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Khandesh College Education Society's
Moolji Jaitha College, Jalgaon
NAAC Accredited "A" Grade
UGC Honoured "College with Potential for Excellence"
ISO 9001 : 2008 Certified
Research Articles by
Budding Researchers
(Under CPE Programme of UGC)

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Jalgaon - 425 002 Maharashtra INDIA Tel.: 0257 - 2237363, 223428l, Fax : 2237363

Web : http://www.mjcollege.kces.in

KHANDESH COLLEGE
EDUCATION SOCIETY, JALGAON
E-MAIL : mjcja!@vsnl.com
M. J. COLLEGE CAMPUS, JALGAON - 425002
TEL. : 2239800, 2234281, 2237363
FAX : 0257-2237363

FOREWORD

I am pleased to see a volume of research article by budding researchers which has resulted from the collaborative and conscious efforts from both the students and the teachers. This is an innovative leap to bridge the void long since neglected between formal education and research with a prime objective of improving participation of students in interdisciplinary research activities in basic and applied sciences.

In developing countries like India, the pace of research needs to be accelerated to cater the needs of growing population. Long since research had been under-funded, unpublished and un-consulted in India. On this background, the present volume is a small but appreciable effort to provide a common platform for especially students and teachers to get involved in research projects which yield socially applicable results and promote science in human face.

I admire the volume for the effort of creating research conducive environment in the institution and motivating students community to participate in research. Secondly, the volume brings together a spectrum of research articles on various themes belonging to life, earth, chemical, computer sciences and information technology that touch upon current burning issues of great concern.

I hope that this volume proves to be a trendsetter and similar innovative activities encouraging research in all the fields of human concern follow. I appreciate the efforts of the students, researchers, teachers, project coordinator and other people involved in bringing out this volume.

(**Shri. N. G. Bendale**)
Hon'ble President, KCE Society, Jalgaon

॥ अंतरी पेटवू ज्ञानज्योत ॥
North Maharashtra University
Umavinagar, P.B.No.80,Jalgaon-425001,INDIA

Prin. Dr. K.B. Patil
Vice-Chancellor

Grade - B (2.88)
(NAAC Re-Accredited)

Telephone (O): 0257-2258401
0257-2258402
(R): 0257-2258404
Fax No. : (91)0257-2258403
E-mail : kbpatil27@gmail.com
vco@nmu.ac.in

FOREWORD

It is indeed a matter of great pleasure for this university that Moolji Jaith College, Jalgaon is doing a commendable job in spreading the scientific spirit among the students by publishing a volume on research articles highlighting research activities carried out by UG and PG students under the scheme College with Potential foe Excellence.

Is is appreciable that main objective for publishing this volume is to encourage students and motivate them towards research, It is an appropriate fourm to promote research oriented study amongst under graduate / postgraduate students creating thereby awareness of various research activities. Such a venture will go a long way in creation of conducive research atmosphere amongst students community. I am sure that this volume touches upon latest research in the field of science which is encouraging for all those interested in science education.

No doubt it is one of the finest volumes dedicated to popularisation of research activities. The get up and the contents of the volume are crivative, academic and inspiring which reflects scholarly articles with elegent outlook.

I take this opportunity to congratulate the editors, researchers and supervisors of the projects for their valuable contribution in the field of interdisciplinary research and warmly compliment the team involved in bringing out this volume.

Dr. K. B. Patil
Vice- Chancellor

NAAC Accredited
North Maharashtra University
Prof. Dr. S. B. Chincholkar
Ph.D.(Moscow), UNESCO Fellow (France), F.B.R.S.
Director

Board of Colleges and University Development
Umavinagar, Post Box No. 80, Jalgaon 425 001, INDIA
☎ : (O) 0257 - 2258409
(O) : 0257- 2257221, 222
Web Site : www.nmu.ac.in
e-mail : bcud_nmu@hotmail.com
Fax : (91)-0257-2258403 & 2258406

B.C.U.D.

FOREWORD

It gives me great pleasure that the M. J. College, Jalgaon is publishing a volume on the research articles prepared by budding researchers under CPE programme of UGC, New Delhi. The college and the authorities deserve compliments for offering research projects to the students of each department to the tune of Rs. 30,000/- to imbibe the research culture among them. It is highly appreciated that about 55 students of UG and PG classes with research aptitude carried out the research work in summer vacation under the supervision of college teachers of research department. from the index of volume, it seems that students from Chemical Sciences, Life Sciences, Computer Science, Information Technology and Earth Science have contributed to this volume, Under the science faculty, focus of the research is given mainly on Waste Management, Recycling of Waste Matter and many other areas of human interest. All research papers have been written in a scientific manner. The outcome of the process is a volume of 30 brief research articles. This is an innovation and pioneer approach among the colleges under the North Maharashtra University, Jalgaon.

I am sure that this volume will encourage to all the teachers and researchers working in the basic as well as allied subjects and provide appropriate platform to them, I hope the college should continue this activity every year in the large interest of faculty and students.

Sincerely yours,

Prof. S. B. Chincholkar
Director

K.C.E. Society's
Moolji Jaitha College
Jalgaon - 425 001(Maharashtra)
Ph : 0257 - 2237363, 2234281 FAX: 0257 - 2237363
Website : mjcollegejalgaon.org
e-mail : mjcjal_jal@sancharnet.in

Diamond Jubilee Year 2004-05
NAAC Accredited 'A' Grade
UGC honoured "College with potential for Excellence"

Ref. No.

FOREWORD

It gives me immense pleasure that KCE Society's Moolji Jaitha College is publishing the compendium of abstracts of the research oriented projects undertaken by students of Postgraduate Departments in the Faculty of Science. The College has been conferred with the status of 'College with Potential for Excellence' by University Grants Commission, New Delhi. Under the special initiative of 'College with Potential for Excellence Scheme', the postgraduate students have been provided with the golden opportunity to undertake multi-disciplinary projects and thereby get the exposure to the science and methodology of research. In the context of present academic curricula, hardly there is chance of real research orientation for the students. It is the glaring lacuna of the present education system. Unfortunately, the course structure and contents do not change with the expected frequency and therefore, there is every possibility of dissemination of obsolete, junk and thereby useless knowledge. Besides, the teaching methodology do not provide sufficient room for application and research orientation. In turn, the students find it difficult to get proper and just employment. To break this vicious cycle, the initiative under above stated scheme is laudable.

I have seen the interest shown by the co-ordinator of this scheme and his fellow colleagues as well as the immense curiosity, anxiety and interest shown by the students. The multi-disciplinary nature of all the research topics is a welcome attitudinal change. All the students who have participated in this project are really the budding researchers with bright future. I am sure that they will blossom into the renowned scientist in the time to come. I wish that they extend their research oriented activity and pursue advanced research for their doctoral thesis. I am hopeful that the industry shall look to this attempt to hunt the young talent. As a principal of the College, I, hereby, express my firm commitment for such endeavour on sustainable basis for the years ahead.

Best wishes.

Anil Rao
Principal

PREFACE

The quality of higher education in our country has not kept pace with the quantitative expansion the system has seen since independence. Though we have been quite successful in developing some technological innovations, we are lagging behind in basic research. Presently we are behind Russia, Brazil and China (the other three nations of BRIC) in terms of number of research publication in peer reviewed international scientific journals. Basic research traditionally has been the domain of state universities (and affiliated colleges) in our country. The government has initiated several measures to reverse this situation by improving the infrastructure and quality of teaching and basic research in state universities and affiliated colleges besides setting an ambitious target of 15% enrollment in higher education institutions by the end of XI five year plan. The University Grants Commission (UGC) has identified 'Colleges with Potential for Excellence' (CPE) for financial assistance to augment and strengthen their teaching and research infrastructure as a part of this exercise.

I am given to understand that the M.J. College has partly utilized the grant, under the CPE scheme of the UGC, for providing financial support to budding researchers (M.Sc. students) to carry out research work in their chosen area under the guidance of a mentor. The outcome of this exercise has been compiled in the form of a book volume. I am really happy to see the wide spectrum of topics, under different disciplines, the budding researchers have chosen to work on. Some of the topics like assessment of ground water quality of rivers in Jalgaon district by GIS approach, utilization of bagasse for biopulping, agriculture land use change analysis, removal of dyes and metal ions from synthetic waste water, tool for converting KML file to GIS shape file etc to name a few have excellent social and scientific relevance and potential for further knowledge creation and technology development, if pursued in right earnest.

Education and innovation are bound to play a significant role in the present century. Whereas the former empowers masses, the latter converts ideas in to improved products, processes, services and knowledge in-to wealth. We will have to make a full circle of idea, research, innovation, technology development and commercialization to prosper and remain globally competitive. The initiative of the college is a step in right direction and will serve as the origin of this circle. It will not only support and nurture the academically fertile budding researchers but

will also create a conducive environ and culture for quality research and 'gene expressions' leading to innovation….. Government schemes started with noble intentions normally do not have measurable end points for determining their success. It is in this regard that this volume of 'Research Articles by Budding Researchers' throw a pleasant surprise. I take this opportunity to congratulate the management, the principal, the mentors and the budding researchers for foreseeing, conceiving, implementing and realizing, respectively this wonderful idea.`

Prof. V.L. Maheshwari
Director
School of Life Sciences

PREFACE

Modern sciences, as training the mind to an exact and impartial analysis of facts, is an education specially fitted to promote sound citizenship. Sciences has been the impetus for technological growth and development. In the drive to provide basic needs and to raise the quality of life of our people, create wealth and to be competitive in an increasingly technologically sophisticated world, harness our natural resources and protect the environment in a sustainable manner we recognize the central role of science and technology, The investments in science today will pay back our technology needs tomorrow.

Therefore the Indian government is promoting the training of young minds to do science and other allied subject through the UGC. The UGC has recognized few colleges and institutions for having achieved excellence or striving for excellence in variety of fields. It is pleasing to know that Moolji Jaitha College, Jalgaon is one such centers for education. The college undertook the activity of doing projects both at graduate and undergraduate level in verity of subjects ranging from computer application to molecular biology. I felt very happy to observe that the young collegians besides their usual examination oriented studies devoted their time to do something useful or better. All the results and interpretations are given in this volume as research papers. Of course even writing a project report is itself a training. I congratulate all the teachers, students who participated in this activity. Similarly, the efforts and motivation on the part of authorities of the college i.e. principal and his supporting staff must be appreciated.

This report consist of twenty nine research papers distributed in four sections namely chemical sciences, life sciences, computer sciences including IT and earth sciences respectively. The projects on recycling of waste and assessment of groundwater quality show the awareness amongst students about environment and a will to use their knowledge to make fine analysis. An attempt has been made to synthesis derivative of oils so that it is protected from degradation or oxidation in one of the report. There are many papers in biology section which describe applicative research for examples studies on toxicity, hemolytic activity, citric acid formulation, enzyme production etc. The readings of these reports indicate that these students are well exposed to modern instrumentation, new methodologies and current problems. I found a paper describing the construction of low cost instrument which can measure the tensile strength of membranes or tissues. Such efforts will be rewarding specially in the field of medicine.

In this computer age, the new generation is getting enriched because of the speed and facilities created by simulation and computational methods. The ingeniousness of the students can be noted in reading the paper on network device detector. Similarly the question of new knowledge about remote sensing technique is reflected in some papers in the section of earth sciences. However, it is noted that there are no reports from physics, mathematics, psychology subjects. Probably, in near future, motivation will be imparted to students from these subjects.

It is certain that the activity of project described in this volume will elevate the spirit of scientific attitude amongst other students as well. The other colleges will also initiate such an activity for their students. I wish that the college will perish the research as well utilize the grants for infra-structure creation so that many students and hence the population get benefited by doing 'Science'

Prof. D .G. Hundiwale,
Director,
School of Chemical Sciences,
North Maharashtra University,
Jalgaon – 425 001

EDITORIAL

In this modern era of commercialization and globalization, as per the Darwin's theory "Survival for the fittest" is more relevant for academic institutions than ever before. Hence every educational institution should become a 'Centre of Excellence' by enhancing its co-curricular, research and extension activities. With this objective and due to inherent strength, our college has been honoured by UGC as "College with Potential for Excellence" Under this scheme, UGC provides a platform to undertake the research activity particularly for the students.

The main objective of this activity is broad based multi-dimensional, multi-disciplinary, fundamental and applied research. The sub-objective is specifically identified with the basic branches of chemical sciences, life sciences, computer sciences, information technology and earth sciences.

The overwhelming response from the students of PG and UG classes is a gesture of their keen interest and dedicated commitment to research activity. UGC granted special funds to each of the fourteen science departments of M J College. Out of the total grant received, five percent from each department's allocation was allocated to carry out the research work with the objective of inculcating the research culture among the UG and PG students. About 55 students were engaged in this activity under the supervision of 30 teachers. The outcome of this research project is this volume.

I put on record my utmost sense of gratitude to Mr. Nandkumar Bendale, Hon'ble President, KCE Society, Jalgaon for his constant encouragement and moral support. I also express my sincere thanks to Principal Anil Rao for his continuous inspiration during the project work.

I am thankful to budding researchers, experts and project supervisors for completing their research activities successfully.

Thanks are due to University Grants Commission, New Delhi for granting the funds for this activity. I also express my deep sense of gratitude towards Hon'ble Dr. K. B. Patil , Vice Chancellor, Prof. S. B. Chincholkar, Director, BCUD, Prof. Dr. V. L. Maheshwari, Director, Life Sciences and Prof. Dr. D. G. Hundiwale, Director, Chemical Sciences, North Maharashtra University, Jalgaon for their appreciation of the academic effort.

I extend my wholehearted thanks to Dr. Prof. K. J. Patil, Dr. Ram Bhavsar, Dr. Bhushan Chaudhari, Dr. P. R. Patil, Smt. Pradnya Vikhar for examining the project. I acknowledge all the known and unknown efforts for bringing out this volume.

I wish the budding researchers a bright research career and expect the researchers to constantly encourage, guide and support them. I am sure that such activity shall continue henceforth.

Dr. V. S. Zope
Co-ordinator
(Research promotion
scheme under CPE of UGC)

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LIFE SCIENCES

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CHEMICAL RECYCLING OF POLYAMIDE WASTE

Karanje A. Bharambe H. and Zope V. S.*

Department of Chemistry, M. J. College, Jalgaon. (M.S.), India.

E-mail: dr_zope@rediffmail.com

ABSTRACT

Dissolution-degradation processes are studied for recycling of polyamide waste. Various solvents such as dimethyl sulphoxide, dimethyl formamide, formic acid, p-cresol were undertaken for the study of degradation of PA. Formic acid is found to be excellent for it. These developed recycling processes reduce the environmental pollution up to certain extent. The kinetic parameters such as order of reaction (first), velocity constant (10^{-2} min^{-1}), energy of activation (40.04 $KJmole^{-1}$) and frequency factor (43.65 min^{-1}) were investigated by four batch wise heating. Ostwald viscometer method was used to determine molecular weight of PA waste which is found to be 1107.

KEY WORDS : Plastics recycling, polyamide, energy of activation, order of reaction.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Plastics are man made material which can be molded into any form. There are many uses of plastics in human life. But, now-a-days plastics are a major source of solid waste pollution. The plastics wastes are eco- hazardous.

There are four different techniques involved for Effective Waste Management, commonly referred as four ñRò Reuse, Reduce, Recycle and Recover.

Why to use Recycled Plastic? Protects resources, reduces unnecessary waste, reduced disposal cost, reduces land filling costs and creates new jobs. The best advantage of recycling of plastics is to create an employment by different process of recycling of plastics and its types. A plastic degrades slowly under the effect of wind, sun and rain. Plastic waste is one of the most objectionable kind as litters. It lies around; it becomes coated with objectionable waste and blocks the drainage systems.

Any process of recycling that places a value upon this material, so that there is financial advantage in preserving it rather than the discarding it, such process is to be welcomed. The benefit is greater in poor, urban areas where even small earning opportunities will be seized. As these are the districts where municipal cleaning frequency is least. By implementing a beneficiary scheme in such areas will boost the poor people to earn a lot through collection, sorting of plastic waster for recycled. Land filling due to plastic waste creates environment pollution problem. The recycling process can be achieved through different stages, such as collection, sorting and cleaning material which are labor intensive and require little capital equipments. The work is suitable for those who have little skill and the sorting and cleaning may be done by people with certain sort of disability. Disposal of plastics to land fill is avoided by eco-friendly chemical recycling[1-3] by hydrolysis, amminolysis, -glycolysis etc.

MATERIAL AND METHODS

Material: Analytical grade chemical such as sodium hydroxide, formic acid Demethyl sulphoxide, Dimethyl ï formamide, P-cresol supplied by S.D. fine chemicals, were used as received. Polymide waste sample obtained from the Ashwini Engineering Works, MIDC, Jalgaon (M.S.).

Degradation kinetics of Polyamide: 1 g of PA sample was taken in different beakers of capacity 100 ml containing various solvents such as Dimethyl sulphoxide, Dimethyl sulphoxide, Diamethyl formamide and p-Cresol. After definite time intervals, the degree of degradation is recovered by measuring the residual weight of the sample. The kinetics of degradation (dissolution) of polyamide waste in formic acid has been studied by measuring polyamide wastes after definite reaction time. Degradation of polyamide by hydrolysis was experimentally studied by taking 1 g of polyamide sample in three neck flask of capacity 250 ml containing 1g of NaOH facilated, with condenser. The flask was heated for various time intervals. After definite time intervals the residual weight of sample is measured by using chemical balance.

Thermodynamics: 1 g of polyamide sample was taken in formic acid solvent. The dissolution was observed at various temperatures ranging from 30^{o}C to 90^{o}C. Residual weights after dissolution were recorded for every 15 minutes dissolution time.

Molecular weight determination: Viscosity average molecular weight of polyamide waste was determined by using Ostwald viscometer. The flow time of various concentration of polyamide waste prepared in formic acid was recorded. The intrinsic viscosity (intercept = 0.7088) of the graph was used to calculate the average molecular weight by using the formula, $[q_{sp}] = k M^{\breve{U}}$. M is the molecular weight of polymer obtained as 1107.

RESULTS AND DISCUSSIONS:

Degree of dissolution (Degradation):

Based on the simple experiments carried out to observe the dissolution of polyamide waste into the various solvents such as p-cresol, Dimethyl sulphoxide, Dimethyl formamide, formic acid, there is absolutely no dissolution (degradation) in Dimethyl formamide. However, 100 % dissolution was observed in formic acid solvent Table shows that 100% degradation was achieved in 15 minutes and 4320 minutes for formic acid and p-cresol solvents respectively. It is evident from this observation that formic acid is an effective solvent for the degradation of polyamide waste. Linear increase in percent degradation was observed for both the solvents formic acid and p-cresol, Table also shows that no degradation up to 1440 minutes dissolution time was observed for DMSO.

Dissolution Time (min)	Solvents			
	DMSO	p-Cresol	Formic Acid	DMF
5	0	0	2058	00
10	0	0	34.5	00
15 and 30	0	0	100	00
120	0	27.74	100	00
1440	0	90.41	100	00
4320	1%	100	100	00

Alkali hydrolysis of polyamide waste: It was observed for the alkali hydrolysis of polyamide waste at atmospheric pressure and an elevated temperature of about 100°C that, there is absolutely no degradation. However, literature review indicates that such a alkali hydrolysis is possible only at higher pressures and temperatures. Thus high pressure autoclave has been recommended to carry out this reaction process[4-5].

Kinetics of degradation of polyamide waste: The velocity constants were determined by measuring the loss in weight during degradation using first order kinetic equation,

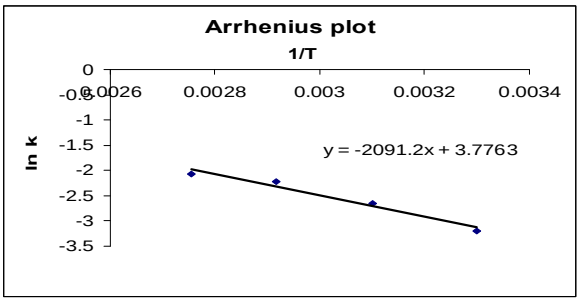
$$k = \frac{1}{t} \ln \frac{w_o}{w_t} \qquad \text{....(1)}$$

Where, Wo is initial weight of the polyamide waste in grams and Wt is weight of the reactant left at time ót ô in grams. The values obtained for ók ô using equation (1) at 30, 50, and 90 °C were 4.1 x 10^{-2}, 7.1 x 10^{-2}, 10.84 x 10^{-2} and 12.54 x 10^{-2}, min^{-1} respectively. As temperature increases the velocity constant also increases. The values of ók ô are constant using first order reaction equation hence reaction shows first order kinetic. The degradation reaction is first order with velocity constant of the order of 10^{-2} min.

Percent conversion of degradation reaction: The degradation process leads to the conversion of polyamide waste into monomer or oligomers. The per cent conversion increases as temperature increases. It was observed that maximum conversion (84.86 %) was achieved at 90°C for 15 min dissolution time. Thus 90°C, temperature is found to be optimum temperature for the degradation process. According to the Arrhenius equation,

$$k = A\, e^{-E/RT} \qquad \text{é é é é é é .. (2)}$$

Where the symbols have their usual meanings



From equation-2, it is easy to determine the energy of activation and Arrhenius constant by plotting the graph of ln k against 1/T. The slopes and intercept of the Arrhenius plot were 2091.2 and 3.7763 respectively. The energy of activation and Arrhenius constant obtained by using these values were 40.040 KJ mole and 43.65 min^{-1} respectively.

CONCLUSIONS:

1. Dissolution of polyamide waste is of first order with velocity constant in the order of 10^{-2} min^{-1}. The energy of activation and frequency factor were found to be 40.04 $KJmole^{-1}$ and 43.65 min^{-1} respectively. The average molecular weight determined by Ostwald viscometer was found to be 1107.
2. The formic acid is found to be the best solvent for dissolution (degradation) of polyamide waste.
3. Absolutely no degradation is observed in Dimethyl formamide and slight degradation is observed in Dimethyl sulphoxide.

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ASSESSMENT OF GROUNDWATER QUALITY IN RIVER LINKING AREA OF JALGAON DISTRICT –A GIS APPROACH

Mahajan C.D., Patil V. J. and **Jadhav B. N.**, **Bendale D. S.***

M. J. College, Jalgaon, Maharashtra

ABSTRACT

Groundwater quality has special significance and needs great attention of all concerned since it is the major alternate source of domestic, industrial, irrigation and drinking water supply. The present study monitors the ground water quality and uses GIS techniques for showing the spatial distribution of various parameters in river linking area of Jalgaon District. Physico-chemical analysis data of the groundwater samples collected from drinking and irrigation sources forms the attribute database for the study, based on which, spatial distribution maps of major water quality parameters are prepared using GIS software to identify the causes of deterioration of water quality and estimate the guidelines for futuristic planning.

KEY WORDS : Water quality, GIS techniques, Physico-chemical analysis, spatial distribution maps.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Water is an essential component for the environment. The quality of ground water is deteriorated day by day due to rapid increase of human activities. The groundwater contamination is due to seasonal variations, hydro geological processes, discharge rate domestic and agricultural activities etc. The environmental impacts of these groundwater contaminations seriously affect the socio-economic conditions of such areas.

Rapid urbanization brings with it many problems as it places huge demands on land, water, housing, transport, health, education etc[1]. In Jalgaon district, North Maharashtra Region River Linking Project is in progress which is looked after by Irrigation Department of Government of Maharashtra.

River Linking Project is found to be very valuable to solve the drinking water problem, for agricultural activity, increase ground water level and recharge wells. The drinking and irrigation water quality is affected due to agricultural and other activities. Therefore, the present study is undertaken to analyze the water quality of different drinking and irrigation water sources in River linking area. The study area includes the villages around the river link which is between the Jamada right canal coming from Jamada Dam built on the Girna River and the Titur River. It is the rural area in which the main source of water for drinking and irrigation is ground water drawn from dug wells, bore wells or hand pumps. About 70% part in this area is agriculture land. The quality of ground water is equally important as that of quantity. Remote sensing and GIS are effective tools for water quality mapping and land cover mapping essential for monitoring, modeling and environmental change detection[2].

Present study is conducted with the objective to analyze the physico-chemical parameters of water and to prepare the ground water prospectus map showing spatial distribution of parameters in the study area using GIS and to estimate the guidelines for futuristic planning.

METHODOLOGY

The study was undertaken in 18 villages of River Linking Area of Jalgaon district of north region Maharashtra. The study area is situated between 20° 37' 51.6" N to 20° 31' 35.1" N latitude and 75° 3' 27" E to 75° 10' 46.4" E longitude.

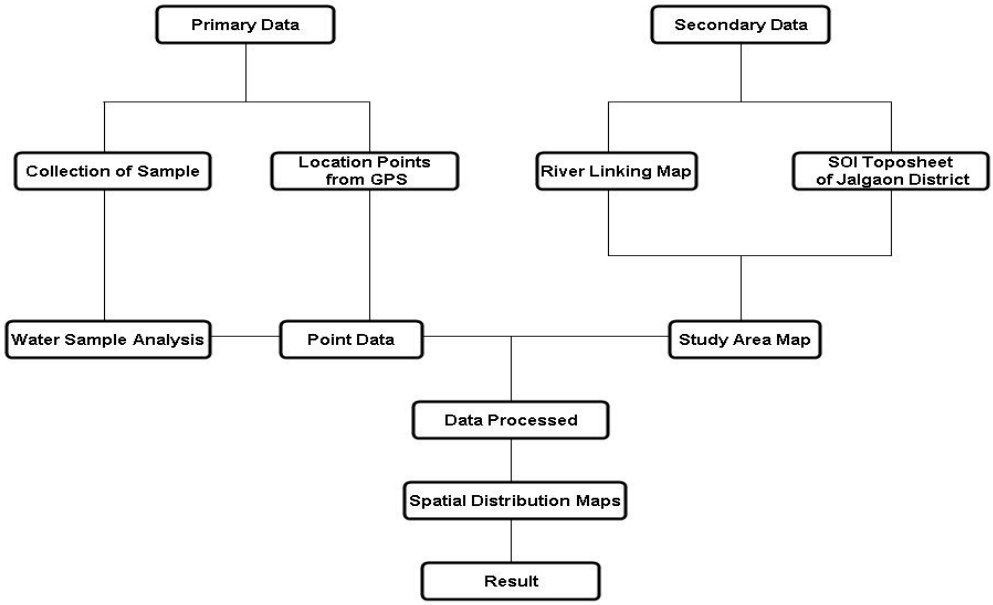
I) Physicochemical Analysis: About 36 samples were collected from different drinking and irrigation sources which are bore wells and dug wells in study area covering 18 villages. The samples were collected in cleaned sterilized bottles. The study was carried out in the month of May 2009. The sample locations were taken with the help of GPS. The samples were stored in cool and dry place avoiding direct sun contact and any unhygienic condition. The water samples were analyzed for various physico-chemical parameters adopting standard protocols[3].

The pH, Temperature and TDS of water are determined on the sample site using pH and TDS meters (HANNA digital pH meter). Conductivity and salinity of water were determined using water analysis kit. Chloride, total hardness, calcium and bicarbonate were measured by titrimetric methods. Nitrate and sulphate was determined spectrophotometrically (spectrophotometer model- Systronics Visiscan- 167) and sodium & potassium by flame photometer model (Systronics Flame photometer 128 μc). Heavy metals were analyzed using Atomic Absorption Spectrometer (Model-ChemitoAA-207). All the chemicals used in the study are analytical grade. De-ionized water used for analysis and reagent preparation.

II) GIS work: GIS enables to look into the cause and effect relationship with visual presentation[4]. Our primary data involves collection of sample and sample location point i.e. latitude and longitude with the help of GPS. It also involves analysis report of water samples which is our raw data for the preparation of spatial distribution maps. Secondary data was availed from local Irrigation department which contains mainly Jalgaon district village map (SOI toposheet) and River Linking Area maps. Our study area is extracted from Jalgaon district village map, this map is then used for preparation of spatial distribution maps in ArcGIS.

Using the Spatial Analyst tools in ArcGIS Desktop, spatial analysis on data was performed.

Inverse distance weighted (IDW) interpolation method was used to obtain the spatial distribution maps for different parameters. Flowchart of Methodology is as given below:



RESULTS AND DISCUSSION

An analysis of the nature and rate of land use change and its associated impact on groundwater quality is essential for a proper understanding of the present environmental problems[5]. The analytical results of various parameters of drinking and irrigation water samples are discussed as per guideline of BIS and WHO. The analysis result of parameters pH, TDS, conductivity, salinity, calcium, chloride, sodium, potassium, bicarbonates, sulphate, and heavy metals- iron and zinc in drinking water samples show that these parameters are in permissible limits. The amount of hardness is beyond permissible limits in samples from villages- Bhortek (Bh.), Pimpri, Tandulwadi, Kajgaon and Kanashi. Also the samples from Bhortek (Bh.), Pimpri, Tandulwadi and Lon contain nitrates range beyond permissible limits. Almost all water samples from irrigation water sources contain high amount of nitrates ranging from 22.0 to 417.5mg/lit.

CONCLUSION

On the basis of physicochemical analysis of the studied water sources in 18 villages from the River Linking area, it has been concluded that ground water varies spatially. Water of the most of the location have parameters- pH, sodium, TDS, chloride, potassium and Zinc well within the permissible limits for drinking water recommended by WHO (1984) and BIS (1991). However some of the water sources are not suitable for drinking purposes as per WHO guideline. The water sources of Bhortek (Bh.), Bamrud and Tandulwadi, have total hardness 650, 544 and 500 mg/lit respectively which is beyond permissible limit i.e more than 500 mg/lit. Bhortek (Bh.), Pimpri, Tandulwadi and Lon sources contain nitrates 110, 185, 142 and 46 mg/lit which is beyond permissible limit i.e. 45 mg/lit. The drinking water sources require essential

treatment for removal of hardness and nitrates before use. Combination of both groundwater quality parameters and GIS methods is very useful to researchers to model the health related issues as GIS provides efficient capacity to visualize the spatial data. 11 samples out of 18 have high contents of nitrates 48.3 to 417.5 mg/lit in irrigation water sources which imply that excessive amounts of fertilizers are used which percolate in the wells. Customized maps created using GIS software can be helpful to gain a better understanding of the water quality to common people and government sources for better water quality management.

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IMPACT OF USE OF FERTILIZER AND PESTICIDES ON SOIL QUALITY: A PHYSICO-CHEMICAL STUDY

Patkar **N.V.** and Gupta G.R.****

Department Of Chemistry M. J. College, Jalgaon.

E-mail: grgupta83@gmail.com

ABSTRACT

The basic aim of the present study is to improve the efficiency of agricultural soil in the study region, Therefore, it is desired to build up scientific apparition and approach for employing fertilizers and pesticides on agricultural land. Soil testing is a foundation for a balanced fertilization program of crop production. Considering soil fertility and plant nutrition are two closely related subjects that emphasize the forms and availability of nutrients in soils, their movement to and their uptake by roots, and the utilization of nutrients within plants. Knowledge of soil fertility is important for the development of soil management systems that produce profitable crop yields while maintaining soil sustainability and environmental quality.

KEY WORDS :- Physicochemical parameter, heavy metals, soil analysis.

* Address to whom the correspondence should be made.

INTRODUCTION

Today, the increasing population is very serious and burning topic in front of man-kind which increases pressure on Agricultural Sector to increase food production. The increase in production will mainly depends on introduction of high yielding Crop and increasing the productivity of land by using various fertilizers and pesticides. Fertile soils have an adequate and balanced supply of elements sufficiently labile or available to satisfy the needs of plants. Soil fertility is the status of a soil with respect to its ability to supply elements essential for plant growth without a toxic concentration of any element. Soil fertility can be readily altered by the application of soil amendments. Repeated application of large amounts of different nitrogen fertilizers affects on C/N ratio[3]. India is the second largest producer of vegetables after China. However, the development of the export market is hindered by concerns about pesticide residues and inadequate monitoring. Over the past few years we have been realizing the counterproductive effects of pesticide use, such as pest resistance to farm chemicals, in addition, long persistence of some agrochemicals in the environment sets in a series of undesirable effects through contamination of food and feed[1]. Soil testing helps the farmer to use the fertilizers input to the exact requirements so that he can avoid incurring more money by using excess quantity or getting low yields by using less quantity.

MATERIALS AND METHODS:

Use of pesticides and fertilizers are essential part of modern agriculture. During the course of present study, we analyzed 15 soil sample in different villages of Jalgaon district. To investigate the effect of pesticides and fertilizer on the soil. Soil samples were collected from the study area by following the standard procedures. These samples were air dried, crushed and screened through 2 µm sieve and stored in polyethylene

bags for analysis. Standard methods are used for both physicochemical and metallic study[4-6], all the chemicals are used as AR Grade and used directly. The laboratory experiments were carried out at the department of chemistry, M.J. College, Jalgaon.

RESULTS AND DISCUSSION:

Sample No.	pH	E.C. (ds/m)	Salinity.	O.C. (%)	Available N_2 (kg/hcre)	K. (mg/L)	Mg. (mg/L)	Iron. (mg/L)	Zn. (mg/L)	Mn. (mg/L)
01	7.8	0.42	300	0.105	46.12	4.18	0.0047	7.12	3.2	35.11
02	8.0	0.40	200	0.075	50.17	3.86	0.0166	8.46	3.8	35.12
03	7.6	0.38	300	0.675	72.12	15.76	0.1812	9.98	3.6	37.84
04	7.4	0.65	400	0.690	100.32	17.66	0.0703	4.96	46.4	23.01
05	7.7	0.22	100	0.435	53.31	2.86	0.0933	6.9	8.4	36.98
06	7.9	0.26	200	0.990	84.67	14.92	0.0359	4.98	6.2	35.32
07	7.5	0.27	200	0.570	78.40	2.42	0.0090	3.04	3.2	35.12
08	8.0	0.25	200	0.495	87.80	9.52	0.1540	12.86	6.2	35.32
09	7.8	0.20	100	0.480	62.78	2.50	0.0688	5.62	6.2	36.35
10	8.0	0.20	100	0.735	78.40	11.06	0.0769	7.84	3.4	35.73
11	7.5	0.39	300	0.375	75.26	11.75	0.0898	2.52	11.6	37.41
12	8.3	0.27	200	0.075	25.08	2.50	0.0736	11.4	31	33.75
13	8.4	0.15	100	0.465	46.12	5.58	0.0211	29.4	4.4	33.56
14	8.3	0.14	100	0.285	53.31	4.42	00941	6.32	5.6	35.32
15	8.2	0.18	100	0.405	68.29	18.50	0.0978	5.94	6.2	34.92

Table shows the results obtained during the course of present investigation. The use of various nitrogenous fertilizers decreases the pH of soil[2,9], but such minimization in pH value are not observed. E.C. and Salinity shows an adverse effect on the process of photosynthesis, However, all the soil sample shows very good commitment towards E.C. and Salinity. Organic carbon, soil organic carbon, in particular labile (easily decomposed) organic carbon, has an overwhelming effect on soil microbial activity (Hajek et al.,1990). Labile organic carbon makes up approximately 10 to 14 per cent of total soil carbon. It is the heterogeneous mixture of living and dead organic materials that are readily circulated through soil biological pools, groups of interacting organisms. This carbon is the basis for a major soil nutrient reservoir[1,8]. Present study shows that the soil samples are having a good percentage of O.C. and available Nitrogen too. The following Table also shows the concentrations of various micronutrients in the soil samples. Micronutrients are the secondary nutrients for plants but they are essential elements, for the process of root growth and photosynthesis[7].

CONCLUSION

1. Soil testing provides sound information about the fertility and productivity of the soils.
2. A soil test measures part of the total nutrient supply in the soil and represents only an index of nutrient availability. Soil tests do not measure the exact quantity of a nutrient potentially taken up by a crop.
3. The quantity of nutrient extracted by the soil test should be closely related but not equal to the quantity of nutrient absorbed by the crop. It is very clear that soil testing act an important tool for soil fertility evaluation and fertilizer recommendation. Soil test based fertilizer recommendation is based on the basic assumption that an increase or decrease of available nutrients in the soil will directly influence crop yield**.**

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SYNTHESIS AND CHARECTERISATION OF EPOXIDISED VEGETABLE OILS

Dixit M.A. and Kulkarni P. R.*

Department Of Chemistry , M. J. College , Jalgaon. (MS India)

ABSTRACT

Epoxidation of vegetable oil is the process of formation of oxirane ring using peracids and provides products that have significant use as plasticizers in PVC resins. The current status of chemistry and technology of synthesis and characterisation of epoxidised oils have been presented. Present paper reports use of partitioning organic solvents and control of reaction temperature as technique for minimisation of ring opening during epoxidation. IV, AV,HV, RI, EEW, and FTIR spectroscopy were used to monitor performic and peracetic acid epoxidation of sunflower,soyabean and groundnut oil. Amongst three oils, rate of epoxidation of sunflower oil was found to be highest.

KEY WORDS :- Epoxidation, performic acid, peracetic acid, groundnut oil, sunflower oil, soyabean oil.

*Author to whom all correspondence should be address

INTRODUCTION

Epoxidized vegetable oils are one of the most effective stabilizers of polyvinyl chloride and other polymers. Recently, epoxides have received increased attention because they are of interest both as end-products and as chemical intermediates for production of multifunctional oleochemicals. Epoxidation of oil, such as soybean oil, using a peracid, was performed in the presence of a complexing agent for heavy metals selected from nitriloacetic, cyclohexane aminotetracetic and diethylenetriaminopentacetic acids[1]. Cleavage trials of the oxirane group of the epoxidized esters with different reactants have been undertaken in order to produce on pilot scale new derivatives to be characterized and tested in different fields of application (lubrication, detergency and as chemical intermediates)[2]. D Ratna, S K Srivastava and Ajit K Banthia[2] performed high pressure epoxidation of soyabean oil. It was observed that high epoxy yield up to 80% can be obtained by optimizing the process parameters like temperature, pressure etc. It was also found that the epoxy yield decreases when oil to CHP ratio reduced beyond 10. In another experimental work, manganese (III) tetraphenylporphyrin acetate (Mn(III)(TPP)OAc) were synthesized and used to conduct epoxidation of olefins (polyisoprene, polychloroprene, Cyclohexene and styrene)[4]. Oat seeds contain lipase and peroxygenase enzymes that are potentially useful for the modification of fats and oils and their chemical derivatives. The investigators have found that in the presence of the salt calcium chloride or the surfactant deoxycholate, the triglycerides of fats and oils are broken down into their constituent fatty acids and glycerol in either all aqueous media and in organic media consisting of nonpolar organic solvent such as hexane. When the oxidant tetrabutylhydroperoxide (TBHP) was added to the reaction media, approximately 35%

of the fatty acids were converted to their epoxide derivatives in the presence of deoxycholate at pH values 6 and 7, while in the presence of calcium chloride only 20% of the fatty acids were converted to epoxide derivates. No epoxidized tri-, di-, or monoacylglycerols were detected[5]. In another work, near-infrared (NIR) spectra recorded off line at the chemical industry during the epoxidation process, combined with the multivariate regression method partial least squares (PLS), was used for the quantification of EI, II, and water percentage in the ESO. It was shown in this work that the use of NIRS combined with chemometric methods are of great importance, especially for industrial purposes[6]. Epoxy alkyl stearates were synthesized by lipase catalysed esterification and perhydrolysis followed by epoxidation of oleic acid in a one-pot process using Immobilized *Candida antarctica* lipase (Novozym®435) as the catalyst. Higher degree of esterification was achieved with *n*-octanol, *n*-hexanol and *n*-butanol as compared to that with ethanol and *iso*-propanol. The rate and yield of epoxidation was enhanced with *iso*-propanol but was lowered with the other alcohols. The lipase suffered significant loss in activity during the reaction primarily due to hydrogen peroxide and alcohols, in particular ethanol[7].

MATERIALS AND METHODS

All AR grade chemicals and reagents such as hydrogen peroxide 50% , formic acid, glacial acetic acid, Wijôs reagent (iodine monochloride), chloroform, acetic anhydride, butanol etc were purchased from sd Fine Chemicals, Mumbai. Groundnut, sunflower and soyabean oil were procured from local market. The determination of acid value (AV), iodine value(IV), saponification value (SV), Epoxide Equivalent Weight(E.E.W.), Hydroxyl value (HV) were performed as per AOCS and IS Methods[8, 9]. The FTIR spectra were recorded using NaCl plate by film deposition technique on Shimadzu FTIR-8400 spectrophotometer. Refractive indices (R.I.) were determined by using Abbes refracto-photometer.

Epoxidation process:-Synthesis of epoxidized vegetable oils was based on epoxidation of unsaturated bonds of vegetable oils by peracids (e.g. performic acid) and consisted of the following stages: formation of performic acid in water phase, transfer of performic and formic acids from water phase to organic one in accordance with the distribution coefficient, epoxidation reaction in organic phase with formation of epoxide and release of formic acid, and decomposition of the obtained epoxide both in oil phase and at the phase border. Reaction assembly thus was consisted with three neck flask equipped with magnetic stirrer and energy regulator. The oil was refined before epoxidation. The source of per acid was added to oil and well mixed reaction mixture was heated to reaction temperature. Peroxidising agent was added. It should be noted that epoxidation is an exothermic reaction with considerable heat effect (~250 kJ/mole). The exotherm was controlled by energy regulator and reaction was monitored. At the end of reaction epoxidation product was separated by centrifugation. The progress of epoxidation was monitored through determination of IV, AV, HV, E.E.W., R.I., and IR spectroscopy.

RESULTS AND DISCUSSION:

The refined Soybean., Sunflower, Groundnut oil has negligible acid value and have iodine value corresponding to oleic acid (1 double bond) and linoleic acid (2 double bond).Groundnut oil was available as double filtered oil and hence exhibited slightly

higher acid value. It has iodine value corresponding mainly to oleic acid.The epoxidation was performed through in situ generation of per acetic acid and per formic acid through reaction of Hydrogen peroxide with glacial acetic acid and formic acid respectively. Firstly, three batches were performed using in situ formed per formic acid through batch mode addition of reactants. Last three batches were performed using in situ generation per acetic acid by semi batch addition of acetic acid over reaction interval. Reaction temperature for first and third batches was maintained at 50^0C. reaction temperature for second batch was maintained in between 70-100 ^{0}C. The total reaction period was two hours. Pressure was found to have significant effect on epoxy yield. Epoxy yield increases linearly with pressure and becomes constant at about 20 MPa. Optimum temperature was found to be 100^0C above which the epoxy yield decreases. The quality of epoxidized soybean oil (ESO), industrially used as a plasticizer and heat stabilizer for PVC, is given by the degree of epoxidation (EI), the number of double bonds expressed as the iodine index (II), and the water percentage in the final product. I.R. spectroscopy shows the peak at 2930 and 2870 cm^{-1} are attributed to symmetric and asymmetric CH- stretching of methyl group. The carbonyl stretching is observed at 1730-1750 cm^{-1}. The C-O stretching of ether linking is observed at 1161 cm^{-1}. Asymmetric stretching of epoxy ring is seen at 810-950 cm^{-1}. Ring breathing frequency of epoxy ring at 1200-1250 cm^{-1} in epoxidation of soybean oil and sunflower oil. FTIR spectroscopic analysis indicates ring opening side reaction at higher temperature. The peak at 1020 cm^{-1} due to ï CH=CH disappears completely and a peak has been observed at 970 cm^{-1}, characteristic of oxiranes, indicating the complete conversion of the polyene to polyepoxide.

CONCLUSION:

Disappearnce of alkene peaks, formation of epoxy ring peak at 810 ï 835 cm^{-1}, drop in Iodine value and Epoxide equivalent weight 700, confirmed formation of epoxy group and positive progress of epoxidation. Performic acid was found to be better epoxidation agent then peracetic acid (epoxy peak~835). Amongst three oils, rate of epoxidation of sunflower oil was found to be highest.

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CHEMICAL SCIENCES

• CHEMISTRIY

IN VITRO HAEMOLYTIC ACTIVITY OF *SPHAEERANTHUS INDICUS* LINN IN HUMAN RED BLOOD CORPUSCLES

Chaudhari H. S. and Chopda M. Z.*

Department of Zoology, Moolji Jaitha College, Jalgaon (M.S.), India

ABSTRACT

Evaluation has been carried on haemolytic activity of methanolic extract and partially purified alkaloidal fraction of flower of Sphaeranthus indicus Linn in vitro in human RBCs. Sphaeranthus indicus Linn was collected and fresh dried flower heads extracted with methanol through Soxhlet. The fractions designated as SiN, SiJ, SiR and phytochemicaly the extract gave positive test for an alkaloid. Haemolytic activity was assayed by a method given by Xiang SUN Hong. Degree of haemolysis in percent of SiN, SiJ and SiR were 34.08%, 33.04%, 40.52%, 27.11%, 57.18% at concentrations 500 µg/ml, 200 and 400 µg/ml respectively. SiR exhibited promising results and lead us to isolate the alkaloidal molecule which was responsible for haemolysis, needs further investigation.

KEY WORDS : Haemolysis, *Sphaeranthus indicus* Linn, Alkaloid.

*Address to whom the correspondence should be made (Supervisor)

INTRODUCTION

Sphaeranthus indicus L. is a multi-branched herb with round purple flowers that grows plentifully in rice fields (Kirtikar *et al.*, 1987) and is distributed throughout India, Ceylon, Malay, China and Africa. It is used for various ailments, such as tonic,laxative, digestive, anthelmintic, and the treatment of insanity, tuberculosis, diseases of the spleen, anemia, bronchitis, elephantiasis, pain of the uterus and vagina, piles, asthma, leucoderma and hemicrania. Almost every part of the plant is useful, anxiolytic (Ambavade *et al*, 2006) macrofilaricidal (Nisha *et al*., 2007), antimicrobial (Ram *et al*., 2004), and insecticidal (Srinivasan *et al*., 2006) activities. Earlier work on the aerial part of this plant revealed it to be quite rich in essential sesquiterpenes, phenolic glycosides, and sesquiterpenes, lactones. A systematic phytochemical study of the chemical constituents of the plant led us to isolate a new alkoloids, c-glycoside compound. In view of this account, usefulness of this plant in the traditional treatment this current study was conducted to observe its haemolytic activity in human erythrocyte by using flowers of S*phaeranthus indicus Linn*.

MATERIALS AND METHODS

IDENTIFICATION AND DESCRIPTION

The collected plants were authenticated by experts of Department of Botany, Moolji Jaitha College, Jalgaon. The plant commonly called Gorakhmundi**,** is a common weed found in rice fields, and widely distributed.

Preparation of Extracts - The present investigation on haemolytic activity of plant extract was undertaken in laboratory at Department Of Zoology, Moolji Jaitha College, Jalgaon. Flowers of *Sphaeranthus indicus* L. were dried under shade. Coarsely

powdered flower heads of *Sphaeranthus indicus* L. extracted with various solvent system, petroleum ether, chloroform, methanol. The extract was dried at 55 to 60 ^{0}C in water bath.

Adsorption Column Chromatography - By using adsorption Column Chromarography SiN, SiJ and SiR were isolated.

Phytochemical analysis - Methanolic extract SiN, SiJ and SiR are analyzed for their phytochemical composition by qualitative methods as described by Horborne, (1984).

Preparation of 6% RBCs solution: Phosphate Buffer Solution (PBS): A) 0.137 gm $NaH_2PO_4.H_2O$ in 100 ml saline solution. B) 0.178 gm $Na_2HPO_4.2H_2O$ in 100ml saline solution. For preparation of 100ml (0.01M) phosphate buffer of pH 7.4, pipette out 9.5ml of $Na_2HPO_4.H_2O$ and 40.5ml of $NaH_2PO_4.H_2O$ in 100ml volumetric flask and volume was made up to mark.

RBCs Suspension: The haemolysis score was measured by the Xiang SUN Hong (2003). Three ml of diluent containing SiN 500 µg/ml, SiJ and SiR 200 µg/ml and 400 µg/ml respectively in PBS. Optical density of control D.W. was treated as 100% lysis. On the basis of this, percent of haemolysis, treated with SiN, SiJ, SiR was calculated.

Table 1 Phytochemical analysis of methanolic extract SiN, SiJ and SiR of *Sphaeranthus indicus* Linn.

Phytochemical studies	Met	SiN	SiJ	SiR
Alkaloids	+ + +	+ +	+ +	+ + + +
Cardiotonic glycosides	--	--	--	--
Cynogenic glycosides	+ +	+	+	+
Flavonoids	+ +	+	--	--
Tannins	+ +	+	--	--
Phenolic compound	++	++	+	+
Anthocyanins	--	--	--	--
Saponins	--	--	--	--

+ = trace, + + = moderate, + + + = prominent, -- = absent.

Table: 2 Haemolytic activity of SiN, SiJ, SiR obtain from *Sphaeranthus indicus Linn*.

Group	Dose(µg/ml)	Haemolytic %
Saline		0.00±0.00
D.W.		99.79± 3.54
Std. Digitonin	100	100±3.31
SiN	500	34.08 ± 3.048
SiJ I	200	33.04±1.95*
SiJ II	400	40.52±3.77*
SiR I	200	27.11±2.19 *
SiR II	400	57.18±3.60 *

Values expressed as Mean ± S.E.,* p<0.001 Vs Control.

RESULTS AND DISCUSSION

Results on haemolytic activity of the SiN, SiJ, SiR of S*phaeranthus indicus* have been recorded in human RBCs *in vitro* and are presented in Table2. The haemolytic activity was found to be highly significant. Highest lysis was seen in the RBCs treated with SiR II at dose 400 µg/ml where as lowest activity was found in extract SiR II at dose 200µg/ml. However, in present study extraction from methanolic extract at 30:70 $CHcl_3$:MeOH solvent system reveals that presence of alkaloids and phenolic compound; glycoside, flavonoid, and tannin present in trace amount. Further purification by column chromatography yield SiJ, which results into presence of alkaloid strongly positive, glycosides and phenolic compound in trace amount and flavonoid absent. Finally, the SiJ fractionated and get SiR fraction which gave strong alkaloid positive test and phenolic compound and glycoside in trace amount. The haemolytic activity of SiN was found statistically significant (p< 0.001) 34.08±3.048 % at a dose 500 µg/ml as compared with control 99.79±3.54 %. It is interesting to note that the fraction derived from SiN that is SiJ was found significant (p<0.001) SiJ I 33.04 ±1.95 % at a dose 200 µg/ml, which is parallel to the SiN at a dose 500 µg/ml. However, SiJ II 40.52±3.77 % at a dose 400 µg/ml and it shows the activity was not dose dependent. SiR obtained from SiJ after rechromatography is phytochemically highly alkaloidal. The haemolytic activity of SiR was found highly significant (P<0.001) at doses 200 µg/ml (27.11 ±2.19 %) and 400 µg/ml (57.18 ± 3.60 %) and show dose dependant activity. These results exhibits that the activity may be due to alkaloid present in it. Therefore, further purification is to be necessary.

CONCLUSION

1. Haemolysis is one of the most important sign of cell toxicity which may cause death of test organism.
2. In present investigation among various fractions of *Sphaeranthus indicus* Linn SiR shows dose dependant activity.
3. Degree of haemolysis is found in SiR present in plant.
4. Promising result of SiR lead us to isolate the alkaloidal molecule; which is responsible for haemolysis and needs further investigation.

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ANTI-INFAMMATORY ACTIVITY OF AN ALKALOIDAL FRACTION OF *SPHAERANTHUS INDICU*S LINN IN RAT.

Wani K. N. and Nemade N.V.*

Department of Zoology, Moolji Jaitha College, Jalgaon. (M.S.), India.

ABSTRACT

Investigation has been carried out on Sphaeranthus indicus Linn for its Anti-inflammatory activity in rat. All doses (10mg/kg, 20mg/kg and 25 mg/kg, 50mg/kg) applied orally, results were compared with standard Ibuprofen (50mg/kg). The Anti-inflammatory activity was studied using techniques of Carrageenan induced paw edema in albino rats. The alkaloidal fractions labeled as SiJ and SiR. SiJ showed the significant ($p<0.001$) inhibition (26.74) of paw edema at the 1st hour whereas the SiR showed the inhibition (6.11%) at the 3rd hour as compared with control. Phytochemical screening of methanolic extract and their fraction gave positive results for alkaloids, cynogenic glycoside and phenolic compounds. Attempts to analyses chemically SiJ and SiR are in progress to evaluate exact chemical nature.

KEY WORDS: Anti-inflammatory, Ibuprofen, *Sphaeranthus indicus* Linn

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

A number of plants of Asteraceae family have been reported to have anti-inflammatory activity. *Sphaeranthus indicus* is much branched, strongly scented. It is commonly known as Mahamundi or Gorakhmundi. Current study is aimed at isolating and investigating possible active principles responsible for its anti-inflammatory activity. All the parts of the plants have medicinal uses. In folk medicine, the plant is reportedly used in treating epileptic convulsions, mental illnesses and hemicranias (Kirtikar and Basu, 1987). The whole herb is used in ayurvedic preparations to treat epilepsy and mental disorders (Gupta, 1984).It is used to treat vitiated conditions of hemicranias, jaundice, hepatopathy, diabetes, leprosy, fever, pectoralgia, cough, gastropathy, hernia, hemorrhoids, helminthiasis, dyspepsia and skin diseases. It is also used as anervine tonic. The oil prepared using the plant roots is reportedly useful in treating scrofula and as an aphrodisiac. The external application of a paste of this herb is beneficial in treating pruritus and edema, arthritis, filariasis, gout and cervical adenopathy. It also trats piles and hepatitis (Paranjape, 2001). No pharmacological studies *in vivo* have previously been conducted on anti-inflammatory action of this plant. This study was carried out to investigate anti-inflammatory properties of the partially purified alkaloidal fractions of *Sphaeranthus indicus* in rat.

MATERIAL AND METHODS

Preparation of Plant extract: - The present investigation on anti-inflammatory activity of *Sphaeranthus indicus* Linn was undertaken in laboratory at Department of Zoology, Moolji Jaitha College, Jalgaon. Flowers of *Sphaeranthus indicus* Linn were dried at 55-60^0 C under shed. The powdered flowers were extracted with $CHCl_3$:MeOH

(30:70) solvent system using Soxhlet apparatus. This crude extract was dried and washed with ethyl acetate labeled as SiJ, further by its rechromatography partially purified fraction was obtained using solvent system $CHCl_3$: MeOH (80:20) labeled as SiR

Anti-inflammatory activity: - Inflammation in the hind paw of Wister rat was induced by 0.1ml of 1% carrageenan suspension was injected into sub plantar surface of the hind paw of rat Winter *et al*., (1962). The different doses of test extract (orally) & ibuprofen (orally) as reference agent were administered 30 min before carrageenan injection. The paw volume was measured at 0, 1, 2, 3, 4and 5hrs, using a mercury displacement to measure the size of oedema formation. The differences in diameter of paws were taken as a measure of oedema. Methanolic extract SiJ and SiR are analysed for phytochemical composition by qualitative method as described by Horborne (1984).

Table 1 Effect of alkaloidal fraction of *Sphaeranthus indicus* - per cent Inhibition in paw edema

	0 hrs	**1 hr**	**3 hrs**	**5 hrs**
Control				
Standard	35.64±9.65	11.13±6.63	38.31±5.64	38.88±5.01
SiJ1	15.98±11.55*	5.17±5.99	9.84±9.62***	7.46±6.84***
SiJ2	32.14±4.44	26.74±4.43***	23.86±3.31*	21.13±4.64***
SiR1	22.53±9.89**	21.77±6.68*	18.40±9.21***	22.63±8.12**
SiR2	11.45±10.91	2.50±2.74	6.11±7.13***	8.34±5.17***

Values are expressed as mean ± S.D., n = 6 animals in each group

SiJ1= 25mg/kg b.w., SiJ2 = 50mg/kg b.w.,

SiR1 = 10mg/kg b.w. and SiR2 = 20mg/kg b.w.

*P<0.05, * *p<0.01, * * *p<0.001 Vs control.

RESULT AND DISCUSSION

Preliminary Phytochemical studies of methanolic extract and their fraction gave positive results for alkaloids, cynogenic glycoside and phenolic compounds.The results of the present study in this model indicate that SiJ2 and SiR2 of *Sphaeranthus indicus* Linn flowers , at dose 50mg/kg body weight and 20mg/kg body weight respectively demonstrated a significant (p<0.001) inhibition of carrageenan induced paw edema. The maximum perecentage of inhibition by SiJ2 and SiR2 were found to be 26.74% at 1hr and 6.11% at 3hrs respectively. Carrageenan induced edema being described as biphasic. It is mediated by the release of histamine, kinins, 5-IIT and more prolonged second phase is related to the prostaglandins like substances (Vogel, 2002).

CONCLUSION

1. The methanolic extraction of *Sphaeranthus indicus* shows anti-inflammatory activity.
2. Phytochemical investigation indicates presence of Alkaloids, Cynogenic glycosides, Flavonoids, Tannins and Phenolic compound.
3. Alkaloids isolated from *sphaeranthus indicus* had been evaluated to possess a significant anti-inflammatory activity.
4. Further studies are necessary to characterize the active principles responsible for its anti-inflammatory activity.

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USE OF *ACHYRANTHES ASPERA* AGAINST GENTAMICIN INDUCED LIVER AND KIDNEY TOXICITY

Maheshwari N. R. and Talele B.D*.

Deparment of Zoology Moolji Jaitha College, Jalgaon (M.S.), India.

ABSTRACT

Common nephrotoxic and hepatotoxic agenst, the aminoglycoside antibiotics gentamicin (GM) are used to alleviate life threatening infection. The ethanolic extract of Achyranthes aspera Linn. administration leads to ameliorates gentamicin induced nepherotoxicity in rats. Alterations in biomolecules were studied at a dose of gentamicin 80 mg/kg/day for 7 days. Significant decrease in DNA, RNA and Protein synthesis was noticed administration of ethanolic extract of Achyranthes aspera Linn. (AEE) resulted in ameliorating sign of nepherotoxicity and hepatotoxicity in gentamicin induced animals.

KEY WORDS : *Achyranthes aspera* Linn., Gentamicin, DNA, RNA, Protein, Nepherotoxicity, Hepatotoxicity.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION :

A number of indigenous plants have been reported in literature to cure kidney and liver damage *Achyranthes aspera Linn*. was reported as diuretic also to improve renal and vesicle calculi. In addition to this, it is also reported for another biological activity as piles, boils, skin eruption, colic, bronchitis, snake bite (Chopra *et al*, 1980). No report was found in literature to evaluate renal and hepatic damage experimentally in rat. Gentamicin is an important aminoglycoside antibiotics commonly used in treating life threatening gram negative infection. Nephrotoxicity is the major side effect of aminoglycosides, accounting for 10-15% of all cases of acute renal failure. Hence, the present study is focused to evaluate the hepatoprotective and nephroprotective potential of the leaves of *Achyranthes aspera Linn* against gentamicin induced liver and kidney in the Wister rat. In present work, we attempted to test and compare the possible action of ethanolic extract of *Achyranthes aspera Linn on* gentamicin induced nepherotoxicity and hepatotoxicity in rats. Initial results are encouraging and need to evaluate extensively.

MATERIAL AND METHODS:

Plant material: The leaves of *Achyranthes aspera Linn.* were collected from forest region, shade dried and crushed in to powder form. Plant material was extracted with ethanol (95% v/v) by using soxhlet method.

Animal and Treatment: Laboratory breed adult *Wistar rats* were used in the experiment, of both sex weighing 150 ï 160 gm and same age. The rats were maintained in the Animal House of Moolji Jaitha College Jalgaon, Maharashtra, India.

They were housed in separate polypropylene cages containing sterile paddy husk as the bedding material. The animals were provided with standard pellet diet and water *ad-libitum* throughout the study. The rats were maintained under normal day/night schedule (12L: 12D) at room temperature 27ºC±1ºC. Gentamicin (IND-Swift Limited) administered intraperitoneally (*ip*) at dose 80 mg/kg/day for 7 day. Following the gentamicin administration, animals belonging to test groups 3, 4, 5 received the AEE by oral intubation, for 8 consecutive days, at the doses rising 100, 250 and 500 mg/kg body weight respectively. Animal was scarified on 8th day, dissected and Liver and Kidney were taken out for biochemical studies.

Biochemical Estimation: Freshly removed Liver and Kidney free from adherent tissues weighed to the nearest milligram and was used for biochemical studies such as ; estimation of DNA by DPA method(Burton K ,1956) , RNA by Orcinol method(Schneider,1957) and Protein by Lowry *et al.*(1951)

Statistical Analysis: Statistical significance between the control and experiment data were subjected to analyze by one way ANOVA followed by Boferrorniôs multiple comparison tests by using Graph Pad prism 4 software.

Table 1: Alteration in kidney tissue level of different Biomolecules involved in gentamicin nephrotoxicity

Group	DNA	RNA	Total Protein
Control	4.36±0.16	28.11±0.24	76.44±0.21
Gentamicin	3.93±0.04*	11.62±0.17**	25.63±0.12**
AEE 1	3.95±0.09*	12.06±0.20**	26.05±0.22**
AEE 2	4.02±0.09***	26.02±0.39**	71.86±0.42**
AEE 3	4.79±0.11*	29.73±0.73*	79.67±0.44**

Values are expressed as mean (mg/gm) ±S.E. n=6 animals in each group.

***** P< 0.01, ** P< 0.001, ***P<0.05, **** P>0.05 Vs Control.

AEE 1 = 100mg/kg, AEE 2 = 250mg/kg, AEE 3 = 500mg/kg

Table 2: Alteration in liver tissue level of different Biomolecules involved in gentamicin hepatotoxicity

Group	DNA	RNA	Total Protein
Control	5.38±0.017	35.59±0.13	94.68±0.13
Gentamicin	4.64±0.027**	11.70±0.11**	22.72±0.16**
AEE 1	4.74±0.063**	12.67±0.27**	22.60±0.18**
AEE 2	5.02±0.010*	31.72±0.74**	88.29±0.19
AEE 3	5.56±0.060****	37.72±0.34***	98.37±0.24

Values are expressed as mean (mg/gm) ±S.E. n=6 animals in each group.

* P< 0.01, ** P< 0.001, ***P<0.05, **** P>0.05 Vs Control.

AEE 1 = 100mg/kg, AEE 2 = 250mg/kg, AEE 3 = 500mg/kg

RESULTS AND DISCUSSION:

Gentamicin at a dose 80 mg/kg/day induced toxicity in rats shows decrease in concentration of DNA, RNA and Protein in liver and kidney as compared to those in control. In the AEE treated rats, slowly and steady increase was noted in DNA, RNA and Protein content in treated group of animals. Recovery of loss of protein content was seen in treated group of animals. This is evident as the total protein content reached to the values observed in control group of animals. The dose dependent recovery was also noted by AEE treated group of animals.

CONCLUSION

1. The gentamicin induced nepherotoxicity and hepatotoxicity exhibits loss of RNA and protein synthesis. Recovery of this was not found by administration of AEE at a dose 100 mg/kg b.w.
2. However, by increasing the dose to 5 times appreciate recovery is noted, indicating that treatment of plant improves the toxicity induced by gentamicin.

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STUDY OF MEDIA PREPARATION FOR TISSUE CULTURE OF *GYMNEMA SYLVESTRE* R. BR.

Phalak M.N., Bhagat A. K. and Chaudhari G. S.*

Department of Botany, M. J. College, Jalgaon (M.S.), India.

E-mail: drgschaudhari@rediffmail.com

ABSTRACT

In vitro regeneration of *Gymnema sylvestre* R. Br. was carried out by varying the components of Murashige and Skoog (MS) medium using leaf as an explant. On Ms medium supplemented with 6 µm NAA and 7 µm BAP greenish callus resulted from leaf explants. Leaf explants on MS+NAA and BAP showed proliferation and deep greening, which turned, into a small friable callus. These calli were morphogenetic.

Keywords: *Gymnema*, tissue culture, media.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Gymnema sylvestre R. Br. (Asclepidaceae), a vulnerable species is slow growing, perennial woody climber of tropical and sub-tropical regions of India and Africa. The plant is commonly known as ñGurmarò. It is well recognized in traditional medicine as a remedy for **diabetes mellitus**, stomachic and diuretic. Use of *Gymnema sylvestre* R. Br. has increased recently due to the pharmaceutical potential of gymnemic acids, found in its leaves. Natural strands of plants are disappearing fast and are threatened with extinction due to its indiscriminate collection, over exploitation of natural resource for commercial purposes and to meet the requirement of pharmaceutical industry. Hence, it is felt that there is a great need for cultivation of this important medicinal plant. Except seed germination (which also has short span of seed viability) no alternative mode of multiplication is available to propagate and to conserve genetic stock of this medicinal plant. Advance biotechnological methods like plant tissue culture can provide new means of conserving and rapid propagation of valuable and rare medicinal plants. Limited tissue culture work has been done on *Gymnema* species (Komalavalli and Rao, 1997; Reddy *et al*; 1998). Komalavalli and Rao (2000) reported an efficient and rapid propagation of *Gymnema sylvestre* R. Br. using various explants from in vitro grown seedling explants, but the multiplication rate achieved was very slow. The present investigation deals with the study of media preparation for tissue culture of *Gymnema sylvestre* R. Br.

METHODOLOGY

Source: Plant material of *Gymnema sylvestre* R. Br. was collected from M. J. College campus, Jalgaon, identified by using Flora of Maharashtra, Vol. II (Singh *et al*. 2001). Young leaves were collected from the plant and used as explant after trimming the ends.

Culture: Explants were subsequently surface sterilized with 0.1% $HgCl_2$ for 5 min and washed thrice with sterile Distilled water. The surface sterilized leaves were cultured on MS (Murashige and Skoog, 1962) medium supplemented with 2 % sucrose and 1 % Agar. Different concentrations of NAA, BAP, 2,4-D and KIN were added to basal MS medium. The experiments were repeated three times using different concentrations of hormones and each treatment consisted of 10 replicates.

RESULTS AND DISCUSSIONS

Among the different concentrations of $HgCl_2$ used for sterilization (0.05, 0.1, 0.15 and 0.2). 0.1% concentration proved best for sterilization as explants remain healthy and contamination free after 10 days also (see fig. 1).

The selected explants were found to be most effective as swelling was observed and green colour of explant persisted which indicate the retention of photosynthesis (see fig. 2).

For the growth of *G. sylvestre* R. Br. callus culture different composition and combination of growth regulators like Ŭ-Naphthalene acetic acid (NAA), 6 Benzyl aminopectin (BAP), 2,4-Dichlorophenoxyacetic acid (2,4-D) and Kinetin (KIN) were tested. NAA and BAP together in combination show good results.

According to Bhojwani and Razdan, 2004 internodal region is highly responsive in several plant species. However, during present study leaf also responded well for developing culture. Desired secondary metabolites can be manipulated by varying media composition (Kumar, 2003). Genetically modified variety will also be possible from this callus (Gamborg and Phillips, 1995). This *in vitro* study will help future workers on developing related manipulations.

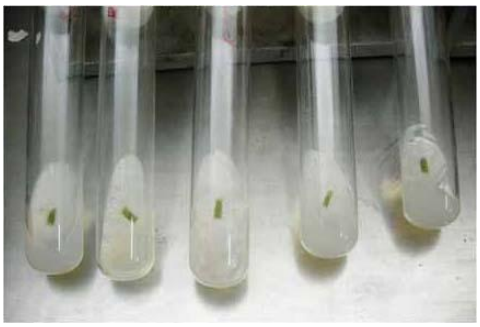

Fig. 1: Inoculation of leaf explant of *Gymnema*

Fig. 2: Calli developed from leaf explant of *Gymnema*

CONCLUSION

In the present research work, the NAA (6 µm) and BAP (7 µm) together with plain MS medium are found to be most suitable media for the growth of *Gymnema sylvestre* R. Br. as the culture shows proliferation and deep greening, which turned into a small friable callus.

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(* Original not seen)

THE STUDY OF VARIOUS FACTORS AFFECTING CITRIC ACID FERMENTATION BY *ASPERGILLUS NIGER*

Chavan D.P., Valvi L.S.. Pawara S.R..and Magar J.G. *

Department of Botany, M. J. College, Jalgaon (M.S.),

ABSTRACT

Wild strains of A. niger group isolated from soil sample of Jalgaon District were screened for citric acid fermentation .Three strains namely kn-2, M-3 and MJ-1were found to be potential strains for citric acid fermentation.

KEW WORDS : *Aspergillus niger*, citric acid fermentation, media, parameters.

*Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Citric acid is one of the most important organic acid present as metabolic intermediate in almost every aerobic cells.

Molecular formula $C_6H_8O_7$

Molecular weight 192.12

Citric acid is colorless and its taste is strongly acidic. It is easily soluble in water, partly soluble in ether and practically insoluble in alcohol. Citric acid is produced by mycological fermentation on an industrial scale using crude sugar solution such as molasses and strains of *Aspergillus niger* .

The natural source of citric acid is citrus fruit eg. lemon which contain about 5% citric acid. At the beginning of 20^{th} century about 1000 tons of citric acid per year was obtained by processing citrus fruit and precipitation of the calcium salt. For the production of one ton of citric acid about 80 to 40 tones of lemon were being processed. Italy being a citrus fruit producing country almost and monopoly until the advent of citric acid fermentation. The procedure of citric acid production through fermentation was first time discovered by Currie (1917).

By 1933, the world production of citric acid amounted to 104000 tons of which Italy contributed only1800 tons from lemons, the rest was produced by fermentation processes in Europe (5100 tons) and U.S.A (3500 tones).

In 2007, world wide annual production stands at approximately 1.700,000 million tons more than 50% of the volume is being produced in China, more than 50% is being used as oxidant in beverages and some 20% in other food applications. 20% is being used for detergent application and 10% for other non-food related application like cosmetics, pharma & in the chemical industries.

Maximum work on citric acid production has been done because of its immense application and because still many of the things regarding its production are unknown FOSTER (1949) said that ñprobably more study has been devoted to citric acid

fermentation to any other function in mold metabolism, yet there is probably less fundamental knowledge regarding its most of the processesò.

The initial sugar concentration has been found to determine the amount of citric acid and amount of the organic acid produced by *Aspergillus niger*. Normaly strain of *A. niger* need a fair high initial conc. (15-18 %) of sugar in the medium. A lower conc. of sugar leads to lower yields of citric acid as well as to the accumulation of oxalic acid (Kovat, 1960)

The concentration of phosphate in the fermentation medium has a profound effect on the amount of citric acid produced. A high concentration of phosphate promotes more growth and less acid production (Khan *et al.*1970, Szucs 1944) in general phosphate concentration of about 0.1 to 0.2 % in the fermentation medium appears to be adequate.

METHODOLOGY

The natural source of *A. niger* is soil. For the isolation of high citric acid yielding strains of *A. niger*, soil samples from various locations were collected with respect to $P^H$of the soil namely Kanalda, Muktainagar and M. J. College campus.

In this way, 20 different samples were collected. Each sample was diluted in sterile saline solution so as to get 1/100, 1/1000 and 1/10000 dilution of each sample. These dilutions (0.1 ml) of each sample were spread separately on sterile Czepeckôs Dox Agar medium containing streptomycin to avoid growth of bacteria.

Plates were incubated at 28^0C 48hours. Isolated cultures were observed and they were purified by sub ï culturing on Czepeckôs Dox Agar slants.

Screening of fungal culture for organic acid

Media constituent :- Czepeckôs Dox Agar media - 1000 ml, Bromo-cresol green - 70 ml, pH - 6.7

Method: Spores from slant cultures were spot inoculated on sterile Czepeckôs Dox Agar medium. Plates incorporated with Bromo-cresol green dye. The plates were then incubated at 28^oC for 24 to 28 hours and were checked for colour change in the vicinity of brown colony.

RESULTS AND DISCUSSION:-

Variation in sugar			
Variable sugar		**Yield reported in %**	
	KN-2	**M-1**	**Mj-1**
12%	3.5%	3.0%	5.5%
13%	3.3%	5.0%	3.0%
14%	3.2%	3.0%	3.9%
15%	3.2%	4.5%	5.2%
16%	4.2%	4.3%	4.1%

When all the three cultures were tested for variation in sugar concentration (sucrose) it was reported that at sugar concentration of 13% all the three cultures gave higher yield. It was also found that at higher sugar concentration (15% and 16%) the yield reported was less as compared to yield in sugar concentration (13%).

Variation in phosphate:

Variation in sugar			
Variable sugar		**Yield reported in %**	
	KN-2	**M-3**	**Mj-1**
25%	2.1%	5.2%	2.0%
50%	2.5%	5.0%	2.0%
75%	3.0%	8.8%	2.5%
100%	2.5%	3.1%	2.0%
125%	2.5%	3.9%	4.7%

CONCLUSION

Among the 11 different strains isolated from different soil types only three strains viz. KN-2, M-3& MJ-1were found to be competent for citric acid production. i.e they have produced comparable citric acid within the ranges 3.5mg /ml to 4.7mg/ml.

An initial pH 4.5 was found to be suitable for KN-2, M-3& MJ-1 and gave a yield of 3.2mg/ml and 3.5mg/ml respectively.

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UTILIZATION OF BAGASSE FOR BIOPULPING BY SOLID STATE FERMENTATION

Mahajan, K. H., Kabra, G. V. and Narkhede K. P*.

Department of Microbiology, M. J. College, Jalgaon, Maharashtra, India , nketan@yahoo.com

ABSTRACT

Now-a-days pulping of forest wood is replaced with agricultural residues to avoid serious risks of deforestation and to decrease environmental problems. The agricultural residues like bagasse, banana fruit stalk and whole jute plants are being utilized or under studied for manufacturing of pulp and paper. In the present investigation studies related to biopulping by solid state fermentation were performed. Various parameters such as weight loss, estimation of cellulose, kappa number, acid soluble lignin and acid insoluble lignin as a result of solid state fermentation were analyzed.

KEY WORDS :- Solid State fermentation, bagasses, biopulping

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

The bagasse is the biomass remaining after sugarcane stalk are crushed to extract their juice. A sugar factory produces nearly 30% of bagasse out of total crushing. This bagasse serves as raw material and is utilized as fuel source. It can also be used with eco-friendly approach in paper industry as raw material. It is tree free alternative for making paper, which requires no bleaching. The pulping is a process, in which lignocellulosic material is separated into cellulose fibers. It can be carried by mechanical means, by using raised temperature known as òThermomechanical pulpingò (TMP) or may utilize chemicals such as Sodium hydroxide (NaOH) or Sodium sulphate (NaS) which actually removes lignin from bagasse; known as chemomechanical pulping (CTMP). In recent years prior to pulping a bio-treatment step is introduced called as óbiopulpingô. It is advantageous way to produce TMP and CTMP, which gives higher pulp yield. Biopulping is carried out with the help of natural wood decay fungi or their enzymes. It results in degradation of lignin as well as cellulose. The most popular approach for this biopulping is solid state fermentation. It is a process whereby an insoluble substrate is fermented with sufficient moisture but without free water.ò In solid state fermentation microbial growth and products appear on solid surface, due to this fact it is easy to observe growth characteristics and purification of desired excreted content. In solid state fermentation the organism not only grows on the surface of the substrate but also penetrates deep into the substrate and even in cell lumen. There are many bacteria and fungi able to degrade lignin. The bacteria are identified from different genera including *Corynebacterium, Agrobacterium, Pseudomonas, Aeromonas*, also *Klebsiella* and *Enterobacter.* The white-rot fungi are generally involved in degradation of lignin. White-rot fungi produce extracellular lignin-modifying enzymes, the best characterized of which are laccase (EC 1.10.3.2), lignin peroxidases (EC 1.11.1.7) and manganese peroxidases (EC 1.11.1.7). Based on the enzyme production patterns of an array of white-rot fungi, the three categories of fungi are suggested as: (i) lignin-manganese peroxidase group (e.g.*P. chrysosporium* and

Phlebia radiata), (ii) manganese peroxidase-laccase group (e.g. *Dichomitus squalens* and *Rigidoporus lignosus*), and (iii) lignin peroxidase-laccase group (e.g. *Phlebia ochraceofulva* and *Junghuhnia separabilima*). The lignin content of wood pulp calculated as kappa number. Kappa number is an indication of lignin content or bleaching of wood pulp. The kappa number can measure the effectiveness of lignin extraction phase of pulping process. The number is in 1-100 and established by measuring the amount of a standard potassium permanganate solution that is consumed by pulp being considered.

MATERIALS AND METHODS

Maintenance of the culture - The culture of the *Phanerochete crysosporium* was procured from NCIM, Pune and maintained on Potato dextrose agar plate at 4^0C.

Production of spores - Spore production medium (Tein and Krik, 1988) plates were aseptically inoculated with the spores of *Phanerochete chrysosporium* and incubated at 30 ^{o}C for 7 days.

Solid state fermentation - Twenty five grams oven dried bagasse was mixed with additive mixture in the ratio 1: 4. The additive mixture contained Jaggry (1 %), Urea (0.1M), Trace elemental solution (Tein and Krik, 1988) (10 %), Streptomycin (10 µg/ml). It was inoculated with 5 mm disc of fungal biomass obtained from spore production media by using cork borer and the flasks were incubated at 30 ^{o}C. One set of flask was analyzed after 15 days for wet weight, dry weight, lignin and cellulose content. Remaining set was analyzed after 30 days for similar analysis.

Analysis of biomass -

Wet weight and dry weight determination - Contents of flasks were oven dried in 7mm Petri plate at 60^{o}C for 48 hr for determination of dry weight. On the basis of dry weight average reduction in biomass was calculated.

Kappa number determination - Four gram of sample was mixed with 500 ml distilled water in conical flask and final volume was adjusted to 795ml with distilled water. It was mixed with 200ml of solution C ($KMnO_4$ (0.1N) : H_2SO_4 (4N) = 1:1). The contents of flask were mixed well. The final volume of the flask was 1000 ml. After exactly 10 minutes 20 ml KI (1N) was added. The contents of the flask was titrated with $Na_2S_2O_3$ (0.2N) by using starch as indicator. The end point is blue to colorless. The blank was run with distilled water and experiments were done in triplicates. The kappa number was calculated as follows.

$$K = (P \times f) / w \,, P = ((b-a)/ N) / 0.1$$

f = factor for correction depending on P, w = gm of moisture free pulp

p = ml of 0.1 N KMnO4 actually consumed by the sample

b = blank reading, a = test reading, N = Normality of thiosulphate

Standardization of $Na_2S_2O_3$ - Twenty five ml of $K_2Cr_2O_7$ (0.1N) was taken in Elrenmeyer flask. It was mixed with 5ml of conc. HCl, 15ml KI (10%) and incubated in dark for 5minutes. The contents were titrated with $Na_2S_2O_3$ using starch (1%) as indicator. The titration was replicated 3 times and normality was calculated as follows.

$$\text{Normality} = \frac{25 \times W}{49.03 \times V}$$

W = weight of $K_2Cr_2O_7$, V = constant burette reading

Cellulose estimation - Standard graph of cellulose was prepared using method described earlier by using standard cellulose powder (100µg/ml). 0.5gm of sample was mixed with 3ml Acetic acid: Nitric acid reagent. The contents were mixed using vortex mixer and kept in water bath for 30minute at 100 ^{0}C. After cooling at room temperature treated sample was centrifuged at 4000 rpm for 15 minutes. The supernatant was discarded and residue in form of pellet was washed with distilled water. The residue was treated with 10ml H_2SO_4 for 1hr. at room temperature. The treated sample was diluted to 1: 100 with distilled water. One ml of this diluted sample was mixed with 10ml Anthron reagent and kept in boiling water bath for 10 minute. The sample was cooled to room temperature and O.D. was measured at 630nm with Anthron reagent as reference.

Lignin estimation:-

Acid insoluble lignin -Hundred milligram of sample is mixed with 1 ml of conc. H_2SO_4 and stirred for 30 minutes. The contents were mixed with 28 ml of the distilled water and autoclaved at 120 ^{0}C for 1hr. After autoclaving sample was filtered, washed to remove acid and oven dried at 105^{0}C. Acid soluble lignin was estimated as follows.

$$\text{AIL / oven dried sample (\%)} = \frac{100Ai}{W\,(1-m/100)\,(1+E/100)}$$

Ai = weight of AIL in gm, W = weight of biomass, M = moisture content in biomass,

E = extract content on oven dried original plant biomass

Acid soluble lignin - The filtrate collected after AIL was diluted to 480ml with distilled water and the absorbance was measured at 205nm with 0.5N H_2SO_4 as reference. Acid soluble lignin was calculated using following formula.

$$\text{ASI / Oven dry biomass} = \frac{100AsV}{110*100w(1-m/100)(1+E/100)}$$

As = 205nm,

V = Volume of total filtrate in gm,

W = weight content of extract plant biomass in gm,

M = Moisture content in biomass, E = extract content on oven dried original plant biomass

RESULTS AND DISCUSSION

After the solid state fermentation the biomass is analyzed with the interval of 15 days. Reduction in biomass was detected after 15 and 30 days fermentation process, 9.6% and 15.6%, respectively. As a result of growth of the microorganisms on bagasse supplemented with carbon and nitrogen sources, there was change in lignin and cellulose contents. The cellulose contained was initially 59.47 µg/ml which changed to

85.35 µg/ml and 109.27 µg/ml after 15 and 30 days respectively. After standardization the Normality of $Na_2S_2O_3$ was found to be 0.97 N which was used for calculation of kappa number. Kappa number was found to be 8.8 units. The reported percentage of lignin in bagasse is in a rage of 18 to 20. In the present investigation method of lignin estimation was studied by determining the acid soluble and insoluble lignin. However the method needs further standardization.

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SCREENING OF FUNGI FROM ROTTED WOOD SAMPLES FOR LIGNOLYTIC ENZYME PRODUCTION

Tejwani A. K., Sagalgile R. M., and Narkhede K. P*.

Department of Microbiology, M. J. College, Jalgaon, Maharashtra, India

E-mail ID : nketan@yahoo.com

ABSTRACT

Delignification of lignocellulosic materials by fungi is of great interest and now it has been well established that delignifying organism has a potential application in various biotechnological fields. The lignin degradative ability of fungi isolated from rotted wood samples is a result of the strong oxidative activity and low substrate specificity of their ligninolytic enzymes. In the present investigation the ligninolytic fungi were screened based on oxidative and dephenolization abilities and assayed for lignolytic enzymes such as lignin peroxidase, laccase and Mn Peroxidase. To study the derivatives of dephenolization λmax determination and estimation of phenol, vanilic acid was also performed. The effect of the buffer pH on the enzyme activity was also studied for laccase.

KEY WORDS :- Lignin peroxidase, laccase, oxidases activity

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Lignin is a natural polymer found in wood and other vascular plants and the most reported lignin degraders are white rot fungi. The examples are *Pleurotus osreatus, Phanerochete crysosporium.* Three major families of fungal lignin-modifying enzymes are laccases, manganese-dependent peroxidases (MnPs), and lignin peroxidases (LiPs). These lignin-modifying enzymes can oxidize phenolic compounds producing phenoxy radicals, while non-phenolic compounds are oxidized via cation radicals. Other enzymes involved in lignin degradation are acidic and neutral peroxidases, veratyl alcohol oxidases, aryl alcohol oxidases and polyphenol oxidases. Lignin monomers are degraded to methane and carbon dioxide due to cleavage of inter monomeric bonds produced during anaerobic attack. Catechol, vanillin, syringic acid, syringaldehyde, ferulic acid, cinnamic acid, p-hydroxy benzoic acid and pyrogallol are the end products on lignin degradation. Lignin-modifying enzymes have a variety of biotechnological applications. These applications include biotransformation of lignocellulosic biomass to feeds, fuels, and chemicals; biopulping; biobleaching of paper pulps; decolorizing and detoxifying kraft bleach plant effluents; and degradation of highly toxic environmental chemicals such as dioxins, polychlorinated biphenyls, various dye pollutants, and polyaromatic hydrocarbons.

MATERIALS AND METHODS

Detection of extracellular oxidases activity from given samples : Malt extract agar media containing 0.5% gallic acid, 0.5% tannic acid and 0.01% guaiacol were sterilized by autoclaving. The inoculated plates were incubated at 30^{o}C for 5 days. After incubation plates were observed for change in coloration by comparison with control.

Detection of lignin dephenolization activity of the isolated samples : Isolates were inoculated on sterile lignin agar plates and incubated at 30°C for 5 days. After incubation dephenolization of lignin agar plates were observed using ferricynide reagent and compared with control. Dephenolization of lignin was detected colorimetrically using Folin-Ciocalteau reagent and phenol was used as standard (10 µg/ml).

Determination of the maximum absorption for Phenol and Vanillic acid: Two ml of phenol was mixed with 0.5 ml of ferricyanide reagent and incubated in dark for 10 minutes. It was then diluted with 2 ml of distilled water and checked for maximum absorption.

Enzyme production from *Phanaerochaete chrysosporium:*1.5% malt extract medium was inoculated with spores of *P. chrysosporium* (5 x 10^6 spores/ml) and incubated at 30°C for 5 days. After incubation, the medium was filtered and filtrate was used for the enzyme assay.

Standardization of enzyme assay using *Phanaerochaete chrysosporium:*

Enzyme assay for Lignin peroxidase: The reaction mixture contained 0.1M Phosphate buffer, pH 6.0 (2.4 ml), 5.33% (W/V) Pyrogallol solution (0.3 ml), Enzyme (0.1ml), H_2O_2 solution (0.2 ml) and the change in absorbance per 20 seconds was measured at 420 nm

Enzyme assay for Mn-peroxidase : The reaction mixture contained 50 mm Sodium oxalate buffer, pH 4.5 (2.0 ml), 0.1 mM Manganese sulphate solution (0.4 ml), 0.1 mM Phenol red solution (0.7 ml), Gelatin (1 mg/ml) (1.0 ml), Enzyme extract (0.5 ml), H_2O_2 solution (0.4 ml). 1 ml of reaction mixture was mixed with 40 µl of 5N NaOH and absorbance at 610 nm was recorded. Same steps were repeated after every 1minute with 1 ml reaction mixture upto 5 minutes.

Enzyme assay for laccase

Guaiacol assay with phosphate buffer - The reaction mixture contained 0.1 mM Potassium phosphate buffer, pH 7.0 (2.8 ml), 0.018 mM Guaiacol solution (0.05 ml), H_2O_2 solution (0.05 ml), Enzyme extract (0.1 ml). The change in absorbance per 20 seconds was recorded at 436 nm.

Guaiacol assay with acetate buffer - The reaction mixture contained 10 mM Sodium acetate buffer, pH 5.0 (2.8 ml), 0.018 mM Guaiacol solution (0.05 ml), H_2O_2 solution (0.05 ml), Standard enzyme (0.1 ml), the change in absorbance per 20 seconds was recorded at 436 nm.

ABTS assay - The reaction mixture contained 9.1 mM ABTS solution (2.9ml), Enzyme solution (0.05ml), H_2O_2 solution (0.1 ml), change in absorbance per minute was recorded at 405 nm

Enzyme production using different media - The given isolates were inoculated into Tien and Kirck medium (for Lignin peroxidase), Malt extract liquid medium (for laccase) and Bermeck Basal Medium (for Mn peroxidase) each separately. All flasks were incubated at 30°C for 5 days and after incubation, contents were filtered carefully. The filtrate was assayed for Lignin peroxidase, laccase and Mn peroxidase using above mentioned assay methods.

RESULT AND DISCUSSION

Extracellular oxidases activity was detected as isolates have shown color change on respective medium. The color of plates containing gallic acid and tannic acid changed to brown as compare to control plates whereas the color of plates containing guaiacol changed to reddish brown as compare to control plate. The dephenolization of lignin was confirmed as lignin agar plates showed yellow greenish colored appearance as compared to blue green colour appearance of negative control plate using ferricyanide reagent. The dephenolization ability was supported when by phenol was detected using Folin ï Ciocalteau reagent test. As shown in fig.1 the isolate no.2 produced maximum quantity of phenol (1.41 µg/ml) while isolate no.4 give lowest i.e. 1.22 µg/ml.

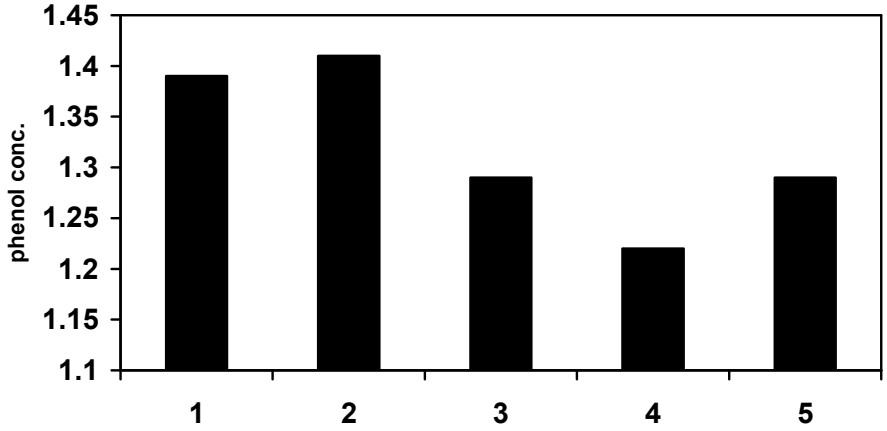

Fig.1 Concentration of phenol release after dephenolization

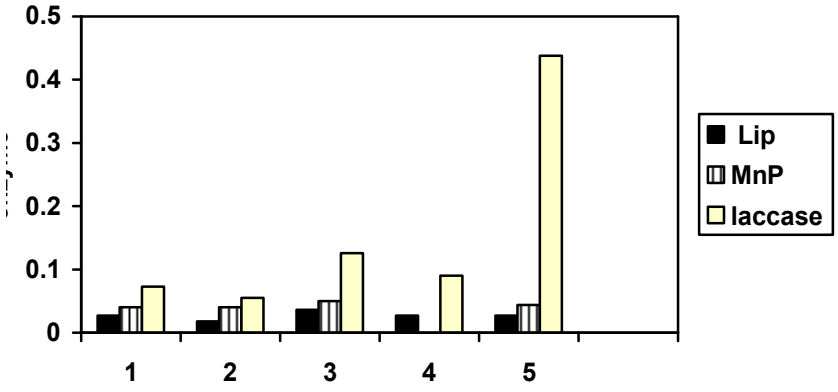

Fig.2 Enzyme production by isolates

As reported earlier, the key end products of the lignin degradation are phenol and vanillic acid. Hence for the further studies in lignin degradation λ max was determined which was found to be 869 nm and 805 nm respectively.

Laccase activity was assayed using ABTS and Guaiacol as substrates and the enzyme activity was expressed as units/ml. Out of the two buffers used for Guaiacol assay viz, phosphate buffer with pH 6.0 and acetate buffer pH 5.0, results were encouraging with acetate buffer. When guaiacol was used as a substrate, the isolate no.3 showed maximum activity of laccase (0.0210 units/ml) while isolate no.1 showed lowest i.e. 0.0012 units/ml. When ABTS was used as a substrate, the isolate no.3 have shown maximum activity of laccase (0.126 units/ml) while isolate no.2 have shown lowest i.e. 0.055 units/ml. 0.036 units/ml enzymatic activity of lignin peroxidases using pyrogallol as substrate is observed with isolate no.3 while minimum activity was shown with isolate no.2 is 0.018 units/ml (fig 2). The Manganese peroxidase activity with Bermeck medium and Phenol red as substrate was 0.050 units/ml for isolate no.3 while for isolate no.2 and isolate no.1 it was 0.040 units/ml. The fungi screened form rotted wood samples were ligniolytic in nature and have ability to produce ligninolytic enzyme system as was confirmed by various enzyme assays.

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IDENTIFICATION OF POTENTIAL SITES FOR FARM POND CONSTRUCTION IN PAROLA TEHSIL, JALGAON DISTRICT -A REMOTE SENSING AND GIS APPROACH

Bari U. R., Chandratre S. J*, Mahendran V.*
Dept. of Microbiology & JalaSRI ï Watershed Surveillance & Research Institute
M. J. College, Jalgaon, (MS) India,
E-mail: vm.jalasri@gmail.com, sjchandratre@gmail.com

ABSTRACT

A farm pond is an aesthetic and recreational amenity which is used for water sources for agricultural and other business related pursuits. Site conditions should be considered while planning to construct a pond to ensure a suitable location, which depends on physiographic factors viz. topography, water sources, community demand etc. In the study area most of farm ponds are used for irrigation purpose and rarely for fishery purpose. Mostly horticultural crops are irrigated using the stored water. Remote sensing and GIS are the latest tools in this kind of studies, which have been widely used to understand various dimensions of natural resources development and management.

KEYWORDS :- Farm Pond, Remote Sensing, GIS, GPS.

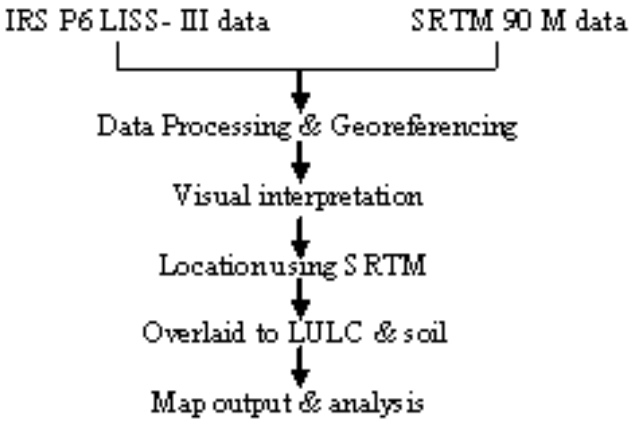
* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Conservation and utilization of water on a sustainable basis to all people of the world without affecting the ecological balance lies in the adoption of new research tools, particularly from remote sensing, and combining them with conventional as well as frontier technologies like Geographic Information Systems (GIS). The broad objective of sustainable agriculture is to balance the inherent land and water resource with crop requirements, paying special attention to optimization of resource used towards achievement of sustained productivity over a long period (Lal and Pierce, 1991). Farm ponds are an important source of irrigation water, particularly for small farms with permanent crops like brambles, fruit trees, trellised fruits, and nurseries. Field crops and vegetables can also be irrigated with pond water during dry seasons. Irrigation is critical to meet high yield goals and should be employed to meet the cropôs peak water use rate. In this study an attempt has been made to identify the potential sites for establishing farm ponds in Parola Taluka of Jalgaon District using remote sensing and geographical information system. It covers irrigation and water conservation methods appropriate to Jalgaon, and also contributes to the goal of rehabilitation of its natural biodiversity and ecosystems.

METHODOLOGY

Following is the adopted methodology for the current paper as mentioned in the table below:

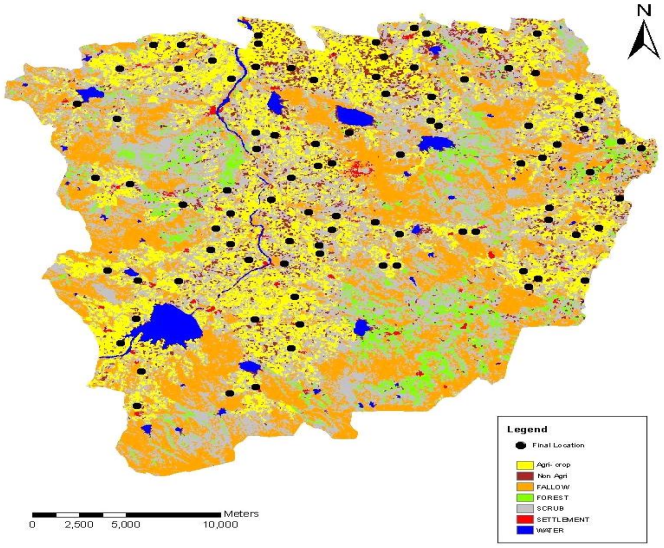


After the analysis of LISS-III image data (November- 2007) and compilation of SRTM image data with LULC image data 93, spots were located on the map which can be used as potential sites for Farm Pond construction. At first two or three locations were fixed temporally in the region which showed suitable spot height in every village of Parola taluka by using SRTM data. By considering each village of Parola taluka contains at least one farm pond, it was needed to analyze the data with LULC data of same location for finalization of exact location from temporally selected spots. LULC data contains the well distribution between agricultural crop land, non agricultural crop land, settlement, water bodies, open scrub, forest, and fallow and it gives the idea to locate a point or finalize the point which exactly falls on agricultural crop land. Thus after analyzing SRTM data with LULC the spots given on SRTM data falls over the region of agricultural crop land, some spots were fall over non agricultural crop land, some were observed on forest covered region and thus finally 20 sites are suggested.

RESULTS & DISCUSSION

As some of the spots were observed on non agriculture crop land which can be further utilized for the construction of pond having size more than that of farm pond which can be helpful for recharge of ground water level in that region. Lastly 93 spot sites were finalized in 93 villages out of 113 villages of Parola taluka and these are the sites other than existing ponds and in remaining 20 villages suitable sites were not observed. Out of those 20 villages, agricultural crop land was found in some villages which was less and in the other it was present but it was not suitable for farm pond construction. After construction of these farm ponds much of area will come under irrigation, and tremendous amount of rain water will be harvested for irrigation as well as it will be helpful for recharge of ground water level in Parola taluka. It will also be helpful for fulfillment of agricultural, drinking as well as other business related water demand in Parola taluka. It will also affect economy of farmers in Parola taluka.

Potential Sites For Farm Pond Construction at Parola



CONCLUSION

Farm ponds are typically constructed to supply agricultural lands with water for irrigation, livestock watering, or fire control, they can also enhance the aesthetic qualities of a landscape, provide recreational opportunities, and supply habitat for wildlife. Farm ponds help to increase the overall health of the watershed, and can contribute to soil and water conservation. If a farm pond is managed properly, it also can provide valuable fish and wildlife habitat, while fulfilling other farm needs for many years.

Although there are some problems like bureaucratic, less interest of farmers, expensive technology but the scope of farm pond is more.

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"IDENTIFICATION OF POTENTIAL SITES FOR FARM POND CONSTRUCTION IN AMALNER TEHSIL, JALGAON DISTRICT - A REMOTE SENSING AND GIS APPROACH"

Pawar A. A. , Chandratre S. J. and V. Mahendran*
Department of Microbiology & JalaSRI ï Watershed Surveillance & Research Institute, M. J. College, Jalgaon, (MS) India
E-mail: vm.jalasri@gmail.com, sjchandratre@gmail.com

Abstract

A farm pond is an aesthetic and recreational amenity which is used for water sources for agricultural and other business related pursuits. Site conditions should be considered while planning to construct a pond to ensure a suitable location, which depends on physiographic factors viz. topography, water sources, community demand etc. In the study area most of farm ponds are used for irrigation purpose and rarely for fishery purpose. Mostly horticultural crops are irrigated using the stored water. Remote sensing and GIS are the latest tools in this kind of studies, which have been widely used to understand various dimensions of natural resources development and management.

Keywords: Farm Pond, Remote Sensing, GIS, GPS.

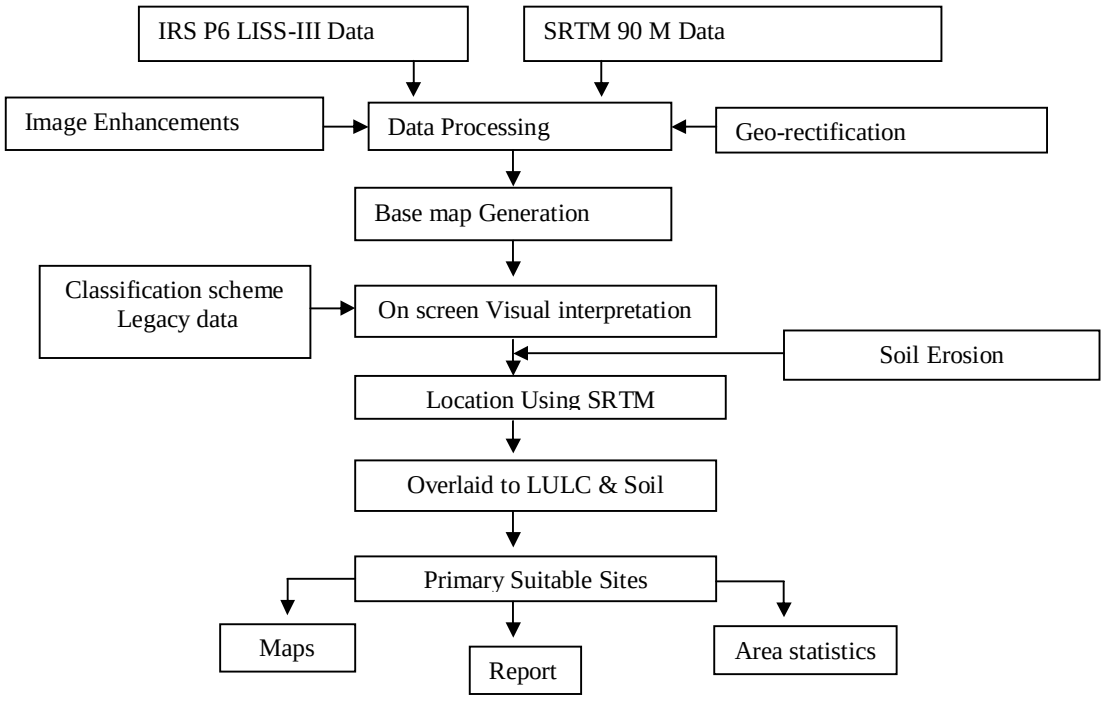
* Address to whom the correspondence should be made.

INTRODUCTION

Farm ponds are now an important source of irrigation water, particularly for small farms with permanent crops like brambles, fruit trees, trellised fruits, and nurseries. In this study an attempt has been made to identify the potential sites for establishing farm ponds in Jalgaon District using remote sensing and geographical information system. It covers irrigation and water conservation methods appropriate to Jalgaon, and also contributes to the goal of rehabilitation of its natural biodiversity and ecosystems.

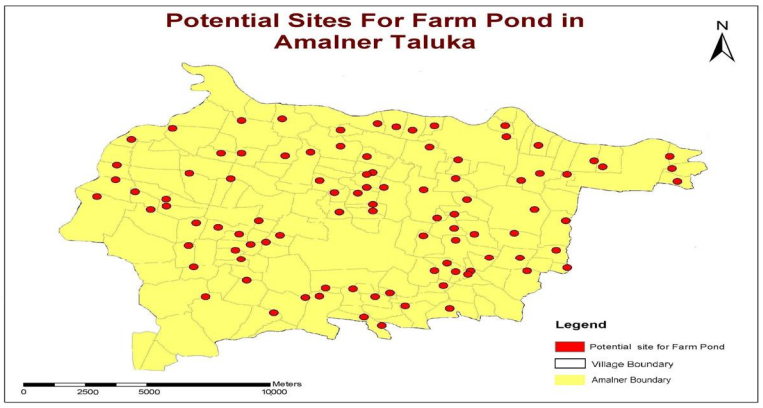
METHODOLOGY

As in flow chart mentioned, first of all LISS-III data of IRS P6 was georeferenced and then Spatial Radar topographic Mission's (SRTM) 90 meter resolution data was georeferenced. First of all a random lowest pixel value was selected and pointed as a primary suitable location. Then this primary layer is overlaid on Land use / Land cover data and emphasis was given to agriculture class only and then soil layer. Thus finally suitable locations are found out for the construction of farm pond in the study area.



RESULT & DISCUSSION

There are near about 145 villages in Amalner tehsil. After getting two to three lowest pixel values from each village and overlaying on the Landuse/Landcover and soil. Thus final 93 sites in 93 villages are selected. These sites occur within the agriculture area or near to it. The Map of primary potential sites for farm pond construction in Amalner taluka is shown below:



CONCLUSION

Farm ponds are typically constructed for various purposes like, to supply water for irrigation, or livestock watering. Farm pond can also enhance the aesthetic qualities of a landscape and as well as supply habitat for wildlife. Although there are so many bureaucratic, technological problems including no proper support from farmers related to this issue but a lot of scope is there for development of farm ponds in Amalner. Farm ponds have an impact on cropping pattern, productivity, employment and income of the farmers in Amalner Taluka. In addition to this, during off-season, construction of farm-ponds and later maintenance of farm pond is also contributed to increasing employment among the farmers who have farm ponds.

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- *Lead Author:* **Michael Pidwirny (other articles)**

SYNERGISM OF COPPER SOLUTION IN COMBINATION WITH ANTIBIOTICS AGAINST MULTI-DRUG RESISTANCE *S.TYPHI*

Mandge B.R., Marathe Y.N. and Narkhede J.D.*

Department Of Biochemistry, Moolji Jaitha College, Jalgaon, (M. S.), India,

email-mjcollege@kces.in

ABSTRACT

The recent increase of infections due to bacterial resistance to antibiotics has been recognized as an alarming problem , especially in case of typhoid. Copper solution as an antibacterial is claimed to have no bacterial resistance.Various antibiotics were checked in combination with copper solution against Salmonella typhi for synergism.First, minimal inhibitory concentrations were determined for the individual antibiotics and copper solution individually. Synergistic activity of copper solution in combination with various antibiotics was tested against S.typhi .Out of the total tests 3 were found synergistic and 5 were additive.

KEYWORDS - Bacterial resistance, Synergism, antibiotics

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

In environment different of microorganisms are present. Out of these some pathogenic micro organism cause infection. The recent increase of infection is due to bacterial resistance to antibiotics. Bacterial resistance to antibiotics results in therapeutic failure. Bacteria that are not killed by the usual of antibiotic medicines are called MDRO. These bacteria developed resistance because antibiotics are used when they are not really needed. When antibiotics are used frequently, there are some bacteria that are not affected by the antibiotics. These bacteria survive, multiply and can cause another infection. If antibiotics are used to fight this new, they wonôt work. *S. typhi* is a straight rod, Gram negative, facultative anaerobic and usually motile by peritrichous flagella. Typhoid fever is endemic in India. Though the disease occurs throughout the year, there is a definite increase in the incidence during the rainy season (June to September). Specific antimicrobial therapy for enteric fever became available in 1948 with the introduction of Chloramphenicol. Chloramphenicol was the drug of choice for the treatment of typhoid fever till recently. Resistance to this drug was observed in England in 1950 and latter on reported from Mexico, Vietnam and Kerla, India. Of late, there has been an emergence of MDRST strains throughout the world. An outbreak of enteric fever called ódombivali Feverô was reported from Mumbai in 1990 and the causative organism was MDRST. Due to the development of MDR and a typical presentation of the disease, typhoid fever is becoming difficult to diagnose unless aided by blood culture studies. Copper 2^{+} ions are soluble in water, where they functions at low concentration as bacteriostatic substances and fungicides. For this reason, copper metal can be used as an anti-germ surface that can add to the antibacterial and antimicrobial features of building like hospitals. Copper solution has been shown as an effective

antibiotic against many MDROs. As high level acquired resistance to conventional antibiobtics is frequent it seems reasonable to use combination therapy in ordered to achieve bactericidal synergism. Active copper solution has shown marked activity against bacterial resistant strains. These metal solution have shown marked activity against bacterial strains hence a range of antibiotic were tested with copper solution to determine additive and synergistic effect against *S. typhi*

METHODOLOGY

a) Materials - Antibiotic discs used in the investigation are standard discs. The 50ppm copper solution was prepared by dissolving copper foil in concentrated nitric acid and then neutralized with sodium hydroxide. Blood sample (test organism) was collected from civil hospital, Jalgaon. Bacteria were maintained on nutrient agar (pH --> 7±0.2) at 37 ±1^{0}C.

b) Methods - About 18 blood samples were collected from Civil Hospital, Jalgaon and are screened for *S. typhi* by

Performing routine biochemical tests and using selective media Wilson Blair.

i) Antibiosis Profile of Isolates: Antibiosis profile of isolates was determined by spreading 16 hr old culture onto the nutrient agar surface (Hi-Media). Then the octa-discs were placed on to the agar surface and the plates were incubated at 37 ^{0}C for 24hrs. All plates were examined for any zone of inhibition around the antibiotic discs that would indicate sensitivity of the organism. Zone diameters were recorded in millimeter using zone reader (Hi-media) and interpreted according to standard charts provided by the National Committee for cultural and laboratory standard.

ii) Antimicrobial activity of copper solution: Actively growing 16hr old culture were surface spread onto the nutrient agar surface, the plates were laid aside for absorption for 15 minutes. Wells were punched into the agar surface using 10mm diameter cork-borer aseptically. Next 100ml of copper solution was introduced into the wells, and the plates were incubated at 37ôC for 24hrs.

iii) Minimum Inhibitory Concentration (MIC) of antibiotics and copper solution: MIC is the minimum concentration of an inhibiting agent that completely inhibits the bacterial growth. The antibiotics and copper solution which exhibited good antibacterial activity were selected for determination of their MIC. For copper solution, concentrations below 30 ppm were taken like 25, 15, 5, 1 ppm and 30, 35, 45, 50 ppm. The lowest concentration at which zone of inhibition was observed was taken as the MIC of the solution.

iv) Assay for Determination of synergistic and Antagonistic antibacterial activities: Drug interaction studies were carried out using the agar well diffusion method. Actively growing 16-hr.-old culture was surface-spread using sterile cotton swabs onto the nutrient agar surface. The plates were laid aside for absorption for 15 minutes wells were punched into the agar surface for adding copper solution. The antibiotic discs were placed at a distance which was the average of their zone diameter obtained individually.

The plates were incubated at 37^0C for 24 hrs. The inhibition pattern obtained was recorded as synergy, additive or antagonistic (according to the criteria stated by Konmen et al.2)

RESULTS AND DISCUSSION

After performing the biochemical tests were observed that, out of 18 blood samples 9 samples were positive and are isolated for *S. typhi* by using selective media.

In the antibiosis profile of these isolates, Out of 9 sample 4 samples were found to be multidrug resistance, that is resistance to three or more antibiotics were observed in 60% sample in present study. They were sensitive to Chloramphenicol Co-trimaxazole, Tetracyclin while, Amphicilin, Gentamycin, Streptomycin, Kanamycin, Amikacin was the commonest pattern of drug resistance.Similarly, the antibacterial activity of copper solution was also determined. The assays were performed as described in section of material and methods in which it shows that, all the 4 isolates studied showed susceptibility to copper solution, when tested both by the agar cup method as well as by the disc-diffusion method. With good results of antibacterial activity of copper solution, we decided to go for the determination of MIC of the solution As the copper-solution was found to be effective against MDRST, we finally looked for combined effects of copper solution with different antibiotics.

The Chloramphenicol and Tetracycline & Co-trimaxaxole exhibited good combined synergistic effect against *S.typhi* whereas, Kanamycin and Amikacin, Streptomycin and Ampicillin shows additive effects.

CONCLUSION

1. Copper solution exhibited good antibacterial activity against *S.typhi.*
2. Determination of MIC shows that copper solution is very effective every at very low concentrations.
3. The copper solution in combination with different antibiotics exhibits both additive as well as synergistic antibacterial activity.
4. This combination will allow a meaningful treatment of multidrug resistance pathogenic organisms, specially for treating typhoid.

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DETECTION OF SECONDARY METBOLITES FROM *CENTELLA ASIATICA*

Sarode C.M., Rane J.S. and Chalse M.N.*

Department of Biochemistry, Moolji Jaitha College, Jalgaon-425001,

E-mail:mjcollege@kces.in

ABSTRACT

"Centella asiatica" commonly known as Mandukparni or Brahmi-Madhuki, It is a medicinal plant. It is Brain tonic, memory enhances and Blood purifies. In the present work protocol for the in Vitro regeneration of "Centelle asiatica" has been initiated by callus culture, secondary metabolites were extracted from the leaves of ***Centalla asiatica****, by using organic solvents. Terpenoids, Tannis, Flavonoids and Alkaloids are extracted.*

KEYWORDS - Callus culture, Secondary metabolites, Centella asiatica.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Plants are traditional source for many of the chemicals used as pharmaceuticals, biochemical, Fragrance, Food colourôs, & Flavourôs. Most valuable phytochemicalôs are the products of secondary metabolism & possess sufficient chemical or structural complexity. (Leung 1980). Most of these phytochemicalôs has great importance in medicines & different Drugôs. According to ñWorld Health Organizationò medicinal plants are best source to obtain a variety of newer herbal drugôs. About 80% of individualôs from developed countries use traditional herbal medicineôs , which has compound derived from medicinal plantôs, Therefore; investigation & phytochemical analysis of medicinal is need of time.**"*Centella asiatica Linn*"** commonly known as Mandukparni or Brahmi-Manduki, is traditional medicinal herb widely used as brain tonic. It is a prostate, perennial, faintly aromatic herb found wild through out India. Leaves are tonic, memory enhancer, and neurotonic & blood purifier. The leaves also used in treatment of Leprosy, Fever, Diarrhea (among children) & eye troubles. The plant is reported to contain glycosides like brahnosideôs indocentellosideôs, asiaticoside, theankuniside & isotheankuniside. Asiaticiside, a trisaccharide triterpene, has been identified as the most active compound in the plant associate with the healing of woundôs & duodenal ulcer, while triterpene saponins are also reported to possess immunomodulatory properties. (Rastogi,, 1993)

MATERIAL & METHODS

Ex-plant collection & Surface Sterilization The plantlets / plants were directly obtained from ñNarkhede Nursery & Garden designing Farm Jalgaon.ò The plantlets

were kept under ambient conditions. Leaves of 10-15 days old plants were used as Ex-plants. The ex-plants were washed under running tap water for 1-2minutes & Surface Sterilization was **achieved** by **70% Ethanol** for 30 Seconds. Finally Ex-plants were washed with sterile distilled water.

Culture Media & Condition The Ex-plant were inoculated on basal M.S. Media---- (Murashinge & Skooge, 1962). Fortified with 3% (W/v) Sucrose. The pH was adjusted to 5.5 to 5.8 and 1% (w/v) Agar (Hi-media, Mumbai) was used to solidify the medium. The media was autoclaved at 1.05 Kg/cmĖ2for 20 minute which was further used as a culture medium after Autoclaving thermo-labile ingredients like Vitamins & Phytohormones were added.

For callus induction leaf Ex-plant 5*5 mm of size were inoculated on M.S. Media Fortified with various Concentrations & combinations of BAP (6-Benzyl Amino-purine) combination of NAA (Naphthalene Acetic Acid), Kn (Kinetin). Each hormonal combination was tried in replicates to 5 test tubes. The sterile Ex-plants were positioned abaxilly (Upper surface in contact with medium). The cultures were maintained under controlled condition of temperature of 23°c with humidity level 60% & photoperiod of 16/8. The white light was provided by white Fluorescent tubes (Phillips) at 1000-lux intensity.

Extraction of Secondary Metabolites–

Steroid ---Dry extract dissolved in 0.5ml of chloroform + Acetic Anhydride (0.5ml) & 2ml of concentrated H_2SO_4 added.

Observation- The blue or green color or a mixture of these two shads show presence of steroidal compound.

Terpenoids ---As above mentioned process

Observation- Red, Pink or Violet color indicates presence of terpenoids.

Tannins ---2cm³ of freshly prepared 10% KOH + 1cm²of extract.

Observation- A dirty white ppt indicates presence of tannin.

2) Powder stem bark of the test plant (1.0gm) was weighted & boiled in 10ml D/W for 5minutes. 2drops of 5% FeCl3 were added.

Observation- Formation of greenish ppt indicates presence of tannins.

Flavonoids ---A small piece of Mg added to ethanol extract of plant material, this was followed by drop wise add of concentrate HCL

Alkaloids ---The extract of the plant bark sample (0.5%) was stirred in 5ml 1% HCL on steam bath; the solution was filtered with 2 drops of Mayerôs reagent. Two solution were mixed final volume was made up to 100ml with distilled water. Turbidity of extract filtrate on addition of Mayerôs reagent was regarded as evidence of presence of Alkaloid in extract.

Saponine ---Stem bark of plant is ground in powder form & 5ml distilled added to

0.5gm of powdered stem bark, then mixture was vigorously shaken Formation of Froth shows presence of saponine.

Glycosides ---Stem bark powdered (1gm) was separated in two beakers. In one beaker, 5ml dilute H2SO4 & in another beaker 5ml of water was added. The two beakers were heated for 5-5 minute & content filtrate into labeled Test tube. The Filtrate was made alkaline with 5% NaOH & heated with Fehlingôs solution for 3 minute.

Observation- Presence of reddish precipitate acid filtrate & absence of such precipitate in aqueous filtrate was regarded as positive glycoside.

RESULT & DISCUSSION

It was observed that the Callus induced in the media which is fortified with various combinations of BAP, NAA, & Kinetin. The Callus induction was obtained with 6mM, BAP & 6mM NAA; but efficient Callus induction was obtained with 7.2mM, BAP combination, 4mM NAA & 2mM Kn observed to be good for Callus induction. Callus was observed with 7-8 days after incubation. The climatic condition affects the rate of Callus induction. It observed that rainy season is good for efficient Callus induction Callus proliferation occurred from the dorsal side & edges of Ex-plant. Response of young leaf Ex-plant is good than Ex-plant obtained from old (10-15 dayôs) Leaf

CONCLUSION

The green leaves extract of Centella asiatica was found to be 475mg/10mg, while that of dried leaves was 300mg/10mg.

Secondary metabolites of both the extracts show that Centella asiatica variety of secondary metabolites such as , Terpenoid, Alkaloid, Glycoside, Flavonoid, Tannin & steroid,(which have been used to treat leprosy) are present; therefore by observing such a variety & great quantity of secondary metabolites from Centella asiatica. We can conclude that, ñThis plant has great medicinal importance and different drugs can be isolated commercially from itò.

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IN VITRO RAPID REGENERATION OF A THREATENED MEDICINAL PLANT *BACOPA MONNIERI* (L)

Patil G.S., Shimpi T.S. and Deshpande H.A *

Department of Biochemistry, Moolji Jaitha College, Jalgaon,(M. S.) India.

E-mail: mjcollege@kces.in

ABSTRACT

Bacopa monnieri L. Penn. commonly known as "Brahmi" is an important medicinal herb of the family Scrophulariaceae. It is the foremost brain tonic herb of the Indian System of Medicine and other traditional systems, used primarily as a nerve tonic, to treat insomnia and nervous tension. In the present work, protocol for the in vitro regeneration of Bacopa monnieri has been initiated by using nodal culture and callus culture. Caulogenesis was induced from these nodal segments on MS medium supplemented with BAP (6-Benzyl Amino Purine) 0.5µM and NAA (α Naphthalene Acetic Acid) 0.5µM. In vitro regenerated plantlets were healthy with dark green leaves in about 8 to 10 weeks.

KEY WORDS - Nodal culture, callus culture, caulogenesis Bacopa monnieri

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

*Bacopa monnieri (*L) belongs to the family Scrophulariaceae is an amphibious plant of tropics and normally found growing on the banks of the rivers and lakes. It is commonly called as brahmi or jal brahmi in India. It has a great market demand due to its high medicinal uses. Brahmi is considered as the main rejuvenating herb for nerve and brain cells and therefore has played a very important role in Ayurvedic therapies for the treatment of cognitive disorders of aging (Anon, 2004;Borrelli, 2005; Ernst, 2006). It also has anti-inflammatory, analgesic, antipyretic, epilepsy, insanity, anticancer and antioxidant activities (Jain et al, 1994; Tripathi et al, 1996; Bafna and Balaraman, 2005; Sinha and Saxena, 2006). It is also used for the treatment of asthma It contains different types of saponions like bacosides A, B, C and D which are active triterpenoid principles and known as ñmemory chemicalsò (Rastogi et al, 2004; Sivaramakrishna et al 2005). Two new dammarane type jujubogegin bisdesmosides, bacosaponins E and F of biological interest have also been isolated from this herb (Mahato et al, 2000; Chakravarty et al, 2003). Recently in a report by the National Medicinal Plant Board (NMPB) and Government of India and Technology Information Forecasting and Assessment Council (TIFAC) has recommended immediate attention to few medicinal plants, among which *Bacopa monnieri* prominently features, which makes this plant in the category of highly endangered plants in India. (http://www.nmpb.nic.in/prioritisedmedcinalplants.htm)

According to NMPB, the popularity of the *Bacopa* ï based drugs is increasing

rapidly. In view of the wider market demand, there is a need to conserve this highly endangered medicinal herb. Therefore, it is necessary to develop and standardize the large-scale multiplication through tissue culture. (http://www.nmpb.nic.in). The present study reports a simple and rapid but novel method for *in vitro* multiplication of *Bacopa monnieri* through nodal explant and leaf explant.

MATERIALS AND METHODS:

Explant Collection and surface sterilization: The plantlets were directly obtained from Narkhede Farms, Jalgaon India. The plantlets were kept under ambient conditions. Nodal explants and leaf explants were used for the present study. The explants were washed under running tap water for 1 to 2 minutes and surface sterilization was achieved by 70 % (v/v) ethanol for 30 seconds and 0.1% (w/v) mercuric chloride for 60 seconds. Finally the explants were washed with sterile distilled water.

Culture media and conditions : These explants were inoculated on Basal MS medium fortified with 3% (w/v) sucrose. Medium was gelled with 0.5 to 1.8% (w/v) agar agar type-I (Hi media, Mumbai) and the pH was adjusted to 5.5 to 5.8. The media was autoclaved at 1.05 kg cm^{-2} for 20 minutes, which was further used as a culture medium. After autoclaving thermolabile ingradients like vitamins and phytohormones were added.

For initiation of the culture nodal segments about 1.5 to 2 cms were inoculated on MS medium fortified with various concentrations and combinations of 6- Benzyl Aminopurine (BAP) and Naphthalene acetic acid (NAA).Each hormonal combination was tried in replicates in 10 test tubes. The cultures were maintained under controlled conditions of temperature of 25 ^{0}C with humidity level of 60% and photoperiod of 16/8. The white light was provided by white flouroscent tubes (Crompton Greaves, India) at 1000-lux intensity.

Similarly for callus induction leaf size of 5x 5 mm were inoculated on MS medium fortified with various concentrations and combinations of 6- Benzyl Aminopurine (BAP) and Naphthalene acetic acid (NAA).Each hormonal combination was tried in replicates in 10 test tubes. The cultures were maintained under controlled conditions of temperature of 25 ^{0}C with humidity level of 60% and photoperiod of 16/8. The white light was provided by white flouroscent tubes (Crompton Greaves ,India) at 1000- lux intensity.

The *in vitro* regenerated plantlets were then kept for primary hardening.

RESULTS AND DISCUSSION:

The few earlier reports available on *Bacopa* demonstrated plant regeneration through axillary node, internode and young leaves on media with very high concentrations of cytokinins.(Shrivastava,1999)

In this paper we have studied the effect of different concentrations specifically lower concentration of cytokinin on caulogenesis on *Bacopa* . Direct regeneration of caulogenesis occurred in mature explants (nodal segments) on MS ï basal medium

containing BAP (0.5 µM). Earlier *in vitro* regeneration through somatic embryogenesis (Tiwari et al, 1998), stem and leaf explants (Rajani and Shrivastava, 1999) callus cultures (Neetu Sharma, 2005), internodal segments (Banerjee and Shrivastava, 2008) have been reported.

Callus induction requires the presence of auxins or cytokinins or both in the nutrient media depending on the source of explant. Callus initiation was carried out by using leaf segment as source of explant. Initiation was carried out using different growth regulators such as BAP, IAA and 2,4-D containing media. However efficient callus induction was achieved when MS - basal media was fortified with BAP (0.5µM) and NAA (0.1µM). The explants enlarged with in 22-30 days of inoculation; however callus formation started after 20-25 days at the ends of the explant. Appearance of callus was globular and was of pale yellow in colour.

Our results suggest that this protocol can be used for large scale propagation of *Bacopa monnieri* without any seasonal constraints.

CONCLUSIONS

In the present work we have attempted to develop suitable micropropagation protocol and try to improve existing protocol of *Bacopa monnieri.*

1. Sterilization protocol was found satisfactory for the surface sterilization of nodal explants of *Bacopa* for 30 minutes under running tap water for 30 minutes.
2. For nodal culture, it was observed that best medium for initiation and development in terms of bud breakage, was MS - basal medium containing lower concentration of cytokinins and auxins BAP(0.5 µM) and NAA(0.5 µM).
3. MS - basal medium fortified with auxins BAP (0.5 µM) and cytokinns NAA (01µM) were responsible for efficient callus induction.

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BIOEFFICACY OF POLYHERBAL PREPARATION AGAINST BRINJAL PEST, *LEUCINODES ORBONALIS,* GUEN.

Shimpi S.B, Yeole G. J. and Patil P. D*.

Department of Biotechnology, Moolji Jaitha college, Jalgaon, (M.S.) India.

ABSTRACT

Use of plant products with cow dung and cow urine has assumed significance as a important component of insect pest management because of their economic viability and eco-friendly nature. In the present investigation, fermented poly herbal product was evaluated for its bio-efficacy against L. orbonalis (Guen) a serious pest of brinjal. Ten botanical tested against L. orbonalis. At laboratory level, the 5 ppm solution of this poly herbal preparation showed 50% mortality i.e. LC_{50} about 0.6 by calculation 0.7 by graph.

KEYWORDS : Bioefficasy, brinjal, borer.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Eggplant (*Solanum melongena*) is one of the most important vegetables in South and South ï East Asia. It is grown on over 678,000 ha, which is about 37% of the world eggplant area, with a production of 10.50 million (FAO, 2007). Eggplant fruit and shoot borer (EFSB), *L. Orbonalis* Guen (Lepidoptera : Pyeallidae) is one of the most destructive pest on egg plant in south and south east Asia. Larvae of this insect bore inside plant shoot and fruits adversely affecting plant growth, yield and fruit quality, and thus making it unfit for human consumption. The yield reduction should be as high as 70%. However, there are insecticides of plant origin that are more environmentally friendly and devoid of adverse effects on the ecosystem that could be used against pest of egg plant.

The objective of this research work is to evaluate the field efficiencies of poly herbal preparation for the control of insect pest associate with eggplant.

MATERIALS AND METHODS

The fresh leaves of following plant were collected. (*A. Sativum, A. Squamosa, A. Indica, C. Papaya, C. Giganties, N. tobaccum, P. Pinnata, R. Communis, T. erecta & V. Negunda.* The leaves were washed and weigh 10gm of leaves paste of each plant. After that, 100gm cow dung, 100ml cow urine and 1000ml of water was added to plant mixture. The whole mixture was kept as it is for 1 month for fermentation with stirring 3 times in a day.

Bio-efficiency of fermented preparation on *L. orbonalis* Pod dip Method : Brinjal fruit blocks dipped in different concentrations of fermented mixture and then air dried were provided to ten third instar of *L. orbonalis* larvae. After 48 hrs of exposure/feeding, the observations of mortality were made.

RESULTS AND DISCUSSION

Effect of prepared botanical pesticide was tested against *L. orbonalis*. The LC_{50} value of this product was calculated and it is 0.604 and 0.7 by the calculation and graph.

The results of this research work indicate that plant leaves with cow dung and urine could reduce the infestation of insects pests and improve the yield of eggplant. The application of bio-pesticides that offer desirable alternatives to using synthetic chemicals in agricultural system where protection of the environment and preservation of beneficial organisms are paramount has increased in recent years. Although, there have been little or no attempt so far to control insect pests of eggplant using such type of poly herbal preparation.

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DESIGNING OF TENSILE STRENGTH METER

Patil H I, Yadav U C, Mahajan R T*.

Department of Biotechnology, M.J. College, Jalgaon, (M. S.), India.

ABSTRACT

Wound healing is one of the major points of study in medicinal research. Many of the medicinal plants show the ability of wound healing. These days there is lot of research work going on identifying such medicinal plant and evaluating the metabolite responsible for effective wound healing. Measurement of tensile strength of the healed wound or skin is a criterion for evaluating the wound healing capacity of the medicinal plant. Tensile strength determination are done by using the traditional method and by method of lee but this method has many drawbacks such as hectic to use., low accuracy ,possibility of false results. The aim of present study is designing the instrument for measuring the tensile strength which is cost effective and easy to handle and would be applicable to skin.

KEY WORDS - Wound healing, tensile strength

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Designing the instrument which will measure the tensile strength of wounded skin.It is a common phenomenon to experience either major or minor wound in accident where a possibility of heavy loss of tissues or skin happened.. For healing such wound some drugs are used like framycetin sulfate. While using such a drugs it is expected that the skin which going to regenerate have some strength of that previous skin. So the tensile strength of the skin newly generated is determined in order to determine efficacy of the drug. In many clinical research and drug development it is required to measure tensile strength of the new generated skin from which wound healing capacity of the drug determined. Also wound healing activity of some medicinal plant extract needs determination of the skin tensile strength. Recently many newly tensiometers are used in advanced laboratory but the size is too large and are very costly.

AIM AND OBJECTIVE

The aim of present study is designing the instrument for measuring the tensile strength which is cost effective and easy to handle and would be applicable to skin.

METHODOLOGY

The planning and modification of the existing instrument is attempted here.

Instrument consists of ï 1.óSô-type load cell 2.stepper motor 3.light senor 4.control box. Instrument has an óS ótype digital load cell of which one end is fixed to one surface. Second end of load cell has pulley which attached to skin .At the lower end of

the instrument there is a stepper motor which also attached to the pulley with string. The space between the two pulleys has a light sensor. The load cell, stepper motor and light sensor are attached to control box through electronic wiring for power supply and for transmit signal. Control box has a digital display which shows the load applied on skin by the motor through the electronic connection with load cell.

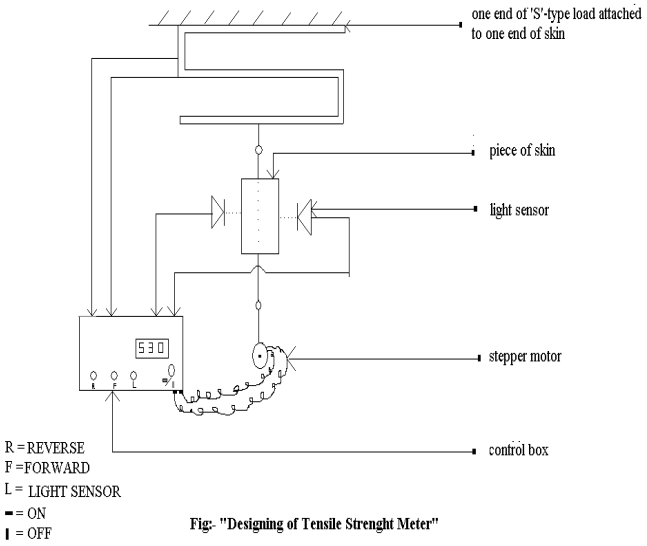

Fig:- "Designing of Tensile Strenght Meter"

Materials

1) S-Type Load Cell. A load cell is a transducer which converts force into a measurable electrical output. Although there are many varieties of load cells, strain gauge based load cells are the most commonly used type.

2) Stepper Motor. The principle of stepper motor working is as follows, Motors convert electrical energy into mechanical energy. A stepper motor converts electrical pulses into specific rotational movements. The movement created by each pulse is precise and repeatable, which is why stepper motors are so effective for positioning applications.

3) Optical Sensor. Optical sensor is used to detect the cut in the skin sample and is based on the principle of photometric detection system. A photometric detection system including a light source, a photometric detector, and a flow cell assembly. A device optically couples the light source to the waveguide at a first position along the length of the waveguide.

4) Control Box. Control box is the processing unit. It collects the information from load cell and light sensor. It analyses information convert it in suitable form and transmit further. From control box all the component of the instrument can be operated. Components like load cell, light sensor, stepper motor are connected to controlled box consist of electronic circuits which are programmed via microprocessor. All the information about the motor response after light sensor signal ,conversion of

information from digital to analog form or analog to digital form are done through programming in microprocessor.

Experiments

Incision wound model The wound healing evaluation: Screening for the wound healing activity was performed by incision wound model as described by Charde et al., (2006). The skin breaking strength was measured on the 10^{th} day by self design tensiometer in laboratory. (Chopada 2009).

RESULT

Result of the present study indicates that automation of the instrument is possible. The working of the stepper motor illustrates good involvement of the device in the framing of the instrument. Application of the light sensor is a additional beneficial tool for the measurement of the tensile strength accurately. One end of skin attached to ósô-type of load cell and another end pulled out with the help of stepper motor. The load exerted by motor creates tension on the skin. This tension tears the skin, as the skin tear, light of sensor passed through it and detected by detector of light sensor which immediately relay the signal to the control box and the stepper motor stop to work. The onset of stop of motion load cell display the actual reading of load applied. This is the accurate and economical way to measure the tensile strength of the skin.

CONCLUSION

The present designed instrument indicates about 20% more accuracy than traditional method.

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AGRICULTURE LAND USE CHANGE ANALYSIS USING LISS III-A CASE STUDY IN PACHORA TALUKA OF JALGAON DISTRICT, MAHARASHTRA

Lathi N. P. Pande J. R*

Department of Biotechnology, M.J. College, Jalgaon

ABSTRACT

The agricultural land use and land cover (LULC) analyzed by using remotely sensed data. The analysis based on visual & digital interpretation. The results revealed a clear change in the land use/land cover over the study period. The rapid decrease of forested &agricultural area is caused by deforestation in advantage to the cultivated land and settlements. The results of the study provide a better understanding about the nature of the LULCC in the agriculture,forest,scrub settlements in Pachora.

KEY WORDS - Land use, land cover, remote sensing, forest settlement.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Land Use Land Cover Change:-Land use and land cover change (LULCC) known as land change is a general term for human modification of earthôs terrestrial surface. Land use also refers to human activities such as agriculture, forestry and building construction that alter land surface processes including biochemistry, hydrology and biodiversity.

Information on land use / land cover and possibilities for their optimal use is essential. For the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare.Land use and land cover change has become a central component in current strategies for managing natural resources and monitoring environmental changes.

Remote sensing (RS) - Remote sensing can be defined as the collection of data about an object from a distance. Humans and many other types of animals accomplish this task with aid of eyes or by the sense of smell or hearing.Remote sensing of the environment by geographers is usually done by remote sensors.

Geographic Information System - GIS is a computer based integrated database management system that stores a large volume of spatial data along with its attribute or non spatial data.

Georeferencing: Georeferencing is the process of scaling, rotating, translating and deskewing the image to match a particular size and position. .

Study area- The Pachora taluka is situated in the southern part of Jalgaon district in Maharashtra State (India). It encompasses geographical area of 793.3641 km^2.

METHODOLOGY

Database

1. Primary Database - The data use for the analysis is of primary, secondary and ground data. The ground data under obtained from is IRS (LISS-III) image standard for false color composite (FCC) imagery by combining three spectral band 3, 2 &1 with a 23.5 meters resolution.

2. Secondary Database - SURVEY OF INDIA (SOI) topographical maps on 1:50,000 scales are used in the preparation of the base map. The interpreted thematic details are transferred to supported data such as thematic maps. Initially the satellite image LISS III of IRS P6 of Pachora is substracted from Jalgaon map, and then georeferencing was done with the help of SOI toposheet of 1:50,000 scale as a reference. Two steps, were as follows,

a. Visual interpretation using **ArcGIS 9.2 software** for digitization.

b. Digital interpretation using **ERDAS imagine 9.2 software**-for classification

a. Visual interpretation:- In this process digitization of various layers such as roads, railway, drainage layer of 1-5 orders, river and settlement by using toposheet as reference in Arc GIS 9.1 as performed.

b.Digital Interpretation: - Digital interpretation technique for the preparation of land use land cover maps (LULC map) by using some visual interpretation keys as tone, texture, shadow, shape, size, association, pattern in ERDAS imagine 9.2 was performed followed by next step unsupervised classification is done. We ran unsupervised classification was done into at least 50 classes on the satellite images, and recoded it into 5-6 classes according color coding. Finally clump ran and eliminate process to get the final map.

RESULTS

Agriculture: The tonal contrast of the agricultural land varies from bright red to red its spread extent varies in size and shape i.e., smooth texture to course or molten it is contiguous in unirrigated or rained dry land contiguity of crop landôs is interfered harvested land according to season .

Forest: It appears dark red in color indicates area under the forest. It varies with irregular and discontinues boundaries. Dense forest area appears in area of hilly region

Open scrub: Gray, light red color indicated the scrubs which stretched from out skirts of settlements .

Water Body: River ,streams ,lake ,dam, canal appear in blue to dark blue tone ,long narrow to wide in size with irregular and smooth to medium texture contiguous nonlinear to dendrite/ sub dendritic in pattern..

Barren land: Bright cyan color indicates area under barren land. which is mostly unused land.

Settlement: Dark cyan color indicates settlement.

CONCLUSION

In order to asses the Land use Land Change dynamic topographic Map and remotely sensed data have been analyzed between the 1998 and 2007.

The remarkable changes have been realized are:

1. The area under agriculture land (current cropped land) were found 335.1498 sq.km and in November 2007 was 417.796 sq. km from LULC Map.
2. Change in agricultural land between the year November 1998 and 2007 of was 10.87 % (82.647 sq. km)
3. The area under forest land in the year of 1998 November was found to be 16.73 sq.km and in 2007 November was 6.39 sq. km.
4. Change in forest area in between the year 1998 and 2007 of November was 1.3 % (10.34). and in srub area was2.1%.
5. In all these villages the forest area is converted into the agriculture area. This study helps us to know at what extent the area under forest was decreased n between the November 1998 and 2007. So, there is need to pay attention towards conservation of forest area to maintain balance of over ecosystem.

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ARBOREAL DIVERSITY IN PUBLIC GARDENS OF JALGAON CITY

Patil K.D., Chaudhari D. B. and Rane G. M*

Department of Botany,Moolji Jaitha College Jalgaon, (M. S.), India.

Email: Patilkailash1112@rediffmail.com

ABSTRACT

Jalgaon is located in North Maharashtra region where the climate is hot throughout the year except few months of winter season. Public gardens are places of recreation & relaxation for the people. In Jalgaon city total 11 public gardens are maintained by Municipal Corporation. Out of these 11 gardens, four are most popular gardens viz. Bahinabai, Mahatma Gandhi, Mehrun, Dr. Shyama Prasad were extensively studied for arboreal diversity. Data obtained by frequent field visits shows diversity of tree, herbs, shrubs & climbers in these gardens. Identification of plants was performed using relevant literature. Total 5084 plants are recorded from these gardens. Highest number of trees are recorded from Mehrun garden - i.e.3547 followed by MahatmaGandhi garden i.e.683, Bahinabai garden, i.e.520, and Dr. ShyamaPrasad mukherjee garden i.e.334. Polyalthia longifolia B&H is the dominant species & recorded from every garden in large numbers. The plant directory of each garden is prepared.

KEYWORDS - Arboreal diversity, Public gardens, Polyalthia longifolia

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Like landscapes in miniature, gardens are set- aside areas of land where plants are grown to provide beauty and relaxation. Since ancient times, such places have nurtured for food and medicine. They reduce noise and air pollution in cities, and create a refreshing environment in hot climate. Glorious landscaped gardens can enhance the finest modern buildings and botanic gardens are the places of scientific study, besides the gardens have an ancient history. Jalgaon has a diverse climate. It is exceptionally hot and dry during summer with temperatures reaching as high as 47 ^{0}C. Jalgaon receives about 700 mm average rainfall during monsoons, which is followed by pleasant temperature in winter. Jalgaon city is having many public gardens maintained by the Jalgaon Municipal Corporation. Some of the popular public gardens are Bahinabai Garden, Mahatma Gandhi garden, Dr. Shyama Prasad Mukherjee Udyan and Shivaji Udyan.

METHODOLOGY

Surveying of these four gardens was performed with filed visits. Observation & recording of arboreal flora of the same gardens was done as traditional methods of studying diversity. Gardens were frequently visited during 2 months. Observation for

plants were recorded. Geographical location map was studied using survey map. Identification of some economically important plants was preserved with photographs and herbariums were prepared as reference material. Identification of plant species was performed with relevant literature.

OBSERVATIONS

All of the four gardens show distinct arboreal flora .Largest number of trees are present in Mehrun garden followed by Mahatma Gandhi, Bahinabai & Dr. ShyamaPrasad Mukherjee garden. In all the gardens *Polyalthia longifolia* B&H is the dominant species. In the diversity of the plants many fruit yielding, medicinally important as well as valuable for fodder, timber etc. are also present. In addition to this large number of avenue and ornamental trees were also observed. To increase the beauty of garden many herbs, shrubs & climbers are also cultivated in these gardens. 31Families of dicotyledons are dominant in which maximum numbers of plants are belonging to family Leguminosae. Monocotyledons & Gymnosperms are represented only by 2 families each.

CONCLUSIONS

1. In spite of high temperatures & water scarcity during summers in Jalgaon city, the gardens are rich in arboreal flora and 5084 plants are present in these gardens.
2. Plants belonging to 80 species of 67 genera are present in these gardens.
3. Bahinabai garden shows total 520 plants belonging to 34 genera & 37 species.
4. Mahatma Gandhi garden shows total 683 plants belonging to 30 genera & 32 Species.
5. Mehrun Garden shows total 3547 plants belonging to 64 genera & 77 species.
6. Dr. ShyamaPrasad Mukherjee Garden shows total 334 plants belonging to 26 Genera & 27 species.
7. 31 families of Dicotyledons & 2 families each from Monocotyledons & Gymnosperms are represented in these gardens.
8. *Polyalthia longifolia* B&H is the largely cultivated species.
9. Apart from ornamental, avenue, trees, medicinal, fruit and timber yielding plants are also present in these gardens.

RECOMMENDATIONS

1. Jalgaon Municipal Corporation has nicely maintained these public gardens but in Mahatma Gandhi garden and Mehrun garden still trees are cut for establishing recreation facilities or construction. This should be stopped
2. There are uncultivated or empty patches in these gardens which should be immediately planted by suitable tree species.
3. All the plants should have name plates for easy identification by common people.

4. In garden like Mehrun a separate section for medicinal plants can be established.
5. All the trees of Sandal wood should be well protected in Mehrun garden
6. The location map of public in Jalgaon city shows that all these gardens are located in the central part of city .The corners of the Municipal Corporation boundary are devoid of gardens so on priority basis some new gardens should be established in these areas.

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COMPUTER SCIENCE & INFORMATION TECHNOLOGY

A TOOL FOR CONVERSION OF KML FILE USING GOOGLE EARTH TO GIS SHAPE FILE

Kharche P. R., Attarde M. S. and Bhole L. Y*.

Department of Computer Science, M. J. College, Jalgaon, (M. S.), India.

ABSTRACT

Google Earth is a virtual globe, map and geographic information program that was originally called Earth Viewer. It maps the Earth by the superimposition of images obtained from satellite imagery, aerial photography and GIS 3D globe. Google Earth displays satellite images of varying resolution of the Earth's surface, allowing users to visually see things like city, road, river, water body etc. Most land (except for some islands) is covered in at least 15 meters of high resolution. The topological data i.e road, river, cannel etc. can directly digitize using Google Earth. Its advantage is that Google earth has latest satellite images. But the digitization is generating KML file. The KML file we need to convert Shape file to open in the GIS software like Arc-GIS, Erdas, fGIS. The tool for converting KML file to Shape file is developed in the Visual Basic 6.0. Is uses MapWinGIS control for generating Shape file from KML file.

KEYWORDS - Google Earth, KML (Keyhole markup language), Shape file, MapWinGIS, Visual Basic 6.0, GIS

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Google Earth is a virtual globe, map and geographic information program that maps the Earth by the superimposition of images obtained from satellite imagery, aerial photography and GIS 3D globe. This imagery can be digitize as a topographical data. It can be used in various research institute, government office, town planning, city survey, river mapping. Google Earth gives KML file for digitization. We need to convert it into GIS shape file. The tool is developed for the conversion of KML file to Shape file. It is developed into Visual Basic to give a GUI facility. The major development is done using MapWinGIS activeX control. It is a freeware OCX control which provides various functionality related to GIS shape file operations. KML, or Keyhole Markup Language, is an XML grammar and file format for modeling and storing geographic features such as points, lines, images, polygons, and models for display in Google Earth, Google Maps and other applications. XML is like database which contains (x, y) coordinate for the features. The tool reads the coordinates and using MapWinGIS control create new shape file.

METHODOLOGY

The following flowchart shows the methodology for the tool. The first flowchart is for creating KML file from Google Earth. The Second flowchart shows KML to Shape file conversion.

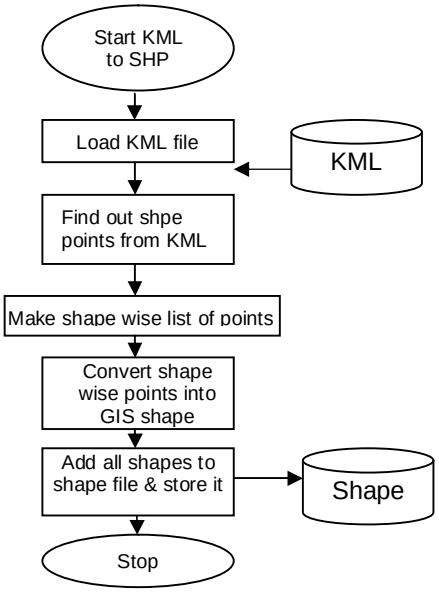


Diagram 1: Flowchart to create KML file.

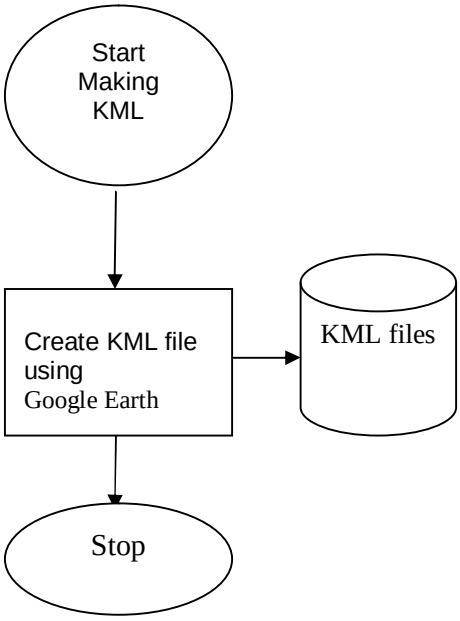
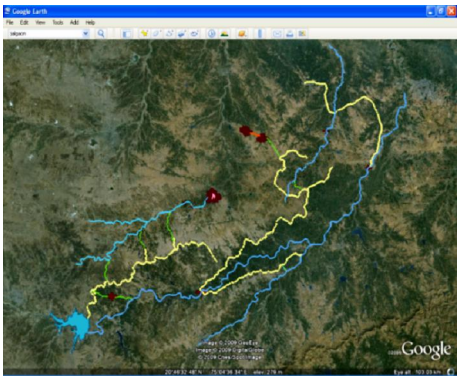


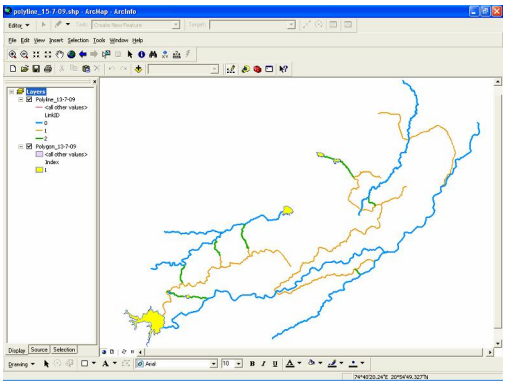
Diagram 2: Flowchart of a conversion of KML file into Shape File.

RESULTS AND DISCUSSION

The tool is GUI based, easy to handle, also very useful for the community. The tool is single window application also has a lot of scope for the development in future. The Google Earth has capacity to create a top sheet for the region with the accurate longitude and latitude and this tool has capacity to convert it into shape file.

The following images shows creation of KML file and conversion of it into Shape file.





CONCLUSION

Using Google earth and our tool user can digitize topography without survey and filed visit.

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MASTER PRACTICAL TIME TABLE GANERATOR

Chaudhari M.A, Kumbhar S. B., Waghulde S. P*.

Department of Computer Science and Information Technology,

M. J. College, Jalgaon, (M. S.), India.

ABSTRACT

The Master Practical Time Table Generator is developed in such a way that it will generate a Master Practical Time Table for S.Y. BSc. (Div A). This will make the batches of all the students as per requirement. It will also provide the timetables for different departments that come under Div. A (day-wise, subject-wise etc)and will also provide batch-wise roll call of students.

KEYWORDS : Customer Communication, Spiral Model, Risk Analysis

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

This software named Master Practical Time Table Generator has mainly been developed keeping in mind the requirements of different departments of the college. The S.Y. B.Sc. students are having many subjects in curriculum to study and it was very difficult to manage their practical time tables.

This is application software that has been developed using C++ as front end and Text File as backend.

This will require source file containing studentôs roll no., name, subject codes as a input and further operations as the requirement is there the files are created and using that files further operations regarding batches and day allocation is done successfully.

The whole and sole purpose of this project is to automate Practical time table generation process so that it will be helpful to reduce userôs stress about arranging the practical batch, overlapping of studentôs Practical time and subject. In this software there are allocations of students as per the following aspects:

- Day wise
- Subject wise and
- Batch wise

METHODOLOGY

Spiral Model was applied in the engineering process for this software; the detailed description of the steps followed is given below:

Customer Communication: Customer means a committee of faculty members who were in touch with the developments in the software and feedback was taken constantly, which helped us in further stages of software analysis and development

Planning: After initial requirements analysis and after each and every requested change by customer, the proper planning was done.

Risk Analysis: The risk involved in making changes was calculated (like time constraint). But during the whole course of development no such high risk change was made.

Engineering: After all the prerequisites were done, we did the actual coding and designing, which was most time consuming part.

Construction and Release: The software was constructed; an executable was made and was passed on to the user.

Customer Evaluation: The response of the user was taken, and some changes were suggested by the client, then whole cycle was repeated.

RESULTS AND DISCUSSIONS

After testing and many rounds of discussions with the client, results of the software are positive and are extremely encouraging.

The discussions were carried out on many issues like future enhancements like to develop this software for S.Y. B.Sc. (Div B) and other classes also.

CONCLUSION

1. The overlapping of day/ time of practical is avoided.
2. The main purpose to develop this project is to decrease the work which comes on teachers while developing the time table for students manually.
3. This project is useful to teachers to make time table for students studying in different departments.

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NETWORK DEVICE DETECTOR

Sayyed J. S., Sadikot T. J., Nagpure V. C*.
Department of Computer Science and Information Technology,
M. J. College, Jalgaon, (M. S.), India.

ABSTRACT

The Network Device Detector is developed keeping in mind the requirements of computer labs in educational institutes and colleges. If any new device is connected to the USB port or a CD is inserted into a CD-ROM of the client machine, a dialog box bearing a blinking warning message and the contents of the device or the CD is flashed on the server. The contents being displayed are not only the files and folders within the drive but also files and folders within a folder that is total contents are displayed. The blinking warning message contains the IP address of the client and the new drive name; it also specifies whether the inserted thing is device or a CD. A dialog box is also displayed if a device or CD is removed from the machine bearing the IP address of the concerned client and the drive name from which the device or CD was removed.

KEYWORDS - Memory Requirement, Processorôs consumption.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

This software named **Network Device Detector** has largely been developed keeping in mind the requirements of computer labs in educational institutes and colleges. But it can be used anywhere within a small network. It is networking software which is meant for network surveillance through server. This software has been developed using Java platform which promises platform independence.

METHODOLOGY

Spiral Model was applied in the engineering process of this software; the detailed description of the steps followed is given below:

Customer Communication: Customer means a committee of faculty members who were in touch with the developments in the software and feedback was taken constantly, which helped us in further stages of software analysis and development

Planning: After initial analysis and the requested change by customer proper planning was done.

Risk Analysis: The risk involved in making changes was calculated (like time constraint). But during the whole course of development no such high risk change was made.

Engineering: After all the prerequisites were done, we did the actual coding and designing, which was the most time consuming part.

Construction and Release: The software was constructed; an executable was made and was passed on to the user.

Customer Evaluation: The response of the user was taken, some changes were suggested by the client. then this whole cycle was repeated once again.

RESULTS AND DISCUSSIONS

After testing and many rounds of discussions with the client, results of the software are positive and are extremely encouraging.

The discussions were carried out on many issues like system requirements, memory consumption, impact of software on system speed and future enhancements.

CONCLUSION

Strengths

1. The breach of protocol by any client over a network cannot go undetected.
2. The contents of the device or CD displayed on the server can partially determine the purpose of the client.
3. Client never knows about the happenings.
4. Doesnôt require any specially trained person to handle it.
5. Server can smoothly do the other desired jobs simultaneously.

Limitations

1. If Server is located at distant place then the action canôt be taken instantly.
2. If used over a large network then the response time of the client increases so it advised that it must be used over small networks.

Future Enhancements

1. There must be an action taking mechanism so that if the server is located at a distant place then also instant actions can be taken.
2. Adding a database to the application which will keep the records of all protocol breaches made by the clients over the network.

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THEORY TIME TABLE FOR T.Y.B. Sc. (COMPUTER SCIENCE & INFORMATION TECHNOLOGY)

Harsole T. P., Jawale G.V., Sapkale E. R*.
Department of Computer Science and Information Technology,
M. J. College, Jalgaon, (M. S.), India.

ABSTRACT

The project, "Theory Time Table for T.Y. B. Sc. (Computer Science & Information Technology)" is an automatic generation of theory time table for Class T. Y. B. Sc. It generates time table for teachers and for the particular class as per the requirement.

KEYWORDS : Risk analysis, Customer Evaluation, Communication, Spiral Model

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Project is about to automate Theory Time Table generation process with the use of computer system. This is the best option to solve the difficulties which come while setting the Time Table manually. The software has been developed using Visual Basic 6.0. as front end and MS-Access as backend.

The purpose of this software is to automate Theory Time Table generation process so that it will be helpful to reduce overlapping of teacherôs schedule. It maintains records of teacherôs, classes and respective subjects.

METHODOLOGY

Spiral Model was applied in the engineering process of this software; the detailed description of the steps followed is given below:

Customer Communication: Customer means a committee of faculty members who were in touch with the developments in the software and feedback was taken constantly, which helped us in further stages of software analysis and development

Planning: After initial requirements analysis and after each and every requested change by customer proper planning was done.

Risk Analysis: The risk involved in making changes was calculated (like time constraint). But during whole course of development no such high risk change was made.

Engineering: After all the prerequisites were done, we did the actual coding and designing, which was most time consuming part.

Construction and Release: The software was constructed; an executable was made and was passed on to the user.

Customer Evaluation: The response of the user was taken, some changes were suggested by the client whole cycle was repeated once again.

RESULTS AND DISCUSSIONS

After testing and many rounds of discussions with the teachers, results of the software are positive and are extremely encouraging.

The discussions were carried out on many issues like future enhancements that to develop this software for all classes of all the departments.

CONCLUSION

1. The software is time saving and efficient for setting Theory Time Table.
2. The overlapping of teachers and subject is avoided.
3. This software will also be useful for teachers of different departments.

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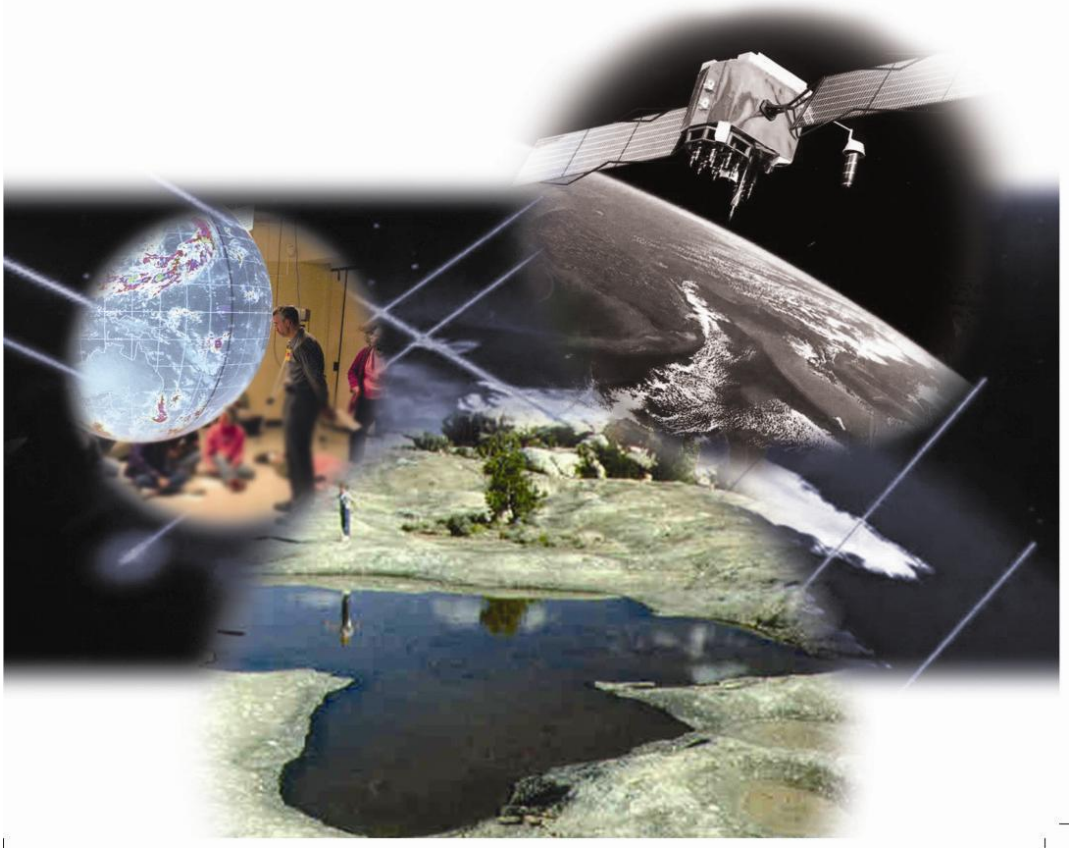
EARTH SCIENCES

- ENVIRONMENTAL SCIENCES
- GEOGRAPHY



ONLINE ADMISSION SYSTEM

Patil H.B., Zambre V. M. and Kulkarni S. A.*

Department of Computer Science and Information Technology,
M. J. College, Jalgaon, (M. S.), India.

ABSTRACT

In a typical admission system we first submit the form with true copy of marksheet. Then the official persons feed the data to generate a merit list. As per the merit list, the student fills the final admission form and gets it checked from the scrutiny committee. He has to pay the fees for the course selected by filling the challan, getting it countersigned and pay the amount in bank. After this, he has to submit the form along with required documents and a copy of challan. According to the information generated the roll no. is assigned to each student as per his choice of subjects.

In an online system, it saves time that is wasted in standing in the long queues. It saves the manpower by reducing the number of steps for the admission process as everything is computerized. There is no need of a Data Entry Operator. Easy payment modes are available for the payment of fees through safe transactions. As there is less paper work hence errors are minimized. This system is useful for students applying from foreign countries and outside state.

KEY WORDS - Data Entry Operator, online, system

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

In an online system, we have centralized all the processes related to admission. We have tried to reduce the manual work of verification and data feeding. Missing of forms and important documents will be avoided. More interactivity is provided to the applicant through a user friendly system. This system will work 24×7 during the days of admission i.e. more forms in less time. More transparency will be provided so that only eligible candidates will get admission. Effective use of database management system to eliminate the errors caused by manual processing of data. Only one authorized administrator has full rights to view information of student using application number. He is authorized to confirm the admission by verifying the documents and D.D.

METHODOLOGY :

The working of a typical online admission system is as follows:

Submit the online application form through the steps of general information, subject selection, payment details & take a printout of receipt generated. Make payment against the form no in the bank directly or attach a DD of the nationalized bank with the form receipt. Submit the printout of admission form with the required documents and

Demand Draft in the office (The designated officer will verify marks, documents and D.D. and confirm the admission on the server through administrator account.)

RESULT

After the process of admission the student admission form is submitted in table 1. When the administrator will confirm the admission after checking the documents and Demand Draft of Nationalized Bank the record of student will be transferred to the respective table of database. This final database can be used for any further reference e.g. allotment of roll no., time table generation, etc.

CONCLUSION

This online admission system involves seventy nine input fields of different data types. Whole admission system is managed by proper filing. Data duplication is put out of action by assigning a primary key field i.e. the application number. The system provides an user friendly handling and interface. Whole program is facilitated by keyboard as well as mouse wherever necessary. Manual work is less and system works on 24 x 7 basis.

Some of the future enhancements of this system can be :

1. Design the admission form for senior college.
2. Design the various queries like:
   i) No of students in a class
   ii) No of students in a division
   iii) Subject wise strength
   iv) Category wise strength,etc.
3. Allotment of Roll No and Practical Time Table (Roll No and password will be used as login information for the student)

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REMOVAL OF DYES AND METAL IONS FROM SYNTHETIC WASTEWATER BY USING NATURAL ADSORBENT

Patil J. R., Patil M.D. and Wankhede S. K.*

Department of Environment of Science,

Moolji Jaitha College, Jalgaon, (M. S.), India,

E-mail: Sandip.wankhede@rediffmail.com

ABSTRACT

Removal of Dyes and Metal ions such as Red 3BN, Yellow 2G, Chromium and Iron from synthetic waste water studied using tree leaves and activated carbon of tree leaves as an adsorbent at room temperature. Eight different kinds of tree leaves species and its activated carbon tested at the room temperature. The experiments were carried out with 5gm of 600mm sized powder in 60ml synthetic waste water containing 50ppm dyes and metal ions. The experimental results indicate that highest removal were in activated carbon tree leaves species that tree leaves. It was 75% Yellow 2G by activated Nilgiri leaves (Eucalyptus), 72% Red 3BN by activated Nilgiri leaves (Eucalyptus), 67% Iron (Fe^{++}) by activated Teak Leaves and 62% Chromium (Cr^{+6}) by activated Teak Leaves.

KEY WORDS - Adsorption, Dyes, Heavy metal ions, Tree leaves, Waste water.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Dyes are the color substance that has an affinity to the substrate to which it is applied. Due to their good solubility, synthetic dyes are common water pollutants and they may frequently be found in trace quantities in industrial wastewater. Examples of Dyes are Food dyes, Solvent Dyes, Organic dyes. Dyes production industries which used dyes and pigments generated waste water characteristically high in color and organic contain. Dyes are widely used in industries such as textile, rubber, paper, plastic, cosmetic etc. Among these various industries, textile ranks first in usage of dyes for coloration of fiber. Heavy metal refers to any metallic chemical element that has relatively high density and is toxic or poisonous at lower concentration. Example of heavy metals includes Iron (Fe++), Chromium (Cr+6).

Adsorption is the process by which a solid adsorbent can attract a component from the aqueous phase to its surface and there by form an attachment via a physical or chemical bond, thus removing the component from the aqueous phase.

MATERIAL AND METHODS

Tree leaves Preparation: - First the dry leaves and other Natural adsorbent were collected from various sites in clean plastic bags. Washed the dry leaves with distilled water and dried. Dry tree leaves were grounded with mixer. After grounding, the leaf particles were sieved and stored into plastic bags is sieved size 600mm and made ready for use.

Preparation of Activated Carbon: - Prior to activation, chemical activation using H_2SO_4 at moderately temperature carbon produce a high surface area and degree of micro priority. The materials were mixed in 1:1 weight ratio with concentrated H_2SO_4 and allowed to soak for 24 hrs at room temperature. The samples were placed in oven and heated at 103^0c. Where they were held for 24hrs after this sample were allow to cool back to room temperature. Then they were washed with distilled water and $NaHCO_3$ (1%) until p^H of the activated carbon reach at 7.

Preparation of Synthetic waste water: All the chemicals were of analytical grade, Spectrophotometer-166 (systronics), Shaker (REMI) and centrifuge (REMI, R-8C DX) were used to determined adsorbent of respective dyes. The artificial waste water containing Yellow 2G, Red 3BN were made in distilled water. The waste water containing Fe^{++} and Cr^{+6} was prepared in laboratory by dissolving a known of salt that is Cr^{+6} and Fe^{++} in distilled water. The two Dyes & Metal ion solutions are prepared in 50ppm concentrated solution. The salt used as $FeSO4.7H_2O$ and $K_2Cr_2O_7$.

RESULT AND DISCUSSION

Table 1: - Different tree leaves species (Fresh) as an adsorbent for removal from synthetic waste water.

Dyes/Metal ion Sol^n	Yellow 2G		Red 3BN		Cr^{+6}		Fe^{++}	
Initial Conc.	50 mg/lit		50 mg/lit		50 mg/lit		50 mg/lit	
Leaves	Contact Time (min)	% of Removal	Contact Time (min)	% of Removal	Contact Time (min)	% of Removal	Contact Time (min)	% of Removal
Mosambi	90	62	90	51	90	52	90	53
Tea Powder	90	69	90	49	90	49	90	38
Teak	90	59	90	53	90	55	90	58
Eggs Shell	90	35	90	37	90	40	90	14
Nilgiri leaves	90	69	90	65	90	53	90	54
Dadar	90	28	90	44	90	47	90	49
Sugarcane Baggage	90	53	90	47	90	49	90	47
Groundnut Shell	90	55	90	52	90	51	90	52

Table 1 represents the adsorption of the kinds of Dyes and Metal ions on eight of tree leaves reveals that different Dyes and Metal Ions on the same tree leaf had different removal rate. At the same experimental condition in Dyes are Yellow 2G and in Metal

ion Iron (Fe^{++}) had highest removal rate. It has been observed that the highest removal rate for Yellow2G (69%), Red 3BN (65%), Cr^{+6} (55%), Fe^{++} (58%).

Table 2 showed the result of adsorption of Dyes and Metal ions, Yellow2G, Red 3BN, Cr^{+6}, Fe^{++} on the eight kinds of activated carbon of tree leaves species. The Experimental results are tabulated in table 2. It reveals that at the same experimental conditions in Dyes are Yellow 2G and in Metal ion Iron (Fe^{++}) had highest removal rate for Yellow2G (75%), Red 3BN (72%), Cr^{+6} (62%), Fe^{++} (67%).

Table 2: - Different tree leaves species (Activated Carbon) as an adsorbent for removal from synthetic waste water.

Dyes/Metal ion Sol^{n}	**Yellow 2G**		**Red 3BN**		**Cr^{+6}**		**Fe^{++}**	
Initial Conc.	**50 mg/lit**		**50 mg/lit**		**50 mg/lit**		**50 mg/lit**	
Leaves	**Contact Time (min)**	**% of Removal**	**Contact Time (min)**	**% of Removal**	**Contact Time (min)**	**% of Removal**	**Contact Time (min)**	**% of Removal**
Mosambi	90	67	90	59	90	58	90	56
Tea Powder	90	71	90	56	90	56	90	41
Teak	90	65	90	62	90	62	90	67
Eggs Shell	90	47	90	47	90	44	90	18
Nilgiri leaves	90	75	90	72	90	58	90	58
Dadar	90	41	90	51	90	51	90	54
Sugarcane Baggage	90	60	90	57	90	54	90	56
Groundnut Shell	90	63	90	64	90	59	90	60

CONCLUSION

The study reveals that Activated Carbon is better adsorbent as compare to Fresh. A detail study on cost benefit is desirable for Activated Carbon. At time interval of 90 minutes the maximum removal are shows. The study shows that increase in contact time, the present of removal increase. After the time interval one state is come at which no further increase in removal even we increase contact time. That state is equilibrium state.

Yellow 2G - Maximum adsorption is 69% shown by fresh Nilgiri tree Leaves and Tea powder and at 90 minutes the adsorption is 75% by Activated Carbon Nilgiri tree leaves. i.e. ñNilgiri tree leaves have maximum capacity to remove the Yellow 2Gò.

Red 3BN - Maximum adsorption is 65% shown by fresh Nilgiri tree Leaves and at 90 minutes the adsorption is 72% by Activated Carbon Nilgiri tree leaves. i.e. ñNilgiri tree leaves have maximum capacity to remove the Red 3BNò.

Chromium (Cr^{+6}) - maximum adsorption is 55% and 52% shown by fresh Teak Leaves and Mosambi and at 90 minutes the adsorption is 62% and 58% by Activated Carbon Teak leaves and Mosambi peels. i.e. ñTeak leaves have maximum capacity to remove the Chromiumò.

Iron (Fe^{++}) - Maximum adsorption is 58% and 54% shown by fresh Teak Leaves and Nilgiri tree Leaves and at 90 minutes the adsorption is 67% and 58% by Activated Carbon Teak Leaves and Nilgiri tree leaves. i.e. ñTeak leaves have maximum capacity to remove the Ironò.

The study shows that the activated carbon is better adsorbent as compare to fresh adsorbent.

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HYDROGEOMORPHIC STUDY OF PURNA RIVER BASIN IN BULDHANA DISTRICT

Pachpande N. P., Patil G. R. and Jangle P. P*.

Department of Geography, M. J. Collage, Jalgaon, (M. S.), India.

ABSTRACT

Importance of ground water resources has been steadily increasing in various field, successive droughts during the recent past as well as the increase in population and their demands have put the ground water as a primary resources for human consumption, agriculture and industries. The unpredictable behaviour of ground water occurrence in hard rock arise and the effect of monsoon failure together with the over exploitation of rich agriculture areas have necessitated of cautions and planned approach for development and management of ground water resources.

In the present study with the help of cross section the potential ground water zones were identified. This help to promote irrigation activities and boosted the social and economy of the study area. It may help in improving the social status of the farmer.

KEY WORDS: Geomorphology, lineaments, recharge, Basalt, Stratiography, permeability, Aquifer.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

The study area is located between 20°23ô N to 21°17ô N. latitude and 75°57ô E. to 76°59ô E. longitude . It is part of Purna river basin lies in SOI toposheet of 55C, 55D. It receives rainfall between 70 to 90 Cm. Major part of the study area belongs to drought prone area. Agriculture is the main occupation of the people. Jawar, Bajara, Cotton, Pulses, Oilseeds, Maize are important crop grown under dry farming. The percentage of the total irrigated area is only 7%. As per land use detail net sown are occupies 73.80%. Purna river is the major perennial river while Nalganga, Vishwaganga, Dnyanganga, Banganga, Man, Mas, Bembla, Nipani, Kedar, Bardi are seasonal rivers.

METHODOLOGY

Literature regarding water resources of Buldhana district is collected by C.G.W.B. Nagpur, WALMI Aurangabad, Central water Commission, Pune. Bhujal Bhavan Pune. G.S.D.A. Buldhana, Irrigation Departments Buldhana, Census Handbook, Socio economic review, Jaykar library and M.J. Collage, Library, various journals, websites, magazines, news paper and books. Field work is completed during field visits. Premonsoon and Postmonsoon water level data have been collected by taking cross section from Vasad to Buldhana. The Collected data analyzed and presented in form of maps and diagram using different cartographic techniques.

RESULTS AND DISCUSSION

To get detail idea about Stratiography, geology, water level fluctuations a cross section from north to south across Purna river basin covering 70 km distance 20 wells were selected from different places.

It is observed that the wells located in the pidmont zone the fluctuation of groundwater in pre-monsoon period ranges between 12 to 14 meter. The wells located in alluvium the fluctuations of groundwater is less. The wells which are located in younger alluvium shows no fluctuation in water level. Towards Buldhana there is sudden decrease in alluvium deposition, the water table fluctuation is more. The above study shows that in the region of thick alluvial deposits there is a rich aquifer with good potential for ground water reservoir. The depth of ground water is more and very less seasonal fluctuations. But on the basaltic plateau the depth of ground water is less and more seasonal fluctuations in ground water level.

CONCLUSION

The Hydro geomorphic study reveals that the region occupied by quaternary to recent alluvium are having good potential for ground water and are favorable sites for the recharge of water such sites are found in alluvial plains along Purna river. In Purna alluvial deposits which contains sand, gravel having high decree of porosity and permeability. The artificial recharge methods like construction of percolation tanks, underground bandaras, contour bunding, nallah bunding, farm ponds may be constructed on a large scale so as to augment the ground water recharge. New sites may be selected in proximity of lineaments.

Mass awareness program should be taken up on large scale to educate the people regarding low yield of aquifer and declining trend of water level the study area. They should be educated to adopt appropriate crop planning.

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FOREST COVER MAPPING USING LISS – III DATA: A CASE STUDY IN PAROLA TALUKA, JALGAON DISTRICT, MAHARASHTRA

Patil J. M, Kaul H. A. and Mahendran V*.

JalaSRI ï Watershed Surveillance & Research Institute &

Department of Environmental Sciences, M. J. College, Jalgaon, (MS) India

E-mail: vm.jalasri@gmail.com

ABSTRACT

Remote sensing techniques have been used to segregate different forest types in the Khandesh region using IRS-P6 LISS III data relating to November 2007. The results demonstrated the capability of satellite remote sensing to delineate dense and open forest along with plantations through normal/stratified classification approaches. The approach is proved to be superior to other traditional classification techniques.

KEYWORDS - Forest Cover, Remote Sensing, GIS, GPS.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Forests perform a number of important roles in the global ecological system by preventing soil erosion, harboring wildlife, increasing air humidity, reducing wind velocities, moderating temperatures and providing watershed protection. But due to human interference in the natural forests, the number of trees per unit area as well as canopy closure is reducing day by day, which in turn affects the ecological status of the forests. Hence, changing conditions and change analysis are extremely important consideration for management, planning and inventory mapping. This was the reason to take up this challenging task for our study and use of Remote Sensing and Geographical Information system (GIS) made it attractive.

In contrast to the supervised classification, unsupervised classification requires very few inputs into the classification processes. The computer selects natural groupings of pixels based on their spectral properties. However, an unsupervised classification algorithm still requires user interaction, however these occur after the classification has been performed. In unsupervised classification, the user attempts to assign information classes to the spectral classes the computer has created. Several potential problems exist.

METHODOLOGY

First of all IRS P6 LISS-III image of resourcsat satellite, which is of November 2007 is georeferenced using ERDAS imaging 9.2. After this data set preparation process using the functions like subset, mosaic etc. done and digital image processing also to

enhance the clarity and information extractability from the satellite scene. Simultaneously some basic layer like settlement, rail, road, canal, river etc. also digitalized to prepare a base of study area. After this DIP unsupervised classification on 100 classes has been run in ERDAS Image. Then Editing → Clump → Eliminate → Recode etc. commands have been used. By these commands we prepared Agriculture, Road, forest and thus LULC map. Then this primarily developed map has been corrected by intensive ground truthing and a final map is prepared.

RESULT AND DISCUSSION

Finally the following results are obtained for the Landuse/Landcover of November 2007 for the study area. Result shows 6959.29 ha. area under dense forest, which is very less and a total of 821.82 ha. of open scrub. The results are shown class wise:

Class	Area (Ha)	Area (Sq. km)	Area (%)
River	2396.56	23.97	2.04
Current Fellow	9627.71	96.28	8.20
Crop Land	36404.70	364.05	31.02
Dense Forest	6959.29	69.59	5.93
Open Scrub	821.82	8.22	0.70
Barren Land	22142.10	221.42	18.87
Settlement	5574.58	55.74	4.75
Miscellaneous	33427.42	390.02	28.48
Total	**117354.18**	**1173.54**	**100.00**

Further for this a soil sampling is also performed to suggest the suitable plantation. The table below gives the information regarding the same:

Villages of Parola Taluka	Parameters				
	Physical			Chemical	
	Moisture content	Bulk density	Sp. Gravity	pH	Organic matter
Winchkheda	4.65%	1.42%	1.18%	8.86	10.86%
Undirkheda	4.10%	1.33%	1.09%	8.02	10.72%
Dhudpimpri	4.02%	1.56%	1.15%	8.62	10.92%
Chorvad	3.98%	1.71%	1.22%	8.71	11.22%
Devgaon	4.91%	1.89%	1.11%	8.22	11.61%

CONCLUSION

In this research, attempt has been made to study a suit of mapping methods relying on digital processing and the integration of remote sensing with GIS, to estimate forest cover. Finally, it can be concluded, that forest cover mapping with the help of RS & GIS provides us field in the laboratory and reduces the field visit. It is also cost & time effective. As advancements are happening in this technology the future in forestry studies is having lot of scope.

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FOREST COVER MAPPING USING LISS – III DATA: A CASE STUDY IN ERANDOL TALUKA, JALGAON DISTRICT, MAHARASHTRA

Sonar M. G., Pandey J. R. and Mahajan C. D.*

JalaSRI ï Watershed Surveillance & Research Institute &
Department of Environmental Sciences, M. J. College, Jalgaon, (MS), India
E-mail: cdm.jalasri@gmail.com

ABSTRACT

Remote sensing techniques have been used to segregate different forest types in the Khandesh region using IRS-P6 LISS III data relating to November 2007. The results demonstrated the capability of satellite remote sensing to delineate dense and open forest along with plantations through normal/stratified classification approaches. The approach is proved to be superior to other traditional classification techniques.

KEYWORDS - Forest Cover, Remote Sensing, GIS, GPS.

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INTRODUCTION

Forests perform a number of important roles in the global ecological system by preventing soil erosion, harboring wildlife, increasing air humidity, reducing wind velocities, moderating temperatures and providing watershed protection. But due to human interference in the natural forests, the number of trees per unit area as well as canopy closure is reducing day by day, which in turn affects the ecological status of the forests. Hence, changing conditions and change analysis are extremely important consideration for management, planning and inventory mapping. This was the reason to take up this challenging task for our study and use of Remote Sensing and Geographical Information system (GIS) made this attractive.

In contrast to the supervised classification, unsupervised classification requires very few inputs into the classification processes. The computer selects natural groupings of pixels based on their spectral properties. However, an unsupervised classification algorithm still requires user interaction, however these occur after the classification has been performed. In unsupervised classification, the user attempts to assign information classes to the spectral classes the computer has created. Several potential problems exist.

Methodology

First of all IRS P6 LISS-III image of resourcsat satellite, which is of November 2007 is geo-referenced using ERDAS imaging 9.2. After this data set preparation process

using the functions like subset, mosaic etc. done and digital image processing also to enhance the clarity and information extractability from the satellite scene. Simultaneously some basic layer like settlement, rail, road, canal, river etc. also digitalized to prepare a base of study area. After this DIP unsupervised classification on 100 classes has been run in ERDAS Image. Then Editing → Clump → Eliminate → Recode etc. commands have been used. By these commands we prepared Agriculture, Road, forest and thus LULC map. Then this primarily developed map has been corrected by intensive ground truthing and a final map is prepared.

RESULT AND DISCUSSION

Finally the following results are obtained for the Landuse/Landcover of November 2007 for the study area. The result shows 750.90 ha. area under dense forest, which is very less and a total of 3584.63 ha. of open scrub. The results are shown class wise:

Class	Area (Ha)	Area (Sq. km)	Area (%)
River	1151.75	11.52	1.16
Current Fellow	18322.64	183.23	18.47
Crop Land	35669.77	356.70	35.96
Dense Forest	750.90	7.51	0.76
Open Scrub	3584.63	35.85	3.61
Barren Land	8119.06	81.19	8.18
Settlement	2080.28	20.80	2.10
Miscellaneous	29525.40	295.25	29.76
Total	**99204.43**	**992.04**	**100**

Further for this a soil sampling is also performed to suggest the suitable plantation. The table below gives the information regarding it:

Villages of Erandol Taluka	Parameters				
	Physical			Chemical	
	Moisture content	Bulk density	Sp. Gravity	pH	Organic matter
1. Bilkheda	4.36%	1.29%	1.02%	8.20	10.92%
2. Erandol	3.89%	1.39%	1.13%	8.12	10.85%
3. Pimpri	3.92%	1.66%	1.21%	9.23	11.32%
4. Khadaka Kh.	4.86%	1.72%	1.17%	8.50	11.44%
5. Varad Bu.	4.48%	1.74%	1.06%	8.44	11.19%

CONCLUSION

In this research, an attempt has been made to study a suit of mapping methods relying on digital processing and the integration of remote sensing with GIS, to estimate forest cover. Finally, it can be concluded, that forest cover mapping with the help of RS & GIS provides us field in the lab and Reduces the field visit. It is also cost & time effective. As advancements are happening in this technology the future in forestry studies is having lot of scope.

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5. Pontius R., Land-use and land-cover change
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AGRICULTURAL LAND USE AND POPULATION IN JALGAON DISTRICT

Patil P.T., Patil N.V. and Bharambe S.N.*

Department of Geography, M. J. College, Jalgaon, (M. S.), India.

ABSTRACT

Land use in Jalgaon district has been largely agricultural dominated more or less subsistence economy. On the other hand, the district experienced a rapid increase in its total population during the last few decades exerting heavy pressure on its agricultural land use. It's land man ratio which is fast changing and deteriorating making it interesting to trace the changing relationship between the agricultural land use and population from the past to the present , revealing the dynamics of these relationships. The result, thus obtained, shows that, the Jalgaon district is overpopulated to the existing extent of sown hectare. There is little possibility of horizontal expansion of farmland due to physical constraints. In order to step up productivity efforts should be made for its vertical extension by increasing agricultural potentiality. Use of chemical fertilizer, HYV seeds and irrigation facilities etc. raise their income more than five fold as compared to one where traditional methods have been in use. There is obvious need for meticulous agricultural planning and its implementation in appropriate measure in the area. A better land use duly supported by efficient agricultural productivity can sustain the increasing population.

KEY WORDS - Land use , Correlation.

* Address to whom the correspondence should be made (supervisor).

INTRODUCTION

Agricultural land use and population, its management and relationship is basic problem of Modern developing India. Today's complex world in the domain of utilization of socio-economic geography as in other discipline a rational and assessment of land has become pre-requisite with a view to a basic resource within and upon which human activities are carried out. In agricultural perspective the world's cultivated land are limited while population is growing rapidly and consequently with the passage of time each one of us will get less food, fuel and fodder. In order to meet this challenge a rational and efficient use of agricultural land need to be given top priority in its developmental strategy and planning.

HYPOTHESIS

The nature and objectives of the problem gave rise to the following hypothesis for testing -

1) Population plays vital role in determining the nature and merit of land utilization in early stages of land use development under subsistence system but its relations are

vice-versa in the following later stages.

2) The deteriorating agricultural land-man ratio by the large is synonymous with poverty and backwardness in regional development but it may not be necessarily true in all the situations.

METHODOLOGY AND DESIGN

The analysis has been comprehended with the help of suitable descriptive and cartographic techniques. Various maps, diagrams, graphs and other illustrations have been prepared at different levels and scales to elucidate variety of geographic aspects and even analysis with some preference given to quantitative and qualitative maps especially those employing isopleths and chloropleth techniques.

The correlation matrix and multivariable analysis as complementary tools have also been both for cross-checking and analyzing the inter-relationships. The data have been processed by the computer.

Database - The study is based on data and information collected from various secondary and primary sources. Secondary data are from various officials sources mostly ranging between 1961-2001. Census of India publications of 1951,1961, 1971, 1981, 1991, 2001 have been extensively as well as intensively used for analysis of population figures required for the district and the unit area under study.

RESULT AND ANALYSIS

Agricultural land use and Population Variables and their abbreviations

Sr. No.	***Particulars***	**Abbrevi-ations**
	Agricultural land use variables	
A_1	Forest land as % of total area	FRA
A_2	Area not available for cultivation as % of total area	NAC
A_3	Other uncultivated land as % of total area	OUA
A_4	Fallow land as % of total area	FWA
A_5	Net sown area as % of total area	NSA
A_6	Cultivated land as % of total area	CLA
A_7	Area cropped more than once as % of NSA	CMTO
A_8	Irrigated land as %NSA	IRN
A_9	Fallow land as % of cultivated land	FWC
A_{10}	Cultivated land in ha per 100 persons	CAP

Sr. No.	Particulars	Abbrevi-ations
	Population variables	
P_1	Density of population-persons per km^2	DPK
P_2	S.C. population as % of total population	SCP
P_3	S.T. population as % of total population	STP
P_4	Literacy as % of total population	LTP
P_5	Workers as % of total population	WOP
P_6	Cultivators as % of total workers	CLW
P_7	Agricultural labourers as %of total workers	ALW
P_8	Number of useful wells per 100 ha of total area	UWA
P_9	No. of electric and diesel pumpsets per 100 useful wells	PUW
P_{10}	No. of tractors per 1000 ha of cultivated land	TRC

Table - Correlation Matrix (See on next page)

SUMMARY AND CONCLUSION

The objective of this research is to analyse the associations and interrelationship between the variables of agricultural landuse and variables of population. The following results have been obtained from the foregoing analysis ï

1) Agriculture is by far the most important occupation of the people of Jalgaon district and an important land use. On an average, the agricultural land accounts 78.15% of the total area of the district during the year 2001.

2) The density of population has been found to be 313 (2001) persons per sq.km. and it is highly concentrated in the tahsils of Jalgaon (695), Bhusawal (490), Raver (426) and Yawal (376) which are located along the Tapi river and belt of deep cotton soil which provide strong base for intensive cultivation.

3) Total per capita land is 0.61 hectares. Taking the 2001 rural population, attempt should be made to increase the amount of agricultural land. The physiological density of an area was increased substantially from 102 per sq.km. in 1961 to 418 per sq.km. in 2001.

4) High or low percentage of other uncultivated land in the area under study with similar population density and in years to come might further decrease. Jalgaon district showed a decrease from 7.01% i.e. 81800 ha in 1960-65 to 5.46% i.e. 63500 ha in 1998-2001.

5) Net area sown increased from 80300 hectares to 81500 hectares during the period of investigation. Out of the total geographical area, 70% of area was under NSA. Per capita NSA varies from tahsils to tahsils. It decreased from 0.45 hectare in 1961 to 0.37 in 1971, 0.30 in 1981, 0.238 in 1991 and 0.214 in 2001.

Correlation matrix of agricultural land use and population association (Region)

Variables	P1	P2	**P3**	P4	P5	P6	P7	P8	P9	P10
	DPK	SCP	STP	LTP	WOP	CLW	ALW	UWA	PWA	TRC
A1 FRA	-0.19*	-0.14	0.10	-0.19*	-0.15	-0.06	-0.10	-0.23**	-0.15	0.03
A2 NAC	-0.20*	-0.21**	0.34***	-0.24**	0.07	0.23**	0.03	-0.22**	-0.13	-0.05
A3 OUA	-0.13	0.15	-0.34****	0.24**	0.11	-0.17*	0.07	0.04	0.17*	0.04
A4 FWA	0.05	0.22	-0.17*	0.10	0.03	-0.13	0.00	0.03	0.11	0.07
A5 NSA	0.46****	0.11	-0.13	0.18*	0.05	-0.08	-0.04	0.39****	0.06	0.05
A6 CLA	0.45****	0.22**	-0.19*	0.21**	-0.04	0.13	0.03	0.38****	-0.12	-0.08
A7 CMTO	0.00	0.02	-0.08	0.17*	0.09	-0.07	0.19*	-0.10	0.20*	0.09
A8 IRN	-0.15*	0.13	-0.27***	0.31***	-0.07	-0.19*	0.00	0.12	0.15	0.13
A9 FWC	-0.11	0.13	-0.07	0.02	0.02	-0.10	0.08	-0.10	0.05	0.09
A10 CAP	0.41****	0.09	0.04	-0.08	0.06	0.17*	0.12	-0.27***	-0.12	-0.05

Level of Significance - 0.10 = * , 0.05 = ** , 0.01 = ***, 0.0001 = ****

[Source : Compiled by Author.]

Positive change in landuse efficiency was observed. It was 106 in 1960-63 and increased by 23 i.e. 129 in 1998-2001.

Agricultural density of the district was 81 persons per sq. km. in 1961 and increased up to 108 persons per sq. km. in 2001.Food crop density was substantially increase from 262 in 1961 to 605 in 2001. The highest caloric density recorded above 700 persons per sq. km. in Jamner tehsil. The results, thus obtained, show that, the Jalgaon district is overpopulated to the existing extent of sown hectarage. There is little possibility of horizontal expansion of farmland due to physical constraints. In order to step up productivity efforts should be made for its vertical extension by increasing agricultural potentiality. Use of chemical fertilizer, HYV seeds and irrigation facilities etc. raise their income more than five fold as compared to one where traditional methods have been in use. There is obvious need for meticulous agricultural planning and its implementation in appropriate measure in the area. A better land use duly supported by efficient agricultural productivity can sustain the increasing population.

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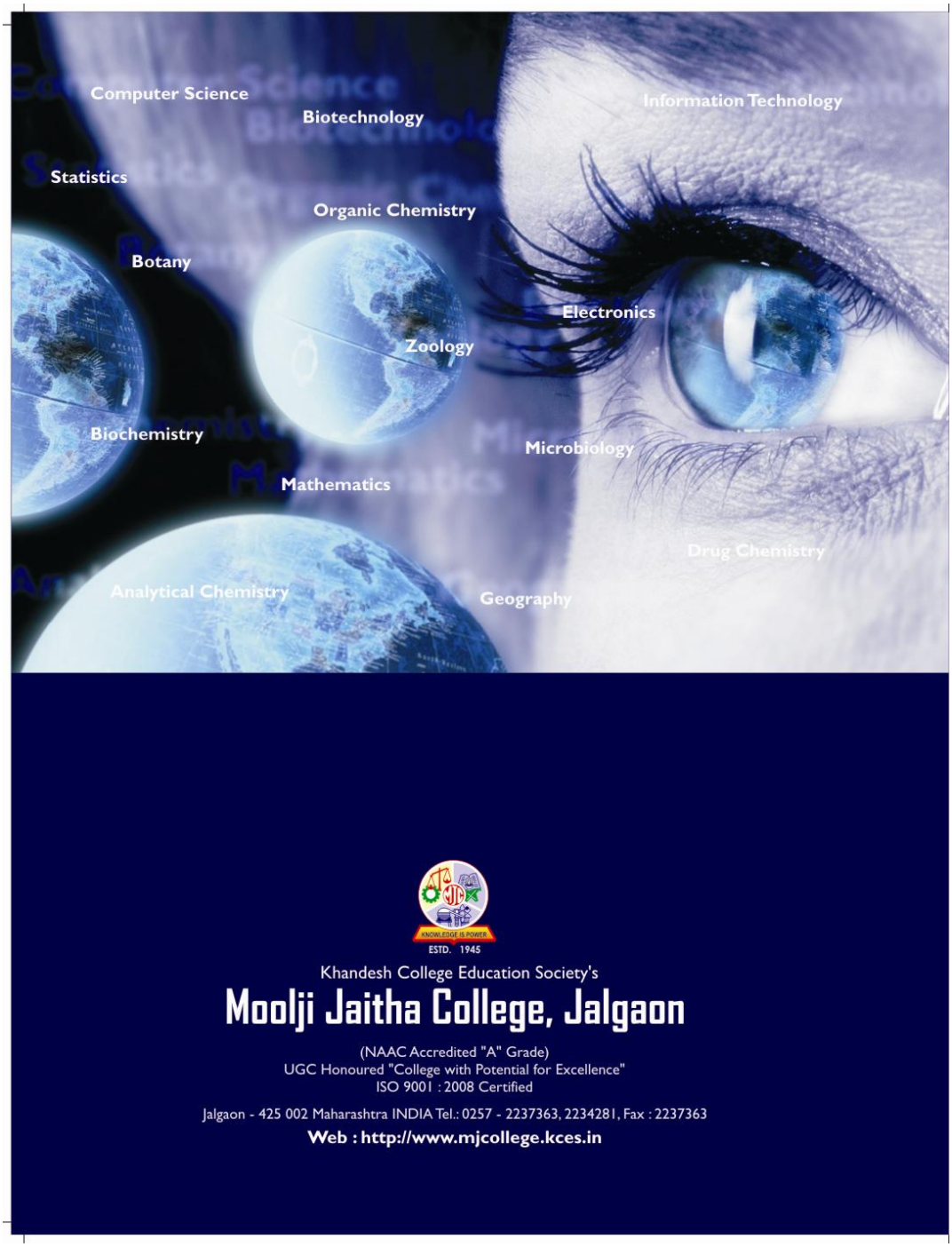
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