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**Dist.-Akola (MS)**

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### **3.2: INNOVATION ECOSYSTEM**

**3.3.2: Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years.**



Shri. Govindsing Rathod Shikshan Prasarak Mandal, Dahatonda's  
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Murtizapur, Dist. Akola, Pin Code 444107 (MS)  
(Affiliated By S.G.B. Amravati University, Amravati)

www.rgrcollmzr.ac.in  
Ph. No. 07256-243951

Email : artssciencecollege@rediffmail.com  
Fax No. 07256-242021

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### 3.3.2

*Number of books and chapters in edited volumes/books  
published and papers published in national/ international  
conference proceedings per teacher during*

**Academic Year: 2021-22 to 2017-18**



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### Number of Books/Chapters

Year	2021-22	2020-21	2019-20	2018-19	2017-18
Number of Books	04	05	07	01	01
Total	18				

Sr.No	Name of the teacher	Title of the book/chapter	Year	Page No
<b>2021-22</b>				
1	A.S. Nimkar	Mathematics Bridge Course-II	2022	2
2	P. M. Makode	A Text Book of Simplified Zoology Volume-I M. Sc-Semester I	2021	4
3	P. M. Makode	A Text Book of Simplified Zoology Volume-II M. Sc-Semester I	2021	7
4	S. K. Shah	Rashtrasantachi Ashtadarshane	2021	10
<b>2020-21</b>				
5	R. P. Shirsat	MCQ's in Botany for B.Sc. I Semester I	2021	16
6	A.S. Nimkar	Mathematics Bridge Course-I for undergraduate	2022	20
7	Sajid K. Shah	Dr. Babasaheb Ambedkaranche Samajik Vichar	2020	22
8	Sajid K. Shah	Mahatma Phule Yanche Dharmvishayak Chintan	2021	36
9	A. S. Tankar	Covid-19 (Challenges and Opportunities in India)	2020	49
<b>2019-20</b>				
10	P. M. Makode	A Text Book of Simplified Zoology Vol I	2019	54
11	P. M. Makode	A Text Book of Simplified Zoology Vol II	2019	57

12	S. K. Shah	Rashtrasantachi Ashtadarshane	2019	60
13	S. S. Kavar	A Text Book of Physics B.Sc. Part-I, First Semester	2019	65
14	A. P Charjan	A Textbook of simplified Zoology Volume I (For post graduate students)	2019	54
15	A. P. Charjan	A Textbook of simplified Zoology Volume II (For post graduate students)	2019	57
16	A.S. Nimkar	A Hand Book for Mathematical Laboratory	2019	67
<b>2018-19</b>				
17	R. H. Khandare	Samajshastra	2018	70
<b>2017-18</b>				
18	R. P. Shirsat	Text book of Botany	2018	73



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**Number of papers published in national/ international conference proceedings**

Year	2021-22	2020-21	2019-20	2018-19	2017-18
Number Papers	02	07	04	05	07
Total	25				

Sr.No	Name of Author	Title of the paper	Year	Page No
<b>2021-22</b>				
1	P.M. Makode	Economic interest of lac culture in India – an overview	2022	85
2	P. M. Makode	Behavioral study of parrots around ground gram tarkheda dharni region of western melghat	2022	93
<b>2020-21</b>				
3	P.M. Makode	Role of spider for trapping harmful insect from traditional crop around farm field of dharni melghat region	2020	102
4	P.M. Makode	Cladoceran diversity in lentic ecosystem of shivan reservoir with reference to physicochemical parameters	2020	110
5	A.S. Tankar	Covid-19 and librarian role	2020	122
6	D.B. Dupare	Phytochemical Analysis Of Medicinal Herbs Hyptis-Suaveolens And Their Application As Home Remedies	2020	129
7	D.B. Dupare	To study leaf extract of ricinus communis L: to cure jaundice and increase wbc of blood	2020	134
8	D.B. Dupare	Gas monitor composites: polypyrrole –polyvinyl alcohol -nickel chloride	2020	138
9	R. B. Kalbande	Real world and Its Computer Representation, Vegetation Monitoring by using Internet Technology tool	2021	146

2019-20				
10	D.B. Dupare	A new method for <i>N-tert</i> -butoxy carbonylation of amine using urea as an organocatalyst	2020	160
11	A. S. Nimkar	Cosmological model in self Creation Theory of Gravitation	2020	165
12	A. S. Nimkar	Bianchi Type Cosmological Model in Saez Ballester Theory of Gravitation	2020	171
13	V. V. Kapile	Role of technologies and skills for better development in sports	2019	176
2018-19				
14	P. M. Makode	Quality orange (citrus <i>Seticulate</i> ) fruit production by applying organic nutrients and water maintenance	2019	182
15	P. M. Makode	Effects of dietary onion on behavior of the fresh water fish <i>chhana punctatus</i> (bloch, 1793)	2019	185
16	S.S Dange	वृद्धावस्था या काळातील शारिरीक बदलामुळे उद्भवणा-या शारिरीक समस्या व त्यावरील उपाययोजना	2018	189
17	R. B. Kalbande	Vegetation monitoring and mapping melghat tree	2019	196
18	R. P. Shirsat	Preliminary Phytochemical observations of <i>Tinosporacordifolia</i> (Willd) Miers.	2019	207
2017-18				
19	P. M. Makode	Correlation between the knowledge of snakes and the snake fear pp. 100-101	2017	219
20	P. M. Makode	Effects of dietary onion on behavior of the fresh water fish <i>clarius batrachus</i> (linn.)	2018	223
21	A. S. Nimkar	Kaluza-Klein Cosmological Model In Saez-Ballester Theory Of Gravitation	2018	227
22	A. P. Charjan	Effect of Nimesulide on hatching rate of <i>Clarias batrachus</i> (Linnaeus, 1758)	2018	230

23	A. P. Charjan	Endosymbiont acquisition of Wolbachia alters Mosquito Population for the prevention of Mosquito borne diseases	2018	232
24	A. P. Charjan	Identification of Blood meals in Haematophagus mosquitoes by a polymerase chain reaction	2018	236
25	R. B. Kalbande	Application of bioinformatics in the study of morphodiversity of some common roadside tree species in Murtizapur Dist. Akola, Maharashtra	2018	241





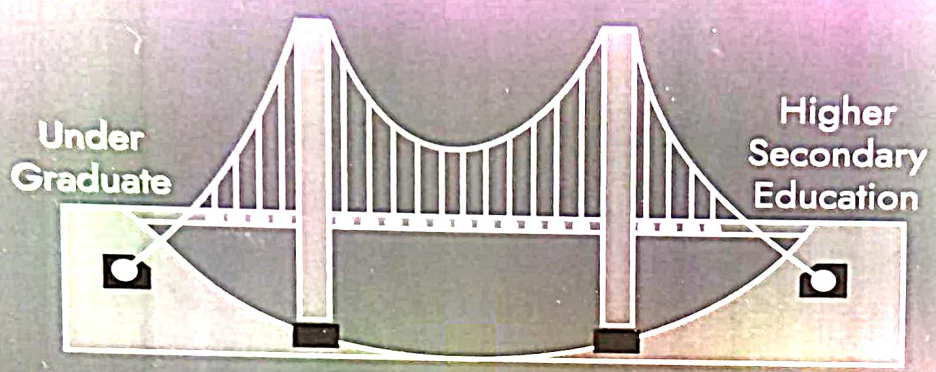
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*Number of books and chapters in edited volumes/books  
published in the year*

**2021-22**



# MATHEMATICS BRIDGE COURSE - II

**Authors**  
Dr. A. S. Nimkar  
Dr. R. S. Thakare  
Ms. V. M. Wankhade

**Editors**  
Dr. A. S. Nimkar  
Dr. A. M. Pund

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Contact us : [dnyanpathpub@gmail.com](mailto:dnyanpathpub@gmail.com)

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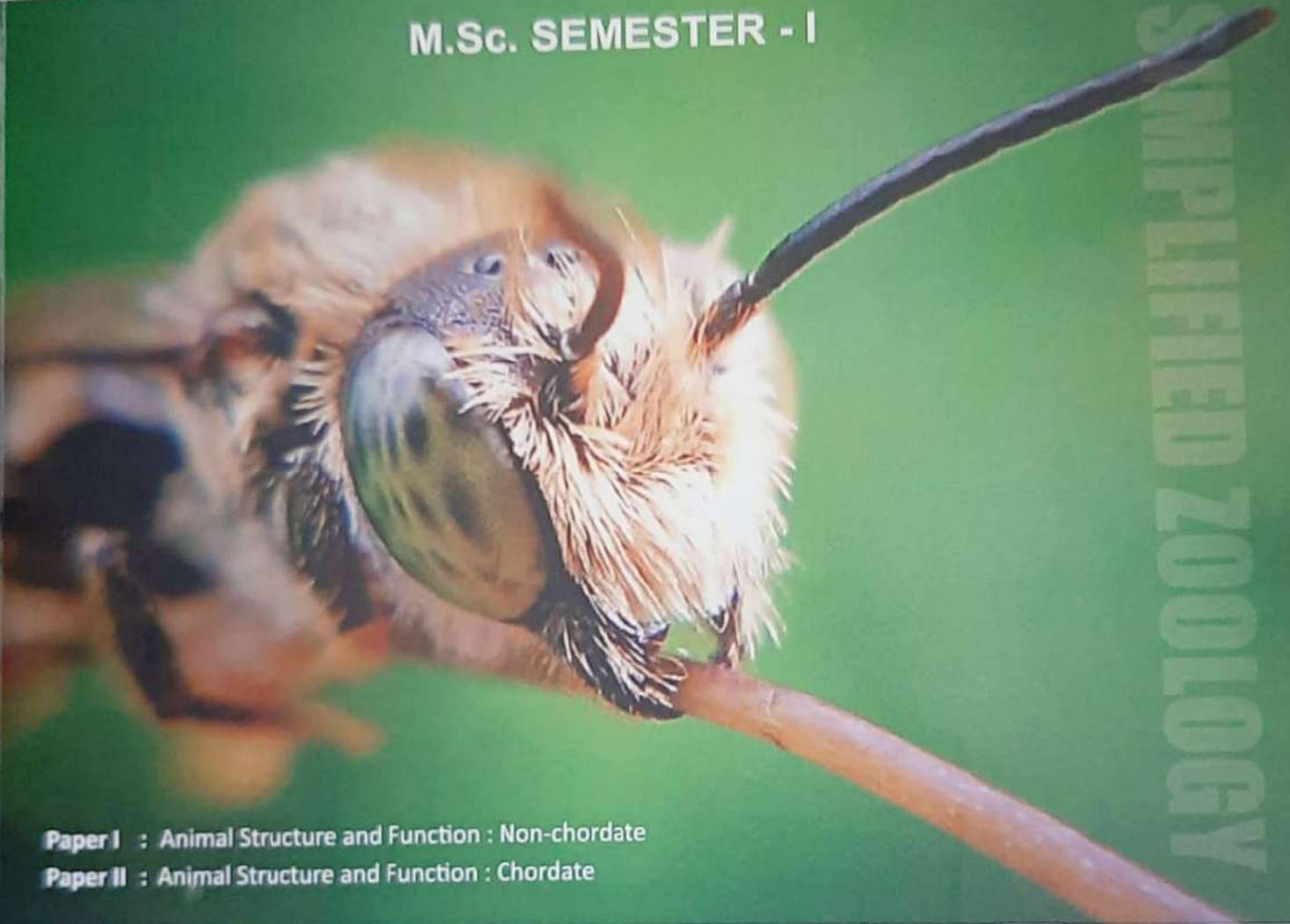
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Volume I

M.Sc. SEMESTER - I



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Karanja (Lad)

**Dr. P. M. Makode**  
Shri. Dr. R. G. Rathod Arts  
and Science College,  
Murtizapur

## - AUTHORS -

**Dr. A. K. Patki**  
S.P.M. Science and Gilani Arts,  
Commerce College,  
Ghatanji

**Dr. V. T. Tantarpare**  
Vidya Bharti Mahavidhyalaya,  
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- संदर्भग्रंथ सूची - ६३

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पुरोवर्ती महाराष्ट्राच्या जडणघडणीत साहित्याचे अनावसाधारण महत्त्व आहे, त्याच 'संतसाहित्य' भोवत्या भर घालत आलेले आहे. संतसाहित्याचे जडणघडणीत वृत्तीमै मानवता कल्याणाचे कार्य केले आहे. महाराष्ट्राला लाभलेल्या प्रबोधनकारी संतांच्या परंपरेतील, विदर्भाच्या कसादार भूमीत जन्मलेले राष्ट्रसंत तुकडोजी महाराज हे एक अद्वैत, राष्ट्रसंतांचे आधुनिक विचार महाराष्ट्राबरोबरच संपूर्ण राष्ट्रालाही दिशादर्शक ठरले आहे.

मानवी जीवनाचे प्रभाव दाकणाऱ्या सर्व पैलूंचे सर्वाधिक विस्तार करणारे, अजकक करणारे राष्ट्रसंत तुकडोजी महाराज होते. संत तुकडोजी महाराज हे सर्वसामान्यांचे प्रतिनिधित्व करणारे संत होते. देशातील ग्रामीण जीवनाला त्यांनी जवळून न्याहाळले. त्यांचे दारिद्र्य, अज्ञान पाहून त्यांचे मन तिळतिळ तुटले. ग्रामगीतेच्या माध्यमातून त्यांचा आत्मविश्कार प्रभावीपणे व्यक्त झाला. ग्रामीण भारताबरोबरच एकूण मानवजातीच्या कल्याणाचे विचार त्यातून व्यक्त झाले आहे. महिलाप्रती सारखा आधुनिक ज्वलंत विषय त्यांच्या विंतनानुत प्रभावीपणे व्यक्त झाला. स्वच्छतेचा मूलमंत्र त्यांच्या शब्दाशब्दानुत व्यक्त झालेला आहे. आरोग्याच्या बाबतीत राष्ट्रसंत अतिशय आग्रही असायचे. स्वावलंबन व स्वयंरोजगार या बाबींचा विचार त्यांनी समर्थपणे समाजापर्यंत पोहोचला होता. तरुणांनी आपल्या आरोग्याच्याप्रती सजग रहावे, हे सांगावलाही ते विसरले नव्हते. गावोगावी वाचनालये निर्माण व्हावी, हा अत्यंत महत्त्वाचा विचार त्यांनी समाजाला दिला. ग्रामीण संरक्षणासाठी राष्ट्रसंतांनी संघटनेचे महत्त्व अधोरेखित केले होते. शेतकऱ्यांच्या बाबतीत राष्ट्रसंत अत्यंत संवेदनशील होते. शेतकऱ्यांच्या प्रस्नांना ते सहानुभूतीपूर्वक उत्तरे घायचे. राष्ट्रसंतांनी व्यसनाधीनतेचे दुष्परिणाम सांगून, त्यातून तरुण पिढीने स्वतःला कसे वाचवावे, हे मार्मिक पद्धतीने सांगितले होते. मानवता हाच खरा धर्म आहे, सर्वधर्मसमभावाची विचारसरणी अंगीकारून विश्व कल्याणाचा मार्ग सुकर होणार आहे. अन्यथा हे विश्व ज्या आधुनिक तंत्रज्ञानाचा वापर करित आहे; तेच मानवाच्या विनाशाचे कारण ठरेल! हा सावधगिरीचा इशाराही राष्ट्रसंतांनी देऊन ठेवला आहे. अध्यात्माचे, भक्तीचे खरे स्वरूप देशभक्ती व समाजसेवेत सामायले असल्याचे त्यांनी प्रथमता अनुभवले. तोच मौलिक संदेश समाजाच्या तळागाळापर्यंत पोहोचविण्याचे काम केले. त्यांचे व्यक्तिमत्त्व उत्तरोत्तर अधिकाधिक विकसित होत गेले. राष्ट्रसंतांना जाणवलेला देव त्यांनी समाजासमोर ठेवला. त्यांचे आचार-विचार आज आधुनिक समाजासाठी प्रासंगिक आहे. त्यांचे कृतिशील अनुकरण करूनच आपला समाज सौख्याचे जीवन जगू शकतो. राष्ट्रसंतांच्या विचारांना प्रांताच्या किंवा देशाच्या सीमा लागू पडत नाहीत. त्यांचे विचार 'वैश्विक कल्याणाचा' मूलमंत्र आहे!

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(Diversity and Applications of Microbes and Cryptogams)

**Authors**

- Dr. Prashant Y. Anasane
- Dr. Rupali P. Shirsat
- Dr. Sanjay M. Deosthale
- Dr. Swapnil E. Mahamune
- Dr. Mangesh J. Dagawal
- Dr. Yugandhara Rajgure/Gulhane

**Editors**

- Dr. Prashant Y. Anasane
- Dr. S. V. Surve



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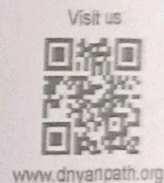
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## - AUTHORS -

### Dr. Prashant Y. Anasane

M.Sc., Ph.D  
Associate Professor,  
G. S. Gawande Mahavidyalaya,  
Umarkhed Dist: Yavatmal.

### Dr. Rupali P. Shirsat

M.Sc., Ph.D  
Assistant Professor,  
Department of Botany,  
Shri Dr. R. G. Rathod Arts and  
Science College, Murtizapur

### Dr. Sanjay M. Deosthale

M.Sc., M.Phil, Ph.D  
Associate Professor,  
Department of Botany, B.B. Arts  
N.B. Commerce and B.P. Science College,  
Digras, Dist. Yavatmal

### Dr. Swapnil E. Mahamune

M.Sc., M.Phil., Ph.D, SET  
Assistant Professor  
Govt. Vidarbha Institute of Science  
and Humanities, Amravati

### Dr. Mangesh J. Dagawal

M.Sc., M.Phil., Ph.D, NET  
Head Department of Botany  
Smt. Radhabai Sarda Arts Commerce  
and Science College  
Anjangaon Surji, Dist. Amravati

### Dr. Yugandhara Rajgure/Gulhane

M.Sc., Ph.D  
Assistant Professor  
Head Department of Botany  
G.S. Tompe Arts, Commerce and  
Science College, Chandur bazaar.

## - EDITORS -

### Dr. Prashant Y. Anasane

M.Sc., Ph.D  
G. S. Gawande Mahavidyalaya  
Umarkhed

### Dr. S. V. Surve

M.Sc., Ph.D  
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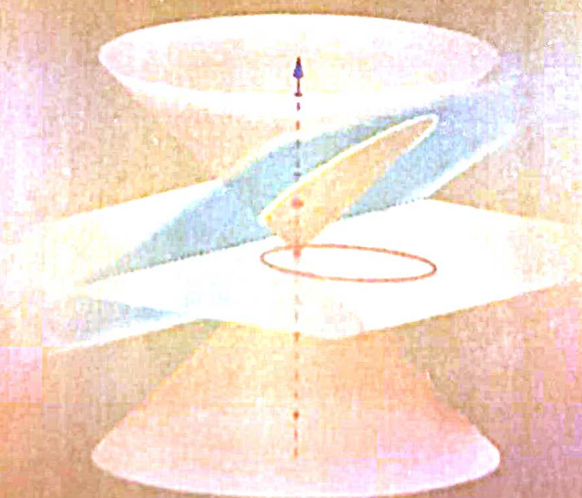
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Dr. A. S. Nimkar  
Dr. R. S. Thakare  
Ms. V. M. Wankhade

## Editors

Dr. A. S. Nimkar  
Dr. A. M. Pund

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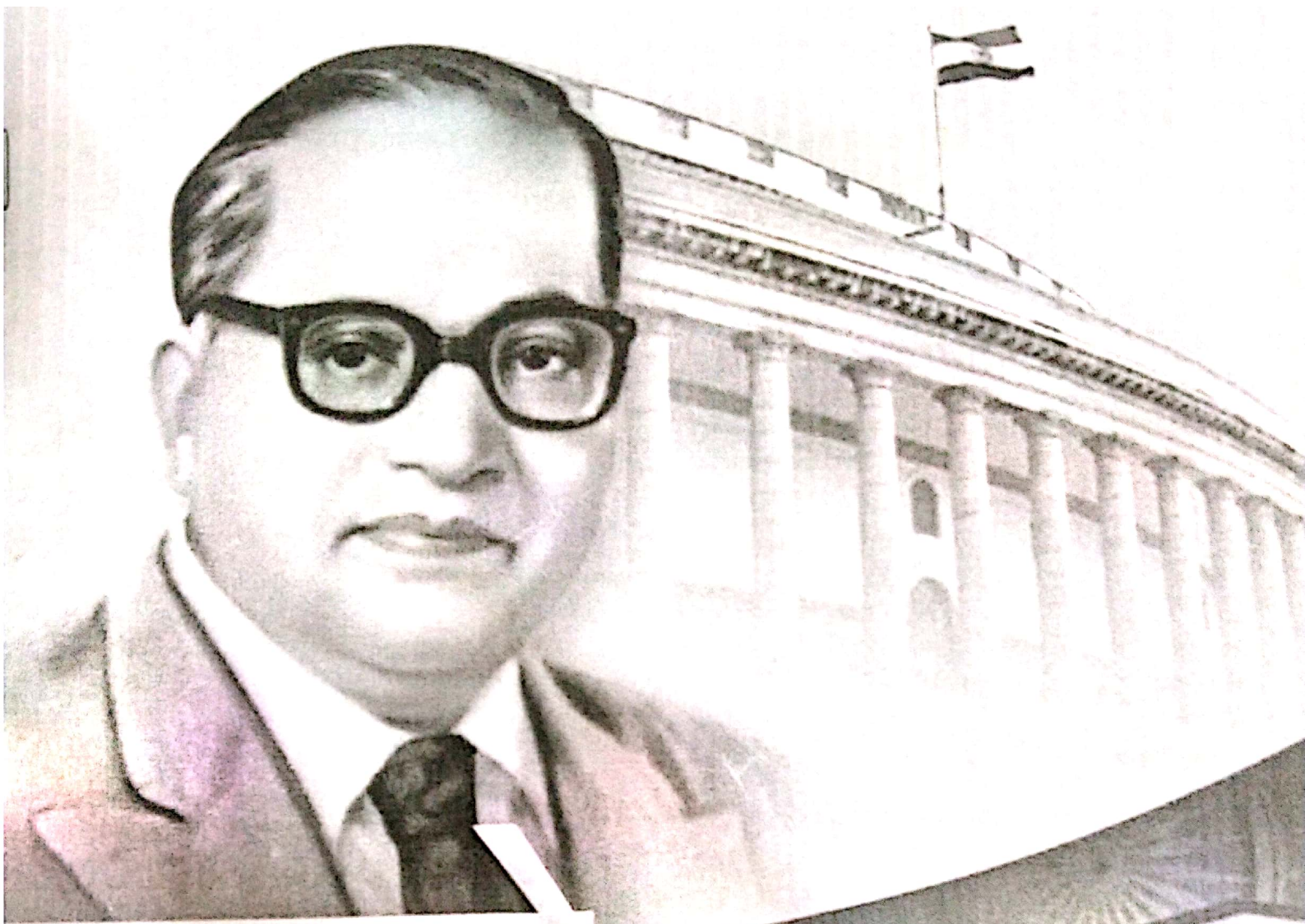
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डॉ. एस. एस. साळुंके,

प्रकाशक

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-प्रा.साजिद के.शाह

### प्रस्तावना :

भारतरत्न डॉ. बाबासाहेब आंबेडकरांचे कार्य विविधांगी आहे. त्यांचे व्यक्तिमत्त्व बहुआयामी होते. मानवी जीवनाच्या विकासासाठी, राष्ट्राच्या उद्वारासाठी महत्त्वपूर्ण असणाऱ्या सर्वच बाबींवर त्यांचे अध्ययन होते. त्यांच्या विचारातून मानवी विकासाला पोषक असणारी अशी कोणतीही बाब सुटलेली नाही. डॉ. बाबासाहेब आंबेडकरांच्या एकंदर कार्यात सामाजिक सुधारणांना विशेषतः दलितोद्वाराच्या चळवळीला विशेष महत्त्व आहे. ते स्वतः एका अस्पृश्य कुटुंबात जन्मल्याने त्यांना अस्पृश्यतेचे अनेक वाईट अनुभव आले होते. म्हणूनच त्यांनी अस्पृश्यता नष्ट करणे आणि अस्पृश्यांचा सर्वांगीण विकास करणे हे आपल्या जीवनाचे पहिले ध्येय ठेवले होते. लक्षात ठेवा तलवारीच्या धारेपेक्षा लेखणीची धार कायम टिकणार आहे आणि सर्वात प्रभावी शस्त्र आहे, म्हणून तलवार हातात न घेता लेखणी हातात घेऊन अन्यायावर मात करा. अशी त्यांची शिकवण होती. बाबासाहेबांनी जगातील सामाजिक शास्त्रांचा (अर्थशास्त्र, राज्यशास्त्र, समाजशास्त्र, मानववंशशास्त्र, धर्मशास्त्र, नीतीशास्त्र, शिक्षणशास्त्र, इतिहासशास्त्र आणि कायदाशास्त्र) सखोल अभ्यास केला. त्याचबरोबर जगातील साम्राज्यशाही, भांडवलशाही, जगातील युद्ध, स्वाच्या, लढाया आणि विविध क्रांत्यांचा अभ्यास केला. तसेच वंशवादाचा आणि जागतिक स्तरावर असलेल्या गुलामांच्या जीवनांचा अभ्यास केला. डॉ. बाबासाहेबांच्या वाचनात, चिंतनात व लेखनात प्रचंड ताकद, शक्ती होती. ज्ञानसंपन्नतेच्या शक्तीमुळेच व्यक्ती, समाज, राज्य आणि राष्ट्र महान बनत असते, याची त्यांना पुरेपूर जाणीव झाली होती. त्यांनी जगातील सर्व धर्मांचे चिकित्सक अध्ययन केले. धार्मिक चिंतनातून त्यांचे मानवी विकासाला पूरक असे सर्वांग सुंदर विचार तयार झाले. ते १८-१८ तास अभ्यास करून शेकडो वर्षांचा शिल्लक राहिलेला ज्ञानाचा बँकलॉग भरून काढत होते. डॉ. बाबासाहेबांनी तळागाळातील

उपेक्षित समजला गेलेला, गणला गेलेला, सर्वसामान्य माणूस सर्वशक्तिनिशी जामा केला. त्याला आत्मसन्मान, स्वाभिमान, अस्मिता व सामर्थ्याची जाणीव करून दिली. मानसिक गुलामगिरीतून मुक्त केले. हक्काने जगण्याचे शिकवले. त्यासाठी स्वातंत्र्य, समता बंधुता व न्याय समाजात निर्माण करण्याचा आटोकाट प्रयत्न केला. बाबासाहेब आंबेडकर म्हणजे भारताच्या नव्या उभारणीचे एक महान स्रोत आहेत.

### लोकशाही आणि राज्यघटना:-

डॉ. बाबासाहेब आंबेडकरांनी खडतर ज्ञानाची साधना करून प्रचंड ज्ञान संकलित केले होते. त्यांना कायद्याचे ज्ञानही प्रचंड प्राप्त झाले होते. त्यांच्या ज्ञानाचा उपयोग करून घेण्यासाठी तत्कालीन राजकीय मंडळींनी भारतीय संविधान रचण्याची जबाबदारी त्यांच्यावर सोपविली. जगातील आदर्श समाज निर्माण करण्यासाठी त्यांनी लोकशाही शासनाचा स्वीकार केला. त्यासाठी एक व्यक्ती, एक मत, एक मूल्य आणि त्यांची एकच किंमत हा सिद्धांत दिला. ही राजकीय लोकशाही असली तरीही त्याचे रूपांतर सामाजिक आणि आर्थिक लोकशाहीमध्ये व्हावे, असे त्यांना वाटत होते. तरच जगापुढे हा देश टिकेल अन्यथा अडचणीत येईल. यासाठी त्यांनी देशाला शोभेल तसेच भारताला आधुनिक काळात सर्व प्रकारच्या सुधारणा व सर्वांगीण विकास करता येईल, अशी राज्यघटना दिली. २१ व्या शतकात आपला देश विकासाच्या दिशेने वाटचाल करित आहे त्याचे श्रेय बाबासाहेबांच्या या लोकशाही प्रधान विचारांना द्यावे लागेल.

### समाजसुधारणाविषयक विचार:

डॉ. बाबासाहेब आंबेडकर यांचा समाजसुधारणाविषयक दृष्टिकोण एकोणिसाव्या शतकातील नेमस्त सुधारकांपेक्षा गुणात्मकदुष्ट्या भिन्न होता. बाबासाहेब आंबेडकरांच्या समोरील समाजाचे प्रश्न मुळात वेगळे होते. समाजात जोपर्यंत विषमता आहे, भेदभाव आहे, उच्चनीचता आहे, स्पृश्य-अस्पृश्य आहे, तोपर्यंत इतर सुधारणा या वरवरच्या आहेत, एक

प्रकारे ती मोडक्या घराची डागडुगी आहे. असा त्यांचा विचार होता. म्हणूनच त्यांनी समाजरचनेच्या बदलाचा विचार मांडलेला आहे. त्यासाठी कृतिशील प्रयत्न सुद्धा त्यांनी केले होते. देशातील दलिताना त्यांचे अस्तित्व व सत्व, अस्मिता आणि आत्मप्रत्यय देण्यासाठी डॉ. बाबासाहेब आंबेडकर नावाच्या क्रियाशील विचारवंताला प्रचंड वैचारिक संघर्ष करावा लागला. एक नवे मानव मुक्तीचे तत्वज्ञान बाबासाहेबांच्या रूपाने विसाव्या शतकात उदयास आले.

### शिक्षण हे समाजपरिवर्तनाचे प्रभावी शस्त्र:

शिक्षणाने माणसाला आपले कर्तव्य व हक्कांची जाणीव होते. समाजातील अस्पृश्य समाजाला स्वत्वाची जाणीव व्हावी यासाठी डॉ. बाबासाहेब आंबेडकरांनी शिक्षणाचे महत्त्व समाजात विशद केले. शिक्षण हे वाघिणीचे दूध आहे. ते जो प्राशन करेल तो माणूस वाघासारखा गुरगुरल्या शिवाय राहणार नाही, असे ते समाज बांधवांना तसेच जो घटक शिक्षणापासून वंचित आहे, त्यांना आग्रहाने सांगत. प्राथमिक शिक्षण हे सर्व शिक्षणाचा पाया आहे, म्हणून हे शिक्षण अतिशय दर्जेदार व गुणवत्तेचे असावे, असे त्यांचे ठाम मत होते. प्राथमिक शिक्षणाचे ध्येय असे असले पाहिजे की, मुलगा किंवा मुलगी एकदा शाळेत दाखल झाली की, तो किंवा ती पूर्णपणे सुशिक्षित, माहितीपूर्ण व गुणवत्ता प्राप्त करूनच बाहेर पडावी. शासनाने यासाठी लक्ष द्यायला हवे. त्यांचे म्हणणे हाते की, समाजाच्या सर्व स्तरापर्यंत शिक्षण गेले पाहिजे. शिक्षण प्राप्त झाल्याने व्यक्ती बौद्धिकदृष्ट्या सशक्त होते. व्यक्तीला चांगले आणि वाईट यातील फरक समजायला लागतो. प्रजा, शील आणि करुणा हे गुण प्रत्येकाच्या अंगी आणण्यासाठी शिक्षणाची गरज त्यांनी प्रतिपादन केलेली आहे. शाळेत मुलांना केवळ बाराखडी शिकवू नये, तर मुलांची मने सुसंस्कृत व गुणवत्तामय बनवावी. समाजहितार्थ या ज्ञानप्राप्त मुलांनी आपली सामाजिक बांधिलकीची कर्तव्ये योग्य व समर्थपणे पार- पाडावीत असे शिक्षण असावे. शाळा म्हणजे उत्तम नागरिक व कर्तव्यदक्ष नागरिक बनविणारे कारखाने आहेत. याचे भान या प्रक्रियेत भाग घेणाऱ्यांनी ध्यानी घ्यावे.

शिक्षणापासून वंचित राहिलेल्या समाजातील बहुजन वर्गासाठी डॉ. बाबासाहेब आंबेडकर यांनी पीपल्स एज्युकेशन सोसायटी; ची स्थापना १९४६ साली करून, त्यांनी मुंबईला सिद्धार्थ कॉलेज व औरंगाबादला मिलिंद महाविद्यालय सुरू केले. राष्ट्रहित व समाजहिताचे भान ठेवणारेच खरे शिक्षण होय, असे ते मानीत. त्यांच्या शैक्षणिक उपक्रमातून आज हजारो- लाखो बांधव शिक्षण घेऊन बाहेर पडतात. एवढेच नव्हे तर त्यांच्या शैक्षणिक उपदेशाचा मार्ग अवलंबून देशातील लाखो करोडो वंचित बांधव शिक्षणाच्या वाटेवर चालत आलेले आहेत. डॉ. बाबासाहेब आंबेडकरांनी समाजाला शिक्षणाचा दाखविलेला हा महान दीपस्तंभ आहे. डॉ. बाबासाहेब आंबेडकर हे बहुआयामी व्यक्तिमत्त्व होते. भारतीय न्यायशास्त्रज्ञ, अर्थशास्त्रज्ञ, राजनीतिज्ञ, तत्त्वज्ञ आणि समाजसुधारक होते. त्यांनी दलित बौद्ध चळवळीला प्रेरणा दिली आणि अस्पृश्य (दलित) लोकांविरुद्ध होणारा सामाजिक भेदभाव नष्ट करण्यासाठी चळवळ उभारली, तसेच महिलांच्या आणि कामगारांच्या हक्कांचे समर्थन केले. ते ब्रिटिशकालीन भारताचे मजूरमंत्री, स्वतंत्र भारताचे पहिले कायदामंत्री, भारतीय संविधानाचे शिल्पकार आणि भारतीय बौद्ध धर्माचे पुनरुज्जीवक होते. अशा सार्थ शब्दांत ज्यांचा गौरव करता येईल.

### जातिसंस्था विषयक सिद्धांत:

कोलंबिया विद्यापीठामध्ये १९१६ साली डॉ. ए.ए. गोल्डनविझर यांनी मानववंशशास्त्र विषयक परिसंवादात भाग घेण्यासाठी भीमराव आंबेडकरांना बोलविले. त्यांनी भारतातील जाती, त्यांचा उगम, विकास आणि वास्तविकता या विषयावर व्याख्यान दिले. तेव्हा आंबेडकर हे केवळ २५ वर्षांचे होते. आंबेडकरांनी या आपल्या शोध पुस्तिकेत जातिसंस्था विषयक खालील सिद्धांत मांडले. वर्ग आणि जात तसे मानायचे झाले, तर निकटवर्ती होत. कालांतराने ते अलग होतात. बंदिस्त केलेली, गोठवलेला वर्ग म्हणजे 'जात'. जातिसंस्था मनूने निर्माण केली हे डॉ. आंबेडकरांना मान्य नव्हते. आंबेडकरांच्या मतानुसार, मनूने जातीचा कायदा सांगितला नाही. तो ते करू शकता नव्हता. मनूपूर्वी कित्येक वर्षे जातिसंस्था अस्तित्वात होत्या. स्मृतिकार

मनूने अस्तित्वात असलेल्या कायद्यांची संहिता बनवून, त्याला तात्त्विक आणि धार्मिक अधिष्ठान प्राप्त करून दिले. जानेवारी, १९२८ च्या टाईम्स ऑफ इंडियात इंदूर संस्थानात अनुसूचित जातींना मिळणाऱ्या वॉईट वागणुकीबद्दलच्या वृत्तांताची तुलना आंबेडकरांनी १८ व्या शतकातील पेशवाईतील रिजनाच्या स्थितीशी केली. आंबेडकरांनी जात या संकल्पनेची चिकित्सा करून तिचा शोध घेण्याचा प्रयत्न केला. जात ही श्रमविभागणी- वरही अवलंबून नाही आणि नैसर्गिक कल वा योग्यतेवरही अवलंबून नाही. व्यक्तीची कामे जात आधीच तयार करते. कुळ कुवतीच्या आधारे नव्हे तर, जन्मानुसार किंवा आई-वडीलांच्या सामाजिक स्थानानुसार ठरते. हा जन्मावर आधारित परंपरागत सिद्धांत हजारो वर्षांपासून चालत आलेला होता. या परंपरेच्या जात्यात बहुजन समाज पिढ्यानपिढ्या पिसला जात होता. याची जाणीव बाबासाहेबांना झाली होती. भारतात निर्माण झालेल्या जातीसंस्थेच्या या सिद्धांताला समजावून देण्याचे काम केले. डॉ. बाबासाहेब आंबेडकर आपल्या जातीभेद निर्मुलन (Annihilation of caste) या ग्रंथात म्हणतात, जातीभेदाचा धर्माशी कवडीचा सुद्धा संबंध नाही. ही प्रथा असून तिचा उगम मला माहीतही नाही आणि माझ्या अध्यात्मिक भुकेच्या शांतीसाठी तो माहीत करून घ्यावा याची मला कधी गरजही वाटली नाही. परंतु हे मात्र मला समजते की, ही प्रथा अध्यात्माच्या व राष्ट्राच्या दोघांच्याही अभ्युदयाला अत्यंत घातक आहे. वर्ण आणि आश्रम या अशा संस्था आहेत की, जातीप्रथेशी त्यांचे कसलेच सोयरसुतक नाही. २ डॉ. बाबासाहेब आंबेडकरांचे आपल्या देशातील जातीप्रथेच्या उत्पत्तीला घेऊन गहन अध्ययन झालेले होते.

### अस्पृश्यतेच्या विरुद्ध संघर्षः

बाबासाहेब आंबेडकरांनी अस्पृश्यतेचे दाहक चटके जन्मताच अनुभवले होते. उठता-बसता अस्पृश्यतेचा अनुभव त्यांना आलेला होता. बाबासाहेबांनी गव्हर्नमेंट ऑफ इंडिया ॲक्ट १९१९ बाबत साऊथ बरो कमिटीसमोर आपले विचार मांडले. यावेळी त्यांनी दलित व इतर मागासलेल्या समाजांसाठी वेगळे मतदान विभाग व आरक्षण यांची मागणी केली. इ.स. १९२०

साली त्यांनी मुंबईत मूकनायक नावाचे वृत्तपत्र सुरु केले. त्यावेळी शाहू महाराजांनी त्यांना २००० रुपयांची आर्थिक मदत दिली. बाबासाहेबांनी वृत्तपत्रांच्या माध्यमातून अस्पृश्यतेला वारंवार विरोध केलेला आहे. बाबासाहेब आंबेडकरांनी मागासवर्गीयांच्या उत्थानासाठी बहिष्कृत हितकारिणी सभा सुरु केली. डॉ बाबासाहेब आंबेडकर आपल्या धर्मांतर का? या ग्रंथात म्हणतात, ज्याप्रमाणे पाण्याचा थेंब समुद्राच्या पाण्यात टाकला असताना त्याच लोप होतो, तसा माणसाचा तो केवळ समाजात राहिला म्हणून त्याचा लोप होऊ शकत नाही. त्याचे जीवन स्वतंत्र असते. त्याचा जन्म समाजाच्या सेवेकरिता नसून स्वउन्नतीकरता आहे. या एकाच कारणामुळे सुधारलेल्या राष्ट्रांत एका माणसाला दुसऱ्या माणसास आपला गुलाम करून ठेवता येत नाही. ज्या धर्मात व्यक्तीला प्राधान्य नाही, तो धर्म मला मान्य होऊ शकत नाही.

### महाडचा सत्याग्रह:

बाबासाहेबांनी महाड येथील चवदार तळ्याचा सत्याग्रह करून अस्पृश्यतेविरुद्धची आपली लढाई आणखीन प्रखर केली होती. इ.स. १९२७ च्या सुमारास त्यांनी अस्पृश्यतेविरुद्ध जागृत चळवळ सुरु करण्याचा निर्णय घेतला. त्यांनी पिण्याच्या पाण्यासाठी व हिंदू देवळांमध्ये प्रवेशासाठी चळवळी व मोर्चे काढण्यास सुरुवात केली. संपूर्ण देशात बहुसंख्य ठिकाणी अस्पृश्यांना सार्वजनिक पाणवठ्यावर पाणी भरण्याचा किंवा पिण्याचा अधिकार नव्हता.

४ ऑगस्ट १९२३ रोजी ब्राह्मणेतर पक्षाचे नेते सी.के. बोले यांनी मुंबई प्रांताच्या विधिमंडळात एक ठराव पास करून घेतला. त्यानुसार सार्वजनिक निधीतून बांधलेली किंवा शासकिय नियमांनुसार बनविलेल्या संस्थांनी प्रशासित केली सार्वजनिक शाळा, न्यायालये, कार्यालये आणि दवाखाने व सर्व सार्वजनिक पाण्याची ठिकाणे, विहिरी व धर्मशाळांचा वापर करण्यास परिषदेने अस्पृश्य वर्गांना परवानगी दिली आहे. ठरावानुसार महाडच्या नगरपालिकेने आपल्या ताब्यातील चवदार तळे अस्पृश्यांना खुले केल्याचे जाहीर केले. परंतु स्पृश्यांनी अस्पृश्यांना तळ्यातून पाणी भरू दिले नाही. त्यामुळेच अस्पृश्यांना त्यांचा हक्क

मिळवून देण्यासाठी बाबासाहेबांनी महाड येथे पिण्याच्या पाण्यासाठी सत्याग्रह करण्याचे ठरवले. बाबासाहेबांनी १९ मार्च व २० मार्च १९२७ रोजी महाड येथे कुलाबा परिषद भरवली, अध्यक्ष स्वतः बाबासाहेब होते. या परिषदेस सुरेंद्र चिटणीस, संभाजी गायकवाड, अनंत चिन्ने, रामचंद्र मोरे, गंगाधरपंत सहस्त्रबुंदे आणि बापूराव जोशी हे दलितोत्तर सवर्ण व ब्राह्मण नेते होते. या परिषदेत अस्पृश्यतेचा धिक्कार करून ठराव पास झाले. महाराष्ट्र राज्य साहित्य, संस्कृती महामंडळ यांनी डॉ. आंबेडकर यांचे जन्मशताब्दी वर्ष म्हणून १९९३ साली प्रकाशित केलेल्या, डॉ. बाबासाहेब आंबेडकर गौरवग्रंथ संपादक मंडळाच्या प्रस्तावनेत असे म्हटले आहे, जातिभेदाच्या दाहकतेचे चटके बाबासाहेबांनी लहानपणापासून सोसले होते. धर्ममुढांनी केलेल्या अन्यायाने घायाळ झाले होते. म्हणून त्यांचा हा लढा अस्पृश्यतेविरुद्धचा आहे, त्यांचा लढा मानवमुक्तीचा लढा आहे.

### बहिष्कृत हितकारिणी सभा :

बाबासाहेब आंबेडकरांनी २० जुलै १९२४ रोजी मुंबई येथे 'बहिष्कृत हितकारिणी सभे'ची स्थापना केली. सामाजिक व राजकीयदृष्ट्या तळागाळात फेकल्या गेलेल्यांना भारतीय समाजातील इतरांच्या बरोबर आणणे, हे ह्या सभेचे ध्येय होते. अस्पृश्यांना समाजाबाहेर ठेऊन, त्यांना नागरी, धार्मिक वा राजकीय हक्क देण्यात आले नव्हते. त्यांच्या अधिकारांप्रती त्यांच्यामध्ये जागृती निर्माण करणे हा उद्देश होता. आंबेडकरांनी सायमन कमिशनकडे एक पत्र सादर केले व त्यात त्यांनी मागासवर्गीयांसाठी नागनिर्देशन तत्त्वावर जागा आरक्षित ठेवण्यासंबंधी मागणी केली. तसेच भूदल, नौदल व पोलीस खात्यात मागासवर्गीयांची भरती करण्यासंबंधीचीही मागणी केली होती. सभेमार्फत अस्पृश्यांच्या कल्याणासाठी शाळा, वसतिगृहे व ग्रंथालये सुरू करण्यात आली.



## स्वातंत्र्य, समता आणि बंधुता:

डॉ. आंबेडकरांच्या विचारात सातत्याने ज्यांचा उल्लेख येतो ती तत्त्वे म्हणजे स्वातंत्र्य, समता आणि बंधुभाव ही तत्त्वे होत. लोकशाही राज्यपद्धती, समाजवाद, राज्यसमाजवाद. हिंदू तत्त्वज्ञानाची चिकित्सा, धम्म या विविध संदर्भातील बाबासाहेबांच्या विचारात एक समान सूत्र दिसते. ते म्हणजे स्वातंत्र्य, समता, बंधुभाव या तत्त्वत्रयीचा पाठपुरावा त्यांच्या लेखनात आणि भाषणांतही या तत्त्वांचा पुनःपुन्हा उल्लेख येतो. खरे म्हणजे बाबासाहेबांच्या प्रत्येक कृतीमागे ही त्रयी असल्याचे स्पष्ट होते. महाडच्या परिषदेपुढे केलेल्या भाषणापासून तर 'बुद्ध अँड हिज् धम्म' पर्यंतच्या लेखनात; तसंच इतर अप्रकाशित लेखनातही स्वातंत्र्य, समता, बंधुभाव यांचे संदर्भ येतात; त्यांचा पुरस्कार केलेला दिसतो. म्हणजे या तत्त्वांचा पाठपुरावा त्यांनी जीवनाच्या कोणत्यातरी एकाच टप्प्यावर केला असे नाही, तर ह्यातभर केला. तसेच हा पुरस्कार जीवनाच्या एखाद्याच क्षेत्रापुरता नाही. म्हणजे फक्त समाजकारणात ही तत्त्वे आणि आर्थिक किंवा धार्मिक बाबतीत दुसरी असे होत नाही. सामाजिक व्यवहारांच्या सर्व क्षेत्रासाठी या तत्त्वांचा पुरस्कार बाबासाहेब करतात. त्यांच्या दृष्टीने ही तत्त्वे सर्वस्पर्शी आहेत. स्वातंत्र्य, समता आणि बंधुभाव हे त्यांनी आदर्शच मानले. 'अँनायझलेशन ऑफ कास्ट' मध्ये ते म्हणतात, "मला विचाराल तर माझा आदर्श समाज म्हणजे स्वातंत्र्य, समता आणि बंधुभावावर आधारित समाज असेल. ऑक्टोबर १९५४ मध्ये आकाशवाणीवरून केलेल्या भाषणातही त्यांनी याचा पुरस्कार केलेला होता. १४ एप्रिल १९२९ रोजी रत्नागिरी येथे डॉ. बाबासाहेब आंबेडकर यांच्या अध्यक्षतेखाली जिल्हा शेतकरी परिषद, चिपळूण येथे आयोजन करण्यात आली होती. या परिषदेत त्यांनी कोकणातील खोतीदारीविरुद्ध शेतकऱ्यांचे आंदोलन सुरु केले. या संबंधी १७ सप्टेंबर १९३७ रोजी खोती पद्धत नष्ट करणाऱ्या कायद्याचे विधेयक बाबासाहेबांनी मुंबई विधिमंडळात मांडले. १० जानेवारी १९३८ रोजी बाबासाहेब आंबेडकरांच्या नेतृत्वाखाली २५,००० शेतकऱ्यांचा मोर्चा विधिमंडळावर काढण्यात आला. सप्टेंबर १९१८ मध्ये शेतजमिनीच्या समस्येवर शोधनिबंध एका प्रसिध्द मासिकात प्रकाशित केला. शेतकऱ्यांसाठी

त्यांनी पीक विमा योजना सुचवली. श्रमिकांची श्रमशक्ती उद्योग क्षेत्रात वळवायला हवी; तसेच शेतीचा विकास करण्यासाठी राज्य समाजवादाचा सिद्धांत त्यांनी मांडला. धार्मिक समानतेचा अधिकार मिळवण्यासाठी अमरावती येथील प्राचीन अंबाबाई मंदिरात, पुण्यातील पर्वती मंदिरात, नाशिक येथील काळाराम मंदिरात बाबासाहेबांनी मंदिर सत्याग्रह केले. डॉ. बाबासाहेब आंबेडकर समग्र पीडित, शोषित व दलितांचे प्रतिनिधी म्हणून लंडनच्या तिन्हीही गोलमेज परिषदांना हजर राहिले.

### समारोप:

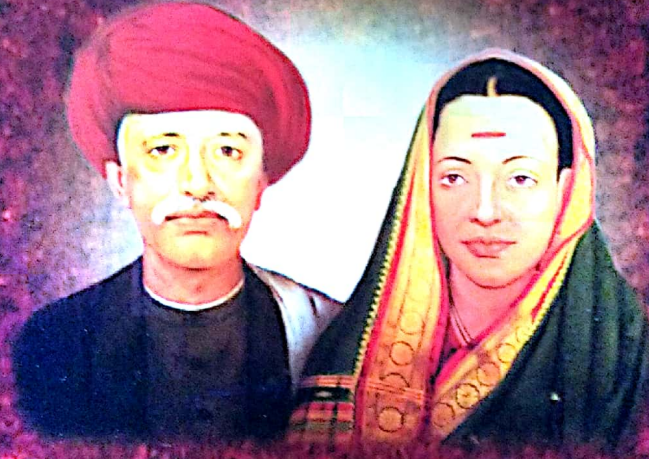
डॉ. बाबासाहेब आंबेडकर गौरवग्रंथांत श्री. कर्णिक म्हणतात, डॉ. बाबासाहेब आंबेडकर यांचे जीवन हे रोमांचकारी इतिहास आहे. त्या जीवनाचे अनेक पैलू उलगडून पहावयाचे झाल्यास, स्वातंत्र्यपूर्व भारताच्या अनेक घडामोडींची चिकित्सा करावी लागेल. बाबासाहेबांचे जीवन परिपूर्ण असे विकसित झाले, त्यामुळे त्याला भीमपर्व असेच नाव द्यावे लागेल. स्वतंत्र भारताच्या राज्यघटनेत अस्पृश्यांचे हितसंरक्षण करण्याच्या हेतूने त्यांनी इंडियन राउंटेबल कॉन्फरन्सला मागण्या सादर केल्या. इ.स. १९२० च्या दशकाच्या अखेरीस डॉ. बाबासाहेब आंबेडकर दलितांचे राजकीय नेते बनले होते. इ.स. १९३२ रोजी ब्रिटिश मंत्रिमंडळाने पुणे करार मंजूर करून घेतला. त्यावर मंत्रिमंडळाने शिक्कामोर्तब केले. मजुरांना, कामगारांना हक्क व अधिकार मिळवून देण्यासाठी इ.स. १९३६ मध्ये त्यांनी स्वतंत्र मजूर पक्षाची स्थापना केली. बहिष्कृत हितकारिणी सभेची स्थापना, दलित शिक्षणसंस्थेची स्थापना, पीपल्स एज्युकेशन सोसायटीची स्थापना करून शिक्षणाची द्वारे खुली केली. डॉ. बाबासाहेब आंबेडकर स्त्रीमुक्तीचे पक्के समर्थक होते. त्यांच्यावर तथागत गौतम बुद्धांच्या शिकवणुकीचा आणि महात्मा जोतिबा फुलेंच्या कार्याचा प्रभाव होता. ते स्त्री शिक्षणाचे पुरस्कर्ते होते. स्वतंत्र भारताचे पहिले कायदामंत्री असलेल्या बाबासाहेब आंबेडकरांचा भारतीय संविधानात सिंहाचा वाटा होता. एवढे सूक्ष्म निरीक्षण असणारे आणि कोणावरही अन्याय न करता सर्वांना समान हक्क, अधिकार देणाऱ्या बाबासाहेबांच्या असामान्य बुद्धीची प्रचिती संविधानाच्या वाचनावरून, तरतुदींवरून

येतेच. त्यांचा आजीवन लढा मानवी हक्कांसाठी सुरु राहिलेला होता. प्रत्येक व्यक्तीला माणूस म्हणून जगण्याचा अधिकार मागण्यासाठी बाबासाहेब समाजव्यवस्थेतील तथाकथित मानसिकते बरोबर लढत होते. त्यांचे सामाजिक कार्य सुद्धा विविधांगी स्वरूपाचे आहे.

### संदर्भग्रंथ सूची:

- १) डॉ.कुंभार प्रकाश, दलित साहित्य: काही विचार आणि दिशा, कैलाश पब्लिकेशन्स, औरंगाबाद. प्रथमावृत्ती २००५ पृष्ठ क्रमांक - २२
- २) डॉ. आंबेडकर भीमराव रामजी, जातिभेद निर्मूलन, संपादक- सूर्यकांत भगत, मिलिंद प्रकाशन, वर्धा. प्रथमावृत्ती २०१८, पृष्ठ क्रमांक- १०५
- ३) डॉ. आंबेडकर भीमराव रामजी, धर्मांतर का?. प्रकाशक-मिलिंद प्रकाशन, वर्धा. द्वितीय आवृत्ती- डिसेंबर २०१५ पृष्ठ क्रमांक -२०
- ४) संपादक मंडळ-डॉ. बाबासाहेब आंबेडकर गौरवग्रंथ, साहित्य व संस्कृती महामंडळ, महाराष्ट्र राज्य. प्रथमावृत्ती १९९३, पृष्ठ क्रमांक - ८
- ५) तत्रैव - पृष्ठ क्रमांक ६०१

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- अशोक गेडाम  
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ही फक्त कागद आणि शाईची किंमत आहे. ग्रंथाची किंमत नव्हे! ग्रंथातील विचार तर अनमोल आहेत! म्हणूनच या ग्रंथाची विक्री होऊ नये, तो अधिकाधिक लोकांना भेट दिल्या जावा, असे आम्हाला मनापासून वाटते! आपणही हा ग्रंथ अधिकाधिक स्नेहीजनांना भेट द्यावा, अशी नम्र विनंती आहे. -निर्मिती मंडळ, 'क्रांतिरत्न' महाग्रंथ.

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॥ सहसंपादक ॥

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१६)	सामाजिक परिवर्तनाचा पथदर्शक : महात्मा जोतीराव फुले	प्रा. डॉ. प्रशांत कडवे	१५३
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२५)	सावित्रीआई फुले यांचे साहित्यदर्शन	प्रा. बापूराव सहदेव डोंगरे	२१३
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## ॥ लेखक परिचय ॥

प्रा. साजिद के. शाह



अकोला जिल्ह्यातील मूर्तिजापूर येथील श्री. डॉ. आर. जी. राठोड कला व विज्ञान महाविद्यालयात सहायक प्राध्यापक तथा मराठी विभागप्रमुख म्हणून कार्यरत. शिक्षण- एम.ए. बी.एड. नेट सेट (मराठी), एम. ए. राज्यशास्त्र (विद्यापीठ मेरिट). पीएच. डी. साठी संत अच्युत महाराज यांच्या वाङ्.मयाचे विकीत्सक परीक्षण या विषयावरील प्रबंध संत गाडगेबाबा विद्यापीठ अमरावतीस सादर करण्यात आला आहे. आंतरराष्ट्रीय शोधपत्रिकेत सेवाव्रती संत: अच्युत महाराज, साहित्योपासक: श्री संत अच्युत महाराज, राष्ट्रसंतांवे स्त्री सवलीकरण व महिलोन्नती विषयक विचार, पर्यावरण संवर्धन हे चार पेपर प्रकाशित. राष्ट्रीय पत्रिकेत एक पेपर प्रकाशित. संपादित ग्रंथात अण्णाभाउ साठे यांच्या कथा, वाङ्.मयातील उपेक्षितांवे अंतरंग, डॉ. बाबासाहेब आंबेडकरांवे सामाजिक विचार, डॉ. बाबासाहेब आंबेडकरांवे जीवन आणि व्यक्ती दर्शन, प्रतिभेचे धनी-डॉ. राठोड साहेब, भारतीय मुस्लीम स्त्री संक्षिप्त आढावा हे लेख प्रसिद्ध. महाविद्यालयीन वार्षिकांक समितीचे मुख्य संपादक- दमयंती वार्षिकांक.

पता : मूर्तिजापूर, जि. अकोला. ४४४१०७

Mob.9850394571, 8788600856 Email : shahsajid7047@gmail.com

## महात्मा फुले यांचे धर्मविषयक चिंतन

सर्वांचा निर्मिक एक आहे जाण ॥

पालनपोषण ॥ तोच करी ॥

स्त्री-पुरुष हक्क सर्वा कळवावे ॥

सत्याने बोधावे ॥ मानवास ॥

(अखंडादी काव्य रचना)

**म** हाराष्ट्र हे नावाप्रमाणेच महान व्यक्तींचे राष्ट्र राहिले आहे. येथे अनेक थोर विभूतींनी जन्म घेऊन आपल्या जीवनाचे सार्थक केले. त्यांनी आपल्या देदीप्यमान कर्तृत्वाने संपूर्ण मानवजातीचे नेत्र दीपविले. या महान पुरुषांच्या यादीत महात्मा

फुलेंचे नाव अग्रस्थानी घ्यावे लागेल. कारण महात्मा फुले म्हणजे अस्पृश्य समजल्या जाणाऱ्या स्त्री-शूद्रांच्या मुलींसाठी शाळा काढणारे पहिले भारतीय, आधुनिक भारतातील स्त्री शिक्षणाचे जनक, भारतीय स्त्रियांचे हक्क व स्वातंत्र्य यांचे उद्गाते, शेतकरी व कामगारांचे दुःख आणि दारिद्र्य निवारण्यासाठी चळवळ उभारणारे पहिले पुढारी, जातीभेदावर कडाडून हल्ला चढविणारे व मानवी समानतेची घोषणा करणारे पहिले लोकनेते, सामान्य जनतेच्या दुःखाला, अन्यायाला वाचा फोडणारे पहिले महात्मा

तसेच 'सत्यमेव जयते' या दिव्य तत्त्वाने भारावून गेलेले 'खरे सत्यशोधक' म्हणून त्यांची ओळख आहे. ज्या काळात धर्माचे सर्वच क्षेत्रात प्राबल्य होते, त्याही काळी महात्मा फुल्यांनी समाजाला दिशा देण्याचे कार्य जिद्दीने आणि हिमतीने सुरूच ठेवले. समता, मानवता व बंधुता या महान तत्त्वावर आधारित समाजनिर्मिती करण्यासाठी शक्य झाले ते सर्व उपाय त्यांनी अंमलात आणले. म्हणूनच त्यांना 'क्रांतीवीर' या शब्दाने संबोधिता येऊ शकते. एकोणिसाव्या शतकातील दीन-दलित व स्त्रियांची अवस्था अतिशय केविलवाणी झालेली होती. त्या समाजाला जागे करण्याचे काम महात्मा फुले यांनी केले. त्यासाठी समाजाला शिक्षणाची संजीवनी देऊन शूद्रातिशूद्र, स्त्रिया, शेतकरी आणि ब्राह्मणेत्तर समाजामध्ये जागृती निर्माण करायला सुरुवात केली.

महात्मा फुले यांनी मानवी स्वातंत्र्य, समता व बंधुता ही सर्वांना सारख्या प्रमाणात प्राप्त व्हावी, यासाठी त्यांनी संपूर्ण भारतात प्रथमच बंडाचे निशाण फडकावले. नव्या सामाजिक क्रांतीचे रणशििंग फुंकले. दीन-दलितांची अवस्था किती भयावह आणि भीषण होती, याची जाणीव समाजाला करून दिली. महात्मा फुल्यांना नवसमाजनिर्मिती करायची होती. म्हणूनच त्यांनी तळागाळातील शोषित, स्त्री, शूद्रातिशूद्रांच्या सामाजिक प्रश्नांना हात घालण्याचे धाडस केले. आपल्या देशातील कृत्रिम धर्माची रचना तसेच शूद्रातिशूद्रांना ज्ञानबंदी करून येथील विषम समाज व्यवस्थेने त्यांच्यावर अन्याय केला. ही शोषण प्रधान समाज व्यवस्था मुळासकट उखडून फेकल्याशिवाय तिच्या जागी नवमूल्यावर आधारित समाज उभा होणारच नाही, याची जाणीव महात्मा फुले यांना होती. समाजाच्या हाडी मुरलेली धार्मिक गुलामगिरी त्यांना अधिक जाचक, भीषण वाटत होती. म्हणूनच त्यांनी सर्वशक्तीनिशी त्या गुलामगिरीच्या विरोधात 'एल्गार' पुकारला होता. त्यासाठी 'अंधश्रद्धा निर्मूलन' या व्यापक लढ्याचा त्यांनी पुरस्कार केला. महात्मा फुले

यांची बांधिलकी यासंबंधी डॉ. नागनाथ कोतापळे म्हणतात, "महात्मा फुले यांनी आपली बांधिलकी सतत उपेक्षित वर्गावरोबर जाहीर केली. मग ग्रंथकार समेलनास पत्र पाठवायचे असो की, सार्वजनिक सत्यधर्माची स्थापना असो. उपेक्षित वर्गात फुल्यांनी सर्वच दलित-पीडित आणि कष्टकरी जनतेचा समावेश केला आहे. मध्यम व कनिष्ठ प्रतीचा शेतकरी, विविध व्यवसायांवर पोट भरणारे ग्रामीण कारागीर आणि एकूणच कष्टकरी समाज हे सर्वच उपेक्षित होते. अनेक शतकांपासून स्त्री ही परंपरांच्या जोखडात सापडलेली होती. तेव्हा स्त्रीसहित सर्व कष्टकरी जनतेच्या व्यथा आणि त्यावरील उपाय महात्मा फुले यांनी सांगितले आहेत."

**महात्मा फुलेंचा सत्यधर्म :**

या पृथ्वीतलावरील प्रत्येक मानव समाज कोणत्या ना कोणत्या धर्माशी निगडित आहेच. अर्थातच तो कुठल्यातरी धर्माचा अनुयायी आहेच. धर्म म्हणजे 'धारण करणे', 'पकडून ठेवणे'. धर्मात विशिष्ट विचार, चालीरीती, परंपरा, रूढी यांचा अंतर्भाव होत असतो. त्या सर्वांचे आचरण धर्मांमध्ये अपेक्षित असते.

महात्मा फुलेंनी मानवता, समता, बंधुता या मूलभूत तत्त्वावर आधारित सार्वजनिक सत्यधर्माची कल्पना मांडली. सर्व विश्व हेच एक मोठे कुटुंब असून, त्यातील सर्व मानवजाती एकाच परमेश्वराची लेकरे आहेत, हे त्यांनी स्पष्ट केले. सर्व सृष्टीचा निर्माता एक असून, तो सर्वांचाच असतो. त्याच्या ठिकाणी धर्म, जात, वंश, वर्ण, श्रेष्ठ-कनिष्ठ असा भेदाभेद असत नाही. मानवता हेच अंतिम खरे सत्य आहे.

या सत्यधर्माच्या तत्त्वावर आधारित 'सत्यशोधक समाजा'ची त्यांनी १८७३ मध्ये पुणे येथे स्थापना केली आणि ज्योतिराव यांच्या नेतृत्वाखाली आपल्या समाजात एका नव्या क्रांतीने जन्म घेतला. धर्म कोणत्याही व्यक्तीला ज्ञान घेण्यापासून रोखू शकत नाही. म्हणूनच महात्मा फुल्यांनी उपेक्षितांना

शिक्षणाची संधी देऊन समाजक्रांतीचे पहिले पाऊल टाकले. सत्यशोधक समाजाच्या कावड ईश्यावाली लोकशिक्षण, लोकजागृतीचा एक महान प्रयोग सुरू केला. या चळवळीला धार्मिक चळवळही काही लोकांनी संबोधले. परंतु, देशाच्या उदात्तासाठी विश्वबंधुत्वाची व विश्वमानवतेची संकल्पना रुजू करून विषमतेविरुद्ध लढा देणे, हेच त्यांचे प्रमुख उद्दिष्ट राहिले होते. यादृष्टीने विचार करता मानवता, समानता, सत्यता व बंधुता यांच्या दृष्टीसाठी ज्योतिरावांनी उभा केलेला लढा हा पहिलाच लढा होय. प्रस्थापितांच्या विरुद्धचे हे या देशातील पहिले बंड होय. सर्व समाजाची धारणा करणारा तोच खरा धर्म, ही त्यांची पायाभूत शिकवण होती.

महात्मा फुले यांनी सार्वजनिक सत्यधर्म व सत्यशोधक समाजाचे कार्य कृतिशील पद्धतीने घडवून आणले. त्यांच्या चळवळीने तत्कालीन महाराष्ट्राच्या जीवनावर दृग्गामी परिणाम झाला. त्यांच्या विचारांची प्रेरणा घेऊनच आजचा पुरोगामी व प्रगत महाराष्ट्र आपल्या डोळ्यांसमोर उभा आहे.

#### निरर्थक कर्मकांडांचा विरोध :

सुधारणेच्या अन्य कोणत्याही प्रवर्तकांपेक्षा महात्मा फुले यांच्या विचारांच्या ठिकाणी क्रांतीची दृष्टी व प्रेरणा अधिक प्रकर्षाने असल्याचे आढळून येते. तत्कालीन सुधारकांच्या तुलनेत खरे क्रांतीकारी विचार या देशात सर्वप्रथम ज्योतिरावांनी मांडले होते. अन्य सुधारकांनी समाजसुधारणेचा पुरस्कार केवळ तात्त्विक, वैचारिक पातळीवरून केला. प्रत्यक्ष कृतीची वेळ आली असता अनेकदा माधार घेतली. पण, ज्योतिराय जे सांगत होते, ते आचरणात आणायचे.

महात्मा फुलेंनी जाणले होते की, अंधश्रद्धांचे अस्तित्व माणसाच्या मनात खोलवर रुजलेल्या पूर्वग्रहदूषित कल्पनांमध्ये आणि चुकीच्या समजामध्ये आहे. म्हणूनच त्यांनी अंधश्रद्धा निर्मूलनाचा हिरीरीने पुरस्कार केला. आपल्याकडील अडाणी, अज्ञानी, निरक्षर लोक केवळ गैरसमजामुळे अशा चुकीच्या

कर्मकांडांना बळी पडतात. याची जाणीव त्यांना होती. त्यांनी या भीष्माभाबद्ध्या समाजावर कधीही दोष देवला नाही. ज्या प्रस्थापित व्यवस्थेने त्यांना अज्ञानी ठेवले, त्या समाज व्यवस्थेवर त्यांचा राग होता.

धर्माच्या नावाने समाजात सुरू असलेल्या अनेक वाईट प्रकारांना महात्मा फुले यांनी निषेधार्थ उरविले होते. प्रारब्ध, पाप-दुष्ट, मरणानंतर सद्गामी-दुर्गामी, कर्मकांड, फलज्योतिष, कुत्रादात्री, अवतार कल्पना या सर्वांवर त्यांनी तात्त्विक व व्यावहारिक प्रहार करून समाजाला उरटवून केला.

#### मिथक धंद्यांचे कार्य :

आपल्या समाज अज्ञानी व भीष्मा आहे. शिक्षण नसल्यामुळे त्याची झालेली दुखवस्था महात्मा फुलेंना यांगलीच माहीत होती. त्यांच्या अज्ञानीपणाचा फायदा घेऊन, वेगवेगळ्या मिथकांचा त्यांच्या मनावर फगदा बसविण्यात आलेला होता. क्रांतीचे शिल्पकार असणाऱ्या महात्मा फुले यांनी हे कार्य अत्यंत समर्थपणे पार पाडले. इथल्या वर्ग व्यवस्थेतील कशाप्रकारे शूद्रातिशूद्र समाज निर्माण झाला, त्यालाच हे गोष्टी मद्दत करावे लागत आले होते. समाजाच्या मनावर बिंबलेली मिथके काढून टाकून समाजपरिवर्तन करणे गरजेचे आहे, याची जाण त्यांना होती. आपल्या समाजात असणारी वर्ग व्यवस्था ही ईश्वरनिर्मित नसून, ती मानव निर्मित आहे; याची जाणीव त्यांनी समाजाला करून द्यायला सुरुवात केली. ज्याचा परिणाम लोकांमध्ये आत्ममानाची जाणीव निर्माण व्हायला सुरुवात झाली. समाजात रुजलेली मिथके ही कर्मा ह्यास्यास्पद आहेत, हेसुद्धा त्यांनी समजावून सांगितले.

#### धर्माचे खरे स्वरूप:

महात्मा फुले हे पुरोगामी विचारांचे होते. त्यांच्या विचारांची बैठक तात्त्विक होती. प्रत्येक गोष्टीच्या मुळाशी जाऊन पाहणे व त्याची कारणमीमांसा करणे हा जमू त्यांचा स्वभाव होता. धर्म हा व्यक्ती-व्यक्तीत भेद करणारा नसतो. महात्मा

फुले सांगायचे, धर्म हा माणसाला माणसाशी व समाजाला समाजाशी जोडणारा सिमेंटिंग फोर्स आहे. जशा दोन विटा एकमेकांवर आपटल्या तर दोन्हीचे तुकडे पडून भुरका होईल. पुन्हा त्या ज्या मातीपासून बनविलेल्या आहेत, त्याच मातीत जातील... परंतु त्यांना एकमेकांसोबत जोडले तर एक भिंत व सुंदर मकान बनविता येईल. तसेच ही माणसे जर एकमेकांसोबत जाती, धर्माच्या नावाने लढत राहिली तर दोन्ही दुःखी होऊन नष्ट होईल. परंतु, त्यांना खरा धर्म सांगून एकेक माणूस जोडून एक समाज तयार होईल. एक समाज जोडला तर एक शक्तिशाली राष्ट्र निर्माण करता येईल.

अनेक लोकांनी आपल्या फायद्यासाठी देवाचा व धर्माचा वापर करून घेतल्याचे महात्मा फुले हिरीने सांगायचे. महात्मा फुल्यांनी समाजाला धार्मिक गुलामगिरीतून बाहेर काढण्यासाठी 'गुलामगिरी' सारख्या ग्रंथांची रचना केली. त्यांना योग्य मार्गदर्शन करण्यासाठी 'सार्वजनिक सत्यधर्म' नावाचे पुस्तक त्यांच्या हातात दिले. त्या अर्थाने ज्योतिराव फुले मोठे धर्मपुरुष ठरतात. धर्माच्या नावाखाली जोपासलेली विषमता नष्ट करण्यासाठी ज्योतिरावांनी सनातन्यांविरुद्ध आणि धर्ममार्तंडांविरुद्ध युद्ध पुकारले. महात्मा फुल्यांनी समाजाच्या उत्थानासाठी आपले संपूर्ण आयुष्य वाहून घेतले होते.

ज्योतिरावांची धर्मचिकित्सा :

विद्येविना मती गेली; मतिविना नीती गेली!

नीतिविना गती गेली; गतिविना वित्त गेले!

वित्तविना शूद्र खचले;

इतके अनर्थ एका अविद्येने केले.

महात्मा फुलेंनी शिक्षणाचे अनन्यसाधारण महत्त्व जाणले होते. 'शेतकऱ्यांचा असूड' या मूलगामी विचारांच्या ग्रंथातही शिक्षणाचे पडसाद त्यांनी उपरोक्त पंक्तीत व्यक्त केले आहे.

महात्मा फुले उक्तीत आणि कृतीत सारखेच होते. ज्या धर्माने लोकांना इतके छेडले, त्या

धर्माची चिकित्सा करणे त्यांना आवश्यक वाटले. अनावश्यक रूढींना खरे मानून सामान्य जनता त्या जोखडात बांधल्या गेली आहे. त्याला तोडण्याचे काम महात्मा फुलेंनी केले. धर्मचिकित्सा करून, प्रसंगी वाद-विवाद करून समाजाला जागे करण्याचे काम केले. धर्माच्या नावाखाली लोकांची होत असलेली विविधांगी फसवणूक थांबवण्यासाठी परोपरीने प्रयत्न केले. धर्माच्या चालीरिती मागील आर्थिक, व्यावहारिक स्वार्थीपणा उघड करण्याचा प्रयत्न केला. धर्मातील सत्यासत्य व कार्यकारणभाव यांचा शोध घेण्याची सवय समाजाला लावण्याचे प्रथम कार्य त्यांनीच केले. त्यांच्या प्रयत्नांमधूनच धर्म भोळ्या चालीरिती बंद व्हायला सुरुवात झाली होती. त्यांचे धार्मिक विचार नैतिक भूमिकेशी सुसंगत होते. महात्मा फुले खऱ्या अर्थाने सत्यशोधक होते. त्यांना अभिप्रेत असलेला धर्म 'सत्यधर्म' तर होताच; पण त्याचबरोबर तो 'सार्वजनिक' ही होता. त्यांना हाती लागलेल्या सत्याला नम्रपणे समाजाच्या तळागाळापर्यंत पोहोचविण्याचा प्रयत्न करित होते.

तर्क, विवेक आणि समतेचे तत्त्व या निकषांवर प्रत्येक धर्मग्रंथातील तरतुदी तपासण्याची शिफारसही महात्मा फुले करित होते. भाराभर धर्मग्रंथ हेच समाजातील अंधश्रद्धांचे सर्वात मोठे मूलस्रोत आहेत. याबद्दल त्यांचे ठाम मत होते. पण, त्याबद्दल त्यांनी कधीही आडमुठे धोरण स्वीकारले नाही. धर्म, धर्मग्रंथ व धर्मश्रद्धा याविषयी उगाच टोकाच्या नकारात्मक भूमिका घेऊन जनसामान्यांपासून दूर फेकले जाणे त्यांना मंजूर नव्हते. याचा अर्थ ते आपल्या विचारांशी तडजोड करित होते, असा मुळीच नाही. ज्योतिरावांनी रूढीविरुद्ध प्रखरपणे बंड केले. त्यांचा सत्यशोधनावर हयातभर भर होता. त्यांना स्वीकृत कर्तव्याची जाण होती आणि लोकजागृतीची तळमळही होती. समाजाच्या अभिप्रायाची परवा न करता जनहितार्थ त्यांनी प्रस्थापितांचा विरोध, मनस्तापही सहन केला. पण ते कधीही डगमगले नाहीत. कितीही संकटे आली,

कोणत्याही प्रकारच्या दिव्याला सामोरे जावे लागले, तरी ज्योतिरावोनी विचारांती घेतलेला निर्णय कधीच फिरविला नाही. दैन-दलितांच्या कल्याणासाठी त्यांनी जे विचार व्यक्त केले, ते त्यांनी आचरणात आणून दाखविले. त्यांच्या प्रत्येक सुधारणाकार्यास कृतीची जोड होती.

महात्मा फुले यांचे कार्य अनेक बाबतीत दूरगामी परिणाम करणारे ठरले आहे. त्यांचे विचार अंतःकरणाच्या तळमळीने जन्मास आलेले आहे. त्यामुळे स्वाभाविकच ते अधिक क्रांतीकारक ठरले आहे. त्यांनी जात्याभिमान, धर्माभिमान, पंथनिष्ठा यांना छेद देऊन मानवतेचा पुरस्कार केला. जुन्या रूढी, कर्मकांडे, जपजाप यांच्यातील पोकळपणा सिद्ध करून दाखविला. स्त्री, शूद्रादिकांना पशूपेक्षाही हीन जीवन जगायला भाग पाडणारी पारंपरिक तत्त्वे नाकारली आणि त्याजागी समाजपरिवर्तनाची नवी सूत्रे रजविण्याचा प्रयत्न केला. ज्या पारंपरिक संस्कारांमुळे माणसाचा आत्मविश्वास नष्ट होतो, त्या विचारांना नाकारण्याचे सामर्थ्य दाखविले. स्वतःला प्रारब्धाच्या, प्राक्तनाच्या हवाली करून जे नशिबी येईल ते बिनतक्रार सहन करणाऱ्या समाजाला कुंभकर्णी निद्रेतून जागी केले. निष्क्रियतेने परिस्थितीला शरण जाऊन जीवन कंठीत करणाऱ्यांना हादरे देण्याचे काम महात्मा फुले यांनी केले. स्वतःच्या मनगटावरचा विश्वास पुन्हा निर्माण करायला वाईट परंपरेतून मुक्त होण्याची गरज त्यांनी सांगितली. धर्माचा खरा अर्थ स्पष्ट करताना डॉ. बाबासाहेब आंबेडकर म्हणतात, धर्माला जर कार्यप्रवण व्हायचे असेल तर त्याचा संबंध कार्यकारणाशी म्हणजेच विज्ञानाशी दृढ असावयास पाहिजे. सामाजिक नीतिमत्ता यादृशीने धर्माला एका विशिष्ट चाचणी परीक्षेत उतरावे लागते. धर्म हा केवळ नीतिबद्ध असून चालत नाही; तर त्याला स्वातंत्र्य, समता व बहुत्व या त्रयीच्या चाचणीत उतरावे लागते. या त्रयीशिवाय कोणताही धर्म निरर्थक ठरत असतो. धर्मने दारिद्र्याचे गोडवे गाऊन त्याचे उदात्तीकरण

केलेले केव्हाही बरे नसते. धर्माच्या नावाखाली श्रीमंतांच्या सन्यास वृत्तीचे स्तोम माजविले गेले, तर ते एकदाचे मान्य केले जाऊ शकते. परंतु गरिबी ही पूर्वजन्माचे फळ आहे, असे म्हणून दारिद्र्याचे स्तोम माजवले गेले तर, धर्माचा विपर्यास करणे होते. नैतिकता व गुन्हेगारी यांना चिरस्थायी स्वरूप प्राप्त करून देणे होते. एवढेच नव्हे तर, नरकाच्या कल्पनेप्रमाणे एका यातना युक्त जीवनाला मान्यता देणे होते.

अर्थातच धर्म हा समानतेवर व मानवतेवर आधारित असला तरच तो समाजाची धारणा करू शकतो. तोच खरा धर्म मानायला हरकत नाही.

**निर्मिक : एक अभिनव संज्ञा :-**

महात्मा फुले हे व्यासंगी व्यक्तिमत्त्व होते. त्यांचे क्रांतीकारीतत्त्व समाजात क्रांती घडवून नवी दिशा देणारे होते. त्यांचा विचार युगप्रवर्तक होता. ते निष्ठेने शूद्रातिशूद्रांच्या अभ्युदयासाठी धडपडत होते.

धर्माच्या क्षेत्रात मध्यस्थांची लुडबूड त्यांना मान्य नव्हती. ईश्वर आणि मानव यांच्यात कोणत्याही मध्यस्था वाचून संवाद शक्य असल्याचे सांगून, त्यांनी पुरोहितशाहीच्या पायाखालची वाळूच काढून घेतली होती. सत्यवर्तन करणारे कोणास म्हणावे याचे ३३ निकषही त्यांनी 'सार्वजनिक सत्यधर्म' या आपल्या पुस्तकात दिले आहेत. त्या निकषांमध्ये अध्यात्मिक, पारलौकिक, अतिंद्रिय असे कोणत्याही थोतांडांना त्यांनी जागा दिली नाही तर मानवी हक्कांचा सन्मान केला. स्त्री - पुरुष समानता मान्य करून कर्मकांडाला फाटा दिला. प्राणीमात्रांबद्दल भुतदया बाळगणे, कोणालाही धार्मिक व राजकीय स्वातंत्र्यापासून वंचित न ठेवणे, तसेच धार्मिक असहिष्णुता आणि अन्याय यांना त्यांनी जराही थारा दिला नाही. तर श्रमाचा, श्रमिकांचा आदर करून त्यांना प्रतिष्ठा मिळवून देण्याचे काम केले. हीच त्यांच्या सत्यवर्तनाची सूत्रे होती. महात्मा फुले यांनी सांगितलेला धर्म हा जगातील कोणत्याही धर्मपेक्षा निराळा व श्रेष्ठ धर्म आहे. माणसाला भयभीत करून

लुबाडणारा, खेळणारा धर्म नसतो, फार झाल्यास त्याला इहवादी किंवा समाजवादी म्हणता येईल. महात्मा फुले यांच्या धर्माचा उद्देश शोषणमुक्तीचा संदेश, ही शिकवणूक आहे. तसेच समता, स्वातंत्र्य, बंधुत्व ही त्यांची पायाभूत तत्त्वत्रयी आहे.

महात्मा फुले यांनी ज्या धर्माचा उल्लेख केला त्या धर्मात ईश्वर आहे आणि त्याचे स्वरूप इतरांपेक्षा निराळे आहे. जगाच्या पाठीवर कोणत्याही धर्मात त्याला न वापरलेली संज्ञा त्यांनी त्यासाठी वापरली आहे. त्याला महात्मा फुल्यांनी निर्मिक किंवा निर्माता अशीच संज्ञा वापरात आली आहे. त्या निर्मात्याने या संपूर्ण विश्वाची निर्मिती केली आहे. या सृष्टीचा, विश्वाचा निर्माता, नियंता, रचियता तो एकच आहे हेच महात्मा फुल्यांनी आप्रहाने प्रतिपादित केले. त्याला सृष्टी निर्माता मानून आपण त्याचे स्मरण कसे करावे, हे 'सार्वजनिक सत्यधर्म' या ग्रंथात त्यांनी नमूद केले आहे. सर्वात महत्त्वाचे म्हणजे हा धर्म 'सार्वजनिक' आहे. तो सर्वांसाठी आहे. इतर धर्मातील सर्व अनुयायांसाठी हा धर्म आहे. त्याही पलीकडे जाऊन असे म्हणता येईल की, 'निर्मिक' संज्ञा इतर सर्व ईश्वरवाचक संकल्पनांना सामावून घेणारी आहे. सर्वांना लागू पडणारी आहे. कारण या विश्वाचा निर्माता एकच आहे, यामध्ये कुणालाही दुमत असता कामा नये. महात्मा फुलेंनी त्यासाठी 'निर्मिक' ही वापरलेली संज्ञा किती संयुक्तिक आहे, याची आपण कल्पनाच करू शकतो!

#### समारोप :

सूक्ष्म निरीक्षण, बुद्धिवादी दृष्टी, विचारांची प्रकटता आणि रूढी-परंपरा शोधून त्या पलीकडील अर्थकारण शोधणारी चिंतनशीलता, ही महात्मा फुले यांच्या विचारांची ठळक वैशिष्ट्ये आहेत. महात्मा फुलेंनी पाहिले की, तत्कालीन समाजाचा भला मोठा घटक पिढ्यान्पिढ्या उपेक्षित व दारिद्र्याचे जीवन खिंतपत भोगत आहे. समाजाच्या अज्ञानाच्या,

अंधकाराच्या, शोषणाच्या मुळाशी असणाऱ्या कारणांचा त्यांनी शोध घ्यायला सुरुवात केली. त्या विविध कारणांमध्ये धर्माचा घेतलेला संकुचित व चुकीचा अर्थ, हे सर्वात महत्त्वाचे कारण त्यांच्या निदर्शनास आले. धर्माच्या नावाखाली धर्मग्रंथांचा आधार घेऊन, देव-देवतांच्या नावाखाली रूढी, प्रथा, परंपरा यांच्या संवर्धनासाठी समाजातील एका विशिष्ट जनसमूहाला कायमचेच उपेक्षित ठेवले गेले होते. परिणामी, महात्मा फुलेंनी धर्माची खरी चिकित्सा करून, धर्माचे खरे स्वरूप सांगून समाजात मानवता निर्माण करण्याचा कसोशीने प्रयत्न केला. समाजातील असणारे भेद ईश्वरनिर्मित किंवा ईश्वरी आदेशाने निर्माण झालेले नसून, त्याची निर्मिती स्वार्थातून झाली असल्याचे त्यांना कळून चुकले होते. ज्योतिरावांनी संपूर्ण मानवजातीसाठी स्वीकृत असणाऱ्या निर्मिकाची संकल्पना दिली. महात्मा फुले यांनी आपले विचार समाजाला पटवून देण्यासाठी लेखणी व कृतीचा भरपूर उपयोग केला. ग्रंथांमधून त्यांनी धर्मविषयक चिंतन समाजासमोर मांडले. त्यांची लेखन शैली संवादात्मक होती. स्वच्छ, स्पष्ट, अर्थगर्भ आणि निश्चित आर्थिक लेखन करणे, हे त्यांच्या लेखनाचे वैशिष्ट्य आहे. महात्मा फुले यांनी सांगितलेले 'धर्मविषयक चिंतन' तत्कालीन समाजाबरोबरच आजच्या आणि उद्याच्या समाजाला दिशादर्शकाप्रमाणे आहेत. त्यांच्या विचारांचा कृतिशील स्वीकार करण्यातच संबंध मानवजातीचे हित सामावले आहे.

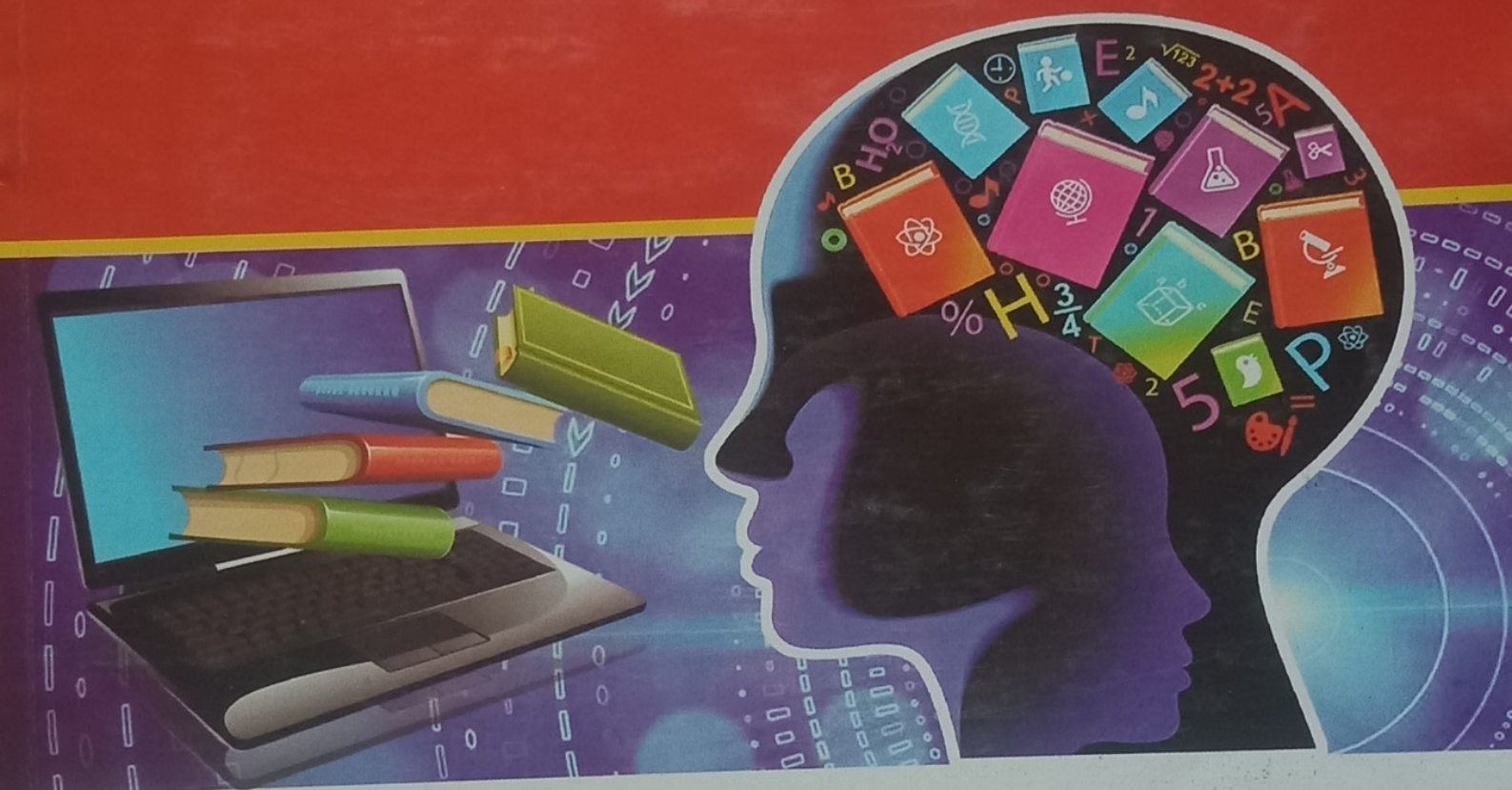
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# FUTURE OF ACADEMIC LIBRARY SERVICES IN INFORMATION COMMUNICATION TECHNOLOGY ENVIRONMENT

Dr. Amit S. Tankar

Librarian, Shri. Dr. R. G. Rathod Arts & Science College, Murtizapur, Dist. Akola

## Abstract

This paper discusses the future and framework of Information Communication Technology (ICTs) in Academic Library Services. Describe the essential conditions that must be met for successful technology integration and provides guidelines for the development of a strategic planning process. It also identifies import strategies for managing the change process in the academic library as technology becomes a catalyst for transforming e-sources based services process. But this is also great challenge for the librarian to work with new trends in information communication technology and to acquire the knowledge to a desire extent important role of Information Communicating Technology in Academic Library Services.

**Keywords:** Information Communication Technology, Information Technology, Academic Library, E-sources.

## Introduction

A transformation is needed to academic libraries from focusing on the traditional information provide in the service operation system to focusing on the information recipient. The information and communication technology is vital part of academic library services and teaching learning process. The service rendered with help of Information Communication Technology are faster and more effective, Moreover, it creates faith and confidence about the product and services of an organization among its users. Development of Information communication technology have brought out revolutionary changes in both the learning needs and the way learning needs and the way learning opportunities are offered college libraries need to develop capability and infrastructure for the use.

## Future of Information Communication Technology

The new technological developments, which had occurred during last few decades, have drastically influenced the functions and different services of academic libraries. They have also reflect the attitude of library users. Information communication technology (ICT) may be defined as a combination of computer and techniques, which makes possible new systems and different user oriented products to help user at work in education field. Information communication technology stands for Information communication

technology and are defined as diverse of technological tool and resources used to communicate and the create disseminate storage and manage information.

The 20th Century and first decade of the 21st have witnessed a transformation of the information environment in which academic libraries live and their being which far eclipses earlier changes, even those wrought by the advent of printing so many centuries ago. Academic libraries must change in radical and differential fundamental ways. This presents both a wrenching challenge and a remarkable opportunity both of which we will be exploring together in the coming days as we seek to understand the way forward for academic libraries in the 21st Century.

In present situation, academic libraries are shifting from the clearing house of different product and different service center for printed publications, towards becoming an intermediary for traditional resources. Information resources come in different formats like audio, video, printed, different electronic and multimedia. However some may be free and available to users directly, others are available only through academic libraries.

The future academic libraries should think differently about the future considering the fact the information communication technology has brought a new and complex future to the profession. The change becomes an obligation in the library profession. In order to remain relevant and be future ready, the change should begin and should be total in orientation and practices.

## Future Research Direction on ICT Views

- Library staff Information Communication Technology training and Motivation:-The quality of academic library service is largely depend on staffing levels quality of information communication technology Training and Motivation. Future research should address issues on college library staff Information Communication Technology Training in Academic Libraries.
- Information Literacy and Competency Programme through Information Communication Technology:-User's information literacy and competency initiatives are minimal: Academic library orientation programmes to new students take place within the first week of the first year

- students reporting.
- Prepare the policy for use of Information Communication Technology in the academic library:-A policy framework for acquisition and use of information communication technology in the academic library would ensure that the information communication technology infrastructure and internet available is optimally use in meeting users needs.
- Use of Information Communication Technology in Academic Library:
- To provide need based, browsing of retrospective search services to the users.
- To help academic library function such as acquisition control circulation and other routine office works and developing in house database.
- To access library open, database of other academic libraries through library networks.
- To have access to a number of national and international journals which are being published only in machine readable forms.
- To introduce and provide new services, revitalize the existing services by providing faster access to the resources.

Effective harness the power of the Information and Communication Technology to improve library services, the following essential conditions must be meet:

- User must have sufficient access digital technologies and the Internet in the Library.
- Quality, meaningful and culturally responsive e-sources must be available for users.
- Library personal must have knowledge and skill to use the new information communication technology tools and resources to help all users achieve high academic standards.

Application of information communication technology has caused significant changes in academic libraries automated cataloging, circulation, information

retrieval, e-sources, electronic documents and CD-ROM databases. Information spread in future will be produced, transmitted and different electronic forms only. It is predicted that perhaps the printed books will be replaced by new different electronic forms and tomorrow static, paper based library with its fixed searching schemes will give way to dynamic computerized library with flexible and sufficient mechanism for storing, locating and personalizing vast amounts of different forms of information.

### Conclusion

The information is totally based on the changes that the mandate of the academic library is intact with the impact of Information Communication Technology we are having computerized libraries as well as library and information network. The critical issued is how accept the change. The future uncertain but bright we will have to create a relative balance of printed material and e-sources. Thus it has become imperative to have generic skills in addition to acquiring of traditional and information communication technology competence, which must be continuously updated so as to meet the need of changing academic services delivery mechanism. Library professional should be trained for the advent of digital technology and provide the better service to users. It is possible with the help of information communication technology.

### References

- Aanjaiah M. (2012). Electronic resources management in libraries: Challenges for Librarians in the Digital Age. Current Publication, Gulbrga, pp. 474-482.
- Borse T.R. (2001). Information and Information Technology, IASLIC Bulletin, 46(2), 79.
- Krishnamurthy M. (2004). Digital Library: An Overview. SRELS Journal of Information Management, 41(4), 317-326.
- Kumbar M. (1996). Use of Information Technology in Library Services, Herald of Library Science, 35(1-2), 18-22.
- Mahapatra, P. K. and Chakrabarti B. (1999). Organizing Information in Libraries. ESS ESS Publication, New Delhi, pp. 125-127.
- Natarajan M. (2003). Selection and Evaluation Criteria for e-resources. ILA Bulletin, 38(3), 11-14.

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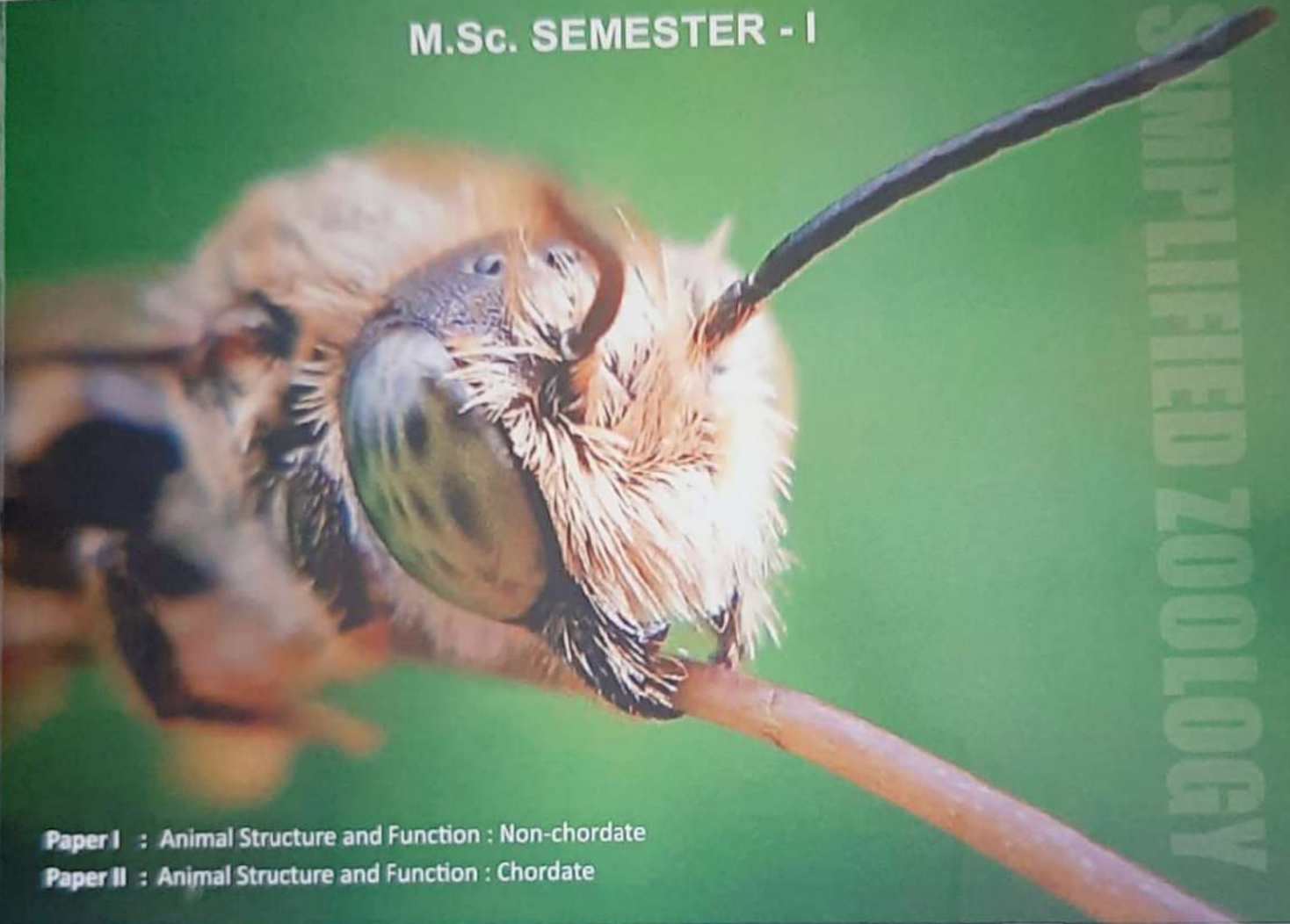
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मानवी जीवनाचे प्रभाव दाकणाऱ्या सर्व पैलूंचे सर्वाधिक विस्तार करणारे, अजकक करणारे राष्ट्रसंत तुकडोजी महाराज होते. संत तुकडोजी महाराज हे सर्वसामान्यांचे प्रतिनिधित्व करणारे संत होते. देशातील ग्रामीण जीवनाला त्यांनी जवळून न्याहाळले. त्यांचे दारिद्र्य, अज्ञान पाहून त्यांचे मन तिळतिळ तुटले. ग्रामगीतेच्या माध्यमातून त्यांचा आत्मविष्कार प्रभावीपणे व्यक्त झाला. ग्रामीण भारताबरोबरच एकूण मानवजातीच्या कल्याणाचे विचार त्यातून व्यक्त झाले आहे. महिलाप्रती सारखा आधुनिक ज्वलंत विषय त्यांच्या विंतानातून प्रभावीपणे व्यक्त झाला. स्वच्छतेचा मूलमंत्र त्यांच्या शब्दाशब्दातून व्यक्त झालेला आहे. आरोग्याच्या बाबतीत राष्ट्रसंत अतिशय आग्रही असायचे. स्वावलंबन व स्वयंरोजगार या बाबींचा विचार त्यांनी समर्थपणे समाजापर्यंत पोहोचला होता. तरुणांनी आपल्या आरोग्याच्याप्रती सजग रहावे, हे सांगावलाही ते विसरले नव्हते. गावोगावी वाचनालये निर्माण व्हावी, हा अत्यंत महत्त्वाचा विचार त्यांनी समाजाला दिला. ग्रामीण संरक्षणासाठी राष्ट्रसंतांनी संघटनेचे महत्त्व अधोरेखित केले होते. शेतकऱ्यांच्या बाबतीत राष्ट्रसंत अत्यंत संवेदनशील होते. शेतकऱ्यांच्या प्रस्नांना ते सहानुभूतीपूर्वक उत्तरे घायचे. राष्ट्रसंतांनी व्यसनाधीनतेचे दुष्परिणाम सांगून, त्यातून तरुण पिढीने स्वतःला कसे वाचवावे, हे मार्मिक पद्धतीने सांगितले होते. मानवता हाच खरा धर्म आहे, सर्वधर्मसमभावाची विचारसरणी अंगीकारून विश्व कल्याणाचा मार्ग सुकर होणार आहे. अन्यथा हे विश्व ज्या आधुनिक तंत्रज्ञानाचा वापर करित आहे; तेच मानवाच्या विनाशाचे कारण ठरेल! हा सावधगिरीचा इशाराही राष्ट्रसंतांनी देऊन ठेवला आहे. अध्यात्माचे, भक्तीचे खरे स्वरूप देशभक्ती व समाजसेवेत सामायले असल्याचे त्यांनी प्रथमता अनुभवले. तोच मौलिक संदेश समाजाच्या तळागाळापर्यंत पोहोचविण्याचे काम केले. त्यांचे व्यक्तिमत्व उत्तरोत्तर अधिकाधिक विकसित होत गेले. राष्ट्रसंतांना जाणवलेला देव त्यांनी समाजासमोर ठेवला. त्यांचे आचार-विचार आज आधुनिक समाजासाठी प्रासंगिक आहे. त्यांचे कृतिशील अनुकरण करूनच आपला समाज सौख्याचे जीवन जगू शकतो. राष्ट्रसंतांच्या विचारांना प्रांताच्या किंवा देशाच्या सीमा लागू पडत नाहीत. त्यांचे विचार 'वैश्विक कल्याणाचा' मूलमंत्र आहे!

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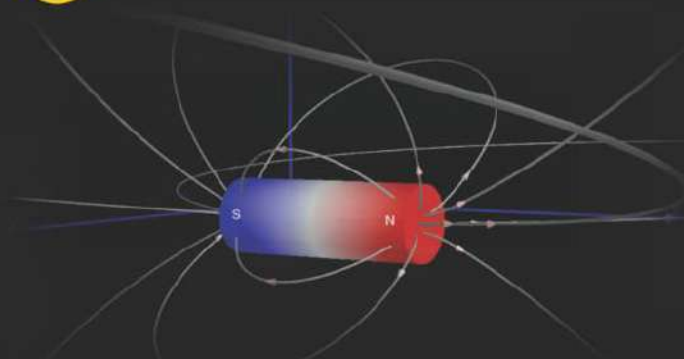
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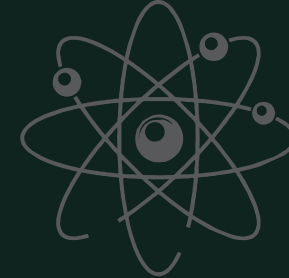
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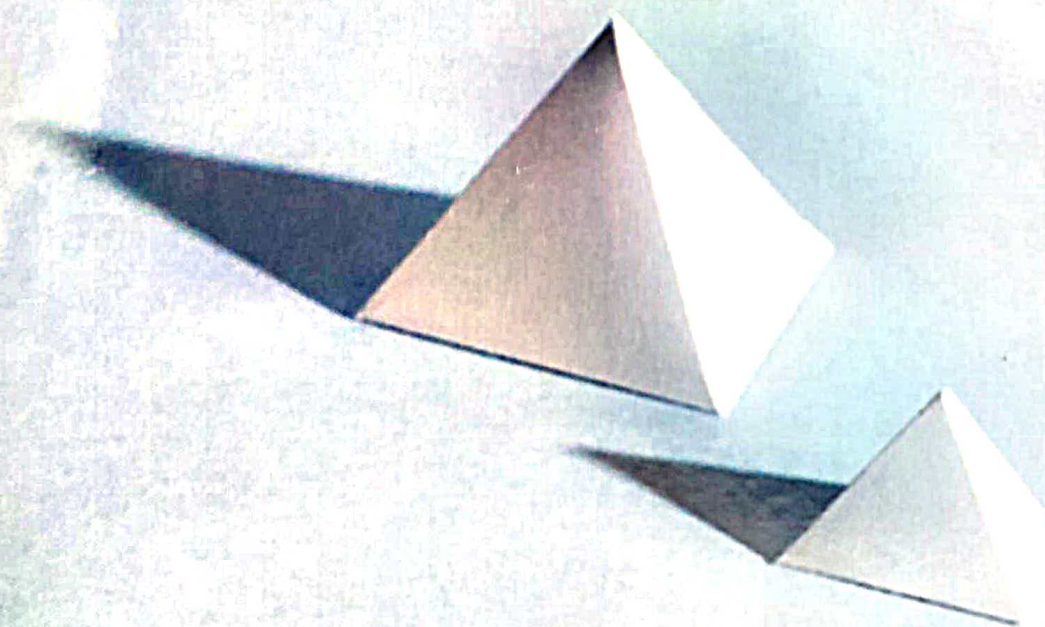


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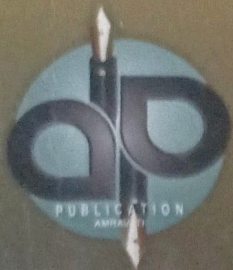
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**Dr. S. M. Deosthale**

*M.Sc. M. Phil, Ph.D*

B. B. Arts, N. B. Commerce and B.P. Science College,  
Digras, Dist. Yavatmal

**Dr. S. K. Lande**

*M.Sc., B.Ed., Ph.D*

Late Pundlikrao Gawali Arts and Science Mahavidyalaya,  
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**Dr. A. A. Sangole**

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Civil line, Akola

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## 5.1 Linkage

**C**oncept of Linkage : When two or more characters of parents are transmitted to the off-springs of few generations such as  $F_1$ ,  $F_2$ ,  $F_3$  etc. without any recombination, they are called as the **linked** characters and the phenomenon is called as **linkage**. Thus, this is a deviation from the Mendelian principle of independent assortment. Mendel's law of independent assortment is applicable to the genes that are situated in separate chromosomes. When genes for different characters are located in the same chromosome, they are tied to one another and are said to be linked. They are inherited together by the offspring and will not be assorted independently. Thus, the tendency of two or more genes of the same chromosome to remain together in the process of inheritance is called **linkage**. Further, the genes situated closely on same chromosome have tendency to inherit together, these genes form a linkage group. It was suggested that, human female has 23 linkage groups while human males have 24 linkage groups.

Some of the common definitions of linkage are stated here. First, linkage is a process where two genes locating on same chromosome tends to inherit and stay together. Second, It is tendency of two or more genes stay together during inheritance. Third, the co-existence of two or more genes on same chromosome and their inheritance in a group is called as linkage.

**Bateson and Punnet (1906)**, while working with sweet pea (*Lathyrus odoratus*) observed that flower colour and pollen shape tend to remain together and do not assort independently.

When two different varieties of sweet pea—one having red flowers and round pollen grain and other having blue flower and long pollen grain were crossed, the  $F_1$  plants were blue flowered with long pollen (blue long characters were respectively dominant over red and round characters). When these blue long (heterozygous) hybrids were crossed with double recessive red and round (homozygous) individuals (test cross), they failed to produce expected 1:1:1:1 ratio in  $F_2$  generation. These actually produced following four combinations in the ratio of 7 : 1 : 1 : 7 (7 blue long : 1 blue round : 1 red long : 7 red round).



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**Ms. Dr. P. M. DAHIKAR**  
Shri R.R. Lahoti College of Sc. College  
**MORSHI**

**Dr. D.P. DUPARE**  
Dr. R.G. Rathod Arts & Sci. College,  
**MURTIZAPUR**

**Dr. S.S. THAKARE**  
Principal,  
Rajarshee Shahu Sci. College  
**CHANDUR RAILWAY (AMRAVATI)**

**Dr. V.W. BANEWAR**  
Govt. Vidarbha Inst. of Sc. and Hum.,  
**AMRAVATI**

**Dr. M.T. SANGOLE**  
Shri Shivaji College of Arts, Com. & Sc.,  
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**Dr. M.R. GADPAYALE**  
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Prof. & HOD Chemistry  
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# Herbal Remedies

From Murtizapur Tahsil

Rupali Prakash Shirsat





**Dr. Rupali Prakash Shirsat** is working in Department of Botany, Shri Dr. R. G. Rathod Arts and Science College Murtizapur, District- Akola (MS) as Assistant Professor. She is teaching plant science since 2009 with specialization in applied mycology and plant pathology. She is recipient of Maulana Azad National Fellowship for her Ph. D. work. Her current field of research is related with natural products and plant chemistry. She has published 17 research papers in the journals of national and International repute and also 04 full length articles in proceedings of various national conferences. She has attended 16 conferences was awarded for best poster presentation in XXIII Annual Conference of IAAT, Nagpur in 2013. She was also working as editorial board member of a National Journal.

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## Economic interest of lac culture in India – An overview

G. V. Ade<sup>1</sup> P. M. Makode<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Zoology, Shankarlal Agrawal Science College Salekasa, Dist. Gondia, Maharashtra. Email.id: [gaurithakre2018@gmail.com](mailto:gaurithakre2018@gmail.com)

<sup>2</sup>Assistant Professor, Head, Department of Zoology, Shri. Dr. R.G. Rathod Arts & Science College Murtizapur. Dist. Akola, Maharashtra. Email. id: [pravin\\_makode@rediffmail.com](mailto:pravin_makode@rediffmail.com)

**Abstract:** Lac culture is the systematic rearing of lac insects on their host plants for sustainable production of commercial lac. The lac harvested from host plants is then processed by using various techniques to produce different kinds of lac resins, lac dye and lac wax. There are versatile applications in many fields of lac resins and lac byproducts generated while processing raw lac. India is among the topmost country in the world for lac production. Comparatively less investment is required for lac culture, and it provides economic benefit to farmers and livelihood to tribal people. lac processing techniques, products and by-products produced by lac culture and their applications, Indian institutes involved in research and development of lac culture, current research for applications of lac.

Keywords: lac culture, host plants, raw lac, lac resin, lac dye, lac wax, etc.

### Introduction:

Lac insects are reared systematically on their host plants to produce resin is called lac culture. Lac insects are found throughout the tropical and subtropical regions of the world. However, they are found abundantly in the tropical forest of India, Thailand, China and Vietnam. In European countries, these insects are not found due to the very cool climate during winter [9]. India is among the topmost countries in lac production and contributes about 80%. The production of raw lac in India is near about 20,000 metric tons and earns a huge amount through export about Rs. 120-130 crores of foreign currency per year [7]. According to 2018-19 statistics, Jharkhand is the topmost state in lac production followed by Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha and Assam [13]. Lac culture requires comparatively less investment and provides good economic return if it is carried out systematically and scientifically. It is the source of livelihood for tribal people and farmers, it is a side income source with good economic returns.

Lac insects belong to the family Tachardiidae (Kerriidae) and are from the order Hemiptera [8]. Lac insects are parasitic they feed by sucking juices of various plants called host plants. A particular type of lac insect species feeds on the particular host plant. Some species of lac insects in India are listed in the table with the region of occurrence and their host plants. In India, there are 16 species under the

genus *Kerria* and 6 under the genus *Paratachardina* are recorded [5,7]. *Kerria lacca* (Kerr) is the most widely occurring species in India, which produces the bulk of commercial lac. [8]

Sr. No.	Species in India	States	Host trees
1.	<i>Kerria chmaberlini</i>	Gujarat West Bengal	<i>Flemingia religiosa</i> (Pipal) <i>Butea monosperma</i> (Palas)
2.	<i>Kerria fici</i>	Panjab	<i>Adansonia digitata</i> (Imli)
3.	<i>Kerria indicola</i>	Andhra Pradesh	<i>Peltoforum ferrugineum</i> (Peela Gulmohar)
4.	<i>Kerria brancheata</i>	Jammu & Kashmir Jharkhand	<i>Ziziphus mauritiana</i> (Ber) <i>Schleichera oleosa</i> (Kusum)
5.	<i>Kerria lacca</i>	Rajasthan Gujarat Maharashtra Jharkhand West Bengal	<i>Flemingia religiosa</i> (Pipal) <i>Ziziphus mauritiana</i> (Ber) <i>Acacia arabica</i> (Babool) <i>Peltoforum ferrugineum</i> (Peela Gulmohar) <i>Butea monosperma</i> (Palas)
6.	<i>Kerria sharda</i>	Orissa	<i>S. Oleosa</i> (Kusum)
7.	<i>Kerria nagoliensis</i>	Maharashtra	<i>Schleichera oleosa</i> (Kusum)
8.	<i>Paratachardina lobata</i>	Andhra Pradesh	<i>Peltoforum ferrugineum</i> (Peela Gulmohar)
9.	<i>Kerria communis</i>	Goa	<i>Acacia catechu</i> (Khair)

Lac insects feed by sucking juices from host plant tissues. Lac is secreted by lac insects through specialized glands, to get protected from their predators. Lac resin is viscous at the time of secretion and gets hardens after coming in contact with air forming encrustations around the body of insects. The encrustations on the branches of a tree are then removed by scrapping this lac is known as stick lac, crude lac, or raw lac. It contains resin, wax, dye, insect body, the bark of host trees as well as other impurities [14]. Stick lac is then processed in various ways to obtain pure lac and different by-products.

This paper provides an overview of lac processing techniques, products and by-products produced by lac culture and their applications, Indian institutes involved in research and development of lac culture, and current research for applications of lac.

### **Lac processing techniques / Products by- produced**

First, the stick lac (raw lac) that is obtained by removing lac encrustations from host plants is processed to obtain seedlac. For this sticklac is dried first to remove moisture. Sticklac cannot be stored for a long time as it contains moisture along with other impurities it forms lumps and hence lowers the crop quality.

Followed by drying stick lac is sieved and crushed to obtain sand and dust this process removes sand, dust. This powdered form of crude lac is then washed to remove embedded insect bodies and host trees debris. Decaying bug bodies impart a red color to water this is processed to obtain a by-product that is lac dye. The remaining resin is dried, thresh to gain seedlac. Seedlac is a commercial variety product and can be stored for a long duration. From seedlac by hot filtration purified lac is obtained called shellac. Seedlac is processed by country process or in mechanized factories to obtain shellac. Shellac obtained by country process (Bhatta) process is called button lac whereas processed from mechanized factories is called machine-made shellac [15].



**Fig.1. Lac processing to different products and by products**

Seedlac is processed by solvent method to obtain dewaxed decolorized lac (DDL) and bleached lac. For making dewaxed decolorized wax, seedlac is dissolved in cold alcohol to render wax insoluble and filter through a filter press to remove wax and impurities. The color may be removed to any required standard by charging with the activated carbon and then alcohol is recovered. The molten shellac is stretched with a roller. This form of lac has high demand in the western market. For obtaining bleached lac many methods are available but the most commercially adopted method is sodium hypochlorite (NaOCl) with some recent modifications [13,15]. Bleached lac is white. It has specialized demand and is manufactured commercially in two grades- Dewaxed bleached shellac and Waxy bleached shellac. The commercial

grades of seedlac, button lac, shellac, dewaxed decolorized lac (DDL) and bleached lac available on market are listed in table 2 [13,15].

Sr. No.	Type of lac	Commercial grades	
1.	Seed lac	Ordinary/ Genuine bysakhi, Fine bysakhi, Golden bysakhi, Golden kusumi, Golden bysakhi – bold grain, Golden kusumi – bold grain, Golden kusumi seed lac – Medium, Manbhum fine seed lac.	
2.	Shellac	Button lac	Lemon one shellac, Lemon tow shellac, Standard one shellac, Superior shellac, Superior kusumi lemon, Kusumi button lac, superior kusumi button lac, light pure button lac, Pure one button lac
		Machine-made shellac.	Orange shellac, Lemon one shellac, Lemon two shellac, standard one shellac, Black T.N. shellac, Kusumi lemon shellac, Orange fine shellac
3.	Dewaxed decolorized lac (DDL)	Dewaxed platina, Dewaxed blonde Dewaxed super blonde, Dewaxed lemon, Dewaxed orange, Dewaxed Garnet	
4.	Bleached lac	Dewaxed bleached shellac and Waxy bleached shellac	

### Applications

Lac is the only resin of animal origin, and it is Nature’s gift to mankind. At present, its importance has been raised in industries, pharmaceuticals, food processing, and textiles being an eco-friendly, biodegradable, and self-sustaining natural material. In India lac is used since ancient times for medication. It is profusely used in ayurvedic treatment for treating various illnesses. It is widely used on open wounds for quick healing and tissue generation. A slurry of lac paste in water mixed with butter oil and milk was commonly taken orally by sick or wounded persons. For controlling blood pressure Lac resin was used for oral administration with fresh goat's milk. It forms one of the main ingredients of a medicated oil known as Lakshadi taila which is reputed to bring down chronic fever and cure rheumatic pain. In modern pharmacy, it is commonly employed as a demulcent in preparations which is designed to treat diarrhea, dysentery, coughs, throat irritation and fevers. It serves as an emulsifying agent and gives viscosity to powdered drug materials.



Lac has innumerable applications in various fields. More than 50% consumption of shellac is in the surface coatings in paints and varnishes due to its properties such as forming UV resistance of the film, smooth, decorative and durable films formation in alcoholic solutions, which dry rapidly as well ability to form solution in alkaline medium. Applications of shellac in the various field are enlisted in the table [13].

<b>Field of application Specific application area</b>	<b>Field of application Specific application area</b>
Pharmaceuticals	Coating for tablets; enteric (digestive fluid proof) coating for tablets, pills, etc. Removing agent for medicinal odor. Enteric pills for sustained release medication
Electronics	Lamps, fluorescent lamps, insulating agent for parts, insulating varnish, PCB coating.
Polishes	Fruits, furniture, floors, shoes, stain sealer, wallboard primer, knot and sap sealer on wood
Food	Chestnuts, healthy foods, glazing agent for chocolates and sweets, protective coating for oranges, lemons, apples, etc. Binding agent for stamp inks for lemons, eggs and cheese. Barrier coating for feeds and seeds. Protective candy coating or glazes on candies. Coating of apples and other fruits. Coating of food materials
Printing ink	Felt pen inks, binder for flexographic inks for paper, cardboard, non-toxic printing ink for food packaging
Paint and varnishes	Wood finishing, metal foil, sealers, leather, rubber, car tyre.
Cosmetics	Additive and binder for manicure, mascara, eye shadow and conditioning shampoo for personal care. Setting agent for hairspray, microencapsulation for perfumes for longer stay
Rub stones	Grinding wheel
Others	Felt hats, pyrotechnics, gunpowder, strippable paints, cards, stiffening felt in hat manufacture and also in textile industries

<b>Lac by product</b>	<b>Applications</b>	<b>Reference used</b>
Lac dye	Food grade lac dye in manufacture of skin creams, food and drug manufacturing and technical grade lac dye in textile industries for coloring silk and wool.	5, 8, 13,14
Lac wax	Electrical industry, shoe creams, floor and car polishes, food, confectionery and tablet finishing, lipsticks, crayons and tailor's chalk	8,13

Isoambrettolide	Perfumery industry	5,14
Mollama	For production of standard quality bleached lac	5

### **Indian institutes involved in research and development of lac culture**

Indian Institute of Natural Resins and Gums (IINRG) was formerly known as Indian Lac Research Institute (ILRI)) is a nodal Institute at the national level for research and development in arid, semi-arid, plateau and hilly regions of the country that help to improve the livelihood of local communities [2]. It was established at Namkun Ranchi in 1924 with the prime motto of research on lac in India and to increase lac production. Indian Institute of Natural Resins and Gums (IINRG) is then handed over to the Indian Council of Agricultural Research, New Delhi in 1966 [3]. This institution is fully devoted to the research and development of lac and succeed in increasing enormous lac production in India. Institute entail varying objectives such as lac and other natural gums & resins (excluding production) such as harvesting/ tapping, processing, product development, training, information repository, technology dissemination and national/international cooperation. There is an increase in lac production in several regions of the country through training programs, capacity building programs run by this institution throughout India to make skilled individuals who can do scientific lac cultivation [4] Scientific cultivation with integrated pest management, enhancing exploitation of unexploited host plants, and cultivation through ‘Joint Forest Management’ program helps cultivars in raising production and gaining good economic returns. This institute also supports by providing financial assistance to lac cultivars. [2]

### **Current lac research**

Yan, X., *et al.*, prepared color-changing and self-repairing dual-function paint film with Lac Resin microcapsules and Fluorane microcapsules They found that paint film with lac resin microcapsules had a better crack inhibition effect. The results obtained are useful as a manufacture reference for multifunctional wood coatings [16].

Lu, J et al., et al., extracted Shellolic esters and Lac dyes from methanol extract of the secretions of *Laccifer lacca* and studied their biological activity. They found some of the compounds considerable active against *Bacillus subtilis*, *Escherichia coli* and *Streptococcus aureus* microorganisms. [6]

Chowdhury, S., put forth the concept of establishment of Brood Lac bank in Chhattisgarh, inspired by an idea of preserving and maintaining local biodiversity along with enhancing forest-based livelihoods. The idea of the Brood Lac Bank has been further extended to envision “Lac Clusters” which would not

only sustainably produce lac but also add value through local processing, enabling rearers to produce raw industrial lac through local lac-based networks to directly engage with the market [1].

Mohanasundaram, A. *et al.*, evaluated chemical communication between the lac insect-associated products and the lac predators under the laboratory condition. They found that *Eublemma amabilis* showed a great response to lac insect whole-body extract. Another lac insect predator *Pseudohyapatopa pulvereae* also showed higher response to lac insect whole body extract than resin, wax, crawler and lac insect female extracts. [10] Along with this much research about lac cultivation, pest management, marketing and application based research has been taking place contributing enormous fruitful knowledge to this area [11,12,18].

### References:

1. Chowdhury, S., 2021. Harboursing brood lac: envisioning lac clusters. *Development in Practice*, pp.1-7.
2. Gupta, R.K., Ganai, S.A. and Bali, K., 2020. Current status, critical gaps and way forward for lac production in J&K.
3. <https://iinrg.icar.gov.in/>
4. Kumar, A. and Jaiswal, A.K., 2017. Knowledge Level of Students via Capacity Building Programme on Scientific Lac Cultivation, Processing, Uses and their Correlates.
5. Kumar, A., Jaiswal, A.K., Singh, A.K. and Yogi, R.K., 2015. Advances in Lac Production. *Processing, Product Development and Value Addition, ICAR-IINRG, Ranchi*, pp.1-206.
6. Lu, J., Shang, L., Wen, H., Huang, J., Li, G. and Wang, J., 2018. Structural identification and biological activity of six new Shellolic esters from Lac. *Fitoterapia*, 125, pp.221-226.
7. Manzoor, U., 2021. Chapter-3 Beekeeping and Lac Culture in India. *ENTOMOLOGY*, p.41.
8. Mishra, Y.D. and Kumar, P., 2017. Lac culture. In *Industrial entomology* (pp. 109-155). Springer, Singapore.
9. Mohanasundaram, A. and Sharma, K.K., 2018. Lac Insect Life Cycle, Lac Crop Cycle and Natural Resins and Gums Related Terminology.
10. Mohanasundaram, A., Kaprakkaden, A., Nebapure, S.M., Sharma, K.K., Naaz, N., Mishra, R. and Shree, U., 2022. Electroantennography and behavioral studies of *Eublemma amabilis*

- [Moore] and *Pseudohypatopa pulverea* [Meyr] in relation to volatiles of lac insect (*Kerria lacca* Kerr.) and its associated products. *International Journal of Tropical Insect Science*, pp.1-12.
11. MUNSHI, R.R. and MANOHAR, A.M., THE LATHE AND HAND TOOLS USED IN TURN-WOOD LAC-WARE OF CHANNAPATNA FOR PRODUCT FORMS.
  12. NAGPURE, S.C., KOSHTI, N.R. and KOKATE, S., Marketing of Lac Production in Gondia District.
  13. Sharma, K.K., Chowdhury, A.R. and Srivastava, S., 2020. Chemistry and Applications of Lac and Its By-Product. In *Natural Materials and Products from Insects: Chemistry and Applications* (pp. 21-37). Springer, Cham.
  14. Siddiqui, S.A., 2004. Lac—the versatile natural resin.
  15. Sivaramane, N. and Reddy, G.P., in *Agriculture*
  16. Yan, X., Zhao, W. and Wang, L., 2021. Preparation and performance of thermochromic and self-repairing dual function paint film with lac resin microcapsules and fluorane microcapsules. *Polymers*, 13(18), p.3109
  17. Yogi, R.K., Sharma, K.K. and Ramani, R., 2016. Model Bankable Projects: Lac Cultivation for Livelihood Security. ICAR-Indian Institute of Natural Resins and Gums, Ranchi, Jharkhand. *Bulletin (Technical) No, 17*.
  18. Yuan, Y., He, N., Dong, L., Guo, Q., Zhang, X., Li, B. and Li, L., 2021. Multiscale Shellac-Based Delivery Systems: From Macro-to Nanoscale. *ACS nano*, 15(12), pp.18794-18821.

**Behavioral Study of Parrots Around Gram Takarkheda Dharni Region of Western Melghat****\*Bahadure R.B. and P.M. Makode**

\*Department of Zoology, Shri Vasant Rao Naik Mahavidyalaya, Dharni, Dist. Amravati-444 702

Department of Zoology, Dr. R.G.Rathod Science Mahavidyalaya, Murtijapur, Dist. Akola.

**Abstract:**

*This study make known that the every day flight activity rose ringed parrots at early morning with massive flocking of parrots, and they find the foodstuff around farms located at Dharni region nearer to the small village Takarkheda. Similarly the flight activities at evening time the pattern of flight were in a different way acted, when they back towards the nesting. The intension following the significant learning of flight activity of Adults and younger parrots showed special difference in their behavioral patterns of early morning and evening instance.*

*This study recommended that the daily observation of flight activity of rose ring neck parrots move early in the morning form their nesting towards the food searches in the forest, farm etc. and vice versa again towards the nesting areas when they get back flight activity of flocking at evening time.*

**Key words:** Behavior, Flocking, Rose ring Neck Parrots, Nesting, Food, Flight Patterns.

**Introduction:**

Behaviour patterns illustrate Most of the time parrots are not easy to catch. Even after being pets, they have a bad mannerism if not maintained properly. Some researchers state that most wild birds can be controlled by banding or wing tagging, but parrots are not birds to be easily trifled with; they chew off such affections. The behaviour of parrots differs from type to type. Some of them are strong and have direct flight whereas most of the species spend their time perching or climbing.

The habitat of African grey parrots is usually moist lowland forests, although they are found up to 2,200 m altitude in the eastern parts of the range. They are commonly observed at forest edges, clearings, gallery forests, mangroves, wooded savannahs, cultivated areas, and gardens Athan and Deter, (2000). African grey parrots often visit open land adjacent to woodlands, they roost in trees over water and may prefer roosting on islands in rivers. These parrots make their nests in tree holes, sometimes choosing locations abandoned by birds like woodpeckers. In West Africa, the species makes seasonal movements out of the driest parts of the range in the dry season Melo and O’Ryan (2007).

They are highly social and nest in large groups, although family groups occupy their own nesting tree. They are often observed roosting in large, noisy flocks calling loudly during mornings and evenings and in flight. These flocks are composed parrots, unlike other parrots that are often found in mixed flocks. During the day, they break into smaller flocks and fly long distances to forage. They often roost in trees over water and are said to prefer roosting on islands in rivers. Young birds stay with their family groups for a long period of time, up to several years. They socialize with others of their age in nursery trees, but remain in their family group within the larger flock. Young parrots are cared for by older birds until they are educated enough and old enough to become independent flock members. Young exhibit appeasement behaviors towards older members. As they mature, birds become more aggressive with nonspecific, Athan, (1999). Parrots in the wild must learn a complex set of skills. They need to learn how to separate desirable food plants from toxic plants, how to defend territory, how to recognize and avoid predators, how to find safe water, and how to rejoin their families when separated. Also, they must learn how to develop role-appropriate behaviors such as competing and defending nest sites and raising offspring Galef, (2004). Competition for nest holes during mating season makes the species extremely aggressive. Because parrots are partial ground feeders, there is a series of behavioral events that occur before landing and safe consumption takes place Luescher, (2006). Groups of parrots gather at a barren tree until it is completely filled with hundreds of birds that partake in preening, climbing, vocalizing, and socializing. Eventually the birds make their way down to the ground in waves with the entire group never being on the ground at the same time. Once on the ground, they are extremely vigilant, reacting to any movement or sound Wright, (2002).

**Materials and Methods:**

Flocking behavioral and flocking routine of rose- ringed parakeet were studied for a period of 12 weeks (November 2021 to January 2022) in irrigated farm fields of Tehsil Dharni located Village Takarkheda, where adequately bulky crops be present. Incidence of such crops largely remains experimental throughout the year, and therefore, no possibility occurs here for the limitation of food to variety of birds. Various crops viz. wheat, maize, rice, fodders besides fruit orchards like citrus, mango, guava, occurs in good proportions. Different trees of variable heights also perform not only as shelter for birds’, but also offer appropriate a place where birds regularly settle or congregate to rest at night, and nests (hollows), maintained by them for long durations. For

the present study, surveys were conducted to flight behavioral activity of flocks of the rose-ringed parakeet within the large agricultural area of Dharni region of Melghat. The parakeet settle was quite huge and was located less than distance away from the well grown croplands. Observations were made consecutively in the present studies and were observation on the basis of bulk flocking, forward journey at early morning for the searching of food and return journey towards the nesting at evening.

### Results and Discussion:

In this observational study reveal that the flocking behavioral pattern shows modest difference pertaining to the flight towards food availability at early morning at 6 to 7 am for the searching of food and *vice versa* returning journey towards nesting at evening 5 to 6 pm daily observational study through the photographic analysis of flocking size and height of the flight of rose ringed parakeets. It seems to be observed that the early morning flight showed more height approximately 90-100 feet. of flock size containing 400-500 parrots group from the land surface area with creating sound as for call and communicate to each other. But in the return journey of flocking flight behavior seems to different, flocking flight at evening time showed very less distance approximately 10-15 feet contains 200-300 parrots group. Distance from land surface to the flight area, without noising any sound as communication in between the flocks size of parakeets.



Fig. 1. Map view of Dharni region of Amravati District



Fig. 2- Map view where the Observational study were performed  
(Note: study area were noted with red colour arrow mark)



**Fig. 3. Monthly parrots flights of flocking behavior and size**  
(November & December-2021 at Morning & Evening flight)



**Fig. 4. Monthly parrots flights of flocking behavior and size**  
(December and January-2022 at Morning & Evening flight)

**Table-1 Monthly noted flocking behavior and size of parrots (2021):**

Months	Morning Time (Forward Journey from the Nesting) 6:00 to 7:00 am	Evening Time (Back Journey towards Nesting) 5:00 to 6:00 pm
November	400-500*	200-300*
December	400-500*	200-300*
January	400-500*	200-300*

\*Note: approximate number of parrots in flight as per photographic collection may vary.

Present reading circumstances showed that observation on the basis of the flock size of parrots in their natural habitats and behavioral patterns characteristically appears as in morning flight had a dispersed patterns in flight as shown in photo plates which indicates that random flight in parrots, more height than that of evening flight in four month observation. And in the return flight of parrots towards nesting they showed very less distance flight, and made pattern of flight were 'V' shaped noted in photograph captured.

#### Conclusion:

In this observational study showed that flocking size and their behavioral patterns vary. Parrots are locally common in the area of Dharni Melghat region; it appears seasonally available with the great quantity of nourish in surrounded areas such as, maiz, rice, cajanus, chickpea, and wheat as well as fruits such as guava, berry etc. conventionally yield taken by the Melghat peoples. This observation may show in the futuristic development and identified the issue act as pest for cropping because they feed voraciously on available food in their farm field. This available basic information of theirs seasonal flight and behavioral patterns seems to be identified as their habits and habitat learning in the additional improvements.

#### References:

1. Athan, M. (1999). Barron's Guide to Companion Parrot Behavior. New York, New York: Barron's Educational Series.
2. Athan, M., D. Deter. (2000). The African Grey Parrot Handbook. Hauppauge, NY: Barron's Educational Series. Accessed March 20, 2008 at <http://books.google.com/books?id=qqrXmrS2bXQC>.
3. Wright, M. (2002). "Understanding the Wild Nature of our Dreys" (On-line). Accessed April 10, 2008 at <http://www.lafeber.com/Laferber-Library/Articles/wright/wildnature.asp>.
4. Galef, B. (2004). Social Learning and Imitation. *Biology of Behavior*, 4: pp 261-269.
5. Luescher, A. (2006). *Manual of Parrot Behavior*. New York, New York: Blackwell Publishing.
6. Melo, M., C. O'Ryan. (2007). Genetic differentiation between Principe Island and mainland populations of the grey parrot (*Psittacus erithacus*), and implications for conservation. *Molecular Ecology*, 16: pp1673-1685.

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# ROLE OF SPIDERS FOR TRAPPING HARMFUL INSECT FROM TRADITIONAL CROP AROUND FARM FIELD OF DHARNI MELGHAT REGION

**R. B. Bahadure<sup>1</sup> and P. M. Makode<sup>2</sup>**

<sup>1</sup>Department of Zoology, Shri Vasantnaik Mahavidyalaya, Dharni, Dist. Amravati-444 702 (MS) India

<sup>2</sup>Department of Zoology, Shri Dr. R. G. Rathod Science and Arts College, Murtijapur, Dist. Akola (MS) India.

Corresponding Author: rameshbahadure531@gmail.com

## **ABSTRACT:**

In this survey to identify the superficial concept of spiders how to trap the harmful insect on traditional crop around farm field of Dharni Tahasil, Melghat region (MS) India. There are thousands of insects living on a farm. They can be both helpful and harmful to the farm and the farmer. The importance of spiders with reference to role of spider in agro-ecosystem has been mentioned as a trapping harmful insect of crop in Melghat region. A survey on spiders of agro ecosystem across the Melghat region around Dharni Tahasil has been discussed.

This survey becomes to elaborate the simple marking of spiders play an vital role to trap the harmful insects by prepared web on fencing made by farmer with dried sticks of bamboos or other twigs of trees as shown in captured photographs around the survey area. In case of some harmful insect are harmful to crop in farm field so naturally maintain the interaction between pray and predator in concern with the finding of our simple survey.

**Key words-** Spiders, Crop, Predator, Harmful Insect, Food Web, Farm Field.

## **Introduction:**

The monitoring the study of “the nature of predatory action of spider” has been mentioned. Most species are carnivorous, either trapping flies and other insects in their webs, or hunting them down. They can’t swallow their food as is, though—spiders inject their prey with digestive fluids, then suck out the liquefied remains (Vairale, 2020).

The main objectives of the study i.e., to inspect the insect pest management system controlled by spider as naturally making their webs around the farm field and trapped the harmful insects of traditional crop such as soybean, maiz, sorgum, cotton, pigeon pea etc.

Most of the spiders have rather small bodies – 1 to 10 mm in length. The distinguishing feature from other invertebrates' group is the ability to produce silk that is used among others for construction of prey-catching webs used for hunting; construction of cocoons and nests; and cocoons for incubating the eggs as well as for spreading through the air on the threads spun from the silk, so-called gossamer. The spiders are predatory animals that use their venom to paralyse their prey. Insects are their usual prey (e.g. flies, true bugs, orthopterans), but sometimes they prey also on other arthropods, including spiders. Spiders are present in almost all of the terrestrial ecosystems. They have managed to colonize almost all the continents (excluding Antarctic) and almost all the environments and climate zones on Earth. They can be usually found on the land, but they can be also observed while in the air, travelling – often over long distances – on long thin silk threads (Marzena and Hajdamowicz, 2016).

Certain insects can be dangerous to animals and plants. The following are a handful of insects that can threaten the vitality of gardens: Aphids: These insects congregate and suck on the juice needed to sustain plants. Bald-faced hornet: Hornets tend to be an aggressive species that can sting repeatedly.

Spiders are one of the largest groups of predatory organisms in the animal kingdom with more than 30,000 species distributed over 60 families worldwide. They are so miscellaneous they are found almost everywhere on ground, from arctic islands to dry desert regions. They are particularly abundant in areas of rich vegetation. It is no amplification to say that spiders have occupied all possible ecological niches on land, (Amalin, 2004). Recent trends in agriculture towards reduced pesticide use and ecological sustainability have lead to increased interest in spiders as potential biological control agents. Although the Chinese have amplified spider populations in field crops as a pest management approach for centuries, much debate remains as to whether spiders will effectively control pest populations in U.S. agricultural ecosystems. This technical bulletin reviews the literature to describe the reduction of insect pest densities by spiders and the effects of pesticides on spiders, in addition to addressing the question of whether spiders can be effective bio-control agents, techniques to safeguard and enhance spider grouping (Darlene *et al.*, 2003).

### **Materials and Methods:**

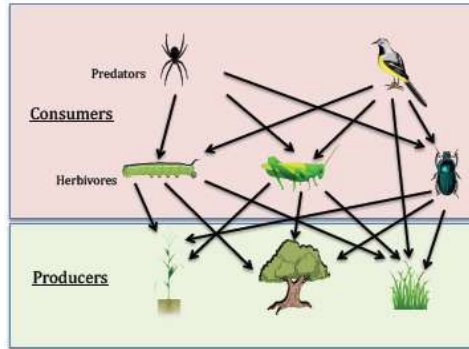
Photographic study and observation in farm field around the Dharni Tahsil of Melghat region (MS) India, to find out the predatory action of common spiders on protection compound wall/ fencing prepared by the most of the farmers on their field with dry branches of trees, bamboo sticks wooden plates etc.

### **Results and Discussion:**

As per our survey we were find out the predatory interaction of spiders by preparing web and trapped insects those are harmful for the traditional crop around Dharni Tahsil of Melghat region (MS) India and photos were collected. Again more harmful insect identification will carry forward for further findings as per the entomological point of view.



Food webs are organized into similar groups based on where organisms get their energy called trophic levels. Plants are considered producers because of their ability to convert sunlight energy into usable energy (food) through the process of photosynthesis. All other organisms are considered consumers, as they must eat their food by consuming other organisms (dead or alive, plant fungi, or animal). Herbivores are animals that eat only plants, while predators eat only other animals.



An example food-web diagram representing some of the interaction that commonly occur in various biological communities. Insects create the biological foundation for all terrestrial ecosystems. They cycle nutrients, pollinate plants, disperse seeds, maintain soil structure and fertility, control populations of other organisms, and provide a major food source for other taxa (Geoffrey and Scudder, 2017). In case of some harmful insect are harmful to crop in farm field so naturally maintain the interaction between pray and predator in concern with the above finding.

### Conclusion:

From this activity, students will gain a better understanding of:

- The organization of biological communities with regards to food based interactions
- Food web construction and organization of spiders
- The importance of spiders to the stability of their communities and to farmers in their farm fields for trapping the harmful insects for crops.

### References:

- Amalin, D. (2004) Spider Behavior and Value in Agricultural Landscapes. In: Encyclopedia of Entomology. Springer.
- Darlene, M., Drummond, F. and Alford, R. (2003) Spider Predation in Agroecosystems: Can Spiders Effectively Control Pest Populations, ISSN 1070-1524.
- Geoffrey, G. and Scudder, E. (2017) The importance of Insects, Insect Biodiversity: Science and Society, Chapter Second.

Marzena, S. and Hajdamowicz, I. (2016) “Protection of species diversity of valuable natural habitats on agricultural lands on Natura 2000 areas in the Lublin Voivodeship” Swiss Contribution of AgroPro Natura Siedlce University of Natural Sciences and Humanities) Publisher: Institute of Soil Science and Plant Cultivation – State Research Institute in Puławy pp. 01-20.

Vairale, Amit B. (2020) Diversity of Spiders in Agro-ecosystems of Buldhana District (M. S.) India. *Int. Res. J. of Science & Engineering*, 8 (2): 85-88.

# CLADOCERAN DIVERSITY IN LENTIC ECOSYSTEM OF SHIVAN RESERVOIR WITH REFERENCE TO PHYSICOCHEMICAL PARAMETERS

**P. M. Makode<sup>1</sup> and R. B. Bahadure<sup>2</sup>**

<sup>1</sup>Department of Zoology, Shri. Dr. R.G.Rathod Arts & Science College, Murtizapur Dist. Akola (MS) India.

<sup>2</sup>Department of Zoology, Shri Vasanttrao Naik Mahavidyalaya, Dharni Dist. Amravati (MS) India

Email: pravin\_makode@rediffmail.com

## **ABSTRACT:**

Water is probably the only natural resource to touch all aspects of human civilization from agricultural and industrial development and having the cultural and religious values. Now a days, this freshwater has become the fastest depleting natural resources globally. Only a small percentage of water exists as freshwater, and the portion accessible to human is again a negligible part of its global sock the surface water bodies such as rivers and lakes. However, knowingly or unknowingly, it is this rarest of resource, which we abuse severely. Ignorant irresponsible and careless management has brought the water of the world to serious depletion. The available freshwater is not accessible to all people due to differences in geographical, geological, climate, and demographic reason. Global literature survey reveals that 70 % of earth surface is covered by water. Although it is surprising that there is shortage of pure freshwater because more than 97 % water is marine and only 3 % fresh, soft water is suitable for human consumption and other uses.

**Key words:** Water, Cladocerans diversity, Zooplankton, Physicochemical parameter.

## **Introduction:**

The world is fast growing with its technologies and the population on earth is increasingly tremendously. So the dependence as well as exploitation of freshwater resources is also increasing rapidly. It is not just the population increase alone but also the technology aided excessive uses, abuses and misuses of water resources that break the natural water cycle. Modern humans cannot advance without determine the right levels of



use for various purposes. The need for the integrated development and management of the lakes, reservoirs, river basins has been recognized not only to harness the optimal benefits of this system but also to maintain the ecosystem that they represent. Every natural system has the capacity to purify itself. Biota of a water body is basically responsible for its natural renewal of purity. The capacity of a system to purify water is an important issue to be investigated in the context of water resource management.

The nature of threats to fresh water resources is almost uniform across the state, though some of them may be site specific. The major threats identified in the state vary in character and intensity. The main causes being change in land use, catchment degradation, irrational use of water, ground water depletion, domestic and industrial pollution, Eutrophication, intrusion of exotic weeds, local biodiversity loss, crossing of carrying capacity of wetland, climate change, droughts, floods, disaster, social economic regional disparities and issues, and local and trans boundary conflicts.

Most of these cause negative and cumulative environmental impacts and are incremental with time having long-term effect. The changing attitude of the people for modern lifestyles and the dilemma between Growth V/s Developments are some of the common factors in aggravating the threat perception in rapidly industrializing state of Maharashtra. According to Samant (2012), in the last few decades it is increasingly realized that there is exponential increase in the environmental problems in the state, just as in the whole country. The Maharashtra being a leading industrialized and urbanized state in India, the gravity and extent of these problems has become more severe.

The quality of water may be described according to their physicochemical and biological characteristics. An understanding of water chemistry is the basis of the knowledge of the multi-dimensional aspect of aquatic environmental chemistry, which involves the source, composition, reaction and the transportation of water. The water bodies of rivers, lakes and dams or reservoirs are continues subject to a dynamic state of change with respect to the geological age and geo-chemical characteristics.

This is demonstrated by continuous circulation, transformation of energy and matter through the medium of living and their activities. Water flows plays a vital role in nutrient dynamics and aquatic productivity through transport of nutrients to the organism (Barik *et*

*al.*, 2010). However, the accelerating effects of human activities on biodiversity and the possibility that the loss of biodiversity might impact ecosystem functioning renewed interest in the effects of diversity on ecosystem processes and on ecosystem services essential to society. Estuaries are bodies of water classified by the interaction of a river and the ocean or sea. Wetlands vary in size, shape, and pattern however the most common types, marshes, bogs and swamps, often fluctuate between containing shallow, freshwater and being dry depending on the time of year (Patra *et al.*, 2011; Jyotsna *et al.*, 2014; Nair *et al.*, 2015) Chemical composition of water in a natural environment is influenced mainly by precipitation, type of soil and bedrock in the watershed, erosion, evaporation and sedimentation. There are hundreds of variables which are considered to play a role in water quality however a few have been determined to be of greater interest regarding the role they play in aquatic ecosystem health. While certain biological activities have an impact on dissolved gas concentrations, nutrients, etc. human activity is one of the strongest influences on water quality (Basawarajeshwari *et al.*, 2015; Kadam, 2016; Sivalingam *et al.*, 2018). Limnology classifies lakes or other bodies of water according to the trophic state index. An oligotrophic lake is characterized by relatively low levels of primary production and low levels of nutrients. A eutrophic lake has high levels of primary productivity due to very high nutrient levels. Eutrophication of a lake can lead to algal blooms.

Dystrophic lakes have high levels of humic matter and have typically yellow- brown, tea-coloured waters. These categories do not have rigid specifications; the classification system can be seen as more of a spectrum encompassing the various levels of aquatic productivity. Hence, these physico-chemical properties directly relate the biodiversity in concern water body. As Communities of organisms that are dependent on each other and on their environment live in aquatic ecosystems (O'Sullivan and Reynolds, 2005; Keddy, 2010).

### **Review of Literature :**

Krishna and Kumar (2017) noted that zooplankton holds a key position in the food web as it was directly related to the consumption of organic energy produced by phytoplanktonic photosynthesis and then by transforming it to the higher trophic levels of heterotrophs such as fish. Some zooplankton population disappeared at a specified period

and reappeared during other period. This disappearance may be due to the fact that some species occur in spores, under favorable conditions spore germinate and appear as zooplankton. Plankton diversity and physicochemical parameters of water are important criteria for evaluating the suitability of water for culture practices. In this study, we tried to assess zooplankton richness, evenness and diversity to observe the state of pond water in the study area. A total number 16 species recorded with 9 Rotifera, 3 Cladocera and 4 Copepods. In the rotifers the genus *Brachionus* is the dominant group.

Taruni and Manoj (2017) studied on Physico-chemical Parameters and Zooplankton diversity of lake on Tapi River at Utran, Surat, Gujarat. For the study, water samples were collected from the pre-selected site. Different Physico- Chemical parameters such as Temperature, pH, Dissolved Oxygen, Total Dissolved solids and Total Hardness were analysed according to the guidelines of APHA. Zooplankton samples were collected and preserved by using 5% formalin. The qualitative estimation of Zooplankton were done by using standard reference materials. This investigation showed that Zooplankton found during the study were belonging to major five groups i.e. Protozoa, Cladocera, Rotifera, Copepoda and Ostracoda. Diversity of Rotifera (12 genera) was highest followed by Cladocera (8 genera) and Copepoda (5 genera). Protozoa (3 genera) and Ostracoda (3 genera) comprised similar generic diversity during the study.

Narasimman *et al.* (2018) stated that zooplankton biodiversity serves as an ecological indicator of aquatic environment due to their rapid response according to environmental changes. At the present study, impact of seasonal changes on zooplankton biodiversity was conducted in the Ukkadam Lake, at Coimbatore city, Tamil Nadu, India. During studied period, in total, 28 species of zooplankton were noticed, which includes 9 species of each Rotifera and Cladocera and 5 species of Copepoda and Ostracoda. In this present observation, total abundance of Rotifera was found to be predominant with 35%, followed by Cladocera 29%, Copepoda 29% and Ostracoda 7%. The population density of various group of zooplankton was observed, and it was found to be following order Rotifera > Copepoda > Cladocera > Ostracoda. The high and low population densities were recorded in summer and early monsoon season respectively. This higher zooplankton population density in summer might be due to the temperature acceleration in the Ukkadam Lake. Their

study revealed that zooplankton productivity was found to be higher in the Ukkadam Lake when the temperature was increased in summer season.

Sivalingam (2018) examined the water quality of Manchiryal town lake Adilabad district Andhra Pradesh, India. The water quality analysis during the academic year June 2013-May 2014 was performed. The water quality analysis helps to know the suitability of water for different purpose like. Agriculture, industrial and domestic uses etc. In this study period water samples were collected in early morning hours at 7-00am to 9-00am. The physico-chemical parameters were used to indication of water quality. In the study period 13 parameters were analysed to water quality of lake used by stranded method.

y are atmosphere temperature, water temperature, pH, transparency, turbidity, TDS, DO, BOD, COD, Cl, P, S. The lake surrounding devotional activities are main cause to pollution of this lake water quality. The main cause to pollution of this lake urbanization, industrialization, domestic uses, devotional activities and people interact with lake surroundings. That's why plankton species low number/lit were recorded. Because domestic activities and sewage consult to the rainy season is main cause to pollution of this lake water.

Sharma and Sharma (2019) investigated the zooplankton diversity in relation to physico-chemical parameters of surface water in Barnai pond of Jammu district. Water parameters were analysed by following various standard methods , where as zooplankton were collected through the plankton net of standard bolting silk cloth no. 25 (mesh size 0.003-0.004  $\mu\text{m}$ ) and the total number of zooplankton was counted by using Drop count method. A total of 38 zooplankton taxa along with Nauplius larvae were observed belonging to 5 major taxonomic groups: Protozoa (6 species), Rotifera (21species), Cladocera (6 species), Copepoda (3 species) and Ostracoda (2species). Physico-chemical parameters of Barnai pond revealed well marked fluctuations with maxima and minima values of each parameter during specific seasons and zooplankton analysis revealed seasonal variations with an increase during summer and a fall during winter and monsoon seasons.

Anbalagan and Sivakami (2019) mentioned that the distribution and diversity of zooplankton in aquatic ecosystem depends mainly on the physico-chemical properties of water. Zooplankton have been considered as ecological importance organisms. The

Mayanur Dam contained a total of 22 species of zooplankton belonging to Protozoa, Rotifera, Cladocera, Copepoda, Ostracoda and Anostraca. A percentage comparison among the various zooplankton species reveals that the rotifers were the dominant group forming 50% of the zooplankton followed by cladocerans and copepods representing 13.7% each. This was followed by Ostracoda and Protozoa representing 9% each followed by Anostraca forming 4.6% of the total zooplankton. Thus, each group of zooplankters preferred to reach their peak in different months of the year.

The above literature clears that the zooplanktons are one of the important biological indicator that represent the health of water body. Their abundance is related to the physicochemical properties of reservoir.

### **Materials and Methods:**

The study was conducted during January to October 2020 to analyze the physicochemical status of reservoir with reference to zooplankton diversity. The effective protocol was adopted. The applied methods were as mentioned below.

#### ***Study Area***

Maharashtra state has occupied a pride to be at the heart of the country. It has also received a ecologically fragile western coast of 500 km and its geographical area also has received the benefits of being situated at the southern tip of the Satpuda mountain and at the east at Western Ghats. This geographical situation of the state has bestowed with rich flora and fauna flourished these two ranges of Western Ghats and Satpudas have gifted many rivers and water bodies to the state. However, irrigation department have tapped these water sources and created good water potential for the development of the state. The reservoir selected for the present investigations is also one of the important water body present in Akola District of Maharashtra.

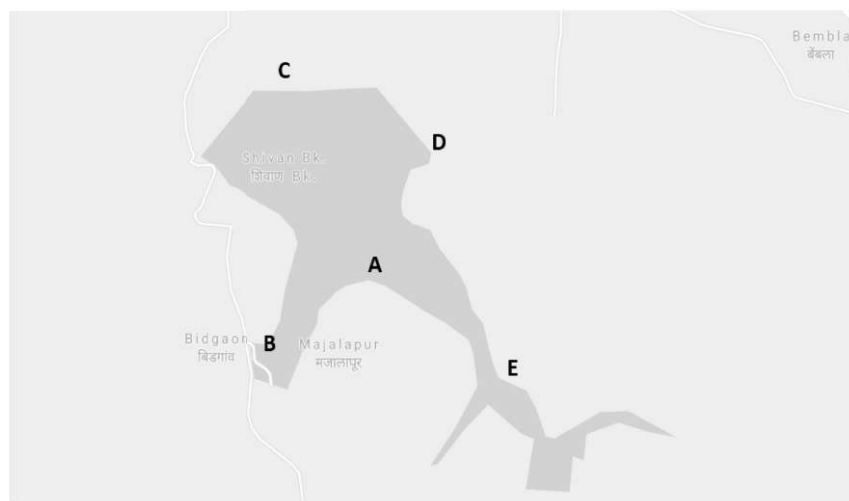


Fig. 1: Map of Shivan Reservoir

It is earthen type reservoir that located between  $20^{\circ} 63' N$  and  $77^{\circ} 44' E$ . During monsoon reservoir gets enough water but in post monsoon period particularly March and April water level is very much reduced. The reservoir is surrounded by red laterite soil and black cotton soil. The inland reservoir is fed by seasonal drainage to its periphery and nearby local streams and springs (Akola Gazetteer, 2020).

The climate of area is characterized by a hot summer, well-distributed rainfall during the south-west monsoon season and generally dry weather during the rest of the year. The cold season is from December to February. This is followed by the hot season from March to May. The southwest monsoon season is from June to September while October and November constitute the post-monsoon season (Falling Rain Genomics 2020). The mean minimum temperature was  $14.4^{\circ}C$  and means maximum temperature is  $36.8^{\circ}C$  at town in the district. The normal annual rainfall over the district varies from 711 to 911 mm from south west monsoon during June to September. Except during the southwest monsoon season when the humidity ranges between 60 to 80 % the air is generally dry over the area. The summer months are the driest when the relative humidity is even less than 20% in the afternoon on many days.

The skies are heavily clouded to overcast during the south-west monsoon season. In the rest of the year clear or lightly clouded skies prevail. Winds are generally light with some increase in wind speed in the latter part of the summer and the monsoon season. In the post-

monsoon months and the earlier half of the cold season the winds blow mostly from east or north-east. By February northwesterly and westerly winds start blowing. With the progress of the season winds from these directions become predominant. During the south-west monsoon season winds are mainly from directions between south-west and north-west.

### ***Field visits and Sample Collection***

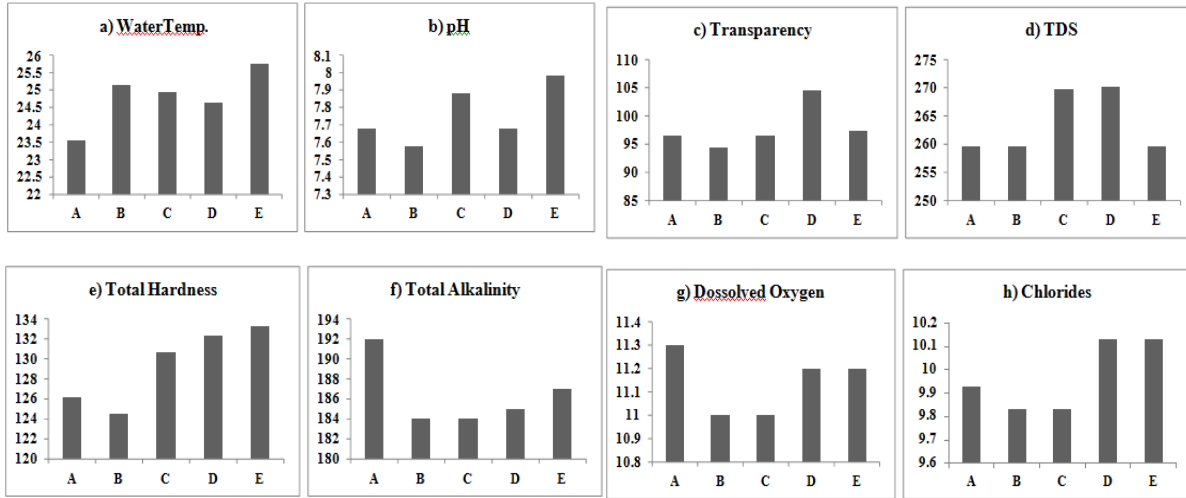
Water samples were collected from the lake early in the morning from different stations. Samples for physico-chemical analysis were collected manually from two different depths. Samples were collected from surface (1-2 cm) and bottom (maximum 10 meters) regions of the reservoir. Variations occurred in sampling according to the variations in water level of the reservoir. Samples were collected directly from the surface of water with the help of 2 liters acid cleaned bottles (Trivedy and Goel, 1986) and samples were transferred to the acid cleaned 2 liters polythene bottles using a plastic tube. All possible precautions were taken to avoid air bubbles. These water samples were kept in darkness packed in an ice boxes at 4<sup>0</sup> C till the samples reached laboratory for analysis.

Water samples were collected separately for the study of all the zooplankton. Zooplankton were collected by filtering net known quantity (1000 liter) of water filtered from sampling site through zooplankton net which is made up of fine mesh and zooplankton collected in to 100 ml bottle which is attached at the bottom of net. The samples were preserved in 4% formaldehyde solution and studied for diversity by using standard key literature.

### **Result and Discussion:**

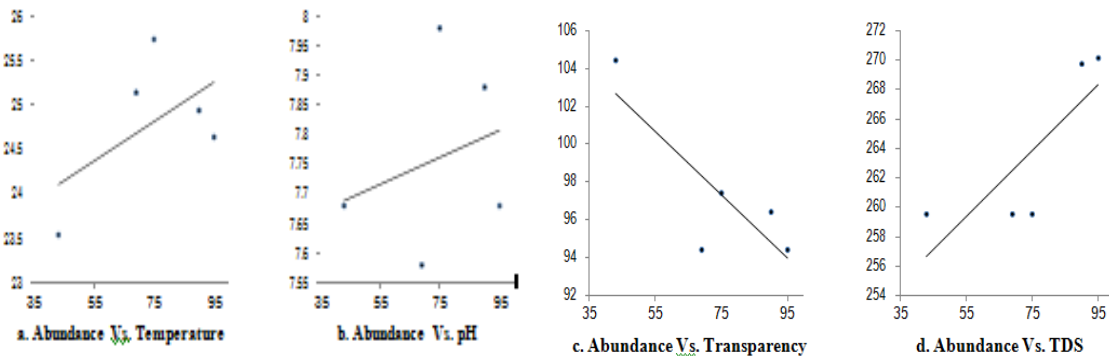
The study was conducted to analyze the physicochemical status of reservoir with reference to zooplankton diversity. The following charts represent the physicochemical status and zooplankton (Cladoceran) abundance in reservoir during study. The study revealed the rich zooplankton diversity.

## The Physicochemical status of reservoir

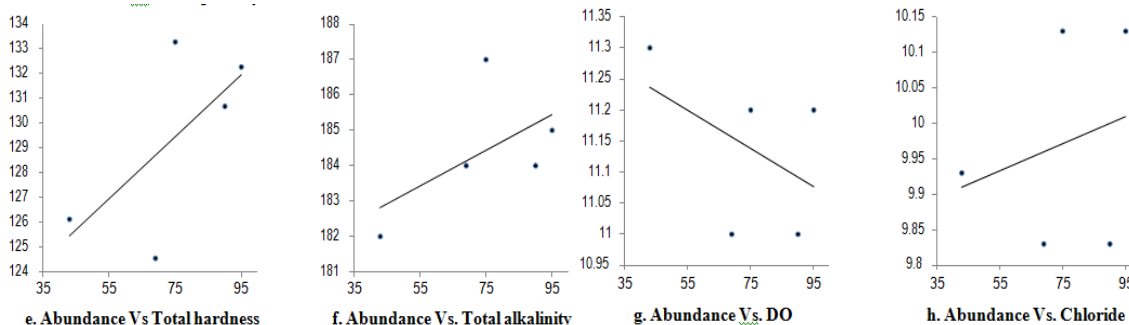


The observed status of zooplankton diversity was mostly related to the studied physicochemical parameters. The observed results were correlated and significantly different at  $p < 0.05$ . The results show the positive relation between these physicochemical parameters such as Water Temperature, pH, Total Dissolve Solids, Total Hardness, Total Alkalinity and Chlorides, with observed zooplankton diversity. But comparing with BIS drinking water standard, the water of these sites is not that much suitable for drinking purpose but can be used for drinking after proper processing/ filtration. But water of reservoir is suitable for irrigation and fish culture.

### *Relation between Zooplankton Abundance and physicochemical parameters*







The findings of present study cleared that the seasonal fluctuations in water properties. While comparing with BIS drinking water standard, the water of these sites is not much suitable for drinking purpose but can be use for drinking after proper treatment. Physico-chemical status showed that the water is suitable for irrigation and fish farming. The study also revealed the rich zooplankton diversity. The observed status of diversity was mostly related to the studied physico-chemical parameters. The results showed the positive relation between these physico-chemical parameters such as Water Temperature, pH, Turbidity, Total Dissolve Solids, Total Hardness, Total Alkalinity, Dissolve Oxygen, Chlorides, Sulphates, Magnesium, Nitrate and Phosphate with number of zooplankton species. The presented observations are in will agreement with previous studies of Thirumala *et al.* (2011), Murugan and Prabhakaran (2012), Mohite and Samant (2013), Bera *et. al.* (2014) and Valentina *et. al.* (2015).

The reservoir represented rich zooplankton diversity. Biodiversity generally refers to the variety and variability of life on Earth. Biodiversity typically measures variation at the genetic, the species, and the ecosystem level. Terrestrial biodiversity tends to be greater near the equator, which seems to be the result of the warm climate and high primary productivity. Biodiversity is not evenly distributed; rather it varies greatly across the globe as well as within regions. Among other factors, the diversity of all living organisms depends on temperature, precipitation, altitude, soils, geography and the presence of other species (Mathur *et al.*, 2008 and Kulkarni, 2009).

## References:

- Akola Gazetteer (2020) Database of Akola District redirected from official website of Aakola District (M.S.), India, [www.akola.nic.in](http://www.akola.nic.in).
- Anbalagan, R. and Sivakami, R. (2019) Freshwater Zooplankton Biodiversity and Physicochemical Parameters Of Mayanur Dam, Tamil Nadu, India. *International Journal of Research and Analytical Review*, 6(1): 85-93.
- Barik, A., Basu, M. and Roy, N. (2010) Seasonal abundance of net zooplankton correlated with physicochemical parameters in fresh water ecosystem. *International Journal of Lakes and Rivers*, 3: 67-77.
- Basawarajeshwari, I., Ramakrishna, R. and Vijaykumar, K. (2015) Zooplankton Diversity In Freshwater Reservoir Of Yadigir District, Karnataka State. *International Journal of Current Innovation Research*, 1(1); 19-22.
- Bera, A., Bhattacharya, M., Patra, B. and Sar, U. (2014) Ichthyofaunal Diversity and Water Quality in the Kangsabati Reservoir, West Bengal, India. *Advances In Zoology.*, ..13: 1-4.
- Jyotsna, N., Subba, R. and Narasimha Rao, G (2014) Seasonal variation of Microalgae in relation to the Physico-Chemical Parameters of Karagam Lake, Srikakulam District, A.P. India. *Journal of Algal Biomass Utiln.* 5 (4): 68-73.
- Kadam, S. S. (2016) Zooplankton Diversity of Bhogaon Reservoir in Parbhani District Maharashtra, India. *International Journal of Research & Review*, 3(6):52-60
- Keddy, P. A. (2010) Wetland Ecology. Principles and Conservation. Cambridge University Press. Cambridge Pp. 497.
- Krishna, P. and Kumar, H. (2017) Seasonal Variations of Zooplankton Community in Selected Ponds at Lake Kolleru Region of Andhra Pradesh, India. *Int.J.Curr.Microbiol.App.Sci.* 6(8): 2962-2970
- Kulkarni, U. D. (2009) Rate of Siltation in Wular Lake, (Jammu and Kashmir, India) with Special Emphasis on its Climate & Tectonics. *The International Journal of Climate Change: Impacts and Responses.* 09:1-5.
- Mathur, P., Agarwal, S. and Nag, M. (2008) Assessment of Physico-Chemical Characteristics and Suggested Restoration Measures for Pushkar Lake, Ajmer Rajasthan (India). *The World Lake Conference* 08:1518-1529.
- Mohite, S. A. and Samant, J. S. (2013) Impact of Environmental Change on Fish and Fisheries in Warna River Basin, Western Ghats, India. *International Research Journal of Environmental Science.*, 2(6): 61-70,
- Murugan, A. and Prabakaran, C. (2012) Fish Diversity in relation to Physico – Chemical Characteristics of Kamala Basin of Darbhanga District, Bihar, India. *International Journal of Pharma, Biology Achieve.*, 3 (1): 211-217.
- Nair, M. S., Reshma, J. K., Anu, M. and Ashok, A. (2015) Effect of Water Quality on Phytoplankton Abundance in Selected Ponds of Nedumangad Block anchayat, Kerala. *Emer*

*Life Sci Res.*, 1(2): 35-40.

Narasimman, M., Periyakali, S. and Santhanam, P. (2018) Impact of seasonal changes in zooplankton biodiversity in Ukkadam Lake, Coimbatore, Tamil Nadu, India, and potential future implications of climate change. *The J. Basic and Applied Zoology* 79 (15): 1-10.

O'Sullivan, P. and Reynolds, C. S. (2005) *The Lakes Handbook: Lake Restoration and Rehabilitation*. Wiley. ISBN 978-0-632-04795-6.

Patra, A., Kalyan, B. and Manna, C. (2011) Ecology and diversity of zooplankton in relation to physico-chemical characteristics of water of Santragachi Jheel, West Bengal, India. *Journal of Wetland Ecosystems*, 11 (5): 20-39

Samant, J. (2012) Wetland conservation in Maharashtra: Need, Threats and potential. Proceeding of International Conference SWRDM.. 234-256.

Sharma, A. and Sharma, M. (2019) Zooplankton Diversity in Relation to Physico- Chemical Parameters in Subtropical Pond of Jammu, Jammu and Kashmir, India, *Biosciences Biotechnology Research Asia*, 16(2): 425-439

Sivalingam, P. (2018) Physico-Chemical Parameters and Plankton Diversity of Manchiryal Town Lake Adilabad District, Andhra Pradesh, India. *J. of Biotech. and Biores.* 1(2):1-3

Taruni, S. and Manoj, K. (2017) A Preliminary Study on Physico-Chemical Parameters and Zooplankton Diversity of Tapi River at Utran, Surat, Gujarat. *International Journal For Innovative Research In Multidisciplinary Field*, 3(8): 179-184

Thirumala, S., Kiran, B. and Kantaraj, G. (2011) Fish diversity in relation to physico-chemical characteristics of Bhadra reservoir of Karnataka, India. *Advances in Applied Science and Research.*, 2(5):34-47.

Trivedi, R. K. and Goel, P. K. (1986) *Chemical and biological methods for water pollution studies environmental Publications*, Karad. 129 pp.

Valentina, T., Singh, H. T., Tamuli, A. K. and Robindra, T. (2015) Assessment of Physico-Chemical Characteristics and Fish Diversity of Hill streams in Karbi Anglong district, Assam, India. *International Research Journal of Environmental Science*, 4(5): 6-11.



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नीतिविना गति गेली, गतिविना वित्त गेले  
वित्तविना शूद्र स्वचले, इतके अनर्थ एका अविद्येने केले

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government offices or department will be used.  
The present research work is being carried out with the help of survey of India topographical maps and maps supplied by district planning.

Reference:

Agnihotri, V.K., Krishna, S. & Mukherjee, A. 1994. Human resource development for panchayats. In Amitava Mukherjee, ed. Decentralization, panchayats in the nineties, pp. 89-106. New Delhi, Vikas.

Bhatnagar, O.P. 1987. Evaluation methodology for training: theory and practice. New Delhi, Oxford Company.

Bishop, S. & Taylor, D. 1996. Training for change: activities to promote positive attitudes of change. New Delhi, Viva Books Pvt. Ltd.

Bohra, O.P. 2000. Decentralization and devolution of powers and functions to panchayats. Journal of Rural Development. 19(2):185-197.

Cernea, M.M.ed. 1991. Putting people first, sociological variables in rural development. New York, World Bank, Oxford University Press.

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## Covid -19: Impact and Challenges on Academic Library Services

Dr. Amit S. Tankar  
Librarian,

Shri Dr. R. G. Rathod Arts & Science College,  
Murtizapur, Dist. Akola (MS)

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### Abstract:-

The covid-19 and its impact and challenges on education system in India and academic library services. The petrifying and the extreme impact and challenges of covid-19 has shaken the world to its core. Additional, the higher a part of the governments across the world have quickly educational establishment making an attempt to consist the unfold of covid-19 pandemic. The purpose of this paper is to share the experience of a academic library service in response to covid-19 pandemic and highlights measures taken by Government of India.

**Keywords-** Covid-19, Education System, Library Services.

### Introduction :-

The covid-19 is most horrifying word of the today's world. It is playing the havoc all over the world and shattered the life, living style and the humanitarian values to the pieces. It has affected all the fields of life and all relations of living are facing the corona effect, How the education can be exception to it? Covide-19 has a tremendous detrimental effect on education system, where ever the corona pandemic has spreaded. 'Covid-19' a word never heard before by the common public and known to the medical persons only have been talked and cited by the media, is probably the most talked and cited word of this decade.

### Covide-19:-

Corona virus (CoV) is a large family of viruses that cause a range of illnesses like common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-Cov) and Server acute Respiratory Syndrome (SARSCov) A novel corona virus (nCov) is a new strain that has not been previously identified in humans. This new 2019 nCov was first identified in Wuhan, the capital of China's Hubai province, when people developed pneumonia without a clear cause.

Symptoms of the infection included coughing fever and breathing difficulties and the disease turned out to be fatal in several cases.

**Prevention and management** - The virus spreads among human via droplets when breathing or coughing or via contact. It is primarily transmitted when a person is within a range of about 90 to 180 cm from the infected person.

Till date no effective medicine or vaccine to treat 2019nCoV infection is available and there is high death rate. The only preventive measures WHO recommended are —

i. Wash your hands frequently with an alcohol-based hand rub or soap and water.

ii. Maintain social distancing- maintain at least 1 meter distance between yourself and other people particularly those who are coughing, sneezing and have a fever.

iii. Avoid touching eyes, nose and mouth.

iv. If you have fever, cough and difficulty in breathing, rush for medical care early as possible.

v. If you have mild respiratory symptoms and no travel history to or within China, carefully practice basic respiratory and hand hygiene and quarantine yourself, stay home until you are recovered.

As the countrywide spread and high death rate of covid-19 compelled the Government of India for declaration of lock down from 23<sup>rd</sup> March 2020. Which paralised the whole

country as if the life has come to stand still, education institutions with their academic library too.

### Objective of the Study:-

a) Impact of Covid-19 education system in India

b) To enlighten various measure taken by UGC & MHRD during Covid-19

c) To enlighten college, library, provides various services during this pandemic

d) Some suggestion how to continue education process during Covid-19

### Research Methodology:-

For this research paper collected the various research paper, shared post, educational e-content of reacted subject, and other literature related to impact of COVID-19 on educational system in India. Collected the various national and international reports like world health organization (WHO), UNESCO report, IFLA, and UGC report etc.

### Impact of Covid-19 on education system in India:-

As a result of lockdown all the conventioanal teaching, learning had to stop, no examination, no admission, to begin with it was all chaos.

Indian education system in general follows traditional methods i.e. face to face or physical form of educational where the academic libraries play import role which the renowned universities & institution in India use audio-visual aids for teaching. ICT (Information Communication Technology) based education pattern of audio-visual aids in class rooms was introduced a decade ago.

ICT has quite a few benefits in itself like ICT has no boundaries, it has more learning engagement expertise relatively than the traditional studying, additionally its a sawy for the college students but the inadequate funding and the limitations at rural area colleges, it did not work, to its fullest capacity. Its impact will be seen with low learning outcomes & a high drop-



out rate.

### To enlighten various measures taken by UGC and MHRD during Covid:-

In Covid-19 pandemic situation several arrangements are made by launching e-books, online teaching material, online depositaries. They have also taken digital initiatives for higher education i.e. **e-pathshala**- is a portal/app developed by the CIET, and NCERT. ... The platform offers a slew of educational resources, including NCERT textbooks for classes 1-12, audio-visual resources by NCERT, periodicals, supplements, teacher training modules and a variety of other print and non-print materials., **Gyan Darshan** is a set of educational television channels that release programmes from various Doordarshan Kendras using satellite transmission in different languages. It was launched as the exclusive Educational Television Channel of India., **e-shodhsindhu**- The MHRD has formed e-Shodh Sindhu merging three consortia initiatives, namely UGC-INFONET Digital Library Consortium, NLIST and INDEST-AICTE Consortium to provide access to peer-reviewed journals and a number of bibliographic, citation and factual databases in different disciplines to the Research, **SWAYAM** -is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged., **Shodhganga**- a reservoir of Indian theses is a digital repository of theses and dissertations submitted to Indian universities. ... The full text of all the documents submitted to Shodhganga are available to read and to download in open access to the academic community worldwide, **National Digital Library of India (NDLI)**- is a virtual repository of learning resources which is not just a repository with search/browse facilities but provides a host of services for the learner community. ... Services for Researchers and general learners are also

provided. **e-Yantra** -Innovation Challenge (formerly known as e-Yantra Ideas Competition) is a competition to encourage innovative projects from robotics labs set up through the e-Yantra Lab Setup Initiative (eLSI) in colleges across the world.

### Provisions made by college libraries in Covid-19 pandemics situation:-

Academic libraries have felt the need to shift their collection development practices to support changes as a result of the covid-19 pandemic disaster.

The biggest changes for libraries has been the shift from class room based instruction to on line & distance learning

We have to plan to review our print collection usages and the mode of services by the library persons to the students.

Acting as an agency - Due to the increase in distance learning college academic library needs to arrange for a range to e-books services so that the students' learning and research proceed with minimal disruption

To find a solution for providing remote access to database typically restricted to on site use, and promoting or easing restriction on digital content so it is necessary to make a provision in a annual budget.

### Some suggestion how to continuing effectively education processes during the covid-19:-

It's pretty difficult to predict how the current crisis will affect academic college libraries and their role in the higher education & research in future. The condition is quite chaotic and unpredictable. Not only the UGC or National Education Policy but the individual unit at rural or urban level has to think the reframing of academic college library working, suitable to their own need and situation

The micro and macro level handling of the problem shall help the college academic libraries so that the students shall not face the brunt brutally, which many influence their whole

academic carrier and future.

The Government of India also shall be declaring the directives from time to time to ensure the smooth flow of educational teaching to the students which shall be implemented by the colleges.

#### Conclusion:-

Many serious questions have arisen from the Covid-19 disaster. It has created many challenges as-

The online education is not available to the students all over as India is not fully equipped to make education, reach all corners of the nation via digital platforms.

The online education is psychologically non accepted by the students as it has many shortcomings.

Neither the students nor the teacher are specially trained for online teaching learning technique

Inadequacy of online education has raised the questions on standard of education and the degrees

In the vocational education the inevitable part as practical's, projects, seminars, internships are lacking totally, making them untaught or incompletely taught degree holders. Which shall never be accepted by the industry, research laboratories or any where

But at the same time it has brought the opportunities to restructure the complete or partially to educational system to face such disasters.

Government of India announced the new education policy 2020. It is most welcome step taken. NEP 2020 as a statement of intent has much in that is positive. But the covid-19 pandemic has made its implementation impossible

Now the Government of India has an opportunity to review the "New Education policy 2020" in the light of this covid-19 pandemic effect on education.

The covid-19 pandemic has very bluntly brought the short coming of present education

system particularly in digital platform.

There is urgent need to take special efforts on making every nook and corner of India well equipped with knowledge of information technology infrastructure and access to digital world.

#### References:-

- 1) Hepworth, Mark,; A study of Undergraduate Information Literacy and skills. The inclusion of Information Literacy and skills in the Undergraduate Curriculum. In 65<sup>th</sup> IFLA conference, Bangkok, 20<sup>th</sup>- 28<sup>th</sup>, August 1999.
- 2) Karisdeppa, G.R. and Kavita H.C.; Information Literacy for life long learning, ILA Bulletin, 2005; 41 (1), P.10-15.
- 3) Balasubramaniam P.; Users and use of Library. Deep and Deep Publication Pvt. Ltd., New Delhi, 2012, P. 14-15.
- 4) Bharat B. Alasandi and Kattmani,; Information Literacy in Higher Education, University News., 2017, 55 (24), P. 16-17.
- 5) Learning On The Go- Epathshala accessed on 16/12/2020 from <https://epathshala.nic.in/pages.php?id=about-us&ln=en>
- 6) Gyandarshan-IGNOU Online, accessed on 16/12/2020 from <https://www.ignouonline.ac.in/gyandarshan/>
- 7) IFLA and Covid-19, accessed on 16/12/2020 from <https://www.ifla.org/covid-19>
- 8) E-ShodhSindhu :Consortium for Higher Education..Inflibnet accessed on 16/12/2020 from <https://ess.inflibnet.ac.in/>
- 9) Swayam. accessed on 16/12/2020 from <https://swayam.gov.in/about>
- 10) Shodhganga:a reservoir of Indian theses@Inflivnet, accessed on 16/12/2020 from <https://shodhganga.inflibnet.ac.in/>
- 11) National Digital Library of India, accessed on 12/12/2020 from <https://ndl.iitkgp.ac.in/>.
- 12) <https://www.e-yantra.org/> accessed on 16/12/2020
- 13) Coronavirus disease (COVID-19) pandemic, accessed on 16/12/2020 from <https://covid19.who.int/>
- 14) Moallem M (2004), Distance Learning and University Effectiveness; Changing Educational Paradigms for Online, Information Mangement; vol.17 No.3/14. p.27-29.

## PHYTOCHEMICAL ANALYSIS OF MEDICINAL HERBS HYPTIS-SUAVEOLENS AND THEIR APPLICATION AS HOME REMEDIES

**Dr. D. B. Dupare**

Head & Assistant Professor, Shri Dr. R. G. Rathod Arts and Science College, Murtizapur,  
Di-Akola

Email-dharamdupare5@gmail.com

### Abstract –

The commonly known as American mint, medicinal herb or in Marathi is known as darptulas or bhustrena. The plant is used as stimulant, carminative, antispasmodic, antirheumatic, antispuritic bath. It is commonly used for headache, stomach, snuff to stop the bleeding of nose and infection of uterus. The leaves and flowers extract are carried out in aqueous as well as hexane extraction for phytochemical study. Most of the plant parts (extract) identified eg. (leaf and flower) serve as major source of active ingredient and products of secondary metabolites e.g. alkaloid, terpenoid etc. used in curing diseases, production of drugs as well as in maintaining good health by the traditional practitioners. The phytochemical screening of ethanol crude leaf extract of *Hyptis suaveolens* revealed the presence of alkaloids, tannins, saponins and flavonoids. These metabolites observed by various techniques like solvent extraction by ultra-sonicator, rota-vapour, thin layer chromatography column separation and HPTLC technique.

**Keyword-** medicinal herb, phytochemical, *Hyptis suaveolens*, ultra-sonicator, American mint.

### Introduction-

Human beings have highly used indigenous medicinal plant life, for treatment of diverse illnesses to heal therapy sicknesses. Historical conventional know-how approximately residences or toxic consequences of vegetation, and herbs accumulated from these earliest times to provide health and predates all other medical treatment. But, on trial basis humans have discovered that under sure condition, physiological results of some secondary metabolites will have curative benefits.

A huge number of medicinal flowers contain important oils that have giant bioactivities. Those oil vegetation are been utilized for their fragrant price as flavorings in meals and liquids and as fragrances in pharmaceutical products. The medicinal impact benefited from plant substances typically resulted from the combination of secondary metabolites located inside the plant. Number one merchandise like carbohydrates, protein, nucleic acids, chlorophyll and lipids, the medicinal actions of plant life that are ordinary to specific plant species or corporations are constant with this idea as the mixtures of secondary products in a particular plant. The medicinal components present in vegetation cost had been, extraction of essential oils changed into accomplished the use of steam distillation technique, hydro-distillation technique, dry/damaging distillation,

Inside the present examine *Hyptis suaveolens* plant leaves and flower material of by means of the use of Rota-vapour changed into used to extract crucial oil from plant material. Those extracted substances are separate by column chromatography, thin layer chromatography and different characterization via using one of a kind characterization approach. The medicinal values of diverse component like leaves and florescent of this plant as use from Vidhabha vicinity, especially Melghat location especially accrued in month of August to month of November year 2020.

Those vital oils are complex mixtures of, created from terpenoid hydrocarbons, oxygenated terpenes and sesquiterpenes. They originate from the plant secondary metabolism and are chargeable for their characteristic aroma. This article reports the phytochemical constituents of leaf extract of *Hyptis suaveolens* plant leaves and flowerence material and their potential for medicinal application.

### Materials And Methods

The fresh leaves of *Hyptis suaveolens*. were collected in the month especially Melghat location especially accrued in month of August to month of November year 2020.

The plant was authenticated at Department of Botany, Dr. R.G.Rathod Arts and science college Murtizapur Di –Akola.[MS], India. Collected fresh leaves were washed and used for the study of microscopic characteristics. The dried leaves of the plant was powdered and passed through 40 mesh size and stored in an airtight container for further use.

### Extraction and Isolation-

Near about 500gm leaves of *Hyptis suaveolens* dried and pulverized to powder using pestle and mortar in the laboratory. The plant material was macerated with hexane at room temperature and the extract store in refrigerator until the need of further study.

### Phytochemical screening–

Phytochemical analysis of the crude extract of hexane was carried out according to standard method (Rangari et-al in 2002)

Table 1: Qualitative Analysis of Phytochemicals

sr.no	Test	Observation
1	<b>Test of Alkaloids</b>	
	1.0ml of plant extract was taken and then adds 1.0 ml of saturated solution of picric acid was added.	Yellow colour appears
2	<b>Test of Tannins</b>	
	About 0.5 g of the extract was boiled in 10 ml of water in a test tube and then filtered. A few drops of 0.1% FeCl <sub>3</sub> was added	Brownish green or blue- black coloration.
3	<b>Test of Saponins</b>	
	0.5g of extract was added in 5ml of distilled water in a test tube. The solution was shaken vigorously. The frothing was mixed with 3 drops of olive oil and shaken vigorously.	Stable persistent froth appears. Formation of an emulsion
4	<b>Test for Terpenoids</b>	
	5 ml of extract was mixed with 2 ml of chloroform and 3 ml of conc. H <sub>2</sub> SO <sub>4</sub> was carefully added to form a layer.	A reddish brown coloration of the interface was formed.
5	<b>Test for Flavonoids</b>	
	5 ml of dil. Ammonia solution were added to a portion of the crude extract followed by addition of conc. H <sub>2</sub> SO <sub>4</sub> .	Yellow coloration occurs.
6	<b>Test for Phenol</b>	
	2 ml of extract was taken and add 2 ml of Folin's reagent.	Appearance of violet or brown colour.
7	<b>Test for phytosterol(salkowski reaction)</b>	
	0.5ml of extract was taken in test tube add 1ml of conc H <sub>2</sub> SO <sub>4</sub> and 1 ml chloroform	Appearance of reddish or brown colour in chloroform layer
8	<b>Liebermann-Burchads test for Triterpenoid</b>	
	Extract are treated with few drops of acetic anhydrides boil and cool and conc sulphuric acid added	showed a brown ring at the junction of two layers and formation of deep red colour
9	<b>Test of lactones</b>	
	0.5ml of extract and 1ml of sodium nitroprusside and 1ml of pyridine were added in test tube and 0.1ml of NaOH	Appearance of reddish deep colour
10	<b>Test of glycosides</b>	
	1 ml glacial acetic acid few drop of ferric chloride solution and conc sulphuric acid added	Appearance of reddish brown Colour at the junction of liquid presence of deoxy sugar.

### Thin Layer Chromatography (TLC)

TLC analysis was carried out for the plant extracts dissolved in hexane. For the analysis the silica gel sheet was used, fresh leaves extracts were analyzed using TLC. The sheets are kept in TLC Chamber for one hour, depending on the polarity of the eluted fractions to be analyzed. The sheets were treated with 1% ninhydrin diluted to acetone.

### HPTLC Technique

HPTLC analysis was carried out for the plant extracts dissolved in hexane. The HPTLC characterization performed at Sophisticated Instrumentation Centre For Applied Research & Testing (SICART), Sardar Patel Centre for Science & Technology, Charutar Vidya Mandal Vallabh Vidyanagar.

### Results and discussion.

#### Phytochemical Investigation:

The Phytochemical screening of dried leaves or useful material plant part showed positive results as the tests like Terpenoids, Flavonoids, Saponins, Tannins and steroids. This data clear that there is presence of various phytochemical in Plant extract.

**Table (3.1): Phytochemical screening of extracts of medicinal plants**

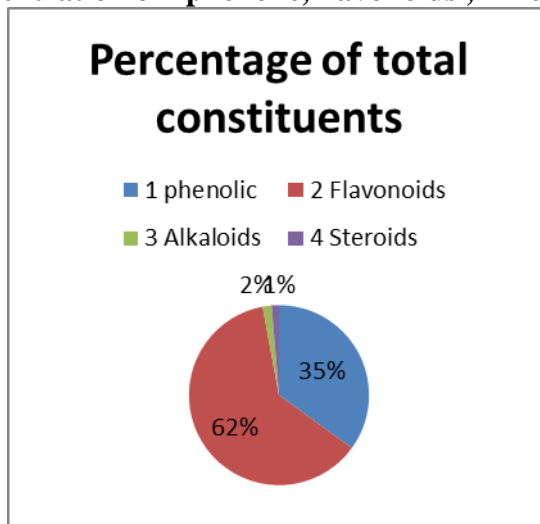
Sr.No.	Phytochemical Constituents	Leaves in Hexane extract	Leaves in Aqueous extract	Flowers in Hexane extract	Leaves in Aqueous extract
1	Tannin	+	++	+++	+
2	Saponins	--	++	++	-
3	Steroid	--	--	--	--
4	Flavonoids	++	+++	++	-
5	Alkaloids	--	+	+	++
6	Terpenoids	++	+++	+++	+
7	Glycosides	+	++	++	--
8	Coumarins	--	--	--	--
9	Carbohydrates	+	++	-	+
10	Quinine	++	++	+++	+
11	Resin	+	--	++	+

#### Quantitative spectrophotometric analysis for phenolic content and flavonoids:

The total phenolic and flavonoids content of plant aqueous extract were determined

Sr no	Plant name	phenolic (ug/ml)	Flavonoids (ug/ml)	Alkaloids (ug/ml)	Steroids (ug/ml)
1	Hyptis – suaveolens	27.232	48.34	1.232	1.032

spectrophotometrically using the tannic acid and quercetin standard calibration curves, respectively, as per Ranjana sing et al (2015)(7). Both standard curves showed linearity with R2 value 0.962 and 0.956. The total phenolic and Alkaloids content was found as per given table 3.2. presence of various phytochemical in Plant extract diabetic treatment alkaloid is used as antidiabetic drug.

**Table-2. The total concentration of phenolic, flavonoids, Alkaloids and steroids.**

Sr no	Plant name	N0. of Bands	Rf Value	Spraying Regents	Colour of Band Appeared	Phytochemical Detected
1	Hyptis – suaveolens	5	0.08	Vanillin-sulphuric acid reagent	Blue	Saponins
			0.32	5% Ferric chloride	Dark grey	Flavonoid
			0.41	5% Ferric chloride	Dark grey	Flavonoid
			0.62	FeCl <sub>3</sub>	Intense red	Phenol
			0.74	Ethanolicsulphuric acid	Brown	Alkaloids

### TLC purification of the extracts

The TLC of hexane extract of plant is shown with their RF values. Hence, further investigations are required to isolate, purify and characterize those compounds which are responsible for the treatment of pharmaceutical disorders like anti-cancer, antitumor, antidiabetic properties.

Table 3: TLC of ethanol extracts in mobile phase petroleum ether: benzene: methanol (16:4:2).

Sr no	Plant name	phenolic (ug/ml)	Flavonoids (ug/ml)	Alkaloids (ug/ml)	Steroids (ug/ml)
1	Hyptis – suaveolens	27.232	48.34	1.232	1.032

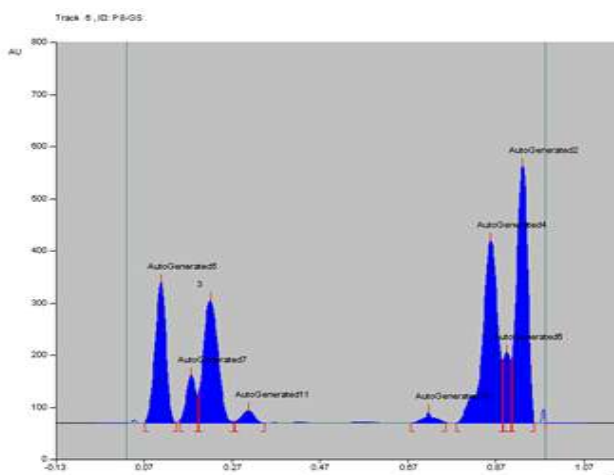
### High Performance Thin Layer Chromatography (HPTLC):

Chromatographic fingerprint profile of ethanol extracts plants were studied by HPTLC. For better resolution and maximum number of spots, and satisfactory resolution was obtained in the solvent

Toluene: Ethyl acetate: Formic acid:: 8:4:2. After scanning and visualizing the plates in absorbance mode at both 254nm and 366 nm range.

The results from HPTLC finger print, The Rf values ranged from 0.07 to 0.99. It is also clear from Table 3.4 and the chromatogram as shown in (Fig. 3) that were found to be more predominant as the percentage area is more with respectively. HPTLC plate showed different colourphytoconstituents of ethanol extract. The bands revealed presence of different colour bands showing the presence of steroids, alkaloids and terpenoids etc.

Table 4: HPTLC of hexane extracts in mobile phase Toluene: Ethyl acetate: Formic acid: (8:4:2)



Sr no	Plant name	N0. of Bands	Rf Value
1	Hyptis – suaveolens	8	0.11,0.17,0.22,0.29,0.69, 0.79,0.82,0.91

**Conclusion**

In the present investigation, Hyptis –suaveolens(Labiatae) is an aromatic annual shrubdistributed in tropical and subtropical region. It wasreported to be used for as anticancer agents (3).This study observation for biologically active compounds with fewer side effects as well as in essential oil antimicrobial activity against a wide range of microorganism.The studies on composition of essential oil are necessary therefore in further study are very necessary to conserve and Further advanced spectroscopic studies are required for the structural elucidation and identification of compounds

**References-**

- 1) Chakra borty R, Rajagopalan R. (2002) Diabetes and insulin resistance associated disorders: disease and the therapy, Current Science; 83: 1533-1538.
- 2) Ladan.Z.,AmupationJ.O.,Oyewale.O.A.,AyoR.G.,Temple .E and Ladan E.O.(2014)Phytochemical screening of the leaf extracts of Hyptis-spicigera. 85:83-88.
- 3) Witavapan N.,SombatC.andSiriporn O.(2007), Antioxidant and Antimicrobial Activites of Hyptis –suaveolens Essential oil. ScientiaPharmacetica 75:35-46.
- 4) Mallavarupa G.R., Sirmivasaiyer R.,Kual P.N ,BhattacharyaA.K.andRajeshwarRao,(2011) The Essential oil ofHyptis –suaveolens (Labiatae) Poit.321-323.
- 5) ZitaA.Abgali and ThieryB.C.Alavo. (2011) Essential oil from Brush Mint Hyptis – suaveolens is an effective as DEET for personal protection agent Mosquito Bites.The open Entomology Journal 5:45-48.



## TO STUDY LEAF EXTRACT OF RICINUS COMMUNIS L: TO CURE JAUNDICE AND INCREASE WBC OF BLOOD

**D. B. Dupare**

Shri Dr R. G. Rathod Arts and Science College, Murtizapur. Di.Akola  
duparedharam5@gmail.com

### ABSTRACT

Most of the plant parts identified like (leaf) serve as major source of active ingredient and products of secondary metabolites e.g alkaloid, terpenoids etc used in curing diseases, production of drugs as well as in maintaining good health by the traditional practitioners. The phytochemical analysis of *Ricinus communis* L was evaluated to ascertain some of the secondary metabolites that exhibit medicinal properties. The results of phytochemical screening of ethanol crude leaf extract of *Ricinus communis* L revealed the presence of alkaloids, tannins, saponins and flavonoids. These metabolites observed by various techniques like solvent extraction secondary metabolites could be responsible for the observed medicinal properties of, microwave oven, ultrasonicator, rotavapour, thin layer chromatography, column separation technique. This will involve a synergy between the traditional practitioners that will aim at formulating an integrative health for the overall goal of maintaining, enhancing and sustaining good health care.

**Keywords:** Phytochemical, Medicinal plant, traditional and Metabolites.

### Introduction

*Ricinus communis* L, a member of Euphorbiaceae family commonly known as "Arandi." in almost all hot places of India specially Amravati region. The Leaves of *Ricinus communis* L are up to 24cm long, petioles. It is fairly common in field side which grown in hotter part of the India. Plant *Ricinus communis* L is extensively utilized for the treatment of pharmaceutical disorders antioxidative, antidiabetic, antibacterial, and hypoglycemic and hepatoprotective properties (1). It has been reputed in Siddha system of medicine as a remedy to treat jaundice; plants are an essential and integral component in the world of prescription medicine and have the ability to make various chemical constituents like flavonoids, alkaloids, and steroids. In some places, juice from the leaves of the plant is used with the liquid extract to treat leaf jaundice.



**Fig 1.a) Ricinus communis L**

### Materials and Methods

#### Plant material

*Ricinus communis* L leaves were collected during the month of February 2015-October 2015, from Satpuda and Dharni hill area near to Amravati region Maharashtra, India. The fresh leaves were separated and kept for shade drying. Dried leaf material was powdered using mechanical grinder and heat in microwave oven to get the powder of desired coarseness. Powdered material was preserved in an air tight container.

#### Preparation of extracts

Dried *Ricinus communis* L leaf powder mixed with ethanol and kept in ultrasonicator for half an hour to mix all chemical constituents in ethanol solvent was subjected to successive extraction in Soxhlet extractor using ethanol and water. The extracts were filtered and the filtrates were concentrated under Rota vapour at room temperature to obtain the extracts as solid residues.

#### Phytochemical screening Thin Layer Chromatography (TLC)

TLC analysis was carried out for the plant extracts dissolved in ethanol and water solvent. For the analysis the silica gel sheet was used, fresh leaf extracts and the cold dried leaves extracts were analyzed using TLC. The sheets are kept in TLC Chamber for one hour, depending on the polarity of the eluted



fractions to be analyzed. The sheets were treated with 1% ninhydrin diluted to acetone and heated in an oven at 40°C for 30 seconds.

#### Test for Anthraquinones

The 0.5 g of the extract was boiled with 10 ml of sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) and filtered while hot. The filtrate was shaken with 5 ml of chloroform. The chloroform layer was pipette into another test tube and 1 ml of dilute ammonia was added. The resulting solution was observed for color changes.

#### Test for Terpenoids (Salkowski test)

The 0.5 g each of the extract was added 2 ml of chloroform. Concentrated H<sub>2</sub>SO<sub>4</sub> (3 ml) was carefully added to form a layer. A reddish brown coloration of the interface indicates the presence of terpenoids.

#### Test for Flavonoids

Three methods were used to test for flavonoids. First, dilute ammonia (5ml) was added to a portion of an aqueous filtrate of the extract. Concentrated sulphuric acid (1 ml) was added. Second, a few drops of 1% aluminium solution were added to a portion of the filtrate. Third, a portion of the extract was heated with 10 ml of ethyl acetate over a steam bath for 3 min. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of dilute ammonia solution. In all the cases, a yellow coloration indicating the presence of flavonoids was observed.

#### Test for Saponins

The 0.5 g of extract was added 5 ml of distilled water in a test tube. The solution was shaken vigorously and the mixture is observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

#### Test for Tannins

The 0.5 g of the extract was boiled in 10 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or a blue-black coloration.

#### Test for Steroids (Liebermann-Burchard's test)

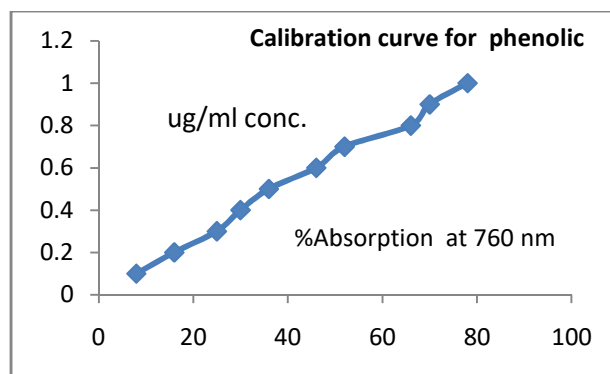
One ml of the extract was dissolved in 10 ml of chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tube. The upper layer turns red and sulphuric

acid layer showed yellow with green fluorescence. This indicated the presence of steroids. (7)

### Quantitative analysis of phytochemical present in plants extract- Estimation of the total phenolic content

Total phenolic content in plant extract aqueous extract was determined by standard method of Ranjana sing et al (2015). Tannic acid was used as a standard phenolic compound. Standard calibration curve (Fig. 1.b) was plotted using known concentrations of tannic acid (10 – 100 µg/ml) at 760 nm. For analysis 250 µl of Tannic acid/ plants extract was mixed with 1 ml of distilled water followed by the addition of equal amount of Folin-Ciocalteu reagent. The mixture was mixed and incubated at room temperature for 5 min before the addition of 7 % Na<sub>2</sub>CO<sub>3</sub>. Then final volume was made up to 6 ml with distilled water. Absorbance of blue colored mixture was observed spectrophotometrically at 760 nm. The total phenol content in the test samples was calculated from the standard curve and expressed as µg tannic acid equivalent (TAE) /mg of concentrated plants extract. This process repeated for number of time to get constant reading for all plants part extract.

Fig 1.b) Tannic acid calibration curve for phenolic compounds

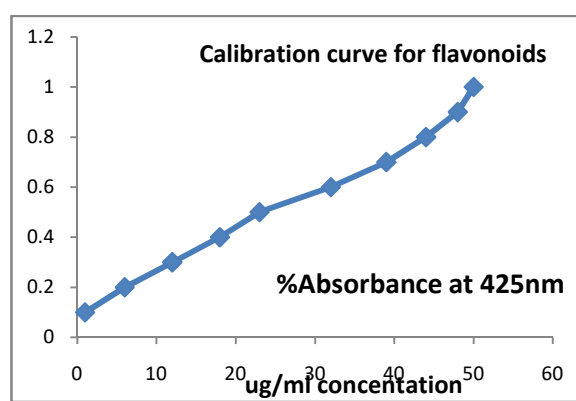


#### Total flavonoids content

Aluminum chloride colorimetric method was used for flavonoid determination based on standard method of Ranjana sing et al (2015). Reaction mixture containing 100 µl plant extract in 2.0 ml of methanol followed by 0.1 ml of aluminum chloride, 0.1 ml of potassium acetate and 2.8 ml of distilled water was incubated at room temperature for 30 minutes.

The absorbance of the colored reaction mixture was measured at 415 nm by spectrophotometer. Sample blank was prepared in similar way by replacing extract with distilled water. In this method quercetin was used as a standard to make calibration curve 10 mg of quercetin was dissolved in methanol and then diluted to make different concentrations (1-50  $\mu\text{g} / \text{ml}$ ). Flavonoids content was estimated as quercetin equivalent  $\mu\text{g} / \text{ml}$  of concentrated plants extract. This process repeated for number of time to get constant reading for all plants part extract.

**Fig 1.c) Quercetin calibration curve for flavonoids**



### Results and discussion.

#### Phytochemical investigation:

The Phytochemical screening of Ricinus communis L showed positive results as the tests like Anthraquinone, Terpenoids, Flavonoids, Saponins, Tannins and steroids Ricinus communis L.

**Table (3.1): Phytochemical screening of extracts of medicinal plants**

Sr no	Test perform	Ricinus communis Leaves ethanolic extract	Ricinus communis Leaves aqueous extract
1	Anthraquinone	+	+
2	Terpenoids	+	+
3	Flavonoids	+	+
4	Saponins	+	+
5	Tannins	-	+
6	Steroids	+	-

#### Quantitative spectrophotometric analysis for phenolic content and flavonoids:

The total phenolic and flavonoids content of plant aqueous extract were determined spectrophotometrically using the tannic acid and quercetin standard calibration curves, respectively, as per Ranjana sing et al (2015). Both standard curves showed linearity with  $R_2$  value 0.982 and 0.984. The total phenolic and flavonoids content was found as per given table 3.2 .as antioxidant used in medicinal application to cure jaundice.

**Table (3.2): Total phenolic and flavonoids contain in Abutilon Indicum.plant**

Sr.no	Plant name	Total phenolic (ug/ml)	Total flavonoids (ug/ml)
1	Ricinus communis L.	7.412	5.123

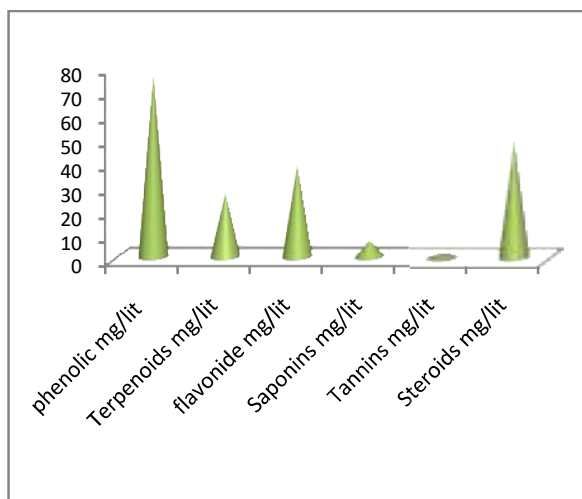
#### TLC purification of the extracts

The TLC of ethanolic extract of Ricinus communis L plant is shown in with their RF values. From it is evident that there are many components that are responsible for the antioxidant activity. Hence, further investigations are required to isolate, purify and characterize those compounds which are responsible for the antioxidant activity used in medicinal application to cure jaundice and increase the WBC from blood.

#### Percentage of major phytochemical present

The TLC of ethanolic extract of Ricinus communis L plant is shown in with their The percentage yield for the various phytochemical in ethanolic solvent extracts of Ricinus communis L plant is shown in Table 1. Phenolic in mg/lit has the highest percentage than, when compared to the other phytochemical.

1	phenolic	76mg/lit
2	Terpenoids	27mg/lit
3	flavonoid	39mg/it
4	Saponins	7mg/lit
5	Tannins	2mg/lit
6	Steroids	56mg/lit



## Conclusion

In the present investigation, *Ricinus communis* L. Medicinal plant species used to treat jaundice. The plants are used to increase WBC of blood. The uses of these plants to treat various illnesses by the communities, because of poor socio-economic conditions, the high cost and a difficult access to allopathic medicines. The majority of the reported species are wild and rare. Now a day, conservation of traditional knowledge is necessary related to modernization of the region and lack of interest in traditional medicine, in transferring it to next generation. Further advanced spectroscopic studies are required for the structural elucidation and identification of compounds.

## References

- Sharma A, Sharma RA, Singh H. (2013) Phytochemical and Pharmacological Profile of *Abutilon indicum* L. Sweet: A Review, *Int. J. Pharm. Sci. Rev. Res.*, 20 (1); 120-127.
- Yoganarsimham SW., (2000) Medicinal plants of India, Vol 2, Cyber Media, Bangalore 10-11
- Md. Reyad-ul-ferdous, Mehedi Rahman, Md. Kawsar Mahamud, Sharmi Sultana Ayshi, Md. Didaruzzaman Sohel, (2015) Pharmacologicals and Phytochemicals Potential of *Abutilon indicum*: A Comprehensive Review *American Journal of BioScience*; 3(2-1): 5-11.
- Golwala D.K., Patel L.D., Vaidya S.K., Bothara S.B., Mani M., Patel P. (2010) Anticonvulsant Activity of *Abutilon indicum* leaf, *International J. Pharmacy and Pharmaceutical Science*, V-2
- Saranya S.R., Krishna P.J, Singh R.K, Dhivya M.G and Rajasekar.S. (2013) *International Journal of Advanced Biotechnology and Research* ISSN 0976-2612, Vol 4, Issue 4, pp 496-504
- Sarkar, R., Haque, A.; Ranjan, S; Sarker, M.(2015) Phytochemical Screening, Antioxidant and Antimicrobial Effects *Abutilon indicum* (L.) Leaves Extracts *Jpharmacology Archives* • vol.1 • 94-103.
- Singh, Ranjana and Mendhulkar, V. D. (2015) *Journal of Chemical and Pharmaceutical Research*, 7(6):205-211.
- Naikade, S.M. and Meshram M.R. (2014) *International Journal of Pharmaceutical Science Invention* 2319 – 6718, PP.39-41 vol-3 No12.
- Dhal, N. K.; Panda, S. S. and Muduli S. D. (2015) *Asian Journal of Plant Science and Research*, 5(2): 27-33.
- Mahadeva Rao U.S. ; Muhammad Abdurrazak; Khamsah Suryati Mohd (2016) phytochemical screening, total flavonoid and phenolic content assays of various solvent extracts of tepal of *Musa paradisiaca* *Malaysian Journal of Analytical Sciences*, Vol 20 No 5 (2016): 1181 - 1190



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## Gas Monitor Composites : Polypyrrole–Polyvinyl alcohol-Nickel Chloride

### ABSTRACT

In present investigation, we have developed Polypyrrole – Polyvinyl alcohol-Nickel chloride doped thin films polymeric composites. These films were synthesized by chemical oxidative polymerization in aqueous acidic medium. These polymeric composites were characterized by U.V.- visible, FTIR spectroscopy; surface morphology by Scanning electron microscope (SEM). Their electrical conductivity was measured by four probe techniques. The linear Ohmic behaviour observed by I-V characteristics. Gas monitoring properties of the sensor was checked against hazardous gases like Ammonia. The sensor shows almost stable and repeatable response up to 1-800ppm.

**Keywords:** polymer, polypyrrole, Nickel Chloride, Conducting polymer, Ammonia gas PPN sensor.

**D.B.Dupare**

Department of Chemistry,  
Shri Dr R.G.Rathod Arts and Science  
College. Murtizapur, Di.Akola.

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## Introduction –

The polymeric composites are the most important materials in the 20<sup>th</sup> century, the utilization of polymeric composites was passive materials, for electronic, optical, energy stockpiling, and mechanical properties. For over thirty years, natural polymers were known as the best applicants due to their one of kind electrical vehicle properties too as their possible utility in the arising innovation.

Electrically conducting polymers are synthesized either by reduction or by oxidation reaction, which is called doping process, giving materials with electrical conductivities up to 10<sup>5</sup> S/cm.

Among the leading polymers, polypyrrole has attracted significant consideration because of its high conductivity, simple preparation, stability, and good mechanical and electrochemical properties. It shows a wide scope of surface conductivities (10<sup>-3</sup> Scm<sup>-1</sup> < 50β < 100Scm<sup>-1</sup>) contingent upon the usefulness and replacement example of the monomer and the nature of the counter ion or dopant. There are other potential application of polypyrrole, for example, chip-in-chip connector, microwave protecting, and erosion assurance (2). Aside from these, polypyrrole is widely utilized in sensor applications since they give steady and permeable network to the gas part and likewise encourages the e-move measure (3). Additionally, polypyrrole offers another class of materials in organic and biomedical applications including biosensors (4).

The present investigation deals with a study of the influence of nickel chloride dopant on synthesis of Polypyrrole doped thin films. These synthesized films were characterized by U.V-visible, Fourier transform Infrared spectroscopy (FTIR), surface morphology by Scanning Electron Microscopy (SEM), electrical conductivity and I-V characteristics. The gas sensing behavior for monitoring of TMA and ammonia gas vapors at room temperature from 10-800ppm concentration.

## 2. Material and Methods

**Materials-** Analytical-reagent-grade

Pyrrrole, nickel choride and anhydrous iron (III) chloride (AR-grade) were obtained and used in the present study.

Pyrrrole monomer was purified by distillation under reduced pressure and stored in dark at 10° C. Each process was done with double distilled conductivity water. (qualigen fine-chem. India) were used.

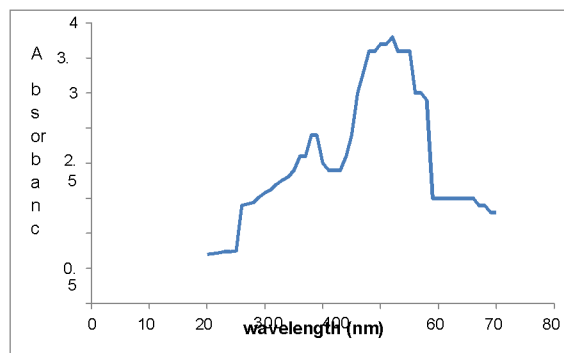
## Synthesis of Polypyrrole and Polypyrrole-Ni Composites-

For chemical polymerisation of pyrrole, FeCl<sub>3</sub> was used as an oxidant 1.5 mL of pyrrole having 1N solution was dissolved in 10 mL of Aqueous ferric chloride solution with doped with 5 ml of nickel chloride in ethanol and stirred for 10min was added drop wise to the solution of pyrrole. Nickel chloride was varied in, 0.5N, 1N, 1.5N and 2N, added to the polypyrrole solution. This reaction mixture was stirred for 3 hr with magnetic stirrer in order to disperse NiCl<sub>2</sub> in the polymer solution and inserted glass plate to obtained coated uniform thin films. The obtained product was filtered and washed thoroughly with distilled water in order to remove the unreacted pyrrole and excess ferric chloride. The samples were vacuum-dried for 1 hr at 60–70°C.

## 3.Results & Discussions-

### 1) UV-Visible spectra -

UV-visible spectroscopy is a very sensitive tool for the study of Polypyrrole





doped thin films protonation and more precisely for the elucidations of the dopant Nickel chloride into the thin films. UV-visible study selected those films, which have uniform, and good sensor response time.

These sample films were dissolved in (DMSO) solvent, and then the UV-visible spectra recorded in the range 200-700 nm. The sample yields sharp peaks within 360-380nm and a broad band at 480-570nm wavelength ranges. In DMSO the sample, however exhibits broad peak around 610 nm indicating formation of emeraldine base. Fig-1

Fig-1. UV-Visible spectra of Py-Ni doped films

## 2) FTIR-spectra

The FTIR- spectra of doped Nickel Chloride in polypyrrole composites thin films were recorded in the range of 4000-400  $\text{cm}^{-1}$  using DMSO as solvent. The principal characteristics band occurrence indicates the type of functional group present in the polymer.

The medium strong band observed at 3400  $\text{cm}^{-1}$  suggests the presence of N-H stretch. The spectra shows the peak at 1660  $\text{cm}^{-1}$ , which is due to the presence of C=C group of aromatic benzenoid ring. The observed medium intensity band in the region 1410-1433  $\text{cm}^{-1}$  suggests the presence of C-N stretch).

Nickel Chloride in Pyrrole material (doublet) splits into triplets and shifts towards lower frequency at 1313  $\text{cm}^{-1}$ . leading to exposure of the hidden C-N<sup>+</sup> group as (NH, <sup>+</sup>NH<sub>2</sub>, <sup>+</sup>NH=, C=N<sup>+</sup>) in Nickel Chloride in Pyrrole depends on the nature and percentage of doping which may effect the population of charge defect center (polaron and bipolaron) and ultimately the electrical conductivity. The C-O stretching vibrations in plane and out of plane, the bending vibration were observed at 1085  $\text{cm}^{-1}$  and 702  $\text{cm}^{-1}$ .

The entire characteristics of band confirm the presence of doped conducting Nickel Chloride in Pyrrole thin films in Fig-2.

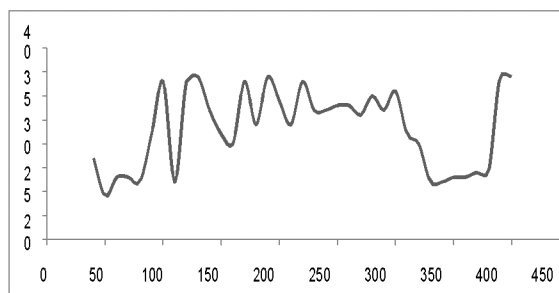
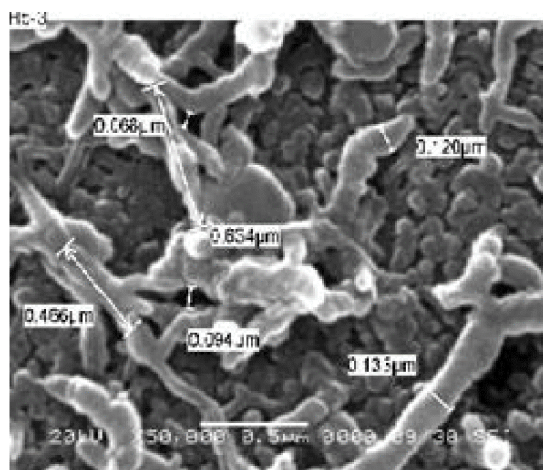


Fig 2. The FTIR spectra of 1) Py-Ni doped

## 3) SEM study

A typical SEM image of 0.5M nickel chloride doped polypyrrole films having uniform and good stability. This film is shown in fig-3. Therefore SEM images give first hand information about a molecular level combination of the components and possibility for application as gas sensors. This thin films surface morphology study indicates that the films have porous surface and uniform in nature, which is one of the essential conditions for gas sensors.



## I-V characteristics-

The electrical conductivity of the synthesized Nickel Chloride in polypyrrole films studied at room



temperature by four probe indigenous developed computer controlled (I-V) system. It is observed that, with the increasing concentration level, the electrical conductivity of thin films gradually increases.

The current-voltage (I-V) characteristics of synthesized films were studied to ensure an Ohmic behavior of all thin films samples. A linear relationship of I-V curve is shown in fig-4.

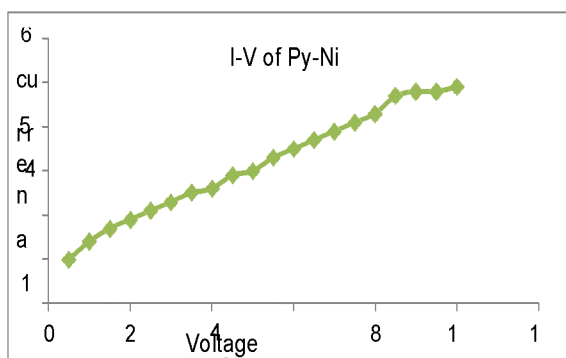


Fig-3.4.I-V curve

### Magnetization-

The magnetization (M) versus the applied magnetic field (H) for polypyrrole doped Nickel chloride nanoparticles. The value of saturation magnetization (Ms), remnant magnetization (Mr) and coercivity (Hc) for polypyrrole doped Nickel chloride were 6.43emu/g, 1.22emu/g,

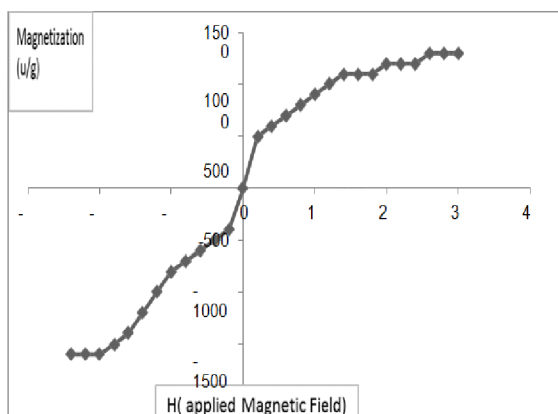


Fig-3.5: Magnetic hysteresis loops of polypyrrole doped Nickel chloride

### TMA and ammonia Gas sensing behaviors-

The synthesized polypyrrole doped Nickel chloride thin films were studied for ammonia and TMA gas at room temperature (303k) by using indigenous developed computer controlled gas sensing system.

Initially the films were allowed to saturate for half an hour before exposing to ammonia & TMA gas. The film was first exposed for five minutes to predefined concentration of ammonia & TMA gas, and then it was exposed to air to recover initial resistance for five to seven minutes .

The same process repeated for 10-800 ppm concentration for both gases. The change in resistance of the gas exposed and its recovery were measured. The barrier height increases when absorption of TMA and ammonia gas concentration in ppm increases. This change in resistance is found to be linearly increasing for this thin film.

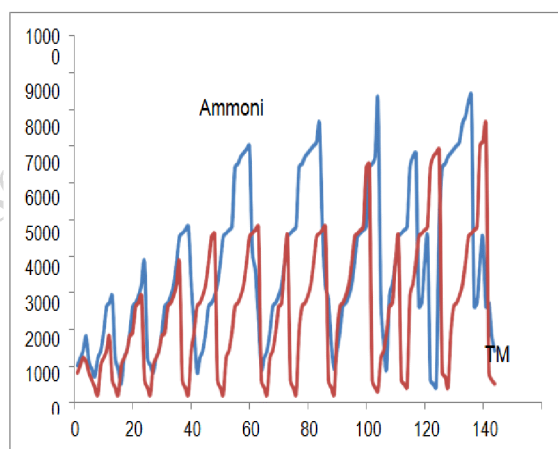


Fig-3.6: TMA and ammonia Gas Monitoring 10-800ppm

### 4) Conclusion-

This study describes the synthesis of Ppy-nickel chloride doped composite films using chemical bath deposition method and successful fabrication of chemiresistive ammine sensors based



on Ppy-Ni composite films for ammine leakage detection at room temperature. Several characterization techniques such as FTIR and SEM analysis confirmed that Nickel were successfully incorporated into the on Ppy-Ni matrix. Effect of different concentration of nickel chloride on structural, electrical and gas sensing properties Ppy-Ni composite films The synthesis composite

films with nickel chloride<sub>3</sub> doping showed highest conductivity with a value of  $28.24 \times 10^{-4} \text{ Scm}^{-1}$  among all the other Ppy-Ni composites. The results obtained in the present study for 0.5N nickel chloride in Ppy-Ni composite films based for ammine as well as TMA gas sensors. This synthesis films were response at lower 10ppm level to higher 800 ppm concentration of ammine gases.

## REFERENCE

- 1). Yan B., wu .Y.and Liang G. (2017). "Recent advance on polypurole electroactuators" [mdpi.com/journal/polymer](http://mdpi.com/journal/polymer) ppm 1-20.
- 2) Dunst K. J, Cysewska K., Kalinowski P., Jasiński P. (2015) "Polypyrrole based gas sensor for ammonia detection" *Materials Science and Engineering*, pp 102-108.
- 3) Mohammad A.S and Bashir I. M(2018). "Characterization of a Novel Polypyrrole (PPy) Conductive Polymer Coated Patterned Vertical CNT (pVCNT) Dry ECG Electrode" *Chemosensors*, 6, 27pp1-12.
- 4) Dupare D.B (2014) "Study of Polyaniline – Polymethylmethacrylate Blend Films for Amine Sensor" *International Journal of Modern Trends in Engineering and Research* p- ISSN: 2393-8161 PP-215-218.
- 5) D. B. Dupare and M. D. Shirsat (2019) "polypyrrole–polyvinyl alcohol doped al<sub>2</sub>o<sub>3</sub> composites as ammine gas sensor" *International Journal of Advance and Innovative Research* ISSN 2394 - 7780 Volume 6, Issue 1 (XIX) PP-17-21.
- 6) Sayad Seema and M.V.N Ambika Prasad (2014) "Dielectric Spectroscopy of Nanostructured Polypyrrole-NiO Composites" *Journal of Polymers* pp-1-5.
- 7) Sarah Zayan, Ahmed Elshazly and Marwa Elkady (2020) "In Situ Polymerization of Polypyrrole @Aluminum Fumarate Metal–Organic Framework Hybrid Nanocomposites for the Application of Wastewater Treatment" *Journal Polymers*, 12, 1764 pp 2-14.
- 8) Agnieszka Brzózka , Krzysztof Fic , Joanna Bogusz , Anna M. Brudzisz , Mateusz M. Marzec , Marta Gajewska and Grzegorz D. Sulka ,(2019) "Polypyrrole–Nickel Hydroxide Hybrid Nanowires as Future Materials for Energy Storage" *Nanomaterials* , 9, 307pp 1-15



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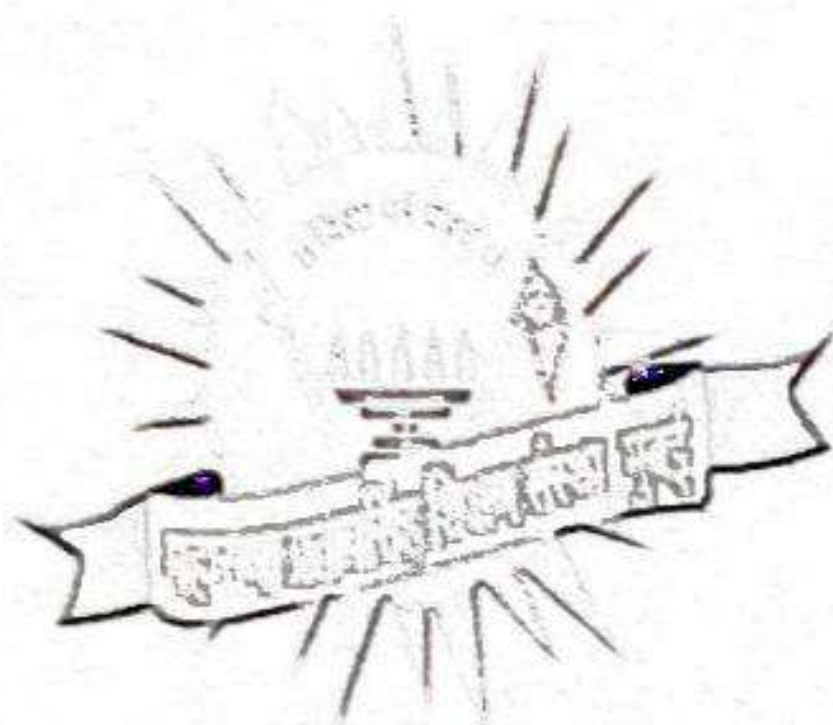
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# REAL WORLD & ITS COMPUTER REPRESENTATION VEGETATION MONITORING BY USING INTERNET TECHNOLOGY TOOL

RANJAN B. KALBANDE

Dept. of Botany, Shri Dr. R. G. Rathod Arts & Science College,  
Murtizapur, Dist Akola, M.S. India

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**Key Words:** Biodiversity, Bioinformatics, Morphodiversity, Information System

## ABSTRACT

Biodiversity stands for all living things on earth. In the developing world, biodiversity provides the assurance of food, raw materials such as fiber for clothing, materials for shelter, fertilizer, fuel, medicines, timber and many other necessities. Biodiversity maintains the ecological balance necessary for human survival. There is a great need for the storage and managing of this data to be protected and secure. The relevance of bioinformatics plays a key role in this process. The above managed data also needs to be kept up it with the latest computational technology. In the present study mophodiversity of common roadside tree species in were studied. The use or relationship with common roadside tree species with human

## INTRODUCTION

Biodiversity stands for all living things on earth. It refers to the range of variations among a set of entities and is commonly used to describe variety and variability of living organisms in terms of genetic diversity, species diversity and ecological diversity. Biodiversity is the basis of human survival, and economic development as it provides a large number of goods, and services, that sustain our lives. A species may be defined as a group of organisms which are able to interbreed freely under natural conditions to produce viable offsprings. Species diversity refers to variety of living species within a geographic area (Glowka, 1994). Genetic diversity refers to the differences in genetic make-up between distinct species as well as the genetic variations within a single species. Since the genes are the fundamental unit of natural selection, and thus evolution, some scientists argue that the real unit of biodiversity is genetic diversity. Ecosystem diversity encompasses the broad differences between ecosystem types, and the diversity of habitats and ecosystem processes within each ecosystem type. Ecosystem diversity deals with species distribution and community patterns, the role and function of key species, and combines species functions and interactions.

Bioinformatics is quickly becoming indispensable to all researchers and scientists alike. The enormous growth of biological data in the last few years has created the need for better data management, capabilities, and thus bioinformatics is a critical piece of the puzzle. The technology

of bioinformatics is both versatile and is able to be applied wherever research is being done on genetics, proteins and cells for herbicide-resistant products for crops in agriculture. Bioinformatics and computational biology are rooted in the life sciences as well as computer and information sciences and technologies. Both of these interdisciplinary approaches draw from specific disciplines such as mathematics, physics, computer science and engineering, biology, and behavioral science. more understandable and useful. We have opportunities to apply this technology to develop an information infrastructure that will enable us to unlock the wealth of biodiversity information that exists around the world. Computer assisted monitoring of vegetation using multi-resolution satellite and geospatial data is the new vegetation monitor methodology by using remote sensing and GIS.

## REVIEW OF LITERATURE

Pant (2003) worked on the structure, composition, regeneration status and plant and animal diversity of the North and South Betul forest divisions in Madhya Pradesh. Diversity of plant species tended to decrease in old growth stands, steep slopes, very disturbed area i. e. areas around villages or recently felled coups, very dry areas, areas that had experienced fires in the recent past etc. Udayan et al., (2003) surveyed medicinal plants conservation areas located in Karnataka for the study of plant diversity. Intensive field work undertaken during all seasons resulted in authentic collection of 933 medicinal plant species represented by 147 Families, including 556 genera. Of the 933 medicinal plants, 912 were native Angiosperms, 20 Pteridophytes and 1 Gymnosperm. Among the 147 Families, the families Rubiaceae, Euphorbiaceae, Asteraceae, Lamiaceae, Fabaceae, Acanthaceae, and Apocynaceae shared a large proportion of medicinal plant species. Fasola and Egunyomi (2005) carried out investigations on Nigerian usage of bark in phytomedicine. A comparison of the phytochemicals of re-grown stem bark (after debarking) with those of older bark of the same tree species, revealed that almost all the phytochemicals screened were present in both old and new bark, indicating that the newly-grown bark was also medicinally useful. A taxonomic key that would facilitated the identification of dry bark of 15 frequently used tree species had been constructed.

Prakasha et al., (2007) studied tree species composition, diversity and dominance along disturbance gradient in tropical dry deciduous forest of Bhadra Sanctuary. Three dry deciduous forests of Bhadra wildlife sanctuary, Karnataka were categorized as Naturally Disturbed Forest (NDF), Disturbed forest (DF) and Partially Disturbed Forest (PDF) across a disturbance gradient. Semwal et al., (2007) carried out assessment of population structure on the basis of density, distribution and diversity – dominance pattern in Kedarnath wildlife Sanctuary, Uttarkhand, India. Besides, distribution pattern, population structure and conservation status of ten rare and endangered medicinal plants were also evaluated. Sahu et al., (2007) carried out phytosociological study of tropical dry deciduous forest of Boudh district, Orissa, India. The predominant tree species were *Shorea robusta*, *Madhuca indica*, *Buchanania lanzan*, *Cleistanthus collinus* and *Diospyros melanoxylon*. Total 100 sample plots (4 ha) area represented by 187 species, which comprised 91 species, 10 shrubs, 12 climbers and 74 herbs.

Work of Sambandan and Chowdhery (2004) focused on the herbarium database software's and its utilities as well as development of herbarium database in Botanical Survey of India. Moreover, the herbarium database was one of the most modern computational methods, where the available information from the herbarium. Hargreaves (2006) studied vegetative morphology for species identification of tropical trees. Tree specimens from the ESAL herbarium of the Universidade Federal de Lavras, Minas Gerais, Brazil, were described by selecting vegetative characteristics using CARip, a Microsoft Access database application specially developed for this study. Dalitz and Homeier (2004) has opined that there is an ongoing process to make biodiversity information available using computer programs as local as well as worldwide accessible Internet-based systems. The range of solution reaches from information systems for herbaria, taxonomic diagnostic system to more easy to use visual information systems. In the opinion of Stuessy (2009) large stores of primary biodiversity data lie relatively inaccessible in herbarium collections around the world. Digitization of herbaria is being done primarily to meet the needs fulfilled by notes on labels, and to save actual specimens from avoidable handling. With proper planning and suitable software, digitization can produce many very useful 'by-products'. One such collection is the Forest Research Institute Herbarium at Dehradun, Uttarakhand, India, more than 100 years old.

## **MATERIALS AND METHODS**

In the present study especially the tree species were selected because the trees were economically and medicinally important and they show lot of diversity among them. The trees are perennial so the morphodiversity study can be carried out through out the year. Moreover, flowering and fruiting period of the trees are different, and the morphological characters are visible with naked eyes. Study of diversity was done up to the family, genus and species level. The whole information was carried over further to computational study. Flowering and fruiting periods. Identification of the plants to the level of species, genus, and family was done with help of published floras. Tree height and girth were recorded. Inventory of tree species was generated by noting local, botanical names and taxonomical description of the plant in order to make the data ready for computation study. The biodiversity information was gathered and processed by applying bioinformatics tools. The collected data was classified in different girth and height class intervals. The height and girth of distributed trees was an important criteria for evaluating research plot site quality, growth performance of the tree species and status of location. The data was entered into an MS-Excel spreadsheet and then it was transformed into graphic form. The diverse nature of the bark was supporting character for tree identification in morphodiversity studies. The information on medicinal use of the bark was collected from local tribal inhabitants.

## **OBSERVATIONS AND RESULTS**

The most common teak associates in this forest area were *Lagerstroemia parviflora*, *Lanea coromandelica*, *Phyllanthus emblica*, *Terminalia tomentosa*, *Anogeissus latifolia*, *Desmodium oojeinensis*, *Boswellia serrata*, *Wrightia tinctoria*, *Cassia fistula*, *Bauhinia racemosa*, *Butea monosperma* and *Mitragyna parviflora*. Some trees were so notable that could catch the

eye attention in hot dry deciduous summer by being lush green in otherwise dry deciduous leafless forest, the most prominent being *Terminalia* sp., *Madhuca* sp., *Buchanania* sp., *Diospyros* sp., *Lagerstroemia* sp., *Butea* sp. and *Ixora* sp. The bark also showed variability from thin scaly, papery, smooth, greenish, to thick furrowed, and spiny; most of them showing vertical cracks, ridges and furrows and of various colours. Trees exhibiting different girths and heights; among the population of *Tectona grandis* L.f. Suppl., the oldest tree represented maximum girth (170 cms) and youngest one representing minimum (19 cms), likewise one individual measuring maximum height (58 feet) and another minimum (12 feet) were recorded in this research plot. The flowering period of the 40 trees was from February to July and fruiting period June to November.

## DISCUSSION

Pant (2003) has carried out ecological analysis of the Satpura conservation area landscape through stratified field sampling and Remotely Sensed data. Diversity of plant species tend to decrease in old growth stands, steep slopes, very disturbed area i.e. areas around villages or recently felled coups, dry areas, areas that experienced fires in the recent past etc. Areas in valley flats, riparian areas, remote and less disturbed areas etc. showed a high diversity. Work of Udayan et al., (2003) provided an insight into the floristic diversity, occurrence and distribution pattern across the the forest of Karnataka . Common ethnobotanically important tree species occurring both in deciduous forest of Karnataka and Compartment 1016, research plot of MTR were *Boswellia serrata*, *Buchanania lanzan*, *Semecarpus anacardium*, *Phyllanthus emblica*, and *Terminalia bellerica*. Fasola and Egunyomi (2005) carried out investigations on Nigerian usage of bark in phytomedicine and indicating that the newly-grown bark was also medicinally useful. A taxonomic key that would facilitate the identification of dry bark of 15 frequently used tree species had been constructed. In present study ethnobotanical information of the bark was collected from knowledgeable persons of Gullarghat and Dharghad, Ethnobotanical use of the bark of 20 trees species on various human health problems such as bone fracture, acidity, injury, worm control, body power, blood impurity, antidote to snake poison, cough, and dysentery were recorded. Prakasha et al., (2007) studied tree species composition, diversity and dominance along disturbance gradient in tropical dry deciduous forest of Bhadra Sanctuary. Three dry deciduous forests of Bhadra wildlife sanctuary, Karnataka were categorized as Naturally Disturbed Forest (NDF), Disturbed forest (DF) and Partially Disturbed Forest (PDF) across a disturbance gradient. The disturbance included grazing by the domestic and wild animals, removal of the grasses by the native people, cutting shrubs and tree branches for fuel. Similarly, dry deciduous forests of Melghat sanctuary was divisible into several protected areas known as compartments which were existed within core, semi core and buffer areas.

Semwal et al., (2007) studied medicinal plant diversity of Kedarnath wildlife Sanctuary, Uttarkhand, India. The rich plant diversity of the Indian Himalaya was utilized by the native communities in various forms, including food and medicine. An Ethnobotanical survey was conducted by interviewing with local people, vaidyas, herbal practitioners, older members of the community. For this a questionnaire was prepared and information related to local name, local

uses and plant parts used for various purposes for each species was collected. Nahu et al., (2007) carried out phytosociological study of tropical dry deciduous forest of Boudh district, Orissa, India. The predominant tree species *M. indica*, *B. lanzan*, and *D. melanoxylon* were common species found in both the forest areas. Orissa forest recorded total 100 sample plots (4 ha) area represented by 187 species which contains 91 trees species, 10 shrubs, 12 climbers and 74 herbs whereas compartment 1016 represented 40 trees species belonging to 34 genera and 24 families. In view of Sambandan and Chowdhery (2004) herbarium database was a computational method, where the information about the herbarium specimens were digitized in such a way that it was easily accessible with the help of Internet and World wide Web (WWW) throughout the world. The modern databases included actual herbarium specimens as digital images with all accompanying information available on the herbarium sheet label. Hargreaves (2006) Studied vegetative morphology for species identification of tropical trees. Tree specimens from the ESAL herbarium of the Universidade Federal de Lavras, Minas Gerais, Brazil, were described by vegetative characteristics using CARip, a Microsoft Access database application specially developed for this study. Thus, 2 observers described 567 herbarium species as a base to test methods of identification as part of a larger study. The work formed part of that study and provided information on the distribution of 22 vegetative characters among 16 families having 10 or more species described. Dalitz and Homeier (2004) developed an visual database program wherein different type of images could be stored in the database with all attached label information: flat-bed scans of living plant material, digitized slides, digitized herbarium specimens or illustrations. Stuessy (2009) gave stress on digitization of the herbarium; with proper planning and suitable software; digitization could produce many very useful 'by-products'. One such collection was the Forest Research Institute Herbarium at Dehradun, Uttarakhand, India, their objective was to digitize the most important elements of this unique collection and make the data available to a world-wide audience via the Web. Digital herbaria are digital images of herbarium specimens, plus information from labels, in an organized database.

#### **BIBLIOGRAPHY**

1. Pant A. 2003. Ecological Analysis of the Satpura Conservation Area Landscape through Stratified Field Sampling and Remotely Sensed Data. Map India Conference on Forestry & Biodiversity from <http://GISdevelopment.net>
2. Udayan PS, Begum SN, Mudappa A, Kumari A. 2003. Plant Diversity of Medical Plants Conservation Areas Located in Karnataka. *J. Econ. Taxon. Bot.* 27(3): 635-639.
3. Fasola TR, Egunyomi A. 2005. Nigerian Usage of Bark in Phytomedicine. From <http://hdl.handle.net/10125/156>. *Ethanobotany Research & Application* 3: 073-077.
4. Prakasha HM, Nanda A, Krishnamurthy YL. 2007. Tree Species Composition, Diversity and Dominance along Disturbance Gradient in Tropical Dry deciduous forest of Bhadra Sanctuary. *Indian J. Ecol.* 34(1): 8-14.



5. Semwal DP, Saradhi PP, Nautiyal BP, Bhatt AB. 2007. Current status, Distribution and Conservation of Rare and Endangered Medicinal Plants of Kedarnath Wildlife Sanctuary, Central Himalayas, India. *Current Science* 92(12):1733-1738.
6. Sahu SC, Dhal NK, Reddy S, Pattnaik C, Brahmam M. 2007. Phytosociological Study of Tropical Dry Deciduous Forest of Boudh District, Orissa, India. *Research Journal of Forestry* 1(2): 66-72.
7. Sambandan K, Chowdhery HJ. 2004. Digital Herbarium Databases. *Indian Journal of Forestry* 27(3): 261-272.
8. Hargreaves P. 2006. Vegetative Morphology for Species Identification of Tropical Trees: Family Distribution. *Cerne, Lavras* 12(1): 1-7.
9. Dalitz H, Homeier J. 2004. Visual Plants – An Image Based Tool for Plant Diversity Research. *Lyonia A Journal of Ecology and Application* 6(1): 47-59.
10. Stuessy TF. 2009. *Plant Systematics World*. *Taxon* 58(2):679-683.



Shri Govindsing Rathod Shikshan Prasarak Mandal, Dahatonda's  
**Shri Dr. R. G. Rathod Arts and Science College,  
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**A New Method For *N*-*Tert*-Butoxy Carbonylation Of Amines Using Urea As An Organocatalyst****Abdul Shahzad, Dharmendra B. Dupare\*, Mohd Mujahid**Department of Chemistry, Shri. Dr. R. G. Rathod Arts & Science College,  
Murtizapur, Dist: Akola, India.

\*Corresponding author. D. B. Dupare

**Abstract:**

A simple, efficient and environmentally benign method for *N*-*tert*-butoxy carbonylation of amines using urea as a mild and cost effective catalyst has been described.

The salient features of the present protocol include high yields (65-99%), short reaction time, high selectivity, etc.

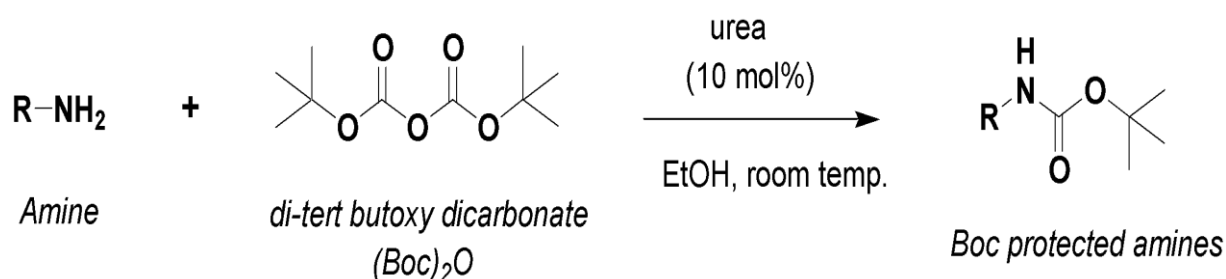
**Introduction**

Protection and deprotection plays an important role in the synthesis of various complex organic compounds. Among different functionalities, amine is one of the most important group present in plethora of bioactive compounds. So, its protection plays a pivotal role while designing the total syntheses of biologically active molecules. Till date, various protective groups are available for the amine functionality. Among these, *N*-*tert*-butoxycarbonyl (Boc) group is commonly used due to the ease of protection as well as deprotection and also it is stable for various base-catalyzed nucleophilic substitutions and catalytic hydrogenation reactions.<sup>1</sup> Different catalytic methods are available for the *N*-*tert*-butoxycarbonylation under basic as well as Lewis acidic conditions using di-*tert*-butyl-dicarbonate (Boc<sub>2</sub>O) reagent that includes I<sub>2</sub>,<sup>2</sup> Zn(ClO<sub>4</sub>)<sub>2</sub>.6H<sub>2</sub>O,<sup>3</sup> ZrCl<sub>4</sub>,<sup>4</sup> HClO<sub>4</sub>-SiO<sub>2</sub>,<sup>5</sup> ionic liquid,<sup>6</sup> Amberlyst-15,<sup>7</sup> sulfamic acid,<sup>8</sup> etc. However, many methods have their own advantages, but most of them suffer from one or more drawbacks like elevated temperatures, highly basic conditions, long reaction times and high toxicity. To tackle these limitations still there is a scope for a new catalyst system that can minimise these drawbacks. Recently, the use of low molecular weight organic compounds as a catalyst in various organic transformations has gained momentum. Organocatalysts have several advantages such as they are cheap, inexpensive, and readily available, also they act as a green catalyst etc. Now a days urea and their derivatives serves as a important organocatalysts and have been used in various organic reactions such as mannich reactions,<sup>9</sup> Biginelli reaction,<sup>10</sup> etc.

Keeping in mind all these advantages, we herein report for the first time use of urea as an organocatalyst for *N*-Boc protection of amines.

**Results and Discussion**

Initially, we carried out the reaction with equimolar quantities of aniline and di-*tert*-butyl dicarbonate (Scheme 1) using ethanol as a solvent and to our delight, the reaction was completed in 30 min with 98% yield.

**Scheme 1**

Comparison of our result with few of the reported procedures is presented in Table 1. which clearly indicates the efficiency of urea in the synthesis of Boc protected amines.

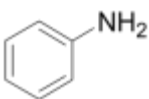
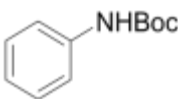
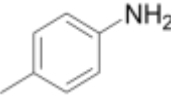
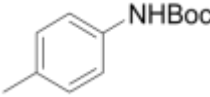
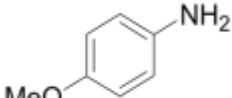
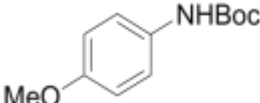
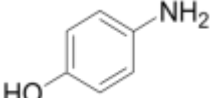
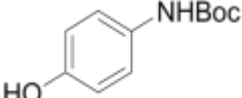
**Table 1.**Comparison of various catalysts employed for the *N*-Boc protection of aniline<sup>#</sup>

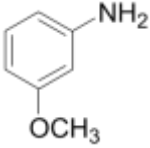
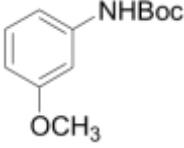
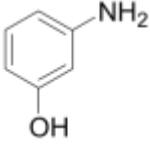
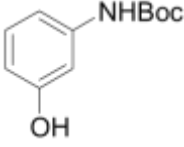
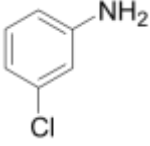
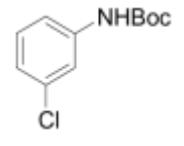
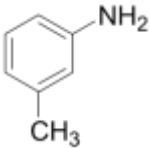
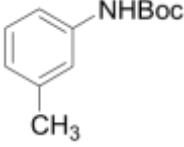
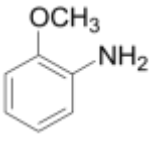
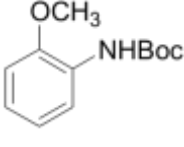
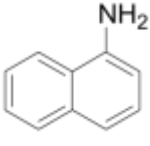
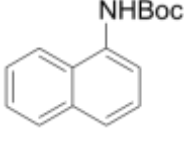
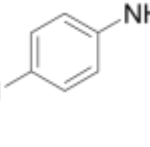
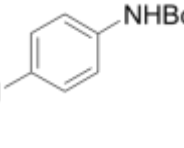
Entry	Catalyst (mol%)	Solvent	Time	Yield(%)	Ref.
1	Iodine	Neat	30 min	95%	2
2	Zn(ClO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	CH <sub>2</sub> Cl <sub>2</sub>	12 h	92%	3
3	Sulfonic acid functionalized silica	CH <sub>2</sub> Cl <sub>2</sub>	45 min	83%	11
4	β- cyclodextrin	H <sub>2</sub> O	2.5 h	75%	12
5	Yttria-Zirconia	CH <sub>3</sub> CN	14 h	90%	13
6	urea	C <sub>2</sub> H <sub>5</sub> OH	30 min	98%	<b>This work</b>

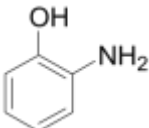
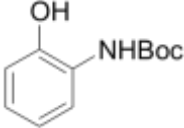
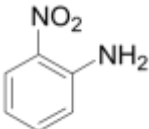
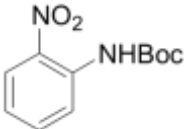
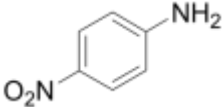
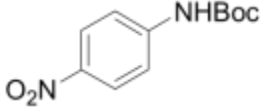
<sup>#</sup>Reaction conditions: Aniline: (1:1), (Boc)<sub>2</sub>O, room temperature.

Here, in most of the cases, expensive catalyst system is required with long reaction time (entry 2-5) which limits the utility of the protocols. With the optimized reaction conditions in hand, we evaluated the scope of the reaction with various aromatic and aliphatic amines. Several amines were treated with 1 eq. di-*tert*-butyl dicarbonate in presence of 10 mol% of urea in ethanol as a solvent to obtain pure products without any column purification. The results (reaction time and the product yields) are depicted in Table 2.

**Table 2. Synthesis of various Boc protected amines catalyzed by urea**

Entry	Amine	Time	Product	Yield (%)
1.		30 min		98
2.		30 min		85
3.		15 min		99
4.		45 min		86

5.		45 min		86
6		30 min		75
7		210 min		57
8		30 min		75
9		45 min		99
10		45 min		78
11		60 min		87

12		20 min		92
13		60 min		28
14		50 min		40
15	$\text{CH}_3(\text{CH}_2)_3\text{NH}_2$	30 min	$\text{CH}_3(\text{CH}_2)_3\text{NHBoc}$	75

Anilines possessing electron withdrawing groups on the phenyl ring (such as chloro Table 2, entry 7, 11) shows decrease in product yields with longer reaction time. In contrast, aniline having electron donating groups on phenyl ring (methyl or methoxy, Table 2, entry 2, 3, 5, 9) results in higher yields with rapid product formation. Position of substituents on aniline does not affect much on the product yield but, the effect can be seen on the reaction time. For example, substituent on *ortho* position of aniline requires more time for the completion of reaction as compared to *para* positions due to the *ortho* effect (Table 2, entry 9).

## Conclusion

In conclusion, we described here a simple, convenient and environment-friendly protocol for the *tert*-butyloxycarbonylation of amines using catalytic amount of urea. The present protocol shows several advantages such as high yields, shorter reaction times, safe handling, clean reactions, excellent selectivity and low cost. We envisage that this new method would be used as an alternative to other existing methods for the Boc protection of amines.

## Experimental

### General procedure for Boc protection of amines:

To a mixture of amine (0.5 mmol) and  $\text{Boc}_2\text{O}$  (0.5 mmol) was added urea (10 mol%) and stirred at room temperature for appropriate time as given in Table 2. The progress of reaction was monitored by TLC. After completion, the reaction mixture was washed with water and extracted with ethyl acetate (3 x 15 mL). The combined organic layer was dried over anhydrous sodium sulfate and concentrated *in vacuo* to afford the pure products.

### Spectral data of selected compounds

**(4-Methoxy-phenyl)-carbamic acid *tert*-butyl ester (entry 3, Table 2):** White solid, M.P. 93-95°C; IR (KBr)  $\nu$  3363, 3074, 1691, 1523, 825  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (200 MHz,  $\text{CDCl}_3$ )  $\delta$  1.48 (s, 9H), 3.74 (s, 3H), 6.20 (br s, 1H), 6.76 (d,  $J=8.76$  Hz, 2H), 7.24 (d,  $J=12.42$  Hz, 2H).

**Naphthalen-1-yl-carbamic acid *tert*-butyl ester (entry 10, Table 2):** Clear solid, M.P. 94-96°C; IR (neat):  $\nu$  3257, 3051, 1687, 1541, 765  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (200 MHz,  $\text{CDCl}_3$ )  $\delta$  1.52 (s, 9H), 6.83 (br s, 1H, NH), 7.38-7.88 (m, 7H).

### Acknowledgements

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### References

1. P. G. M. Wuts and T. W Greene, in Protective Groups in Organic Synthesis, John Wiley & Sons, New Jersey, 4th Edn. **2007**.
2. Varala, R; Nuvula,S; Adapa, S. R; *J. Org. Chem.* **2006**, *71*, 8286.
3. Bartoli, G.; Bosco, M.; Locatelli, M.; Marcantoni, E.; Massaccesi, M.; Melchiorr, P.; Sambri, L. *Synlett.* **2004**, 1794.
4. Sharma, G. V. M.; Reddy, J. J.; Lakshmi, P. S.; Radha Krishna, P.; *Tetrahedron Letters*, **2004**, *45*, 6963.
5. Chakraborti, A. K.; Chankeshwara, S. V. *Org. Biomol. Chem.*, **2006**, *4*, 2769.
6. Tekale, S. V.; Kauthale, S. S.; Pawar, R. P.; *J. Chil. Chem. Soc.* **2013**, *58*, 1619.
7. Sarkar, A.; Roy, S. R.; Parikh, N.; Chakraborti, A. K. *J. Org. Chem.* **2011**, *76*, 7132.
8. Heydari, A.; Shiroodi, R. K.; Hamadi, H.; Esfandyari, M.; Pourayoubi, M.; *Tetrahedron Lett.* **2007**, *48*, 5865.
9. Wenzel, A. G. and Jacobsen, E. N. *J. Am. Chem. Soc.*, **2002**, *124* (44), 12964.
10. Puripat, M.; Ramozzi, R. *J. Org. Chem.*, **2015**, *80* (14), 6959.
11. Das, B.; Venkateswarlu, K.; Krishnaiah, M.; Holla, H. *Tetrahedron Lett.* **2006**, *47*, 7551.
12. Reddy, M. S.; Narender, M; Nageshwar, Y. V. D.; Rao, K. R. *Synlett.* **2006**, 1110.
13. Pandey, R. K.; Dagade, S. P.; Upadhyay, R. K.; Dongare, M. K.; Kumar, P. *Arkivoc.* **2002**, *VII*, 28.

## Cosmological Model In Self-Creation Theory of Gravitation

**A. S. Nimkar**

Department of Mathematics  
 Shri. Dr. R. G. Rathod Arts & Science College,  
 Murtijapur, Dist. Akola (M.S.) India.

**J. S. Wath**

Department of Applied Mathematics  
 P.R. Pote (Patil) College of Engineering and Management, Amravati (M.S.) India.

**V. M. Wankhade**

Department of Mathematics Shri. Dr. R. G. Rathod Arts & Science College,  
 Murtijapur, Dist. Akola (M.S.) India.

### Abstract:

*In this paper, we have investigated the Barber second self-creation cosmology with macroscopic body as a source of matter in Bianchi type-III space time. Exact cosmological model is obtained by using relation between metric coefficients i.e. and radiation universe. Also, we have discussed the features of the obtained solutions.*

*Keywords: Bianchi type –III metric, macroscopic body and self- creation Theory.*

### I Introduction

Bianchi type cosmological model are important in the sense that these are homogenous and anisotropic, from which the process of isotropization of the universe is studied through the passage of time. Moreover, from the theoretical point of view anisotropic universe have a greater generally than isotropic models. The simplicity of the field equations made Bianchi space time useful in constructing models of spatially homogenous and anisotropic cosmologies.

Barber has invented two continuous self-creation theories by modifying the Brans and Dicke theory and general relativity. These modified theories create the universe out of self-contained gravitational scalar and matter fields. Brans has pointed out that the Barber's first theory is not only in agreement with experiment but also inconsistent in general. Barber's second theory is a modification of general relativity to a variable G-theory. In this theory the scalar field does not directly gravitate but simply divides the matter tensor acting as a reciprocal gravitational constant.

The Barber field equation in second self-creation theory (Barber, 1982) can be expressed as

$$R_{ij} - \frac{1}{2} R g_{ij} = -8\pi\phi^{-1} T_{ij} \quad (1)$$

and

$$\square\phi = \phi_{;k}^k = \frac{8\pi\lambda}{3} T \quad (2)$$

where  $\phi$  is the Barber's scalar,  $T_{ij}$  is the energy momentum tensor,

$\square\phi$  is the invariant D'Alembertian, T is the trace of energy momentum tensor  $T_{ij}$ ,  $\lambda$  is a coupling constant to be determined from experiment and  $0 < |\lambda| < 1/10$ .

In the limit  $\lambda \rightarrow 0$ , this theory approaches the Einstein's theory in every respect. Due to the nature of the space time Barber's scalar  $\phi$  is a function of 't'.

Reddy (1987 a, b), Maharaj et al (1988), Shanti and Rao (1991), Mohanty et al (2000,2002), Adhav et al (2008) etc. are some of the authors who have investigated various aspects of Barber's self-creation theories. Singh and Suresh Kumar (2007) have studied Bianchi type-II space times with constant deceleration parameter in self creation cosmology. Also, Reddy DRK (2005), Adhav et al



(2009), Khadekar et al (2011), Nimkar *et al* (2014), Katore et al (2015), Pawar et al(2015), Mete, V.G. (2017) have studied some topological defects in Bianchi type space time.

The purpose of the present work is to obtain Bianchi type-III cosmological model in presence of macroscopic body. Our paper is organized as follows. In section II, Metric and field Equations. Section III, is mainly concerned with the physical and Kinematical properties of the model. The last section contains some conclusion.

## II Metric and field Equations

Let's consider the Bianchi type-III space-time in the form

$$ds^2 = dt^2 - A^2 dx^2 - B^2 e^{-2ax} dy^2 - C^2 dz^2 \quad (3)$$

Where  $A, B, C$  are functions of time  $t$  alone and  $a$  is constant.

The energy momentum-tensor for a macroscopic body (Landue L. D. and Lifshitz E.M) is given by

$$T^{ik} = (p + \varepsilon) u^i u^k - p g^{ik} \quad (4)$$

Here  $p$  is the pressure,  $\varepsilon$  is the energy density and  $u_i$  is the four velocity vectors of the distribution respectively.

From Eq. (4), we have

$$T_1^1 = T_2^2 = T_3^3 = -p \text{ and } T_4^4 = \varepsilon \quad (5)$$

The trace of energy-momentum tensor is given by

$$T = T_1^1 + T_2^2 + T_3^3 + T_4^4 = -3p + \varepsilon \quad (6)$$

Using the equations (1), (2) and (4), the field equations of metric (3) are

$$\frac{B_{44}}{B} + \frac{C_{44}}{C} + \frac{B_4 C_4}{BC} = -8\pi\phi^{-1} p \quad (7)$$

$$\frac{A_{44}}{A} + \frac{C_{44}}{C} + \frac{A_4 C_4}{AC} = -8\pi\phi^{-1} p \quad (8)$$

$$\frac{A_{44}}{A} + \frac{B_{44}}{B} + \frac{A_4 B_4}{AB} - \frac{a^2}{A^2} = -8\pi\phi^{-1} p \quad (9)$$

$$\frac{A_4 B_4}{AB} + \frac{A_4 C_4}{AC} + \frac{B_4 C_4}{BC} - \frac{a^2}{A^2} = 8\pi\phi^{-1} \varepsilon \quad (10)$$

$$\frac{A_4}{A} - \frac{B_4}{B} = 0 \quad (11)$$

$$\phi_{44} + \left( \frac{A_4}{A} + \frac{B_4}{B} + \frac{C_4}{C} \right) \phi_4 = \frac{8\pi\Lambda}{3} (\varepsilon - 3p) \quad (12)$$

$$\varepsilon_4 + (\varepsilon + p) \left( \frac{A_4}{A} + \frac{B_4}{B} + \frac{C_4}{C} \right) + p \frac{a}{A^2} = 0 \quad (13)$$

Where the subscript '4' after  $A, B$  and  $C$  denotes ordinary differentiation with respect to  $t$ .

From equation (11), we have

$$A = B \quad (14)$$

With the help of equation (14), the set of equation (7)-(13) reduces to

$$\frac{B_{44}}{B} + \frac{C_{44}}{C} + \frac{B_4 C_4}{BC} = -8\pi\phi^{-1} p \quad (15)$$

$$2 \frac{B_{44}}{B} + \left( \frac{B_4}{B} \right)^2 - \frac{a^2}{B^2} = -8\pi\phi^{-1} p \quad (16)$$

$$\left(\frac{B_4}{B}\right)^2 + 2\frac{B_4C_4}{BC} - \frac{a^2}{B^2} = 8\pi\phi^{-1}\varepsilon \quad (17)$$

$$\phi_{44} + \left(2\frac{B_4}{B} + \frac{C_4}{C}\right)\phi_4 = \frac{8\pi\Lambda}{3}(\varepsilon - 3p) \quad (18)$$

$$\varepsilon_4 + (\varepsilon + p)\left(2\frac{B_4}{B} + \frac{C_4}{C}\right) + p\frac{a}{B^2} = 0 \quad (19)$$

The field equation (15) to (18) are Four equations in five unknown  $B$ ,  $C$ ,  $\phi$ ,  $\varepsilon$  &  $p$ . Hence to get a determinate solution one has to assume the relation between metric coefficients i.e.  $C = B^n$  and radiation universe

$$\varepsilon = 3p$$

The above equations admits an exact solution given by

$$A = (K_3t + K_4) \quad (20)$$

$$B = (K_3t + K_4) \quad (21)$$

$$C = (K_3t + K_4)^n \quad (22)$$

and the scalar field is given by

$$\phi = \frac{K_7}{(K_3t + K_4)^{n+1}} + K_6 \quad (23)$$

The pressure and energy density is given by

$$\varepsilon = \frac{-3}{8\pi} \left\{ \left[ \frac{K_7K_3^2}{(K_3t + K_4)^{n+3}} - \frac{a^2K_7}{(K_3t + K_4)^{n+3}} \right] + K_6 \left[ \frac{K_3^2}{(K_3t + K_4)^2} - \frac{a^2}{(K_3t + K_4)^2} \right] \right\} \quad (24)$$

$$p = \frac{-1}{8\pi} \left\{ \left[ \frac{K_7K_3^2}{(K_3t + K_4)^{n+3}} - \frac{a^2K_7}{(K_3t + K_4)^{n+3}} \right] + K_6 \left[ \frac{K_3^2}{(K_3t + K_4)^2} - \frac{a^2}{(K_3t + K_4)^2} \right] \right\} \quad (25)$$

Using equations (20), (21) and (22),

Bianchi type-III cosmological model in equation (4) takes the form

$$ds^2 = dt^2 - (K_3t + K_4)^2 dx^2 - (K_3t + K_4)^2 e^{-2ax} dy^2 - (K_3t + K_4)^{2n} dz^2 \quad (26)$$

### III. The Physical and Kinematical Properties

The expression for the energy density  $W$ , energy flow vector  $S$  and stress tensor  $\sigma_{\alpha\beta}$  are

$$W = \frac{-1}{8\pi} \left( 3 + \gamma^2 / C^2 \right) \frac{\left[ \frac{K_7K_3^2}{(K_3t + K_4)^{n+3}} - \frac{a^2K_7}{(K_3t + K_4)^{n+3}} \right] + K_6 \left[ \frac{K_3^2}{(K_3t + K_4)^2} - \frac{a^2}{(K_3t + K_4)^2} \right]}{\left( 1 - \gamma^2 / C^2 \right)} \quad (27)$$

$$S = \frac{-1}{2\pi} \frac{\left\{ \left[ \frac{K_7 K_3^2}{(K_3 t + K_4)^{n+3}} - \frac{a^2 K_7}{(K_3 t + K_4)^{n+3}} \right] + K_6 \left[ \frac{K_3^2}{(K_3 t + K_4)^2} - \frac{a^2}{(K_3 t + K_4)^2} \right] \right\}}{\left(1 - \gamma^2 / c^2\right)} \quad (28)$$

$$\sigma_{\alpha\beta} = \frac{-1}{8\pi} \gamma_\alpha \gamma_\beta$$

$$\frac{\left\{ \left[ \frac{K_7 K_3^2}{(K_3 t + K_4)^{n+3}} - \frac{a^2 K_7}{(K_3 t + K_4)^{n+3}} \right] + K_6 \left[ \frac{K_3^2}{(K_3 t + K_4)^2} - \frac{a^2}{(K_3 t + K_4)^2} \right] \right\}}{c^2 \left(1 - \gamma^2 / c^2\right)} + \frac{-1}{8\pi} \left\{ \left[ \frac{K_7 K_3^2}{(K_3 t + K_4)^{n+3}} - \frac{a^2 K_7}{(K_3 t + K_4)^{n+3}} \right] + K_6 \left[ \frac{K_3^2}{(K_3 t + K_4)^2} - \frac{a^2}{(K_3 t + K_4)^2} \right] \right\} \quad (29)$$

If the velocity  $v$  of the macroscopic motion is small compared with the velocity of the light, then we have approximately  $S = (p + \varepsilon)v$ .

Since  $S/c^2$  is the momentum density and  $(p + \varepsilon)/c^2$  plays the role of the mass density of the body.

From the expression (5), we get

$$T_i^i = \varepsilon - 3p \quad (30)$$

But

$$T_i^i = \sum_a m_a c^2 \sqrt{1 - \frac{v_a^2}{c^2}} \delta(r - r_a) \quad (31)$$

Compare the relation (30) with the general formula (31) which we saw was valid for an arbitrary system. Since we are at present considering a macroscopic body, the expression (31) must be averaged over all the values of  $r$  in unit volume.

We obtain the result

$$\varepsilon - 3p = \sum_a m_a c^2 \sqrt{1 - \frac{v_a^2}{c^2}}$$

Here the summation extends over all particles in unit volume

The right side of this equation tends to zero in the ultra-relativistic limit, so in this limit the equation of state of matter is

$$p = \frac{\varepsilon}{3}.$$

Also,

The Scalar expansion,

$$\theta = \frac{(n+2)K_3}{3(K_3 t + K_4)} \quad (32)$$

Shear scalar,  $\sigma^2 = \frac{1}{2} \sigma_{ij} \sigma^{ij}$

$$\sigma^2 = \frac{K_3^2}{(K_3 t + K_4)^2} \left\{ \frac{486 + 243n^2 - 13(n+2)^2}{486} \right\} \quad (33)$$

Spatial Volume

$$V = \sqrt{-g}$$

$$V = (K_3 t + K_4)^{n+2} e^{-ax} \quad (34)$$

Hubble Parameter

$$H = \frac{(n+2)K_3}{(K_3 t + K_4)} \quad (35)$$

Graphs are plotted for particular values of the physical parameters and other integration constants.

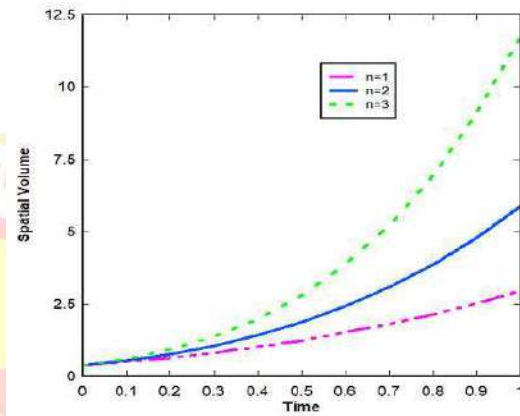
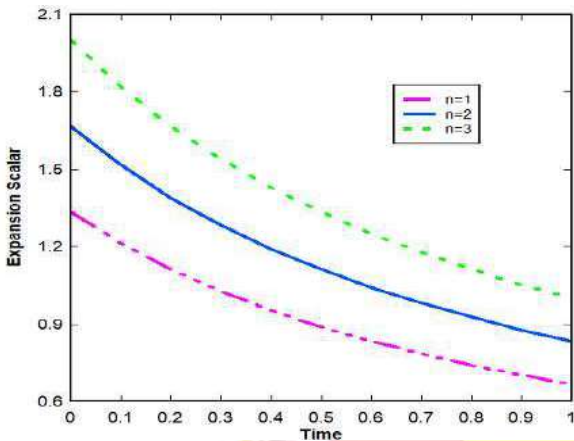


Fig. 1 Plot of Expansion Scalar Vs. Time for  $K_3 = K_4 = 1$

Fig. 2 Plot of Shear Scalar Vs. Time for  $K_3 = K_4 = 1$

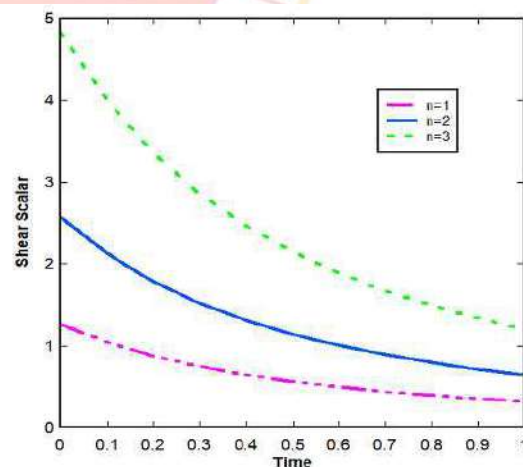
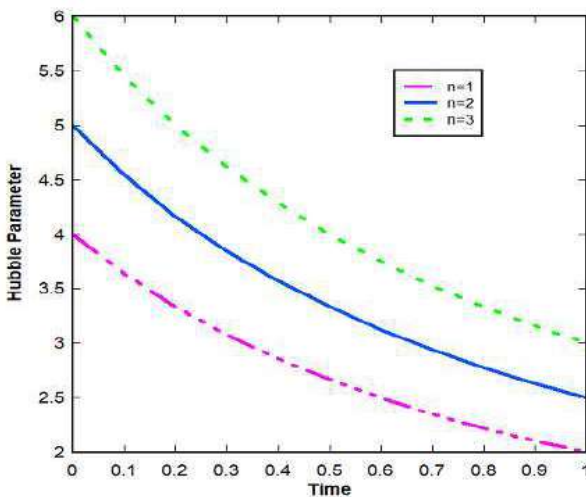


Fig.3 Plot of Spatial Volume vs. Time for  $K_3 = K_4 = a = x = 1$

Fig.4 Plot of Hubble Parameter vs. Time for  $K_3 = K_4 = 1$

#### IV. Conclusion

In this paper, we have considered Bianchi type-III cosmological model in Barber second self-creation theory in presence of macroscopic body. For solving the field equations, relation between metric coefficients i.e.  $C = B^n$  and radiation universe are used. Also, it is interesting to note that as  $T$  gradually increases, the scalar expansion  $\theta$  and shear scalar  $\sigma^2$  decrease and finally they vanish when  $T \rightarrow \infty$ .

## References

- [1] G. Mohanty, U. K. Panigrahi and R. C. Sahu: Astrophysics and space Science 281:633-640(2002).
- [2] C. P. Singh, Suresh Kumar: Astrophysics Space Sci, 310:31-39(2007).
- [3] K. S. Adhav, A. S. Nimkar, M. V. Dawande: Int J Theory Phys.:47:3201-3206(2008).
- [4] P.K. Sahoo et al: Can. J. Phys. 92: 1068 dx.doi.org/10.1139/cjp-2014-0348 (2014).
- [5] R. Chaubey: International Journal of Astronomy and Astrophysics, 1, 25-38(2011).
- [6] Adhav et al.: Int.J.TheoryPhys, 50,164(2011a).
- [7] A. S. Nimkar, A.M. Pund :IOSR Journal of Mathematics, Volume 11, issue 4 Ver.II.pp 47-50 (July-Aug.2015).
- [8] Shanthi, K. & Rao, V.U.M.: Astrophysics and Space Science 179, 1. (1991).
- [9] Reddy,D.R.K.: 1987a, Astrophysics and Space Science 132, 2.
- [10] Reddy, D.R.K.:1987b, Astrophysics and Space Science 132, 2
- [11] Maharaj, S.D. & Beesham, A.: 1988, Astrophysics and Space Science 140, 1.
- [12] Landau, L.D., Lifshitz,E.M. The classical Theory of Fields Fourth Revised English Edition, Pergamon Press.
- [13] Khadekar, G.S. and Shelote, R.: Int.J.Theor.Phys, 51(5), 1442-1447(2011)
- [14] Katore S. D .and Hatkar, S. P., New Astronomy, 34,172-177(2015)
- [15] Bhowmik,B.B. and Rajput, A.:Pramana J. Phys.**62**,6,1187 (2004).
- [16] Reddy, D.R.K.: Astrophysics. Space Sci.**300**, 381 (2005).
- [17] Adhav K.S., Nimkar A.S., Ugale M. R. and Raut V.B.: FIZIKA B 18, 2, 55-60(2009)
- [18] Pawar,D.D,Dagwal,V.J.and Solanke Y.S.: Int.J.Theor.Phy, 54, 6 pp 1926-1937(2015)
- [19] Mete V.G.: Advances in Astrophysics,Vol.2, No. 3, (2017)



## Bianchi Type Cosmological Model in Saez-Ballester Theory of Gravitation

**A. S. Nimkar**

Department of Mathematics  
 Shri. Dr. R. G. Rathod Arts & Science College  
 Murtijapur, Dist. Akola (M.S.) India.

**S. R. Hadole**

Department of Mathematics,  
 Shri. Dr. R. G. Rathod Arts & Science College,  
 Murtijapur, Dist. Akola (M.S.) India.

**S. C. Wankhade**

Department of Mathematics  
 Shri. Dr. R. G. Rathod Arts & Science College  
 Murtijapur, Dist. Akola (M.S.) India.

### Abstract:

In this paper, we have obtained Bianchi Type  $VI_0$  cosmological model with strange quark matter attached to the string cloud in scalar tensor theory of gravitation proposed by Saez-Ballester (1985). For solving the field equations relation between metric coefficient  $C$  and  $A$  is used. i.e. ( $C = A^n$ ). Also, some physical and kinematical properties of the model are discussed.

**Key words:** Bianchi type- $VI_0$  space time, Quark matter, Saez-Ballester Theory of Gravitation.

### Introduction

In recent years there has been lot of interest in several alternative theories of gravitation. The most important among them are scalar-tensor theories of gravitation formulated by Brans and Dicke(1961), Nordvedt(1970) and Saez –Ballester (1985). All version of the scalar-tensor theories are based on the introduction of a scalar field  $\phi$  into the formulation of general relativity, this scalar field together with metric tensor field then forms a scalar-tensor field representing the gravitational field.

The field equations given by Saez and Ballester (1985) for the combined Scalar and tensor fields are

$$G_{ij} - \omega \phi^n \left( \phi_{,i} \phi_{,j} - \frac{1}{2} g_{ij} \phi_{,k} \phi^{,k} \right) = -T_{ij} \quad (1)$$

$$2\phi^n \phi_{,i}^i + n\phi^{n-1} \phi_{,k} \phi^{,k} = 0 \quad (2)$$

Where  $G_{ij} = R_{ij} - \frac{1}{2} R g_{ij}$  is the Einstein tensor,  $R_{ij}$  is the Ricci tensor,  $R$  is the scalar curvature,  $n$  an arbitrary constant,  $\omega$  is a dimensionless coupling constant and  $T_{ij}$  is the matter energy-momentum tensor. Here comma and semicolon denote partial and covariant differentiation respectively (we have chosen the units such that  $8\pi G = 1 = C$ ).

The equation of motion

$$T_{;j}^{ij} = 0 \quad (3)$$

is a consequence of field equation (1) and (2).

In this study, we will attach strange quark matter to the string cloud. Because, one of such transitions during the phase transitions of the universe could be quark gluon plasma (QGP) harden gas (called quark-hard phase transition) when cosmic temperature was  $T \approx 200$  Mev. Strange quark matter is modeled with an equation of state based on the phenomenological bag model of quark matter, in which quark confinement is described by an energy term proportional to the volume. In this model, quarks are through as degenerate Fermi gas, which exists only in a region of space endowed with a vacuum energy density  $B_c$  (called as the bag

constant). In the framework of this model the quark matter is composed of mass less u, d quarks, massive s quarks and electrons. In the simplified version of the bag model, assuming quarks are mass less and non-interacting. We then have quark pressure

$$p_q = \frac{\rho_q}{3} \quad (4)$$

( $\rho_q$  is the quark energy density).

The total energy density is

$$\rho = \rho_q + B_c \quad (5)$$

But the total pressure is

$$p = p_q - B_c \quad (6)$$

Yilmaz (2005, 2006) have studied quark matter attached to the string cloud and domain wall. Mak and Harko (2004) have studied charged strange quark matter in the spherically symmetric space-time admitting conformal motion. Very recently Yavuz et al (2005) has studied strange quark matter attached to the string cloud in the spherical symmetric space-time admitting conformal motion. Also a detailed discussion of Saez and Ballester cosmological model is contained in the work of Reddy and Venkateswara Rao(2001), Adhav *et al.* (2007), Ugale(2014) and Pund & Nimkar (2015) , Reddy and Subbarao (2006) , katore *et al* (2011) and Pund & Avachar (2014) .

The purpose of the present work is to obtain Bianchi Type VI<sub>0</sub> strange quark matter in scalar-tensor theories of gravitation proposed by Saez-Ballester (1985).

Our paper is organized as follows. In Section II, we derive the field equations in Saez-Ballester with strange quark matter attached to the string cloud .Section III, deals Solutions of Field equations. Section IV is mainly concerned with the physical properties with graphical representation of the model. The last section contains some conclusions.

## II. Metric and Field Equations

We consider the Bianchi type VI<sub>0</sub> space time in the form

$$ds^2 = -dt^2 + A^2 dx^2 + B^2 e^{2x} dy^2 + C^2 e^{-2x} dz^2 \quad (7)$$

Where, A, B and C are the functions of time 't' only.

The energy-momentum tensor for strange quark matter attached to the string cloud is given by

$$T_{ij} = (\rho_q + \lambda + B_c)u_i u^i - \lambda x_i x^i \quad (8)$$

$$T_1^1 = -\lambda \quad , \quad T_2^2 = T_3^3 = 0 \quad , \quad T_4^4 = -\rho$$

Using the equations (1), (2), (3) and (8), the field equations of metric (7) are

$$\frac{B_{44}}{B} + \frac{C_{44}}{C} + \frac{B_4 C_4}{BC} + \frac{1}{A^2} + \frac{\omega}{2} \phi^n \phi_4^2 = \lambda \quad (9)$$

$$\frac{A_{44}}{A} + \frac{C_{44}}{C} + \frac{A_4 C_4}{AC} - \frac{1}{A^2} + \frac{\omega}{2} \phi^n \phi_4^2 = 0 \quad (10)$$

$$\frac{A_{44}}{A} + \frac{B_{44}}{B} + \frac{A_4 B_4}{AB} - \frac{1}{A^2} + \frac{\omega}{2} \phi^n \phi_4^2 = 0 \quad (11)$$

$$\frac{A_4 B_4}{AB} + \frac{A_4 C_4}{AC} + \frac{B_4 C_4}{BC} - \frac{1}{A^2} - \frac{\omega}{2} \phi^n \phi_4^2 = \rho \quad (12)$$

$$\frac{B_4}{B} - \frac{C_4}{C} = 0 \quad (13)$$

$$\phi_{44} + \phi_4 \left( \frac{2B_4}{B} + \frac{A_4}{A} \right) + \frac{n\phi_4^2}{2\phi} = 0 \quad (14)$$

$$\rho_4 (\rho - \lambda) \frac{A_4}{A} + \rho \left( \frac{C_4}{C} + \frac{B_4}{B} \right) = 0 \quad (15)$$

### III. Solutions of Field Equations

From equation (10) we get,

$$B = \mu C \quad (16)$$

Now with the help of Eqs. (6) - (12) and use (13), the field equation reduces to

$$2 \frac{C_{44}}{C} + \left( \frac{C_4}{C} \right)^2 + \frac{1}{A^2} + \frac{\omega}{2} \phi^n \phi_4^2 = \lambda \quad (17)$$

$$\frac{A_{44}}{A} + \frac{C_{44}}{C} + \frac{A_4 C_4}{AC} - \frac{1}{A^2} + \frac{\omega}{2} \phi^n \phi_4^2 = 0 \quad (18)$$

$$\frac{2A_4 C_4}{AC} + \left( \frac{C_4}{C} \right)^2 - \frac{1}{A^2} - \frac{\omega}{2} \phi^n \phi_4^2 = \rho \quad (19)$$

$$\phi_{44} + \phi_4 \left( \frac{2C_4}{C} + \frac{A_4}{A} \right) + \frac{n\phi_4^2}{2\phi} = 0 \quad (20)$$

$$\rho_4 (\rho - \lambda) \frac{A_4}{A} + 2\rho \left( \frac{C_4}{C} \right) = 0 \quad (21)$$

Where suffix 4 after field variable denotes ordinary differentiation with respect to time t.

The equations (17) to (19) is a system of independent equations with five unknown

$A, C, \rho, \lambda$  and  $\phi$ . Hence to get deterministic solution, we use relation between metric coefficients

$$C = A^n \quad (22)$$

and geometric string  $\lambda = \rho$

The above equations admits an exact solution given by

$$A = K_3 t + K_4 \quad (23)$$

$$C = (K_3 t + K_4)^n \quad (24)$$

$$B = \mu (K_3 t + K_4)^n \quad (25)$$

Using equations (23)-(25),  $VI_0$  cosmological model for strange quark matter attached to string cloud in equation (7) takes the form

$$ds^2 = -dt^2 + (K_3 t + K_4)^2 dx^2 + \mu^2 (K_3 t + K_4)^{2n} e^{2x} dy^2 + (K_3 t + K_4)^{2n} e^{-2x} dz^2 \quad (26)$$

The string density is given by

$$\lambda = \frac{1}{(K_3 t + K_4)^2} \left[ K_5 + \frac{\omega}{2(K_3 t + K_4)^{4n}} \right] \quad (27)$$

$$\rho = \frac{1}{(K_3 t + K_4)^2} \left[ K_6 - \frac{\omega K^2}{2(K_3 t + K_4)^{4n}} \right] \quad (28)$$

$$\rho_p = \frac{1}{(K_3 t + K_4)^2} \left[ 2(nK_3^2 - n) - \frac{\omega K^2}{(K_3 t + K_4)^{4n}} \right] \quad (29)$$



$$\rho_q = \frac{1}{(K_3t + K_4)^2} \left[ 2(nK_3^2 - n) - \frac{\omega K^2}{(K_3t + K_4)^{4n}} \right] - B_c \quad (30)$$

$$p_q = \frac{1}{3(K_3t + K_4)^2} \left[ 2(nK_3^2 - n) - \frac{\omega K^2}{(K_3t + K_4)^{4n}} \right] - \frac{B_c}{3} \quad (31)$$

#### IV. The Physical Properties

The physical quantities that are important in cosmology are spatial volume  $v^3$ , the expansion scalar  $\theta$ , shear scalar  $\sigma^2$ . Which have the following expression for the model (26) as given below

Spatial Volume

$$V = \sqrt{-g}$$

$$V = (K_3t + K_4)^{2n+1} \mu \quad (32)$$

The Scalar expansion,

$$\theta = \frac{(2n+1)K_3}{3(K_3t + K_4)} \quad (33)$$

Hubble constant

$$H = \frac{(2n+1)K_3}{(K_3t + K_4)} \quad (34)$$

Shear scalar,

$$\sigma^2 = \frac{1}{2} \sigma_{ij} \sigma^{ij} \quad \sigma^2 = \frac{K_3^2}{(K_3t + K_4)^2} \left\{ \frac{729 + 1458n^2 + 169(2n+1)^2}{1458} \right\} \quad (35)$$

#### V. Discussion

Graphs are plotted for particular values of the physical parameters and other integration constants From Fig.1 and Fig. 2, it is initially observed that expansion scalar and Hubble Parameter decreases as time increases. As  $T \rightarrow \infty$ , expansion scalar as well as Hubble Parameter will be zero. From Fig. 3 it is observed that Spatial Volume increases as increase in time as  $V \rightarrow \infty$  as  $T \rightarrow \infty$ . From Fig. 4, it is observed that as  $T \rightarrow \infty$ ,  $\sigma \rightarrow \infty$  i.e. shape of the universe is changing with increasing time.

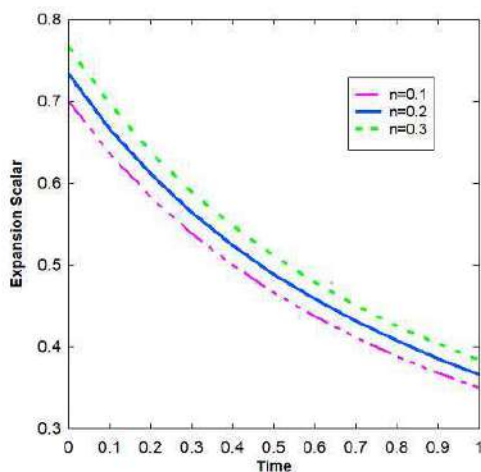


Fig. 1 Plot of Scalar expansion Vs. Time for  $k_1=k_6=0.1$

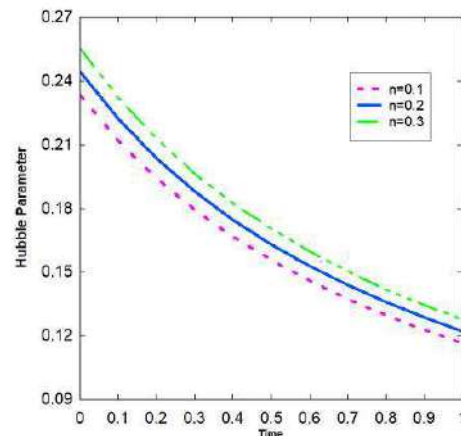


Fig. 2 Plot of Hubble parameter Vs. Time for  $k_1=k_6=0.1$

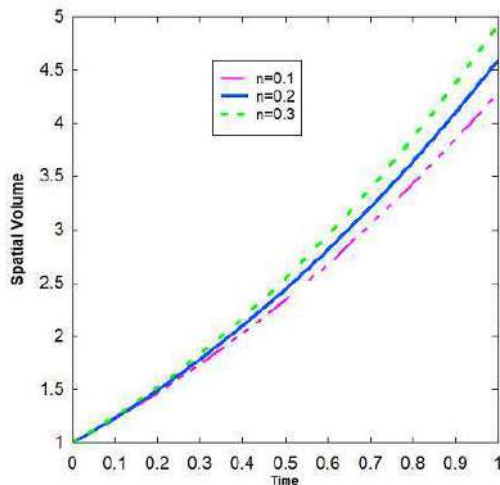


Fig. 3 Plot of Spatial volume vs. Time for

$$k_1=k_6=0.1$$

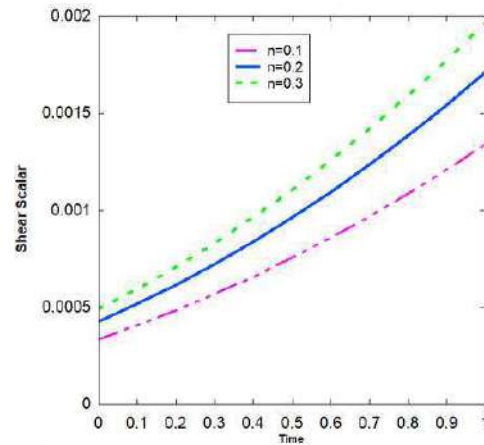


Fig. 4 Plot of Shear Scalar vs. Time

$$\text{for } k_1=k_6=0.1$$

### Conclusion

In this paper, we have obtained Bianchi Type  $VI_0$  cosmological model with strange quark matter attached to the string cloud in scalar tensor theory of gravitation proposed by Saez-Ballester (1985). For solving the field equations relation between metric coefficient  $C$  and  $A$  is used, obtain model is expanding, shearing, non-rotating and do not approach isotropy for large value of time. The rest energy density for the cloud of string with particles attached to them ( $\rho$ ), string tension density ( $\rho_s$ ) and particle energy density tends to zero as  $T \rightarrow \infty$ . Also the kinematical variable  $\theta$  and  $\sigma$  tends to zero as  $T$  becomes large.

### References

- [1] Saez, D., Ballester, V. J.: Phys. Lett.A113, 467(1985).
- [2] Brans, C. and Dicke, R.H.: Phys.Rev.124, 925. (1961).
- [3] Norvedt, K. Jr.: Astrophys. J.161, 1069, (1970).
- [4] Reddy, D.R.K., Venkateswara Rao, N.: Astrophys. Space Sci. 277, 461 (2001).
- [5] Yavuz, I., Yilmaz, I., Baysal, H.: Int. J. Mod. Phys. D 14 1365-1372 (2005).
- [6] Yilmaz, I.: Gen. Rel. Grav. 38, 1397-1406 (2006).
- [7] Yilmaz, I.: Phys. Rev. D 71, 103503 (2005).
- [8] Adhav, K.S., Nimkar, A.S., Naidu, R.L.: Astrophys. Space Sci.312, 165-169 (2007).
- [9] Ugale, M. R.: International Journal of Mathematical Archive 5(3), 280-282(2014).
- [10] Pund, A. M., Nimkar, A.S.: International Journal of Mathematical Archive 6(9), 18-21(2015).
- [11] Reddy, D.R.K. Rao, M.V.S.: Astrophys. Space Sci. 302, 157 (2006).
- [12] Adhav, K.S., Nimkar, A.S., Naidu, R.L.: Astrophys. Space Sci.312, 165-169 (2007).
- [13] Adhav, K.S., Mete, V. G., Pund, A. M., Raut, R.B.: Journal of vectorial Relativity 5(4), 26-33(2010).
- [14] Katore, S. D., Adhav, K. S., Sancheti, M. M.: Prespacetime Journal, 2(1), (2011).
- [15] Pund, A. M. Avachar, G.R.: Prespacetime Journal, 5(3), 207-211 (2014).
- [16] Mak and Harko: International Journal of Modern Physics D 13 (01), 149-156 (2004)

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## Role Of Technologies And Skills For Better Development In Sports

Prof. Vinod Kapile

R.G. Rathod Arts And Science College Murtizapur, Dist Akola

### Abstract

*Sport and exercise science like most areas of life have been affected greatly by technological advancements. It is difficult to imagine modern sports and various sub-disciplines of exercise science without technologies. The use of technologies is, without exception, tainted with frustration and ambivalence. Paradoxically, it is the omnipresence of technology that has contributed most to people's inability to fully grasp the scope and depth of its influence and also uncertainty as to what role various technological advancements play in sports. Indeed, the influx of sport technologies has profoundly changed the landscape of sport and exercise science. Importantly, technology has in many ways changed what we think of as the athletic body. Therefore, this paper examines the impact of technology on sport performance, considering the theories of technology and quest for improved performance, types of sport technologies, i.e. advantages and disadvantages of sport technologies in modern day sports. It is recommended that those managing, handling and using sport must be equipped to make wise choices on the type and use of sport technologies that would assist in the right performance.*

### Introduction

Sports science is a widespread academic discipline, and can be applied to areas including athlete performance, such as the use of video analysis to fine-tune technique, or to equipment, such as improved running shoes or competitive swimwear. Sports engineering emerged as a discipline in 1998 with an increasing focus not just on materials design but also the use of technology in sport, from analytics and big data to wearable technology. In order to control the impact of technology on fair play, governing bodies frequently have specific rules that are set to control the impact of technical advantage between participants. For example, in 2010, full-body, non-textile swimsuits were banned by FINA, as they were enhancing swimmers' performances.

### Technology in sports

Sport world today is getting technological by combining natural athletic talent with advanced analytics and artificial intelligent to produce the best possible outcomes on the playing field of sports. Sport excite people as a triumph of human effort, with Barr (2016) stating that behind the scenes are a number of things that go into that triumph and at the top is technology. Technology has been utilized in sport for many years in various forms and play particularly vital role especially for the elite sport. Numerous attempts to define technology have yielded such an array of descriptions that one may resigned to the idea that technology is simply not definable. On the one hand, it is synonymous with science and rational thought, encompassing every little gadget ever held in hands. Cave and Miller (2015) states that technology plays an increasing role in assisting professional athletes, amateur runners and armchair fans to engage in the sport.

### Computer Software

There are numerous software packages that are designed for fitness and nutrition professionals to organize data and produce reports, ideal for visitors to this site. Here are a couple of packages that come recommended by Topend Sports.

- Team Beep Test — the most versatile and useful software for conducting and recording results of the beep / beep test, with results recorded directly onto your computer.
- adyByte — a universal standalone computer software program specially developed to comprehensively organize and manage all the information associated with nutrition, training and fitness.

### HANS device

A vast majority of technological advancements in sports revolve around safety, and the HANS (Head and Neck Support) device used in motorsports is one of the most famous.

At the time of Dale Earnhardt's death on the track at the Daytona 500 due to head and neck trauma, Thomas Gideon, senior director of Safety, Research & Development of NASCAR, claims that only about six drivers were wearing a HANS device. That moment changed the sports as more drivers adopted this technology geared towards saving their lives in the event of a tragic crash.

### Details of a HANS device:

- U-shaped device which is placed behind the neck and its two arms are placed over the pectoral muscles of the chest
- It is only connected to the helmet by two anchors on each side and supported by the shoulders
- A HANS device keeps the head from whipping forwards and backward in a crash, while also preventing excessive twisting movements

**Video Technology**

To remind you just how long ago 1980 was – The 'Miracle on Ice' was not broadcast live. The epic Olympic hockey battle between USA and USSR, won in epic fashion by the US, was on tape delay, ending an hour before the TV broadcast started.

There is no way that would happen in today's sports era.

Everything is live, and not just on your home TV, but on your smartphone, tablet, and the overhead screen in your local church. In today's sports world you are never far from live access.

But it isn't just access that has adapted to the times, it is features. Instant replay, 1st and ten lines, pitch trackers, HD TV sets, DVR's – the experience of watching sports has changed dramatically for the better.

**Wearable Computers**

Another advancement in the world of safety and monitoring, wearable computers allow for real-time tracking of an athlete's health. Since their creation, the incidents of dehydration, heart attacks and worse, have dramatically decreased.

When Minnesota Vikings offensive lineman Corey Stringer died of heat stroke during training camp in 2001, companies began to investigate ways to monitor health in real-time and stave off tragedies like this. Wearable tech has made a difference in the lives of many athletes, by supervising pulse rate, hydration, and temperature through its wireless and microscopic health monitoring system.

**Sports skills****Coordination****Description**

Getting different parts of your body to work together to move in the pattern wanted.

**Planning the Movement**

- Timing the movement
- Think/predict what to do
- React to a situation if different from what you predicted

**Bilateral coordination**

- To use both sides of the body together
- Can be a symmetrical movement (star jumps)
- Can be an alternating movement (walking)

**Hand Eye coordination**

- Eyes guide the hands to complete movement (catching, striking)
- Coordinated movements start in your large muscles groups and move into your smaller muscle groups working together for a fluid motion.

**Rhythm****A body in Motion**

- Helps kids learn to move through their environment in a smooth flowing and graceful way

**Assessing the skill**

- It is hard to break rhythm down into a specific body movements or pattern, it should be a part of all movement
  - It is important to offer activities in programs like dance, music play, skipping, hopscotch, etc. that work on rhythm
  - Activities should allow children to move in patterns, changing the shape of their bodies, move to a beat/music and move around each other skillfully
- Developing Rhythm helps children perform many fundamental movements easier and with more confidence.

**Conclusion**

The word sport is changing because of technology, as technology plays large roles in daily lives, it also play a large role in changing the body. Thus, technology continues to change the way sports are played, how injuries are treated, what kinds of sports are played and enhances performance outcomes. Sporting technologies are man-made means developed to reach human interests or goals in or relating to a particular sport.

**References**

1. Merrett, Christopher (2005). "Sport and apartheid". *History Compass*. 3: \*\*. doi:10.1111/j.1478-0542.2005.00165.x
2. Fulton, Gareth; Bairner, Alan (2007). "Sport, Space and National Identity in Ireland: The GAA, Croke Park and Rule 42". *Space & Policy*. 11 (1): 55–74.
3. Tyler Cowen; Kevin Grier (24 October 2012). "Will Ohio State's Football Team Decide Who Wins the White House?". *Slate*. Retrieved 29 December 2013.



Shri Govindsing Rathod Shikshan Prasarak Mandal, Dahatonda's  
**Shri Dr. R. G. Rathod Arts and Science College,  
Murtizapur Dist.-Akola, (MS)**

Website: <https://rgrcollmzr.ac.in/>

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**Number of papers published in national/ international  
conference proceedings in the year  
2018-19**





## **Quality Orange (Citrus Reticulata ) Fruit Production by Applying Organic Nutrients And Water Maintenance**

**P. M. Makode**

Department of Zoology, Sh. Dr. R. G.  
Rathod Arts & Science College, Murtizapur Dist.  
Pravin\_makode@rediffmail.com

### **Abstract**

*Use of organic materials such as farmyard manure, cakes of plant origin and Vermicompost, are important components of the bio-organic concept of orange cultivation. The Vermicompost application is one of the effective methods to rejuvenate the depleted soil fertility and enrich the available pool of nutrients and conserve more water, maintain soil quality and conserve more biological resources. Nagpur Oranges (Citrus reticulata) are predominantly grown on black soils, rich in minerals. It was observed that due to consistent depletion of organic matter and higher availability of potassium in soil induced high acidity in the fruits, which take comparatively longer time for ripening that result in poor fruit yield and quality. Increased realization of ill effects due to exclusive use of chemical fertilizers, unsustainable productivity of orange and growing demand from consumers for fruit quality have fostered experimentation with some alternative cultural practices. Organic culture is claimed to be the most benign alternative.*

**Key Words:** Citrus fruit, Production growth, Best in quality.

### **Introduction**

Use of organic materials such as farmyard manure, cakes of plant origin and Vermicompost, are important components of the bio-organic concept of orange cultivation. The Vermicompost application is one of the effective methods to rejuvenate the depleted soil fertility and enrich the available pool of nutrients and conserve more water, maintain soil quality and conserve more biological resources. As reported by some of the researchers vermicomposting is an appropriate technology for residue and waste management <sup>[8]</sup>. Vermicomposting is an easy and effective way to recycle agricultural waste, city garbage and kitchen waste along with bioconversion of organic waste materials into nutritious compost by earthworm activity <sup>[7]</sup>. Vermicompost is potential organic manure rich in plant nutrients compared to farmyard manure or other organic manures in respect to supply of N, P, and K fertilizers <sup>[1]</sup>. Citrus reticulata (Nagpur Orange) is one of the most promising fruit crops of Vidarbha. It is claimed to be one of the most remunerative and potential foreign exchange earning fruit crop of Vidarbha but recently drying of orange trees, irregular flowering due to varied abiotic and biotic factors resulted in significant decrease in productivity of orange. Oranges are predominantly grown on black soils, rich in minerals. It was observed that due to consistent depletion of organic matter and higher availability of potassium in soil induced high acidity in the fruits, which take comparatively longer time for ripening that result in poor fruit yield and quality. Increased realization of ill effects due to exclusive use of chemical fertilizers, unsustainable productivity of orange and growing demand from consumers for fruit quality have fostered experimentation with some alternative cultural practices. Organic culture is claimed to be the most benign alternative. The activities of dehydrogenase, nitrogenase, phosphatase, arylsulfatase and urease were found



higher in process of vermicomposting<sup>[12]</sup>. Vermicomposting is fast growing popularity as a tool of reclamation of waste and used vermicompost for reclamation of waste land<sup>[3, 13]</sup>. Fertilizer have almost replaced use of farmyard manures and resulted in severe depletion of soil quality by erosion and loss of organic content<sup>[9]</sup>. Vermicompost have a much finer structure than compost and contain nutrients informs that are readily taken up by the plants such as nitrates, exchangeable phosphorous and soluble potassium, calcium and magnesium<sup>[6]</sup>. Their growth productivity and ability to transform organic waste as animal dung, agricultural residues, urban washes and sludge have been widely reviewed.

### **Materials And Methods:**

The work were carried out in my own field at Nagarwadi Orange Garden during period of one year from Dec 2017 to Nov 2018, to study the effect of vermicompost application on productivity and quality of orange in typical expansive clay soils in the field of 02 hectors with 500 trees. The soil had pH 7.6, CaCO<sub>3</sub> 79 g/kg, organic carbon 6.3 g/kg and. The culture bed of 20ft X 20ft for experimental sets were prepared by putting a layer of garden soil up at the base over this softened wastes mixed with cow dung in equal proportion was added on the surface of the soil. The entire culture trough was left for 15 day prior to experimentation for composting of the bedding materials. These stock foods were stabilized by moistening with water to maintain 75 - 80% moisture content. The heat produced due to decomposition process was reduced by sprinkling water over the bed. In 10 –15 days, the predigested compost was ready for the preparation of vermicompost. After 15 days 300 worms were introduced in bed. Surface of the composting setups were covered with polythene to prevent the entry of predators and to keep away flies. This setup was left without disturbing the beds and worms until the vermicast were produced<sup>[4]</sup>. Water was sprinkled over the surface once a day and sometimes alternate days if the bed was wet and covered by net during the time of vermicomposting.

### **Result And Discussion**

Vermicomposts prepared from cow dung and wastage fruits in the field processed by earthworm. Is used as a best organic fertilizer in terms of nutritional quality and the impact on the growth of the fruit and plant. The earthworm activity accelerated the process of waste products decomposition and stabilization and promoted biochemical characteristics of the Vermicastings that were favorable for plants growth. Vermicomposting has been recently universally accepted as eco friendly technology for sustainable development and abatement of pollution caused by municipal; garbage, sewage, sludge, agricultural wastes. The higher potassium concentration in the end product prepared from sewage sludge<sup>[5]</sup>. The calcium level was more in experimental than control. This is due to microbes in gut of earthworms and their metabolic process. Calcium, Potassium is higher in Vermicompost<sup>[2]</sup>. The results at the present experiment revealed that the reduced C: N ratio of the substrate material reflects the organic waste mineralization and stabilization during the process of composting or vermicomposting. The loss of carbon as carbon dioxide through microbial respiration and simultaneous addition of nitrogen by worms in the form of mucus and nitrogenous excretory material lowered the C: N ratio of the substrate<sup>[15]</sup>.

The enhanced phosphorous level in vermicompost suggests phosphorous mineralization during vermicomposting process. The passage of organic matter through the gut of earthworm's results in phosphorus is converted to forms, which are more available to plants<sup>[10]</sup>. Some

previous studies also indicate enhanced potassium content in vermicompost by the end of the experiment <sup>[11,15]</sup>. It was found that pots containing soil amended with vermicompost at the time of plant growth achieving significantly better height and large number of leaves than control. *Punica granatum* balasta showed the richest contents of organic carbon, Nitrogen Phosphorus, Potassium and Calcium.

There were two treatments namely in year namely in January and June before flowering i.e. application of 10 kg per average above 12 year's age of orange tree. Vermicompost had relatively higher concentration of different nutrients which might have met the nutrient requirement of crop reasonably better and suitably modified the physical and biological properties of soil <sup>[14]</sup>.

Nutrient content of Vermicomposts used

Nutrients	N	P	K	Ca	Mg	Fe	Mn	Cu	Zn
	Percentage mg /hectars								
Vermicompost	1.3	0.59	0.72	0.46	0.16	148	86	4.67	21

Application of 10 kg vermicompost per plant in the month of January (during basin preparation), recorded significantly higher number of fruits, fruit weight and yield. The per cent increase in fruit number per tree, fruit weight and yield due to vermicompost application. Vermicompost application improves the porosity and internal drainage of soils, nutrient content of soil and conservation of water led to low fruit drop and higher fruit number and fruit weight and yield of orange.

Treatment	Without Vermicompost	With Vermicompost
<b>Year</b>	2017	2018
<b>No. of Trees Treated</b>	500	500
<b>Av. Weight of fruit (gm)</b>	120	135
<b>Fruit Production/ ha (tons)</b>	22	35

**Conclusion:**

Application of Vermicomposts improved Juice content of fruits significantly and juice content indicates the regulated nutrient supply to plants in vermicomposte applied plants as compared to non applied plants. Nagpur Orange favors more requirement of organic matter to maintain and regulate the supply of nutrients to plants. Application of 10 kg Vermicomposts in the month of January (during basin preparation) significantly increased the fruit number, fruit weight and fruit yield of orange.





## Effects of Dietary onion on Behaviour of the fresh Water fish *Channa Punctatus* (Bloch, 1793)

Makode P. M.1, Pandharikar S. D.2, Gulhane R. A.3

1. Shri. Dr. R. G. Rathod Art's and Science College, Murtizapur, Maharashtra (India)
2. G. S. Art's, Commerce and Science College, Khamgaon, Maharashtra (India)
3. S. S. S. K.R. Innani Mahavidyalaya, Karnja (Lad), Maharashtra (India)

### Abstract:

*The aim of this study was to assess the effect of onion (*Allium cepa*) on growth performance in the fresh water fish *Channa punctatus*. A total number of 80 fish (average weight  $20.86 \pm 0.27$  g) was used. Fish were divided into four groups fed on diets containing onion in different levels and the control group diet was without onion. The experiment extended for two months. The results showed significant enrichment in behaviour of fish fed on onion. From obtained results, it could be recommended that onion (*Allium cepa*) should be added to the diets of fresh water fish *Channa punctatus*.*

**Key words:** Behaviour, *Channa punctatus*, Fresh water, onion.

### Introduction:

Inclusion of feed additives in diets of fish is goal to improve the growth performance, immunity and body composition. The investigation for novel feed additives is quiet a very imperative point for aquaculture investigators (Cho and Lee, 2012). Onion (*Allium cepa*; local name Kanda or Pyaz) is the most important commercial vegetable spice crop grown in India and exported. Onion leaves and immature bulbs are consumed as vegetable. It is mixed in other vegetables and soups as spice and flavouring agent. Onion is well known for its mineral and vitamin content as it is rich with vitamin B and C with various regulatory minerals as Ca, Fe, Mg, k, Cu (Gabor et al., 2010). Onion is also known for its medicinal properties as an antibiotic, antiseptic, anti-infectious, antibacterial and antifungal agent (Benkeblia, 2004). It is also an antioxidant and has anticancer properties (Ramos et al., 2006; Bello et al., 2012 a, b).

Though the dietary onion has several aforesaid important applications but its effect in fresh water fishes is not well known. Hence the presented study aim to assess the effects of dietary onion on behaviour of fresh water fish *Channa punctatus*.

### Material And Methods

**Experimental fish:** The *Channa punctatus* ( $20.88 \pm 0.25$  g) were obtained from a commercial farm and were transferred to the place of experiment and acclimated for 2 weeks. During the acclimation, fish were fed the experimental diet to satiation twice a day at 09:00 and 15:00 hours. After acclimation, fish were fasted for one day; batch weighted and randomly distributed among density of 20 fish per tank (Joshi et. al., 2015).

**Experimental diet and feeding regime:** The basal experimental diets were formulated with the commonly available ingredients. The formula and analyzed proximate composition of the basal diet are shown in Table 1. The ingredients were grinded, milled, weighed, mixed and pelleted with meat mincer through a 2 mm die. After pelleting, the feeds were air dried and put in an air-tight container. During the experiment, fish were fed the experimental diet to satiation third a day at 08:00, 12:00 and 16:00 hours.

Measurements and sample analysis: It was carried out each 20 days. Water temperature was 15°C, O<sub>2</sub> 7-8 mg/l, pH 7-8 and light: dark cycle of 12:12 h was maintained during the feeding trial. Proximate composition of diets and tissues were carried out using the Association of Analytical Chemists (AOAC, 1995) methods.

**Calculations and statistical analysis:**

The behavior of experimental fishes were recorded in the period between 09:00 till 15:00 h for 2 weeks by using focal sample technique for 15 sec. with intervals during one hour daily. The frequency and duration of feeding, swimming, aggression, rest, arousal and surface visit was recorded by using the method suggested by Khalil et al. (2016).

**Results And Discussion:**

Behavioural responses of the fishes during 2 weeks of feeding are summarized in Table 2. Results cleared that frequency and time of feeding, swimming and rest increase with increase in dietary onion content. While the frequency and time of aggression, arousal and surface visit decrease with increase in dietary onion content.

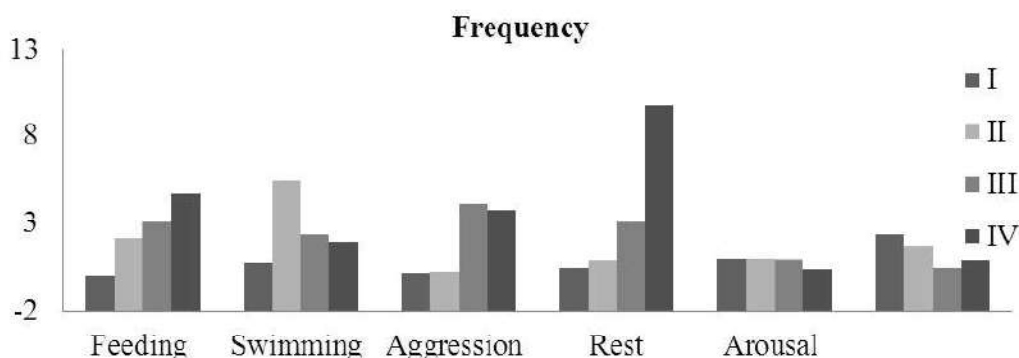
It is clear that onion is a main vegetable extensively cultivated in many countries. It is used as food for humans as well as some animals and as remedy for several diseases, as reported in folk medicine (Saleh et al., 2015). The dietary onion also enhances the growth of fish (Gabor et al., 2010; Gabor et al., 2012 and Makode 2017). It is clear that obtained behavioral patterns of fish were influenced by different levels of dietary onion. The study clears that behaviour pattern of treated group attributed to fish increase the feed intake and growth rate. It is due to increase oxidative metabolism and protein synthesis. This result was in harmony with observations noted by Khalil et al. (2016).

**Conclusions:**

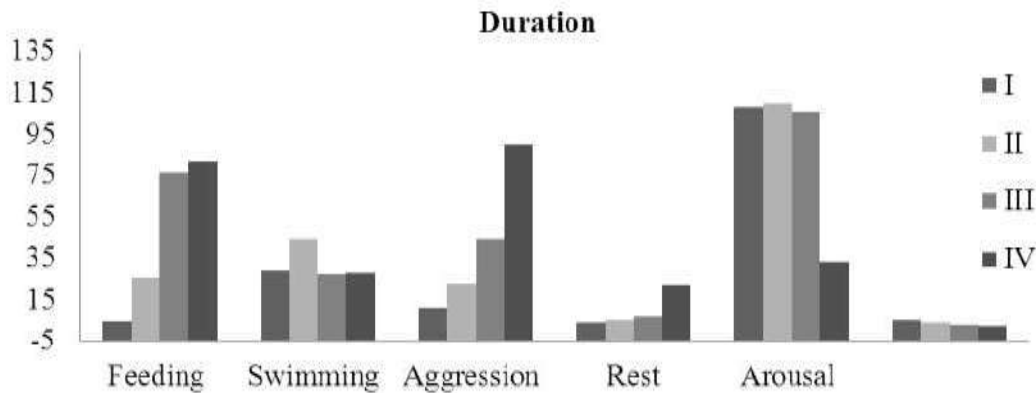
From obtained results, it could be recommended that onion (*Allium cepa*) should be added to the diets of fresh water fish *Channa punctatus*.

**Table 1. Formulation and proximate composition of the basal fish diets**

Ingredients	Control	Onion diets Ingredients (g /100g diet)		
		I	II	III
Meat	25	25	25	25
Wheat	50	47	44	41
Soybean	20	20	20	20
Soybean oil	05	05	05	05
Onion Powder	00	01	02	03



**Figure 1: Effect of dietary onion (wt/100gm) on behavioral patterns of**



### References:

1. AOAC (Association of Official Analytical Chemists), 1995. International Official Methods of Analysis, sixteenth ed. Arlington, Virginia, USA.
2. Bello OS, Emikpe BO and FE Olaifa, 2012 a. The body weight changes and gut morphology of *Clarias gariepinus* juveniles in feeds supplemented with walnut (*Tetracarpidium conophorum*) leaf and onion (*Allium cepa*) Bulbs. *Resiues. Int. J. Morphol.* 30 (1): 253–257,
3. Bello OS, Olaifa FE, Emikpe BO and ST Ogunbanwo, 2012 b. The effect of walnut (*Tetracarpidium conophorum*) leaf and onion (*Allium cepa*) bulb residues on the tissue bacteriological changes of *Clarias gariepinus* juveniles. *Bull. Anim. Health Prod. Africa* 60 (2), 205–212,
4. Benkeblia, N., 2004. Antimicrobial activity of essential oil extracts of various onions (*Allium cepa*) and garlic (*Allium sativum*). *LWT Food Sci. Technol.* 37 (2): 263–268.
5. Cho SH and L Lee, 2012. Onion powder in the diet of the olive flounder, *Paralichthys olivaceus*: effects on the growth, body composition, and lysozyme activity. *J. World Aquaculture Society* 43: 30–38.
6. Joshi PS Gulhane RA, and VT Tantarपाले, 2015. Effects of dietary garlic on growth performance in the fresh water fish *Channa punctatus* (Linn.). *Int. J. Res. Biosci. Agri. Tech.* 2 (3): 244-246.
7. Khalil A, EL-Husseiny W, Azhar F and W Ghonimi, (2016). Effect of Feeding with Different Dietary Protein Levels and Starvation on the Health, Nonspecific Immune Parameters, Behavior and Histoarchitectures of Fantail Goldfish (*Carassius auratus* L.), *J Vet. Sci. Technol.* 7 (1): 01-12.
8. Makode PM (2017). Effect of dilatory onion on growth performance in fresh water fish *Channa punctatus*. *Bioscience Discovery*.
9. Ramos FA, Takaishi Y, Shirotori M, Kawaguchi Y, Tsuchiya K, Shibata H, Higuti T, Tadokoro T and M Takeuchi, 2006. Antibacterial and antioxidant activities of quercetin oxidation products from yellow onion (*Allium cepa*) skin. *J. Agric. Food Chem.* 54: 3551–3557.
10. Saleh N, Michael M, and M Toutou, 2015. Evaluation of garlic and onion powder as phyto-additives in the diet of sea bass (*Dicentrarchus labrax*). *Egy. J. Aqua. Res.* 41: 211–217.
11. Shalaby AM, Khatlab YA and AM Rahman, 2006. Effect of garlic (*Allium sativum*) and chloramphenicol on growth performance, physiological parameters and survival of Nile tilapia (*Oreochromis niloticus*). *J Venom Anim Toxins incl Trop Dis.* 12(2):172-201
12. Tacon A, 1990. Standard method for nutritional and feeding of farmed fish and shrimp. *Argent librations press*, Vol. 1: 117pp.



## Estrogenic Activity of Alcohol Extract of *Gossypium Herbaceum* Linn. Stem and Leaves on Albino Rat *Rattus Rattus*

S.R. Pare and V.S. Zade

\*Department of Zoology,

Government Institute of Science and Humanities, Amravati (M.S.)

E-mail: shtlpare85@gmail.com, zvarsha27@gmail.com

### Abstract

*To determine the effect of alcohol extract of Gossypium herbaceum Linn. stem and leaves on estrogenic potential in albino rat rattus rattus. The phytochemical screening of GH stem and leaves revealed the presence of alkaloids, flavanoids, phenolics, tannins and saponins. Clinical toxicity symptoms such as respiratory distress, salivation, weight loss and change in appearance of hair as well as maternal mortality were not observed at any period of the experiment. Alcohol extract of the stem and leaves of the plant Gossypium herbaceum were tested for estrogenic activity in female albino rats at highest dose 400 mg/kg body weight. In oviectomised immature rats, alcohol extract of GH exhibited significant estrogenic activity (uterine weight, vaginal opening/cornification, diameter of uterus and thickness of endometrium).*

**Key words:** Estrogenic activity; *Gossypium herbaceum*; Female albino rat; Tribal medicine.

### Introduction

In recent years, plants are exploited for steroidal contraceptive drug because plants are easily available, economic and devoid of harmful side effects. A large number of plants have been reported to exhibit anti-implantation and abortifacient activity but a few have been evaluated for such effects in laboratory animals [1]. So far no single plant is available which can be developed further as a postcoital antifertility agent. Many of these plant products have inherent estrogenic- antiestrogenic effects possibly bringing about alteration in tubal transport of blastocyte or hormonal milieu of the uterus making the uterine environment hostile for implantation or foetal development [2].

*Gossypium herbaceum*, belongs to the family Malvaceae, and is widely used in traditional African medicine, especially its root preparations. In Senegal root maceration is given to new-born babies and sickly or rachitic children, to strengthen them. In Ethiopia the root is chewed in case of a snake bite. In Namibia the powdered root bark is applied as a haemostatic. In Botswana root preparations are used for the treatment of heart palpitations. In Mozambique root decoctions are drunk as a tonic and to control vomiting, an infusion of the root against lack of appetite. The stem juice is applied against otitis in the Seychelles. The juice of the heated unripe fruit is dropped into the ear against earache in Somalia, while in Ethiopia the powdered fruit is applied on the head for the treatment of fungal infections [3].

The survey in the tribal belt of Melghat, revealed that tribals used *Gossypium herbaceum* (GH) (Malvaceae) plants for abortion. Therefore the present study was carried out to validate scientifically, its tribal claimed antifertility activity in female albino rats.

### Materials And Methods

The plant *Gossypium herbaceum* was identified and authenticated by experts from Botanical Survey of India, Pune where a voucher specimen with herbarium accession number (SHPAGOSH8) was deposited.

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242.	प्रा.शारदा सु.डांगे	वृद्धावस्था या काळातील शारिरीक बदलामुळे उद्भवणा-या शारिरीक समस्या व त्यावरील उपाययोजना	671 To 673
243.	प्रा. सौ. श्वेता प्रियदर्शी मेंढे	बच्चों और युवाओं के मानसिक स्वास्थ्य और कल्याण के लिए योग की भूमिका	674 To 676
244.	Dr. Ram Kumar Thakur Dr. Ajay Langewar	A Study of Aggression in Male and Female Basketball Players: With Reference to Level of Participation	677 To 679
245.	Faheem Faisal	Role of New Technologies in Enhancing the Athletic Performances	680 To 683
246.	Mr. Vijay A. Nimkar	Study Of Agility And Speed Between Rural And Urban Areas Of Intercollegiate Male Soccer Players	684 To 686
247.	Prof Navin S. Vighe	Relevance of Yoga for Today's life	687 To 690
248.	Dr. Ravijet O. Gawande	A Comparative Study Of Flexibility And Cardiovascular Fitness Between Yoga And Other Sports Person	691 To 693
249.	Mrs. Vrushali P. Deshmukh	How To Improve Your Wellbeing Through Physical Activity And Sport	694 To 695
250.	Surendra T. Chauhann	Comparative Study Of Physical Fitness Of The Students Of Central And State Schools In Maharashtra	696 To 698
251.	डॉ. अनिल वसंतराव वाळके	राष्ट्रसंत तुकडोजी महाराज नागपूर विद्यापीठांतर्गत येणाऱ्या महाविद्यालयातील जिम्नेस्टिक्स व मल्लखांब खेळाडूंच्या शारीरिक क्षमतेच्या घटकांचा तुलनात्मक अभ्यास	699 To 704

**वृद्धावस्था या काळातील शारिरीक बदलामुळे उद्भवणाऱ्या शारिरीक समस्या व त्यावरील उपाययोजना**

प्रा.शारदा सु.डांगे

गृहअर्थशास्त्र विभाग प्रमुख

श्री.डॉ.आर.जी.राठोड कला व विज्ञान महाविद्यालय मुर्तिजापुर त्रिअकोला.

**प्रस्तावना-**

मानवाची वाढ व विकास हा सतत चालू असतो.विकासाच्या अनेक अवस्था असून प्रत्येक बालकाला या अवस्थेतून जावे लागते या प्रत्येक अवस्थेतून जात असतांना त्यांच्यात शारिरीक,मानसिक,भावनिक असे अनेक बदल होत असतात आणि हे बदल परिपक्वतेच्यादृष्टीने अत्यंत महत्वाचे असतात.अशा या अवस्थेमधील सर्वात शेवटची अवस्था म्हणजे वृद्धावस्था होय.

वृद्धावस्था ही एक नैसर्गीक अवस्था असून प्राण्यांच्या व माणसाच्या आयुष्यातील प्रौढावस्थेनंतरचा कालावधी आहे.साधारणतः आयुष्याच्या ६० व्या वर्षापासून ते मृत्युपर्यंतचा हा कालखंड असतो.शारीरगच्या इतर विकास अवस्थेप्रमाणे वृद्धावस्थेची सुरवात होण्याचे वय स्थळकाल व सामाजिक परिस्थिती यानुसार बदलते. वृद्धत्व हे व्यक्तिच्या प्रकृतीवर तसेच आयुष्यात आलेल्या अनुभवांवर अवलंबून असते.निवृत्त होण्याचे वय ६० वर्षे असते. म्हणजे निवृत्त होण्यानंतरचा जो काळ असतो त्यालाच वृद्धावस्था असे म्हणू शकतो.आणि अशाच व्यक्तिला जेष्ठ नागरीक असे संबोधले जाते. वृद्धावस्थेमध्ये अनेक शारिरीक व मानसीक बदल होतात.या काळात त्वचेवर सुरकृत्या पडतात.शरीरातील विविध संस्था नीट काम करू शकत नाही.शरीर रोग व आजार यांनी बळी पडण्याची शक्यता अधिक असते.आणि अशा अवस्थेत मृत्यु सुध्दा येऊ शकतो

वृद्धावस्था किंवा म्हातारपण ही जीवनाची अशी अवस्था असते ज्यात मानवाचे वय अधिक वाढलेले असते. वृद्धावस्था एक हळूहळू येणारी अवस्था असून ती एक स्वाभाविक व नैसर्गीक घटना आहे. वृद्ध या शब्दाचा अर्थ म्हातारा,परिपक्व असा होतो. जसे झाडाला एखादे फळ लागले आणि ते पिकत पिकत जाऊन अतिप्रमाणात पिकले तर ते गडून पडते. त्याच प्रमाणे ही वृद्धावस्था असते. ही अवस्था पृथ्वीवरील प्रत्येक मानवप्राण्यांच्या वाट्याला येत असते. त्यामुळे प्रत्येकांनी आपल्या जीवनात येणा-या वृद्धावस्था या अवस्थेचा विचार आधीच करावा.कारण वृद्धावस्थेत अनेक समस्या उदभवतात त्या समस्या राहण्यापासून ते खाण्यापर्यंतच्या अशा अनेक समस्यांना सामोरे जावे लागते

**उद्दिष्ट:-**

- १) वृद्धावस्था या काळातील लोकांविषयी समजून घेणे
- २) वृद्धावस्था या काळातील आहाराअभावी उदभवणा-या समस्या अभ्यासणे.
- ३) वृद्धावस्था या काळातील समस्यांवर उपाययोजना सुचविणे

**वृद्धावस्थेतील आहाराविषयी समस्या व उपाययोजना:**

भारतीय कुटुंबामध्ये वृद्धांची पुष्कळदा दयनीय अवस्था होवे.बहुतेक लोक आपली आयुष्याची कमाईमुलांसाठी खर्च करून टाकतात व वृद्धावस्थेत मुलांवर अवलंबून राहिल्याने अनेक पेचप्रसंग निर्माण होतात.शरीरातील वातावरण निरोगी राहत नाही.त्यामुळे वृद्धांना समजून घ्यायला हवेतसेच वृद्धांनी सुध्दा थोडीफार तडजोड करायला हवी म्हणजे समस्याचनिर्माण होणार नाहीत.

वृद्धावस्थेतील व्यक्तीची सर्वात मोठी समस्या ही खाण्याविषयी असते.कारण दात पडल्यामुळे खाता येत नाही.खातांना त्रास होतो.भूक लवकर लागते.कडक चावत नाही.अशा अनेक खाण्यासंबंधी समस्या निर्माण होतात.या वयात जीभेला काही चव राहत नाही.काहीही खाल्ले तरी गोड लागत नाही.म्हणून शरीराला पुरेशा आहार मिळत नाही त्यामुळे शरीर व्यवस्थीत कार्यक्षम राहत नाही.थकवा लवकर येतो.अस्वस्थ वाटते.त्यामुळे चिडचिडेपणा येतो.अशा अनेक समस्या या काळात उदभवतात.म्हणून आपण प्रत्येक अवस्थेची काळजी घेतली पाहिजे ती बाल्यावस्था असो तारुण्यावस्था असो प्रौढावस्था असो किंवा वृद्धावस्था असो.कारण मानव हा प्रत्येक अवस्थेत काळजी घेतो पण वृद्धावस्थेत नाही.म्हणून प्रत्येकाने आपल्या वृद्धावस्थेची काळजी घ्यायला हवी.

**वृद्धावस्थेत होणारे शारिरीक बदल:-** वृद्धावस्थेमध्ये शरीरातील अनेक अवयव कमजोर झालेले असतात अंधत्व,दात पडणे,ऐकु कमी येणे,व्यक्तींना ओळखता न येणे अशा अनेक समस्यांना सामोरे जावे लागते.जन्मभर परिश्रम केल्याने त्यांचे सर्वच अवयव हळूहळू थकल्यासारखे होतात

- १) वृद्धावस्थेमध्ये चयापचयाची क्रिया १० ते ५० टक्क्यांनी कमी होत असते.
- २) शरीरातील नवीन पेशीची निर्मिती होण्याकरीता वेळ लागतो.
- ३) म्हातारपणामध्ये थकवा लवकर येतो कामे करता येत नाहीत
- ४) शरीराची पचनशक्ती, स्मरणशक्ती, सहनशक्ती सर्वच क्षीण होत जातात.
- ५) शरीरातील बहुतेक ज्ञानेंद्रीये शिथिल होतात डोळ्यांनी नीट दिसत नाही. ऐकु कमी येते.
- ६) दात पडल्यामुळे चावता येत नाही. खाण्याविषयी समस्या निर्माण होतात.
- ७) वेगवेगळे रोग जडतात उदा.- मधुमेह, उच्चरक्तदाब, हृदयरोग, संधिवात इ.

या सर्व बाबींचा परिणाम आहारावर होतो. म्हणूनच वृद्धांना योग्य आहार देणे जरूरी असते वयात सुद्धा सर्वच अन्नघटक आवश्यक असतात.

कॅल्शियम:- या वयात शारीरिक स्थितीवर कॅल्शियमची आवश्यकता अवलंबून असते. शरीरातील मूळ चयापचय गती कमी झाल्याने त्यासाठी कमी कॅल्शियम लागतात. या वयात कॅल्शियमचे प्रमाण कमी करावे.

प्रथिने:- या वयात दूध पिणेसर्वात योग्य कारण ते पचायलासोपी जाते. वयात सुद्धा १ किलोग्रॅम शारीरिक वजनाला १ ग्रॅम प्रथिने आवश्यक असतात.

कॅल्शियम व स्निग्धे:- वृद्ध व्यक्तीचे वजन जास्त असेल तर कॅल्शियम व स्निग्धे नेहमीप्रमाणे असावे. पण वजन जास्त असल्यास त्याचे प्रमाण कमी करावे. स्निग्धे पचायला जड असल्याने २० ते ३० ग्रॅम रोज घ्यावीत. वनस्पती स्निग्धांचा वापर करावा.

जिवनसत्व:- वृद्धावस्थेमध्ये शरीराची पचनशक्ती व शोषणशक्ती कमी झाल्याने जिवनसत्त्वाची कमतरता निर्माण होऊ शकते. यासाठी जिवनसत्व-अ, जिवनसत्व-ड आणि ब-गटातील जिवनसत्त्वे आहारातून मिळायला हवे. म्हणून हिरव्या पालेभाज्या व फळांचा उपयोग करावा. जर कच्च्या भाज्या व फळे खाता येत नसतील तर मल्टीव्हिटॅमिनची एक गोळी घ्यावी.

खनिजपदार्थ:- वृद्धावस्थेमध्ये सुद्धा कॅल्शियम व फॉस्फोरसची आवश्यकता तारुण्यावस्थेप्रमाणेच असते. परंतु या वयात हाडे कमजोर होतात. पचनसंस्थेत कॅल्शियमचे अभिशोषण योग्य होत नाही त्यामुळे ऑस्टोओपोरोसिस (हाडांची दिसुळता) होण्याची शक्यता असते. दररोज ०.८ ग्रॅम कॅल्शियम मिळण्यासाठी दुग्ध घ्यावे.

लोह:- स्त्रियांचा मासिक स्राव बंद झाल्याने लोहाची आवश्यकता कमी होते. जर लोह व जिवनसत्व-क चे योग्य शोषण झाले नाही तर रक्तक्षय होतो. त्यामुळे लोहयुक्त औषध घ्यावे लागते.

पाणी:- दररोज भरपूर पाणी प्यायल्याने बद्धकोष्ठता होत नाही म्हणून रोज ६ ते ७ ग्लास पाणी व इतर द्रव पदार्थ पण घ्यावेत.

वृद्ध व्यक्तीकरिता कॅल्शियम १७००, प्रथिने ४५ग्रॅम, कॅल्शियम ०.५, लोह ३० मि. ग्रॅम असे शिफारस केलेले प्रमाण असून सामान्य काम करणा-या वृद्धांची एकदिवसाची आहारतालीका पुढीलप्रमाणे आहे

वेळ	पदार्थ
सकाळी ७वा.	चहा, बिस्किट
सकाळी ९वा.	सुजीचा उपमासंत्राचा रस, दुग्ध
दुपारी १२वा.	पातळ वरण, मऊ भात, नरम पोळी, आलुची भाजी, काकडी किसुन कोशिंबीर, दही
दुपारी ४वा.	चहा, बिस्किट
सांय ६वा.	किसलेले सफरचंद
रात्री ८वा.	मूंगाच्या डाळीची पातळ खिचडी, कढी, चिकु,

अशाप्रकारे पोषकघटकयुक्त आहार वृद्ध व्यक्तीचा असावामनुष्याने आधीपासूनच आहाराबाबत नियमित चांगल्या सवयी असल्यास, आपले मानसिक संतुलन चांगले ठेवल्यास तसेच वृद्धावस्थेचे आधीच नियोजन केलेले असल्यास आणि तरुणपणात जे करता आले नाही असा एखादा छंद जोपसला तर वृद्धपकाळसुद्धा समृद्धीचा होऊ शकतो

**सारांश:-**

वृद्धावस्था या काळात बरेच शारीरिक व मानसिक बदल होत असतात. मानवी आयुष्यातील तारुण्यावस्था व प्रौढावस्था अतिशय धावपळीत जातात. त्यामुळे एक प्रकारची पोकळी, रिकामेपण निर्माण होतो आणि त्याचा परिणाम मानसिक व शारीरिक स्वास्थ्यावर होतो. म्हणूनच निवृत्त होण्याच्या तीन चार वर्षे आधीपासून आपले वृद्धपकाळ आपण कसे घालविणार याची योजना प्रत्येकाने करायला हवी म्हणजे वृद्धपकाळ हा सुखाचा होऊ शकतो. तारुण्यावस्थेपेक्षा वृद्धावस्थेमध्ये जास्त पैसाची

गरज असते,परंतु तेव्हाच येणारा पैसाकमी होतो म्हणूनच त्याची सोय आधीच करायला हवी.तरूणपणी सर्व कामे स्वतः करू शकतो परंतु वृद्धावस्थेत ती करवून घेण्यासाठी पैसाचे बळ हवे.या सगळ्यांचा विचार आजच्या पिढीतील प्रत्येक प्रौढांनी आवश्यक करायला हवा.

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AND MAPPING MELGHATTREE COVER FOR COLLECTION OF POTENTIALLY IMPORTANT DATA BY USING  
GEOGRAPHICAL INFORMATION SYSTEM (GIS) TOOL**  
during technical session of the conference.

  
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# 1. Vegetation Monitoring and Mapping Melghat Tree Cover for Collection of Potentially Important Data by Using Geographical Information System (GIS) Tool

Ranjan B. Kalbande

Dept. of Botany, Shri Dr. R. G. Rathod Arts & Science College, Murtizapur, Dist Akola, M. S. India.

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**Key Words:** MTR, GIS, GPS, Vegetation monitoring, Tree cover, Melghat, Mapping forest digitally, Information system, Satellite, geospatial data.

## Abstract

Aerial satellite monitoring method helps to understand better the complexity of the forest. The main intension of using this Geographical Information System (GIS) was to provide current status of forest with its potentially important data for monitoring, planning, conservation and management of the forest. The present study was carried out on the basis of computer assisted monitoring of vegetation using satellite and geospatial data. The study was conducted in order to understand the complexity of the forest. The grid of square and circles were drawn to map the forest cover area, to know where it was open, scattered, dense or very dense. The overall area of forest was marked and labeled. Satellite photographic images of research plot, a relatively new method in computing was attempted to improve modeling of the real world. This data images used to solve the information in handling large complex spatial data. The main intension of using this geographical information system (GIS) was to provide current status of forest with its potentially important data for monitoring, planning, conservation and management of the forest.

## Introduction

### Mapping Forest Digitally

Computer assisted monitoring of vegetation using multi-resolution satellite and geospatial data is the new vegetation monitor methodology by using remote sensing and GIS. It is relatively new method in computing to improve modeling of the real world. The idea is to provide an isomorphy that is direct correspondence, between real world entities and their computer representation. This data model can be used to solve the problem that is critical to relational spatial information system in handling complex data sets. The use of objected-oriented

data model is to handle the integration problem of multi-resolution, multi-temporal data sets by defining an object oriented data model (Lertlum and Murai, 1995)

#### **Satellite and geospatial data**

The composition and viability of a forest may be determined using a combination of remote sensing and geographic information systems (GIS). GIS uses different levels of geographical information, such as elevation, hydrology, or the location of roads and infrastructure, to create a multi-layered representation of a site. GIS and remote sensing are used to find solutions to environmental problems through improved information effectiveness and efficiency. Remote sensing, in this manner, could aid in determining the effects of forest management activities, such as timber harvesting and best management practices on soil erosion and sedimentation.

#### **Review of Literature**

##### **Vegetation Monitoring**

Lertlum and Murai (1995) carried out computer assisted monitoring of vegetation using multi-resolution satellite and geospatial data. The authors approach was object oriented, a relatively new method in computing, was an attempt to improve modeling of the real world. This data model could be use to solve the problem that was critical to relational spatial information system in handling complex data sets. They illustrated the use of objected-oriented data model to handle the integration problem of multi-resolution, multi-temporal data sets by defining an object oriented data model. Joshi *et al.*, (2004) explored the potential of multi-temporal IRS-ID WiFs (Wide Field Sensor) data for characterization of tropical forest in Central India. As the WiFS has red (R) and near infrared (NIR) band that was sensitive to vegetation. In the present study the forest cover of the central highland was accounted as 34.68% whereas the FSI reports 34.84 % forest cover. However, the WiFS product provided additional information on forest types, Viz., tropical moist deciduous, dry deciduous and mixed deciduous. The WiFS derived forest maps could be very useful as input to biogeochemical models that require timely estimates of forest area and type. The analyses of IRS-ID WiFS data highlighted significant seasonal difference among the various forest types in the study area. Gupta *et al.*, (2006) assessed the directionality of the changes and quantification of the dynamics of forest in the Mokokchung district Nagaland, India using satellite remote sensing data and GIS. The approach considered forest cover and canopy density within the mapping unit. The successional stages of forest in a shifting

cultivation landscape had been mapped using on screen visual interpretation of digital data on Landsat TM. It was established that dense forests were converted into medium density, open and mosaic forests and the well-stocked forests were being replaced by mosaic and fragmented forests annually at a rate of 8.43 km<sup>2</sup> per year. The small and scattered patches of vegetation/forest resulted due to clear felling and then abandoned after shifting cultivation were changing the basic nature of the forests in terms of biodiversity and other goods. Barilotti *et al.*, (2007) described laser scanning as a proficient technology to better understand the complexity of the forest. The method, developed in an open source environment, was based on the automatic determination of the forest structure by means of some LiDAR-extracted vegetation indexes. The study site was located in some mountainous parts of Friuli Venezia Giulia (N-E Italy) characterized by coniferous, mixed and broad-leaved forests with high variability in terms of population densities and composition. The results have been validated using topographic total station data surveyed in situ, in 13 forestry sample plots with a total of about 550 reference trees. The main components of the software allowed the visualization of the laser scanning data, to draw sections, to calculate DTM and DSM and to overlap them with other cartographic maps. Moss (2007) presented information on forest inventories and monitoring for biological conservation. Within large forested landscapes, inventories provide the cornerstone for effectiveness monitoring of biological conservation. Systems of classification are needed to characterize the varieties of expression of large number of habitat elements as well as their distributions in terms of their geographic locations. These systems of classification must underwrite reasonably reliable forecasts of future forest conditions. It is suggested that to do an acceptable job of effectiveness monitoring, much more attention needs to be paid to the details of how inventories are designed, maintained and used to develop forest management practices and guidelines in anticipation of future forest conditions. Rawat *et al.*, (2008) have shed light on monitoring and mapping India's forest and tree cover through Remote Sensing. Forests are ecological as well as socio-economic resource. These have to be managed judiciously not only for environmental protection and other services but also for various products and industrial raw materials. This requires periodic monitoring of the forest cover of the country for effective planning and sustainable development. The main objective of forest survey of India in mapping and monitoring forest and tree cover of the country is to know the dynamic changes of forest

resources in terms of quantity and quality over a period of time so that appropriate planning and management interventions could be developed for their conservation and sustainable utilization.

#### **Materials & Methods:**

Using World Wide Web, the information on vegetation cover was prepared. The photographs were downloaded from the internet. Aerial satellite photographic method was useful for mapping large scale forest area. Accurate identification of spot-vegetation potential was done, and topographic situations were well labeled. The series of photographs helped in proper interpretation. Visual photographs were easier for understanding the position of vegetation.



**Fig. 3. Vegetation-Spot, Melghat.**

Satellite forest cover maps of the Melghat Tiger Reserve were downloaded through World Wide Web or Internet technologies using Google search engine through Earth satellite map. The web browser i.e. Internet explorer software was used. Actual topographic locations of vegetation-spot potential from the satellite photographic images were studied. A total of 15 different sites, aerial photographs were taken.

#### **Observations & Results**

The study was carried out with the help of computer and Internet. The satellite maps were downloaded to understand the area broadly. The study site was located in Satpura mountains ranges. Present study explored the current status of the forest site. During monitoring study the area was highlighted properly and visually labeled. 26 satellite photographs of different views of the research area were prepared and studied. This data was useful for identify the forest category as tropical dry deciduous type. The satellite map indicated small visual patches of forest

vegetation cover comprising dense forest, open forest and non forest areas which were well labeled showing thereby the topographic situation of the area. During this study MTR forest was explored and its statewide, countrywide and worldwide existence was captured. Satellite data was mapped and magnification of areas was done to focus it in maximum possible closer view. Overall the Melghat forest exhibited dense crowded patches of vegetation. The Melghat sanctuary and its peripheral area was clearly demarcated by labeling surface area.

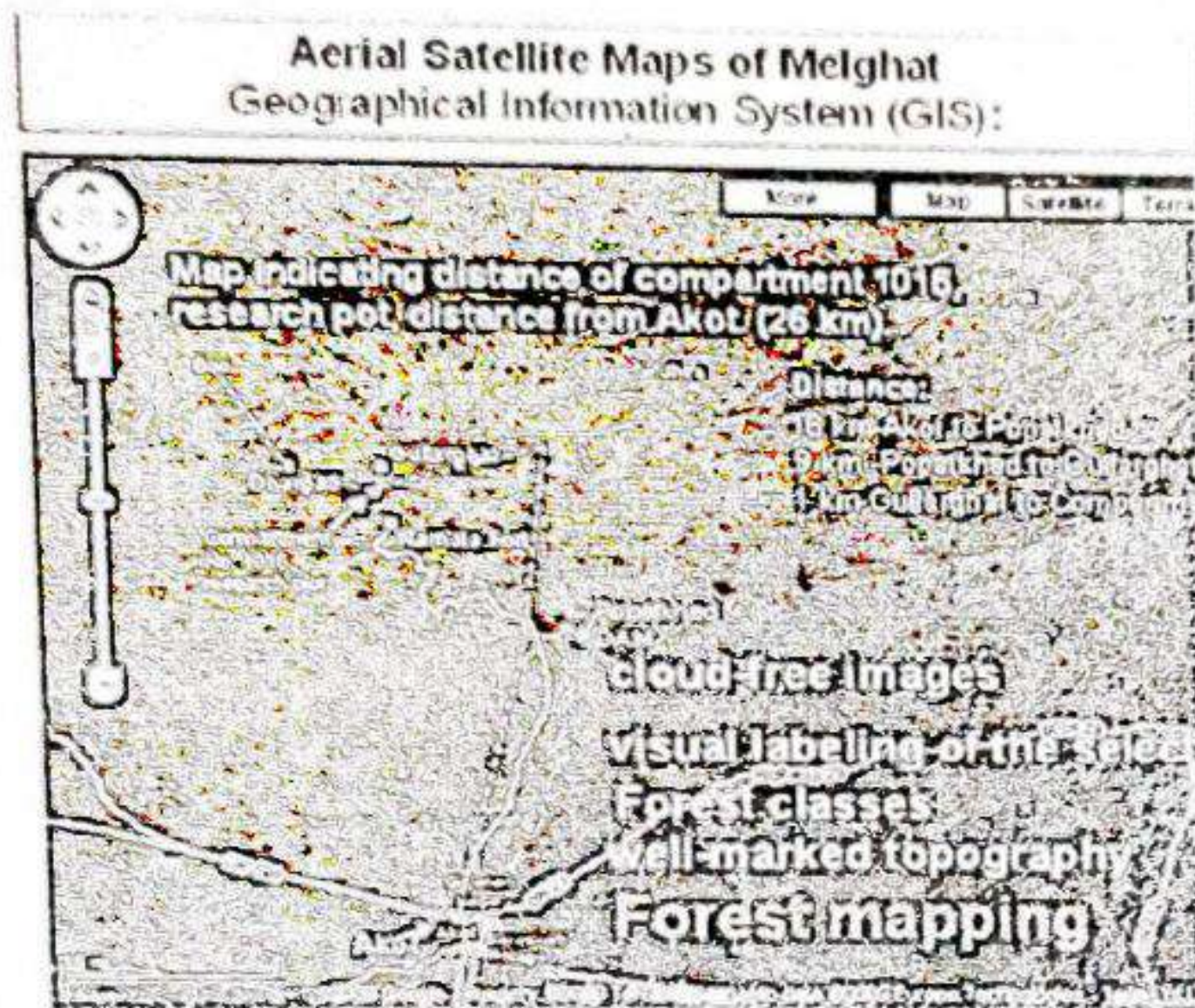


Fig. 2. Aerial satellite image

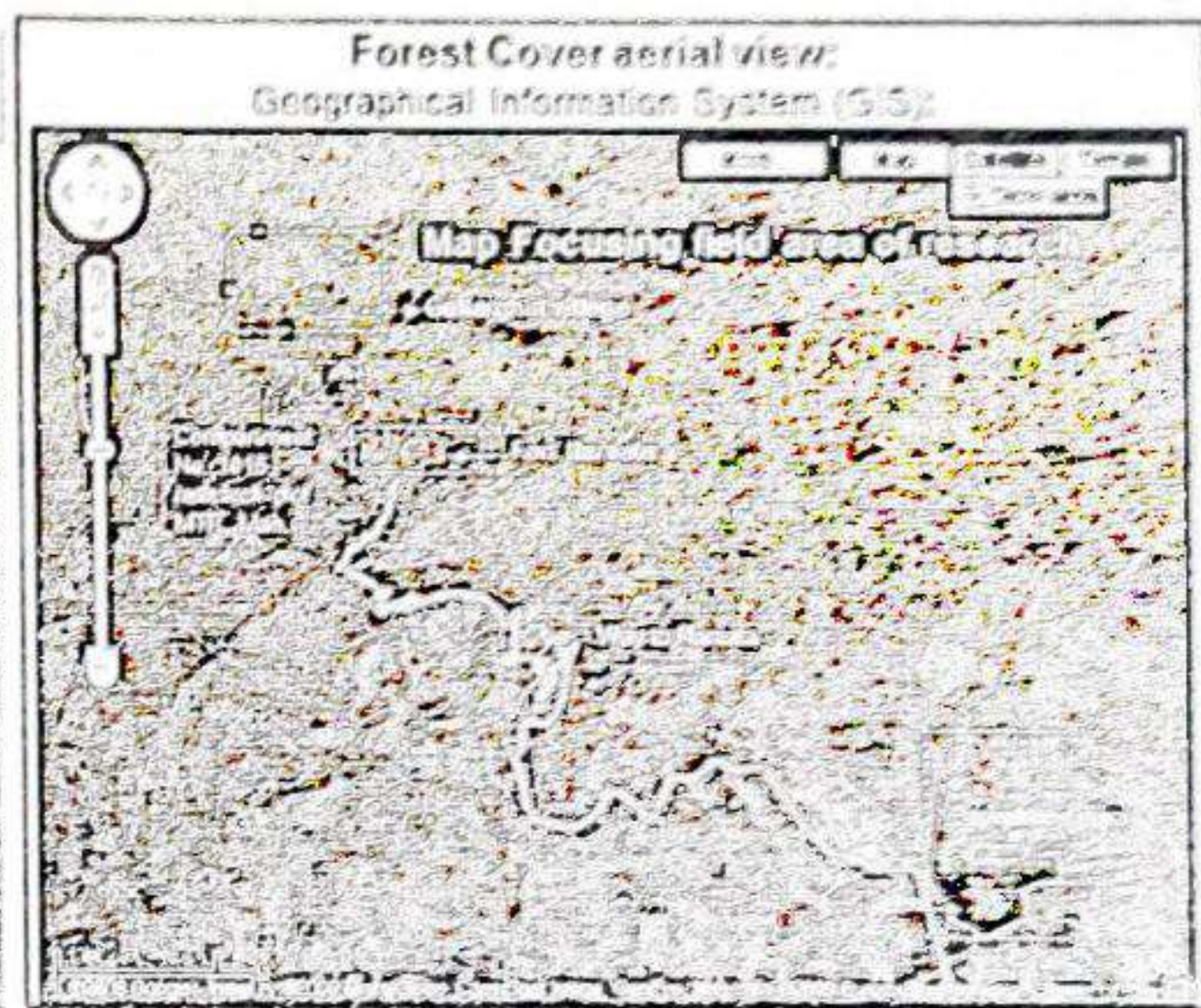


Fig. 3. Vegetation-Spot Potential

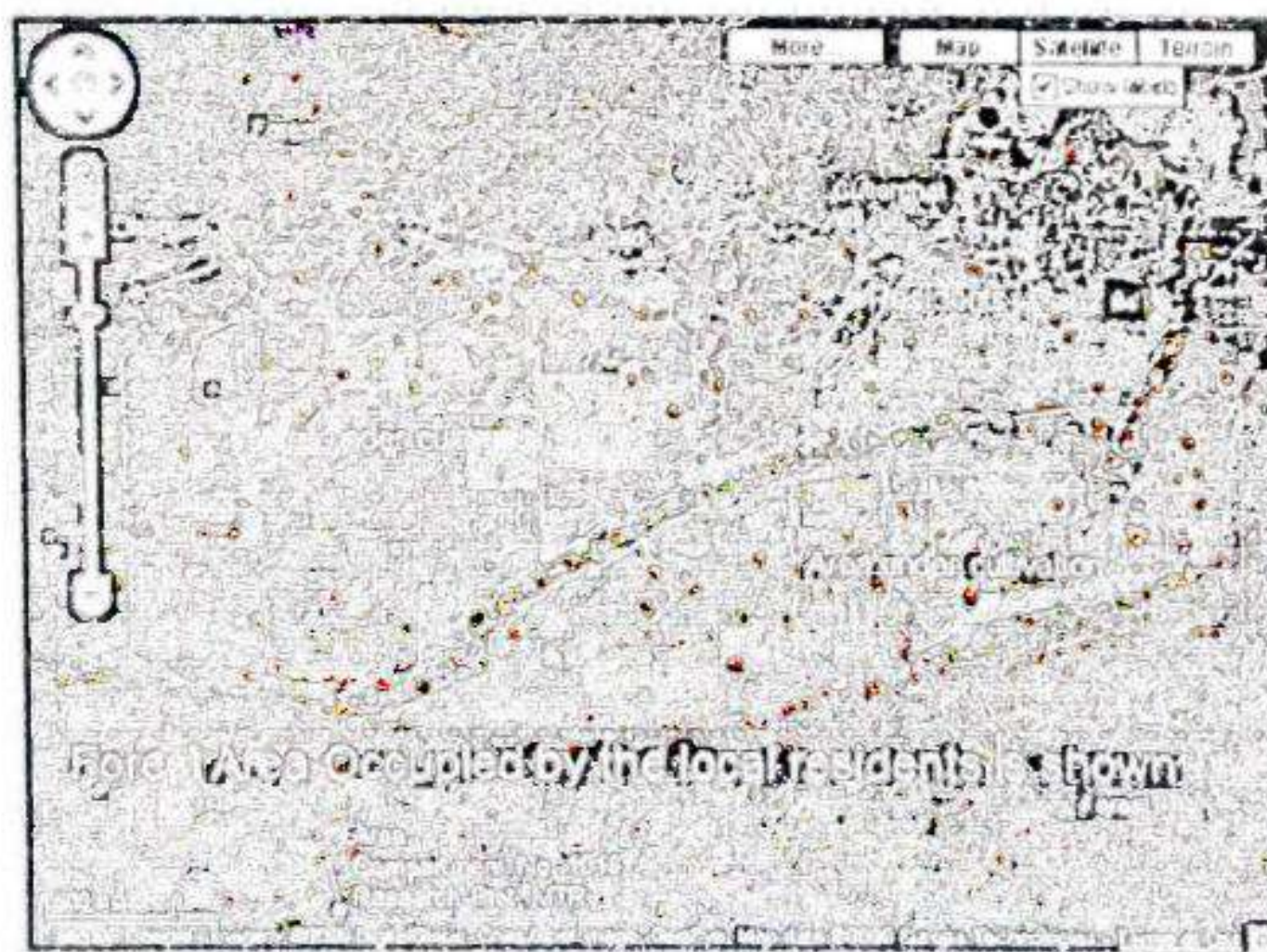


Fig. 3. Geospatial data

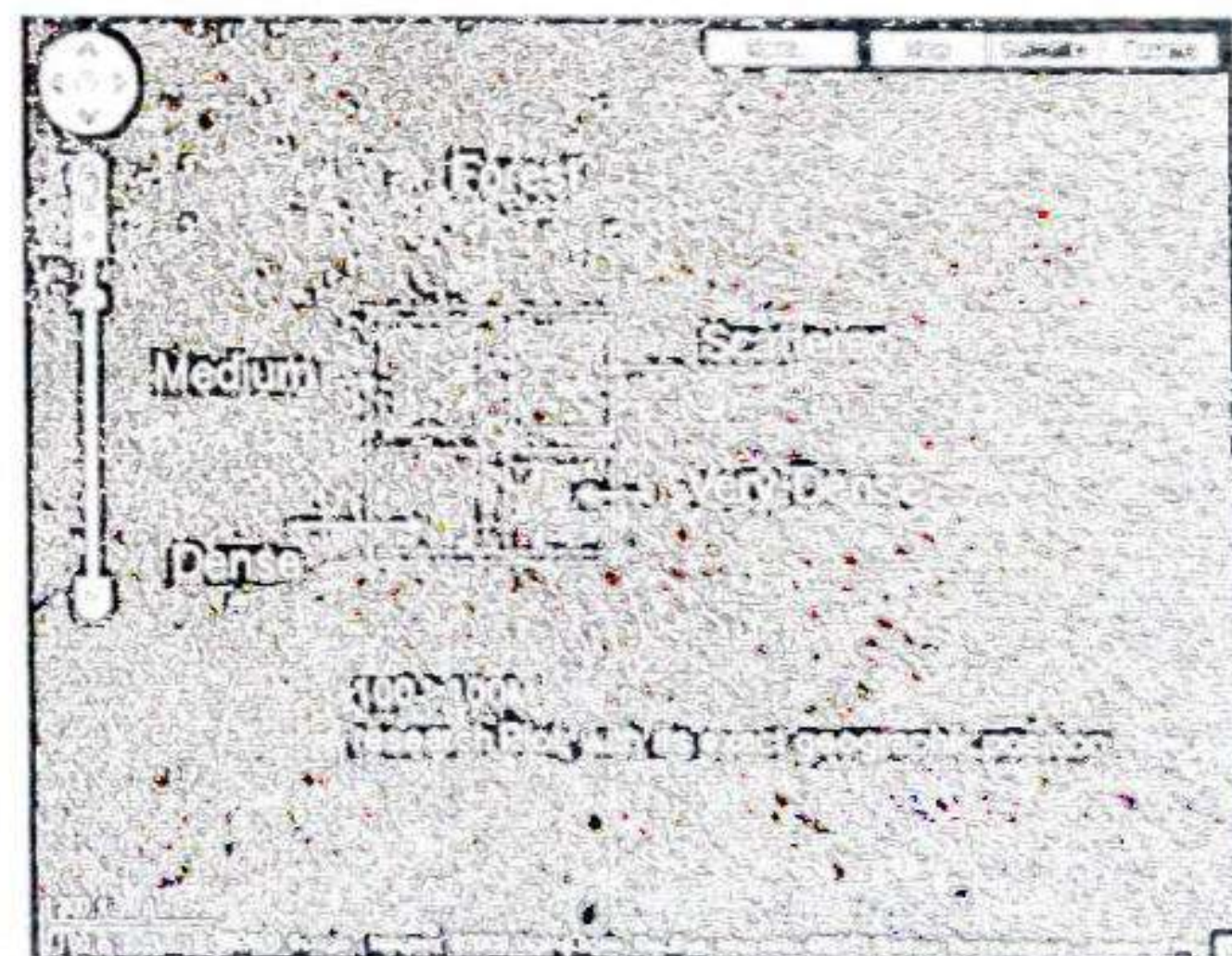


Fig. 4. Vegetation cover

The present study was carried out on the basis of computer assisted monitoring of vegetation using satellite and geospatial data. The study was conducted in order to understand the complexity of the forest. The grid of square and circles were drawn to map the forest cover area, to know where it was open, scattered, dense or very dense. The overall area of forest was marked and labeled. Satellite photographic images of research plot, a relatively new method in

computing was attempted to improve modeling of the real world. This data images used to solve the information in handling large complex spatial data. The main intension of using this digital image processing system was to provide current status of forest with its potentially important data for monitoring, planning, conservation and management of the forest. The present study deals with the data collection for Vegetation-Spot potential through aerial satellite photograph monitoring method to evaluate the potentially important data in identification of forest land. The map clearly revealed that this area was seen to be located under Central Forest Land Area situated in Satpura hills of India. The compartment was digitally mapped along with its original form. It showed overall picture of forest, recognizing field patches under cultivation, water resources, river, bandhara/dam, stream, rocky land, open area, dense forest, core area of forest, forest fire affected locations, villages, shady places, directions, hills and slopes, roads and flow of river water.

### Discussions

Aerial satellite monitoring method helps to understand better the complexity of the forest. The main intension of using this digital image processing system was to provide current status of forest with its potentially important data for monitoring, planning, conservation and management of the forest. Lertlum and Murai (1995) illustrated the use of objected-oriented data model to handle the integration problem of multi-resolution, multi-temporal data sets by defining an object oriented data model that could handle multi-resolution, multi temporal remote sensing GIS data sets. A semi-automated classification procedure was adopted by Meyera *et al.*, (1996) for identification of forest species from digitized large-scale, colour-infrared aerial photographs to simulate imagery from future sensors with high spatial resolution capability. With the help of applied computer-assisted classification approaches involving a tree by tree approach an average about 80% of the trees could be classified. A GIS database of environmental and management data for 40,000 hectare segment of Kinleith Forest, New Zealand, has been built by Hock, *et al.*, (2003). The digital forest provides a stable database to develop and test models, and is accessible for planning new experiments and future research. The database has proved to facilitate research efficiency and capability. The wealth of digital data permitted the development of new approaches in using spatial information for forest management. Joshi *et al.*, (2004) explored the potential of multi-temporal IRS-ID WiFs (Wide Field Sensor) data for characterization of tropical forest in Central India. The WiFS product provided information on forest types, Viz.,

tropical moist deciduous, dry deciduous and mixed deciduous. The present the data collection was done for Vegetation-Spot potential through aerial satellite photograph monitoring method to evaluate the potentially important data in identification of forest land. The map clearly indicated that this area was located under Central Forest Land Area situated in Satpura hills of India which was meeting place of ghats, which divided MTR in well defined northern and southern parts. The compartment was digitally mapped along with its original form. It showed overall picture of forest, recognizing fields under cultivation, water resources, river, dam, stream, rocky land, open area, dense forest, core area of forest and forest fire affected locations. These are the usage of new technology in monitoring forest cover which describes relationship in between real world and its computer representation. Aerial digital satellite maps provided accurate and real picture of geographical distribution so as to expose this hidden area to the world peoples.

#### **Bibliography**

- Lertlum S, Murai S. 1995. Computer Assisted Monitoring of Vegetation Using Multi-Resolution Satellite and Geospatial Data. From <http://www.aars-acrs.org/acrs/proceedings/ACRS1995/Papers/PS295-1.htm>
- Joshi PK, Joshi PC, Singh S, Agarwal S, Roy PS. 2004. Tropical Forest Cover Type Characterisation in Central Highlands of India, Using Multi-Temporal IRS-IC WiFS Data. *Indian Journal of Forestry* 27(2): 157-168.
- Gupta S, Singh S, Agarwal S, Roy PS. 2006. Degradation of Tropical Evergreen Forests in Mokokchung, Nagaland, India. *International Journal of Ecology and Environmental Sciences* 32(4): 345-356.
- Rawat JK, Saxena A, Dasgupta S. 2008. Application of Satellite Based Remote Sensing for Monitoring and Mapping of India's Forest Tree Cover. *Monitoring and Mapping India's Forest tree Cover through remote sensing* 1-7. From <http://www.gisdevelopment.net/application/environment/lfm.ma04067pf.htm>
- Barilotti A, Sepic F, Abramo E, Crosilla F. 2007. Improving The Morphological Analysis for Tree Extraction: A Dynamic Approach to Lidar Data. *ISPRS Workshop on Laser Scanning 2007 and SilviLaser 2007*, Espoo, September 12-14, 2007, Finland.
- Moss IS. 2007. The Design of Forest Inventories and Monitoring for Biological Conservation. Paper Presented at the "Monitoring the effectiveness of Biological



- Conservation" Conference, 2-4-November 2004, Richmond, BC. From <http://www.forrex.org/events/mebc/papers.html>.
- Rawal JK, Saxena A, Dasgupta S. 2008. Application of Satellite Based Remote Sensing for Monitoring and Mapping of India's Forest Tree Cover. Monitoring and Mapping India's Forest tree Cover through remote sensing 1-7. From <http://www.gisdevelopment.net/application/environment/ffm.ma04067pf.htm>
  - Meyera P, Staenzb K, Ittena KI. 1996. Semi-automated procedures for Tree Species Identification in high Spatial Resolution data from Digitized Colour Infrared-Aerial Photography. Published by Elsevier Science B.V. 51 5-16.
  - Hock B, Payn T, Stevens P, Dunningham A. 2003. A Digital Plantation Forest for Research and the Demonstration of Spatial Modeling. The 15<sup>th</sup> Annual Colloquium of the Spatial Information Research Centre University of Otago, Dunedin, New Zealand.
  - Musavi A, Mathur PK, Qureishi Q, Sawarkar VB. 2006. Mapping of Biotic Pressure and its Impact on Prey Densities in Melghat Tiger Reserve, Maharashtra. International Journal of Ecology and Environmental Sciences 32(4): 327-343.

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## Preliminary Phytochemical observations of *Tinosporacordifolia* (Willd) Miers.

Ashwini Sirsat<sup>1</sup>, Rupali Shirsat<sup>2</sup>, Pratiksha Kokate<sup>1</sup> and Deepak Koche<sup>1</sup>

<sup>1</sup>Department of Botany, ShriShivaji College of Arts,  
Commerce and Science, Akola (MS) India.

<sup>2</sup>Department of Botany,  
Shri Dr. R. G. Rathod Arts and Science College,  
Murtizapur, Dist- Akola (MS) India

### Abstract:

As per Ayurveda *Tinosporacordifolia* (Gulvel) is considered as one of the most important medicinal plant due its versatile pharmaceutical properties. The primary phytochemical analysis of leaf and stem of *T. cordifolia* indicates that the plant is rich in chemical composition and showed presence alkaloids, phenolics, flavonoids, cardiac glycosides, terpenoids, steroids, carbohydrate proteins and amino acids. Methanol was found to most suitable solvent to extract all possible phytochemicals from this plant. Further, it was noted that the stem possesses higher concentration of available phytochemicals than leaves. The availability this diverse range of phytochemicals could be correlated with the multi-dimensional medicinal potential of this plant.

**Key words:** *Tinosporacordifolia* (Willd) Miers., phytochemical, traditional medicine.

### Introduction:

Traditional healthcare system in India is well rooted since civilization. Ayurveda is one of the ancient treaties having cited more than two thousand medicinal plants with their uses and administration for different ailments. Traditional herbal healthcare is most reliable and affordable system for nearly 80% peoples in developing countries. The development of this system depends on investigation of active principles in the cited plants for which primary phytochemical observations should be accurate.

*Tinosporacordifolia* (Willd) Miers., belongs to family Menispermaceae. It is commonly known as Gulvel or Guduchi. The plant is a large glabrous, deciduous climbing shrub with corky, grooved stems, branches sending down slender pendulous fleshy roots, shining or glaucous bark (Fig. 1). Leaves membranous 7-9 nerved 4-11 cm roundish or subdeltoid, cordate with reticulate venation and microscopic glistening glands beneath; petiole 2.5-7cm long and bear yellow flowers and reddish fruits. It is widely used in Ayurveda and folk system of medicine in India since ancient time. Traditionally, it has been used as anti-inflammatory, anti-diabetic, antispasmodic, antioxidant and carminative (Kartikar and Basu, 2005 and Sarangi and Soni (2013).

The present work is focused on screening leaves and stem of *T. cordifolia* for available major phytochemicals and to correlate them with its medicinal properties.

### Material and Methods:

The plant material of *Tinosporacordifolia* was collected from Botanical garden of ShriShivaji College of Arts, Commerce and Science, Akola. It was taxonomically identified using flora of Marathwada (Naik, 1998) and a specimen was deposited in the herbarium of Department of Botany. The collected material (leaves and stem) rinse under tap water, cleaned

and then shade dried. The shade dried material was then powdered and kept in air-tight bags till further experimentation.

**Extractive values:**

Extractive values of *T. cordifolia* leaf and stem with different solvents is determined with the specific standard methods explained Ayurvedic Pharmacopoeia of India (2007).

Following methods were employed for preliminary phytochemical analysis:

**Qualitative analysis:**

**Tests for alkaloids:** 0.2 g of powder extract was warmed with 02 ml of sulphuric acid for 02 min and then added 2-3 drops of Mayer's reagent, cream to orange red precipitate confirm presence of alkaloids (Ansari, 2006).

**Test for Cardiac glycosides:** 0.5 g of powder extract was mixed with 02 ml glacial acetic acid containing a drop of ferric chloride solution. This was under-layered with 1ml of concentrated tetra-oxo-sulphate (VI) acid. Observation of brown ring at interface confirms the cardiac glycosides (Harborne, 1973).

**Test for terpenoids:** 0.5ml of powder extract was mixed with 2 ml of chloroform and then 2 ml of concentrated sulphuric acid was added to form a layer. The appearance of reddish brown ring at interface confirms presence of terpenoid in sample (Harborne, 1973).

**Test for reducing sugars:** 2ml of powder extract with 5 ml of distilled water and filter it. Filtrate was boiled with 3-4 drops of Fehling's solution A & B for 2 min., appearance of orange red precipitate indicated presence of reducing sugars (Harborne, 1973).

**Tests for tannins and phenolics:** Test for tannins and phenolics were performed by adding 2-3 drops of ferric chloride to 1ml of extract and the formation of a dark blue or greenish black colour product shows the presence of tannins (Mukherjee, 2002).

**Test for flavonoids:** 02 ml of powder extract mixed with dilute sodium hydroxide and add about 1ml diluted hydrochloric acid. Yellow solution turns colorless indicate presence of flavonoids in sample (Kokate, 1994).

**Test for saponins:** The procedure adopted for the identification of saponins was to take 1 ml of extract which is diluted with 20 ml distilled water and then shaken in a graduated cylinder for 15 minutes. A 1 cm layer of foam indicates the presence of saponins. (Ansari, 2006).

**Test for steroids:** 2ml powder extract was taken in a test tube and dissolved with chloroform (10 mL), then added equal volume of concentrated sulphuric acid to the test tube by sides. The upper layer in the test tube was turns into red and sulphuric acid layer showed yellow with green fluorescence.

**Tests for carbohydrates:** To the 0.5 ml of powder extract, 2-3 drops of mixture of Fehling solution A and B (1:1) was added and boiled for few minutes. A brick red colored precipitate of cuprous oxide forms which confirms presence of carbohydrate (Kokate, 1994).

**Test for proteins and Amino acid:** 0.5 mg of extract was taken and two drops of freshly prepared 0.2% Ninhydrin reagent was added and heated. The appearance of pink or purple colour indicates that the presence of proteins, peptides or amino acids (Harborne, 1973).



### **Quantitative analysis:**

#### **Estimation of Total Alkaloids:**

0.5 g of powdered material was weighed into a 250 ml beaker and 200 ml of 10% acetic acid in ethanol was added, covered and allowed to stand for 10 h. This was filtered and the extract was concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitated was collected and washed with dilute ammonium hydroxide and then filtered. The residue is alkaloid content, which was dried and weighed.

#### **Estimation of Cardiac Glycosides:**

5 g of powder was taken in 100 ml distilled water. To this 10 g conc. H<sub>2</sub>SO<sub>4</sub> (prediluted with 10 ml H<sub>2</sub>O) was added. It was then reflux for 6-8 h. Cooled and extracted with chloroform(2 x 25ml). The chloroform layer was then washed with distill water till it is acid free. Transferred to a pre weighed beaker and dried in an oven to a constant weight. Percentage of cardiac glycoside was calculated from the following formula:

$$\% \text{ of Cardiac glycoside} = (B - A) \times 100 \times 2$$

Where,

(B - A) = Weight of sample;

B = Weight of beaker with sample &

A = Weight of empty beaker

#### **Estimation of Total Phenols:**

Total phenols were determined by FolinCiocalteu method(Mc Donald et al., 2001). 0.5 gm of the powdered stem was taken in a pestle and motor and grinded in 20 ml of 80% ethanol. The homogenate was then centrifuged at 10,000 rpm for 20 min. The supernatant was transferred to a beaker and evaporated to dryness. The residue was dissolved in 20 ml of distilled water. 0.2 ml of samples were then taken in test tube and volume made up to 3ml with distilled water. 0.5 ml of FolinCiocalteu reagent was then added. After 3 min, 2 ml of 20% Na<sub>2</sub>CO<sub>3</sub> solution was added to each tube, mixed thoroughly, placed in boiling water for exactly 1 min, cooled and absorbance was taken at 650 nm against blank. The standard graph was prepared by using different concentration of catechol. The concentration of phenols in samples was then calculated from the standard graph.

#### **Estimation of Total Flavonoids:**

Total flavonoids were determined by Aluminium chloride colorimetric technique (Change et al., 2002). 0.5 g powdered sample was weighed and kept in 95% ethanol for 24 hours. It was than filtered and volume was made up to 25 ml with 80% ethanol. 0.5 ml of filtrate was then mixed with 1.5 ml of 95% ethanol, 0.1 ml of 10% AlCl<sub>3</sub>, 0.1 ml of potassium acetate and 2.8 ml water. The tubes were then incubated at room temperature for 30 min and absorbance was measured at 415 nm. The flavonoids content of the samples was calculated from the standard graph of quercetin.

### **Results and Discussion**

**Table-1 : Extractive value of Tinosporacordifolia leaf and stem.**

Solvents	Extractive value (%)	
	Leaf	Stem
Aqueous	26.59%	22.31%
Methanol	18.25%	15.25%

<b>Ethanol</b>	19.33%	16.24%
<b>Chloroform</b>	05.26%	4.68%

**Table - 2: Phytochemical analysis of T. cordifolia leaf and stem extract**

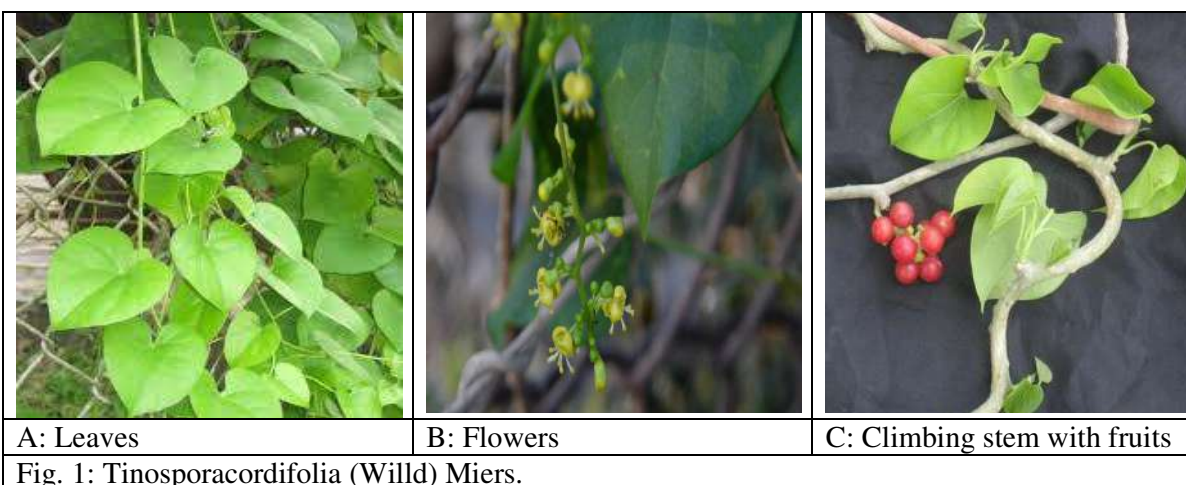
Test	Leaf				Stem			
	AE	ME	EE	CE	AE	Me	EE	CE
Alkaloids	-	-	-	+	-	+	+	+
Cardiac glycosides	+	+	+	-	-	+	+	-
Terpenoids	-	+	-	+	-	+	+	-
Tannins	-	+	-	-	-	+	+	-
Saponnins	+	-	-	+	+	+	+	-
Flavonoids	-	+	+	-	-	+	+	-
Phenolics	+	+	+	-	+	+	+	+
Steroids	-	+	+	-	+	+	+	-
Carbohydrates	+	+	-	+	+	+	-	-
Proteins and amino acids	+	-	-	-	+	+	-	-

AE= Aqueous extract; ME= Methanolic extract; EE= Ethanolic extract; CE= Chloroform extract

**Table 3 : Qualitative analysis of stem and leaf powder (% W/W)**

Phytochemical	Leaf	Stem
Total Alkaloid	0.85 ± 0.02	2.55 ± 0.22
Total phenolics	1.05 ± 0.22	0.91 ± 0.02
Total Flavonoids	0.09 ± 0.02	0.12±0.01
Total glycosides	0.20 ± 0.01	0.22±0.02

Note: Results are mean of triplicate analysis



The extractive values of leaves of *T. cordifolia* were found to higher than that of stem. The highest extractive values were recorded in distilled water followed by ethanol and least in chloroform (Table-1). The preliminary screening of leaves and stem powder of *T. cordifolia* indicates that, the plant is rich in phytoconstituents. It showed presence of alkaloids, phenolics, flavonoids, cardiac glycosides, tannins, terpenes, saponins and steroids apart from carbohydrates and proteins (Table-2). However, methanol emerges as most suitable solvent to extract maximum number of phytochemicals from this plant materials. Further chloroform has shown positive tests only for alkaloids and phenolics (in stem powder) and alkaloid, terpenoids, saponins and carbohydrate in leaf powder. Overall results including crude quantification of alkaloids, phenolics, flavonoids and cardiac glycosides indicates that stem contain higher level of available phytochemicals than leaves (table-3).

*Tinosporacordifolia* is traditionally being used as anti-diabetic, anti-spasmodic, anti-inflammatory, anti- stress, antioxidant, anti-cancer and immunity booster (Saha and Ghosh, 2012). Some other important reports demonstrating phytochemicals in leaves and stem of *T. cordifolia* includes that of Pradhan et al., (2013) and Mathavi et al. (2017).

On the basis of medicinal potential cited in traditional literature, *Tinosporacordifolia* is a versatile resource for all forms of life. Present report indicates that extracts have active compounds in the form of alkaloids, glycosides, phenolics, flavonoids and steroids. All these active compounds have immunomodulatory and physiological roles of different types, thereby demonstrating the diverse medicinal versatility of the plant. Further the presence of phenolics and flavonoids directly correlate its importance as antioxidant and anti-cancer agent; the significant level of cardiac glycosides related that the plant possesses heart protective property. However, it further pharmacological studies to actually identify and isolate respective bioactive principles. Further the aspect regarding how the active compounds actually interact with the living systems and affects the structure-function relationships is also equally important.

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#### References:

1. Ansari, S. H. (2006) Essentials of Pharnacognosy, 1 st edition, Birla publications, New Delhi, pp. 357-359, 588-590.
2. Ayurvedic Pharmacopoeia of India (2007) part 1 Appendix 1(Govt. of India, Ministry of Health and Family Welfare, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy, New Delhi),
3. Chang, C. C., Yang, M. H., Wen, H. M. and Chern, J. C. (2002) Estimation of total flavonoid content in propolis by two complementary colorimetric methods. *J. Food Drug Anal* 10: 178-182.
4. Harborne, J. B. (1973) *Phytochemical methods: A guide to modern techniques of plant analysis*. Chapman and Hall Ltd. London.
5. Kirtikar, K. R. and Basu B.D. (2005) *Indian Medicinal Plants*, Vol 1 International book distributors, 2nd edition 2005
6. Sarangi, M. K. and Sony, S. (2013) A Review on Giloy; the magic herb. *Invent. J. (2)*:1-4, 2013



7. Kokate, C. K. (1994) Practical Pharmacognosy, 4 th edition, VallabhPrakashan, New Delhi, pp. 4, 29.
8. Madhavi, A., Vijayalaxmi, A and Narasimha, V. (2017) Preliminary phytochemical analysis of Guduchi (*Tinosporacordifolia* (Willd) Miers) leaf in different solvent extracts. *Int. Ayur. Med. J.* 5(5): 1500-1505.
9. McDonald, S., Prenzler, P. D., Autolovich, M. and Robards, K. (2001) Phenolic content and antioxidant activity of olive extracts. *Food Chem.* 73: 73-84.
10. Mukherjee, P. K. (2002) Quality Control of Herbal Drugs, Business Horizons Pharmaceutical Publishers, New Delhi, pp. 356-358.
11. Naik, V. N. (1998) Flora of Marathwada. AmrutPrakashan, Aurangabad.
12. Pradhan, D., Ojha, V. and Pandey, A. K. (2013) Phytochemical analysis of *Tinosporacordifolia* (willd.)Miers ex Hook. F. &Thoms stem of varied thickness. *Int J Pharm Sci Res* 4(8); 3051-3056.
13. Saha, S. and Ghosh, S. (2012) *Tinosporacordifolia*: One plant many roles. *Ancient Sci. Life.* 31(4): 151-159.





Shri Govindsing Rathod Shikshan Prasarak Mandal, Dahatonda's  
**Shri Dr. R. G. Rathod Arts and Science College,  
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# Correlation Between The Knowledge Of Snakes And The Snake Fear

Authors

Joshi PS, Makode PM, Charjan AP

Dr. R. G. Rathod Arts and Science College, Murtizapur, Maharashtra, India.

## Abstract

The question tackled in the current study is to what extent realistic knowledge of snakes may influence the fear of snake in humans. The biology students of our college, mean age 20, of both sexes were asked to fulfill two pencil-and-paper questionnaires (Q) consisted of 21 statements referring to the fear of snake (Q-1) and of 28 false statements about snake anatomy and behavior (Q-2). Experimental subjects were asked to agree or disagree with each statement given in Q. All tests were scored according to standardized procedures and the data were entered into an SPSS file for further analysis. Data obtained revealed positive correlation between positive answers ("agree") in Q-1 and Q-2. Considerably weak but positive correlation was found between negative answers ("do not agree") in Q-1 and Q-2. Presumably people having superficial (if any) knowledge of snake anatomy and behavior are more afraid of snakes as compared to those possessing correct information about snake biology. The data obtained suggest proper factual knowledge to help reduce the snake fear.

**Keywords:** fear, knowledge snake.

## Introduction

Snakes are the more intrinsic animals of the world. Among common specific fears and phobias of human beings is fear of snakes (Soares and Esteves, 2013). The question addressed in the current study is to what extent education level, in particular factual knowledge of snakes, may influence the fear of snake. Fear acquired indirectly through social observation, with no personal experience of the aversive event, engages similar neural mechanisms as fear conditioning and indirectly attained fears may be as powerful as fears originating from direct experiences (Olsson et al., 2007). Myths usually show snakes to be harmful creatures and are rarely based on their actual natural history. Horrible stories told by "eyewitnesses" in nearly every village, fears passing down from parents to children are likely the source of most myths in different human cultures (Prokop and Tunnicliffe 2010). Prokop, and Tunnicliffe (2010) suggests that myths perpetuated by ignorance can be dispelled through education. It seems reasonable suggesting education to help in reducing socially and evolutionary acquired fear of threatening animals (Kaishauri and Makashvili, 2013). Hence the present study conducted to address the correlation between the knowledge of snakes and the snake fear.

## Material and Methods

For study, the method suggested by Kaishauri and Makashvili (2013) was adopted. Total of 100 biology students of our college of mean age 20 years, of both sexes (75 females and 25 males), have been recruited as experimental subjects. They were asked to fulfill two pencil-and-paper questionnaires. The first questionnaire (Q-1) consisted of 21 statements referring to the negative attitudes to the snake (For example: "Even if I risk being late to significant appointment, I never cross a field to shorten my way, if there may be snakes", "I don't like watching snakes in the zoo", "I would not wear the belt, made of the snake's skin"). Second questionnaire (Q-2), consisted of 28 false statements about snake anatomy and behavior (For example: "Snake's skin is wet", "Anaconda may reach 30 meters in the length", "Cobra can swallow large animals, such as deer or wild pig", "Going swimming, snake leaves poison on the stones at the river bank). Experimental subjects were asked to agree or disagree with each statement given in both Q-1 as well as Q-2. Positive responses ("agree") to the Q-1 statements were considered pointing to the fear of snake, while positive responses ("agree") to the Q-2 statements were believed to point to the lack of factual knowledge of snake anatomy and behavior. Negative responses ("disagree") to Q-1 and Q-2 statements were believed to point to the absence of fear of snakes and presence of factual knowledge of snake anatomy and behavior respectively. All tests were scored according to standardized procedures and the data were entered into an SPSS file for further analysis.

## Results and Discussion

The obtained result is shown in Table 1. As it is shown in the Table 1, 523 positive and 1573 negative answers were registered in response to Q-1 statements, while 684 positive and 2116 negative



answers were registered in response to Q-2 statements. Mathematical processing revealed positive correlation between "agree" in Q-1 and "agree" in Q-2. Weaker, but positive correlation was found between "do not agree" in Q-1 and "do not agree" in Q-2.

**Table 1. Total number of positive ("agree") and negative ("do not agree") responses to the Q-1 and Q-2 statements**

Q-1, Cronbach's alpha- 0.905		Q-2, Cronbach's alpha-0.957	
agree	do not agree	Agree	do not agree
523	1573	684	2116

The level of snake fear was proved correlating positively with the level of ignorance of snakes. Results obtained may be interpreted in favor of factual knowledge of snakes as a factor, reducing the fear of these animals. Females are believed to experience the greater fear of animals than males (Rackison, 2009). Unfortunately, relatively small number of male experimental subjects in the current study did not allow conducting gender related analysis of the data obtained. We would like to stress the problem of snake fear in the light of human health-care and protection of wild nature as well. On the one hand, snake fear as a stressogenic factor may have serious psychological and physiological impact on stress victim (Shin and Liberzon, 2010). On the other hand, fear may induce aggression against the source of the fear (Archer, 2009).

People often kill snake; destroy their nest, crash eggs—the cruelty dangerous for snake survival in the area, inhabited by human. The overall goal of finding a way to reduce snake fear in humans is protection of people from snake fear-induced stress as well as protection of snakes from snake fear-induced human aggression. We agree with the opinion (Tomazic, 2011) that as compared to direct physical contact with live snakes' factual knowledge might be less efficient in reducing snake fear and improving the attitudes of humans toward these animals. Direct exposure to live snakes is considered effective method of cognitive therapeutic desensitization of snake-phobic persons. At the same time, data obtained in the current study, as well as recent reports on the effectiveness of teaching in the classrooms and efficacy of combination of education with other approaches in reducing snake fear are encouraging to further investigation of the role of factual knowledge in reducing the fear of snake in humans.

#### References:

- Archer J, (2009). The nature of human aggression, *Int J Law Psy*, 32:202-208.
- Kaishauri N and M Makashvili, (2013). Correlation between the Knowledge of Snakes and the Snake Fear. *Asi J Hum SocStud*, 1(3):142-145
- ncy?, *Evol Behav*, 30 (6): 439-444
- Olsson A, Nearing K and E Phelps, (2007). Learning fears by observing others: the neural systems of social fear transmission, *Soc Cogn Affect Neurosci*. 2(1): 3-11.
- Prokop, P and S Tunnicliffe, (2008). Disgusting animals: Primary school children's attitudes and myths of bats and spiders, *Eur J of Math, sci and tech edu*, 4(2):87-97.
- Prokop, P and S Tunnicliffe, (2010). Effects of keeping pets on children's attitudes toward popular and unpopular animals, *Anthrozoös*, 23(1): 21-35.
- Rackison D, (2009). Does women's greater fear of snakes and spiders originate in infancy?
- Shin M and I Liberzon, (2010). The Neurocircuitry of Fear, Stress, and Anxiety Disorders, *Neuropsychopharmacology*, 35 (1): 169-191
- Soares S and F Esteves, (2013). A glimpse of fear: fast recognition of threatening targets in visual search with brief stimulus durations. *PsyCH J*, 2(2):11-16.
- Tomazic I, (2011). Pre-Service biology teachers' and primary school students attitudes towards and knowledge about snakes *Eur J of Math, sci and tech edu*, 3 (2):161-171



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## EFFECTS OF DIETARY ONION ON BEHAVIOUR OF THE FRESH WATER FISH *CLARIAS BATRACHUS* (LINNAEUS, 1758)

Makode P. M.<sup>1</sup>, Pandharikar S. D.<sup>2</sup>, Bhise J. V.<sup>3</sup>, Gulhane R. A.<sup>4</sup>

1. Shri. Dr. R. G. Rathod Art's and Science College, Murtizapur, Maharashtra (India)
2. G. S. Art's, Commerce and Science College, Khamgaon, Maharashtra (India)
3. Dr. Manorama and Prof H. S. Pundkar Art's, Com. & Sci. College, Balapur, Maharashtra (India)
4. S. S. S. K.R. Innani Mahavidyalaya, Karnja (Lad), Maharashtra (India)

### ABSTRACT

The aim of this study was to assess the effect of onion (*Allium cepa*) on growth performance in the fresh water fish *Clarias batrachus* (Linn.) A total number of 80 fish (average weight 20.86±0.27 g) was used. Fish were divided into four groups fed on diets containing onion in different levels and the control group diet was without onion. The experiment extended for two months. The results showed significant enrichment in behaviour of fish fed on onion. From obtained results, it could be recommended that onion (*Allium cepa*) should be added to the diets of fresh water fish *Clarias batrachus*.

**Key words:** Behaviour, *Clarias batrachus*, Fresh water, onion.

### INTRODUCTION

Inclusion of feed additives in diets of fish is goal to improve the growth performance, immunity and body composition. The investigation for novel feed additives is quiet a very imperative point for aquaculture investigators (Cho and Lee, 2012). Onion (*Allium cepa*; local name *Kanda* or *Pyaz*) is the most important commercial vegetable spice crop grown in India and exported. Onion leaves and immature bulbs are consumed as vegetable. It is mixed in other vegetables and soups as spice and flavouring agent. Onion is well known for its mineral and vitamin content as it is rich with vitamin B and C with various regulatory minerals as Ca, Fe, Mg, k, Cu (Gabor *et al.*, 2010). Onion is also known for its medicinal properties as an antibiotic, antiseptic, anti-infectious, antibacterial and antifungal agent (Benkeblia, 2004). It is also an antioxidant and has anticancer properties (Ramos *et al.*, 2006; Bello *et al.*, 2012 a, b).

Though the dietary onion has several aforesaid important applications but its effect in fresh water fishes is not well known. Hence the presented study aim to assess the effects of dietary onion on behaviour of fresh water fish *Clarias batrachus*.

### MATERIAL AND METHODS

1. **Experimental fish:** The *Clarias batrachus* (20.88±0.25 g) were obtained from a commercial farm and were transferred to the

place of experiment and acclimated for 2 weeks. During the acclimation, fish were fed the experimental diet to satiation twice a day at 09:00 and 15:00 hours. After acclimation, fish were fasted for one day; batch weighted and randomly distributed among density of 20 fish per tank (Joshi *et al.*, 2015).

2. **Experimental diet and feeding regime:** The basal experimental diets were formulated with the commonly available ingredients. The formula and analyzed proximate composition of the basal diet are shown in Table 1. The ingredients were grinded, milled, weighed, mixed and pelleted with meat mincer through a 2 mm die. After pelleting, the feeds were air dried and put in an air-tight container. During the experiment, fish were fed the experimental diet to satiation third a day at 08:00, 12:00 and 16:00 hours.
3. **Measurements and sample analysis:** It was carried out each 20 days. Water temperature was 15°C, O<sub>2</sub> 7-8 mg/l-1, pH 7-8 and light: dark cycle of 12:12 h was maintained during the feeding trial. Proximate composition of diets and tissues were carried out using the Association of Analytical Chemists (AOAC, 1995) methods.
4. **Calculations and statistical analysis:** The behavior of experimental fishes were recorded in the period between 09:00 till 15:00 h for 2 weeks by using focal sample technique for 15 sec. with intervals during one

hour daily. The frequency and duration of feeding, swimming, aggression, rest, arousal and surface visit was recorded by using the method suggested by Khalil *et al.* (2016).

### RESULTS AND DISCUSSION

Behavioural responses of the fishes during 2 weeks of feeding are summarized in Table 2. Results cleared that frequency and time of feeding, swimming and rest increase with increase in dietary onion content. While the frequency and time of aggression, arousal and surface visit decrease with increase in dietary onion content.

It is clear that onion is a main vegetable extensively cultivated in many countries. It is used as food for humans as well as some animals and as remedy for several diseases, as reported in folk

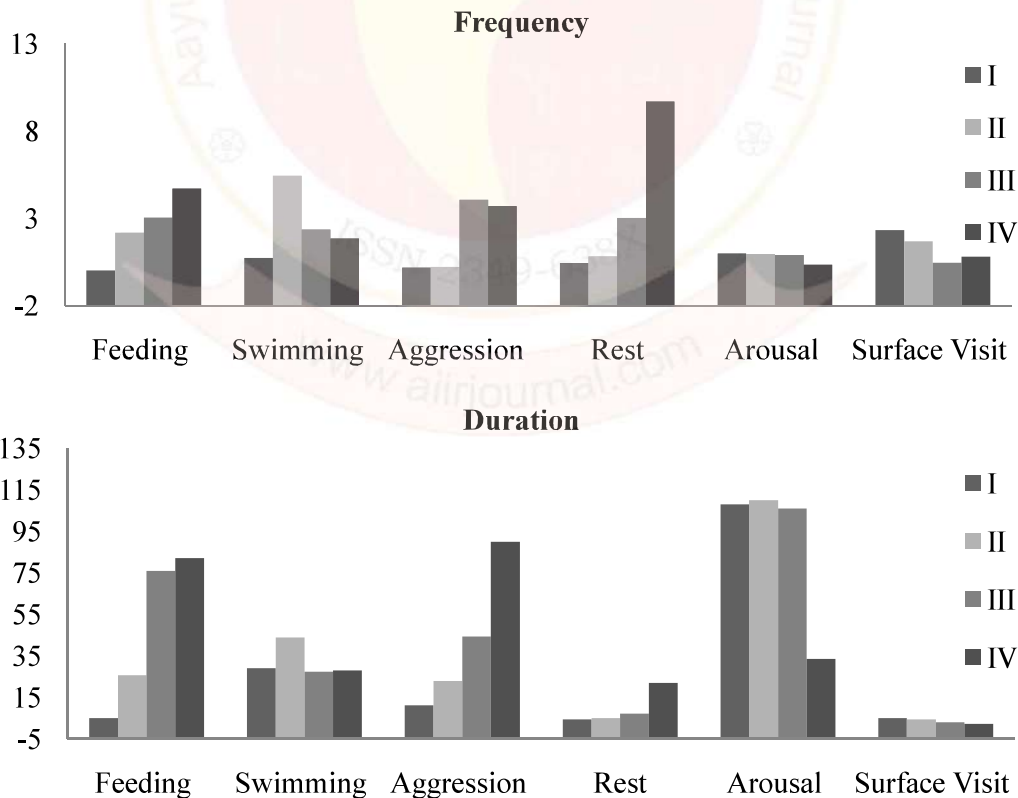
medicine (Saleh *et al.*, 2015). The dietary onion also enhances the growth of fish (Gabor *et al.*, 2010; Gabor *et al.*, 2012 and Makode 2017). It is clear that obtained behavioral patterns of fish were influenced by different levels of dietary onion. The study clears that behaviour pattern of treated group attributed to fish increase the feed intake and growth rate. It is due to increase oxidative metabolism and protein synthesis. This result was in harmony with observations noted by Khalil *et al.* (2016).

### CONCLUSIONS

From obtained results, it could be recommended that onion (*Allium cepa*) should be added to the diets of fresh water fish *Clarias batrachus*.

**Table 1. Formulation and proximate composition of the basal fish diets**

Ingredients	Control	Onion diets Ingredients (g /100g diet)		
Meat	25	25	25	25
Wheat	50	47	44	41
Soybean	20	20	20	20
Soybean oil	05	05	05	05
Onion Powder	00	01	02	03



**Figure 1: Effect of dietary onion (wt/100gm) on behavioral patterns of**

## REFERENCES

1. AOAC (Association of Official Analytical Chemists), 1995. International Official Methods of Analysis, sixteenth ed. Arlington, Virginia, USA.
2. Bello OS, Emikpe BO and FE Olaifa, 2012 a. The body weight changes and gut morphology of *Clarias gariepinus* juveniles in feeds supplemented with walnut (*Tetracarpidium conophorum*) leaf and onion (*Allium cepa*) Bulbs. *Resiues. Int. J. Morphol.* 30 (1): 253–257,
3. Bello OS, Olaifa FE, Emikpe BO and ST Ogunbanwo, 2012 b. The effect of walnut (*Tetracarpidium conophorum*) leaf and onion (*Allium cepa*) bulb residues on the tissue bacteriological changes of *Clarias gariepinus* juveniles. *Bull. Anim. Health Prod. Africa* 60 (2), 205–212,
4. Benkeblia, N., 2004. Antimicrobial activity of essential oil extracts of various onions (*Allium cepa*) and garlic (*Allium sativum*). *LWT Food Sci. Technol.* 37 (2): 263–268.
5. Cho SH and L Lee, 2012. Onion powder in the diet of the olive flounder, *Paralichthys olivaceus*: effects on the growth, body composition, and lysozyme activity. *J. World Aquaculture Society* 43: 30–38.
6. Joshi PS Gulhane RA, and VT Tantarapale, 2015. Effects of dietary garlic on growth performance in the fresh water fish *Clarias batrachus* (Linn.). *Int. J. Res. Biosci. Agri. Tech.* 2 (3): 244-246.
7. Khalil A, EL-Husseiny W, Azhar F and W Ghonimi, (2016). Effect of Feeding with Different Dietary Protein Levels and Starvation on the Health, Nonspecific Immune Parameters, Behavior and Histoarchitectures of Fantail Goldfish (*Carassius auratus* L.), *J Vet. Sci. Technol.* 7 (1): 01-12.
8. Makode PM (2017). Effect of dilatory onion on growth performance in fresh water fish *Clarias batrachus*. *Bioscience Discovery*.
9. Ramos FA, Takaishi Y, Shirotori M, Kawaguchi Y, Tsuchiya K, Shibata H, Higuti T, Tadokoro T and M Takeuchi, 2006. Antibacterial and antioxidant activities of quercetin oxidation products from yellow onion (*Allium cepa*) skin. *J. Agric. Food Chem.* 54: 3551–3557.
10. Saleh N, Michael M, and M Toutou, 2015. Evaluation of garlic and onion powder as phyto-additives in the diet of sea bass (*Dicentrarchus labrax*). *Egy. J. Aqua. Res.* 41: 211–217.
11. Shalaby AM, Khattab YA and AM Rahman, 2006. Effect of garlic (*Allium sativum*) and chloramphenicol on growth performance, physiological parameters and survival of Nile tilapia (*Oreochromis niloticus*). *J Venom Anim Toxins incl Trop Dis.* 12(2):172-201
12. Tacon A, 1990. Standard method for nutritional and feeding of farmed fish and shrimp. Argent librations press, Vol. 1: 117pp.

## KALUZA-KLEIN COSMOLOGICAL MODEL IN SAEZ-BALLESTER THEORY OF GRAVITATION

**Nimkar, A.S.<sup>1</sup>, Ugale, M.R.<sup>2</sup> & Pund, A.M.<sup>3</sup>**

<sup>1</sup> Department of Mathematics, Shri Dr. R.G.Rathod Arts and Science College, Murtizapur.

<sup>2</sup>Department of Mathematics, Sipna's College of Engineering, Amravati.  
 mohini\_261@rediffmail.com

<sup>3</sup>Department of Mathematics, Science College, Congress Nagar, Nagpur

### ABSTRACT

*In this paper, we have obtained the field equations in the presence of perfect fluid source distribution in Saez and Ballester theory of gravitation (Phy. Lett. 113,1985,467) with the aid of n-dimensional Kaluza-klein space time. Exact cosmological model is presented with the help  $p = \gamma\rho$ . Also some physical and kinematical properties of the model are discussed.*

**Key words:** Perfect Fluid, Saez-Ballester theory, Kaluza-klein.

### INTRODUCTION

In recent year there has been considerable interest in scalar-tensor theories of gravitation proposed by Brans and Dicke(1961), Nordtvedt (1970), Lyra(1951), Sen and Dunn(1971) and Saez and Ballester(1985). Brans-Dicke theory includes a long range scalar field interacting equally with all forms of matter (with the exception of electromagnetism) while in Saez-Ballester scalar-tensor theory the metric is coupled with a dimensionless scalar field in a simple manner. This coupling gives a satisfactory description of the weak fields.

The field equations given by Saez and Ballester(1985) for the combined Scalar and tensor fields are

$$G_{ij} - \omega\phi^n \left( \phi_{,i}\phi_{,j} - \frac{1}{2}g_{ij}\phi_{,k}\phi^{,k} \right) = -8\pi T_{ij} \quad (1)$$

$$2\phi^n \phi_{,i}^i + n\phi^{n-1} \phi_{,k}\phi^{,k} = 0 \quad (2)$$

Where  $G_{ij} = R_{ij} - \frac{1}{2}Rg_{ij}$  is the Einstein tensor,

$R_{ij}$  is the Ricci tensor,  $R$  is the scalar curvature,  $n$  an arbitrary constant,  $\omega$  is a dimensionless coupling constant and  $T_{ij}$  is the matter energy-momentum tensor. Here comma and semicolon denote partial and covariant differentiation respectively.

The equation of motion

$$T_{;j}^{ij} = 0, \quad (3)$$

is a consequence of field equation (1) and (2).

A detailed discussion of Saez - Ballester and string cosmological model is contained in the work of Singh and Agrawal (1991). Shri Ram and Tiwari (1998). Reddy and Venkateswara Rao(2001), D.R.K. Reddy, CH,C.S.V.V.RMurthy, R. Venkateswarlu(2006), K.S. Adhav, A.S.Nimkar, R.L.Naidu (2007) and K.S.Adhav, V.G.mete, A.S.Nimkar and A.M.Pund (2008).

The purpose of the present work is to obtain Kaluza-klein cosmological model in a scalar tensor theory of gravitation proposed by Saez and Ballester in presence of a perfect fluid. Some physical and kinematical properties of the cosmological models are also discussed.

### METRIC AND FIELD EQUATIONS

We consider the n-dimensional Kaluza Klein space time in the form

$$ds^2 = -dt^2 + a^2 \sum_{i=1}^{n-2} dx_i^2 + b^2 dx_{n-1}^2, \quad (4)$$

where  $a$  and  $b$  are the functions of time 't' only.

The energy momentum tensor for Perfect Fluid is

$$T_{ij} = (\rho + p)u_i u_j + pg_{ij}, \quad (5)$$

where  $p$  and  $\rho$  is proper pressure and energy density of the fluid resp.

Using the co moving coordinate system, the non-vanishing components  $T_j^i$  can be obtained as

$$T_0^0 = -\rho \quad T_1^1 = T_2^2 = \dots = T_{n-2}^{n-2} = T_{n-1}^{n-1} = p \quad (6)$$

With the help of equations (5) and (6), field equations (1),(2) and (3) for the metric (4) can be written as

$$\left(\frac{n^2 - 5n + 6}{2}\right) \left(\frac{\dot{a}}{a}\right)^2 + (n-2) \frac{\dot{a}\dot{b}}{ab} - \frac{\omega}{2} \phi^n \phi_0^2 = \rho \quad (7)$$

$$(n-3) \frac{\ddot{a}}{a} + \frac{\ddot{b}}{b} + \left(\frac{n^2 - 7n + 12}{2}\right) \left(\frac{\dot{a}}{a}\right)^2 + (n-3) \frac{\dot{a}\dot{b}}{ab} + \frac{\omega}{2} \phi^n \phi_0^2 = -p \quad (8)$$

$$(n-2) \frac{\ddot{a}}{a} + \left(\frac{n^2 - 5n + 6}{2}\right) \left(\frac{\dot{a}}{a}\right)^2 + \frac{\omega}{2} \phi^2 \phi_0^2 = -p \quad (9)$$

$$\frac{\phi_{00}}{\phi_0} + \left[ (n-2) \frac{\dot{a}}{a} + \frac{\dot{b}}{b} \right] - \frac{n \phi_0^2}{2 \phi} = 0 \quad (10)$$

$$\rho + (n-2)(\rho + p) \frac{\dot{a}}{a} + (\rho + p) \frac{\dot{b}}{b} = 0$$

(11)

Here over head dot denotes differentiation with respect to  $t$ .

### SOLUTIONS OF THE MODEL

The field equations (7) to (10) are four independent equations in five unknown  $a, b, \phi, \rho$  and  $p$ . Hence to get a determinate solutions one has to assume a physical or mathematical condition. In the literature, we have equation of state for perfect fluid model.

i.e.  $p = \gamma\rho$ .

here also above set of equations (7) to (10) are highly non linear therefore, we have to assume the relation between metric coefficients  $a$  and  $b$ ,

$$\text{i. e. } b = \mu a^n \quad (12)$$

using equation (11) for  $\gamma = 1$  and (12), the field equations (7) to (10) admit the exact solution

$$a = K_4 (k_2 t + k_3)^{\frac{1}{k_1+1}}, \quad (13)$$

$$\text{And } b = k_5 (k_2 t + k_3)^{\frac{n}{k_1+1}}, \quad (14)$$

where,  $k_4 = (k_1 + 1)^{\frac{1}{k_1+1}}$ ,  $k_5 = k_4^n$

$$\phi = k_9 \left[ \frac{1}{k_7} \int \frac{k_6}{(k_2 t + k_3)^{\frac{2n-2}{k_1+1}}} dt + k_8 \right]^{\frac{2}{2-n}}$$

$$\text{where } k_9 = \left( \frac{2-n}{2} \right)^{\frac{2}{2-n}}$$

Using equation (13) & (14) the equation (4) becomes

$$ds^2 = -dt^2 + (K_4 (k_2 t + k_3)^{\frac{1}{k_1+1}})^{n-2} \sum_{i=1}^{n-2} dx_i^2 + k_5 (k_2 t + k_3)^{\frac{n}{k_1+1}} dx_{n-1}^2$$

After a suitable choice of coordinates and constant of integration, the above model can be written as

$$ds^2 = -\frac{dT^2}{k_2^2} + k_4^2 (T)^{\frac{2}{k_1+1}} \sum_{i=1}^{n-2} dx_i^2 + k_5^2 (T)^{\frac{2n}{k_1+1}} dx_{n-1}^2, \quad (15)$$

### SOME PHYSICAL AND KINEMATICAL PARAMETERS FOR THE MODEL :-

The model (15) represents an exact cosmological model in the frame

Work of Saez-Ballester theory of gravitation.

The physical quantities that are important in cosmology are proper volume, expansion scalar, shear scalar. They have the following expression for the model (15) :

$$\text{Proper Volume } V^3 = \sqrt{-g} = k_9 T^{\frac{2n-2}{k_1+1}} \quad (16)$$

$$\text{Expansion Scalar } (\theta) = \frac{2k_2(n-1)}{3(k_1+1)} \frac{1}{T} \quad (17)$$

$$\text{Shear scalar } (\sigma^2) = \frac{2(n-1)^3 k_2^2}{27(k_1+1)^2} \frac{1}{T^2} \quad (18)$$

$$\text{Deceleration parameter } (q) = +ve \quad (19)$$

**Case II:**  $\gamma = 1$

$$\text{i.e. } p = \rho \quad (20)$$

In this case, again similar result is obtained and value of

$$p = \rho = \frac{c_4}{(k_2 t + k_3)^{c_3}} \quad (21)$$

Some physical and kinematical parameters for the model (15) are

$$\text{Proper Volume } V^3 = \sqrt{-g} = k_8 (T)^{\frac{2(n-i)}{k_1+1}}$$

$$k_8 = (k_4)^{\frac{n-2}{k_5}} \quad (22)$$

$$\text{Expansion Scalar } (\theta) = \left( \frac{2n-2}{3} \right) \left( \frac{k_2}{k_1+1} \right) \frac{1}{T}$$

$$\text{Shearscalar}(\sigma^2) = k_9 \frac{1}{T^2} \quad (23)$$

Deceleration parameter ( $q$ ) = +ve

The model (15) has no initial singularity, while the energy density and pressure are zero. For the model (15), the expansion scalar  $\theta$  and shear scalar  $\sigma^2$  tends to zero as  $T \rightarrow \infty$ . The positive values of the deceleration parameter indicates that the model decelerates in the standard way.

Also, since  $\lim_{T \rightarrow \infty} \left( \frac{\sigma}{\theta} \right) \neq 0$

The model does not approach isotropy for large values of  $T$ .

## CONCLUSION

In this paper, we have studied n-dimensional Kaluza-Klein cosmological model in the presence of perfect fluid in Saez-Ballester scalar tensor theory of gravitation. For solving the field equations we have assumed the relation between metric coefficients and equation of state. The cosmological model, thus obtained are free from initial singularities and they are expanding, anisotropic, shearing, non rotating and decelerate in standard way. Also, we find all the physical quantities like pressure and density.

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## REFERENCES

1. Saez D., Ballester, V. J (1985)..: Phys. Lett.A113, 467
2. Bran,C.H.,Dicke,R.H(1961).:Phys.Rev.,124,92 5.
3. Lyra,G.,Math.Z(1951)..54,52
4. Sen,D.K.,Dunn,K.A(1971).:J.Math.Phys.12,57 8.
5. Singh, T. and Agrawal, A. K(1991).; Astrophys. Space Sci., 182, 289
6. Shri Ram, Tiwari, S.K(1998).: Astrophys Space Sci. 259,91.
7. Reddy, D.R.K., Murthy, C.S.V.V.R., Venkateswarlu, R.(2006): Astrophys. Space Sci. 301, 79-82 .
8. Adhav, K.S., Nimkar, A.S., Naidu, R.L(2007).: Astrophys. Space Sci. 312, 165-169 .
9. Adhav, K.S., Mete, V.G.,Nimkar, A.S. and Pund, A.M.(2008): Int. J. Phys. 47, 2314 .
10. Norvedt, K.Jr.(1970): astrophys. J.161,1069.
11. Letelier,P.S.(1983) :Phys.Rev.,D.28,2414.



## EFFECT OF NIMESULIDE ON HATCHING RATE OF *CLARIAS* *BATRACHUS* (LINNAEUS, 1758)

Charjan A. P.<sup>1</sup>, Joshi P. S.<sup>1\*</sup>, Thakare V. G.<sup>2</sup> and R. S. Virani<sup>3</sup>

1. Shri. Dr. R. G. Rathod Art's and Science College, Murtizapur, Maharashtra (India)
2. Govt. Vidarbha Institute of Science and Humanities, Amravati, Maharashtra (India)
3. Shri. Shivramji Moghe Mahavidyalaya, Kelapur, Dist. Yeotmal, Maharashtra (India)

\*Email: psjoshi009@gmail.com

### ABSTRACT

The use of some drugs during pregnancy may causes abnormalities to the embryo. Sometime the drug also effect to the new born if the drug transferred through lactation. The present experiment used the *Clarias batrachus* as model to check the effect of nimesulide on hatching rate of eggs. The 10, 20, 50, 100 µg/ml concentrations of drug were used. No significant mortality or malformations were observed in fish embryos. Hatching was started from 36 hr. In control group, 92% hatching rate was observed. Lowest hatching rate was observed in highest concentration (100µg/ml). Present investigation suggests the possibility that high dosage can harm the unborn baby or new born babies, if the mothers use nimesulide.

**Key words:** *Clarias batrachus*, fluoroquinolone, hatching rate, nimesulide.

### INTRODUCTION

The use of some drug during pregnancy can cause the harm the fetus. These drugs may be the reason for birth defects, like cleft lip or physiological harms. The improper administration may also leads to miscarriage. If such drug taken by mother during lactation then it can be transfer through the milk and can also affect the new born. These drugs are commonly referred as contraindicated drugs. Nimesulide is a non-steroidal anti-inflammatory drug (NSAID) with analgesic and antipyretic properties, which is also prescribed by doctors to the pregnant woman in some geographic location of India. However, it is banned in many countries due to cases of jaundice and hepatitis induced by its use (Thawani *et al.*, 2003; McNaughton *et al.*, 2014). The purpose of the present study was to investigate the effect of nimesulide on hatching rate of fresh water catfish *Clarias batrachus* embryos.

### MATERIAL AND EXPERIMENTAL

The adult brooder catfish were collected from local water body. After natural fertilization in the aquarium, the fertilized eggs were collected for the experiment through the standard method (Srivastava *et al.*, 2012). The Nimesulide tablets was purchased form the local pharmaceutical stores. The tablets ware grinded and make powder. Then directly used into water. The solutions of the drug were prepared in distilled water to obtain various dilutions (10, 20, 50, 100 µg ml).The

warned on a water bath to accelerate the dissolution process as describe previously (Maheshwari *et al.*, 2006). The pH of the solution water was in between 7 to 7.5.

The eggs were collected and rinsed several times with double distilled water. The eggs transferred to various petridishes where the eggs have exposed to the drugs with water. At around 4-6 hr postfertilization, only the fertilized eggs were selected and transferred to the petridishes (20 plate) containing different concentrations (10, 20, 50, 100 µg/ ml) of Nimesulide of at 32°C. The entire experiment was conducted in twice to verify results with a total of 100 eggs for each treatment group (Siu *et al.*, 2002). Treatment effects on the hatching rate was determined by formula of Hajjizadeh *et al.* (2008)

$$\text{Hatching Rate (HR)} = \frac{\text{No. of hatched egg}}{\text{Total no. of egg in batch}} \times 100$$

### RESULTS AND DISCUSSION

Hatching was occurred during 36 to 60 hours. No significant mortality or malformations were observed in fish embryos exposed to the different treatment groups. In control group, 90% hatching rate was observed. Lowest hatching rates were observed in nimesulide groups treated with in 100 µg/ml concentration which was 30%. Hatching rate was decrease with the increasing amount of concentration. Present data clearly indicated that low concentration did not cause any detrimental effects but higher concentration can affect the

hatching rate. The over-all hatching success rates did not differ significantly among the different exposure groups. Furthermore, no differences were observed in either mortality or incidence of malformations between the treated and control embryos. The concentration threshold did not effect morphologically to the embryo. So, the question of why fish embryos showed concentration threshold that did not affect morphologically to the embryo needed to be satisfied. As stated earlier, the concentrations used in the present investigation were not sufficient to cause morphological or developmental effects.

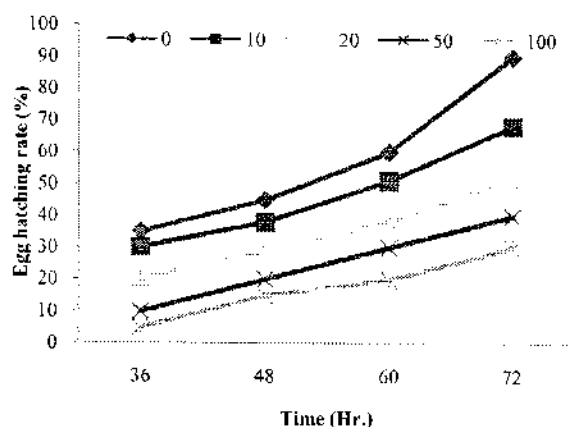


Figure 1: Egg hatching rate of fish treated with nimesulide

There is a possibility that they can tolerate this amount of concentration. They might develop natural tolerance capacity of toxicity from the natural systems (Luckenbach *et al.*, 2001).

In human, the concentration of drug reaches into the serum level varies which is depending on the types of the drugs and the dosage. In present cases, concentration range of drug varies from 10 to 100 µg. The concentrations like 10, 20, 50, 100 µg/ml were selected for the present investigation because Siu *et al.* (2002) reported that naproxen, a non-steroidal anti-inflammatory drug, detected from a pregnant woman serum at a concentration of 70 µg/ml. In this point of view, present experiment concentrations are very relevant. The nimesulide can also alter the expression of Vascular endothelial growth factor (VEGF). It is an important protein which plays a key role for the development of the blood vessels of the heart and also promotes development of endothelial muscle (Chakraborty, 2011; Bally *et al.*, 2017).

### CONCLUSIONS

To conclude, since the concentrations of nimesulide used in the present study, is same as the concentrations detected in the serum of the lactating woman. So, use this drug by a mother can cause miscarriage or physiological harm to the new born baby because

### REFERENCES

1. Bally, M; Dendukuri, N; Rich, B; Nadeau, L; Helin-Salmivaara, A; Garbe, E; Brophy, JM (2017). "Risk of acute myocardial infarction with NSAIDs in real world use: bayesian meta-analysis of individual patient data". *BMJ* 357: j1909.
2. Chakraborty C, Hsu C.H., Wen Z.H., Lin C.S. and G. Agoramoorthy (2011). Effect of caffeine, norfloxacin and nimesulide on heartbeat and VEGF expression of zebrafish larvae. *J. Environ. Biol.* 32, 179-183.
3. Hajizadeh A, Jauncey K And K Rana (2008). Effects of dietary lipid source on egg and larval quality of Nile tilapia, *Oreochromis niloticus* (L.). 8<sup>th</sup> Int. Symp. Til. Aqua. 965-977.
4. Luckenbach, T., M. Kilian, R. Triebkorn and A. Oberemm (2001). Fish early life stage tests as a tool to assess embryotoxic potentials in small streams. *J. Aquat. Ecos. Stress. Recov.*, 8, 355-370
5. Maheshwari, R.K., S.C. Chaturvedi and N.K.Jain (2006). Novel spectrophotometric estimation of some poorly water soluble drugs using hydrotropic solubilizing agents. *I. J. Pharm. Sci.*, 68, 195-198.
6. McNaughton R., Huett G. and S. Shakir (2014). An investigation of drug products withdrawn from the EU Market between 2002 to 2011 for safety reasons and evidence used to support the decision-making. *BMJ* 4(1): e004221
7. Siu, S.S.N., J.H.K. Yeung and T.K. Lau (2002). An In-vivo study on placental transfer of naproxen in early human pregnancy. *Human Reproduction*, 17, 1056-1059.
8. Thawani, V., S. Sontakke, K. Gharpure and S. Pimpalkhute (2003). Nimesulide: The current controversy. *Ind. J. Pharmacol.*, 35, 121-122.
9. Srivastava P, Raizada S, Dayal R, Chowdhary S, Lakra W, Yadav A, Sharma P and J Gupta (2012). Breeding and Larval Rearing of Asian Catfish, *Clarias batrachus* (Linnaeus, 1758) on Live and Artificial Feed. *J. Aquacult. Res. Dev.* 3 (4): 1-4.

## ENDOSYMBIONT ACQUISITION OF *WOLBACHIA* ALTERS MOSQUITO POPULATION FOR THE PREVENTION OF MOSQUITO BORN DISEASES

S. S. Siddiqui; A. P. Charjan

Dr. R. G. Rathod Arts and Science College, Murtizapur, Akola 444001  
siddiqui.shabana@rediffmail.com

### ABSTRACT

Mosquito species like *Aedes*, *Anopheles* and *Culex*, are the major vectors of human pathogens including protozoa (*Plasmodium* sp.), filariae and of a variety of viruses (causing dengue, chikungunya, yellow fever). There is lack of efficient methods and tools to treat many of the diseases caused by these major human pathogens, since no efficient vaccines or drugs are available. Thus hard work is currently focused on the control of vector populations. Insecticides alone are insufficient to control mosquito populations since reduced susceptibility and even resistance is being observed more and more frequently. There is also increased concern about the toxic effects of insecticides on beneficial insect populations, on humans and the environment. During recent years, the role of symbionts in the biology, ecology and evolution of insect species has been well-documented and has led to suggestions that they could potentially be used as tools to control pests and diseases. *Wolbachia* is perhaps the most aggressive insect symbiont, mainly due to its ability to manipulate insect reproduction and to interfere with major human pathogens thus providing new avenues for pest control. We herein present recent achievements by detecting *Wolbachia* using PCR in the field of mosquito-*Wolbachia* symbiosis with an importance on *Culex quinquefasciatus* and *Aedes albopictus* species of Vidarbha region of Maharashtra. We also discuss how *Wolbachia* symbiosis can be harnessed for vector control as well as *Wolbachia*-based approaches for the enhancement of population suppression programs.

**Keywords:** PCR, *Wolbachia*, mosquito-*Wolbachia* symbiosis, vector control

### INTRODUCTION

*Wolbachia pipientis* is a gram negative endosymbiont bacterium that is well known as reproductive manipulator. It forms the intracellular inherited infections in many invertebrate host. They are extremely found in at least 20% of all insects. Since insect species comprise ~85% of all animal species on the planet. This endosymbiont bacteria plays a vital role in ecological and evolutionary processes. This bacterium causes classical mutualism in nematodes as it requires for fertility and larval development and reproductive parasitism in arthropods as it posses the ability to change the sex of the insect, induces parthenogenesis, selectively kill males, generate the cytoplasmic incompatibility. *Wolbachia* are present in a mature egg but not in mature sperm. Thus such type of unique biology of *Wolbachia* has attracted the research interest. Hence the study was conducted in order to determine the prevalence of *Wolbachia* in mosquito species of Vidarbha region of Maharashtra. In mosquitoes, *Wolbachia* strains can induce cytoplasmic incompatibility (CI), which results in the generation of unviable offspring when an uninfected female mates with a *Wolbachia* infected male ( Werren J.H. *et.al.* 2008). In contrast, *Wolbachia*-infected females can produce

viable progeny when they mate with both infected and uninfected males, resulting in a reproductive advantage over uninfected females. CI can also be the result when mating occurs between mosquitoes with two different, incompatible *Wolbachia* strains. This CI can occur bidirectionally if crosses of both males and females with each different *Wolbachia* strain are incompatible, resulting in embryonic death in both crosses. In recent years, *Wolbachia*-based biocontrol has emerged as a very promising method that is environmentally friendly, safe to humans and potentially cost effective (Turbe-Ormaetxe I. *et.al.* 2011). The 'eliminate dengue' project ([www.eliminatedengue.com](http://www.eliminatedengue.com)) has shown that *Wolbachia* can prevent DENV transmission in mosquitoes without significant fitness costs.

*Wolbachia* is safe for humans, animals and the environment. It is naturally occurring bacteria already found in the environment, in many insect species. *Wolbachia* are an endosymbiotic bacteria that are found in many insect species and it can be used as a biological control agent . When dengue epidemics occur, the usual response is to use outdoor space spraying of insecticides. Recent laboratory studies show that certain strains of *Wolbachia* can reduce the capacity of mosquito species to transmit diseases such as dengue, fever and malaria, either by directly inhibiting the pathogen or by shortening the lifespan. Thus such

type of novel mechanism of *Wolbachia* attracted an interest towards the research in *Wolbachia* for controlling the mosquito-vector borne diseases. Hence an investigation were done in mosquito population for knowing the infection status of *Wolbachia* of Vidarbha region of Maharashtra. Detection of WO Phage orf-7 gene of *Wolbachia* in different species of mosquitoes were done in this study.

## MATERIAL AND METHODS

### Collection of mosquito species

The species of mosquitoes were collected from different areas of Vidarbha region, Maharashtra, India (Table 1). The collected species were transferred to the laboratory carefully in collecting vials, identified and separated with respect to their sex.

### Molecular detection of *Wolbachia* infection

The genomic DNA was isolated by the Kit method. The DNA was extracted by the Insect DNA Extraction Kit (Nucleopore Insect DNA Extraction Kit). Polymerase chain reaction was performed using *Wo-orf7* gene i.e. *WO* putative minor capsid protein to detect the presence of *Wolbachia*. Extracted genomic DNA (aliquot of 1µL containing 50 ng of genomic DNA) was added to *Taq* polymerase and amplification was done with PCR thermocycler using 50 µl reaction volume consisting of 14 µl of master mix 10 mM (Thermo scientific), 1ul *Taq* DNA polymerase, 2ul 25mM MgCl<sub>2</sub>, 2ul buffer (NH<sub>2</sub>)SO<sub>4</sub>, 1ul 10X *Taq* buffer with KCL (100 mM Tris-HCl pH 8.8, 500 mM KCl), and 0.5 U *Taq* DNA polymerase. 100 pm of 3 µl each of forward and reverse *wspec* primers, 23 µl of nuclease free water to make up 50 µl. The reaction conditions consisted of an initial denaturation step at 95°C for 2 min followed by 35 cycles of denaturation at 95°C for 30 sec, annealing at 60°C for 1 min and extension at 72°C for 45 sec and a final extension at 72°C for 5 min to complete partial polymerizations. PCR procedures were carried out as described by Masui *et al.* 2000. Amplification was done with Peltier PCR Processor Model NEO (BioEra).

The amplified PCR products were separated through electrophoresis run of 1% agarose gel in 1X TAE (40 mM Tris-HCl, 20 mM acetic acid and 1 mM EDTA)(Puregene genetix brand) buffer for a length of 5-6 cm at a constant 60 V. A standard molecular weight marker DNA ladder (Thermo Scientific GeneRuler 1 kb Plus DNA Ladder) was used in electrophoretic run and the gel documentation system (BioEra's Gel

Documentation system, Model Endure) was used to document the gel. Samples yielding a product of the expected size (400 bp) were tentatively scored as positive for *Wolbachia*.(Figure 1)

## RESULT AND DISCUSSION

The present study revealed that species of *Culex quinquefasciatus* male, *Aedes albopictus* male were infected with *Wolbachia*, confirmed by amplifying *WO*-Phage orf7 gene at ~400bp whereas *Aedes aegypti* female, *Aedes aegypti* male, *Anopheles stephensi* female, *Culex quinquefasciatus* female and *Aedes albopictus* female are negative for *Wolbachia* infection. Thus it shows the possibility that all the mosquitoes which indicates the absence of *Wolbachia* are also of primary importance as a vectors in Vidharbha region and this offers a potential advantage for the application of *Wolbachia* for the genetic control of the disease vectors because these species represent an empty population into which *Wolbachia* could be experimentally introduced. Through this preliminary survey naturally occurring *Wolbachia* infection types in mosquitoes have been identified. However, *Wolbachia* infection in other mosquito species needs to be investigated to understand the variation in *Wolbachia* infection. Such studies will provide basic descriptive information to invent new experimental strategies by exploiting a *Wolbachia*-cytoplasmic incompatibility based mechanism to control vectors.

Table 1 : Detection of *WO*- orf7 gene of *Wolbachia* in different species of Mosquitoes

Sr.no.	Species	Gender	Detection of gene	Individuals detected	Detection of <i>Wolbachia</i>
1	<i>Culex quinquefasciatus</i>	Male	Wo phage Orf-7	39	+ve
2	<i>Culex quinquefasciatus</i>	Female	Wo phage Orf-7	34	-ve
3	<i>Aedes albopictus</i>	Male	Wo phage Orf-7	20	+ve
4	<i>Aedes albopictus</i>	Female	Wo phage Orf-7	23	-ve
5	<i>Aedes aegypti</i>	Male	Wo phage Orf-7	24	-ve
6	<i>Aedes aegypti</i>	Female	Wo phage Orf-7	26	-ve
7	<i>Anopheles stephensi</i>	Female	Wo phage Orf-7	27	-ve

The frequency of phage *WO* infections among *Wolbachia* in natural populations of different mosquito species was based on PCR detection of

WO putative minor capsid protein (orf7). The present study detected 100% infection of Phage WO in Wolbachia positive mosquito species. Thus observations suggested that the phage WO was extensive in infected mosquito species. The extensive association of Wolbachia and phage WO means that the phage WO may be helpfully support to mosquito and Wolbachia, as it is found in various other phages/bacteria couples (Miao & Miller, 1999). Furthermore, according to Chauvatcharin et al. (2006) Wolbachia associated bacteriophages may have played a key role in the evolution of these diverse bacterial genera of arthropods. Wolbachia are detected all over the world and spreading rapidly, by causing various reproductive alterations to their hosts, through which they can efficiently spread in the host populations (Werren et al. 1995). It is probable that phage WO has associated with Wolbachia for a very long time, enabling Wolbachia to remain in insect hosts by producing some virulence factors. However, due to the lack of a genetic system to manipulate this bacterium, very little is known about molecular mechanisms that underlie the interaction of this agent with its host and phage WO can hopefully be used as a vector to transform these fastidious bacteria without any culture step as stated by Masui et al. (2000). Wolbachia have been receiving much attention in recent years for its role as a tool for controlling economically important insect pests and disease vectors. According to (Brelsfoard & Dobson, 2009) Wolbachia induced cytoplasmic incompatibility mechanism is an useful tool for implementing population suppression and replacement strategies used in biocontrol. In this direction, introduction of Wolbachia infection in previously uninfected vectors such as *Aedes aegypti* with wMelPop strains have shown potential implication in reducing the fitness of their hosts. It is an encouraging to note that such transfection studies have high rate of maternal inheritance and this can be easily exploited in controlling mosquitoes through cytoplasmic incompatibility (McMeniman et al., 2009) Information about the presence or absence of Wolbachia infection in their host also encourages identifying their interaction with viral infections. Recent studies in this direction by Teixeira et al. (2008) suggested that Wolbachia infection may confer resistance to virus infection in their host, which gives a ray of hope in combating the vectors effectively. Thus such investigations are also helpful in identification of Wolbachia infection and the reproductive phenotype they

induce in their hosts, which are not previously studied or described earlier in Vidarbha region of Maharashtra.

Since Wolbachia infections cause cytoplasmic incompatibility leading to few or no offspring in mosquitoes, there is considerable interest in using Wolbachia for biological control of mosquitoes to reduce the reproductive potential of mosquito species. The phenomenon of cytoplasmic incompatibility has made Wolbachia attractive as a potential gene driving system for the modification of insect vectors so that they cannot transmit diseases (Sinkins and Gould, 2006). An implementation programme of this magnitude requires such preliminary survey for identifying the infection status of vectors. So the strategies could be devised to use both naturally occurring infection and genetically modified Wolbachia strains for biocontrol programmes. Here our study provided the natural infection status of Wolbachia to the *Culex quinquefasciatus* male, *Aedes albopictus* male species of mosquito of Vidarbha region of Maharashtra. Wolbachia bacteria can also be used to suppress mosquito populations. As it involves the release of only male mosquitoes with Wolbachia because when these mosquitoes mate with wild female mosquitoes without Wolbachia, they are unable to reproduce. Thus such type of technique proved to be biologically successful, affordable, selfsustaining and having long-term solution for biocontrolling the mosquito-vector borne diseases.

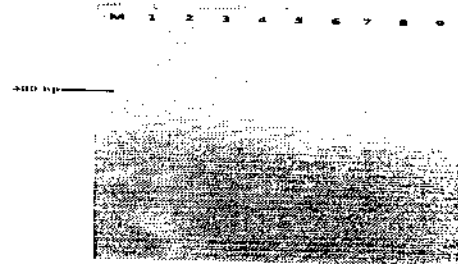


Figure 1: Gel image of a *WO-orf7* gene amplification, arrow showing 400bp fragment of ladder in mosquitoes species.

Lane M : Molecular weight Marker, Lane 1: Positive Control, Lane 2: *Culex quinquefasciatus* male ; Lane 3 : *Culex quinquefasciatus* female; Lane 4: *Aedes albopictus* male; Lane 5 : *Aedes albopictus* female; Lane 6 : *Aedes aegypti* male ; Lane 7 : *Aedes aegypti* female ; Lane 8 : *Anopheles stephensi* female; Lane 9: Negative Control.

## CONCLUSION

The present study revealed that species of *Culex quinquefasciatus* male, *Aedes albopictus* male were infected with Wolbachia, confirmed by amplifying WO-Phage orf7 gene at ~400bp whereas *Aedes aegypti* female, *Aedes aegypti* male, *Anopheles stephensi* female, *Culex quinque fasciatus* female and *Aedes albopictus* female are negative for Wolbachia infection. Thus it shows the possibility that all the mosquitoes which have no Wolbachia are also of key importance as vectors in Vidharbha region and this offers a potential advantage for the

application of Wolbachia for the genetic control of these disease vectors because these species represent an empty niche into which Wolbachia could be experimentally injected. This study also provided preliminary survey of naturally occurring Wolbachia infection types in mosquitoes. And Such studies will provide basic information to apply new experimental strategies by introducing a Wolbachia transfection in the empty niche of mosquito population to control vectors population biologically.

## REFERENCES

1. Beard, S. L. O'Neill, R. B. Tesli, F.F. Richards, S. Aksoy (1993). Modification of Arthropod vector competence via symbiotic bacteria. *Parasitol. Today* 9:179- 83
2. C.J. McMeniman, , R.V.Lane, B.N. Cass, A.W.Fong, , M.Sidhu, Y.F. Wang, & S.L. O'Neill, (2009). Stable introduction of a life-shortening *Wolbachia* infection into the mosquito *Aedes aegypti*. *Science* 323: 141-144.
3. C.L. Brelsfoard, & S.L. Dobson, (2009). *Wolbachia*- based strategies to control insect pests and disease vectors. *Asia- Pacific Journal of Molecular Biology and Biotechnology* 17(3): 55-63.
4. Beckett, B. Boothroyd, and W. W. Macdonald (1978). A light and electron microscope study of rickettsia-like organisms in the ovaries of mosquitoes of the *Aedes scutellaris* group. *Ann Trop Med Parasitol.* 72: 277-283.
5. E.A. Miao. & S.I. Miller, (1999). Bacteriophages in the evolution of pathogen-host interaction. *Proceeding of the National Academy of Sciences. USA* 96(17): 9452-9454.
6. Bian, Y. Xu, P. Lu, Y. Xie, Z. Xi (2010). The endosymbiotic bacterium *Wolbachia* induces resistance to dengue virus in *Aedes aegypti*. *PLoS Pathog.* 6: e1000833.
7. Barclay, (1982) The sterile release method with unequal male competitive ability. *Ecological Modelling*, 15, 251-263.
8. J. H. Werren, J. Jaenike (1995). *Wolbachia* and cytoplasmic incompatibility in mycophagous *Drosophila* and their relatives. *Heredity* 75:320-26
9. H. Werren,; L. Baldo, and M.E. Clark, (2008). *Wolbachia*: master manipulators of invertebrate biology. *Nat. Rev. Microbiol.*, 6: 741-751
10. J.H. Werren, L.Guo, D.W. Windsor (1995). Distribution of *Wolbachia* in neotropical arthropods. *Proc. R. Soc. London Ser. B* 262:147-204
11. J.H. Werren, W. Zhang and L.R. Guo (1995) Evolution and phylogeny of *Wolbachia*: reproductive parasite of arthropod. *Proc. R. Soc. London B.* 161 55-63
12. Alphey, (2002). Re-engineering the sterile insect technique. *Insect Biochemistry and Molecular Biology* 32: 1243-1247.
13. L. Teixeira, , A. Ferreira, & M. Ashburner, (2008). The bacterial symbiont *Wolbachia* induces resistance to RNA viral infections in *Drosophila melanogaster*. *PLoS Biology* 6(12):2753-2763.
14. M. L., Allen, D. A., O'Brochta, P. W. Atkinson & C. S. Levesque, (2001) Stable, germ-line transformation of *Culex quinquefasciatus* (Diptera: Culicidae). *J. Med. Entomol.* 38, 701-710.
15. N. Chauvatcharin, A. Ahantarig, V. Baimai, & P. Kittayapong, (2006). Bacteriophage WO-B and *Wolbachia* in natural mosquito hosts: infection incidence, transmission mode and relative density. *Molecular Ecology* 15: 2451-2461.
16. Ormaetxe I Iturbe-, T Walker, S. L. O'Neill (2011) *Wolbachia* and the biological control of mosquito-borne disease. *EMBO Rep.*;12: 508-18.
17. Masui, S. Kamoda, T. Sasaki, & H. Ishikawa. (2000). Distribution and evolution of bacteriophage WO in *Wolbachia*, the endosymbionts causing sexual alterations in arthropods. *Journal of Molecular Evolution* 51: 491-497.
18. P. Sinkins, & S. L. O'Neill, (2000) *Wolbachia* as a vehicle to modify insect populations. In *Insect transgenesis: methods and applications* (ed. A. M. Handler & A. A. James), pp. 271- 288. Boca Raton, FL: CRC Press.
19. P. Sinkins, (2004). *Wolbachia* and cytoplasmic incompatibility in mosquitoes. *Insect Biochemistry and Molecular Biology* 34: 723-9.
20. S. P. Sinkins, and F. Gould, (2006). Gene drive systems for insect disease vectors. *Nature Reviews Genetics* 7: 427-35.

## IDENTIFICATION OF BLOOD MEALS IN HAEMATOPHAGUS MOSQUITOES BY A POLYMERASE CHAIN REACTION

S. P. Varma<sup>1</sup>, Dr. K. M. Kulkarni<sup>2</sup>, Dr. A. P. Charjan<sup>3</sup>

1-Research student, Zoology Department, Dr. R. G. Rathod Arts and Science College, Murtizapur.; 2- Former V.C. of S.R.T.M. University, Nanded; Former Director, Higher Education, Government of Maharashtra; 3-Principal, Dr. R. G. Rathod Arts and Science College, Murtizapur.

### ABSTRACT

*The purpose of this study was to investigate bloodmeal sources of mosquitoes captured, and to identify the probable relation between mosquito species and their food preferences. We have developed a vertebrate specific primer set based on mitochondrial cytochrome b to identify the vertebrate blood host of field collected mosquitoes. This investigative assay will be valuable tool for identifying the bloodmeal of field collected mosquitoes where people and alternative mammal hosts are present. In this survey 8 species of mosquitoes belonging to 3 genera have been identified, out of 208 blood meal samples of fed mosquitoes were collected from different habitats 203 samples showed positive reaction while 5 did not show any DNA band with any of the primer tested and hence were considered negative for the blood meal tested.*

**Key words:** Bloodmeal, PCR, Host preference, cytochrome b.

### INTRODUCTION

As part of the incredible diversity, the mosquitoes are the most important single group of insects in terms of public health importance. Mosquitoes are small, midge-like flies that constitute the family Culicidae. Females of most species are ectoparasites, whose tube-like mouthparts called a proboscis that pierce the hosts' skin to consume blood. The mosquito species feed on the blood of various kinds of hosts, mainly vertebrates, including mammals, birds, reptiles, amphibians, and even some kinds of fish. Some mosquitoes also attack invertebrates, mainly other arthropods. Though the loss of blood is seldom of any importance to the victim, the saliva of the mosquito often causes an irritating rash that is a serious nuisance. Much more serious though, are the roles of many species of mosquitoes as vectors of diseases. In passing from host to host, some transmit extremely harmful infections such as malaria, yellow fever, chikungunya, dengue fever, filariasis and many more that rendering it the deadliest animal family in the world (Davidson, 1981). Exploring the correct identification of the blood meal taken by a mosquito species provides information on host preferences under natural conditions (Randolph and Kilpatrick, 2012).

The feeding patterns and the degree of contact of mosquito vectors with potential hosts may be directly analyzing the bloodmeal contents of field-derived females. Advances in molecular techniques for bloodmeal analyses by using

polymerase chain reaction (PCR)-based assays and direct sequencing of the cytochrome b gene, have permitted the identification of hosts to the species level with a much higher degree of accuracy than could be achieved with previous serologic techniques. Cytochrome b is a well-characterized protein from complex III of the mitochondrial oxidative phosphorylation system, and the only protein in this complex encoded by the mitochondrial genome. This gene has been used to resolve vertebrate evolutionary questions as well as served as a target for molecular diagnostics. Cytochrome b has a proven utility for identifying arthropod blood meals due to high copy number as a mitochondrial gene and sufficient genetic variation at the primary sequence level among vertebrate taxa for reliable identification. These molecular techniques have recently been used to examine the feeding patterns of the primary and secondary mosquito vectors (Önder et al., 2014).

In this concern, the present study was aimed to develop a vertebrate-specific multiplexed primer set based on cytochrome b to identify the mammalian blood hosts of engorged mosquitoes caught during field collections from Akola region. The benefit of this novel PCR diagnostic test is that mammalian blood hosts can be identified directly by size specific fragments following agarose gel electrophoresis. This diagnostic test was designed for use in differentiating between blood meals of mosquitoes involved in disease transmission caught in study area where the

potential hosts are primarily humans and domestic animals.

### MATERIAL AND METHOD

The present study include the mosquito collection from different habitats of Akola district(Maharashtra)

**Mosquito Collection:** For collection of mosquitos suction tube, mosquito net and hand picking methods were used. Collected mosquitos maintained separately in suitable container.

**Identification** of the adult mosquito was carried out microscopically with the aid of published taxonomic keys of by, Chrostopher (1933), Hopkin (1952), Gillies and Coetzee (1987), Das et al. (1990) Nagpal and Sharma (1995).

The identification was based on gross external morphological features, appearance of the antennae, palps, proboscis, thorax, terminal abdominal segments, wings, colour of hind legs and striations on the body

**Dissection:** Live mosquitoes were killed either with chloroform or ether or by chilling them for few minutes. After immobilization, the mosquito was held by one wing to remove the legs and afterwards pulled off the wings. Then the mosquito was placed on a dry slide and arranged in a more suitable position for dissection after that with the help of pointed niddle the abdomen of the mosquito were separated from head and thorax, blood meal from abdomen had been taken out.

**Extraction** of DNA from the obtained blood-meal of mosquito had been carried out by following standard protocol of manufacturer (X-pert Blood Genomic DNA Extraction Kit. (Hi-media Labs, India).

1) Addition of 5 ul of RBC lysis buffer and mixing well by inverting the tube a 6-8 times. Incubation at room temperature for 5 minutes. Mixing the tube contents intermittently by inverting 2-3 times during incubation was carried out.

2) Centrifugation at 15,000 rpm for 1 minute. Discarding the supernatant and vortex.

3) Addition of 4 ul WBC lysis buffer and add 1 ul RNase solution and incubate for 10 minutes at 37°C

4) For precipitation of proteins addition of 5ul precipitation buffer.

5) For precipitation of DNA, supernatant were transfered in a new 2 ml collection tube with addition of 10 ul of 100% isopropanol. DNA fibre were visible.

6) Washing with 70% ethanol

7) DNA elution by using elution buffer and stored at -200C until needed.

### BLOODMEAL IDENTIFICATION

Isolated DNA from the mosquito blood meals served as DNA templates in subsequent PCR reactions. PCR primers were based on cytochrome b sequences of avian and mammalian species. DNA templates were initially screened with avian- and mammalian-specific primer pairs, by using described protocols (Molaci et al. 2006a, 2006b, 2007; Molaci and Andreadis 2006).

### AGAROSE GEL ELECTROPHORESIS

Amplified DNA products had been confirmed with 1.2% agarose gel in 0.5 x electrophoresis buffer and visualized under ultraviolet (UV) light after staining with 2 mg/mL ethidium bromide. A 100 bp DNA ladder (Bioron, Germany) was used as the standard marker for comparison.

### RESULT AND DISCUSSION

Blood-fed mosquitoes were processed individually using the PCR method to identify the blood-meal source. Genomic DNA from blood-fed mosquitoes was extracted using the QIAamp DNA Mini Kit (Qiagen GmbH, Hilden, Germany) and the protocol described by the manufacturer was followed.

The PCR amplifications were conducted in 25µl of a solution containing 2.5 µl of PCR Buffer (10x), 2.5 µl of MgCl<sub>2</sub> (50mM), 0.5 µl of dNTP Mix (10 mM), 0.75 µl of each primer (10 Mm), 0.2 µl of Taq Platinum DNA polymerase (5U), 13.8 µl of sterile water, and 5.0 µl of DNA.

**Table1:** showing Order-specific group primers and species-specific primers used in blood-meal identification

Group	Primer	Size (bp)
Mammal	Forward, SstI and BclI	508
	Reverse	508
Avian	F: GACTGTGACAAAATCCCN TTCCA	64
	R: GGTCTTCATCTYHGGYTT ACAAGAC	508
Mammal	F:	59
	R:	772



Human	AAGCTTGATATGAAAAA CCATCGTTG R: TGTAGTTRTCWGGGTCHC CTA		
Bovine	F: GGGACACCCTCCCCCTTA ATGACA R: GGAGGGCTGGAAGAAGG AGTG	69	303
Bovine	F: GCCATATACTCTCCTTGG TGACA R: GTAGGCTTGGGAATAGTA CGA	61	414
Pig	F: GCCTAAATCTCCCCTCAA TGGTA R: ATGAAAGAGGCAAATAG ATTTTCG	64	453
Goat	F: TTAAAGACTGAGAGCAT GATA R: ATGAAAGAGGCAAATAG ATTTTCG	54	225
Dog	F: GAACTAGGTCAGCCCGGT ACTT R: CGGAGCACCAATTATTA CGGC	67	153
Human	F: TTCGGCGCATGAGCTG GAGTCCR: TATGCGGGGAAACGCCA TATCG	70	334

The primer sequences were as per referred by Ngo and Kramer (2003). The sequences of the primers for the 6 animals used in the PCR are listed in Table 4.2.1. Two additional order-specific primers (mammalian and avian) were included to detect other possible hosts as well. Reactions began with an incubation at 94°C for 2 min, followed by 35 cycles consisting of 94°C at 30 sec, 54–70°C at 30 sec (detailed temperature for each primer listed in Table 3), and 72°C at 30 sec. The reaction was completed by incubation at 72°C for 20 min and kept at 4°C. Then, 17 µl samples of PCR products were analyzed using a 2% agarose gel in Tris Borate EDTA and visualized on a UV light box

after ethidium bromide staining. Negative and positive controls were included in each PCR.

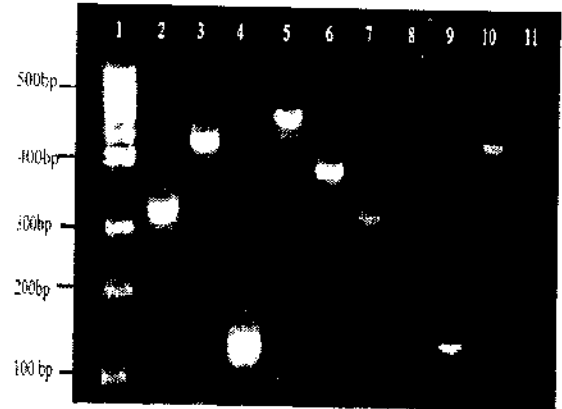


Fig.1 - Ethidium bromide-stained agarose gel showing bloodmeal identifications of engorged field samples. Lane 1 show 100-basepair DNA ladders. bp \_ basepairs. lane 2–6 show positive controls amplified from animal whole blood extractions, and lanes 7–11 show products obtained from field captured mosquitoes samples. Lane 2- human, lane 3- bovine, lane 4- dog, lane 5- pig, lane 6- chicken, in lane no 7 human blood meal detected in *Anopheles fluviatilis*; lane 8 pig blood meal detected in *Anopheles stephensi*; lane 9 dog blood meal detected in *Aedes aegypti*; lane 10 bovine blood meal detected in *Anopheles fluviatilis*; lane 11 chicken blood meal detected in *Culex quinquefasciatus*

The size amplified products showed Avian (505), Mammalian (772), Chicken (303), Bovine (414), Pig (453), Goat (225), Dog (153) and Human (334) bp primers in blood-meal identification

*Anopheles fluviatilis* (Human, Bovine, Goat, Pig); *Anopheles stephensi* (Human, Bovine, Dog, Goat, Pig); *Anopheles culicifacies* (Mammal); *Anopheles annularis* (Human); *Culex quinquefasciatus* (Avian, Human, Chicken, Bovine, Dog); *Culex vishnui* (Avian, Chicken); *Aedes aegypti* (Human, Dog) and *Aedes albopictus* (Human, Dog, Goat).

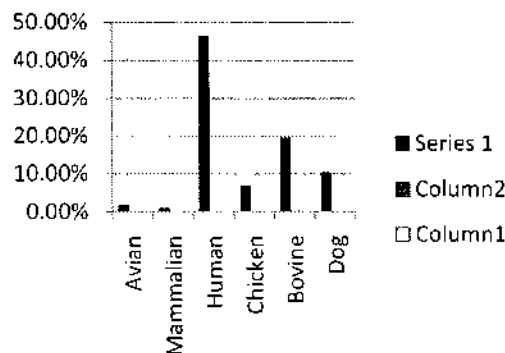
A total of 208 blood meal samples of feeded mosquitoes were collected from different habitats 203 samples showed positive reaction while 5 did not show any DNA band with any of the primer tested and hence were considered negative for the blood meal tested. out of these 105 specimens collected from indoor collection and 97 from outdoor collection.

From indoor 57 were positive for human blood, 23 were positive with bovine bloodmeal, 14 with dog bloodmeal, 9 with goat bloodmeal and 2 with

chicken. Out of the 97 specimens collected from outdoor, 39 were positive for human blood, 17 were positive for bovine 12 for pig bloodmeal 11 for chicken bloodmeal 7 for dog bloodmeal 5 for goat bloodmeal 4 for avian bloodmeal and 2 for mammalian bloodmeal.

**Table 2: Animals tested for bloodmeal**

Species	mamm	avian	Human	Chicken	Bovine
Animal tested	alian				
Anopheles fluvitilis	0	0	27	0	13
Anopheles stephensi	0	0	16	0	16
Anopheles culicifacies	2	0	0	0	0
Anopheles annularis	0	0	1	0	0
Culex quinquefasciatus	0	1	12	9	4
Culex vishnui	0	3	0	5	0
Aedes aegypti	0	0	15	0	0
Aedes albopictus	0	0	2	0	0
Total (157)	2	4	73	14	33



The above graph clearly shows that most of the blood feded mosquitos of study area i.e 46.15% were detected with human bloodmeal, 19.23% were detected with bovine bloodmeal, 10.09% were found to feed on dog bloodmeal, 6.73% feded no mosquito spots with chicken bloodmeal, 6.25% mosquito were detected with goat bloodmeal, 5.77% mosquito were found to feed on pig bloodmeal, 1.92% and 0.96% mosquito found to b feed on avian and mammalian bloodmeal respectively, these avian and mammalian bloodmeal may be any other than chicken and human.

**CONCLUSION**

From the observation and results, it can be concluded that Akola region showed the presence of mosquitoes belonging to 3 genera and 8 species. The blood meals of these mosquitoes involved in various disease transmissions caught in study area where the potential hosts are primarily humans and domestic animals.

**REFERENCES**

1. Akola Gazetteer. (2017). Database of Amravati District redirected from official website of Akola District (M.S.), India, [www.Akola.nic.in](http://www.Akola.nic.in)
2. Ansari DR, Handique R, Dutta LP, Dutta P, Doloi P, Goswami BK. (2005) Host feeding pattern of Culex vishnui sub group of mosquitoes in Dibrugarh district of Assam. Journal of Communicable Diseases 1994; 26, 133-138.
3. Arti S and M. Kumar (2016). Blood meal analysis of a few mosquito species using double immuno diffusion technique. Proceedings of the second symposium on vectors and Vector Born Diseases, 169-175.
4. Ary F., Andrea E., Dina M. F., Isik U., Taryn C., Sean P. H., Randy G. (2014)
5. Comparative Host Feeding Patterns of the Asian Tiger Mosquito, Aedes albopictus, in Urban and Suburban Northeastern USA and Implications for Disease Transmission. PLoS Neglected Tropical Diseases 8:8, e3037.
6. Charles E, Sina B, Hawley WA, deBenedictis J, Scott TW, (2004). Laboratory and field evaluation of polymerase chain reaction- based forensic DNA profiling for use in identification of human blood meal sources of

Graph no.1 Frequency of bloodmeal feed

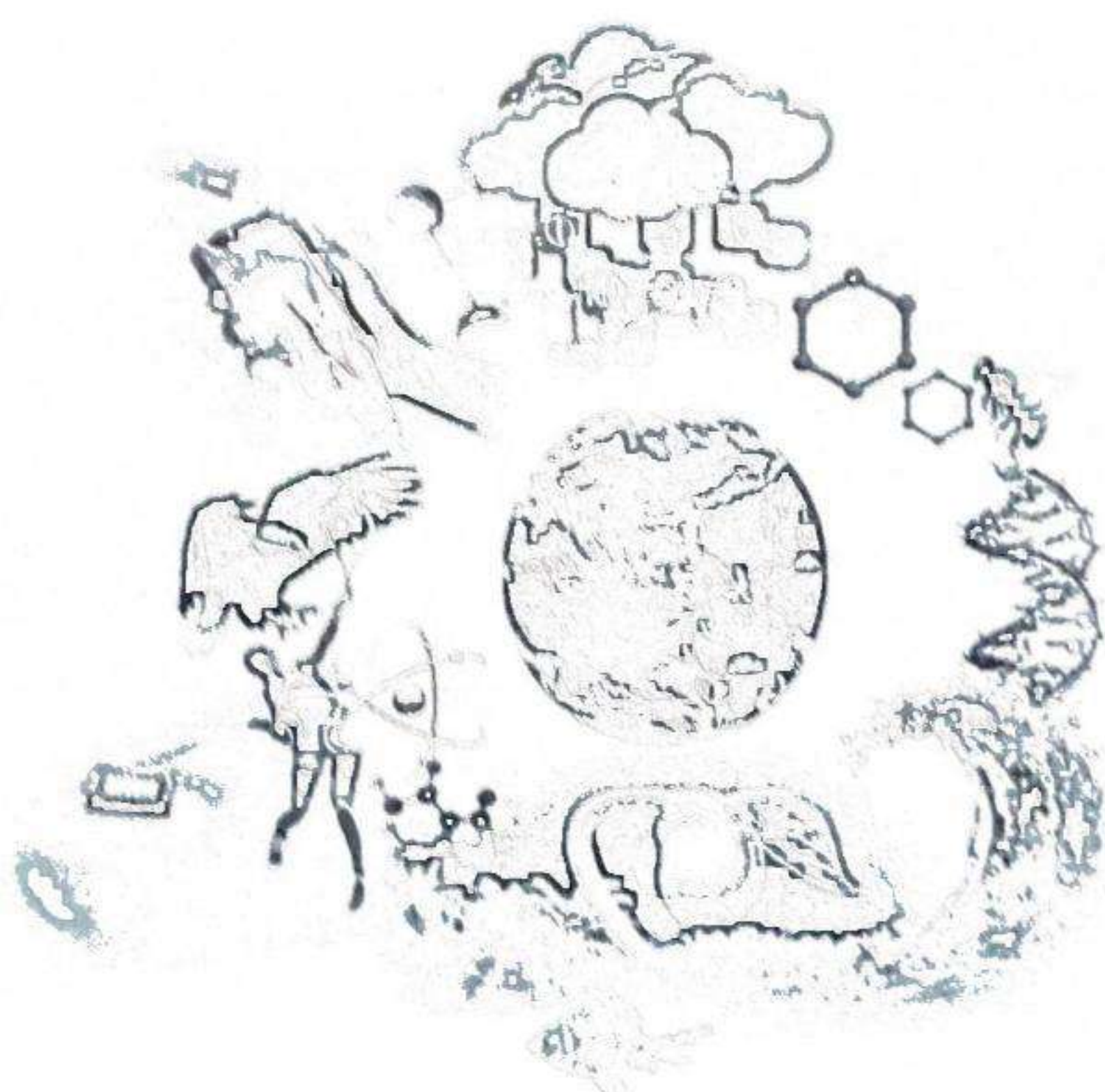
- Aedes aegypti* (Diptera: Culicidae). *J Med Entomol* 37: 492–502.
7. Christophers SR, (1933). The fauna of British India including Ceylon and Burma, Diptera. Volume IV-Family Culicidae, Tribe Anophelinae, Taylor and Francis, London, 1933, 1-371.
  8. Dash S and R Hazara. (2011). Mosquito biodiversity in Chilika lake area India. *Tropical Biomedicine*. 28 (1): 1-6
  9. Goudarz DG., J. Tang, P. True, A. Merriweather, and T. R. Unnasch, (2006). Identification of bloodmeals in haematophagous Diptera by cytochrome B heteroduplex analysis. *Med. Vet. Entomol* . 13:282–287.
  10. Hopkin, G, 1952. Mosquitoes of the Ethiopian Region. Larval Bionomics of Mosquitoes and Taxonomy of Culicine larvae. British Museum (Nat.History) 8:1-14
  11. Kiet F., and A. Kramer. (2013) Development and Evaluation of Real-Time Polymerase Chain Reaction Assays to Identify Mosquito (Diptera: Culicidae) Bloodmeals Originating from Native Australian Mammals. *Journal of Medical Entomology* 44:1, 85-92.
  12. Maharashtra. *Rivista diparass itologia* 18 (12): .193-198.
  13. Murty RT, Narasimham MVVL, Dhal KB, Mukherjee BP (2002). Gel diffusion analysis
  14. of Anopheles blood meals from 12 malarious study villages of Orissa state, India.
  15. *Journal of the American Mosquito Control Association* 1991; 7:595-603.
  16. Nagpal BN and VP Sharma (1995). Indian Anopheles, Oxford and I.B.H. Publishing Co. Pvt. Ltd., 1-416.
  17. Ngo KA and Kramer LD, (2003). Identification of mosquito bloodmeals using polymerase chain reaction (PCR) with orderspecific primers. *J Med Entomol* 40: 215–222.
  18. Rui-De R. and Y. Ali. (2008). Mosquito (Diptera: Culicidae) bloodmeal sources during a period of West Nile virus transmission in Puerto Rico. *J Med Entomol* ;48(3):701-4.
  19. Sathe T.V, Girhe B.C., (2001), Biodiversity of Mosquito in Kolhapur District.
  20. Sathe, R. A. (2013). Field evidence for multiple host contacts during blood feeding by Mosquitoes (Diptera: Culicidae). *J. Med. Entomol* . 32:705–710.



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# PROCEEDINGS



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## APPLICATION OF BIOINFORMATICS IN THE STUDY OF MORPHODIVERSITY OF SOME COMMON ROADSIDE TREE SPECIES IN MURTIZAPUR, DISTRICT- AKOLA MAHARASHTRA, INDIA

**Kalbande, R.B.**

Dept. of Botany, Shri Dr. R. G. Rathod Arts & Science College, Murtizapur, Dist Akola, M.S. India

### ABSTRACT

Biodiversity stands for all living things on earth. It refers to the range of variations among a set of entities and is commonly used to describe variety and variability of living organisms in terms of genetic diversity, species diversity and ecological diversity. In the developing world, biodiversity provides the assurance of food, raw materials such as fiber for clothing, materials for shelter, fertilizer, fuel, medicines, timber and many other necessities. Biodiversity is the basis of human survival, and economic development as it provides a large number of resources and services, that sustain our lives. Biodiversity maintains the ecological balance necessary for human survival. In present study the cultural associations are studied, recorded or understood. There is a great need for the storage and managing of this data to be protected and secure. In present work the main objective of research is to make available biodiversity information by using computer programs as well as worldwide accessible Internet-based systems. Bioinformatics derives knowledge from computer analysis of biological data. In the present study morphodiversity of 64 common roadside tree species in Murtizapur were studied. The use or relationship with common roadside tree species with human survival was taken in consideration.

**KeyWords:** Biodiversity, Bioinformatics, Biodiversity Informatics, Morphodiversity, Roadside trees, Information System, Global environmental informatics

### INTRODUCTION

The term "Biodiversity Informatics" was coined to circumscribe the application of IT tools technology to biodiversity information. It thus deals with the information capture, storage, provision, retrieval and analysis, taxa and their interaction. The range of solution reaches from information systems for herbaria, taxonomic diagnostic system to more easy to use visual information systems. The visual plant as a specimen is one of the ultimate categories by providing digitized images from plants with all attached label information together with some characters for the identification of individual plant. The activities in Biodiversity Informatics are to provide sound information for better management infrastructure for biodiversity conservation & to unlock the wealth of biodiversity information that exists around us. These newer methods have no offline equivalent or antecedent, but they have tremendous capabilities to not only locate desired "trees within the forest" in numerous ways, but to view and interact with these "trees" once located (Fleet, 2006).

### REVIEW OF LITERATURE

In the opinion of Stuessy (2009) large stores of primary biodiversity data lie relatively inaccessible in herbarium collections around the world.

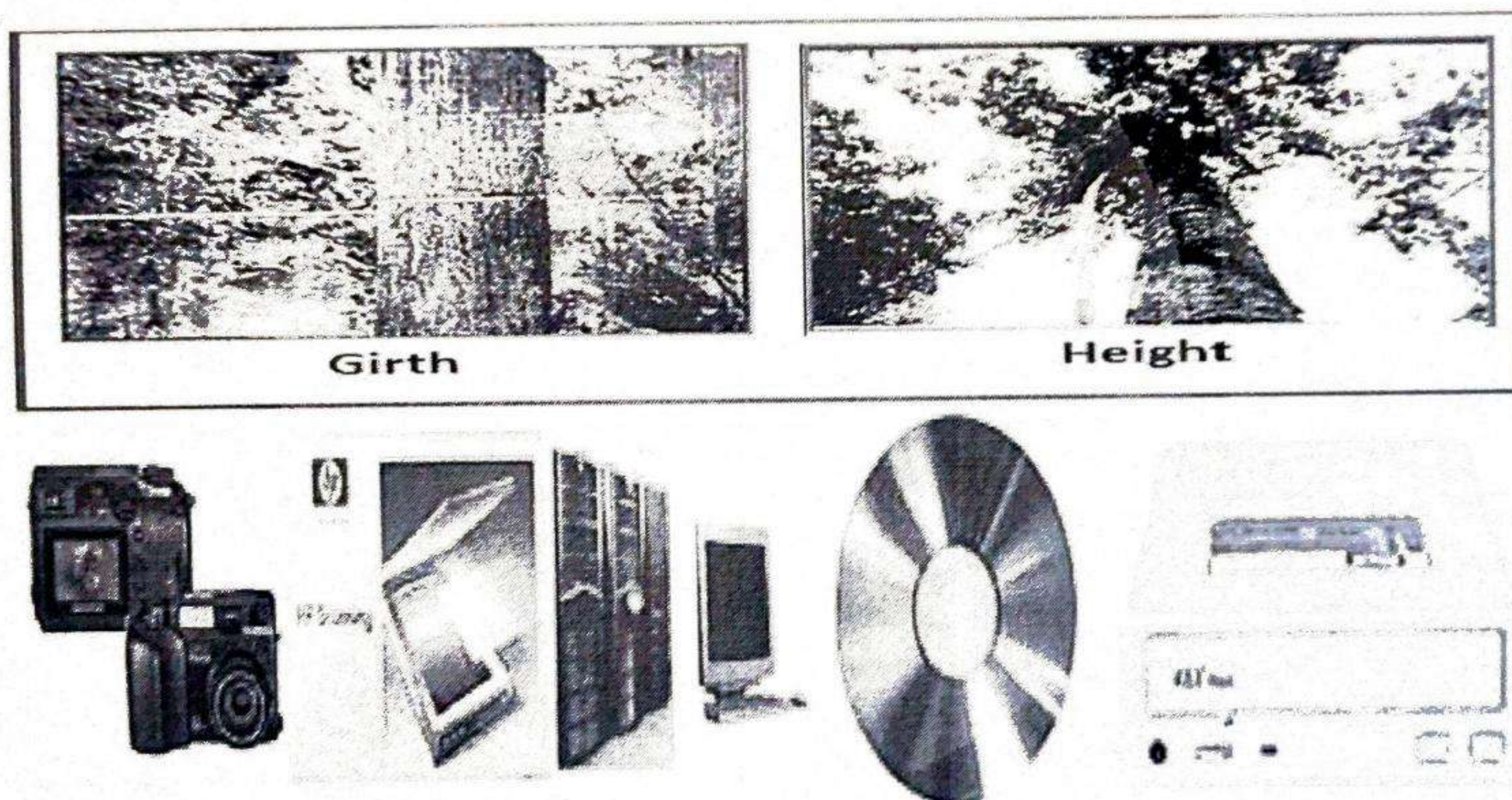
Digitization of herbaria is being done primarily to meet the needs fulfilled by notes on labels, and to save actual specimens from avoidable handling. With proper planning and suitable software, digitization can produce many very useful 'by-products'. One such collection is the Forest Research Institute Herbarium at Dehradun, Uttarakhand, India. Kagan (2006) has shed light on challenges and opportunities for applying biodiversity information to management and conservation. Information on vascular plant taxonomy, as addressed by global biodiversity information facility and key partners, serves as an example of current efforts to integrate information. In order to describe GBIF methodology he used vascular plants as an example, with a particular focus on the way the information is developed applied in North America. The above example appears as representative of biological informatics systems globally. Schneider *et al.*, (1998) described a tool developed for panoramically surveying the contents of the collection: the Herbarium Specimen Browser. They created WWW tools for botanists and botanically interested nonspecialist to explore aspect of botanical datasets, mainly relating to geographic distribution of various plant groups. Roderic and Page (2008) focused on challenges of linking data and the role of shared identifiers. A major challenge facing biodiversity

informatics is integrating data stored in widely distributed databases. Initial efforts have relied on taxonomic names but have limitations as identifier, being neither stable nor globally unique, and the pace of molecular taxonomic and phylogenetic research means that a lot of information in public sequence databases is not linked to formal taxonomic names. With the efforts of Hock *et al.*, (2003) a 'digital forest' had been developed by the Sustainable Forest Management project at Forest Research for Research purposes, in collaboration with Carter Holt Harvey Forests. A GIS database of environmental and management data for 40,000 hectare segment of Kinleith Forest, New Zealand, had been built up. The database proved to facilitate research efficiency and capability. The wealth of

digital data permitted the development of new approaches in using spatial information for forest management.

### MATERIALS & METHODS

The survey of area was carried out during study, often visits were arranged of the locations and collected firsthand information of natural habitat of tree species in Murtizapur, District Akola, Maharashtra, India". The study area, Murtizapur, District Akola, Maharashtra, India "Application of bioinformatics in the study of morphodiversity of some common roadside tree species in Murtizapur, District Akola, Maharashtra, India"



**Fig:1.1. Devices & Software's**

The information capture, storage, provision, retrieval and analysis, taxa and their interaction. In present work the main objective of research is to make available biodiversity information available by using computer programs as local as well as worldwide accessible Internet-based systems. the graphics supported software's used were MS Access, DBMS, Adobe ImageReady, Adobe Photoshop, MS-PowerPoint software and MS Paint and the files were stored in the .JPJ, JPEG, .PPT, and .BMP graphics, etc.

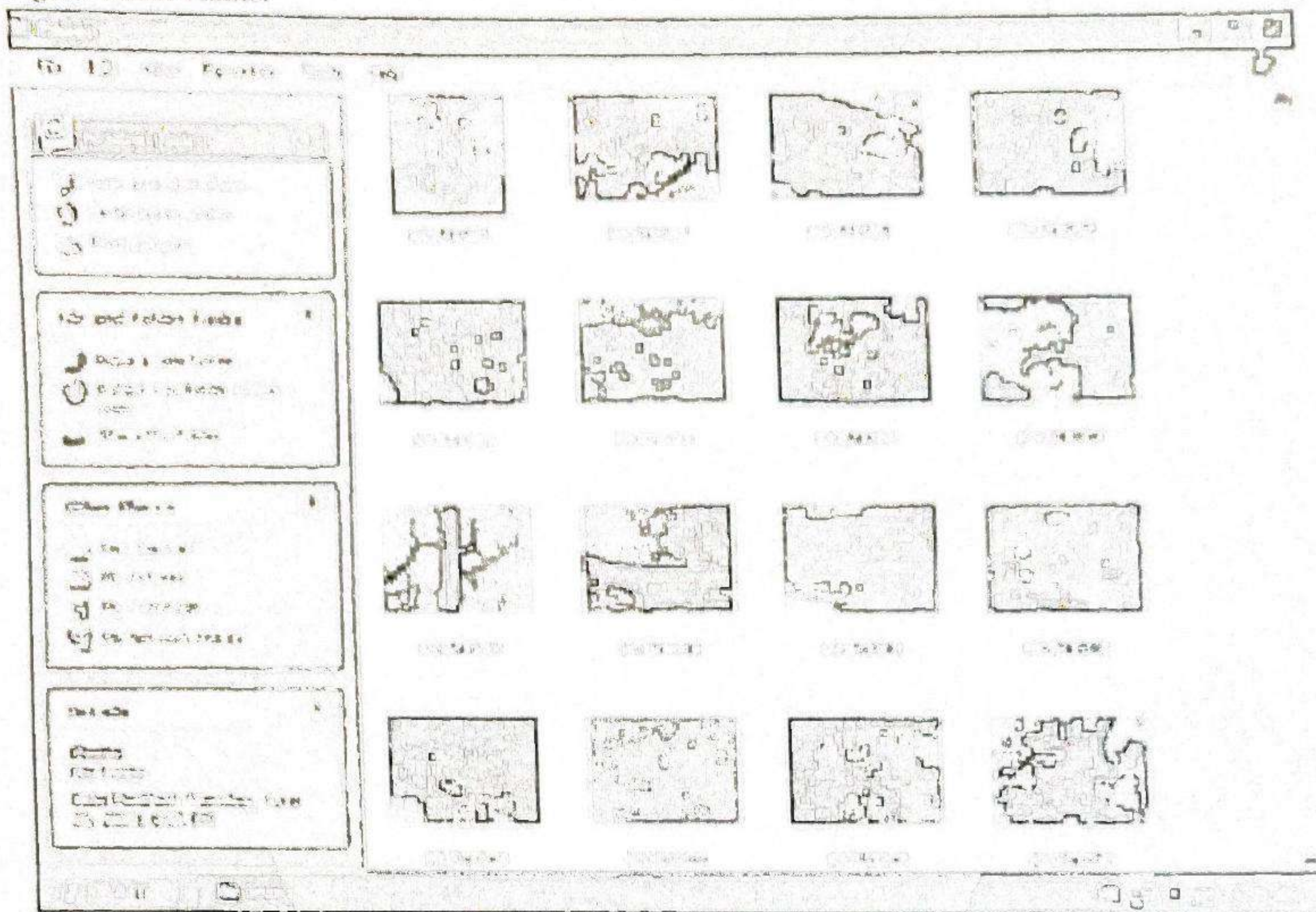
### OBSERVATIONS & RESULTS

Present study was based on data recording, field survey and collection of specimens. Study of about 64 trees species was completed by collecting all

the required information available with respect to morphodiversity, e.g. specimen sample collection, photographs, description, illustrations, height and girth data and bark features. The research work was carried out to study morphodiversity of the tree species of some common roadside tree species in Murtizapur, District Akola, Maharashtra, India". This study provided a base line information to understand the diversity of the species. In the present work the table was cataloging 64 tree plants with family, genus local and botanical name of each tree, in addition images of herbarium, bark and location map as supporting documents. It was an opportunity to apply this technology to develop an IT infrastructure that would enable us to unlock

the wealth of biodiversity information that existed around locality.

**Digital Visual Plants:**

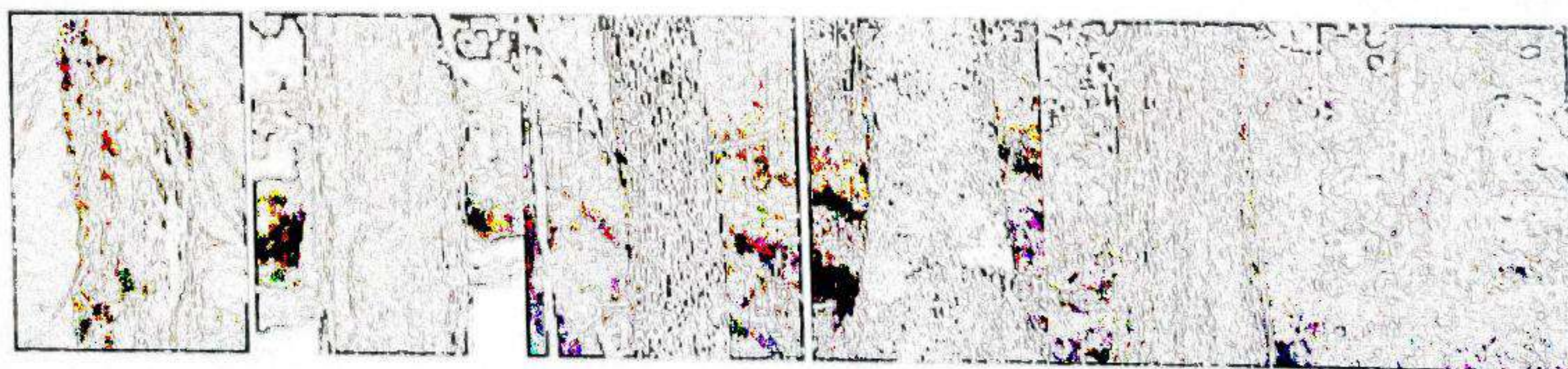


**Fig:1.2.Digital Visual Plants**

This was an image based tool used by the researcher. During the preparation of Digital Plant Images as Specimens, the graphics supported software's used were Adobe ImageReady, Adobe Photoshop, MS-PowerPoint software and MS Paint and the files were stored in the .JPJ, JPEG, .PPT, and .BMP graphics file formats, for their

accurate resolution; the scanning was done with the help of HP flatbed scanner. Thereal plant photographs of 64 plants were digitized along with their photo images i.e. a tree, flowering twig, flowering close-up, Plant description, Leaf, Fruit and Bark.

**Digital Bark Library:**



**Fig:1.3.Digital Bark Library**

The 'Digital Bark Library' was prepared. Scanned images of the barks were arranged properly with the help of computer software for further study. Morphological features were studied and recorded. Collected samples were carried to work

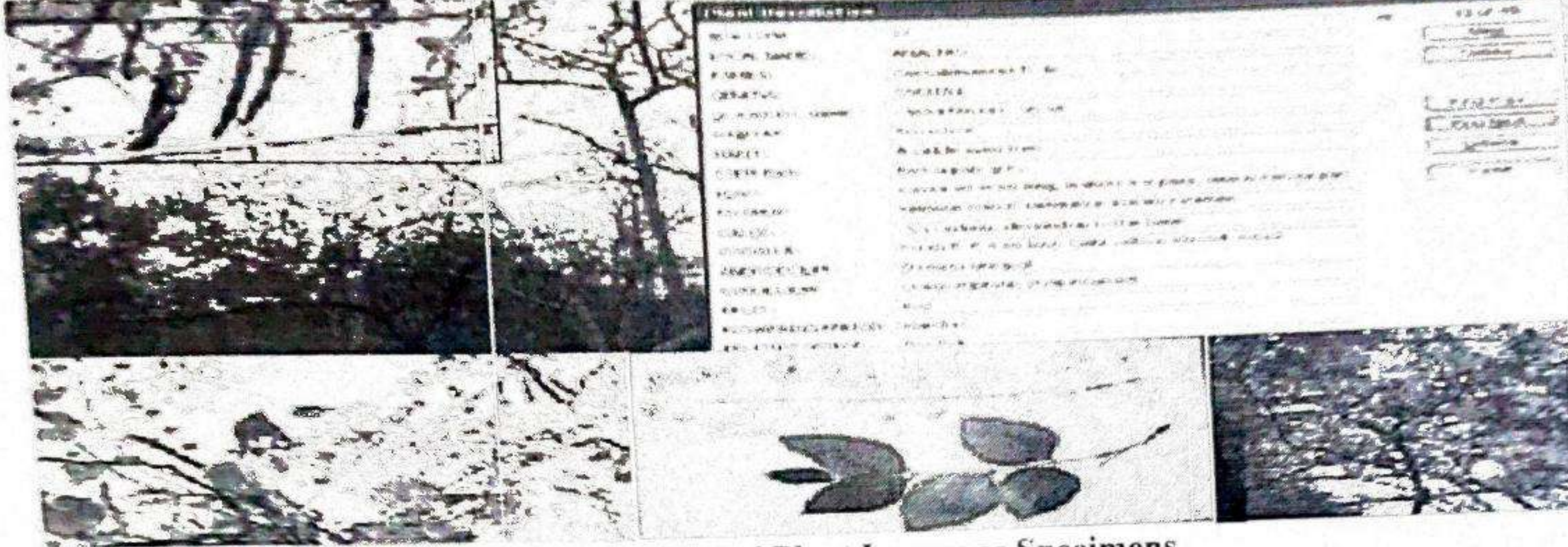
place and properly identified, labeled and classified on the basis of external features. Identification of bark was possible by keen observations and through experience. Smooth, Furrowed, Scaly, Warty, and Shaggy bark types



were found. The bark also showed variability from thin scaly, papery, smooth, greenish, to thick furrowed, and spiny; most of them showing

vertical cracks, ridges and furrows and of various colours

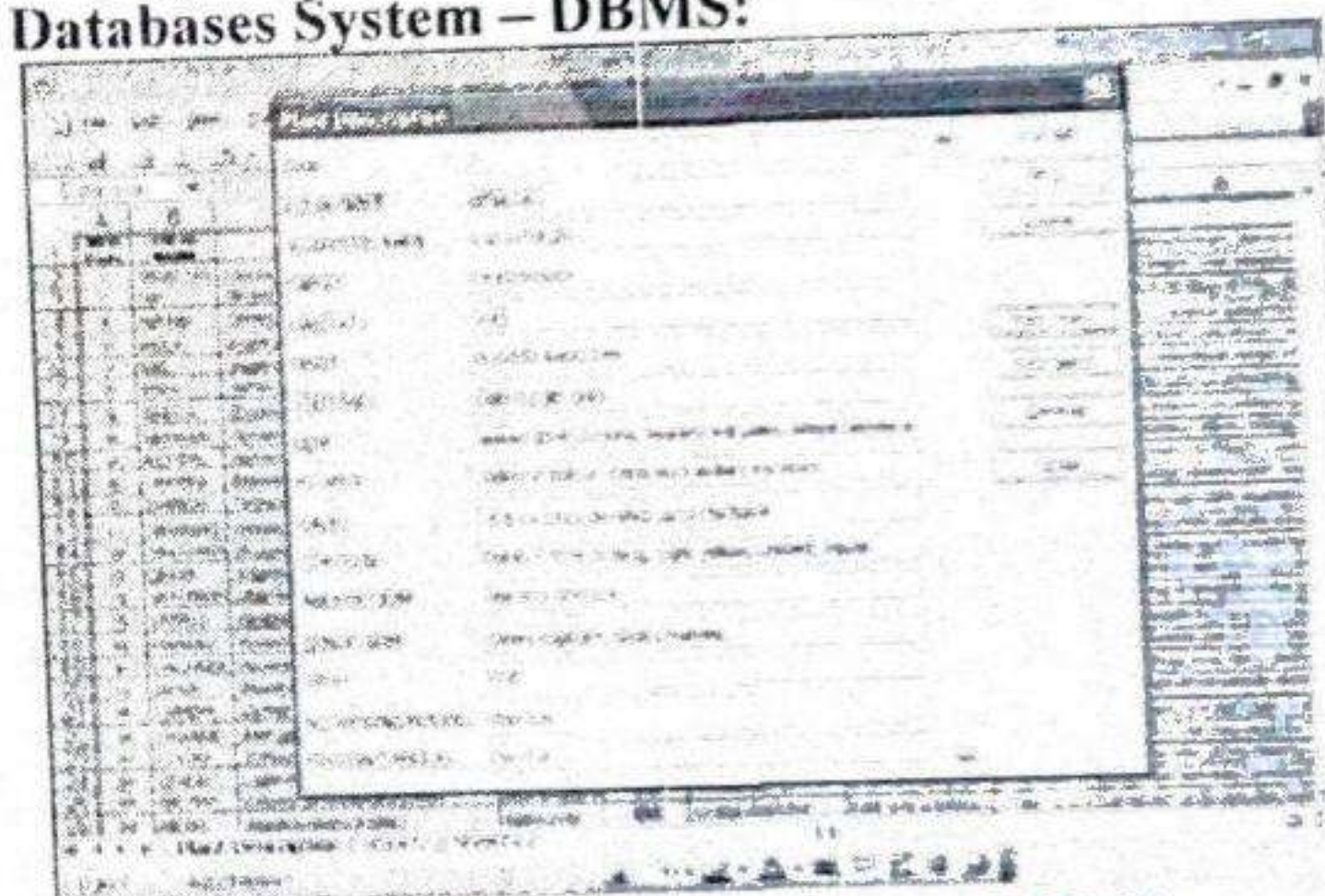
**Digital Plant Images as Specimens:**



**Fig:1.4. Digital Plant Images as Specimens**

This was achieved by using software MS-Internet Explorer (Web browser), Adobe ImageReady CS, Adobe Photoshop CS, and Corel Graphics suite II. The satellite maps were prepared with the support of Google Earth Maps searching tool. This software's were used to visualize captured data and to zoom it many more times.

**Databases System – DBMS:**

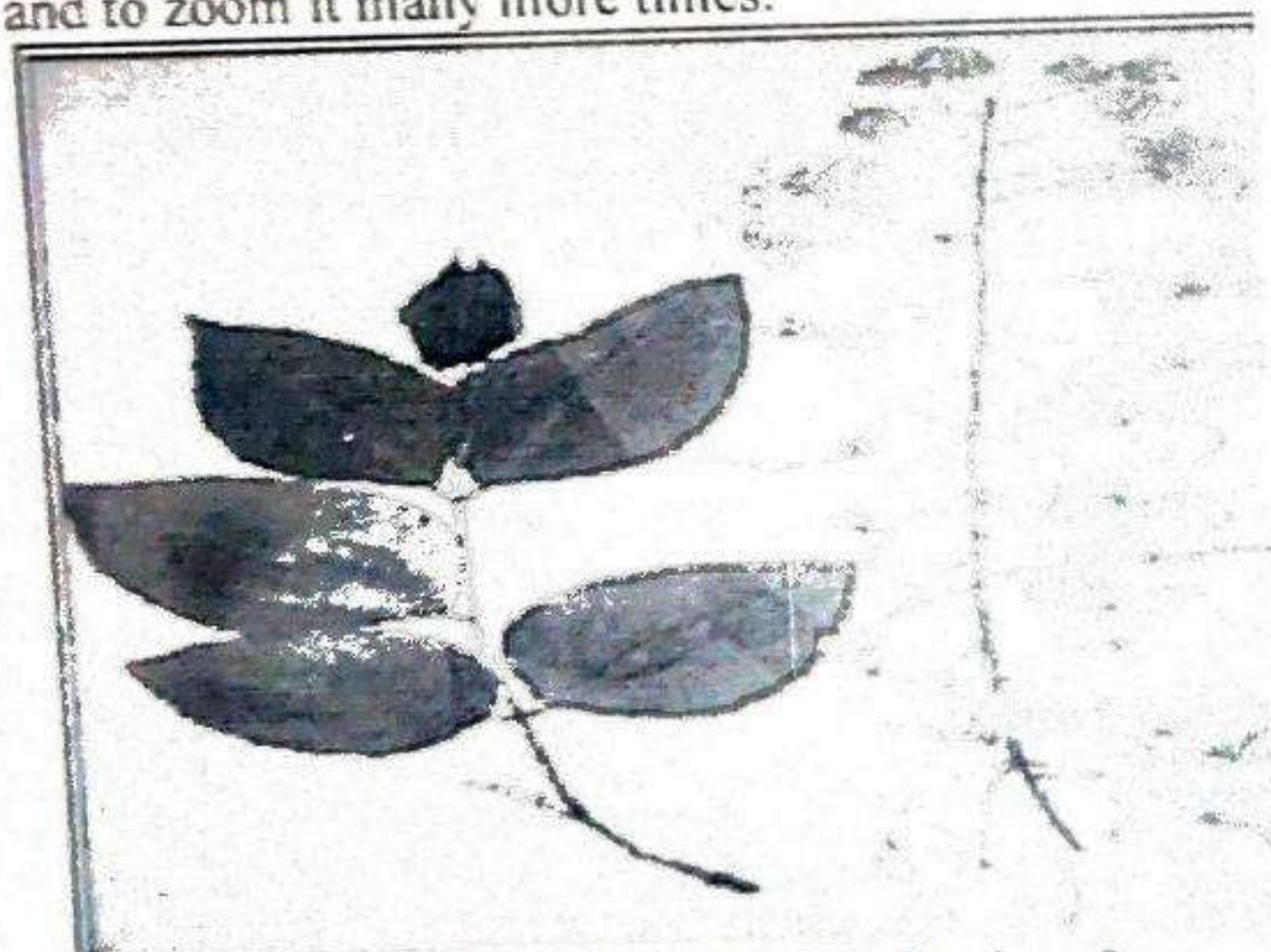


**Fig:1.6. Databases System - DBMS**

The databases on plant description were developed with the help of MS-Access database software. The different morphological characters such as tree code, local name, family, genera, botanical name, habitat, habit, stem, bark, leaf, flower, calyx, corolla, androecium, gynoecium, fruit, flowering and fruiting period of the individual species were stored in the prepared database.

**DISCUSSION**

The herbarium, bark specimens along with field maps were linked to the table. The specimen browser provided specified image and table data in its desirable form rapidly. Schneider *et al.*, (1998) pursued the more specific project of transferring the field information into electronic form. Specimens collected within Texas were used by the Specimen Browser. For each of those, the following items have been recorded: accession number and source herbarium, collector's name, a collector-specific number for the specimen, data of



**Fig:1.5. Digital Virtual Herbarium & Labels**

In the present study of biodiversity of tree species, new method was applied in the preparation of Digital Virtual Herbarium, wherein label data, specimen information and herbarium images were captured and made available through electronic system. This was done by data capture and its management through software. The main purpose was to develop Digital Virtual Herbarium of the specimens by digitizing the data and content and to make them available electronically.

collection, country of collection, and scientific name. Future revisions to the Specimens to be used as they were entered; future data-gathering passes were anticipated to input data from annotations and images of the plants themselves. Cotter and Bauldock (2000) assumes that information technology provides us tools to digitize information and store it in accessible systems; discover and retrieve data pertinent to the issue at hand; analyze data from diverse distributed databases input and promote interactions among colleagues through collaboratoria, internet-based communication facilities which enable discussions, document development and revision, and decision making in real time. In view of Kagan (2006) Biodiversity informatics has to provide consensus reference system in structural features (e.g. in database design) and content definitions (controlled vocabularies, i.e., list of applicable terms). Taxon based information system (or system using taxon names) must find ways to map individual taxon concept reliably. Information on vascular plant taxonomy, as addressed by global biodiversity information facility and key partners, serves as an example of current efforts to integrate information of the plant biodiversity. Efforts of Roderic and Page, (2008) have relied on taxonomic names as the share identifier linking record in different databases. Integrating diverse sources of digital information is a major challenge facing biodiversity informatics. Not only authors has faced with numerous, disparate data providers, each with their own specific user communities, but

also the information in which author interests are diverse, and includes taxonomic names and concepts, specimen in museum collections, scientific publications, genomic and phenotypic data and images. In the present work the table was cataloging 64 tree plants with family, genus local and botanical name of each tree, It was the easiest and effective way for retrieving the biological data just by pressing the computer keys. It was the foremost need to greatly increase our computing capacity to process and integrate extensive biodiversity information for conservation, management and decision making purposes by applying informatics tools.

### CONCLUSION

The computer assisted monitoring of vegetation by which wealth of the area was known accurately thereby one could describe relationship in between real world and its computer representation. In the Database taxonomic information was assembled, giving unique ID codes to avoid data duplication, the prepared database complied huge data which could be used in different types of manipulations. The Digital Bark Library & Digital Virtual Herbarium was developed as visual information system by cataloging 64 tree species data with their local and botanical names and their tree codes. Digital Visual Plants was an image based tool. All plants were digitized along with their plant descriptions, including specimen images of leaf, fruit and bark, photo images of a tree, flowering twig assisted in species identification as visual information system.

### REFERENCES

1. Fleet C. 2006. Locating Trees in the Caledonian forest: A Critical Assessment of Methods for Presenting Series Mapping over the Web. *e-Perimtron* 1(2): 99-112.
2. Stuessy TF. 2009. Plant Systematics World. *Taxon* 58(2):679-683.
3. Schneider ER, Leggett JJ, Furuta RK, Wilson HD, Hatch SL. 1998. Herbarium Specimen Browser: A Tool for Accessing Botanical Specimen Collections. The proceedings of the Third ACM Conference on Digital Libraries. June 23-26.
4. Cotter GA, Bauldock BT 2000. Biodiversity Informatics Infrastructure: An Information Commons for the Biodiversity Community. Proceedings of the 26<sup>th</sup> International Conference on Very large Database, Cairo, Egypt.
5. Kagan JS. 2006. Biodiversity Informatics: Challenges and Opportunities for Applying Biodiversity Information to Management and Conservation. *Northwestern Naturalist* 87:80-85.
6. Lertlum S, Murai S. 1995. Computer Assisted Monitoring of Vegetation Using Multi-Resolution Satellite and Geospatial Data. From [http://www.aars-acrs.org/acrs/proceedings/ACRS1995/Papers/P\\_S295-1.htm](http://www.aars-acrs.org/acrs/proceedings/ACRS1995/Papers/P_S295-1.htm)
7. Roderic D, Page M. 2008. Biodiversity Informatics: The Challenges of linking data and the role of shared identifiers. *Nature Proceedings*: hdl: 10101/npre.2008.1760.1

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8. Hock B, Payn T, Stevens P, Dunningham A. 2003. A Digital Plantation Forest for Research and the Demonstration of Spatial Modeling. The 15<sup>th</sup> Annual Colloquium of the Spatial Information Research Centre University of Otago, Dunedin, New Zeyland.
  9. Hargreaves P. 2006. Vegetative Morphology for Species Identification of Tropical Trees: Family Distribution. *Cerne, Lavras* 12(1): 1-7.
  10. Lertlum S, Murai S. 1995. Computer Assisted Monitoring of Vegetation Using Multi-Resolution Satellite and Geospatial Data From <http://www.aars-aars.org/aars/proceedings/ACRS1995/Papers/P5295-1.htm>
  11. Musavi A, Mathur PK, Qureishi Q, Sawarkar VB. 2006. Mapping of Biotic Pressure and its Impact on Prey Densities in Melghat Tiger Reserve, Maharashtra. *International Journal of Ecology and Environmental Sciences* 32(4): 327-343