitha is often considered the first female playwright in history.

In the Elizabethan age, William Shakespeare created some of the most impressive female characters in history. Rosalind, Cordelia, Lady Macbeth, and other Shakespearean icons were among the first female characters to be portrayed with the depth, cunning, and bravery often accorded to male characters. Yet female actors were prohibited from playing these roles.

As early as the 1620s, actresses were appearing on stage in Europe. This was a turbulent time for female performers, as they were often harassed and insulted during their performances. Even when they faced public ridicule, women continued to conquer the stage. In 1660, the movement known as the Restoration sparked a wave of change in the theatre. With the king's support, women were finally allowed to perform in major

productions. This fundamentally changed the collective attitude toward female performers. For the first time in history, it seemed that society was recognizing the value of actresses.

In the second half of the 17th century, women playwrights appeared in Europe. The first women playwrights, including **Aphra Behn** and **Susanna Centlivre**, brought women's voices and perspectives into the spotlight for the first time. These female playwrights didn't shy away from controversial issues specific to women. Behn even drew inspiration from her defiance of forced marriages in some of her plays. The early female playwrights also used their platform to write heroic, dynamic, and autonomous female characters.

In the centuries that followed, women's performances in the theatre became increasingly important. In the United States, the late 19th and early 20th centuries were a seminal time for women in the performing arts. Women artists were given a relatively prominent place under the dazzling lights of Broadway. Attending the theatre also gradually became a women's affair. As actresses saw a new potential for independence and economic power, the theatre truly began to become a world for women! Then American women found more space on stage.

In the Indian context:

The origin of the Indian theatre is found in the *Natyashastra* of Bharata. According to it, the gods asked Lord Brahma to do something that could be seen and heard and that would benefit everyone. Thus, Brahma adopted recitation from the **Rigveda**, chanting from the **Samaveda**, the art of drama from the **Yajurveda**, and the aesthetic sense from the **Atharvaveda**, and finally the new *Natyaveda* was born. The *Natyaveda* of Brahma was given to Bharata to make it known to mankind. Bharata with his troupe of Gandharvas and Apsaras danced and played before Lord Shiva. The majestic dance of Lord Shiva was also included. *Lasya* and *Tandava* were led by Parvati and *Tandu* respectively. From the gods and goddesses, the arts were passed on to the mortals. Art forms, music, dance and mime are integral parts of Indian theatre.



Sanskrit theatre is a good example of how women have contributed greatly to building a theatre culture and foundation from the beginning. Ancient theatre or Sanskrit theatre was always performed for the king and elite classes or bureaucrats, they were not meant for the general public. But when it came to the public, the female characters started to be played by the Boys Club. After that, women gradually disappeared from the stage, and for centuries women were forbidden to come on stage. After several hundred years, the female reappeared in the 19th century. A play was performed, written and directed by **Vishnudas Bhave** and named **Sita Suyamvar**. From here on, the female again took her place in the theatre.

A quick comparison between western and Indian theatre:

Now that we have understood the brief history of the Western and Indian theatre. Then it becomes very clear that the feminine in the theatre now has a significance whose place cannot be taken by anyone.

Now let us understand what is the difference between the Western world and the Asian or Indian theatre. As in Greek mythology, it is believed that Apsaras appear before the gods in heaven. This belief is also accepted in India.

In the Western world, women were not allowed on stage, but in India the same was believed. In 1660, Charles II ordered that women be allowed to work freely in the theatre. After that women conquered their place in the West. The first woman to appear on the English stage was **Margaret Hughes**, who appeared in a production of Othello in 1660. She was soon followed by other women, such as **Anne Marshall** and **Susanna Centlivre**.

In Indian theatre, after the Sanskrit theatre, the **Devadasi** system comes to the fore, but until 1843 there is no evidence to show an active relationship between these women and the theatre. However, after a great drama like SITA SWAYAMVER, women have an unbreakable relationship with the theatre that can be seen in various places throughout India. But professional theatre has only been around since the 1930s.

It means that women in the Western world were active in theatre as early as the 17th century, while in India this awareness only began 300 years later.

Modern and Contemporary aspects:

In this era, women made theatre timeless through their contribution. In the Western world, theatre flourished in connection with women. But in Indian society, women also made their mark in the theatre. During this period, plays were written by women, and actresses performed who are revered today. Women took over the direction of the theatre, whose arrow was not only difficult but impossible to catch.

All over the world, women have contributed to the revival of theatre in equal measure with men. In the West, Sarah Kane, Caryl Churchill, Sophie Treadwell, Martha Morton. People like Pina Bausch, Martha Graham, Stella Adler, etc. made their mark on the theatre.

After 1843, there were great women theatres in India whose contributions must not be forgotten like Binodini Dasi, Norah Richard, Bharti Sarabhai, Poile Sengupta, Sheela Bhatia, Irpinder Bhatia, Varsha Adalja, etc.

And that is the legacy that the women of today are carrying forward.

Women as theatre personality and their contribution:

**Neelam Man Singh Chaudhary (Director)** was born on April 14, 1951, and grew up in Amritsar, Punjab. She graduated with a master's degree in art history from Punjab University, Chandigarh. She graduated from the National School of Drama in Delhi in 1975 and was trained by Ebrahim Alkazi.

The Chandigarh-based theatre artist has worked all over the world. In 2003, she was awarded the Sangeet Natak Akademi Award in theatre directing. In 2011, she received the Padma Shri Award. She was a professor at the Department of Indian Theatre at Punjab University. Her well-known plays include Kitchen Katha, The Suit, Yerma, Nagamandala, The Mad Woman of Chaillot, Little Eyolf, Bitter Fruit, Naked Voices, Stree Patra and Gumm Hai.

It is known for its theatre that combines source material from Western classics with a performance style based on an earthy Punjabi aesthetic.



**Binodini Dasi (Actress)** also known as Noti Binodini, was an Indian Bengali actress and theatre performer. She began acting at the age of 12 and finished at the age of 23, as she later recounted in her well-known autobiography *Amar Katha (The Story of My Life)*.

She was born into prostitution and began her career as a courtesan. In 1874, at the age of twelve, she played her first serious dramatic role in the National Theatre of Calcutta, which was directed by its founder Girish Chandra Ghosh. Her career coincided with the advent of the European theatre-inspired proscenium form among Bengali theatre audiences. In her twelve-year career, she played more than eighty roles, including those of Pramila, Sita, Draupadi, Radha, Ayesha, Kaikeyi, Moti bibi and Kapal kundala. She was one of the first South Asian actresses of the theatre to write her own autobiography

**Stella Adler (Acting Teacher)** was an American actress and acting teacher. She founded the Stella Adler Studio of Acting in New York City in 1949. She later taught part-time in Los Angeles, assisted by her protégé, actress Joanne Linville, who continued to teach Adler's technique. Her grandson Tom Oppenheim now runs the school in New York City, which has produced former students such as Marlon Brando, Robert De Niro, Harvey Keitel, Elaine Stritch, Kate Mulgrew, Kipp Hamilton, Jenny Lumet and Jeff Celentano.

**Shanta Gokhale (Theatre Critic and writer)** is an Indian writer, translator, journalist and theatre critic. She published a critical study of Marathi theatre, *Playwright at the Centre: Marathi Drama from 1843 to the Present*. She has also published *The Scenes We Made: An Oral History of Experimental Theatre in Mumbai*. She edited the book *The Scenes We Made* about the theatre scene between the mid-1970s and early 1990s at Chabildas School in Dadar, Mumbai. The book was published in 2015.

**Sulabha Deshpande (Actress)** was an Indian actress and theatre director. In addition to Marathi theatre and Hindi theatre in Mumbai, she acted in over 73 Bollywood films. She also acted in arthouse films such as *Bhumika*, *Arvind Desai Ki Ajeeb Dastaan*, and *Gaman* as a character actress and in numerous TV series and plays.

**Vijaya Mehta (Director)** is a well-known Indian film and theatre director from Marathi. She became a prominent personality in the experimental Marathi theatre of the 1960s.

Her stage production *Ek Shoonya Bajirao* is considered a landmark of contemporary Indian theatre. She introduced Bertold Brecht to Marathi theatre with an adaptation of *The Caucasian Chalk Circle* (*Ajab Nyay Vartulacha*) and Ionesco with *Chairs*. She worked on Indo-German theatre projects with German director Fritz Bennewitz, including a traditional performance of Bhasa's *Mudrarakshasa* with German actors. She was awarded the Sangeet Natak Akademi Award for excellence in direction.

**Anuradha Kapoor (Director)** is an Indian theatre director and professor of drama. She teaches at the National School of Drama. She was the ex-director of the school (2007-2013). She was awarded the Sangeet Natak Akademi Award in 2004 for his work as a theatre director.

**Caryl Lesley Churchill (Director)** is a British playwright known for dramatising abuses of power, using non-naturalistic techniques, and exploring sexual politics and feminist issues. She is known for works such as *Cloud 9*, *Top Girls*, *Serious Money*, *Blue Heart*, *Far Away*, and *A Number*, and has been described as "one of Britain's greatest poets and innovators for the contemporary stage." In a 2011 survey of playwrights conducted by *The Village Voice*, five of the 20 writers surveyed named Churchill as the greatest living playwright.

**Mannu Bhandari (Writer)** was a famous Hindi story writer.

She became famous for the novel *Aapka Bunt* published in *Dharmayug* magazine, was also the chairman of Premchand Srijanpeeth at Vikram University in Ujjain

Manu's writings gave new dimensions to theatre. The play *Mahabhoj* still has its place in the world of theatre today. Among his famous compositions are *Ek Sehlaab*, *Main Haar Gai*, *Teen Nigahon Ki Ek Tasveer*, *Yahi Sach Hai*, *Trishanku*, *Aankhon Dekhee Jhooth*, *Bina Deevaaron ka Ghar* etc.



Above we read about some theatre personalities and how they popularized mass theatre through their work. Because of these people always remember their contribution, whether he lives today or not. But his contribution can never be forgotten.

Thousands of women theatrist have worked in the world who are not dependent on any identity today. These include Bharati Achrekar, Mary Shelley, Deepika Amin, Radhika Apte, Monalisa Bagal, Bhakti Barve, Mukta Barve, Susan Glaspell, Leena Bhagwat, Jyotsna Keshav Bhole, Devika Daftardar, Vibhavari Deshpande, Hruta Durgule, Shubhangi Gokhale etc.

#### **Conclusion:**

After glance the history of women in the Western and Indian theatre, one knows how much trouble women have had to take their place in the theatre, and they have reached such a point that it is impossible to think of a theatre without women.

Women have played to make the theatre shine through their acting, writing and directing achievements.

They have contributed in equal measure to bringing the theatre to its pinnacle.

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# Solution of Space Fractional Radon Diffusion Equation in Soil Medium

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**Abstract:** In this paper we present the Crank-Nicolson finite difference scheme for space fractional radon diffusion equation (SFRDE) in soil medium. We discuss that the scheme is unconditionally stable and convergence of the scheme is also verified at the length. Validation of the solution is carried out with the help of graphical illustration using 'Mathematica' software.

**Index Terms** - Fractional calculus, Grunwald formula, Stability, Convergence, and Mathematica.

## I. INTRODUCTION

The Fractional Calculus (FC) is a generalization of classical calculus concerned with operations of integration and differentiation of non-integer (fractional) order. The concept of fractional operators has been introduced almost simultaneously with the development of the classical ones. The study of fractional calculus has been a highly specialized and isolated field of mathematics. The fractional calculus was recognized to represent an useful tool for understanding and modeling many natural and artificial phenomena. Fractional calculus has many applications in biology, physics, engineering, economics etc. [1,2,6]. Most of the fractional differential equations do not have analytical solution therefore approximation and numerical techniques are developed. There are many numerical methods to find the solution of classical differential equations, while numerical methods for the fractional differential equations are very limited. As the fractional derivatives are the generalization of classical derivatives, the numerical techniques for the classical differential equations can be extended to the fractional differential equations in some way. In the recent years, there are many numerical techniques like finite difference method (FDM), finite element method (FEM), He's variational iteration method, Adomian decomposition method (ADM), matrix transform method (MTM), etc. Finite difference method is very rich and continuous to be developed. Also this method is very powerful tool and widely used to solve the differential equations as well as fractional differential equations in science and engineering. The main cause of implementation of this method is simple and easy to be put into practice in computer programs. Many papers have recently published on finite difference methods for solving the diffusion equation [3,4,7,8,9,10,11].

In this paper we discuss the fractional radon diffusion equation in soil medium. The diffusion theory came from the famous physiologist Adolf Fick. He stated that the flux density  $J$  is proportional to the gradient of concentration. This gives,

$$J = -D \frac{\partial C}{\partial x} \quad (1.1)$$

where  $J$  is the radon flux density is diffusion coefficient,  $\frac{\partial C}{\partial x}$  is gradient of radon concentration and  $D$  is diffusivity coefficient of radon. Now the change in concentration to change in time and position is stated by the Fick's second law which is the extension of Fick's first law, that gives,

$$\frac{\partial C(x,t)}{\partial t} = \frac{\partial^2 C(x,t)}{\partial x^2} - \lambda C(x,t) \quad (1.2)$$

where  $\lambda = 2.1 \times 10^{-6} \text{s}^{-1}$  is the decay constant. Many researchers have discussed the radon transport through soil, activated charcoal, concrete, etc. [5,12,13,14,15,16].

Here, we develop the space fractional crank-nicolson finite difference method for fractional order RDE in soil medium. We consider the following space fractional radon diffusion equation [SFRDE],



$$\frac{\partial C(x,t)}{\partial t} = D \frac{\partial^\beta C(x,t)}{\partial x^\beta} - \lambda C(x,t), 0 < x < L, 1 < \beta \leq 2, t \geq 0, (x,t) \in [0,L] \times [0,T] \quad (1.3)$$

$$\text{initial conditions: } C(x,0) = 0, 0 < x < L \quad (1.4)$$

$$\text{boundary conditions: } C(0,t) = c_0 \text{ and } \frac{\partial C(x,t)}{\partial t} = 0, t \geq 0 \quad (1.5)$$

**Definition 1.1:**—The Grunwald Letnikov space fractional derivative of order  $\beta$  is defined by,

$$\begin{aligned} \frac{\partial^\beta C(x,t)}{\partial x^\beta} &= {}_0D_x^\beta C(x,t) = \frac{1}{h^\beta} \lim_{N \rightarrow \infty} \sum_{j=0}^N \frac{\Gamma(j-\beta)}{\Gamma(-\beta)\Gamma(j+1)} C(x-(j-1)h,t) \\ &= \frac{1}{h^\beta} \lim_{N \rightarrow \infty} \sum_{j=0}^N g_{\beta,j} C(x-(j-1)h,t) \end{aligned}$$

where

$$g_{\beta,j} = \frac{\Gamma(j-\beta)}{\Gamma(-\beta)\Gamma(j+1)}$$

We organize the paper as follows: Section 2 is devoted for to develop Crank-Nicolson finite difference scheme for space fractional radon diffusion equation. In section 3, we discuss the stability of the approximated solution obtained by Crank-Nicolson finite difference scheme developed for fractional radon diffusion equation. In section 4, we discuss the convergence of the scheme. In the last section we solved test problem and their solution is represented graphically by mathematical software Mathematica.

## II. FINITE DIFFERENCE SCHEME

In this section, we develop the space fractional Crank-Nicolson finite difference method for fractional order radon diffusion equation (1.3)-(1.5).

We define,

$$t_k = k\tau; k = 0, 1, 2, \dots, N \text{ and } x_i = ih; i = 0, 1, 2, \dots, M$$

where

$$\tau = \frac{T}{N} \text{ and } h = \frac{L}{M}$$

Let  $C(x_i, t_k); i = 0, 1, 2, \dots, M$  and  $k = 0, 1, 2, \dots, N$  be the exact solution of space fractional radon diffusion equation (SFRDE) (1.3)-(1.5) at mesh point  $(x_i, t_k)$ . Let  $c_i^k$  be the numerical approximation of the point  $C(x_i, t_k)$ .

We consider the spatial  $\beta$  - order fractional derivative using the Grunwald finite difference formula at all-time levels. The standard Grunwald estimates generally yields unstable finite difference equation regardless of whatever results in finite difference method is an explicit or implicit system for related discussion. Therefore, we use a right shifted Grunwald formula to estimate the spatial  $\beta$  - order fractional derivative.

For

$$\frac{\partial^\beta C(x,t)}{\partial x^\beta} = {}_0D_x^\beta C(x,t) = \frac{1}{h^\beta} \sum_{j=0}^{i+1} g_{\beta,j} C(x_{i-(j-1)h}, t_{k+1}) + O(h^2)$$

and the normalized Grunwald weights are given by,

$$g_{\beta,0} = 1 \text{ and } g_{\beta,j} = (-1)^j \frac{\beta(\beta-1) \dots (\beta-j+1)}{j!}, j = 1, 2, 3, \dots$$

Using forward difference formula for time, right shifted Grunwald formula for second order space. Therefore, Crank-Nicolson type numerical approximation to equation (1.3) is given as follows-

$$\left[ \frac{C_i^{k+1} - C_i^k}{\tau} \right] = D \frac{1}{2h^\beta} \left[ \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} + \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^k \right] - \lambda C_i^{k+1}$$

$$[C_i^{k+1} - C_i^k] = D \frac{\tau}{2h^\beta} \left[ \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} + \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^k \right] - \lambda \tau C_i^{k+1}$$

let

$$r = D \frac{\tau}{2h^\beta} \text{ and } \mu = \lambda \tau$$



$$[C_i^{k+1} - C_i^k] = r \left[ \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} + \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^k \right] - \mu C_i^{k+1}$$

$$(1 + \mu)C_i^{k+1} - r \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} = C_i^k + r \sum_{j=0}^{i+1} g_{\beta,j} C_{i-j+1}^k \quad (2.1)$$

$$(1 + \mu)C_i^{k+1} - r g_{\beta,1} C_i^{k+1} - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} = C_i^k + r g_{\beta,1} C_i^k + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^k$$

since  $g_{\beta,1} = -\beta$

$$(1 + \mu + r\beta)C_i^{k+1} - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} = (1 - r\beta)C_i^k + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^k \quad (2.2)$$

Therefore, the complete discretized problem is:

$$(1 + r\beta + \mu)C_i^1 - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^1 = (1 - r\beta)C_i^0 + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^0, \quad \text{for } k = 0 \quad (2.3)$$

$$(1 + r\beta + \mu)C_i^{k+1} - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^{k+1} = (1 - r\beta)C_i^k + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} C_{i-j+1}^k \quad \text{for } k \geq 1 \quad (2.4)$$

$$\text{initial conditions, } C_i^0, i = 0, 1, 2, \dots, M \quad (2.5)$$

$$\text{boundary conditions, } C_0^k = C_0 \text{ and } C_{M+1}^k = C_{M-1}^k; k = 0, 1, 2, \dots, N \quad (2.6)$$

$$\text{and } r = D \frac{\tau}{2h^\beta}; \mu = \lambda \tau$$

The matrix form of the above initial boundary value problem is

$$AC^1 = BC^0 + S; \text{ for } k = 0 \quad (2.7)$$

$$AC^{k+1} = BC^k + S', \text{ for } k \geq 1 \quad (2.8)$$

where

$$A = \begin{pmatrix} 1 + r\beta + \mu & -rg_{\beta,0} & \dots & \dots & \dots & \dots \\ -rg_{\beta,2} & 1 + r\beta + \mu & -rg_{\beta,0} & \dots & \dots & \dots \\ -rg_{\beta,3} & -rg_{\beta,2} & 1 + r\beta + \mu & -rg_{\beta,0} & \dots & \dots \\ \vdots & \vdots & \vdots & \ddots & \ddots & \vdots \\ -rg_{\beta,M} & -rg_{\beta,M-1} & \dots & \dots & -r(g_{\beta,0} + g_{\beta,2}) & 1 + r\beta + \mu \end{pmatrix};$$

$$B = \begin{pmatrix} (1 - r\beta) & rg_{\beta,0} & \dots & \dots & \dots & \dots \\ rg_{\beta,2} & (1 - r\beta) & rg_{\beta,0} & \dots & \dots & \dots \\ rg_{\beta,3} & rg_{\beta,2} & (1 - r\beta) & -rg_{\beta,0} & \dots & \dots \\ \vdots & \vdots & \vdots & \ddots & \ddots & \vdots \\ rg_{\beta,M} & rg_{\beta,M-1} & \dots & \dots & r(g_{\beta,0} + g_{\beta,2}) & (1 - r\beta) \end{pmatrix};$$

$$S = \begin{pmatrix} rg_{\beta,2}C_0^1 + rg_{\beta,2}C_0^0 \\ rg_{\beta,3}C_0^1 + rg_{\beta,3}C_0^0 \\ rg_{\beta,4}C_0^1 + rg_{\beta,4}C_0^0 \\ \vdots \\ rg_{\beta,M+1}C_0^1 + rg_{\beta,M+1}C_0^0 \end{pmatrix}; S' = \begin{pmatrix} rg_{\beta,2}C_0^{k+1} + rg_{\beta,2}C_0^k \\ rg_{\beta,3}C_0^{k+1} + rg_{\beta,3}C_0^k \\ rg_{\beta,4}C_0^{k+1} + rg_{\beta,4}C_0^k \\ \vdots \\ rg_{\beta,M+1}C_0^{k+1} + rg_{\beta,M+1}C_0^k \end{pmatrix}$$

$$C^k = [c_1^k, c_2^k, c_3^k, \dots, c_N^k]^T; r = D \frac{\tau}{2h^\beta}; \mu = \lambda \tau; i = 0, 1, 2, \dots, M; k = 0, 1, 2, \dots, N;$$

$$g_{\beta,0} = 1 \text{ and } g_{\beta,j} = (-1)^j \frac{\beta(\beta-1)\dots(\beta-j+1)}{j!}, j = 1, 2, 3, \dots$$

### III. STABILITY

**Theorem 3.1:** The solution of approximated initial boundary value problem (2.3)-(2.6) for space fractional radon diffusion equation (SFRDE) (1.3)-(1.5) is unconditionally stable.

**Proof:** We assume that,  $\|E^k\|_\infty \leq |\epsilon_i^k| = \max_{1 \leq i \leq M} \epsilon_i^k$



Therefore, for  $k=0$ , from equation (2.3), we get

$$\begin{aligned} |\epsilon_l^1| &= \left| (1+r\beta+\mu)\epsilon_l^1 - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} \epsilon_{i-j+1}^1 \right| \\ &= |(1-r\beta)\epsilon_l^0 + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} \epsilon_{i-j+1}^0| \\ &\leq |1-r\beta + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j}| \epsilon_l^0; \quad \because (g_{\beta,1} = -\beta) \\ &\leq |\epsilon_l^0|; \quad \because (\sum g_{\beta,j} < 0 \Rightarrow 1+r \sum g_{\beta,j} < 1) \end{aligned}$$

Therefore,

$$\|E^1\|_{\infty} \leq \|E^0\|_{\infty}$$

Thus, the result is true for  $k=0$ .

Suppose that, the result is true for  $k$ ,

$$\|E^k\|_{\infty} \leq \|E^0\|_{\infty}$$

To prove that the result is true for  $k+1$ , from equation (2.4), we have

$$\begin{aligned} |\epsilon_l^{k+1}| &= \left| (1+r\beta+\mu)\epsilon_l^{k+1} - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} \epsilon_{i-j+1}^{k+1} \right| \\ &= |(1-r\beta)\epsilon_l^k + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} \epsilon_{i-j+1}^k| \\ &\leq |1-r\beta + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j}| \epsilon_l^0; \quad \because (g_{\beta,1} = -\beta) \\ &\leq |\epsilon_l^0|, \quad \because (\sum g_{\beta,j} < 0 \Rightarrow 1+r \sum g_{\beta,j} < 1) \end{aligned}$$

Therefore,

$$\|E^{k+1}\|_{\infty} \leq \|E^0\|_{\infty}$$

Thus, the result is true for  $k+1$ .

Hence by mathematical induction, the result is true for all  $k$ .

$$\|E^{k+1}\|_{\infty} \leq \|E^0\|_{\infty}$$

Thus, the scheme is unconditionally stable.

#### IV. CONVERGENCE

In this section, we discuss the convergence of the approximate finite difference scheme (2.3) - (2.6). Let  $C(x_i, t_k)$  be the exact solution of the SFRDE (1.3)-(1.5) and  $C_i^k$  be the exact solution of the discrete equation (2.3)-(2.6) at the mesh point  $(x_i, t_k)$ , where  $i = 0, 1, \dots, M-1$ ;  $k = 1, 2, \dots, N$ .

We define,  $e_i^k = C(x_i, t_k) - C_i^k$ , where  $i = 0, 1, \dots, M-1$ ;  $k = 1, 2, \dots, N$  and  $E^k = (e_1^k, e_2^k, \dots, e_{M-1}^k)$

**Theorem 4.1** The fractional order Crank-Nicolson finite difference scheme (2.3)-(2.6) for SFRDE (1.3)-(1.5) is convergent and the solution  $C_i^k$  of the discretize scheme (2.3)-(2.6) and the solution  $C(x_i, t_k)$  of the equation (1.3)-(1.5) satisfy,

$$\|C(x_i, t_k) - C_i^k\| \leq \|E\|_{\infty} + O(\tau + h^{2-\beta}); i = 0, 1, \dots, M-1; k = 0, 1, \dots, N$$

**Proof:** Let us assume that,

$$|e_l^k| = \max_{1 \leq i \leq M-1} |\epsilon_l^k| = \|E\|_{\infty}; \text{ for } l = 1, 2, \dots$$

and

$$T_l^k = \max_{1 \leq i \leq N} |T_i^k|; T_j^n = h^2 [O(\tau) + O(h^{2-\beta})]$$

Therefore, from equation (4.1), we have

$$\begin{aligned} |e_l^1| &= \left| (1+r\beta+\mu)e_l^1 - r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} e_{i-j+1}^1 \right| \\ &= |(1-r\beta)e_l^0 + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j} e_{i-j+1}^0| \\ &\leq |1-r\beta + r \sum_{j=0, j \neq 1}^{i+1} g_{\beta,j}| e_l^0; \text{ since } g_{\beta,1} = -\beta \\ &\leq |e_l^0|, \text{ because } \sum g_{\beta,j} < 0 \Rightarrow 1+r \sum g_{\beta,j} < 1 \end{aligned}$$



Therefore,

$$\|E^1\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

Suppose that

$$\|E^k\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

From equation (2.4), we have

$$\begin{aligned} |e_i^{k+1}| &= \left| (1+r\beta+\mu)e_i^{k+1} - r \sum_{j=0, j \neq i}^{i+1} g_{\beta,j} e_{i-j+1}^{k+1} \right| \\ &= |(1-r\beta)e_i^k + r \sum_{j=0, j \neq i}^{i+1} g_{\beta,j} e_{i-j+1}^k| \\ &\leq |1-r\beta + r \sum_{j=0, j \neq i}^{i+1} g_{\beta,j}| e_i^k; \text{ since } g_{\beta,1} = -\beta \\ &\leq |e_i^k|, \text{ because } \sum g_{\beta,j} < 0 \Rightarrow 1+r \sum g_{\beta,j} < 1 \end{aligned}$$

Therefore,

$$\|E^{k+1}\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

Hence by mathematical induction, the result is true for all k.

$$\|E^k\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

This shows that fractional finite difference scheme (2.3)-(2.6) for SFRDE (1.3)-(1.5) is convergent.

## V. NUMERICAL SOLUTION

The approximated solution of space fractional radon diffusion equation in soil medium with initial and boundary conditions is achieved. The numerical solution of the space fractional radon diffusion equation (SFRDE) by the finite difference scheme is validated by using software, it is important to use some analytical model. Therefore, we have solved the problem at specific particular conditions by using Mathematica Software. We consider the following, dimensionless space fractional radon diffusion equation with suitable initial and boundary conditions.

$$\frac{\partial C(x,t)}{\partial t} = D \frac{\partial^\beta C(x,t)}{\partial t^\beta} - \lambda C(x,t), 0 < x < L, 1 < \beta \leq 2, t \geq 0, (x,t) \in [0,L] \times [0,T]$$

$$\text{initial condition: } C(x,0) = 0, 0 < x < L,$$

$$\text{boundary conditions: } C(0,t) = c_0 \text{ and } \frac{\partial C(x,t)}{\partial t} = 0, t \geq 0$$

with the radon diffusion coefficient  $D = 4.1 \times 10^{-7} \text{ m}^2/\text{s}$ . The numerical solutions obtained at  $t = 0.05$  by considering the parameters  $L = 1.7278 \text{ cm}$ ,  $\lambda = 2.1 \times 10^{-6} \text{ s}^{-1}$ ,  $\tau = 0.05$ ,  $k = 4 \text{ m}^2/\text{kg}$ ,  $\rho = 0.5 \text{ g/cm}^3$ ,  $c_0 = 200 \text{ Bq/m}^3$ ,  $\alpha(0,t) = 40 \times 10^3$ ,  $\alpha = 0.9, \alpha = 0.8$  is simulated in the following figure,

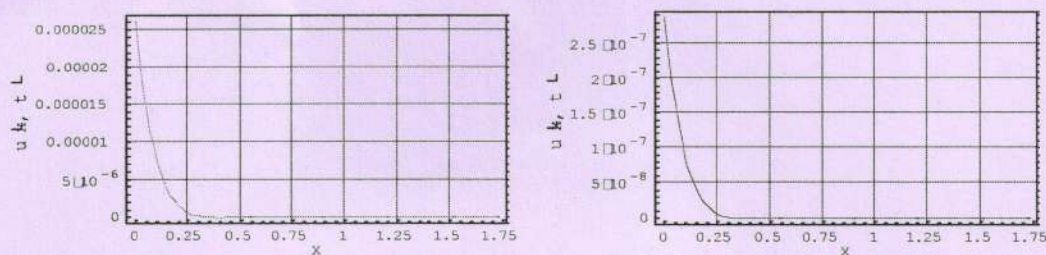


Fig. The approximate solution of radon diffusion equation for  $\alpha = 0.9$  and  $\alpha = 0.8$

## VI. CONCLUSION

We successfully develop the fractional order Crank-Nicolson finite difference scheme for space fractional radon diffusion equation. Furthermore we discuss its stability and convergence of the scheme. As an application of this method we obtain the numerical solution of text problem and its solution is simulated graphically by mathematical software Mathematica.



Therefore,

$$\|E^1\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

Suppose that

$$\|E^k\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

From equation (2.4), we have

$$\begin{aligned} |e_i^{k+1}| &= \left| (1 + r\beta + \mu)e_i^{k+1} - r \sum_{j=0, j \neq i}^{i+1} g_{\beta,j} e_{i-j+1}^{k+1} \right| \\ &= |(1 - r\beta)e_i^k + r \sum_{j=0, j \neq i}^{i+1} g_{\beta,j} e_{i-j+1}^k| \\ &\leq |1 - r\beta + r \sum_{j=0, j \neq i}^{i+1} g_{\beta,j}| e_i^k; \text{ since } g_{\beta,1} = -\beta \\ &\leq |e_i^k|, \text{ because } \sum g_{\beta,j} < 0 \Rightarrow 1 + r \sum g_{\beta,j} < 1 \end{aligned}$$

Therefore,

$$\|E^{k+1}\|_\infty \leq \|E^0\|_\infty + h^2[O(\tau) + O(h^{2-\beta})]$$

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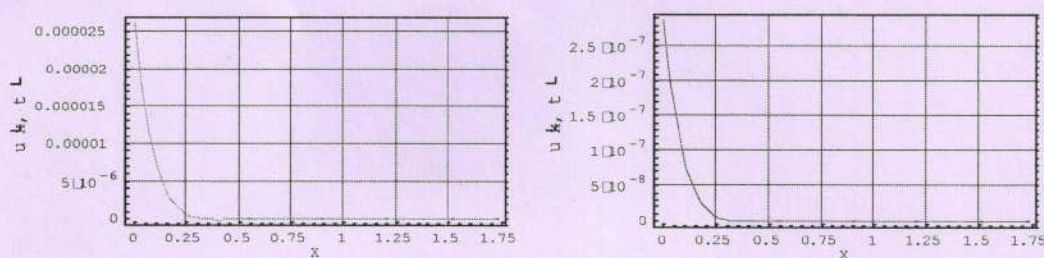


Fig. The approximate solution of radon diffusion equation for  $\alpha = 0.9$  and  $\alpha = 0.8$

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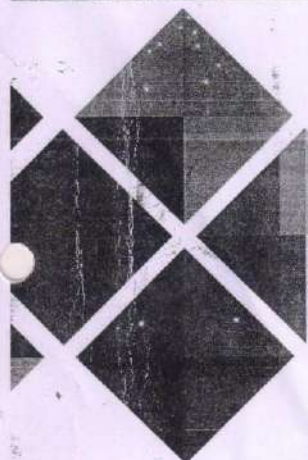
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✓ 36		सुधा नेमीचंद पाटवी	
37	धोडे		
38	जाधव		



**Empowerment of Mothers through Intervention in Terms of Scientific Child Rearing Practices**

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**Abstract**

*It is generally believed that intervention is an essential key to improve children and feeding practices must begin in early age of the child. There is evidence which suggest that a caregiver's knowledge, attitude and action towards proper care for the child are crucial to the nutritional outcome of a child. Degree of maternal awareness has a direct relationship with infant nutrition. Intervention studies have shown that it is possible to improve infant all round growth and development through maternal intervention. Present study focuses on empowerment of mothers through intervention in terms of scientific child rearing practices. Results revealed that there was significant difference in child rearing practices followed by mother after intervention, more scientific practices were adopted by experimental group mothers than control group mothers at post testing.*

**Keywords:** Mother empowerment, early childhood children, Intervention, scientific child rearing.

**Introduction:** mothers are the caretakers of children in early years. Many researches showed that mother's knowledge, attitude and action towards proper care for the child are crucial to the child's all round development. Care giving affects the child's health status, nutritional status as well as physical, mental and social wellbeing of child in future (Thuita et al 2002). It has been reported by researchers (Bhat et al 1992) the degree of maternal awareness has a direct relationship with child all round development. Starting years of child's life are the formative years and children need special attention of mothers, father and caregivers who are involved in child care. Particularly first three years of life are of prime importance from the development of view. Care during this stage has crucial influence on child's growth and development. (Sangwan and Monocha 2009) During early years of child's life brain is most plastic, grows fastest and is most responsive to the outside world. Most of the brains neural pathways supporting communication, understanding, social development and emotional wellbeing grow rapidly in this first three years. One reason for poor brain growth is malnutrition; children who have been severely malnourished are more vulnerable to physical and mental illnesses. Intervention programs implemented for mothers and caregivers can provide ideal opportunities to serve scientific practices and activities to children in early childhood years. An intervention is a Latin word intervener, meaning "to come between; interrupt". Intervention studies have shown that it is possible to improve infant growth and feeding practices through action oriented messages probably the most comprehensive Indian studies of Infant focused nutrition education intervention have been conducted by Bhandari et al., (2004). Early intervention services can change a child's development and path

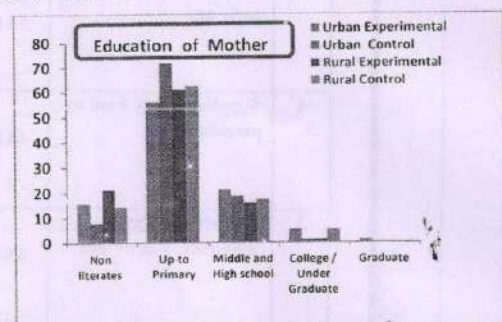
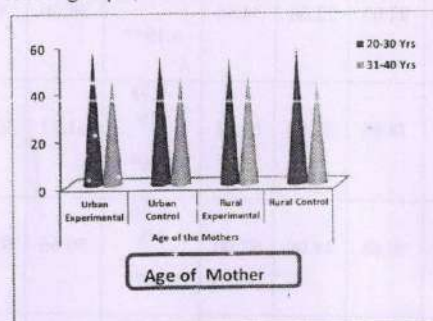


4	Small Business	30 (40.00)	01 (1.33)	13 (17.33)	08 (10.66)
5	Business / Agriculture	03 (4.00)	10(13.33)	06 (8.00)	10 (13.33)
D	<b>Socio economic status of Mothers</b>				
1	Low	11(14.66)	22(29.33)	13 (17.33)	22 (29.33)
2	Medium	56(74.66)	46(61.33)	51 (68.00)	45 (60.00)
3	High	08(10.66)	07(9.33)	11 (14.66)	08 (10.66)

Figures in parenthesis indicates percentages

Table 1 illustrated the profile of the sample mothers. Majority of the mothers were in the age range between 20-30 years old in urban as well as rural area. With regarding to educational status of the early childhood children's Mothers, majority of urban mothers from both the groups were educated up to primary (56% and 72%), 1-4% mothers were graduate educated. Only one percent mother from urban area was post graduate. No literate mother from urban and rural area and both the groups were between 7 to 16%. Regarding occupational status of the family majority of mothers 40% from experimental group were having the small business, followed by 30% Laborer 24% unemployed, 4% Business/agriculture and only 1% were doing caste occupation. The percentage was near about same for urban mother of control group. Regarding rural mothers of both the groups' majority (48% and 60%) were laborer followed by unemployed (15 to 25%) small businesses (11 to 17%) ,Agriculture (8 to 13% ) and caste occupation 1% each.

Regarding socio economic status of mothers, it is clear from the table that majority of urban and rural experimental and control groups mothers were from medium status that is urban experiment group 75% urban control group 61%, rural experimental group 68% and rural control group 60% ,where as low social economic status urban mothers from experiment and control group were 15% and 20% and from rural area this were 17% and 29% respectively. Very few percentage of mothers from both urban and rural area experimental (11% and 9% ) and control groups (15% and 11%) were from high socio economic status.





6.66	1.33 NS
	7.02*
4.66	-0.43 NS
	5.79*
8.00	0.86 NS
	6.24*
5.33	-0.12 NS
	7.18*

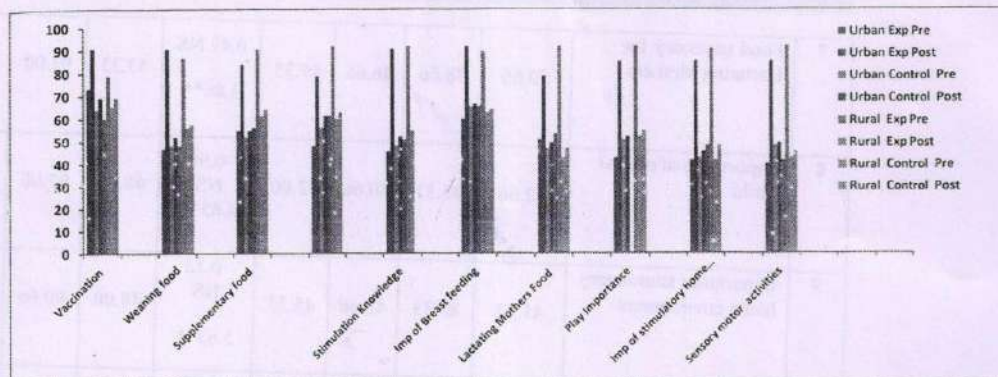


Fig. 2 Mother Awareness about Scientific Child Rearing Practices at Pre and Post test

Table 3 Stimulatory Play material provided to the early childhood children

S. No	Stimulatory play material	Percentage of children					
		Urban (150)			Rural (150)		
		Experimental 75	Control 75	t values	Experimental 75	Control 75	t values
A	Play Material						
1	Plastic bottles & boxes	92.95	54.76	10.49**	94.11	52.63	9.29**
2	Balls	96.04	50.00	3.01**	60.00	65.78	-0.89NS
3	Kitchen utensils	52.38	35.71	1.06NS	82.35	52.63	5.82**
4	Bat	42.82	36.71	-0.77NS	26.47	21.04	1.02NS
5	Plastic van/Jeep	26.19	30.95	2.37*	34.29	26.31	1.51NS
6	Marbles	42.85	29.60	-0.14NS	44.11	25.32	3.53**
7	Dolls	35.71	36.21	-0.40NS	26.47	24.32	0.40NS
8	Earthen toy pot	23.80	25.10	0	14.70	23.68	-2.02NS
9	Tricycles	4.65	4.32	-1.01NS	8.82	5.23	1.05NS
10	Walkers	2.13	4.21	8.20**	5.88	7.23	-0.72NS
B	Indigenous Play Material						
1	Sand	46.45	26.19	3.68**	58.82	34.21	4.29**
2	Soil	38.09	23.80	2.85**	55.88	31.57	4.32**



3	Stones and pebbles	28.57	19.04	1.84NS	29.41	14.28	3.21**
4	Seeds	18.04	7.04	2.92**	17.64	7.89	2.69**
5	Water	21.42	11.19	2.38*	32.35	10.52	4.85**
6	Clay	11.90	8.15	0.88NS	32.29	10.25	4.85**
7	Flowers	19.04	5.21	3.82**	26.47	5.26	5.25**
8	Leaves	11.90	8.12	0.88NS	25.41	5.23	5.05**

NS-Non significant \* p<0.05 level \*\*p<0.01 level

Table 3 illustrates stimulatory play material provided to the young children at their home. Two types of play materials were provided to children. Play material were plastic bottles, boxes, balls, kitchen utensils, tricycle and Waller. Indigenous play material provided to children were sand, soil, stones and pebbles, seeds, water, clay, flowers and leaves. Percentages of play material provided to experimental group were more than the percentage of children in control group. Beneficiary children were more from experimental group. Calculated "t" values were significant at 0.01% level, means highly significant difference was observed in experimental and control group as well as urban and rural early childhood children regarding stimulatory play material.

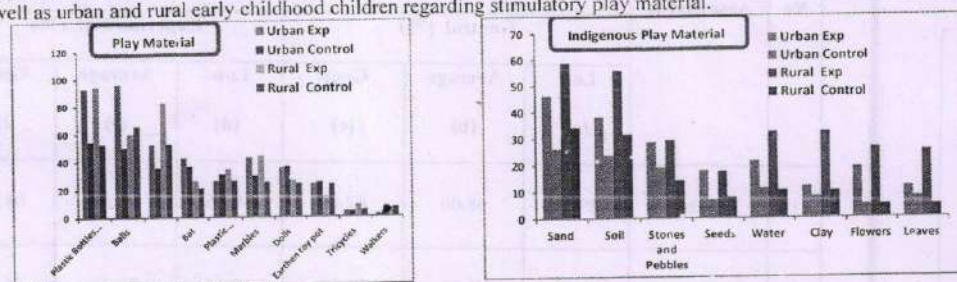


Fig. 3 Stimulatory Play Material Provided to the Early Childhood Children

Table 4 Comparison of knowledge levels of the urban mothers about early childhood care

Table 4 Comparison of knowledge levels of mothers on child abuse								
S. No	Order of Assessment	Percentage of Urban Mothers						t values
		Control (75)			Experimental (75)			
		Low (a)	Average (b)	Good (c)	Low (d)	Average (e)	Good (f)	
1	Pre test	34.66	62.44	02.66	32.00	58.66	09.33	a vs d 0.26NS b vs e 0.50NS c vs f -1.09NS
2	Post test	17.33	69.33	13.33	13.33	20.00	66.66	vs d 0.68NS b vs e 6.93** c vs f -7.90**

NS-Non significant \* p<0.05 level \*\*p<0.01 level

Table 4 reveal comparison of knowledge level of the urban mothers about young child care as per the groups, it is seen that after intervention mother's knowledge score where increased 9% and 67% where as low knowledge course decreased 32% and 13% after intervention. Calculated "t" values were significant at 0.01% level, means highly significant difference was observed at in control and experimental group children's' mothers knowledge.



3.21\*\*

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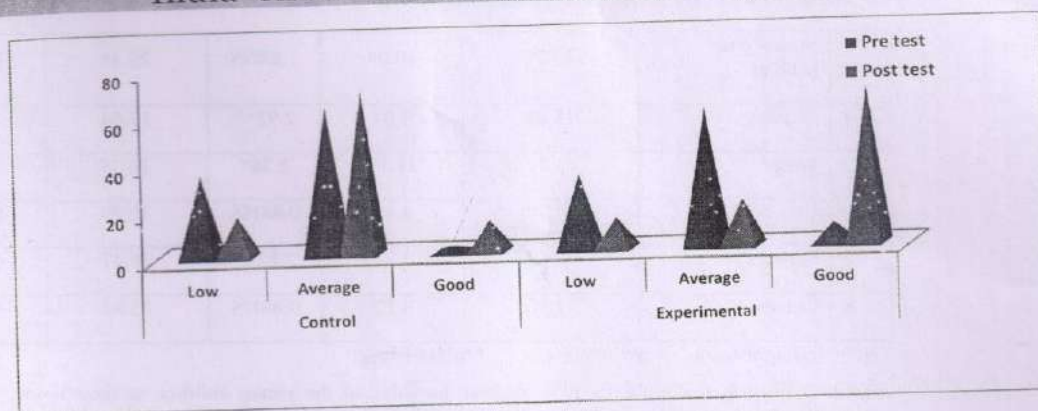


Fig. 4 Comparison of knowledge levels of the Urban mothers about early childhood care

Table 5 Comparison of knowledge levels of the rural mothers about early childhood care

S. No	Order of Assessment	Percentage of Rural Mothers						t values
		Control (75)			Experimental (75)			
		Low (a)	Average (b)	Good (c)	Low (d)	Average (e)	Good (f)	
1	Pre test	29.33	68.00	02.66	30.66	61.33	08.00	a vs d -0.13NS b vs e 0.89NS c vs f -1.70NS
2	Post test	22.66	73.33	04.00	18.66	25.33	56.00	a vs d 0.61NS b vs e 6.70** c vs f -8.43**

NS -Non significant \*p<0.05 level \*\*p<0.01 level

Table 5 reveals comparison of knowledge level of the rural mother about young child care as per the groups it is seen that after intervention mother knowledge for their increased after intervention 8% and 56% where as low knowledge scores decrease 31% and 19% after intervention. Calculated "t" values were significant at 0.01% level. means highly significant difference was observed in control and experimental group childrens' mothers knowledge.



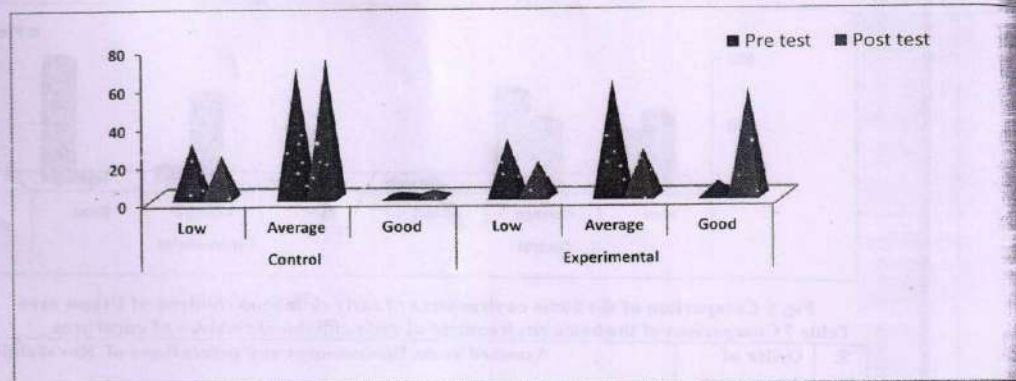


Fig. 5 Comparison of knowledge levels of the Rural mothers about early childhood care

Table 6 Comparison of the home environment of early childhood children of urban area

S. No	Order of Assessment	Assessed home Environment and percentages of Urban children						
		Control (75)			Experimental (75)			t values
		Poor (a)	Average (b)	Good (c)	Poor (d)	Average (e)	Good (f)	
1	Initial	52.38	47.61	--	33.33	64.28	2.38	a vs d 2.39* b vs e 2.12* --
2	Post test	39.52	69.07	--	--	9.87	90.12	-- b vs e 9.55 --

\*  $p < 0.05$  level

Table 6 explain comparison of the home environment of early childhood children of urban area. It is seen from the table that home environment scores of experimental urban children were found increased ( 2% and 90% ) whereas poor home environment scores of experimental group was nil ( 33% and 0% ) after intervention. Calculated "t" values were significant at 0.05% level, means significant difference was observed in control and experimental group childrens' home environment



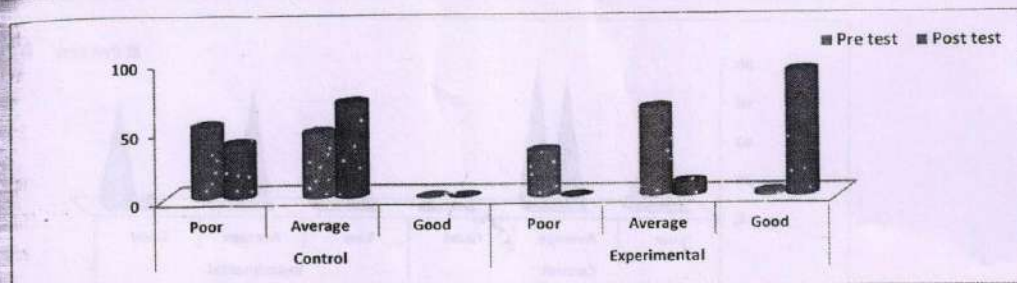


Fig. 6 Comparison of the home environment of early childhood children of Urban area

Table 7 Comparison of the home environment of early childhood children of rural area

S. No	Order of Assessment	Assessed home Environment and percentages of Rural children						
		Control (75)			Experimental (75)			‘t’ values
		Poor (a)	Average (b)	Good (c)	Poor (d)	Average (e)	Good (f)	
1	Initial	55.37	44.62	--	31.33	66.28	2.38	a vs d 3.05** b vs e -2.77**
2	Post test	39.52	69.07	--	--	10.87	89.12	b vs e 9.26**

\*\*p < 0.01 level

Table 7 explained about comparison of the home environment of early childhood children of rural area. It is seen from the table that good home environment scores of experimental or control rural children were found increased (two percent and 89%) where as poor home environment scores of experimental groups was nil (31% and 0%). Calculated "t" values were significant at 0.01% level, means significant difference was observed in control and experimental group childrens' home environment

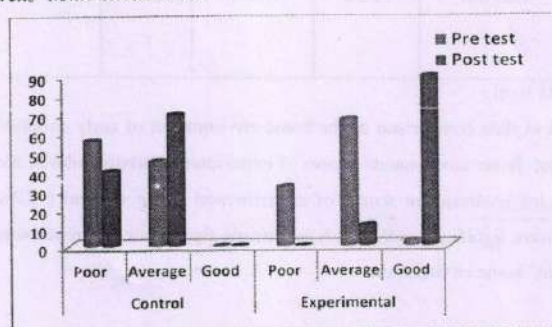


Fig. 7 Comparison of the home environment of early childhood children of rural area



**Conclusion:** From this study it can be concluded that intervention given to mothers had positive significant effects in most of the aspects of knowledge related to child care and stimulatory activities. Knowledge level of mothers was enhanced, quality of environment available to children at home was improved after intervention.

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## ग्रामीण भागातील किशोरवयीन मुलींचा आरोग्य विषयक समस्या -एक अभ्यास

संशोधक मार्गदर्शक

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संशोधक विद्यार्थी

अश्विनी संतोष वळसाने

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## सारांश :-

किशोरावस्था म्हणजे बाल्यावस्थेपासून प्रौढवस्थेकडे वळणारा संक्रमणाचा कालावधी होय. १३ ते १९ वर्ष हा किशोरवस्थेचा काळ समजला जातो. १३ ते १६ वर्ष पूर्व किशोरावस्था आणि १६ ते १९ वर्ष उत्तर किशोरावस्था अशा दोन भागात किशोरावस्था विभागली जाते. पूर्व किशोरावस्थेत लैंगिक परिपक्वतेचस सुरुवात होते. ह्या काळात मुलींच्या शरीरात होणाऱ्या बदलाविषयी पोकळेपणाने बोलले जात नाही. मुलींच्या शरीरात होणाऱ्या इतर बदलांपैकी मासिक पाळीचे आगमन हा महत्त्वपूर्ण बदल असतो. जे शास्त्रीय सिद्धांतानेही स्पष्ट झाले आहे. या वयोगटातील मुलींमध्ये मासिक पाळीत वजन वाढणे, अनियमितता, आहार विषयक आरोग्याचा बहल समस्या आढळून येतात.

किशोरवयीन मुलींना त्यांच्या वाढत्या वयात भेडसावण्याऱ्या प्रश्नांना घरातून तसेच शाळेतून आवश्यक प्रतिसाद मिळण्याची गरज आहे. करीता आई वडिलांनी किशोरवयीन मुलींना विश्वासात घेऊन त्यांच्याशी या विषयावर बोलणे महत्त्वाचे आहे. त्यांच्यात शारीरिक, मानसिक, भावनिक बदल घडून येतात. त्या बदलांना अनुसरून अपेक्षित वैकसिक कार्य करण्यासाठी पोषक आहार मिळणे आवश्यक आहे.

## प्रस्तावना :

शेती करण्याआधी शेतकरी जमीन नीट नागरून तिची सगळी मशागत करून ठेवतो. मुलगी वयात येण्यापूर्वी, स्त्री म्हणून तिचे जीवन निसर्गानियमा प्रमाणे सुरू होण्यापूर्वीच तिच्या मनाची त्यासाठी तयारी करणे, तिच्या मनाची एक मशागत करून ठेवणे हे मुख्यतः मुलींच्या आईचे किंवा मोठ्या बहिनीचे आणि शाळेतल्या तिच्या शिक्षिकेचेही काम असते.

किशोरावस्था किंवा किशोरवय म्हणजे लॅटीनमधील Adolescence म्हणजे मोठे होणे To grow up म्हणजे मोठे होण्याचा काळ किशोरवय हा अपरीपक्व मुलीचे पूर्ण वाढ झालेल्या प्रगल्भ तरुणातील रुपांतर होण्याच्या प्रक्रियेतचा कालखंड होय. मानवाची वाढ व विकास अनेक टप्प्यातून होत असते. त्या अनेक टप्प्यांपैकी एका विशिष्ट संक्रमणाच्या कालावधीला किशोरवय म्हणतात. या काळात मुलीत अनेक शारीरिक, मानसिक, सामाजिक, बौद्धिक बदल होण्यास सुरुवात होते. किशोरावस्था मुलींच्या जीवनातील स्वत्वाची जाणीव होते. या वयात मुली सौंदर्याबाबत जागरूक असतात. शरीर सौष्ट्याबाबत खूप जागरूक असतात. वजन वाढू नये म्हणून खूप कमी जेवतात. किशोरावस्थेत २४०० कॅलरीज, प्रथिने, ५५.५ ग्रॅम प्राणीज प्रथिने आहारात घेणे आवश्यक असतात. आहारातून भाज्या, फळे, अंडी, दूध यांचा आहारात समावेश करण्याची आवश्यकता असते.



किशोरावस्थेतील मुली अज्ञात गरीबी कारणांमुळे समतोल आहार घेत नाही. त्यामुळे त्यांच्यात पोषण विषयक समस्या निर्माण होऊन त्यांच्या आरोग्याविषयक दर्जावर वाईट परिणाम होता. किशोरावस्थेतील मुली घरी केलेल्या पोषण आहारापेक्षा फॉस्टफुड अधिक आवडीने सेवन करतात. त्यामुळे त्यांच्यात कुपोषणाची समस्या निर्माण होते.

#### व्याख्या :

१. प्रा. सौ. नलिनी चंदवासकर : "लहानपण ओसरलेले नसते आणि मोठेपण आलेले नसते. अशी द्विधा मनस्थिती अवस्थेला किशोरावस्था असे म्हणतात."

२. बिगे एवं हंट : "किशोरावस्था के समुचित अर्थ को प्रकट करनेवाला एक ही शब्द है परिवर्तन यह परिवर्तन शारिरिक, सामाजिक तथा मनोवैज्ञानिक होता है."

"आरोग्य म्हणजे केवळ रोगांपासून मुक्तता नव्हे तर शारिरिक, मानसिक, सामाजिक व संपूर्ण स्वास्थ्य म्हणजेच आरोग्य होय."

#### उद्दिष्टे :

१. ग्रामीण भागातील किशोरवयीन मुलींच्या स्वच्छते विषयी जागरूकता अभ्यासणे.
२. किशोरवयीन मुलींच्या आरोग्य व आहार या बद्दल जागरूकता अभ्यासणे.
३. किशोरवयीन मुलींच्या आरोग्य विषयक समस्यांवर उपाय सुचविणे.

#### मर्यादा :

१. सदर अभ्यास हा ग्रामीण भागातील किशोरवयीन मुली पुरतेच मर्यादित आहे.
२. संशोधनाकरीता १३-१८ वर्ष वयोगटातील ३० किशोरवयीन मुलींचा निवड करण्यात आली.

#### संशोधन पद्धती :

प्रस्तुत शोध निबंधासाठी प्राथमिक व दुय्यम स्त्रोतांचा वापर केलेला आहे.

#### संशोधन क्षेत्राची निवड :

प्रस्तुत विषयाचे अध्ययन करण्या करीता औरंगाबाद जिल्ह्यातील चिंचोली हे गाव निवडण्यात आले. संबंधित विषयाची माहिती गोळा करण्यासाठी प्रश्नावली तयार करण्यात आली. त्यातील प्रश्न होय किंवा नाही स्वरूपाचे होते. प्रश्नावली माहिती गोळा करण्यासाठी मुलाखत अनुसूचीद्वारे त्यांची कौटुंबिक व सामाजिक माहिती घेण्यात आली. १३ ते १८ वर्ष वयोगटातील ग्रामीण भागातील ३० किशोरवयीन मुलींचा अभ्यास करण्यात आला.

#### संशोधनाची आवश्यकता :

ग्रामीण भागातील मुलींमध्ये पोषक आहाराच्या अभावी कुपोषणाची समस्या दिसून येते. कारण त्यांचा पोषक विषयक दर्जा निम्न प्रतीचा असतो. त्यामुळे त्यांचे स्वास्थ्य उत्तम राहात नाही. ग्रामीण भागातील मुलींच्या आहाराकडे मुलांच्या तुलनेत दुर्लक्ष केले जात नाही. ही खरी समस्या आहे. ग्रामीण भागातील मुली घरातील दैनंदिन कामासोबतच शेतातील श्रमाचीही कामे करतात. त्यांची तीव्र वाढीची अवस्था असते. तसेच त्यांच्यात शारीरिक बदल ही झपाट्याने होतात. त्यामुळे त्यांना पोषक आहाराची जास्त आवश्यकता आहे. पोषक आहार पूर्ण भेटेल तेव्हाच त्यांचे आरोग्य उत्तम राहील.



**चर्चा व विश्लेषण :**

२० टक्के मुलींना समतोल आहार म्हणजे काय हे माहिती नाही. तर ८० टक्के मुलींना समतोल आहार म्हणजे काय हे माहिती आहे. ७५ टक्के मुली ह्या मांसाहार खात नाही तर २५ टक्के मुली ह्या मांसाहार खातात.

६८ टक्के मुलींना हिरव्या भाज्यांतून पोषक घटक मिळतात तर हे माहिती आहे. तर २८ टक्के टक्के मुलींना माहित नाही. ४० टक्के मुली ह्या सकाळी नाष्टा करतात ६० टक्के मुली नाही करत. १० टक्के मुली ह्या फळभाज्यांचा रामावेश करतात. ३० टक्के मुली ह्या कडधान्याचा जेवणात उपयोग करतात. ३५ टक्के मुली ह्या जंकफूड फास्टफूडचे सेवन करतात तर ६५ टक्के मुली ह्या जंगफूडचे सेवन करीत नाही. ४६ टक्के मुली आहारात सलाद घेतात तर ४४ टक्के मुलींना पोषक आहार घेतला नाही तर कुपोषणाची समस्या निर्माण होते हे माहित नाही. ३२ टक्के मुलींना लोह ह्या खनिज पोषक घटकाविषयी दर्जा सुधारण्याच्या पद्धती विषयी माहिती आहे. ४५ टक्के मुलींना पोषण विषयक दर्जा सुधारण्याच्या पद्धती विषयी माहिती आहे. वयात येणे म्हणजे काय विचारले तर ७० टक्के मुलींना माहित अगं. तर ३० टक्के मुलींना नाही. वयात येताना शारीरिक बदल जावणले का? ८२ टक्के मुली हो बोल्या तर १८ टक्के नाही. मासिक पाळी बदल विचारले असता ८५ टक्के माहिती आहे तर १५ टक्के नाही. मासिक पाळीच्या काळात काय वापरावे हे माहित आहे. माहित आहे का ६८ टक्के मुलींना माहित नव्हते. तर ३२ टक्के मुलींना माहित होते. मुलींशी चर्चा केली असता असे निदर्शनास आले की, मुलींना मासिक पाळी म्हणजे काय हे माहिती आहे, परंतु मासिक पाळीत काय वापरावे कसा आहार घ्यावा, कोणत्या गोष्टी कराव्यात व वैयक्तिक स्वच्छता कशी ठेवावी हे माहित नाही.

**किशोरवयीन मुलींच्या आरोग्य आणि आहारा विषयक समस्यांची कारणे :**

१. कुटुंबाची खालावलेली आर्थिक स्थिती
२. कुटुंबात मुलींना मिळणारे दुय्यम स्थान
३. किशोरवयीन मुलींमध्ये बारीक दिसण्यासाठी योग्य आहार न घेणे
४. अफावाचे रोग आढळतात. शरीरातील रक्ताचे प्रमाण कमी असणे.

**उपय योजना :**

१. ग्रामीण भागातील सर्व शाळा, महाविद्यालये, प्राथमिक आरोग्य केंद्र, ग्रामपंचायत आदिनी आहार, व्यायाम आणि आरोग्य या विषयीच्या जन जागृतीचे अभियान राबवले पाहिजे. ज्यात सर्व वयोगटातील व्यक्तींना सहभागी केले पाहिजे.
२. आहार आणि आरोग्याचे कार्यक्रम प्रत्येक गावागावात आणि सर्व समाज घटकांपर्यंत स्वयंसेवी संस्थामार्फत पोहचविले पाहिजे.
३. मुलगा मुलगी हा भेदभाव नाहीसा करून समाजात समांतर वागणुक दिली पाहिजे यासाठी कुटुंब प्रमुखाने पुढे यावे.

**संदर्भ सूची**

१. डॉ. इंदिरा खडसे, अन्न व पोषणशास्त्र, हिमालया पब्लिशिंग हाऊस
२. प्रा. सौ. सरल लेले, पोषण व आहार शास्त्र परिचय पिंपळपुरे पब्लिशर्स, नागपूर
३. पोषण आणि आहार, शोभा वाघमारे
४. पोषण आणि आहारशास्त्र प्रा. फरकाडे, गोंगे



औरंगाबाद शहरातील वसतिगृह निवासी प्रारंभिक प्रौढास्थेतील (२१-२५ वर्ष) महिलांचा आरोग्य दर्जा अभ्यासणे

मार्गदर्शिका

प्रा.दॉ.माया खांदार

सौ.के.एस.के.कला विज्ञान, वाणिज्य महाविद्यालय, बीड

संशोधिका

प्रा.मनिषा मुलंचंद राठोड

कला वरिष्ठ महाविद्यालय, हसूल, औरंगाबाद

भारत हा विकसनशिल देश आणि कृषिप्रधान देश म्हणून ओळखला जातो. कृषिप्रधान देश असल्याने बहुसंख्य लोक हे ग्रामीण भागात राहतात. भारतात अनेक आरोग्यविषयक समस्या उद्भवतांना दिसून येतात. उदा- रक्तक्षय, मधुमेह, मासिकपाळी विषयक समस्या, रक्तदाब इ. अशा आरोग्यविषयक समस्यांचे निरासन होणे आवश्यक आहे. म्हणूनच योग्य आहार आणि विहार असणे महत्वपूर्ण ठरते.

महाविद्यालय म्हणजे एक शैक्षणिक संस्था किंवा घटक आहे. इंग्रजी भाषिक देशांमध्ये महाविद्यालयाचा अर्थ बदलतो. महाविद्यालय एक पदवी पदान करणाऱ्या तृतीय शिक्षण संस्था असू शकते. एखाद्या महाविद्यालयाचा एक भाग किंवा व्यावसायिक शिक्षण देणारी संस्था असू शकेल.

चांगल्या शैक्षणिक संस्थेत प्रवेश मिळावा या करिता मुले-मुली प्रयत्न करतात शैक्षणिक प्रवेश पध्दतीनुसार कहीना आवडीचे महाविद्यालय किंवा संस्थेत प्रवेश मिळतो तर काहीना आपेक्षेप्रमाणे मिळत नाही. मनाविरुद्ध मिळालेल्या महाविद्यालयात आपले शैक्षणिक कार्य पार पाडावे लागते. मिळालेल्या शैक्षणिक संस्था किंवा महाविद्यालय घरापासून दूरवर स्थित असते. म्हणून शिक्षणासाठी त्यांना घर सोडून दुसरीकडे जावे लागते. या करिता शासनाने शैक्षणिक संस्थेजवळ या जागेची निर्मिती केलेली दिसून येते. या जागेला वसतिगृह असे संबोधले जाते.

वसतिगृह हे दूर वरुन येणाऱ्या विद्यार्थ्यांचा एक निवास आहे विद्यार्थी एकमेकांबरोबर राहतात. शिस्तबद्धतेचे मूल्य जाणून घेतात वसतिगृहाचे वातावरण हे अभ्यासाकरिता हितवह असते. वसतिगृहातील जीवन हे शिस्तबद्ध जीवन आहे. वसतिगृहात विद्यार्थ्यांना एकटे वाटत नाही. वसतिगृहाचे अधीक्षक हे कुटूंब प्रमुख म्हणून कार्य करतात. वसतिगृह ही अशी जागा आहे जी विद्यार्थ्यांच्या घरापासून दूर असते. उच्च माध्यमिक शिक्षण घेतल्यानंतर विद्यार्थी पुढील शिक्षणासाठी विविध ठिकाणावरून वसतिगृहात राहण्यासाठी येतात.

"वैकासिक मानसशास्त्र" यांच्या लेखकांच्या मतानुसार (डॉ.रा.र.बोरुडे, डॉ.सौ.मेधा कुमठेकर, डॉ.भरत देसाई, डॉ.शीला गोलविकर) प्रौढ म्हणजे ज्या व्यक्तीची वाढपूर्ण होते त्यांना समाजामध्ये इतर प्रौढांप्रमाणे दर्जा प्राप्त होतो अशी व्यक्ती आहे. संस्कृतीनुसार व कायद्याने परिपक्व असा प्रौढत्वाचा दर्जा मिळण्याचे वय भिन्न आढळते. आयुर्मर्यादा जशी वाढत जात आहे, तस- तसा प्रौढावस्थेचा कालखंड ही वाढलेला दिसतो त्रिवेणी फरकाडे आणि मुलभा गोंगे यांच्या मतानुसार किशोरावस्थानंतरची अवस्था म्हणजे तरुणावस्था होय. प्रा.शोभा वाघमारे (नाईक) यांच्या मतानुसार किशोरवयनंतरचा ५ वर्षांचा काळ हा तरुणावस्था मानला जातो. वयाच्या २५ वर्षांपर्यंत काही विशिष्ट लक्षणे किंवा सकारात्मक बदल घडून येतात.

उद्दिष्ट्ये :-

१) वसतिगृहातील महिलांची आरोग्यस्थिती व सवयी अभ्यासणे

गृहितके :-

१) वसतिगृहातील सहभागी महिलांची शारीरिक व्यायाम करण्याचे प्रमाण अधिक असते.

संशोधन कार्य पध्दती :-



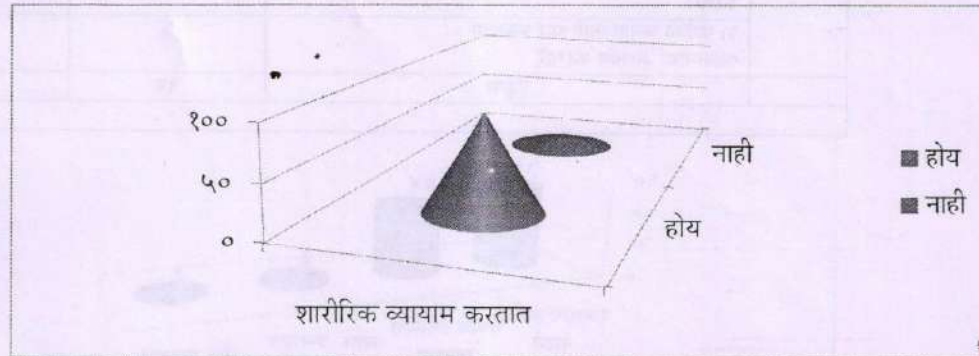
१००

आला.

४)	डोके	१	१
५)	सर्वांग	०	०
३)	शरीरातील तापमानात बदल होणे / नाडी ठोक्याचा दर वाढणे	०	०
४)	रक्तदाबात बदल होणे	०	०
५)	यापैकी कमीत कमी - दोन आरोग्य समस्या असणाऱ्या	२८	२८
६)	यापैकी कमीत कमी तीन आरोग्य समस्या असणाऱ्या	२५	२५
७)	यापैकी कमीत- कमी चार आरोग्य समस्या असणाऱ्या	१०	१०
८)	यापैकी कमीत-कमी पाच आरोग्य समस्या असणाऱ्या	५	५
	एकूण	१००	१००

तक्ता क्र. १ मध्ये दर्शविल्याप्रमाणे एकूण महिलांचे मासिक आरोग्य विषयी अभ्यास करण्यात आला. त्यामध्ये मासिक पाळी दरम्यान निर्माण होणाऱ्या भावना तसेच आरोग्यविषयक समस्यांचा अभ्यास करण्यात आला. मासिक पाळीच्या दरम्यान निर्माण होणाऱ्या चिडचिडेपणा ही भावना निर्माण होणाऱ्याचे प्रमाण सर्वाधिक २७% होते, तर उपरोक्त भावनापैकी कमीत-कमी तीन भावना निर्माण होणाऱ्याचे प्रमाण अल्प ५% असल्याचे दिसून आले. मासिक पाळी दरम्यान निर्माण होणाऱ्या समस्या पाहता सदरील समस्यांपैकी कमीत-कमी दोन समस्या निर्माण होणाऱ्यांचे प्रमाण अधिक २८% होते, तर त्वचा विषयक समस्या व डोके दुखी या आरोग्य समस्या निर्माण होणाऱ्याचे प्रमाण सर्वात कमी १% इतके आढळून आले जे की सारख्याच प्रमाणात दिसून आले.

आलेख क्र. २ सहभागी महिलांचे व्यायाम प्रमाण दर्शविणारा आलेख

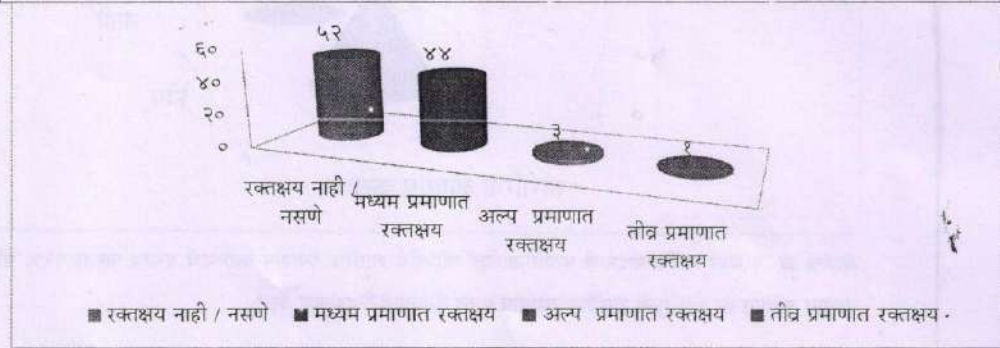


आलेख क्र. २ मध्ये दर्शविल्याप्रमाणे वसतिगृहातील महिलांचे शारीरिक व्यायाम करण्याचे प्रमाण पाहता ९२% महिला या शारीरिक व्यायाम करतात तर ८% मुली शारीरिक व्यायाम करत नसल्याचे निदर्शनास आले.



तक्ता क्र.२ सहभागी महिलांचे शारीरिक व्यायाम करण्याचे प्रमाण कारण आणि व्यायामाचे प्रकार दर्शविणारा तक्ता

अ.क्र.	विवरण	संख्या	टक्केवारी
१	व्यायाम केव्हा करतात		
	१) दररोज	२९	३१.५३
	२) कधी- कधी	५३	५७.६०
	३) आठवड्यातून ३-४ वेळा एकूण	१०	१०.८७
	एकूण	१००	१००
२	व्यायाम करण्याचे कारण		
	१) वजा कमी करणे किंवा वजन योग्य राखणे	२०	२१.७३
	२) सर्व साधारण आरोग्य	३९	४२.४
	३) तणाव दूर करण्यासाठी / होण्यासाठी	८	८.७
	४) आनंद किंवा इतर	२५	२७.१७
	एकूण	९२	१००
३	व्यायाम कोणता प्रकारचा करतात		
	१) चालणे	१९	२०.६५
	२) जॉगिंग	२१	२२.८३
	३) बॅटमिंटन	५	५.४३
	४) दोरीवरच्या उड्या	५	५.४३
	५) नृत्य करणे	८	८.७
	६) इतर	८	८.७
	७) यापैकी कमीत-कमी दोन प्रकारचा व्यायामाचा अवलंब करणारे	१६	१७.४
	८) यापैकी कमीत-कमी तीन प्रकारचा व्यायामाचा अवलंब करणारे	५	५.४३
	९) यापैकी कमीत-कमी चार प्रकारचा व्यायामाचा अवलंब करणारे	५	५.४३
	एकूण	९२	१००



आलेख क्र.३ सहभागी महिलांचे रक्तक्षयाचे प्रमाण दर्शविणारा आलेख



तक्ता

आलेख क्र. ३ मध्ये दर्शविल्याप्रमाणे सहभागी महिलांचे रक्तक्षय प्रमाण पाहता रक्तक्षय नसणाऱ्याचे प्रमाण (Hb > ११ mg /dl) ५२% आढळून आले. यावरून येते की सहभागी महिलांचे रक्तक्षय असणाऱ्या महिलांचे प्रमाण हे ४८% निदर्शनास आले.

गृहीतकाचे परीक्षण :-

- १) H<sub>०</sub> - वसतिगृहातील सहभागी महिलांचे शारीरिक व्यायाम करण्याचे प्रमाण कमी असते.  
H<sub>१</sub> - वसतिगृहातील सहभागी महिलांचे शारीरिक व्यायाम करण्याचे प्रमाण अधिक असते.

शारीरिक व्यायाम	संख्या	टक्कवोरी
होय	९२	९२
नाही	८	८

अ.क्र	विवरण	संख्या	एकूण संख्या	नमुना प्रमाण	P. मूल्य
१	वसतिगृहात शारीरिक व्यायाम करणाऱ्या	९२	१००	०.८८४७६६	०.०००

वरील सारणीवरून असे निदर्शनास येते की, सांख्यिकीय Z चाचणीचा वापर करून वसतिगृहातील सहभागी महिलांचे शारीरिक व्यायामाचा प्रमाणाची पडताळणी केली आहे. P.Value (०.०००) हे महत्तम पातळी ५% पेक्षा कमी (०.००५) आहे म्हणून H<sub>१</sub> गृहीतक स्वीकारले गेले. यावरून असा निष्कर्ष दिसून आला की, वसतिगृहातील सहभागी महिलांचे शारीरिक व्यायाम करणाऱ्याचे प्रमाण अधिक दिसून आले.

निष्कर्ष :-

- १) सहभागी ८६% महिलांचे मासिक पाळीचे चक्र नियमित होते तर १४% महिलांचे अनियमित होते.
- २) ६२% महिलांचे मासिक पाळीचा अनुभव वेदनादायक तर ३८% महिलांचा अनुभव वेदनारहित होता.
- ३) मासिक पाळी दरम्यान चिडचिडेपणा होणाऱ्याचे प्रमाण सर्वाधिक २७% होते.
- ४) मासिका दरम्यान आरोग्य विषयक समस्या म्हणून कमीत- कमी दोन आरोग्य समस्या निर्माण होणाऱ्याचे प्रमाण सर्वाधिक (२८%) होते, त्वचेच्या व डोके दुखी या आरोग्य समस्या उद्भवणारी केवळ एकच मुलगी आढळून आली.
- ५) ९२% महिला या शारीरिक व्यायाम करतांना निदर्शनास आल्या.
- ६) एकूण व्यायाम करणाऱ्या महिलांमध्ये कधी-कधी व्यायाम करणाऱ्याचे प्रमाण अधिक ५७.६०% दिसून आले तर आठवड्यातून ३-४ वेळा व्यायाम करणाऱ्याचे प्रमाण कमी १०.८७% आढळले.
- ७) सर्वसाधारण आरोग्या करिता व्यायाम करणाऱ्या महिलांचे प्रमाण सर्वाधिक ४२.४% होते तर तणाव दूर होण्यासाठी व्यायाम करणाऱ्याचे प्रमाण अल्प ८.७% निदर्शनास आले.
- ८) जॉगिंग या व्यायामाचा अवलंब करणाऱ्या महिलांचे प्रमाण अधिक २२.८३% आढळून आले.



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- १) रक्तक्षय नसणान्या महिलांचे प्रमाण ५२% होते तर तीव्र प्रमाणात रक्तक्षय असणारी फक्त एकच महिला निदर्शनास आली.  
१०) रक्तक्षय असणान्या महिलांचे प्रमाण ४८% आढळून आले.

**संदर्भ ग्रंथ सूची :-**

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- २) [shorteassy on life in the hostel, by mill www.preservearticles.com](http://shorteassy.onlifeinthehostel.by.mill.preservearticles.com)
- ३) Dr. Kayavhthan, (२०१३) Depression among fresh college hostellers laring per and post semester, international journal of scientific and research publication, VOL-३ Issu-१ १-३.
- ४) डॉ. बोरुडे, रा.र.डॉ.सौ.कुमठेकर मेधा, डॉ.देसाई भारत, डॉ. गोलविलकर शीला, "वैकसिक मानसशास्त्र" पुणे विद्यार्थी प्रकाशन १७६६, सदाशिव पेट, पुणे, प्रथम आवृत्ती.
- ५) प्रा.फरकाडे त्रिवेणी शा. सौ.गोंगे सुलभा सुहास, पोषण आणि आहार शास्त्र, पिंपळापुर अॅण्ड कं. पब्लिशर्स, नागपूर, प्र. आवृत्ती.
- ६) प्रा.सौ.वाघमारे (नाईक) शोभा, पोषण आणि आहार, विद्या बुक्स पब्लिशर्स, औरंगपूरा, औरंगाबाद, सुधारित दुसरी आवृत्ती.



माली,

## आदिवासी मातांचे शिक्षण व मुलांचे आरोग्य यांचा सहसंबंध अभ्यासणे

डॉ. माया खंडाट

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ester,

मद्यार्थी

म

ती.

"Education is the backbone of the nation"

शिक्षण हे राष्ट्राच्या प्रगतीमध्ये अत्यंत महत्त्वाची भूमिका पार पाडते. प्रत्येक व्यक्तीला शिक्षणाची तिच्या विकासाकरिता गरज असते. कारण शिक्षणामुळे व्यक्ति सामाजिक, बौद्धिक, नैतिक तसेच आर्थिकदृष्ट्या सक्षम बनते. यामुळे तिच्यामध्ये आत्मविश्वास निर्माण होऊन उत्तम व्यक्तिमत्त्व निर्माण होते. आज तंत्रज्ञानाच्या युगामध्ये शिक्षणाचे महत्त्व अधिक वाढले आहे. कारण रोज नवनवीन शोध लागत असल्यामुळे त्याबद्दल माहिती घेणे जरूरी आहे आणि त्याकरिता शिक्षण आविश्यक आहे. समाजाच्या प्रगतीकरिता स्त्री शिक्षण महत्त्वाचे ठरते. कारण स्त्रीशिक्षित असेल तर ती संपूर्ण कुटुंबाचा विकास करते.

स्त्री शिक्षणामुळे घरातच नव्हे तर संपूर्ण समाजामध्ये मोठा बदल होताना दिसून येतो. पूर्वी स्त्रिया शिक्षणापासून वंचित असत. त्यामुळे विविध बाबी संदर्भातील ज्ञान तिच्याकडे नव्हते. मात्र आज परिस्थिती बदलत चालली आहे. स्त्री सुशिक्षित झाल्यास घरातील सदस्याच्या विकासात ती मोठी भूमिका बजावते आणि समाजिक कार्यात हातभार लावते. म्हणजेच तिच्यामुळे संपूर्ण कुटुंबाचा विकास होत असतो. मुलांना शिकविणे, त्यांच्या वाबतच्या निर्णय प्रक्रियेत त्या सहभागी होतात. मात्र सर्वात महत्त्वाचे म्हणजे स्त्री जर साक्षर असेल तर ती घरातील सर्वात महत्त्वाचे काम म्हणजे आहार तयार करण्याच्या प्रक्रियेत आहारशास्त्र विषयक ज्ञानाचा संपूर्ण उपयोग करू शकते. आहारातील कोणत्या घटकाला कोणत्या वयोगटात अधिक महत्त्व द्यावे, कोणते अन्नपदार्थ मुलांच्या वाढ व विकासाकरिता आवश्यक आहे व उपलब्ध आहे त्या अन्नघटकाचा कसा चांगल्याप्रकारे उपयोग करता येईल हे समजते. म्हणूनच आदिवासी मातांना याचे ज्ञान असणे महत्त्वाचे ठरेल.

आदिवासी मातांना साक्षर करणे गरजेचे आहे. कारण शिक्षणाचा अभाव असल्यामुळे आहारविषयक माहितीचा अभाव निर्माण होतो आणि परिणामी या मातांच्या मुलांमध्ये कुपोषणाचे प्रमाण आढळून येते. एकतर बिकट आर्थिक परिस्थिती आणि शिक्षणाचा अभाव यामुळे मुलांमध्ये पोषक घटकाची कमतरता निर्माण होते व ही मुले विविध आजारांना बळी पडतात. शालेय मुलांचे (६ ते १२ वयोगट) आरोग्य उत्तम राहण्याकरिता आहार हे महत्त्वाची भूमिका बजावत असते. कारण या मुलांना सर्व पोषक घटक न मिळाल्यास त्यांची वजन आणि उंची परिणामीत होते. म्हणूनच आदिवासी मातांच्या शिक्षणाचा मुलांच्या आरोग्यावर होणारा परिणाम लक्षात घेणे महत्त्वाचे आहे.

उद्दिष्टे :

१. आदिवासी मातांचा शिक्षण विषयक दृष्टीकोन जाणून घेणे.
२. आदिवासी मातेच्या शिक्षणाचा तिच्या मुलांच्या आरोग्यावरील होणाऱ्या परिणामाचा अभ्यास करणे.



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**संशोधन पद्धती :**

प्रस्तुत शोधनिबंधाकरिता सर्वेक्षण पद्धतीचा अवलंब करण्यात आला आहे. प्रश्नावली पद्धतीचा वापर करून प्रत्यक्ष मुलाखतीद्वारे माहिती संकलित करण्यात आली व मानवमिती मापन पद्धतीचा उपयोग करून मुलांची उंची व वजन मोजण्यात आले.

**मर्यादा :**

१. प्रस्तुत अभ्यास जालना जिल्ह्यातील मंडा तालुक्यातील निवडक गावापुरता मर्यादित आहे.
२. प्रस्तुत अभ्यास १०० आदिवासी माता व त्यांच्या शालेय मुलापुरता मर्यादित आहे.

**चर्चा व विश्लेषण :**

१. प्रस्तुत संशोधनामध्ये ८८ टक्के माता या आंध आदिवासी तर १२ टक्के माता या महादेव कोळी या आदिवासी जमातीच्या आहेत.
२. ७७ टक्के माता संयुक्त कुटुंब पद्धतीत तर २३ टक्के माता या विभक्त कुटुंबातील आहेत. म्हणजेच संयुक्त कुटुंबाचे प्रमाण अधिक आढळून आले.

३. मातांच्या शिक्षणाचे प्रमाण दर्शविणारा तक्ता

अ.क्र.	पर्याय	टक्केवारी
१	अशिक्षित	७०
२	प्राथमिक	२६
३	माध्यमिक	४
४	उच्च माध्यमिक	०

उपरोक्त तक्त्यावरून ७० टक्के माता या अशिक्षित आहेत. २६ टक्के मातांना प्राथमिक शिक्षण घेतले आहे. तर फक्त ४ टक्के मातांचे माध्यमिक शिक्षण झाले आहे. माध्यमिक शिक्षणाचे प्रमाण अत्यंत कमी आहे व उच्च माध्यमिक शिक्षण कोणीही घेतलले दिसून येत नाही. मात्र अशिक्षित मातांचे प्रमाण खूप अधिक आहे. यावरून शिक्षणाबद्दलची अनास्था दिसून येते.

४. मातांच्या शिक्षणावर आधारित मुलांची उंची आणि वजनाचे प्रमाण दर्शविणारा तक्ता

अ.क्र.	मातेचे शिक्षण	मुलांची संख्या १००	उंची		वजन	
			कमी	साधारण	कमी	साधारण
१	अशिक्षित	७०	५१ ७२.८५%	१९ २७.१४%	५७ ८१.४२%	१२ १७.१४%
२	प्राथमिक	२६	१० ३८.४८%	१६ ५७.६९%	९ ३४.९१%	१७ ६५.३८%
३	माध्यमिक	४	१ २५%	३ ७५%	१ २५%	३ ७५%



लक्ष्य  
ने.

उपरोक्त तक्त्यावरून असे निदर्शनास आले की, ज्या मुलांच्या माता या अशिक्षित आहेत त्यातील ७२.८५ टक्के मुलांची उंची कमी होती तर २७.१४ टक्के मुलांची उंची साधारण होती आणि ८१.४२ टक्के मुलांचे वजन कमी होते. तर १७.१४ टक्के मुलांचे वजन हे साधारण होते. प्राथमिक पर्यंतचे शिक्षण घेणाऱ्या मातांच्या ३८.४६ टक्के मुलं कमी उंची असणारी ६१.५३ टक्के मुले साधारण उंची असणारी दिसून येतात. तर ३४.६१ टक्के मुलांचे वजन कमी होते व ६५.३८ टक्के मुलांचे साधारण होते. माध्यमिक पर्यंतचे शिक्षण घेणाऱ्या मातांच्या मुलांची उंची व वजन २५ टक्के कमी व ७५ टक्के साधारण दिसून आले.

**निष्कर्ष :**

येच्या

आदिवासी मातांमध्ये शिक्षणाचे प्रमाण खूपच कमी दिसून येते. शिक्षणामुळे समाजाचा विकास होतो आणि स्त्री या समाजाचा महत्त्वाचा घटक आहे. मात्र ती शिक्षणापासून वंचित राहता कामा नये. निरक्षर मातांचे प्रमाण अधिक दिसून येते. प्राथमिक शिक्षणाचे प्रमाण देखील म्हणावे तसे समाधानकारक नाही, तर माध्यमिक शिक्षण घेणाऱ्या मातांचे प्रमाण खूपच कमी आहे. शिक्षण घेणे गरजेचे आहे का? असे विचारले असता मातांचा चांगला प्रतिसाद होता. मात्र शिक्षणाच्या सोयी सुविधांच्या अभावामुळे, कौटुंबिक परिस्थितीमुळे शिक्षण घेणे शक्य होत नाही. पोषण विषयक शिक्षण मिळणे हे गरजेचे आहे हे संशोधनात दिसून येते. कारण आहाराबात जागृकता निर्माण झाल्यास कुपोषणासारखी समस्या कमी होत जाईल. तसेच मुलांना पोषक आहाराची गरज आहे हे माता ओळखून आहे. मात्र ती कशी पूर्ण करावी याबाबत उपाययोजना करणे आवश्यक आहे. मातांच्या शिक्षणाचा मुलांच्या आरोग्यावर निश्चित परिणाम दिसून येतो.

**उपाययोजना :**

१. आदिवासी मातांमध्ये शिक्षणाचे प्रमाण वाढविण्याकरिता विविध उपाययोजना राबवाव्यात.
२. मातांना पोषण शिक्षणाविषयी जागृक करण्याकरिता विविध उपक्रम आयोजित करावेत.
३. मुलांना उपलब्ध अन्न सामुग्रीद्वारे पोषक घटकयुक्त आहार कसा देता येईल त्याचे पोषणमूल्य कसे टिकविता येईल, कसे वाढविता येईल या संदर्भात कार्यशाळा आयोजित करून मातांचा सद्ग्रीय सहभाग घ्यावा.

**संदर्भ सूची :**

१. पोषण आणि आहार - प्रा. सौ. शोभा वाघमारे
२. सामुदायिक विकास, विस्तार शिक्षण व महिला सबलीकरण - डॉ. उज्ज्वला वैतगडे व प्रा. विद्युलता मुळे
३. शैक्षणिक संशोधन पद्धती - डॉ. वि. रा. भिंताडे
४. सामाजिक संशोधन पद्धतीशास्त्र व तंत्रे - डॉ. प्रदीप आगलावे
५. [www.researchgate.net](http://www.researchgate.net)

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औरंगाबाद शहरातील नोकरी करणाऱ्या महिलांमधील ताणतणाव आणि व्यायामाचे महत्त्व

मार्गदर्शक

डॉ. माया खंडाट,

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सौ. के. एस. के. महाविद्यालय, बीड

संशोधक

नेत्रा शेळके

गृहविज्ञान विभाग,

डॉ. बाबासाहेब आंबेडकर मराठवाडा

विद्यापीठ, औरंगाबाद.

वक्त

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## सारांश :

दैनंदिन गरजा पूर्ण करण्यासाठी पुरुषाबरोबर स्त्रीएव नोकरीकडे जाण्याचे प्रमाण वाढत आहे. स्त्रीला घर व नोकरी दोन्ही सांभाळताना विविध समस्यांना सामोरे जावे लागत असून तिच्या ताणतणावाचे प्रमाण वाढत आहे व ती विविध आजारांना सामोरे जात आहे. सदरील लेखामध्ये नोकरी करणाऱ्या महिलांना व्यायाम केल्यास ताणतणाव कमी होतो का याचा अभ्यास करण्यात आला आहे. ताणतणावाचे स्वरूप, ते कमी करण्यासाठी व्यायामाचे महत्त्व सांगण्यात आले आहे. तसेच ताण तणाव कमी करण्यासाठी शिफारशी देण्यात आल्या आहेत.

बीजसंज्ञा - ताणतणाव, व्यायाम, महिला, आरोग्य

## प्रस्तावना :

नोकरीसाठी घरातून बाहेर पडणारी स्त्री हे दृश्य आज सर्वांच्याच परिचयाचे झालेले आहे. शाळा - महाविद्यालयातून शिक्षण घेतानाच मुलींच्या मनात नोकरीचे ध्येय जागे होत असते. त्यादृष्टीने त्यांनी आपले शिक्षण केलेले असते. या धावपळीच्या व महागाईच्या जगात शिक्षण कटल्याली क्षेत्रातले असो मिळेल ती नोकरी करणे हे त्यांचे साध्य असते. पण बदलत्या आर्थिक परिस्थितीमुळे, वाढत्या महागाईने आणि मुलींना दिल्या गेलेल्या शिक्षणाच्या समान संधींनी नोकरी ही वाट निश्चित होऊ लागली.

शहरातील वाढते खर्च, शिकलेल्या ज्ञानाचा उपयोग, घराचा आर्थिक भार उचलण्यासाठी स्त्री ही घराबाहेर जाऊ लागली आहे. स्त्रीची नोकरी म्हणजे आर्थिकदृष्ट्या आगगाडीचे दुसरे इंजिन समजले जाते.

समाजात नोकरी करणाऱ्या स्त्रियांचे प्रमाण वाढत चाललेले आपल्याला दिसून येते. त्याचबरोबर त्यांच्या अडचणी व समस्या याच्यात सुद्धा वाढ झालेली आपल्याला दिसून येते. नोकरी, मुलांचे संगोपन, घरकाम आणि नातेसंबंध, कार्यक्रम या सर्व पातळ्यांवर स्त्री लढताना दिसून येते. ही कसरत साधताना अनेक स्त्रियांवर अतिरिक्त ताण येत आहे. ताण आणि जबाबदाऱ्या याची परिणीती ही स्त्रियांच्या मानसिक आणि शारीरिक आजारपणात होते. त्यामुळे उच्चरक्तदाब, मधुमेह, कॅन्सर, लठ्ठपणा, थायरॉईड अशा विविध आजारांना बळी पडावे लागते. घरातील व नोकरीतील कामाच्या जबाबदारीमुळे स्वतःकडे लक्ष देण्याचे प्रमाण कमी होत चालले आहे. वेळेवर जेवण न करणे तसेच व्यायाम न करणे, आहारात पोषक घटक न घेणे, याबरोबरच मिळणारे संकरित अन्न या सर्व कारणांमुळे महिलांना विविध आजारांना सामोरे जावे लागत आहे. यासाठी महिलांनी ज्याप्रमाणे कुटुंबातील सर्व लहान-थोर



व्यक्तीच्या आरोग्याकडे लक्ष दिले जाते, त्याचप्रमाणे त्यांनी आपल्या स्वतःच्या आरोग्याकडेही वैज्ञानिक दृष्टिकोनातून लक्ष देणे तितकेच महत्वाचे आहे.

**व्यायाम :**

योग्य आहारातून योग्य पोषक घटक मिळाल्यास शरीर निरोगी राहून व्यक्ती सतत क्रियाशील राहतो. त्याचप्रमाणे पोषक अन्नासोबत व्यायाम हा पण शरीरासाठी तितकाच महत्वाचा आणि आवश्यक आहे. व्यायामामुळे शरीरातील विविध ग्रंथी, अवयव संस्था यावर सकारात्मक परिणाम होतो. दिवसाची सुरुवात ही व्यायाम, प्राणायाम व योगाने झाल्यास दिवस अगदी चांगला जातो. व्यायामामुळे शरीर हे तंदुरुस्त राहते, थकवा जाणवत नाही, काम करण्यास दिवसभर उत्साह निर्माण होतो.

व्यायाम हा शारीरिक तसेच मानसिक आरोग्यासाठीही खूप फायदेशीर असतो. व्यायामामुळे शारीरिक कष्ट करण्याची क्षमता अर्थात स्टॅमिना वाढतो. तुम्ही जर चार्जिंग केलं नाही तर तुमचा मोबाईल फोन चालेल का? अगदी तसेच शरीराला, मनाला, डोक्याला रिचार्ज करण्यासाठी कमीत कमी दररोज ३० मिनिटांचा व्यायाम आवश्यक आहे. त्यामुळे नांकरी करणाऱ्या महिलांच्या जीवनामध्ये नियमित व्यायामाचे महत्त्व खूप असते.

**व्यायाम म्हणजे काय?**

'शरीराला स्थिरता प्राप्त करण्यासाठी शरीर मजबूत बनवण्यासाठी केल्या जाणाऱ्या क्रिया येस व्यायाम असे म्हणतात.'

**व्यायाम,**

'शारीरिक स्वास्थ्य वाढविणारी आणि आरोग्य टिकविणारी क्रिया म्हणजे

शरीराची व मनाची विशेष प्रगती करणे म्हणजे व्यायाम होय.' - भगवद्गीता 'कमीरम्भाणं योगारोधानो व्यायाम' -

**कौटिल्य**

मैदानी खेळ, चालणे, धावणे, पोहणे, दोरीवरच्या उड्या, जोर-बैठका, चढणे- उतरणे, स्ट्रेचिंग, डान्सिंग, योगासने, सूर्यनमस्कार अशा विविध शारीरिक क्रियांचा समावेश होतो.

**आरोग्यासाठी व्यायामाचे महत्त्व :**

कोणत्याही परिस्थितीत चांगल्या आरोग्यासाठी प्रयत्न करणे, नियमित व्यायाम करणे उपयुक्त असते. कारण रोजच्या व्यायामामुळे आजार आटोक्यात राहण्यास मदत होते. रक्तातील ब्लड शुगर आणि कोलेस्ट्रॉल नियंत्रित राहते. मानसिक ताण दूर होण्यास मदत होते. लठ्ठपणा, हृदयविकार, उच्चरक्तदाब, पक्षाघात, सांधेदुखी, गुडघेदुखी नियमित व्यायाम केल्याने दूर होते. अशाप्रकारे निरोगी आरोग्यासाठी व्यायाम खूप महत्वाचा आहे.

**नियमित व्यायामाचे फायदे :**

१. व्यायामाने संपूर्ण शरीर निरोगी आणि बांधेसुद्ध बनते.
२. रोज व्यायाम करणाऱ्याच्या आरोग्यावर खूप चांगले परिणाम होतात.
३. रोजच्या व्यायामाने स्नायूंची ताकद व लवचिकता वाढते.
४. नियमित व्यायामाने सांध्याची हालचाल योग्यरित्या होते. त्यामुळे संधीवात,
५. गुडघेदुखी यासारखे आजार होण्याचा संभव कमी होतो.



३ देणे

६. शरीरातील रक्तदाब नियंत्रित राहतो.
७. शरीराच्या चयापचय गतीमध्ये बदल होतो.
८. हृदय आणि फुफ्फुसांचा स्टॅमिना वाढतो.

पोषक

ताणतणाव :

प्रत्येक

जातो.

क्षमता

मर्यादा

मध्ये

सध्याच्या धावपळीच्या काळात ताणतणाव सर्वांनाच कमी-अधिक प्रमाणात सहन करावा लागतो. परिस्थितीशी योग्यप्रकारे जुळवून घेता न आल्यामुळे जीवनातील आनंद, स्वास्थ्य हरवलेल्या महिलांची संख्या दिवसेंदिवस वाढत आहे. आरोग्याच्या किरकोळ तक्रारी किंवा गंभीर आजार या स्वरूपात अनेक महिला ताणाची किंमत मोजताना दिसतात. याशिवाय ताणामुळे पुरुषासोबत नोकरी करणाऱ्या महिलाही मद्यपान, धुम्रपान, अमली पदार्थांचे सेवन यासारख्या गोष्टींना आहारी जात आहेत. ताणतणावाचा महिलांच्या स्वास्थ्यावर वाईट परिणाम होताना दिसतो. अनेक कारणांमुळे तणाव जाणवतो आणि त्याचे परिणाम शरीरावर, वर्तनावर दिसतो. ताणतणाव निर्माण करणारा प्रसंग मोठा किंवा लहान असतो. तसेच क्षुल्लक वाटणारा, प्रसंगदेशील एखाद्या महिलेमध्ये ताणतणाव निर्माण करू शकतो. उदा. नेहमीच बस चुकणे, कार्यालयात जायला उशीर होणे अशाप्रकारच्या छोट्या तणावाने स्त्रियांच्या शारीरिक, मानसिक आरोग्यावर परिणाम होऊ शकतो. त्याचबरोबर बऱ्याच समस्या व विकृती यांनाही ती प्रत्यक्ष किंवा अप्रत्यक्ष जबाबदार असते. संश्रमतीने मृत्यूकडे नेणारी अशी ही अवस्था आहे.

व्याख्या :

१. कोणतेही प्रसंग अथवा प्रासंगिक बदलाला दिलेला नकारात्मक शारीरिक व भावनिक प्रतिसाद म्हणजे 'तणाव' होय.
२. मनातील अनावश्यक व नकारात्मक विचारांच्या गर्दीमुळे मनाची जी स्थिती होते तिला तणाव असे म्हणतात.

ताणतणावाची कारणे :

पासने,

**बाह्य** - एकूण तणावनिर्मितीमध्ये बाह्य घटकांचा केवळ ५ ते १० टक्के एवढाच वाटा असतो. उदा. कामाच्या ठिकाणचे व घरातील वातावरण, आर्थिक स्थिती, सामाजिक समस्या, प्रकृती अस्वास्थ्य.

**आंतरिक** - एकूण ताणतणाव निर्मितीमध्ये आंतरिक घटकांचा ९०-९५ टक्के वाटा असतो. आजीवन प्रणालीमुळे तणाव निर्माण होतो असे म्हटले जाते. परंतु कोणतीही परिस्थिती ही स्वतः तणावपूर्ण नसते.

जच्या

गे दूर

होते.

एखाद्याच्या स्वभावानुरूप त्या परिस्थितीकडे पाहण्याच्या त्याच्या दृष्टीकोनावर सर्व अवलंबून असते. उदा. आत्मविश्वासाचा अभाव - आकानात्मक परिस्थिती निर्माण झाली की व्यक्ती तणावग्रस्त होते.

**हळवेपणा** - रस्त्यात भेटलेली मैत्रिण बघून हसली नाही म्हणून तणाव.

ताणतणावाचे दुष्परिणाम :

ताणतणावाचे दुष्परिणामांची दोन गटात विभागणी करता येते.

- १) **शारीरिक ताण** - ताणामुळे पित्त वाढणे, भूक न लागणे, वजन कमी होणे, हृदयरोग, दमा, रक्तदाब, मधुमेह, यकृत, मुत्रपिंड इ. विकार होऊ शकतात.
- २) **मानसिक ताण** - अतिरिक्त राग येणे, विकृत व्यक्तिमत्व, निरुत्साहीपणा, उदासीनता, निद्रानाश, विस्मरण, कशातच रस न वाटणे, सतत दुःखी राहणे असे मानसिक त्रास होऊ शकतात.



तणावग्रस्त व्यक्तीची कार्यक्षमता कमी होऊ शकते, ती योग्य निर्णय घेऊ शकत नाही. स्वतः आनंदी राहू शकत नाही व इतरांनाही आनंद देऊ शकत नाही.

**संशोधन विषयाची निवड :**

मराठवाड्यातील असलेले औरंगाबाद हे महत्त्वाचे शहर आहे. औरंगाबाद हे मराठवाड्यातील व सोबतच महाराष्ट्रातील पर्यटनाच्या दृष्टीने राजधानीचे शहर आहे. औरंगाबाद हे जगातले एक सर्वाधिक वेगाने वाढणारे औद्योगिक शहर आहे. वाढत्या औद्योगिकीकरणामुळे वाढती महागाई व लोकसंख्या यांचे प्रमाण वाढत आहे. वाढत्या दैनंदिन गरजा पूर्ण करण्यासाठी पुरुषांवरोबर स्त्रीपण नोकरीकडे जाण्याचे प्रमाण वाढत आहे. स्त्रीला घर व नोकरी दोन्ही सांभाळताना विविध समस्यांना सामोरे जावे लागत असून तिच्या ताणतणावाचे प्रमाण वाढत आहे व ती विविध आजारांना सामोरे जात आहे. औरंगाबाद शहरातील नोकरी करणाऱ्या महिलांपैकी २५ व्यायाम करणाऱ्या व २५ व्यायाम न करणाऱ्या महिलांची निवड करण्यात आली. त्यांच्याकडून प्रश्नावलीद्वारे प्रश्न विचारून सर्वेक्षणाच्या मूल्यमापन करण्याच्या दृष्टीकोनातून 'नोकरी करणाऱ्या महिलामधील ताणतणाव आणि व्यायामाचे महत्त्व' या संशोधन विषयाची निवड करण्यात आली आहे.

**उद्दिष्ट्ये :**

१. नोकरीतील व्यायाम करणाऱ्या व न करणाऱ्या महिलांचा सहसंबंध अभ्यासणे.
२. नोकरीतील महिलांच्या कामाच्या वेळा व ताणतणाव याचा सहसंबंध अभ्यासणे.
३. ताणतणाव कमी करण्यासाठी व्यायामाचा उपयोग होता का हे अभ्यासणे.

**गृहितकृत्य :**

१. नोकरी करणाऱ्या महिलांचा व्यायाम केल्याने ताणतणाव कमी होत आहे.
२. नोकरी करणाऱ्या महिलांची व्यायामामुळे कामातील कार्यक्षमता वाढत आहे.

**संशोधन पद्धती :**

सदरील विषयाचा अभ्यास करण्यासाठी विश्लेषणात्मक, वर्णनात्मक व सर्वेक्षणात्मक पद्धतीचा वापर करण्यात आला आहे. तसेच माहिती संकलनासाठी प्रश्नावलीचा वापर करण्यात आला आहे.

**नमुना निवड :**

सदरील अभ्यास करण्यासाठी औरंगाबाद शहरातील नोकरी करणाऱ्या ५० महिलांची नमुना म्हणून निवड करण्यात आली असून त्यापैकी २५ व्यायाम करणाऱ्या महिला व २५ व्यायाम न करणाऱ्या महिला अशी निवड केली आहे.

**विश्लेषण व अर्थनिर्वचन**

औरंगाबाद शहरातील नोकरी करणाऱ्या ५० महिलांकडून मुलाखत अनुसूचीच्या माध्यमातून माहिती घेऊन तक्त्याच्या आधारे त्यांचे विश्लेषण व अर्थनिर्वचन करण्यात आले आहे.

**१) नोकरी करणाऱ्या महिलांना कामाच्या ताणाचे स्वरूप**



माही व

द्वितीय

माह

बरोबर

असून

माग्या

प्रश्न

व या

तक्ता क्र. १

नोकरी करणाऱ्या महिलांना कामाचा येणारा ताण

अ. क्र.	विवरण	संख्या	टक्केवारी
१	होय	४२	८४
२	नाही	०८	१६
एकूण		५०	१००

नोकरी करणाऱ्या महिलांना कामाच्या ठिकाणी येणाऱ्या ताणाचा अभ्यास केला असता कामाच्या ठिकाणी ताण येतो अशी उत्तरे देणाऱ्या महिलांचे प्रमाण ८४ टक्के आहे तर कामाच्या ठिकाणी ताण येत नाही अशी उत्तरे देणाऱ्या महिलांचे प्रमाण १६ टक्के आहे. यावरून असे लक्षात येते की, रोजच्या दैनंदिन दिनचर्याचा नोकरी करणाऱ्या महिलांच्या कामावर परिणाम होत आहे.

२) व्यायाम करणाऱ्या महिलांना होणारा ताणतणाव :

तक्ता क्र. २

व्यायाम करणाऱ्या महिलांना होणारा ताणतणाव

अ. क्र.	विवरण	संख्या	टक्केवारी
१	अति प्रमाणात ताणतणाव	०५	१०
२	मध्यम प्रमाणात ताणतणाव	१६	३२
३	कमी प्रमाणात ताणतणाव	०४	०८
४	व्यायाम न करणाऱ्या महिला	२५	५०
एकूण		५०	१००

आहे.

माली

धारे

वरील तक्ता क्र. २ चे अवलोकन केले असता असे लक्षात येते की, व्यायाम करणाऱ्या १० टक्के महिलांना अति प्रमाणात ताण जाणवतो. तर ३२ टक्के महिलांना मध्यम प्रमाणात ताण जाणवतो. ८ टक्के महिलांना कमी प्रमाणात ताण जाणवतो. तर ५० टक्के महिला ह्या व्यायाम न करणाऱ्या आहेत.

यावरून असे लक्षात येते की, व्यायाम केल्याने मध्यम प्रमाणात ताण जाणवतो असे म्हणणाऱ्या महिलांचे प्रमाण अधिक आहे.

३) व्यायाम न करणाऱ्या महिलांना होणारा ताणतणाव :

तक्ता क्र. ३

व्यायाम न करणाऱ्या महिलांना होणारा ताण

अ. क्र.	विवरण	संख्या	टक्केवारी
१	अति प्रमाणात	१८	३४
२	मध्यम प्रमाणात	०४	०८



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४	व्यायाम न करणाऱ्या महिला	२५	५०
	एकूण	५०	१००

वरील तक्त्याच्या अवलोकनावरून असे लक्षात येते की, व्यायाम न करणाऱ्या ३४ टक्के महिलांना अति प्रमाणात ताण जाणवतो. तर मध्यम प्रमाणात ताण जाणवतो. अशा महिलांचे प्रमाण ८ टक्के आहे. कमी प्रमाणात जाण जाणवतो अशा महिलांचे प्रमाण ६ टक्के आहे. ५० टक्के महिला या व्यायाम करणाऱ्या आहेत.

यावरून असे लक्षात येते की, व्यायाम न करणाऱ्या सर्वाधिक महिलांना ताण जाणवतो.

**निष्कर्ष :**

नोकरी करणाऱ्या महिलांच्या या धावपळीच्या जीवनात ज्या महिला स्वतःच्या कामाच्या दिनचर्यामध्ये वेळ काढून व्यायाम करतात त्यांना दैनंदिन कामात उत्साह निर्माण होतो. तसेच नैराश्याचे प्रमाण कमी होते. रोग प्रतिकार क्षमता वाढते, वजन नियंत्रित राहण्यास मदत होताना आढळून आली आहेत. सदरील विषयाच्या अनुषंगाने खालील प्रमाणे निष्कर्ष प्राप्त झाली आहेत.

१. रोजच्या दैनंदिन दिनचर्याचा नोकरी करणाऱ्या महिलांच्या कामावर परिणाम होत आहे. कामाच्या ठिकाणी ताण येतो अशा महिलांचे प्रमाण सर्वाधिक ८४ टक्के आहे.
२. व्यायाम केल्याने ताणाचे प्रमाण मध्यम प्रमाणात कमी होते याचे प्रमाण सर्वाधिक ३२ टक्के आहे.
३. व्यायाम न करणाऱ्या महिलांना नोकरी करताना ताण येतो का असे विचारले असता अति प्रमाणात ताण येतो असे म्हणणाऱ्यांचे प्रमाण सर्वाधिक ३४ टक्के आहे. •

**शिफारशी :**

१. नोकरी करणाऱ्या महिलांनी वेळ मिळेल तेव्हा थोड्या प्रमाणात का होईना व्यायाम केला पाहिजे.
२. ज्या ठिकाणी महिला नोकरी करतात त्या कार्यालयानी प्रत्येक महिलांना व्यायामाचे महत्त्व समजवाण्यासाठी कार्यशाळेचे आयोजन केले पाहिजे.
३. नोकरी करणाऱ्या महिलांनी प्रत्येक महिन्याला आरोग्याची तपासणी करून आपल्या आरोग्याकडे लक्ष दिले पाहिजे.

**संदर्भ :**

१. जीवनाचा मंत्र : प्रतिभा गोपुजकर
२. स्त्री, परंपरा और आधुनिकता : सं राजकिशोर
३. योग जीवन : डॉ. अतुल शुल्का
४. <https://mr.m.wikipedia.org>



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Chief Editor  
Mr. Arun B. Godam

Guest Editors  
Dr. Viswas Kandhare



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**अण्णा भाऊ साठे इनकी कविताओं में सामाजिक बोध**

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**प्रस्तावना :**

लोकशाहीर अण्णाभाऊ साठे इनका मराठी साहित्य एवं कला जगत में महत्वपूर्ण स्थान रहा है। उनका जन्म १ अगस्त १९२० को महाराष्ट्र में सांगली जिले के वाटेगांव नामक गाँव में हुआ था। उनका नाम तुकाराम था। पिता का नाम भाऊराव साठे था। आर्थिक विपन्नता एवं सामाजिक विषमता के कारण उन्हें अपनी आजीविका के लिए अपना गाँव त्याग कर मुंबई आना पड़ा।

गाँव में एक तरह से छुआछूत जैसी दकीयानुसी परंपरा का अपमान तुकाराम साठे उन्हें झेलना पड़ा था। मुंबई जैसे महानगर में कम से कम गाँव की इस छुआछूत जैसी परंपरा से राहत तो मिली। क्योंकि शहर और उसमें मुंबई जैसा शहर जो दिन-रात दौड़ता ही रहता है। अण्णाभाऊ साठे इन्होंने केवल डेढ़ दिन की पाठशाला की। इसके पिछे भी सामाजिक विषमता रही हैं क्योंकि पाठशाला के कुलकर्णी नामक शिक्षक उन्हें पाठशाला में दर्ज कराने के लिए ही तैयार नहीं थे। कई प्रयासों के बाद दाखिला मिलने पर अन्य छात्रों की तुलना में मिलनेवाले अपमानजनक व्यवहार से तंग आकर उन्होंने पाठशाला को त्याग दिया। पाठशाला के बाद की दुनिया में उन्हें शिक्षा मिलती रही। सामान्य लोगों के जीवन को, उनकी पीड़ाओं को, त्रासदी को अण्णाभाऊ साठे करीब से देख सके। उनके भीतर की जनसामान्यों के प्रति संवेदनशीलता उन्हें झनझोरती रहीं और वे स्वयं सामान्य दलित वर्ग से थे उन्होंने दास्यता का स्वयं दुःख झेला था। व्यवस्था विरोध को दर्शाने के लिए अण्णाभाऊ साठे लेखनधर्मिता को अपनाते हैं एवं सामान्यवर्ग की, दलित, पीड़ितों की त्रासदी को सही मायने में वाणी देने का महत्वपूर्ण कार्य करते हैं। मार्क्सवादी विचारधार से प्रेरित होकर वे अपने लेखन कार्य से सामाजिक समता की स्थापना करने का प्रयास करते हुए दिखाई देते हैं।

**अण्णाभाऊ साठे इनकी लेखनधर्मिता :**

अण्णाभाऊ साठे मराठी भाषी साहित्य में समाजसुधारक, लेखक, शाहीर, लोककवि आदि नामों से पहचाने जाते हैं। उनके साहित्य एवं जीवन पर साम्यवादी विचारधारा का स्पष्टरूप से प्रभाव दिखाई देता है। डॉ. बाबासाहेब आंबेडकर इनके व्यक्तित्व का बहुत बड़ा प्रभाव अण्णाभाऊ साठे इनके जीवन एवं लेखनकार्य पर रहा है।

कथा, पोवाडा, (शौर्यगीत) लावणी, गण, उपन्यास, गीत आदि द्वारा अण्णाभाऊ साठे सामान्यों के जीवन को, पीड़ितों की त्रासदी को, पीड़ा को सशक्त रूप से साहित्य पटल एवं समाज के सामने लाते रहे। उन्हें एक सफल कहानीकार, सफल उपन्यासकार, लोकशाहीर के रूप में सर्वदूर पहचाना जाता है। 'फकीरा' यह उपन्यास बहुचर्चित रहा है। देश एवं विदेशों की कई भाषाओं में फकीरा तथा अन्य कृतियों को अनुवादित किया गया है। सही मायने में अण्णाभाऊ साठे इनका लेखन समाज एवं साहित्यिक विचारधारा को एक नया आयाम प्रदान करने का कार्य करता है। मराठी भाषा के कई रचनाकार जब 'स्वान्त सुखाय' से लेखन कार्य करते थे तब अण्णाभाऊ साठे 'बहुजन हिताय' को महत्वपूर्ण मानकर सही मायने में अपना परिचय मराठी साहित्य जगत को देते हुए दिखाई देते हैं। अण्णाभाऊ साठे जिस प्रकार एक सफल कहानीकार, सफल उपन्यासकार एवं लोकशाहीर (लोककवि) के रूप में अपना परिचय मराठी साहित्य जगत को देते हुए दिखाई देते हैं। वहीं वे एक संवेदनशील कवि के रूप में भी हमारे सामने आते हैं।

समाज में व्याप्त विभिन्न विषमता का विरोध, व्यवस्था विरोध उनके साहित्य की महत्वपूर्ण विशेषता रही है। सामाजिक समता के लिए ज्यो-ज्यो बाधा उत्पन्न करता है उसका धिक्कार साठे पूरजोर रूप से करते हुए दिखाई देते हैं। मानवजाति की तरक्की में वर्गवाद एवं धर्म बाधा उत्पन्न करता हुआ सांठेजी को दिखाई देता है। अण्णाभाऊ साठे पूरे समाजव्यवस्था में दो वर्ग को स्वीकार करते हुए दिखाई देते हैं एक - शोषण करनेवाला, दो-शोषितों का। उनका व्यवस्था विरोध



कविताओं में सहजरूप से दिखाई देता है। "अन्य साहित्यिक विधाओं की अपनी लेखनधर्मिता की तरह की अपने काव्य लेखन में भी अण्णाभाऊ ज्यो-ज्यो प्रशंसा के लायक है उसकी प्रशंसा करते हैं एवं ज्यो-ज्यो बर्बर है, अधम है उसका विरोध करते हैं।"

कविताओं में सामाजिक बोध:

अण्णाभाऊ साठे तमाशे के जरिए अपने पद, गण, कविताओं के माध्यम से प्रत्यक्षरूप से समाज से जूझ जाते थे। विचारों को, भावनाओं को लोगों तक पहुँचाने का तमाशा यह बहुत असरदार एवं प्रभावशाली माध्यम रहा है। 'लाल बावटा' के माध्यम से अण्णाभाऊ साठे मजदूरों, सामान्य लोगों का दर्द दुनिया के सामने लाते रहे। डॉ. बाबासाहेब आंबेडकर इनके प्रति अपनी कृतज्ञता जताते हुए एवं समाज में अगर परिवर्तन लाना है, तो व्यवस्था पर चोट करना जरूरी है। इस विचार को प्रकट करते हुए वे लिखते हैं "जग बदल घालुनी घाव। सांगुन गेले मला भीमराव।" डॉ. भीमराव आंबेडकर इनकी समातावादी समाजरचना को स्थापित करना अण्णाभाऊ साठे इनका सपना एवं प्रयास रहा है। वे लिखते हैं -

"अंग झाड़ुनी निघ बाहेरी। घे बिनीवरती धाव  
धनवंतांनी अखंड पिळले। धर्मांधांनी तसेच छळले।"

सामाजिक विषमता को मिटाना यह सहज संभव बात नहीं है, उसके लिए जी जान लगाकर प्रयास जरूरी है, इसके लिए घर से बाहर निकलकर रास्तों पर उतरना होगा।

अण्णाभाऊ साठे इनका यह मानना रहा है कि, यह धरती किसी शोषणाग (साँप) के मस्तिष्क पर खड़ी नहीं है बल्की वह दलित, सामान्य, मजदूरों के शोषण पर टीकी है।

इस समाज में पूँजीपती एवं धर्म के ठेकेदारों ने आम आदमी का जैसे चाहे वैसा शोषण किया है। इस वर्गवादी व्यवस्था तथा धर्मांधता को अण्णाभाऊ साठे अपनी कविताद्वारा विरोध करते हैं।

अण्णाभाऊ साठे इनकी कविता की महत्वपूर्ण विशेषता यह रही है कि, उनकी रचनाओं में यथार्थ का साक्षात्कार दिखाई देता है। अण्णाभाऊ साठे इन्होंने जो समाज में देखा, जिन यातनाओं को भोगा उसी अनुभूतियों को कविता द्वारा समाज के सामने रखा है।

'माझी मैना गावावर राहिली।' इस लावणी के माध्यम से मजदूरी करने के लिए जो लोग अपना परिवार, पत्नी, गाँव छोड़कर मुंबई शहर आये हैं उनकी विरह वेदना एवं पीड़ा को व्यक्त करते हैं। बड़े-बड़े सपने अपने मन में रखकर सामान्य लोग मजदूरी करने शहर पहुँच तो जाते हैं लेकिन उनका शोषण सर्वत्र होता दिखाई देता है। मुंबई शहर की आपाधापी में उसे अपनी पत्नी की याद आती है -

"माझी मैना गावावर राहिली। माझ्या जिवाची होतीया काहिली।"

विरह भावना, मुंबई की भीड़, यंत्रों की खडखडाहट, आपाधापी, गतिविधियाँ, भांडवलदार, चोर, हरामखोर लोग, शोषण आदि का चित्रण किया है साथ ही एक महत्वपूर्ण सामाजिक गतिविधि भी इस लावणी में चित्रित की गई है। 'संयुक्त महाराष्ट्र' को लेकर जो गतिविधि मुंबई शहर में छेड़ी गई उसका चित्रण भी अण्णाभाऊ साठे करते हैं -

"उठला मराठी देश। आला मैदानी त्वेष। वैरी करन्या नामशेष।

गोळी डमडमली छातीवर साहिली।"

संयुक्त महाराष्ट्र को लेकर जो जुलूस निकले, जो आंदोलन छेड़े गए उसमें स्वयं अण्णाभाऊ साठे इन्होंने हिस्सा लिया था। गृहमंत्री मोरारजी देसाई के आदेश पर पुलिस द्वारा जो गोली आंदोलनकारीयों पर चलाई गई उसमें कई लोगों को शहादत मिली। आखिरकार आंदोलनकारीयों का जुलूस, विरोध, शहादत के फलस्वरूप मुंबई के साथ महाराष्ट्र गठीत किया गया। यह लावणी केवल एक मजदूर पती अपनी पत्नी को विरहभाव, पीड़ा को ही दर्शाती नहीं है साथ ही मुंबई एवं संयुक्त महाराष्ट्र के रणसंग्राम को भी समाज के सामने रखती है।

स्तालिनग्राडचा पोवाडा (शौर्यगीत) इसमें रशियन शहर में किस प्रकार नाझी का आक्रमण एवं दमण, शोषण का किस प्रकार रशियाने विरोध किया तथा नाझी को पराभूत किया इसका वर्णन किया गया है।

"सहा आठवड्यात सर करू रशिया हे स्वप्न।

आणि नाझी फौज अजिंक्य ही उपमा महान। ही दोन्ही फोल केली लाल सेनेन। हासत वदने मृत्यु कवटाळून। स्वातंत्र्य



केले रक्षण | धन्य ते जन शूर रशियन |”<sup>४</sup>

‘बंगालची हाक’ (बंगाल की गुहार) यह पोवाडा (शौर्य गीत) अण्णाभाऊ साठे इन्होंने जब बंगाल में अकाल गिरा था एवं इस अकाल में जनता पूरी तरह से टूट चुकी थी | अन्न के अभाव में भूक के कारण लोग मर रहे थे, भयावह स्थिति में जिवित रहना यह बड़ा दुष्कर साबित हो रहा था | बच्चों को जिवित रहने के लिए औरतों को शरिर तक बेचना पड़ा था | इस करुण एवं अकाल की भीषणता का चित्रण अण्णाभाऊ साठे इस पोवाडा में करते हैं |

प्राकृतिक आपदाओं में भी कई पूंजीवादी लोग ऐसे होते हैं जो मौके का फायदा उठाते रहते हैं | नफाखोरी एवं बढ़ती महंगाई के कारण सामान्यों को कई यातनाओं से गुजरना पड़ता है | कोरोना जैसी महामारी में नफाखोरी, महंगाई, आपूर्ति, स्वास्थ्य सेवा एवं यातायात की समस्याओं से लोगों को गुजरना पड़ा | ‘बंगाल की हाक’ में साठेजी लिखते हैं –

“ भारताचे शूर संतान | अन्नविण सोडी ते प्राण ||

शतकानुशतके ज्यानं | गाजविले शौर्य दारुण ||

त्याचा तो देह कोल्ह्यानं | निर्भय केला भक्षण ||

त्या वंग वररमातेनं | भुकेच्या आहारीजाऊन |

शील, कूल, मुल, विकून | शमविली पोटाची अन्न ||”<sup>५</sup>

इस भयावहता का चित्रण करके, अण्णाभाऊ साठे बंगाल को सभी लोगों ने सहायता करने की गुहार लगाई है | प्रशासन व्यवस्था से यह अकाल की भयावहता कम होनेवाली नहीं है, लोगों को ही मानवता की रक्षा के लिए स्वयं आगे बढ़ना जरूरी है | बंगाल की जनता का अकाल में प्राण बचाने का ‘प्रण’ अण्णाभाऊ साठे अपनी इस रचना के माध्यम से करते हैं |

‘पंजाब-दिल्लीचा दंगा’ यह रचना भी बहुत महत्वपूर्ण समझी जाती है | १५ अगस्त को भारत को स्वतंत्रता मिली लेकिन साथ ही भारत पाकिस्तान का विभाजन एवं दंगों की त्रासदी को देश को झेलना पड़ा | लोगों की खून की नदीयाँ बही, नारियों पर जुल्म ढाये गये | लुटपाट, आगजनी, अपहरण, बलात्कार को अंजाम दिया गया | इस त्रासदी एवं भयावहता का चित्रण अण्णाभाऊ साठे ‘पंजाब-दिल्लीचा दंगा’ इस रचना में करते हैं | साथ ही इस घटना को जानबुझकर अंजाम देनेवाले अंग्रेज, कट्टर धर्मांधतावादी लोगों की मनोदशा को भी वे दर्शाते हैं |

“ इंग्रजांच्या डाव साधला | जातीयवादी त्यांच्या साथीला |

देव, धर्म, संस्कृतीचा खोटा बुरखा घेतला ||

पेटवाया हिंदी राज्याच्या राजधानीला ||

दोन लाख निर्वासिताला | चिथावून दिले दंग्याला |

वै-यांनी वणवा दिल्लीला आणून भिडविला ||

काठ्याने काटा काढायाचा कट जाहला ||”<sup>६</sup>

महाराष्ट्र के समतावादी राजा छत्रपती शिवाजी महाराज इनके प्रति अण्णाभाऊ साठे अपनी कृतज्ञता को व्यक्त करते हैं | ‘गण’ इस रचना में वे लिखते हैं –

“ प्रथम मायभूच्या चरणा

छत्रपती शिवबा चरणा

स्मरोनि गातो | कवना ||”

‘महाराष्ट्राची परंपरा’ इस रचना में महाराष्ट्र की गरिमा, सभ्यता, संस्कृति, वैभवशीलता, प्राकृतिक एवं सांस्कृतिक धरोहर, संत साहित्य, मराठी बोली, भाषा, बाह्य आक्रमणकारी, राजा छत्रपति शिवाजी महाराज का व्यक्तित्व, कृतित्व, आजादी की गतिविधियाँ, अंग्रेजनीती, समाजसुधारवादी विचारक, महात्मा फुले, तात्या टोपे, लोकमान्य टिळक, वासुदेव फडके, क्रांतिसिंह नाना पाटील, आदि इतिहासकारों के कार्य को उल्लेखित करके अण्णाभाऊ साठे महाराष्ट्र की धरोहर को स्थापित करने का महत्वपूर्ण कार्य अपनी रचना द्वारा करते हैं |

निष्कर्ष :



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सामान्यतः अण्णाभाऊ साठे इनकी कुछ पद्य रचनाओं का अध्ययन करने पर यह साबित होता है कि, साठे सही मायने में 'लोककवि' रहे हैं। उनकी कविता का केंद्रबिंदू यह सामान्य आदमी रहा है। उन्हें सामाजिक, राजनीतिक, प्रशासनिक व्यवस्था का अच्छा ज्ञान था। सामाजिक गतिविधियों में स्वयं रास्ते पर उतरकर वें व्यवस्था विरोध करते हैं। अण्णाभाऊ साठे की कविता पीड़ित, दलित, आम लोगों की त्रासदी, व्यथा को अभिव्यक्त करती है।

अण्णाभाऊ साठे की पद्यरचना में सामाजिक बोध सर्वत्र दिखाई देता है। मार्क्सवादी विचारधारा से प्रेरित साठेजी की कविता सामाजिक विषमता का पूरजोर विरोध करके सामाजिक समता का पक्ष लेती है। साठे अपनी कविताओं में केवल समाज का चित्रण ही नहीं करते बल्के जहाँ-जहाँ अवसर मिला वहाँ-वहाँ वे समाज को नई दिशा प्रदान करने के लिए लोगों के बीच उनकी आवाज बनकर खड़े रहे। उनकी कविता आज वर्तमान समय भी प्रेरित करती है। एक संवेदनशील कवि के रूप में अण्णाभाऊ साठे का व्यक्तित्व एवं कृतित्व दिखाई देता है। अण्णाभाऊ साठे की कविता का समाज से सरोकार रहा है।

संदर्भ :

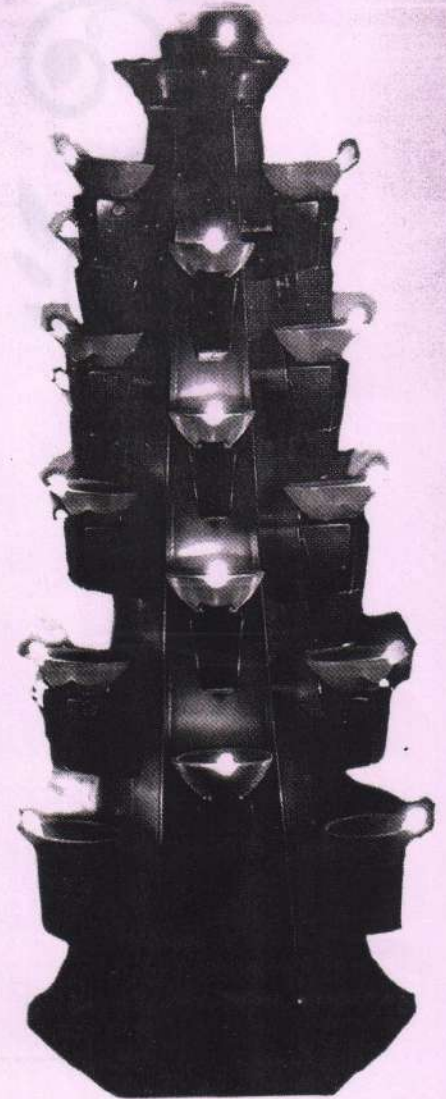
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प्राचार्य डॉ. दीपा क्षीरसागर गौरवग्रंथ...

# दीपस्तंभ

Dr. Kale N.P.



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## दीपस्तंभ

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# नारीवादी आंदोलन एवं विचार

— डॉ.न.पु.काळे, बीड

## प्रस्तावना:

‘नारीवाद’ इस शब्द में नारी के साथ ‘वाद’ शब्द जोड़ा गया है। लेकिन इस ‘वाद’ का अर्थ कोई विरोध नहीं है। इसका अर्थ यह एक विचार है; ज्यों नारी को स्वतंत्रता प्रदान करना चाहता है। पुरुष व्यवस्था द्वारा ज्यों पाबंदीया समस्त नारी जाति पर लगाई गई है उसका विरोध करके नारी को सामाजिक, शिक्षा, आर्थिक, राजनैतिक आदि क्षेत्रों में समानता के प्रदान करके नारी को एक मानव, मनुष्य के रूप में स्वीकार कर के उसके उत्कर्ष के लिए सभी द्वार को खोलना, उसे समता प्रदान करना। यह व्यापक विचार नारीवादी विचारधारा चाहती है। लैंगिक समानता को नारीवादी विचारधारा स्थापित करना चाहती है। पुरुष को जिस प्रकार सभी क्षेत्र के द्वार उन्नति के लिए खुले हैं। उसी प्रकार लिंगबोध के कारण नारी को जिन क्षेत्रों से दूर रखा गया है, उन सभी असमानता की श्रृंखलाओं को नारीवादी विचारधारा तोड़ना चाहती है। पुरुषों के समान ही सभी क्षेत्रों में नारी को समान अवसर मिलने चाहिए यही नारीवादी आंदोलन का एकमात्र उद्देश रहा है।

## मातृसत्ता बनाम पितृसत्ता व्यवस्था:

समाज व्यवस्था में हमें पुरुष प्रधान व्यवस्था एवं स्त्री प्रधान व्यवस्था दिखाई देती है। पुरुष प्रधान व्यवस्था में अधिकतर अधिकार पुरुषों के पास होते हैं। मातृसत्ताक व्यवस्था में घर, गृहस्थी के अधिकार नारी के पास होते थे। वह घर की मुखिया हुआ करती थी। समयानुरूप पुरुषों ने यह सभी बागडोर अपने हाथ ले ली साथ ही सामाजिक, शिक्षा, कानून, धार्मिक, पारिवारिक आदि निर्णय प्रक्रिया से नारी को वंचित रखा गया। परिमाण स्वरूप मातृ सत्ता में जो विशेषाधिकार नारी के पास थे वे सारे पुरुष को मिले तथा नारी को पुरुषों पर निर्भर रहकर उसके कृपा का पात्र बनना पड़ा। पुरुष प्रधान व्यवस्था में नारी को दोयम दर्जा दिया जाता है। यह व्यवस्था नारी को दासी, भोग्या के रूप में स्वीकार कर उसके अस्तित्व को ही अस्वीकार करती है!



## नारीवादी विचारधारा:

पुरुषों को विशेषाधिकार तथा नारी को उनके अधिकार से वंचित रख कर उनके वजूद को नकारना यह एक तरह का षड्यंत्र दिखाई देता है। नारीवादी विचारधारा इस षड्यंत्र का विरोध करती है। लैंगिक असमानता की वजह बताकर नारी को जिन क्षेत्र से, अधिकारों से दूर रखा गया वह सारे हक, अधिकार नारी को मिलने चाहिए। सामाजिक, शिक्षा, आर्थिक, व्यापार, राजनैतिक, धार्मिक, पारिवारिक, रोजगार सभी क्षेत्रों में उचित अवसर को प्राप्त करने के लिए जो विचारधारा या आंदोलन चलाया जाता है, उसे नारीवादी आंदोलन के नाम से जाना जाता है। फ्रांस की महिला रचनाकार 'सिमोन द ब्यूवॉयर' ने अपने 'द सेकंड सेक्स' इस ग्रंथ के माध्यम से नारीवादी विचारधारा, आंदोलन को प्रस्तुत कर सामाजिक, धार्मिक, पारिवारिक, राजनीतिक, साहित्यिक क्षेत्र में तहलका मचा दिया था। एक सप्ताह में इस ग्रंथ की बाइस हजार प्रतियां बिक गई थी। १९४६ से लेकर १९४८ इस अवधि में यह ग्रंथ पूरे गहन अध्ययन से लिखा गया। इस ग्रंथ में नारी को मानसिक, सामाजिक, धार्मिक, पारिवारिक, रोजगार आदि क्षेत्रों में किस प्रकार विविध मान्यता तथा मिथको के माध्यम से दोहरे स्थान पर रखा गया है इस बात का विस्तृत रूप से विवेचन किया गया है। सिमोन द ब्यूवॉयर के 'द सेकंड सेक्स' इस पुस्तक को नारीवाद का बाइबल माना जाता है। इसके पहले एवं बाद में भी नारी के दोहरे अस्तित्व का इतना व्यापक ढंग से कहीं भी चित्रण नहीं किया गया है।<sup>१</sup> इस ग्रंथ के विचार पुरुषी वर्चस्व माननेवालों को रास नहीं आए। विविध स्तरों पर ग्रंथ एवं रचनाकार का विरोध किया गया। और जब विचारों का जवाब विचारों से देने में कोई असमर्थ साबित होता है तो चरित्र पर सवाल उठाए जाते हैं! सिमोन के साथ भी वैसा ही हुआ। भले ही धार्मिक, राजनीतिक, साहित्यिक दलों से सिमोन पर आलोचना की गई हो, लेकिन कथा, मिथकों के माध्यम से मनोविज्ञान द्वारा जिन विचारों को सिमोन ने नारी के अस्तित्व को स्वीकार, अस्वीकार की चालबाजी को कई तथ्यों द्वारा उजागर किया है वह बहुत महत्वपूर्ण रहा है। नारी को एक दासी, भोग्या, वस्तु के रूप में न देखकर उसके समूचे अस्तित्व को, उसे मनुष्य के रूप में स्वीकार करने का महत्वपूर्ण विचार ग्रंथ के माध्यम से सामने आया है यह सिमोन के ग्रंथ की महत्वपूर्ण उपलब्धि रही है। ग्रंथ के अर्पण पत्रिका में सिमोन ने लिखा है- 'स्त्री पैदा नहीं होती है उसे स्त्री बनाया जाता है।'<sup>२</sup> यह विधान बहुत महत्वपूर्ण तथ्य को हमारे सामने रखता है। अमेरिका में भी मतदाता के अधिकार को लेकर महिलाओं द्वारा आंदोलन चलाया गया था।

नारीवादी विचारधारा या आंदोलन यह नारी के अधिकारों की मांग करता है। वह लैंगिक आधार पर स्थापित विषमता का विरोध करके समानता को स्थापित करना चाहता है। सिमोन के इस लेखन कार्य के पहले भारत वर्ष में महात्मा जोतिबा फुले, सावित्रीबाई फुले इन्होंने छात्राओं के लिए पाठशाला खोलकर उन्हें शिक्षा का अधिकार प्रदान करने की क्रांतिकारी कार्य की नींव डाली थी।

केवल विचार प्रस्तुत न कर प्रत्यक्ष रूप से उस दिशा में प्रयास करना यह असामान्य कार्य रहा है।



फुले दंपति द्वारा किये गए इस कार्य से सनातनी व्यवस्था के होश उड़ गए। उन्होंने फुले दंपती का विरोध किया। आलोचना की लेकिन अपने कार्य एवं मार्ग से फुले दंपती विचलित नहीं हुए। परिणाम स्वरूप आज लगभग सभी क्षेत्रों में नारी अपने कार्य, कर्तृत्व का परचम फहरा रही है।

भारत वर्ष के सबसे ऊंचे पद राष्ट्रपति पद पर द्रोपदी मुर्मू नारी को सम्मान मिल सका इसके लिए विचारों की जमीन तैयार करने के लिए विभिन्न व्यवस्था का विरोध को झेलना पड़ा।

नारीवाद यह एक विचारधारा है। एक ऐसी सोच जो नारी को वस्तु, दासी नहीं समझता है बल्कि उसे मनुष्य, मानव के रूप में स्वीकार करता है। साथ नारी को अपने विकास के लिए पुरुषों के समान अवसरों की प्राप्ति का विचार है।

भारतवर्ष में राजाराम मोहन राय, महात्मा फुले, सावित्री बाई फुले इनका कार्य महत्वपूर्ण रहा है। आगे देश को स्वतंत्रता प्राप्त होने पर डॉ बाबासाहेब आंबेडकर द्वारा संविधान के माध्यम से नारी को विभिन्न हक एवं अधिकारों को प्रदान करके नारी के स्थान को हाशिए से केंद्र बिंदु में लाने का महत्वपूर्ण कार्य किया गया है। परिणाम स्वरूप निर्णय प्रक्रिया में नारियों का योगदान आज हमें सर्वत्र दिखाई देता है। नारीवाद यह एक व्यापक विचार है। इसे अधिक संजीदा रूप से समझने के लिए शिक्षा की आवश्यकता है। शिक्षा के माध्यम से नारी का बौद्धिक विकास हुआ परिणाम स्वरूप वह अपने अस्तित्व को तलाशती रही है। अपने वजूद को मुकम्मल करने के लिए उसने संघर्ष को अपनाया है। देश विदेशों के विचारों से, विचारधारा से परिचित होकर वह अपने सही, बुरे का विचार करने लगी एवं व्यवस्था द्वारा जो विचारों की पाबंदियां, बेड़ियां उसके पैरों में, व्यक्तित्व में लगाई गई थी उसका विरोध करके अपने विकास के लिए नारी प्रयासरत दिखाई देती है। यह नारीवादी विचारधारा का ही परिणाम कह सकते हैं।

पाश्चात्य विचारधारा जीवनशैली से परिचित होकर आज नारी ने विभिन्न दिशा में सफलता को प्राप्त किया है शिक्षा से ही रोजगार मिल सकता है एवं आर्थिक स्वावलंबन बहुत मायने रखता है। आर्थिक स्थिति अच्छी होने पर एक आत्मविश्वास पैदा होता है। प्रशासन, रोजगार, शिक्षा, कानून, रक्षा, राजनीति आदि क्षेत्रों में साथ ही साथ सबसे अधिक रूप में सिनेमा जगत में नारियों का बोलबाला दिखाई देता है। पाश्चात्य जीवन शैली का विकास सर्वदूर दिखाई देता है। नारीवादी आंदोलन एवं विचारधारा के कारण नारी का लगभग सभी क्षेत्रों में वर्चस्व तथा सहभागिता हमें दिखाई देती है। पुरुष प्रधान व्यवस्था द्वारा हाशिए पर रखे गए महिला के स्थान को केंद्र बिंदु में लाकर निर्णय प्रक्रिया से जोड़ने का काम नारीवादी विचारधारा द्वारा सफलतापूर्वक होता हुआ हमें दिखाई देता है। साहित्य के क्षेत्र में भी नारी रचनाकारों का परचम बुलंदी को छूता हुआ दिखाई देता है। केवल नारी द्वारा लिखे गए साहित्य को ही नारीवादी साहित्य स्वीकार करना चाहिए या नहीं? इस पर भी सवाल उठाए गए लेकिन नारीवादी विचारधारा के व्यापक स्वरूप को अगर हम देखते हैं तो यह विचार नारी को मुक्ति प्रदान करने का विचार रहा है यदि पुरुषों के विषमतामूलक सोच में फर्क पड़ता है एवं वह नारी के उत्थान के लिए प्रयास करता है तो उसका भी स्वागत नारीवादी



विचारधारा या यह आंदोलन करेगा। इस विचार को अभिव्यक्त करते हुए कमला भसीन ने लिखा है ऐसी औरतें भी होती हैं, जो दूसरी औरतों के साथ गलत करती हैं और ऐसे मर्द भी होते हैं, जो औरतों के लिए अच्छा करना चाहते हैं। समस्या मर्द होने में नहीं सोच में है। अंग्रेजी, हिंदी, मराठी और अन्य भाषी साहित्य के कुछ पुरुष रचनाकारों ने नारी को विभिन्न शृंखलाओं से मुक्ति प्रदान करने के लिए विभिन्न कविता, कहानी, उपन्यास के पात्र आदि द्वारा जो प्रयास किए गए उसे हम नजरअंदाज नहीं कर सकते। महिला रचनाकारों द्वारा जो साहित्य लिखा गया उसमें निश्चित रूप से नाटक, कहानी, उपन्यास, कविता आत्मकथा आदि विधाओं में यथार्थ के विविध रूप को साहित्य एवं समाज के सामने बेहिचक रखने का कार्य किया है। जिससे नारी जाति का यथार्थ रूप से चित्रण हुआ है। जिससे नारी के दशा एवं दिशा का बोध होता है।

नारीवादी विचारधारा का केवल पुरुष को विरोध के लिए विरोध करना यह लक्ष्य नहीं है। यह कोई प्रतिशोध का विचार नहीं है। यह नारी मुक्ति का, समानता का तथा मानवाधिकारों की रक्षा का व्यापक विचार रहा है। अमेरिका से महिला मताधिकार आंदोलन में योगदान देने वाली एलिजाबेथ कैडी स्टेटन, सुसान बी अँथोनी, ल्युट्क्रेटिया मॉट, सिमोन द ब्यूबॉयर, टोनी मोरिसन, आंद्रे लॉर्डे, प्लोरा नवप्पा, चिमामद आदिची, कमला भसीन, नासिरा शर्मा, महादेवी वर्मा, उर्वशी बुटालिया, तारा बाई शिंदे, महाश्वेता देवी, मन्नू भंडारी, दीप्ति नवल, अरुंधति रॉय, इस्मत चुगताई, बेबी कांबले, निवेदिता मेनन, शर्मिला रेगे, मालती बेडेकर, कामिनी रॉय, अमृता प्रीतम, तसलीमा नसरीन, सलोनी चोप्रा, सुभद्रा कुमारी चौहान, गीतांजली श्री, चित्रा मुद्गल, उषा प्रियवंदा, अलका सरावगी, प्रभा खेतान, मालती जोशी, मृदुला गर्ग, ममता कालिया, सूर्यबाला, मैत्रयी पुष्पा, कृष्णा सोबती, सुधा अरोडा, किरण देसाई, मीराबाई, पद्मा सचदेव, शोभा डे इस्मत आरा अन्य कई महिला रचनाकारों का साहित्य, सामाजिक, शिक्षा राजनीतिक, पत्रकारिता आदि व्यवस्था में महत्वपूर्ण योगदान दिखाई देता है। नारी को खेल, रक्षा, अवकाश, जैसे क्षेत्र से 'नारी' होने के कारण दूर रखा जाता था, आज खेल के विभिन्न क्षेत्रों में भी नारी का वर्चस्व स्थापित हुआ है।

यह एक तरह से नारीवादी विचारधारा की सफलता कही जा सकती है। जो विभिन्न क्षेत्रों में नारी का बढ़ता प्रभाव दिखाई देता है।

नारीवादी विचारधारा यह एक स्वतंत्र विचार है। ज्यों नारी को बंधनों से मुक्त करने का प्रयास तथा समर्थन करता है। सिमोन ने यह भी कहा था, नारी ने अपने उत्कर्ष के लिए स्वयं भी प्रयास करना जरूरी है। साथ ही यह कोई स्वैराचार नहीं है। समाज में कुछ उदाहरणों को देखते हैं तो नारीवादी विचारधारा को पुरुषों के खिलाफ तथा प्रतिशोध के रूप में देखा जाता है। आज कई शहरों में पत्नी पीड़ित संगठनों की स्थापना हो रही है। ज्यों एक नए विमर्श को सामने रखता है!

### निष्कर्ष :

पुरुषी मानसिकता के कारण सामाजिक, धार्मिक, राजनीतिक आदि व्यवस्था में नारी को दोहरा स्थान दिया गया था। कई बंधनों से उसे कैद किया गया था।



लादे गए विषमतामूलक बंधनों से नारी को मुक्त करना नारीवादी विचारधारा का या आंदोलन का लक्ष्य रहा है। सामाजिक क्षमता की कामना नारीवादी विचारधारा करती है। नारीवाद यह एक व्यापक विचार है। नारीवादी विचारधारा को सिर्फ महिलाओं द्वारा ही नहीं चलाया गया बल्कि उसमें कई संवेदनशील पुरुष रचनाकारों ने भी सहायता की है। नारीवादी विचारधारा नारी के अस्तित्व को तलाशती है। वह शिक्षा को प्रधानता प्रदान करती है। शिक्षा के कारण ही स्वतंत्र विचार का निर्माण हो सकता है एवं रोजगार, व्यापार, प्रशासन, राजनीति, साहित्य आदि क्षेत्रों में अपना अस्तित्व बनाकर आर्थिक दृष्टि से सक्षम बन सकते हैं।

महिला रचनाकारों के माध्यम से विभिन्न विधाओं में यथार्थवाद को वाणी मिलने के कारण नारी की विपदा, सामाजिक स्थिति, पारिवारिक स्थिति एवं उसके स्थान को समझने में साह्यता मिल सकी। समाज द्वारा धर्म द्वारा स्थापित लिंग बोध या कृत्रिम और समानताओं को दूर करना एवं नारी को अपने विकास के लिए सभी अवसरों की प्राप्ति की मांग नारीवादी विचारधारा करती है। नारीवादी विचारधारा यह एक व्यापक रूप से सामाजिक आंदोलन रहा है जो नारी को वस्तु, दासी, भोग्या मानने से इंकार करता है एवं उसे भी एक मानव के रूप में, मनुष्य के रूप में स्वीकार करने की पहल करता है। वह नारी के मानवाधिकारों के हक की बात करता हुआ दिखाई देता है। नारीवादी विचारधारा यह कोई पुरुषों का विरोध करने वाला संगठन या विकल्प की विचारधारा नहीं है। वह नारी की मुक्ति की कामना करता है उसके उत्थान के लिए सामाजिक सांस्कृतिक, धार्मिक, राजनीतिक सभी तरह की समता का विचार है। नारीवादी विचारधारा नारी के उत्कर्ष के लिए सभी प्रकार के समान अधिकार एवं अवसरों को प्राप्त करना चाहती है। महिलाओं का हिंसा, शोषण से छुटकारा पाना नारीवाद का लक्ष्य है। एक स्वस्थ समाज का निर्माण करने के लिए नारीवादी विचारधारा आगे बढ़ती हुई दिखाई देती है। स्वयं के विकास के लिए नारी को स्वयं प्रयास करना जरूरी है। सभी दिशाओं से नारी मुक्ति के प्रयास होने चाहिए इसके लिए सबसे पहले नारी को आर्थिक रूप से सक्षम होना बहुत जरूरी है।<sup>३</sup>

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- २ सिमोन द ब्यूवॉयर द सेकंड सेक्स : अनुवाद करुणा गोखले अर्पण पत्रिका से
- ३ सिमोन द ब्यूवॉयर द सेकंड सेक्स : अनुवाद करुणा गोखले पृष्ठ ४५२



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प्रस्तावना –

अमृता प्रीतम का नाम साहित्य क्षेत्र में महत्वपूर्ण रहा है। पंजाब के गुजरावला जिले में अमृता का जन्म हुआ था। बचपन से ही अमृताजी को लेखन कार्य की रुचि रही है। पिताजी से कविता लेखन की बारिकियों को अमृता समझ सकी। उनका व्यक्तित्व बचपन से ही विद्रोही रहा है। पंजाब की पहली कवयित्री के रूप में अमृताजी को स्वीकार किया जाता है। अमृताजी अपनी रचनाओं के लिए जितनी लोकप्रिय रही है, उतनी ही अपनी निजी जिंदगी के लिए लोकप्रिय रही है। 'रसीद टिकट' इनकी लोकप्रिय रचना रही है यह एक आत्मकथा है। इसकी अगली कड़ी के रूप में 'अक्षरों के साये' इस कृती को देखा जाता है। एक सफल रचनाकार के रूप में अमृताजी को पहचाना जाता है। उनकी कई कृतियों का विभिन्न भाषाओं में अनुवाद किया गया है। साहित्य अकादमी पुरस्कार पाने वाली अमृता प्रीतम पहली महिला लेखिका रही है। अमृता और इमरोज के रिश्ते के बारे में सभी परिचित हैं। उनकी जिंदगी के विभिन्न पन्ने उनके खतों में पढ़ने को मिलते हैं। अमृता के दोस्त, साथी, चित्रकार इमरोज के आपसी प्रेम का परिचय खतों के द्वारा मिलता है। अमृता एक लेखिका थी एवं इमरोज चित्रकार। अमृता अपने पहले रिश्ते 'साहिर' के प्यार एवं विरह को लेकर नाखुशा थी, वहीं अमृता के जिंदगी में इमरोज इस नाखुशी, मायुशी को दूर कर अमृता को प्यार करते दिखाई देते हैं। अमृता इमरोज से सात साल बड़ी थी। इमरोज और अमृता का प्यार, दोनों की अंतरंगता का परिचय खतों के माध्यम से मिलता है।

अमृता और इमरोज दोनों का प्यार एवं रिश्ता जब उफान पर था तब इसकी गहराइयों को देखने के लिए उनके खतों का अध्ययन करना होगा। आज संचार माध्यमों में काफी परिवर्तन एवं बदलाव आया है। मोबाईल, इंटरनेट के माध्यम से संचार माध्यमों के साथ ही मनुष्य के आपसी रिश्तों में भी कई तरह के बदलाव आये हैं। जब यह आज के जमाने के अद्यतन माध्यमों का अस्तित्व नहीं था तब दूरियों का फासला नापने का, अपने विचारों को, भावनाओं को प्रस्तुत एवं अभिव्यक्त करने का खत यह एक प्रभावी माध्यम समझा जाता था। आज की तारीख में खतों का सफर खत्म हो चुका है।

**विषय प्रवेश :-**

अमृता के जीवन को, जिंदगी की वास्तविकता को समझने के लिए 'खतों का सफरनामा' यह किताब बहुत महत्वपूर्ण रही है। इमरोज, अमृता के एक-दूसरे को लिखे खतों का संग्रह इसमें क्या गया है।

अमृताजी का साहित्यिक जीवन भले ही सुखद एवं सफलतापूर्ण दिखाई देता हो, लेकिन उनकी निजी जिंदगी काफी निराशा एवं अकेलेपन से घिरी रही है। इमरोज के शब्दों में "अमृता की जिंदगी के कई आयाम थे। बचपन में ही माँ की मौत, बँटवारे का दर्द एक ऐसी शादी जिसमें वो बरसो घुट कर रहीं, साहिर से प्रेम और फिर दूरियाँ और इमरोज का साथ... अमृता प्रीतम का जीवन कई दुखों और सुखों से भरा रहा है।"

समाज, धर्म, संप्रदाय सामाजिक समता के लिए बनाये गये हैं लेकिन कट्टरता इस हद तक बढ़ गई है कि, पराये, दूसरे धर्म, जाति का व्यक्ति हमें अनजान या दूश्मन के रूप में दिखाई देने लगा है। हर एक धर्म, जाति की मान्यताएँ अपने आप को दूसरों से अलग तथा स्वयं को श्रेष्ठ समझती है। सामाजिक समता की जगह एक अलगाव, विषमता, द्वेष की मानसिकता हमें दिखाई दे रही है। समाज की बहुत सुंदर तथा व्यापक परिभाषा अमृता इमरोज के खतों में की गई है – "तू मेरी समाज / और मैं तेरा समाज / इससे ज्यादा / और कोई नहीं समाज"

१५ अगस्त को भारतवर्ष में स्वतंत्रता दिवस पूरे हर्ष उल्लास के साथ मनाया जाता है। आज़ादी का चिन्ह है उसी प्रकार अमृता को अपनी आज़ादी का चिन्ह इमरोज लगता है। अमृता के शब्दों में –



“ एक पराये मुल्क से तुम्हें खत लिखते समय याद आया है कि आज पंद्रह अगस्त है, हमारे मुल्क की आजादी का दिन अगर कोई इंसान किसी दिन का चिन्ह बन सकता है, तो कहना चाहूंगी कि तुम मेरे पंद्रह अगस्त हो। मेरे अस्तित्व की और मेरे मन की अवस्था की स्वतंत्रता का दिन...”<sup>3</sup>

यूगोस्लाविया से लिखे इस खत द्वारा अमृत एवं इमरोज की अंतरंगता का परिचय मिलता है।

अपने लोग, अपनी मिट्टी, पंजाब से जो प्यार, दुलार, स्नेह अमृताजी चाहती थी वह अपनों से नहीं मिला। विदेश में जब शतरूपा के मेले में कविता पढ़ने पर वहाँ के लोगों ने ज्यो प्यार अमृता को दिया उससे उनकी आँखें छलक आती हैं। अपने मुल्क, पंजाब के बारे में एक कसक का परिचय भी इन शब्दों में दिखाई देता है – “ पंजाब ने मुझे सारी उम्र निरादर सहते रहने की आदत डाल दी है, इसलिए बेगाने देशों में मिली इस चीज को झेलते समय बहुत अजीब लगता है।<sup>3</sup>

प्यार एक दूसरे को मुक्त करने का नाम है। एक-दूसरे का अस्तित्व समझकर उसे व्यापकता प्रदान कर वजूद को तलाशने का नाम है। अगर कोई व्यक्ति प्यार के नाम पर किसी को दायरे में बांधता है तो वह प्यार नहीं हो सकता। इमरोज अपने खत में अमृता के व्यक्तित्व को उनके अस्तित्व को व्यापकता प्रदान करते हुए लिखते हैं – “मेरी शायरा, तुम किसी एक धरती, किसी एक देश, किसी एक जवान या किसी एक कौम को बिलोंग नहीं करती। तुम बिलोंग करती हो उस धरती से, जहाँ धरती दिल की तरह विशाल होती है और जजबात से महकती है।”<sup>4</sup>

अमृताजी का इमरोज के प्रति ज्यों प्यार रहा है वह बातों-बातों पर व्यक्त होता दिखाई देता है। ‘मैं तुम्हें फिर मिलूंगी’ इस कविता में इमरोज के बारे में अपना प्यार कुछ इस प्रकार अमृताजी द्वारा व्यक्त किया गया है-

“ मैं तुम्हें फिर मिलूंगी  
कहाँ ? किस तरह ? नहीं जानती  
शायद तुम्हारे तख्तिल की चिनगारी बनकर  
तुम्हारी कैनवस पर उतरूंगी  
या शायद तुम्हारी कॅनवस पर  
रहस्यमय रेखा बनकर  
खामोश तुम्हें देखती रहूंगी।”<sup>4</sup>

चाहें खत यह अमृताजी ने लिखा हों या फिर इमरोज ने दोनों को भी अकेलेपन की पीड़ा एवं वियोग की त्रासदी को झेलना पड़ा। विदेश से लिखे एक खत में अमृताजी ने लिखा है “ अकेलेपन के अथाह सागर में तुम्हारा ख्याल एक लाईट हाऊस की तरह आ रहा है।”

अकेलेपन की त्रासदी इमरोज को वनवास के रूप में लगती है। यही पीड़ा अमृताजी को वनवास के रूप में ही लगती है वह लिखती है, “ मेरे जितनी यह वनवास मेरा भी रहा है और इसमें मैं भी शामिल हूँ।” यह वियोग की पीड़ा हटकर जल्दी से मिलन की घटा आये यह एक आशावाद दिखाई देता है – अमृताजी लिखती है – “और मेरा वनवास मेरी अयोध्या बन जाए और मेरी जिंदगी का एक-एक पल तुम्हारा रामराज्य हो जाए।”<sup>5</sup>

अमृताजी को निराशा, विषाद, अवसाद से गुजरना पड़ा था हमारी जिंदगी में एक पल ऐसा भी आता है जब हमें यह लगने लगाता है की यह सब आदर्शवादी बातें, नसीहतें दुनिया को बेतुकी लगती हैं। स्वयं को भी यह रचनात्मक कार्य की कोई ठोस वजह नहीं लगती। इस निराशावाद से अमृता को बाहर निकालते हुए अपनी मित्रता का परिचय देते हुए इमरोज लिखते हैं – “ मेरी शायरा , तुमने अपने लिए और दुनिया, दोनों के लिए हसीन सपने देखे हैं अमन के सपने... मोहब्बत के सपने... उम्मीद के सपने.....! यह क्यों भूल जाती हो कि बेईन्साफी और मजबूरी के खिलाफ तुम्हारी आवाज बहुत बुलंद है !”

जिंदगी में एक दुसरे के बूरे वक्त में काम आना बहुत जरूरी है। एक-दुसरे का साथ निभाना आवश्यक है। अमृताजी जब स्वयं किसी विवादसे, मोहभंगसे निराश है ऐसे मुश्किल समय में इमरोज अमृता को अपनी रचनाधर्मिता के बारे में रुबरु कराते हैं। अमृताजी के व्यक्तित्व एवं उनके अस्तित्व का बोध कराते हुए इमरोज लिखते हैं – “मेरी महबूबा, यह नहीं कह सकता कि अब इस दुनिया में किसी और इसा को सलीब पर नहीं चढ़ाया जाएगा, लेकिन इतना कह सकता हूँ कि उसके बाद भी दुनिया कुछ बदलेगी जरूर, जैसे पहले बदली थी ...



मेरी जान, मुझसे एक वायदा करो ... खुश रहने का..” अमृताजी को निराशा के अवसाद से बाहर निकालने में इमरोज को आखिरकार सफलता मिलती है। अमृताजी को लिखना पड़ा – “ मेरे इमा, तुम्हारी जैसी सोच, तुम्हारी जैसी शख्सियत अगर इस दुनिया में न होती, तो तुम्हीं बताओ, कहाँ जाती मैं। अच्छा, अब जल्दी से घर लौट आओ।”

**निष्कर्ष :-**

अमृता प्रीतम इनका व्यक्तित्व एवं कृतित्व यह चर्चित रहा है। एक सफल कहानीकार, उपन्यासकार के रूप में अमृता प्रीतम को देखा जाता है। एक सफल रचनाकार के रूप में भले ही अमृता प्रीतम को नवाजा जाता है उनकी नीजि जिंदगी मात्र काफी वेदना से भरी दिखाई देती है। ‘कागज और कॅनव्हास’ इस काव्य कृति को ‘ज्ञानपीठ पुरस्कार’ से सम्मानित किया गया है। इस शिर्षक को यदि हम प्रतिकों के माध्यम से समझते हैं तो कॅनव्हास यह इमरोज का एवं कागज स्वयं अमृता का प्रतिक बनकर उभरते हुए दिखाई देते हैं। अमृता एक रचनाकार तो इमरोज एक चित्रकार। कलाकार दोनों भी नवसर्जन की शक्ति को जानते हैं। दोनों के खतों में संवेदनशीलता दिखाई देती है। अमृता एवं इमरोज दोनों भी एक-दूसरे के व्यक्तित्व तथा अस्तित्व को स्वतंत्र रूप से स्वीकार करते हैं। दोनों भी एक-दूसरे के अस्तित्व के निर्माण में सहायक बनते हैं। ‘लिब्ध इन रिलेशनशिप’ आज हमें समाज में दिखाई देता है, जब यह मान्यता समाज से काफी दूर थी तब अमृता एवं इमरोज इस रिश्ते को सफलतापूर्वक निभाते हुए दिखाई देते हैं। दोनों का एक-दूसरे के प्रति गहरा प्यार एवं मजबूत रिश्ता दिखाई देता है। अमृता प्रीतम एवं इमरोज का प्यार, वियोग, साथ, इसका मुकमल चित्रण दोनों के खतों में किया गया है। दोनों की जिन्दगी के सफर को समझने में यह ‘खतों का सफरनामा’ सहायक बनता है।

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७. खतों का सफरनामा संपा: उमा त्रिलोक- पृ. २१५





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### ABSTRACT

Reservoir serves as potential water body of water which also harbors coveted bio-resources that sustain animal life. Fish is a potential bioresource for nutrition and offers workplaces for people. The present investigation intended to study the fish diversity in Bendsura reservoir along with threats and their possible conservation measures. The study revealed the occurrence of 25 freshwater fish species which belong to 17 genera under 12 families and 6 orders. The present investigation showed that Bendsura reservoir possesses rich biodiversity but proper conservation measures are required to maintain its sustainability. There is a need for the conservation of fish diversity in this reservoir. The present status of Bendsura reservoir in the study area may only be improved by preparation and strict enforcement of proper wildlife legislation for aquatic biota.

**Keywords:** Reservoir, Ichthyofauna, Conservation measure, Fish diversity.

### INTRODUCTION

India is one among the seventeen mega biodiversity nations known from the world endowed with remarkable biodiversity in its diverse ecosystems and habitats, and occupies the 9th position in terms of freshwater mega biodiversity. The freshwater ecosystems of India include all types of inland wetlands: lakes, rivers, ponds, streams, groundwater, springs, cave waters, floodplains, as well as bogs, marshes and swamps, including 26 Ramsar Sites. India with 2.4% of global landmass has 4% of the world's freshwater resources.

Among different ecosystems, freshwater ecosystems are the richest and more diverse ecosystems on earth. 6% of all species, and more than 10% of all animal species, occur in freshwater, including 25% of all vertebrates. The fishes are cold blooded vertebrates (Verma, 2017; Verma and Prakash, 2020). Among vertebrates, fishes are the fifth largest agricultural resource and are the primary source of protein to over one billion people (Ahmad *et al.*, 2019). It has been estimated that the global diversity of all fishes is 32,500 species. Considering that freshwater may constitute less than 0.3% of available global water, it is remarkable that there are

almost 15,000 freshwater fish species. In recent year international community has become sensitive in conservation of natural resources to respond new challenges and development. Govt. of India has legislated the Biodiversity Act 2002 and Biodiversity diversity rules 2004. According to IUCN re data list 16928 species are threatened in the world of which 659 fish species are observed in Indian water (Bobdey, 2013).

In India, there are about 1,570 freshwater fishes are categorized into primary, secondary and alien fishes. Primary freshwater fishes include 858 species belonging to 167 genera, 40 families and 12 orders. Further, 137 species of secondary freshwater fishes that frequently enter and thrive in freshwater rivers are also known from India. The freshwater fishes are categorized into primary, secondary and alien fishes. Primary freshwater fishes include 858 species belonging to 167 genera, 40 families and 12 orders. Further, 137 species of secondary freshwater fishes that frequently enter and thrive in freshwater rivers are also known from India (Singh and Prakash, 2022).

A number of researchers including Verma and Prakash

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(2016). Verma (2016). Ashok (2017), Prakash et al. (2020), Ashok (2020), Chakraborty et al. (2021) did a lot on fish biodiversity of various fresh water bodies but as far as Bendsura Reservoir of Beed is concerned, it is little explored hence author attempted to explore it in detail.

#### MATERIAL AND METHODS

Bendsura reservoir (capacity 7.106 million cubic metres) is constructed on a small seasonal river, Bindusara in 1955 and it is situated near the village of Pali, about 10 km south of district Beed of Maharashtra. At some places the river is narrow and looks like a stream. Bindusara originates in the hills of Balaghat near the village Waghira, in south of district Beed in Patoda taluqa. It is a hilly area. Various small streams contribute to the river. River Bindusara is a tributary river of Sindphana and a sub-tributary of Godavari river. Bendsura river flows from south to north and meets Sindphana river, about 10 km north of Beed town. Total length of the river is about 40 km. As an important resort for the native faunal diversity and beautiful habitat for the phytodiversity, it has

never been a subject of scientific or geological study. Therefore, the present study was undertaken to evaluate the Bendsura reservoir in terms of its ichthyofaunal diversity as well as ecological significance for the area.

Fish samples were collected in different seasons from July 2021 to June 2022 from Bendsura reservoir with the help of a local fisherman mainly during the time of fishing. The collected small-sized fishes were directly placed in a plastic jar containing 10% aqueous formaldehyde solution. But larger specimens were preserved with an incision on the belly in the plastic containers. Fresh or preserved samples were identified up to species level.

Identification of fish specimens was done with the help of its shape, colour, the pattern of scales, fins, mouth pattern and other morphological characters and after following standard taxonomic keys for fishes (Day, 1886; Datta Munshi and Srivastava, 1988; and Jayaram, 2010).

#### RESULT AND DISCUSSION

Table 1: Ichthyofauna of Bendsura Reservoir district Beed.

S. No.	Fish Species	Common Name/ Local Name	Availability in Reservoir	IUCN (2007) Conservation status
<b>Order- Cypriniformes; Family- Cyprinidae (Minnows and Carps)</b>				
1.	<i>Catla catla</i> (Hamilton)	Bhakur	Common	LC
2.	<i>Labeo rohita</i> (Hamilton)	Rohita	Common	LC
3.	<i>Labeo bata</i> (Hamilton)	Bata	Common	LC
4.	<i>Labeo dero</i> (Hamilton)	Gargi	Common	NE
5.	<i>Cirrhinus mrigala</i> (Hamilton)	Naini	Common	LC
6.	<i>Puntius sarana</i> (Hamilton)	Sarana	Moderate	VU
7.	<i>Puntius ticto</i> (Hamilton)	Two spot barb	Moderate	LC
8.	<i>Danio devario</i> (Hamilton)	Pataki	Rare	LC
9.	<i>Amblypharyngodon mola</i> (Hamilton)	Mola carplet	Rare	LC
<b>Order- Siluriformes; Family- Bagridae</b>				
10.	<i>Bagarius bagarius</i> (Hamilton)	Goonch	Moderate	VU
11.	<i>Mystus tengara</i> (Hamilton)	Tengara	Common	LC
12.	<i>Mystus aor</i> (Hamilton)	Tengara	Common	LC
13.	<i>Mystus cavasious</i> (Hamilton)	Tengara	Common	LC
<b>Order- Siluriformes; Family- Siluridae</b>				
14.	<i>Wallago attu</i> (Schneider)	Pardni	Common	NT
<b>Order- Siluriformes; Family- Schilbeidae</b>				
15.	<i>Pangasius pangasius</i> (Hamilton)	Pangas catfish	Rare	LC



Order- Siluriformes; Family- Clariidae				
16.	<i>Clarias batrachus</i> (Linnaeus)	Mangur	Moderate	LC
Order- Siluriformes; Family- Saccobranchidae				
17.	<i>Heteropneustes fossilis</i> (Bloch)	Singhi	Moderate	VU
Order- Ophiocephaliformes; Family- Ophiocephalidae				
18.	<i>Channa gachua</i> (Hamilton)	Saura	Rare	LC
19.	<i>Channa punctatus</i> (Bloch)	Saura	Common	NE
Order-Perciformes; Family- Gobiidae ( Gobies)				
20.	<i>Badis badis</i> (Hamilton)	Blue Perch	Rare	LC
Order-Perciformes; Family- Osphronemidae (Gourami fish)				
21.	<i>Colisa fasciatus</i> (Bloch)	Rainbow gourami	Very Rare	NE
Order-Perciformes; Family- Ambassidae ( Glassfishes)				
22.	<i>Chanda nama</i> (Hamilton)	Chanda	Moderate	NE
Order-Clupeiformes ; Family-Clupeidae (Herrings)				
23.	<i>Gudusia chapra</i> (Hamilton)	Subia / Suiya	Rare	LC
Order -Synbranchiformes ; Family- Mastacembeleidae (Spiny eels)				
24.	<i>Mastacembelus armatus</i> (Lacepede)	Bam	Rare	LC
25.	<i>Mastacembelus aculeatus</i> (Bloch)	Bam	Very Rare	EN

LC= Least concern, NT= Near Threatened, NE= Not Evaluated, EN=Endangered, VU=Vulnerable.

During present exploration 25 species of fishes are reported with 6 orders and 12 families. Perusal of past literature of fish diversity in Beed district showed most of the species washed out from the Bendsura Reservoir. Three threatened species (TH) are observed in the study area are *Puntius sarana*, *Bagarius bagarius* and *Heteropneustes fossilis* moderately distribute and *Colisa fasciatus* are very rare in the fish population of the study area (Table-1). More abundance of carps and cat fishes are observed in the Bendsura Reservoir due to establishment of inland fisheries, but on the other side population of wild species went on decreasing due to deliberated negligence of communities. Since past decades, the continuous harvesting of high yield fish species from the reservoir was exercised but less attention towards the conservation of genetic resources or illiteracy of the localities about fish genetic resources was done. Endangered condition of *Bagarius bagarius* and *Colisa fasciatus* species from the study area is also may be due to its over exploitation. Repeated and unplanned fishing in the reservoir and rivers lowers the population of fishes in this reservoir (Kar Devashish *et al.*, 2006). During present condition of increased human population and unplanned fishing may be changed the fish fauna of Bendsura Reservoir. Regarding the threats, many workers reported that directly or indirectly anthropogenic activities are responsible for decreasing the diversity and density of fishes in natural water bodies

(Prakash, 2020a; Prakash and Singh, 2020; Prakash, 2021; Verma, 2021). The threats to Global freshwater biodiversity have been described under some common interacting categories such as overexploitation, water pollution, destruction or degradation of habitat and invasion by exotic fishes and anthropogenic activities (Prakash and Verma, 2022; Singh and Prakash, 2022).

## CONCLUSION

Social awareness about the new conservation approaches of biodiversity and genetics resources is necessary in the study area so as to aware the localities, Proper management of surface waters by concerned rural authorities may reduce the threat of fish diversity. The present investigation showed that Bendsura reservoir possesses rich biodiversity but proper conservation measures are required to maintain its sustainability. There is a need for the conservation of fish diversity in this reservoir. The pressure is increasing day by day due to the increasing population, leading to loss of fish diversity hence, identifying the problem and making a better management plan is the way for conservation of the fish diversity of Bendsura reservoir of Beed district of Maharashtra.

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## 8. Geographic Information System (GIS) GIS in Geoscience & its Application

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### Abstract

Geographical Information Systems (GIS) is a fundamental application field of Geographical Information Systems, where the strength lies in defining the two dimension (X,Y extent), third dimension (Z component) and the fourth dimension (time) of spatial information. In the beginning, various attempts were made to solve complicated geological problems using multivariate and geostatistical methods, which laid the foundation of the geological application of spatial information system. Specialized mining packages were developed in the late 70s and 80s, but the cost of the packages were prohibitive and the general geological community had to be content with cheaper multivariate/geostatistical packages or such package available in public domain. In the early years of GIS, the systems were visualized as a graphic tool with limited spatial analysis capabilities, and the traditional geological community was skeptical about its usage in solving serious geological problems. However, the GIS developers soon realized the need for incorporating multivariate, Geostatistical modules and powerful 3-D analysis and these components work often considered as advanced components and became the selling point of GIS packages. This resulted in the popularity of GIS in the geological community.

### Introduction

With time, geological factors evolve. Due to the power in defining the two-dimensional (X, Y extent), third-dimensional (Z component), and fourth-dimensional (time) spatial information, it is a most genuine application field of Geographic Information Systems. Multivariate and geostatistical methods were initially utilised to resolve complex geological problems because of the diversity of geology throughout space and time. These two sections were created for geological applications, including mineral prospecting and data interpolation/extrapolation. These two approaches nearly led to the widespread use of geological spatial information systems. Spatial approaches were created and used for data analysis in the early years. Later methods for 3-D visualising geological data were created, which prompted the



In recent years various hydrological modeling options have become available in commercial GIS packages. Additionally, some hydrological packages have a live link with GIS packages and to perform specific hydrological operations. The most notable amongst them are:

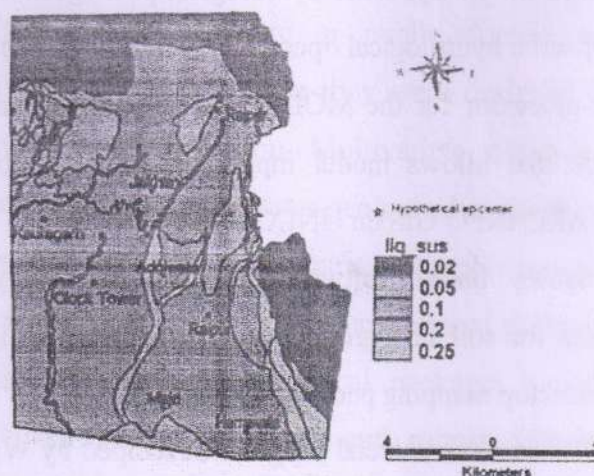
- ModelGIS – pre-processor for the MODFLOW (USGS software for GW modelling) groundwater code that allows model input and output to be created, stored and displayed within ARC/INFO GIS on UNIX workstations.
- SiteGIS – Windows based software package for analysing and presenting environmental data for soil and groundwater remedial investigations. SiteGIS is an application for a desktop mapping package MapInfo.
- Visual MODFLOW- is a commercial program developed by Waterloo Hydrogeologic. Its main advantage over MODFLOW is that it allows the user to design the finite difference grid and input the boundary conditions of the model in a graphical environment. Coupling Visual MODFLOW with ArcView, the most popular GIS software, promises increased accuracy in data input and opportunity to further process modelling output in GIS environment, as well as visually appealing presentation of results.

Nearly all groundwater management applications, including hydrogeological database management, groundwater targeting, resource estimation, recharge estimation, evaluation of the impact of groundwater exploitation on the environment (runoff, soil moisture, conditions for vegetation growth, etc.), and evaluation and reevaluation of groundwater resources for urban and rural fresh water supplies, can be done using GIS. GIS can be used for groundwater risk assessment, which may include the eradication, localization, and remediation of pollutant plumes (such as those contaminated with radioactive material and oil), vulnerability assessment, and environmental impact assessments for civil engineering and human activity influencing ground water, among other things. Groundwater GIS was created in South Australia using ARC/INFO and ArcView. Groundwater assessment, development, and management are made easier by this GIS.

On a scale of 1:50,000, IIRS produced groundwater prospect maps for the whole Indian National Capital Region. Geological, geomorphological, and groundwater quality data on a 1:50,000 scale were merged into ARC/INFO GIS software. In India's most prone to drought



districts, the Rajeev Gandhi National Drinking Water Mission is producing 1:50,000 ground water prospect maps.



**Fig. 1: Liquefaction susceptibility in parts of Doon valley**

(Source: G. Dole and B. K. Srivastava, IIRS)

### Mining and Mineral Exploration

The use of GIS in mineral exploration is now widespread, allowing the integration of disparate digital datasets into a single, unified database. The recommended approach is to compile all of the available geoscientific data within the GIS in the context of an exploration model in order to produce a mineral potential map. Careful consideration must be given in developing the model so that all of the relevant, important aspects of the deposit being sought are represented. The model is also very important in deciding what weightages to apply to each of these aspects. In the final analysis, these weightages may be arbitrarily applied by a geologist, with an intimate knowledge of the model and the deposit. He also decides which factors related to the deposit are most important, ranging down to those of least importance (a knowledge based approach). Another approach, which is not applicable in all situations, is to use a statistical method in order to decide upon weightages. The final result is a combination of all of the weighted values, producing a map which ranks the study area by degrees of perceived prospects. One of the widely used statistical data integration technique is the Weights of Evidence Method suggested by Bonham-Carter et al. (1989) and Bonham-Carter (1994) in which the quantitative relationships between data sets representing the deposit recognition criteria and known mineral occurrences is analyzed using Bayesian weights of evidence probability analysis. In this method the predictor maps are used as input maps and the end product is an output map showing the probability of occurrence and the associated uncertainty of the probability estimates of mineral



deposits. In ample number of case examples, this approach has been applied using various GIS packages.

GIS is increasingly important in customizing and integrating a broad range of exploration data consisting of information on drill holes with summary stratigraphic logs, rock sample and drill hole sample geochemistry, mineral occurrences, magnetic and gravity images, digital geology, current and historic exploration details, roads and railways, localities, parks and reserve forests, restricted areas and integrated bibliography. IIRS has attempted to develop such a system i.e. Mineral Resource Information System, which is a database on mineral deposits, mainly iron and manganese ore deposits of the Iron Ore belt of Keonjhar and Singhbhum regions of Orissa and Jharkhand, India (see box). Similar type of database also exists with much more capabilities and information content like CB Map which is a two-part GIS database that assembles and displays information related to mineral exploration in Central America and the Caribbean Basin. Part 1, The Prospect Database locates and describes over 1000 base and precious metal mines and prospects and the second Part 2, The Land Status Database locates and describes over 2000 mineral concessions, national parks, forest reserves, reservations, and other areas of restricted mineral entry. The data from both the Prospect and the Land Status Databases can be overlaid on a series of detailed base maps including geology, geography, and shaded relief.

### 3-D and 4-D GIS

The progress of GIS into three dimensions is a revolutionary change for the utility of the technology in oil and gas exploration and production – because depth is such a fundamental consideration. One example can be cited where Earth Science Association (ESA) has exploited ESRI's extensions to ArcView – Spatial Analyst and 3-D Analyst – to put all of the fields of the Gulf of Mexico in their proper 3-D perspective. By clicking on a field or well in a 2-D map one can see the field or well in 3-D with variables for sands, and wells correctly rendered in 3-D. Also the relevant data can be visualized in 4-D, which can represent series of maps made on a variable that changes over time. For example, it is possible to see monthly or annual maps for oil, gas or water production from a reservoir draped over the 3-D polygon for the reservoir. This is not a simple animation tool – one can still pan and zoom within the viewer and use the ESA Hot Link tool to access Reports, Charts, make Notes or export chosen data to Excel. This technology has great power in quickly examining reservoir performance, identification of permeability barriers and reservoir compartmentalization.



### Landslide Hazard Zonation

Landslide Hazard Zonation (LHZ) refers to “the division of a land surface into homogeneous areas or domains and their ranking according to degrees of actual / potential hazard caused by mass-movement” (Varnes, 1984). In the recent past various methods and techniques have been proposed to analyse causative factors and produce maps portraying the probability of occurrences of similar phenomena in future. They are as direct and indirect methods. The direct method consists of geomorphological mapping in which past and present landslides are identified and assumptions are made on the factors leading to instability, after which a zonation is made of those sites where failures are most likely to occur. The indirect method includes two different approaches, namely the heuristic (knowledge driven) and statistical (data driven) techniques. In the heuristic approach, landslide-influencing factors such as slope, rock type, landform and land-use are ranked and weighted according to their assumed or expected importance in causing mass movements. In the statistical approach, the role of each factor is determined based on the relationship with the past/present landslide distribution. With the advancement of computing technology, it has become feasible to apply various statistical methods to analyse landslide phenomena and derive at reproducible hazard zonation maps. This is further facilitated by the rapid progress in the field of remote sensing, which provides most authentic information on earth surface features and processes involved. Moreover, information from remotely sensed data can be digitally processed and integrated with other ancillary information using GIS.

Recently IIRS has contributed towards a national mission launched at the behest of Cabinet Secretary for landslide hazard mitigation in most critical areas of H.P. and Uttaranchal Himalayas, subsequent to Malpa and Okhimath landslides killing over 300 people in 1998. This project was a joint effort of 11 government departments coordinated by NRSA. The database was generated on 1:25,000 using IRS-LISS-III and PAN merged data products and data integration was carried out in ARC/INFO GIS using customised add-on software modules on Analytical Hierarchy Process (AHP). The hazard degree can be expressed by the Safety Factor, which is the ratio between the forces that make the slope fail and those that prevent the slope from failing. Using one of the simplest models, the so-called infinite slope mode Factor of Safety can be calculated on a pixel basis. For example, the following formula can be easily implemented in any raster based GIS.



$$F = \frac{C' + (\gamma - m\gamma_w)Z \cos^2 \beta \tan \phi'}{\gamma z \sin \beta \cos \beta}$$

in which

$C'$  = effective cohesion (Pa = N/m<sup>2</sup>).

$\gamma$  = unit weight of soil (N/m<sup>3</sup>).

$m = Z_w/Z$  (dimensionless).

$\gamma_w$  = unit weight of water (N/m<sup>3</sup>).

$Z$  = depth of failure surface below the surface (m).

$Z_w$  = height of watertable above failure surface (m).

$\beta$  = slope surface inclination (°).

$\phi'$  = effective angle of shearing resistance (°).

Some parameters here can be taken from laboratory analysis as constants and the depth of failure surface can be taken as the thickness of the sliding material. The depth of the water table can be used to build up different scenarios such as slope stability in completely dry or saturated condition. We can also include the effect of seismic acceleration in the infinite slope model.

### Earthquake studies

Potential earth science hazards due to earthquakes include ground motion, ground failure (i.e., liquefaction, landslide and surface fault rupture) and tsunamis. Ground motion is characterised by: (1) spectral response, based on a standard spectrum shape, (2) peak ground acceleration and (3) peak ground velocity. The spatial distribution of ground motion can be determined using one of the following methods such as, deterministic ground motion analysis (methodology calculation), probabilistic ground motion maps and other probabilistic or deterministic ground motion user-supplied maps. Deterministic seismic ground motion demands are calculated for user-specified scenario earthquakes. For a given event magnitude, attenuation relationships are used to calculate ground shaking demand for rock sites which is then amplified by factors based on local soil conditions when a soil map is supplied by the user. IIRS has done such studies for Bhuj with respect to recent earthquake and for Dehradun region with respect to a hypothetical event using ARCVIEW. Peak ground acceleration, liquefaction probability and lateral spreading are calculated and cross-checked with actual liquefaction in Bhuj region. For Dehradun region, different scenarios were built for assessing seismic hazard. Although these studies are very much generalised with respect to data variability, at least one point is highlighted



that the role of GIS is obvious in creating such maps. Such maps can be used for calculating intensity and damage in different scenarios using damage assessment methodology such as RADIUS in GIS environment.

Seismicity induced landslides can also be assessed in GIS using parameters such as Intensity; slope steep-ness; strength and engineering properties of geologic materials; water saturation existing landslide areas; and vegetative cover. Various integration techniques for seismic induced landslides like the one given in HAZUS methodology, can be implemented using simple matrix overlay in any GIS package.

### Concluding

In recent years, there has been explosion of GIS applications in geosciences, a simple search command in MSN shows 36,000 items for groundwater and GIS, 52,000 items for mining and GIS, 20,000 items for earthquake and GIS. However, the case studies from Indian region are limited to only a few academic departments and research organizations. The single most important reason being late realisation of the role of GIS in geoscience in India. As a result most of the professional departments either have just started or have yet to institutionalize GIS. Any useful Geoscience GIS needs enormous amount of data which lies only with professional departments, therefore, it is highly essential that such departments take a lead in implementing GIS. The need of the hour is that GIS must be seen as a part of the ERP solution in mineral related industry. Apart from the visualization, simulation and modeling, GIS based Spatial Decision Support Systems must be explored for geological applications.

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### Infrared Thermometer: Temperature Sensing Device

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#### Abstract

Temperature sensing devices such as thermometers are in continuous demand. As, Temperature is a common symptom of many infections. There has been a need to constantly check temperatures. It is essential to select the perfect type of device for temperature readings. There are infrared thermometers (e.g., forehead Digital thermometers) specially made for temperature reading from a safe distance with better precision. After COVID-19 outbreak, to prevent risk, infrared thermometer has recently seen an increase in popularity offering a safe and effective technique to monitor

human body temperatures. Infrared thermometers are temperature sensing devices that use electromagnetic radiation to make non-contact surface temperature readings. This allows for contactless, fast measurements of temperature from a safe distance of multiple individuals. An infrared thermometer proposed a suitable way to ensure accuracy in temperature Monitoring. To recognize the infected persons, IR thermometer can accomplish Forehead temperature measurement.

**Keywords:** Human Body Temperature, Infrared Forehead Thermometer

#### 1. Introduction

After COVID-19 outbreak, to avoid risk, it is essential to routinely check temperatures of individuals. Contact and non-contact are the two categories of Temperature measurement. Forehead thermometers, are also known as an infrared thermometer. Nowadays you will find anywhere such as public places, offices, Hospitals etc., the contactless thermometers and temperature guns. There are plenty of choices available. These latest tools are being positioned to check the temperature of human body making use of an infrared wave, which succeed on contactless technology. There are a lot of certified methods which were developed after years of research and definitely, the highest accuracy is achieved by some sort of physical contact between the measurement device and the patient. However, as recent events have shown, there are cases such as virus pandemics, in which avoidance of direct contact with objects that may be used by other people is strongly suggested. The high contagion rate of viruses such as the recent COVID-19 can be best dealt with by achieving highest degree of prevention possible<sup>[1]</sup>.

Infrared waves or Infrared radiation is a part of the electromagnetic spectrum. Infrared radiation (IR), sometimes referred to simply as infrared. The radiation is characterized by wavelength. The infrared wavelengths range from about 700 nanometers (nm) to 1 millimeter (mm). Every day, we all encounter Infrared radiations. In the electromagnetic spectrum, infrared (IR) is invisible to the human eye as its wavelength is longer than that of visible light. Infrared radiation (IR) is less harmful. The human eye cannot see it, but humans can detect it as heat.

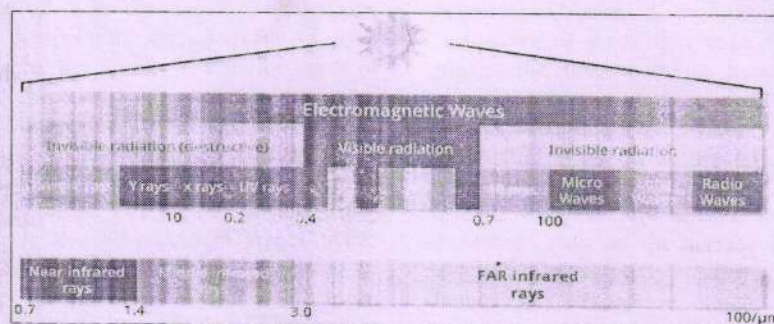


Fig 1: Electromagnetic Spectrum



This region of the spectrum is divided into near, mid, and far-infrared. The region from 8 to 15 microns ( $\mu\text{m}$ ) is referred to by Earth scientists as thermal infrared since these

wavelengths are best for studying the longwave thermal energy radiating from our globe. The wavelength range of infrared radiation lies between  $0.7 \mu\text{m}$  and  $1000 \mu\text{m}$ .

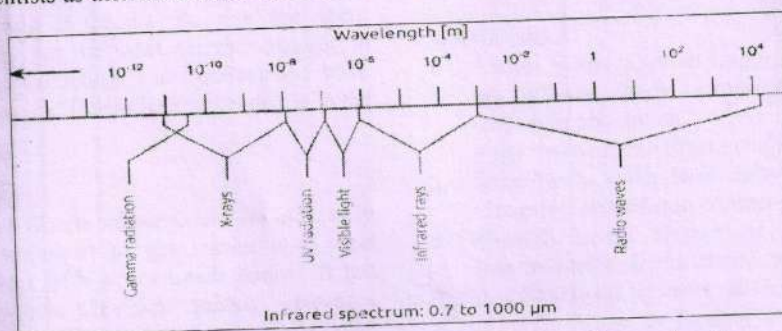


Fig 2: Electromagnetic radiation Spectrum characterized by wavelength

Infrared thermometers measure temperature by sensing the infrared energy which every material or object with a temperature above absolute zero ( $0^\circ\text{K}$ ) will radiate. In the simplest configuration, a lens will focus the infrared radiation onto a detector which in turn will convert this energy into an electronic signal. After compensating for the ambient temperature this signal will be displayed as a temperature reading [2].

In daily life, the measurement of body temperature is a basic way to determine the normal life of the human body [3].

An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and or the detecting infrared radiation. By knowing the amount of infrared energy emitted by the object, it permits temperature measurement from distance without contact with the object to be measure [4].

Measurements of forehead temperature are convenient, fast and involve a low risk of infection. Forehead Infrared thermometers (IRTs) are suited to quick screening but are not be used to represent the actual body temperature as tympanic(ear) temperature measurements [5].

## 2. Literature review

The coronavirus (COVID-19) has spread globally and temperature measurement is used rapidly to screen people. Handheld forehead IRTs are easy to use, rapid, noncontact, and inexpensive, so they are widely used [6]. Both electronic thermometers (rectal, oral, axillary sites) and infrared thermometers (forehead and tympanic membrane) accurately measure body temperature, although variability is greatest with the tympanic thermometer. A temperature reading of  $37.8^\circ\text{C}$  or more using any of these instruments is abnormal and indicates fever [7]. Two types of infrared thermometers are used to measure body temperature: tympanic(ear) and forehead. With the spread of COVID-19 coronavirus, forehead temperature measurement is used widely to screen people for the illness. The performance of this type of device and the criteria for screening are worth studying [8]. When the temperature of a natural object is higher than the absolute temperature, the surface emits thermal radiation. The infrared thermometer (IRT) detects this radiant energy that is released by the object via sensing elements and converts it into an electrical signal. After signal processing, the measured temperature is displayed on the IRT. This principle is used to develop an IRT to measure body temperature [9-12]. Many factors affect the temperature measurement of the human body [13, 14]. Recent technological

advancements have made infrared (IR) thermometers the choice for contactless screening of multiple individuals. Yet, even so, the measurement accuracy of such thermometers is affected by many factors including the distance from the volunteers' forehead, impurities (such as sweat), and the location measured on the volunteers' forehead. While minimal, temperature differences between the center and lateral areas of the forehead highlight the importance of the user in targeting the right area, which is the center of the forehead. It is necessary for the user to take precaution in ensuring that the forehead is dry and the skin surface temperature is restored before accurate measurements can be taken [15]. Some non-contact infrared thermometers (NCITs) devices may not be consistently accurate enough to be used as a stand-alone temperature measurement tool to determine if the temperature exceeds a specific threshold (e.g.,  $38^\circ\text{C}$ ) in an adult population. Model-to-model variability and individual model accuracy in the displayed temperature are a major source of concern. Users should be aware of the consequences of false negatives and false positives when using NCITs as a screening tool. Accuracy and credibility of the NCITs should be thoroughly evaluated before using them as an effective screening tool. Factors affecting NCIT temperature measurement and their interpretations should be considered when developing the temperature measurement protocol and screening criteria [16].

Temperature measurement provides information about the internal energy of an object, and its determination and control are of significant diagnostic importance.

The human body temperature values are distributed accordingly: constant temperature inside the body (deep temperature), variable temperature of the skin and extremities (surface temperature). From the surface of the body, heat is dissipated into the environment in several mechanisms: radiation, conduction, convection, evaporation. In the case of checking a large number of people in public places, the first choice is noncontact thermometers that allow temperature measurement without any contact with the person. The temperatures measured with contact thermometers in the upper armpit were higher than the temperatures measured noncontact on the forehead. In the armpit, with the arm closed, there are different thermal conditions than on the surface of the forehead, which is exposed. To correctly interpret the result of measuring human body temperature, it is necessary to specify the place of measurement and the type of thermometer used [17].

The use of forehead thermometers has increased because



they are easy to operate, and it is possible to take a reading without any contact between people. However, they may be less accurate than other thermometers, such as oral or ear thermometers, particularly if people do not use them properly. To ensure they get the most accurate reading, a person should read the manufacturer's instructions and make sure the forehead is clean and free of hair or headwear in the measurement area<sup>[18]</sup>.

### 3. Result and discussion

Infrared and Contactless Thermometer Guns are extremely easy to operate and are used to get instant and exact temperature measurement with a one-touch button. It has Low battery consumption. It can quickly return a temperature result. It has a distance sensing capability. So, the chances of infection and transferable diseases automatically get reduced. You can adjust the settings to get accurate readings, whenever you are measuring the temperature. You can easily adjust the readings between Celsius and Fahrenheit to be easy while checking the temperature. When an object comes close to the sensor, the infrared light from the LED reflects off, of the object and is detected by the receiver. You should press a button to start the reading and wait until the device toots or flashes the temperature reading on a screen. This should only take a few seconds<sup>[19]</sup>.

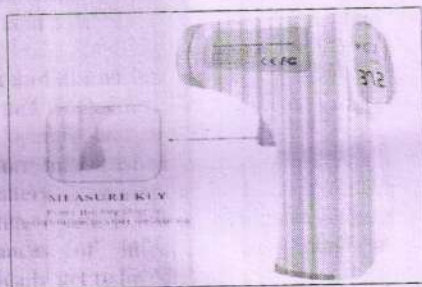


Fig 3: Infrared and Contactless Forehead Thermometer Gun

You can measure the body temperature easily at everywhere. We can use it at home. Every one Even a Kid Can Measure the Temperature Easily. A traditional thermometer has to be disinfected or wash after every measurement or use. Don't necessarily send radiation inside the body and hence affect you, since Infrared thermometers guns work by using Infrared radiation. However, because of their ability to measure temperature from a safe distance range, these devices have a wider scope of application than just checking whether you have a fever.

### 4. Conclusion

This paper does review on human body temperature measurement by Forehead Digital Infrared Thermometer. IR forehead thermometers check the human temperature by sensing the infrared energy radiated by the body. Forehead Digital Infrared Thermometer is a good measure in controlling the spread of the disease. Forehead thermometers could help to scan large number of peoples. Making use of forehead thermometers regularly is not terrifying. It is essential to specify the place of measurement and the type of thermometer used in order to correctly interpret the result of measuring human body temperature. The chances of infection and disease transmission, without bringing the device in contact, automatically get reduced by

using IR thermometer. Read the instructions before you start measuring the temperature since the range can vary depending upon the thermometer you are using.

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## Introductory Optical and Microwave Remote Sensing : A Review

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### ABSTRACT

Remote sensing technology is widely used in many fields which collects a wide range of observations in a timely manner and use less restricted data collection methods. In recent years, there have been great progresses in remote sensing developments, especially in the microwave remote sensing over the optical remote sensing. Due to the advantages of independency on weather conditions as well as day/night detection of target of interest the microwave remote sensing becoming the main focus of researchers. It is used for collecting information about object of interest on the earth surface and also used for monitoring many environment related disciplines, glacial dynamics, crop classification, forest cover, flood mapping, coastal vegetation and many more. This paper concludes that microwave remote sensing has great potential than optical remote sensing and will play more significant role in the various fields of interest.

Keywords : Remote sensing, Active and Passive, Optical, Microwave

### I. INTRODUCTION

Remote sensing is the greatest achievement for acquiring information from objects on earth or other planetary bodies. It performs the detection, collection and interpretation of target of interest. Getting information about an object, area or phenomenon without being in contact with it called as remote sensing. By measuring the amount and the nature of the reflection of visible light energy from our external source( such as the sun or light bulb, tube), we can gather information around us, as it reflects away from the objects in the field of our approach. In simple words we can say that, with the help of our eyes we can collect information about surroundings without touching it. i.e., our eyes are excellent example of remote sensing device.

The principle of remote sensing is based on measurement made by the satellite sensor in different wavelength or frequency regions of electromagnetic spectrum. The electromagnetic radiation have an



enormous range of wavelengths and frequencies, the range is called as electromagnetic spectrum. Fig.1, shows the different regions of the electromagnetic spectrum.

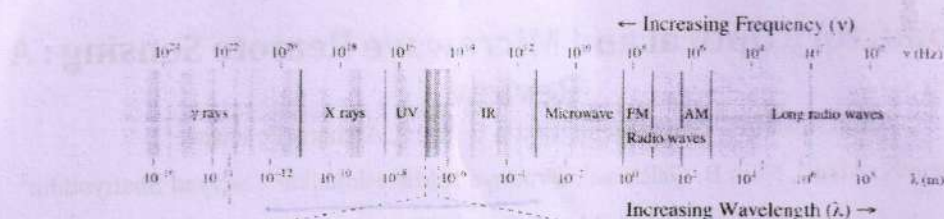


Fig.1. Electromagnetic Spectrum

According to frequency used of electromagnetic spectrum, there are different types of remote sensing [1-2].

### I. Optical Remote Sensing :

It is operate in the Visible (0.38-0.72nm), Near Infrared (0.72-1.30nm), middle infrared (1.30-3.00nm), short wave infrared (7.00-15.0nm) portion of electromagnetic spectrum. Optical remote sensing is a passive technique for earth observation which relies on solar illumination. Below we have discussed the passive remote sensing.

#### Passive Remote Sensing :

Such remote sensing requires an external energy source (such as the Sun). It detects natural radiations. This kind of remote sensing collects data from the Earth's atmosphere and not from the Earth's surface hence, passive remote sensing mostly perform from satellites. Fig.2. give the idea about passive remote sensing. Mainly this remote sensing is used in the applications in optical, infrared, and thermal electromagnetic radiation. The drawback of this technique is, it's applicable only during daytime with full of sun radiations without interfering clouds or smoke or rainfall, etc. another drawback is that the noise is very much comparable to the desired signal. Hence, the resolution of each cell degrades the quality of the images.

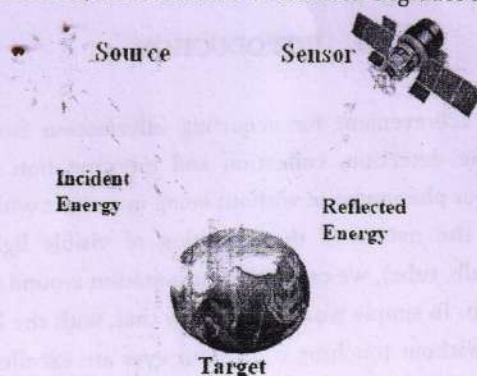


Fig.2. Passive Remote Sensing

The earliest application was aerial photography for surveying and military use. Multiple spectral Earth observation systems were introduced in the mid-1960s that captured spectra in the form of images, also



known as imaging spectroscopy (IS) [3]. However, when cloud cover, rain, haze persists over an area of interest in that case, such remote sensing fails to retrieve data.

## II. Microwave Remote Sensing :

It operates in the microwave region of EM spectrum. Wavelength of this region is 1mm – 1m and frequency of this region is 40,000Hz – 300Hz. It has long wavelength thus it penetrates through clouds or any other weather conditions without any restrictions (except during periods of heavy rain). It provides unique information like sea, wind and wave direction which are derived from frequency characteristics, Doppler Effect, polarization, backscattering etc. It overcomes the disadvantages of optical remote sensing. Microwave wavelength region is used in remote sensing to provide useful information about the earth's surface (atmosphere, land and ocean). The microwave remote sensing is basically carried out using active remote sensing.

### Active Remote Sensing :

Such remote sensing has its own energy source for illuminations. Thus they can send their own signals for acquiring data. Major advantage of active remote sensing is, data is available both time day or night and also capable of measuring electromagnetic signals in all weather conditions. Fig.3. gives the idea about active remote sensing. The most common examples of this remote sensing are LiDAR (Light Detection and Ranging) is used to examine the surface of the earth and RADAR (Radio Amplitude Detection And Ranging).

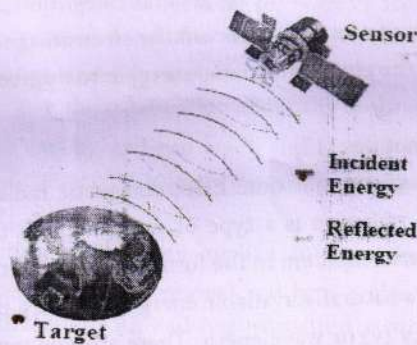


Fig.3. Active Remote Sensing

It transmits and receives its own radio wave pulses towards the object. The active microwave radar system can be classified in two types as following.

#### 1) Non – Imaging Radar :

It first contains an altimeter that is used to measure sea surface height as well as wind speed. It can be used in aircraft and spacecraft [4]. The other is a scatterometer that is used to measure the direction and speed of the ocean wind. Applications of scatterometer play an essential role in regulating the global climate [5-8].

#### 2) Imaging Radar :

It includes side looking airborne radar (SLAR), real aperture radar (RAR) and synthetic aperture radar (SAR). All the types of imaging radar produce images of the area on the earth. SAR is the modified version of imaging radar which provides very high resolution imagery of the earth as well as planetary bodies [9].



### Literature Review

Natural environment is essential for human survival and development as it provides water resources, land resources, biological resources and climate resources etc. The development trends and future directions are forwarded to direct the research application of environmental monitoring and protection in the new era. Global and regional environmental monitoring relies heavily on remote sensing satellites and sensors that are able to quickly collect local and spectral data of large-scale components on the Earth's surface. With the rapid development of space technology, remote sensing data is becoming increasingly abundant [10].

Remote sensing provides an ideal platform for gathering empirical data, such as mapping of global climate change, to help decision makers and support policies that ensure the right balance between land development and environmental protection [11]. The main advantage of remote sensing is gaining information without any direct human or machine contact, achieved by sending electromagnetic radiations. i.e., gaining information about large sections of earth in a very less time and again and again of the same patch to observe the changes in a given list of parameters.

India is not behind the leading countries in the developed world in taking big steps forward in remote sensing. ISRO, the Indian Space Research Organization, has launched numerous satellites since 1975, the latest being the PSL V-C14 (Earth Satellite Launch Vehicle) on September 23, 2009 and the Prithvi-II satellite in October 2009. Due to all this, modernization, broad casting networks also provided very valuable information [12].

The field of remote sensing can be divided into two general categories: Analog remote sensing and digital remote sensing. Analog remote sensing uses film to record the electromagnetic energy. Digital remote sensing uses some type of sensor to convert the electromagnetic energy into numbers that can be recorded as bits and bytes on a

Computer and then displayed on a monitor [13].

Remote sensing works on electromagnetic radiation. Electromagnetic radiation consists of the electrical and magnetic field. An electromagnetic radiation is a type of energy which travels at universal speed of light through free space or through a material medium in the form electromagnetic waves.

Remote sensing system that measures naturally available energy is called a passive sensor. We categorize each spectral region based on its frequency ( $\nu$ ) or wavelength. There are two types of imagery for passive sensors, Multispectral imagery and Hyperspectral imagery.

The main difference between multispectral and hyperspectral is the number of bands and how narrow the bands are. Hyperspectral images have hundreds of narrow bands, multispectral images consist of 3-10 wider bands. Both imagery give the power to see like humans (red, green, and blue), goldfish (infrared), and bumblebees (ultraviolet). Actually, we can see even more than this as reflected EM radiation to the sensor [14].

Optical imaging is the widely used passive remote sensing where the range is from  $0.4\mu\text{m}$  to  $1\text{mm}$ . In it electromagnetic energy of the sun is reflected by the earth is received and measured. It cannot penetrate through clouds; therefore, image is acquired only in clear weather [15].

Optical remote sensing is the oldest method of remote sensing which is started with the invention of photography. As the optical remote sensing has started much earlier than the advance imaging techniques



like SAR therefore temporal studies are well supported by the optical images. In optical remote sensing many types of error are shown including skew distortion, panoramic distortion, haze, error due to varying solar illumination conditions and error due to unstable platform [16]. It is affected by the shadow that leads to the misclassification of pixel into low reflectance objects like water [17]. Over the time, resolution of the images has improved. Now a day's several images have the centimeter level of accuracy. Hence microwave remote sensing is used for data detection and collection.

Microwave remote sensing can be passive as well as active. The process involves transmitting the pulses of microwave in the direction of interest and record the reflection which contains strength and position of the object. Its electromagnetic spectrum range is from 1mm to 1m. Microwave can penetrate through clouds; therefore, image is acquired in any weathers [15,17].

SAR is the type of microwave remote sensing which can provide a quantitative estimation of ground changes and can be used in all weathers. It also has the some errors like speckle, layover and foreshortening but these are less than optical remote sensing [16].

Remote sensing plays an important role in various applications such as Agriculture, Vegetation, Wetland Mapping, River Mapping, Glacier Mapping, Urbanization, Analysis of Landslide-Earthquake, Forestry, Geology, Hydrology, Ocean and Coastal Monitoring, Surface Topography and many more [17-22].

Optical remote sensing gives the biophysical and biochemical data through the study of leaf pigmentation and structure is performed [20]. Under the optical remote sensing, pest infection and disease can be identified as it appears in the form of change in spectral reflectance. Also change in photosynthetic processes can be determined through the near-infrared band and Crop growth monitoring and yield estimation can be performed. Abandoned agricultural land also can be identified [21].

Microwave remote sensing can give the information about the moisture content and structure of the canopy. It can penetrate the vegetation canopy and can study the surface water or flood extent. It detects water content of the plant and the soil characteristics which can support the crop disease detection and also helps in crop growth monitoring [20-22].

Currently available satellite imagery has been applied to numerous applications in disaster prediction, investigation and or management at global, regional and local scales. Data have been mostly used for more detailed assessments of an earth's aftermath and reconstruction as well as in post disaster scientific research [23].

### Discussion

A systematic review of remote sensing is discussed in this paper. In this paper, we have discussed Active and passive remote sensing and also discussed about the microwave remote sensing and optical remote sensing with positive and negative points of the given remote sensing.

### Conclusion

This study is to investigate the capability of remote sensing for various applications. It has numerous applications related to our environment. Microwave remote sensing gives clarity about images and shows high-resolution images thus nowadays microwave remote sensing is a growing technique for acquiring data.



its advantages which overcome the disadvantages of optical remote sensing. Satellite imagery is a great data source for quickly responding to different emergency events. In the field of agriculture (crop monitoring, crop mapping), forestry, geology, hydrology, marine ice conditions, glacier exploration, ocean and coastal monitoring, remote sensing are of great benefits.

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