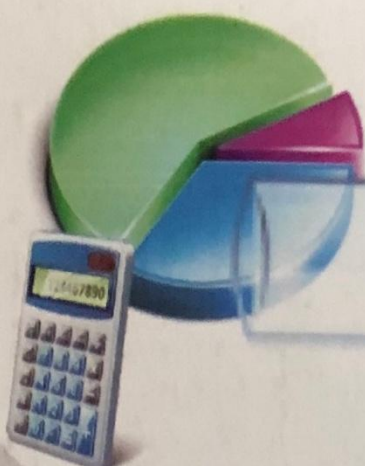


Volume 1- 2014

ISBN 978-81-929897-0-9



SANSHODHANA



Since .1989



Devoted to Serve

ROYAL COLLEGE
OF ARTS, SCIENCE & COMMERCE

Empowerment through Value Education



ISBN 978-81-929897-0-9

SANSHODHANA

VOLUME - 1, 2014

Since 1989



Devoted to Serve

ROYAL COLLEGE OF ARTS, SCIENCE & COMMERCE

Empowerment through Value Education

Compiled By:

Dr. Chitrlekha Amin

Prof. Aqueela Qureshi

Everything is determined by forces over which we have no control.

It is determined for the insect as well as for the star.

Human Beings, Vegetables, Cosmic Dust,

We all dance to a mysterious tone,

Intoned in the distance by the mysterious piper.

Albert Einstein

PREFACE

Quality has become the defining element of education in the 21st century. In the context of the present social order, research has become one of the primary factors that determines quality of any Institution of higher education.

The research initiatives by teachers and the stimulating ideas and enthusiasm transpired to students consequently, go a long way to create a society of enlightened youth with high academic index and awareness quotient.

This publication of Research work is a humble effort of us that seeks to harness intellectual labour, creativity and meaningful experimentation of our teachers in their respective fields. Over and above reflecting their deep love for subject knowledge and sincere efforts at innovations in academics, many of these research also reflect their genuine concern for environment and sustainable development. I am very proud to state that eco-consciousness is an integral part of Royal College culture.

We do hope you have an enlivening experience going through our research work and also feel stimulated with the new ideas and make your own contribution to further human knowledge & evolution.

Principal

SANSKODHANA- VOLUME 1, 2014 ISBN 978-81-929897-0-9

CONTENTS

| | Page No |
|---|---------|
| 1 Proceedings of UGC sponsored National Level seminar on "New Methodologies in Chemical Education" NMCE 2011 | 1-7 |
| 2 Study of Micro-Flora on the Lid Surface of Canned Beverages Makba M. Farhaan(Research Paper)* | 8-14 |
| 3 Abstracts of Papers presented at National Level and International Conferences (2011-12) | 15-17 |
| 4 Proceedings of UGC sponsored National level seminar on Information technology, convergence and services ITCS 2012 | 18-27 |
| 5 Study of Heavy metal tolerance of Halophilic bacteria Vilasini Gaode (Research Paper)* | 28-38 |
| 6 Effect of Long term use of Synthetic fertilisers on the Cation Exchange capacity of farming soils of Vasai region Dr. Juliet Miranda, Dr. Chitrlekha Amin .(Research Paper)* | 39-47 |
| 7 Qualitative and Quantitative assessment of Commercial samples of Abharak and Trivangabhasma. Dr. Chitrlekha Amin, Dr. Juliet Miranda (Research Paper)* | 48-60 |
| 8 Socio –Economic Profile of Koli Women: A study of Naigaon Village Dr. Raju Kurien, Ravishri Mishra (Abstract)* | 61-63 |
| 9 Study of Diversity of Soil Micro Anthropods near and around Mira road region Ravindranath G (Research Paper)* | 64-70 |
| 10 Isolation and Identification of halophilic/halotolerant organisms having the potential to produce Xylanase, Zamanat Sayyed (Research Paper)* | 71-80 |
| 11 Abstracts of Papers presented at National Level and International Conferences (2012-13) | 81-106 |
| 12 Abstracts of Paper Publications | 107-108 |

* University of Mumbai sponsored Minor Research Project

National Level Seminar
On
'New Methodologies in Chemistry Education'
Organized by
Department of Chemistry
Royal College of Arts, Science & Commerce
Tuesday 20th December 2011

Details of Proceedings

A one day UGC sponsored National Level Seminar on 'New Methodologies in Chemistry Education' was organized by Department of Chemistry, Royal College, Mira Road on 20th December' 2011 in Collaboration with Association of Chemistry teachers (ACT)

The seminar was organized to highlight the need to implement 'New Methodologies in Chemistry Education' amongst the academia. The focus of the seminar was to make the teaching community aware of the changing learner characteristics and learning environment in the global context.

The seminar was attended by 58 delegates from colleges in Maharashtra.

The Chief Guest of the seminar was Prof. (Dr) R.T. Sane Retd Principal, Ruia College, Director Research & Development Centre, G.N. Khalsa College. In his address Dr. R.T.Sane emphasized that in view of the changing global scenario university syllabi must be treated as mere guidelines. He stressed on the need to introduce autonomous add-on courses in colleges which match the needs of the industry. He stressed the need to train the students in the aspect of knowledge management in today's age of knowledge explosion. Dr. R.T. Sane also informed the audience about the importance of inter-disciplinary courses and the development of research culture among teachers and students.

The Keynote address on 'A New Approach to teach Organic Chemistry' was delivered by Prof. P.S. Kalsi, former Dean, Punjab Tech University. In his address he indicated that the boundaries in the field of chemistry need to disappear. He enlightened the audience about the fact that students must be given conceptual knowledge to read and understand the subject in hand on their own. A strong correlation between theory and practice should be the firm foundation of Chemistry teaching. He also mentioned that in the changing scenario a student must be credited for his approach to solve a question rather than for arriving at the correct answer. Prof. P.S. Kalsi went on to explain how concepts in like structure determination, reaction mechanism, and stereochemistry must be taught in reference to each other to give students a more complete and holistic perspective of the subject.

The speaker for session II was Dr. S. Sivaram, CSIR Bhatnagar Research fellow at NCL Pune. The theme of his talk was 'Emergence of Integrative Science Challenges to Chemistry Education'. Dr. S. Sivaram expressed that chemical science has transformed our world and our ideas. He informed the audience that education in Science must cultivate curiosity, a power of observation and the courage to ask questions. He felt that more often failure in Science is rooted in not having asked an important question rather than not having arrived at the right answer. Dr. S. Sivaram also focused on the need for more women being at the forefront in the field of science. His lecture also attempted to define the framework of integrative science and the issues that need consideration while defining a teaching pedagogy. Newer methods of communicating chemical science will need extensive teacher reorientation and curriculum reform.

In the III session, Prof. Dr. Anil Kumar, Department and Center for Excellence in Nanoelectronics, IIT Mumbai, spoke on the topic 'The Art of Active Learning and Research'. The talk was aimed at encouraging teachers to take up research. His talk involved some classical examples of research breakthrough from history. Prof. (Dr) Anil Kumar gave several examples of how topics like phosphorescence, absorbance, and optical activity can be taught in the class room by taking up day to day life illustrations. The talk left the audience with many research ideas which are still looking for solutions.

Four papers on the theme and sub theme of the seminar were presented in the last session. The details are as follows:-

- 1) New Methodologies in Chemistry Education by Dr. RanjeetKaurG.N.Khalsa
College.
- 2) Greener Approach in Synthesis of Inorganic Complexes, B. Arora, A. Anthony, M.D.
College.
- 3) Implementing Spread Sheet Simulation for class room teaching of Practical Aspect of
HPLC. Chromatogram D.R. Shinde, P.S. Tambd, Prof. R. More College.
- 4) Mixed Ligand complexes of Zinc with 8-Hydroxy Quinoline and some amino acids.
A. Bodhke & S. Patil - C.K.T. College.

The Seminar was extremely productive as it threw up new vistas in the field of chemistry education. It promoted awareness amongst the academia about the need to branch out in new directions while imparting chemical education.

MIXED LIGAND COMPLEXES OF ZINC WITH
8-HYDROXYQUINOLINE AND SOME AMINO ACIDS

Akalpita S. Bodkhe, Sunil S. Patil

Department of Chemistry,

Changu Kana Thakur Arts, Science and Commerce College, Panvel

ABSTRACT

Mixed ligand Zn(II) complexes of the type $[M(Q)(L).2H_2O]$ have been synthesized using 8-hydroxyquinoline (HQ) as a primary ligand and N- and/or O- donor amino acids (HL) such as L-threonine, L-proline, L-hydroxyproline L-isoleucine and L-serine as secondary ligands. The metal complexes have been characterized on the basis of elemental analysis, electrical conductance, room temperature magnetic susceptibility measurements, spectral and thermal studies. The electrical conductance studies of the complexes in DMSO in 10^{-3} M concentration indicate their non-electrolytic nature. Room temperature magnetic susceptibility measurements revealed diamagnetic nature of the complexes. Electronic absorption spectra of the complexes shows intra-ligand and charge transfer transitions. The thermal analysis data of the complexes indicate the presence of coordinated water molecules. The agar cup method and tube dilution method have been used to study the antibacterial activity of the complexes against the pathogenic bacteria *S. aureus*, *C. diphtheriae*, *P. aeruginosa* and *E. coli*. The results have been compared with those of tetracycline, which was screened simultaneously and indicated moderate antibacterial activity of the complexes.

**Implementing Spreadsheet Simulation for Classroom Teaching of Practical Aspects
of HPLC Chromatogram**

D.R. Shinde, P.S. Tambde,

Department of Chemistry,

Prof. R. More College

Abstract

The objective of this article is to illustrate effects of experimental conditions on HPLC chromatogram with the help of interactive spreadsheet simulation. The output of HPLC instrument is a graph called as chromatogram which is always governed by tabular information regarding it. A virtual experiment is designed in MS-Excel ® spreadsheet of which output exactly same as that of the HPLC instrument. Simulation demonstrates the effect of various virtual experimental conditions in HPLC experiment on characteristics of chromatogram. Like actual laboratory experiments, spreadsheet simulated chromatogram and tabular information is used for various quantitative calculations. Quantitative calculations are used further for predicting effects of experimental conditions on characteristics of chromatogram. The teachers' feedback on simulation showed that such spreadsheet generated HPLC experiment is helpful for teaching in classroom.

New Methodologies in Chemistry Education**Ranjeet Kaur****Department of Chemistry,****G.N.Khalsa College, Mumbai**

Conceptual understanding in chemistry is related to the ability to explain chemical phenomena through the use of *macroscopic, molecular and symbolic* levels of representation and thus assigning meaning to the unseen and the intangible things. The result is students develop scientifically unacceptable conceptions about many subjects or concepts in chemistry.

Bridging the gap between chemistry education research and teaching practice, attention to technological tools that appeal, to the *sense organs* and which require interaction with the learner in educational environments is the need of the hour.

The following new methods are thus proposed

1. ICT (Information and Communication Technology)

- a. ***Animation, Simulation, and Video and Multimedia resources:*** The software Designs must consider both a student's prior knowledge and the development of knowledge over the course of the student's learning process.
- b. ***Dedicated chemistry messengers services with eminent scientists/academicians available online via internet, mobile.***

Through ICT, students rearrange their thoughts about chemical phenomena and processes and build meaningful **mental models**. The ***mode of education is thus switched from teacher-centered learning to student-centered learning***. In student-centered learning, instead of remaining passive, students **actively participate** in the learning process, lots of opportunity for group work is provided.

2. Television: *Exclusive channel dedicated to Chemistry* education right from elemental to research level.

3. Radio: *An FM channel should be launched* providing platform for the interaction of students with scientist/academicians, job etc.

4. Touch and Feel method: The students should be provided hands on experience on the topic to be covered.

Key words: **sense organs, ICT, mental models, student -centered, Television, Radio, Touch and Feel method**

GREENER APPROACH IN THE SYNTHESIS OF INORGANIC COMPLEXES

**B. Arora, A. Anthony,
Department of Chemistry,
M.D. College, Mumbai**

The Chemists all over the globe are motivated not only for the environmentally benign synthesis of new products but also to develop green synthesis for existing chemicals. This has been possible by the replacement of the organic solvents, which are hazardous or eliminate the use of solvent altogether. Bringing green chemistry to the class room and the laboratory will have the desired effect in educating the students at various levels about green chemistry.

Substantial improvement in education in response to the changes in society and industry can be achieved by careful curriculum development. Chemistry has become an all pervading science and chemists are employed in almost all types of industry and take up research career in all frontier areas of science. Several procedures for the preparation of metal complexes with acetyl acetone, dimethylglyoxime, oxine, ethylenediamine etc. are existing, but, most of them have not addressed the green chemistry issue. They are associated with generation of pollutants, required of high reaction temperature, low yields, lack of generalized procedure, etc. Hence, there is a demand for developing an efficient, convenient, and non-polluting or less polluting alternative method for the preparation of these complexes. At the same time undergraduate programme in chemistry has to be designed in such a way that the candidates develop a creative mind, sound understanding of the fundamentals along with entrepreneur skills, which are the basic requirements for the industry. Keeping all these ideas in mind, practical syllabus for the undergraduate course in chemistry at Mumbai University was developed. The existing methods of preparation of complexes has been replaced by methods using 'GREEN CHEMISTRY PRINCIPLES', for few of the complexes .e.g. Tris- (acetylacetonato) iron (III), Nickel dimethylglyoximate. Further this effort will be continued to prepare all the complexes using green chemistry principle

Study of Micro-Flora on the Lid Surface of Canned Beverages

Makba M. Farhaan

Dept. of Microbiology,

Royal College of Arts, Science and Commerce, Mira Road.

Abstract

Several canned beverages from various types of stores were analyzed for the load of microorganisms on the top surface of the cans to get an estimate of the number and types of organisms which may be present of the lid surface of canned beverages. Various selective and differential media were used for detection and isolation of pathogens from the surface of cans.

Introduction :

Canned drinks have become an important part of our life. With the increasing popularity of ready to drink beverages a variety of canned drinks are available over the counter. Though the drink inside the can is processed thoroughly and free from any kind of spoilage or damage, during storage microorganisms from the air settle on the surface of the cans leading to an increase in the microbial load on the surface. The 'peel-off seal' on the can surface may also shelter some microbial load. The sanitary condition during the storage of the product is of great concern as chances of contamination and presence of pathogens may increase the risk of spreading health hazards and may prove dangerous to the consumer. Hence, this project was taken up to get an estimate of the number and types of organisms which may be present of the lid surface of canned beverages.

Materials and Method :**Sampling Plan :**

Random sampling of variety of commercial canned drinks from retail outlets like malls and shops was carried out. The samples included aerated and non-aerated soft drinks, hard drinks, energy drinks and milk based drinks. The details of each sample purchased were recorded and they were analysed within 24 hours. Each sample was allotted a code for further reference. A total of 18 samples were used. The details are listed below.

SAMPLE DETAILS: Table 1

| Sr. No. | Type of Beverage | Name | Place | Area | Sample Code |
|----------------|-------------------------|-----------------|--------------|-------------|--------------------|
| 1. | Aerated Soft drink | Mirinda | Store | Andheri | AST01 |
| 2. | Aerated Soft drink | Pepsi | Store | Andheri | AST02 |
| 3. | Hard drink | Carlsberg | Store | Andheri | HST03 |
| 4. | Hard drink | Kingfisher | Store | Andheri | HST04 |
| 5. | Energy drink | Red Bull | Store | Andheri | EST05 |
| 6. | Energy drink | Red Bull | Super market | Mira Road | ESM06 |
| 7. | Non-Aerated Soft drink | Orange | Super market | Mira Road | NASM07 |
| 8. | Non-Aerated Soft drink | Pineapple | Super market | Mira Road | NASM08 |
| 9. | Aerated Soft drink | Thumbs up | Store | Mira Road | AST09 |
| 10. | Aerated Soft drink | Pepsi My Can | Store | Mira Road | AST10 |

| | | | | | |
|-----|---------------------------|--------------------|-------|-----------|--------|
| 11. | Non-Aerated Soft drink | Pineapple | Store | Mira Road | NAST11 |
| 12. | Non-Aerated Soft drink | Mixed fruit | Store | Mira Road | NAST12 |
| 13. | Milk Product | Kool Café | Mall | Mira Road | MDM13 |
| 14. | Milk Product | Kool Milk Shake | Mall | Mira Road | MDM14 |
| 15. | Non-Aerated Soft drink | Mango | Mall | Mira Road | NAM15 |
| 16. | Non-Aerated Soft drink | Orange | Mall | Mira Road | NAM16 |
| 17. | Aerated Soft drink | Pepsi My Can | Mall | Mira Road | AM17 |
| 18. | Aerated Soft drink | Fanta | Mall | Mira Road | AM18 |

Determination of the Microbial Load :

The can surface may harbor organisms from the air, from handlers or from rodents during storage. It is necessary to determine the load of organisms on the surface as the consumer's health would directly be affected by the presence of large number of organisms which may include pathogens. Hence, **Total Viable Count (TVC)** was determined from the surface(1). Each can was swabbed using a sterile cotton swab and the organisms were suspended in two ml of sterile physiological saline. A ten-fold serial dilution of sample was carried out depending upon the turbidity of the sample. One ml aliquot from last three tubes of each diluted sample was used to determine the average number of organisms present in each sample by pour plate method using standard plate count agar. The plates were incubated at

room temperature upto 48 hours. The colonies developing on each plate were counted and recorded as colony forming units (**cfu**) the results are as in table 2.

Detection of Potential Pathogens

The presence of pathogens on the surface of canned beverages may increase the risk of spreading health hazards and may prove dangerous to the consumer. Hence, various selective and differential media were used for detection and isolation of pathogens from the surface of cans. The following media were used (4).

Salt Mannitol Agar (SMA): Selective and differential medium used for detection of pathogenic *Staphylococcus*. Staphylococcal food poisoning cases are usually caused by the organism *Staphylococcus aureus*. However, the incidence of infections due to *Staphylococcus epidermidis* and other coagulase-negative staphylococci has been steadily increasing in recent years.

Mac Conkey Agar (Mac): Selective and differential medium used for detection of lactose fermenting and non-fermenting enteric pathogens like *E. coli*. This organism normally occurs in the human and animal intestine and it is natural to assume that their presence indicate recent contamination due to unhygienic conditions.

Salmonella-Shigella Agar (SS): Highly Selective medium used for detection of pathogenic *Salmonella and Shigella*. These are important intestinal pathogens responsible for gastrointestinal tract outbreaks.

Cystine Lactose Electrolyte Deficient Agar (CLED): This medium was used for detection of *Proteus* and *Bacillus.B. cereus* is responsible for a minority of foodborne illnesses (2–5%), which occur due to survival of the bacterial endospores.

The surface of the canned beverages was swabbed with sterile cotton swabs and inoculated on all the above mentioned media for isolation of potential pathogens. All the plates were incubated at 37°C for 24 hours. The colony characteristics of the isolates were studied. The results are as in table-3

Observations and Result:

Table 2

| Sr. No. | Sample Code | Total Viable Count | |
|---------|-------------|---------------------|--------------------------|
| | | cfu/ml | organism/cm ² |
| 1. | AST01 | 1.1x10 ⁶ | 1.1x10 ⁵ |
| 2. | AST02 | 2.9x10 ⁴ | 2.8x10 ³ |
| 3. | HST03 | 2.9x10 ⁶ | 2.8x10 ⁵ |
| 4. | HST04 | 5.7x10 ⁵ | 5.2x10 ⁴ |
| 5. | EST05 | 1.8x10 ⁶ | 1.7x10 ⁵ |
| 6. | ESM06 | 1.9x10 ⁶ | 1.8x10 ⁵ |
| 7. | NASM07 | 4.4x10 ⁵ | 4.5x10 ⁵ |
| 8. | NASM08 | 4.3x10 ⁶ | 4.4x10 ⁵ |
| 9. | AST09 | 6.6x10 ⁴ | 6.2x10 ³ |
| 10. | AST10 | 1.2x10 ⁴ | 1.2x10 ³ |
| 11. | NAST11 | 3.2x10 ⁴ | 3.2x10 ³ |
| 12. | NAST12 | 1.4x10 ⁴ | 1.4x10 ³ |
| 13. | MDM13 | 1.2x10 ⁴ | 9.1x10 ² |
| 14. | MDM14 | 1.6x10 ⁴ | 1.2x10 ³ |
| 15. | NAM15 | 2.6x10 ⁴ | 2.2x10 ³ |
| 16. | NAM16 | 1.3x10 ⁴ | 1.1x10 ³ |
| 17. | AM17 | 4.9x10 ⁴ | 3.7x10 ³ |
| 18. | AM18 | 4.6x10 ⁴ | 4.3x10 ³ |

Table 3

| Sr. No. | Sample Code | Growth on | | | | |
|---------|-------------|------------------|---------------------------|----|-----------------|---------------------|
| | | SMA S. aureus | Mac GN coccobacilli | SS | CLED GP rods | CLED GP cocci |
| 1. | AST01 | - | - | - | + | + |
| 2. | AST02 | - | + | - | + | + |
| 3. | HST03 | + | - | - | + | + |
| 4. | HST04 | - | + | - | + | + |
| 5. | EST05 | + | + | - | - | + |
| 6. | ESM06 | + | + | - | + | + |
| 7. | NASM07 | + | + | - | + | + |
| 8. | NASM08 | + | + | - | + | + |
| 9. | AST09 | - | - | - | + | + |
| 10. | AST10 | - | - | - | + | + |
| 11. | NAST11 | - | - | - | + | + |
| 12. | NAST12 | - | - | - | - | + |
| 13. | MDM13 | - | - | - | - | + |
| 14. | MDM14 | - | - | - | - | - |
| 15. | NAM15 | - | - | - | + | + |
| 16. | NAM16 | - | - | - | - | + |
| 17. | AM17 | + | - | - | - | + |
| 18. | AM18 | + | - | - | - | + |

Organisms Present on can surface**Table 4**

| Organisms | % Samples |
|------------------------------------|------------------|
| S. aureus | 44 |
| Gram negative coccobacilli to rods | 33 |
| Gram positive aerobic rods | 55 |
| Gram positive cocci | 100 |

Percentage of Organisms Present**Table 5**

| Organisms | % |
|------------------------------------|----------|
| Gram negative coccobacilli to rods | 18 |
| Gram positive aerobic rods | 29 |
| Gram positive cocci | 53 |

Discussion**Total Viable Count of Microorganisms**

A large number of viable organisms were found to be present on the surface of all the cans tested. The organisms ranged from minimum 1.2×10^4 to 4.4×10^6 cfu/ml when calculated in terms of surface area it turned out to be 9.1×10^2 to 4.5×10^5 org/cm² which was found to be much higher than the number of organisms reported by Fellers et. al. The number of organisms were found to be maximum on the surface of cans taken from supermarkets and least on cans taken from Malls indicating that hygienic conditions prevailed in the Mall environment. Non-aerated cans harboured comparatively larger number of organisms on the surface

Types of Microorganisms

All the cans tested harboured Gram positive cocci or cocco in clusters. 55% of the cans showed the presence of Gram positive rods, 44% of the cans showed the presence of *Staphylococcus aureus*, and 33% of the samples tested showed the presence of lactose fermenting Gram negative coccobacilli. Of the total number of organisms present on the surface of the cans, 53% were Gram positive cocci, 29% were Gram positive bacilli and 18% were lactose fermenting Gram negative coccobacilli. These counts were much higher than those reported earlier. Chromogenic cocci were more abundant than non-chromogenic cocci. Amongst the chromogenic cocci yellow micrococci were predominant. Very few coagulase positive, β haemolytic cocci were observed. The group of organism indicate that the flora largely consisted of common air saprophytes. Although, no *Salmonella* or *Shigella* were found, presence of *E. coli* indicate unhygienic conditions prevailing in 33% of the cans tested hence, there is a risk to the health of the consumers.

Fellers had reported presence of 28.6% cocci and 18.8 % bacilli and the maximum average count of 1.6×10^5 bacteria from a cannery located in dusty region. The results obtained also were similar to those reported earlier. Michaels had reported presence of a variety of *Staphylococci* and spore forming *Bacillus* species during the survey carried out by him.

Conclusion

The results of this analysis can serve as an estimate for the canned drink retailers to revise their storage strategies and review the steps for consumer safety. Thompson recommends dust proof storage of cans. Also, the results will address the need for awareness among the consumers and the retailers regarding the chances of infections that can spread via container surfaces of canned drinks even if the product inside is safe enough to drink. The consumers need to thoroughly wash the surface of the cans before opening the can and drinking from it

The manufactures on their end can also think of providing some type of thin plastic or cap to cover the surface of these cans so that the consumer can peel it off before opening the cans. This small step may go a long way in providing safety to the consumers although, it may cost a small amount to the company.

REFERENCES

1. Collins C. H., Patricia M Lyne, Microbiological methods (1995) seventh edition
2. Fellers Carl R.(1927), American Journal of Public Health, 17:763-770.
3. Hi-Media Manual, A manual of microbiology laboratory practice, Hi-Media Laboratories, 2009
4. John G. Holt, Noel R. Kriej, Peter H. A. Sneath, James T. Staley, Stanley T. Williams, Bergey's Manual of Determinative Bacteriology (1994) ninth edition.
5. John T. Jones, Ph.D. , Leptospirosis: Rat Urine and Soda Can Lids, www.america.gov/surveillance.html
6. Micheals B., V. Gangar and M. Curiale(2003), Food Service Technology, 3:123-132.

PAPER PRESENTED

AT

INTERNATIONAL CONFERENCE OF INDIAN COUNCIL OF CHEMISTS

ICC JUNE 2011 , BANGKOK

**THEME: GLOBAL CHALLENGES AND THE ROLE OF CHEMISTRY IN
PROVIDING THE SOLUTIONS**

SUB THEME: CHEMISTRY OF WATER

**IMPACT OF INDUSTRIALISATION AND HUMAN SETTLEMENT ON THE
QUALITY OF ESTUARINE WATER IN VASAI REGION, INDIA**

C. S. Amin

Department of Chemistry,

Royal College of Arts, Science and Commerce

Abstract

The paper presents the results of a monitoring study carried on the quality of water samples collected from the Ulhas estuary of Vasai Region. The region has seen massive industrialisation and urbanisation in the past two decades. Coastal Water samples were collected from three sampling stations on the coast for the duration of a twelve month period. Seasonal and Tidal variations in the properties of water were studied. The results of the study indicate that the estuarine environment of Vasai is under stress. High levels of Biological Oxygen Demand, Chemical Oxygen Demand and Total Dissolved Solids were observed for the water at the coastal sites. Metals like Iron, Chromium, Zinc, Copper, Nickel Cadmium and Aluminium have accumulated in very high levels in the water and sediments of coastal region of Vasai. Industrial discharges from various small scale units, domestic sewage, agricultural runoff, road runoff are affecting the water compartment of the environment in the study area. Statistical Methods like Pearson's Correlation, Analysis of Variance were carried out to interpret the results.

Key words: Vasai, Estuary, Heavy Metal

PAPER PRESENTED AT
STATE LEVEL SEMINAR
THEME: ISSUES AND IMPLICATIONS OF FDI IN INDIA
AT
URAN COLLEGE OF COMMERCE

21st APRIL 2012

ISSUES AND IMPLICATIONS RELATED TO FDI IN RETAIL MARKETING.

Sanchita Datta, Renu Khandelwal.
Department of Commerce
Royal College of Arts, Science and Commerce

Abstract

Retailing is the largest private sector industry in the world economy with the global industry size exceeding \$12,104 billion. More than 70% of retailing in developed countries is organized.

Even though organized retail sector in India is at the infant stage, India has today become a budding target for FDI. But the trade in India is fragmented, unorganized, not networked and individually small. Globally, there has been significant change in the retail sector over the past two decades with the entry of global retailers. The Indian retail industry is of enormous size(\$300billions) with nearly 10% of GDP, employing 21 million persons which are 7% of the labour force. The 15 million kirana shops constitute the unorganised sector (96%) leaving the rest to the organised retailing. The Indian retail sector has little capital for expansion or credit to receive.

India today offers the most persuasive investment opportunity for mass merchants and food retailers looking to expand overseas as Indian economy is growing at a rapid pace with consumers having high purchasing power.

Instead of shedding tears for indigenous trade and resisting FDI in the industry the Government has decided to open the retail sector by announcing 100 percent FDI in single brand retailing. However FDI in multiple brand retailing is strictly prohibited.

PAPER PRESENTED
AT
NATIONAL LEVEL CONFERENCE ON
RABINDRANATH TAGORE CONTRIBUTION TO EDUCATION
ADARSH COLLEGE, THANE
12th JANUARY 2012.
RABINDRANATH TAGORE'S IDEAS ON EDUCATION

Ravishri Mishra, Momina Sirguroh

Dept., of Humanities,

Royal College of Arts ,Science and Commerce

Abstract

The focus of this paper is on the thought of Rabindranath Tagore, especially his educational ideas. This paper attempts to highlight his views on education for the people, the role of the mother tongue in education, women's education in India, his experiments in the field of education at Santi Niketan, his concept of university education, free education to all and relevance of his educational philosophy today. Tagore considered lack of education to be the main obstacle in the way of India's progress and at the root of all its problem. Therefore, he advocated education for the masses. Rabindranath Tagore suggested **Jatra and Kathakatha** as two convenient methods of people's education. In one of his significant essay *Shikshar Vahana*, he emphasized the importance of the mother tongue as the medium of education. He opined that the use of English in education hinders assimilation of what was taught and kept education confined to urban centers and the upper classes. Thus, if the vast rural masses were to benefit, it was absolutely necessary to switch over to the use of mother tongue at all levels of education, including higher education. The ideal school according to Tagore, should be established away from the turmoil of human habitation under an open sky and surrounded by vistas of fields, trees and plants. There the teachers would engage in study and teaching and the students would grow up in the practice of knowledge.

NATIONAL LEVEL SEMINAR
ON
INFORMATION TECHNOLOGY, CONVERGENCE AND SERVICES
ITCS 2012
ORGANISED BY
DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS

29th November 2012

Keynote Address

**Dr. M. Sasikumar,
Director,
C-DAC, Pune**

Use of technology in education, to enhance the teaching-learning process is now spreading to newer dimensions and technologies. Though, we, in India, are still in the early days struggling with PPTs and Learning Management Systems, a number of aspects including online lectures (e.g. used. With personalized access to computing becoming feasible through laptops, smartphones, etc, personalized tutoring is an active area of interest. This offers a number of educational, pedagogic and technological challenges. Personalization means choosing right topic, right type of content, right type of intervention, etc while teaching. We will look at two First, **we look at** adaptive instruction where the focus is in capturing and maintaining a detailed learner profile and always choosing an appropriate type of learning resource, keeping in mind his prior knowledge, academic goals, learning style, etc. We discuss based on the Anurup, the adaptive instruction delivery system, project in CDAC Mumbai. Second, we look at building intelligent tutoring systems where the focus is on tutoring a learner on a specific topic (e.g. factorization, inflection of verb in Marathi) through a set of suitably chosen problem scenarios. The approach is constructivist, enabling the learner to explore, with the teacher observing and intervening meaningfully. This involves formalizing and understanding a number of aspects of teaching-learning process and building computer models of them. We look at a set of examples from teaching how to compute LCM, to teaching Marathi, and expose the challenges and excitements of the journey.

NATIONAL LEVEL SEMINAR
ON
INFORMATION TECHNOLOGY, CONVERGENCE AND SERVICES
ORGANISED BY
DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS

29th November 2012

**How It Happened: Internet, The World Wide Web and Search
Engines**

Dr. Ajay S. Patil
Department of Computer Science,
North Maharashtra University,
Jalgaon

The world has sensed a lot of change as compared to the past decade. It has all become possible due to the development of technologies to send, receive, share, use, store and retrieve data. The Internet and its allied technologies have served as a catalyst to bring about this change. Internet applications like Facebook, Twitter, Google etc. has become the integral part in the life of a common man. There are a plethora of services that help run the Internet and its applications. This lecture digs out the development of the current Internet & its core services in brief, and is specially prepared to address the students and teachers from Computer Science, IT and Mathematics. An honest attempt is made to present the lecture in an illustrated manner with the help of images collected from various online sources. The lecture can be seen to be divided into two main parts, first that sees the Internet, WWW and Search Engines in historical and current perspective and the second, about future break through trends.

The lecture begins from establishment of DARPA and the early design of the Internet i.e., ARPANET (1969), replacement of NCP protocol with TCP/IP, ARPANET split, establishment of CSNET, NSFNET and decommissioning of ARPANET giving rise to **Internet** that we see today.

In July 1945, Vannevar Bush in an article "As We May Think" in The Atlantic Monthly on automated information systems proposed a theoretical prototype of a hypertext computer system called "Memex". The concept of the Memex influenced computer scientists Douglas Engelbart and Theodor Holm Nelson. They started working on hypertext systems and it was in 1968 that Engelbart demonstrated the first hypertext interface to the world. J.C.R. Licklider realized that minicomputers can be used to support the type of automated information systems that Vannevar Bush had described. Along with Wesley Clark in 1962, he further developed the idea of the Galactic Network and promoted the concept of social interaction through the networking of computers. Tim Berners Lee, "The Father of the Web" also felt that there should be a tool to enable collaboration between physicists and other researchers in the high-energy physics community. He therefore wrote a proposal "Information Management: A Proposal" to CERN in 1989. In 1990, Berners Lee developed the world's first web browser and web server. In 1991 this software programs were ported on other platforms. These software component's i.e., the web server and browser, sowed the seeds for the Hypertext Transfer Protocol (HTTP), Hyper Text Markup Language (HTML) and the Universal Resource Locator (URL), the **World Wide Web** was born.

Archie (before WWW) was used to download files from FTP Servers, Veronica and Jughead searched filenames and titles stored in Gopher systems. In the very early days of the web there were no search engines. However, a complete list of all web servers, edited by Tim Berners-Lee was hosted on the CERN web server. As more and more web servers went online the central list could not keep up, and was later discontinued. In June 1993, Matthew

Gray, wrote Perl-based software tool which he called World Wide Web Wanderer, to generate an index called “Wandex”. Aliweb which appeared in 1993, is the **Web’s firstsearch engine**. It did not use a web robot, but relied on being notified by websiteadministrators vide an index file for each site in a particular format. Jump Station designed in December 1993 was the first WWW resource discovery tool that combined the essential features (crawler, indexer and search interface) of a web search engine. However, searching was limited to the title and headings of the crawled web pages. WebCrawler, a crawler based search engine appeared in 1994, and allowed “full text” search of its crawled pages. In the same year, Lycos was launched. Thereafter numerous search engines of various types appeared including yahoo, google, bing etc. The architectures of 3 basic search engine types i.e., crawler based, meta search and directories are discussed in brief.

The culmination of development of Internet, World Wide Web and Search Engines along with several protocols and services have created a platform for thousands of Internet applications involving people (Web 2.0) accessed vide a huge range of different devices. The development has not stopped. Tim Berners-Lee has envisioned an altogether new type of web which is called as Semantic Web (Web 3.0), for which research is still in progress all over the world.

The concluding part discusses the difference between the different versions of Web and what it may offer in the future. During the course of the lecture several Internet related technical jargons like host, packet switching, TCP/IP, DNS, DHCP, IMP, Hypertext, Web 1.0, 2.0, 3.0, Semantic Web etc. are elaborated in a way to be understood by a layman to Computer Science.

NATIONAL LEVEL SEMINAR
ON
INFORMATION TECHNOLOGY, CONVERGENCE AND SERVICES
ORGANISED BY
DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS

29th November 2012

Web Mining and its Applications

Dr. P. S. Hiremath,

Chairman,

Department of Computer Science,

Gulbarga University

The web mining deals with an important class of problems encountered in Computer Science and its applications, namely, the automated web data extraction. The aim of the study is to develop a fully automated information extraction and knowledge discovery system with inputs from the web pages by applying different techniques and test the performance of these algorithms for the practical viability. It is envisaged that the results of these investigations would be useful in the design of intelligent systems for web mining suitable for different applications. The main contributions in this work comprise the following:

- (i) visual clue based methods VSAP and VCED for data extraction from web pages,
- (ii) customer review assessment based on feature distribution and feature clustering, and
- (iii) customer review assessment based on review clustering using principal component analysis (PCA).

VSAP (Visual Structure based Analysis of web Pages) is an efficient method for determining data regions in a web page, whereas the VCED (Visual Clue based Extraction of web Data) is employed for nested data record extraction. These methods are used for a specific application, namely, customer review summarization. The customer review assessment is based on feature distribution and feature clustering. The statistical clustering techniques are used. It is attempted to improve the results by using principal component analysis (PCA) for review clustering in order to identify critically significant reviews and lesser significant reviews. Such customer review analysis is helpful for making buying decisions on the part of customer and also product improvisation decision on the part of manufacturer

The performance of the proposed techniques for web data extraction and its application to customer review assessment has been analyzed by extensive experimentation using different web pages and publicly available review databases. The experimental results demonstrate the efficacy of the proposed methods.

The future directions of the present research work on web mining has far reaching consequences in the areas of information security systems, security surveillance systems, business intelligent systems and several such applications.

NATIONAL LEVEL SEMINAR
ON
INFORMATION TECHNOLOGY, CONVERGENCE AND SERVICES
ORGANISED BY
DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS

29th November 2012

Artificial Intelligence and Convergence

Prof. S. B. Patil
Ex Dean, Science faculty,
University of Mumbai,

Philosophers, psychologists and linguists have often sought to find rules which describe human behaviour. A linguist for example, might want to draw up rules which tell us whether a sentence is correct grammatically or not and what exactly we mean by it. A psychologist interested in human vision might want to find out how we interpret the scene that reach our eyes as physical objects in the world. A philosopher interested in logic might ask how to reach further conclusions when certain facts are known. Computer scientists too are interested in drawing up rules. Write a program which enables a computer to produce the desired output from the given input.

Artificial Intelligence [AI] fills the gap between the scientists of human behavior [philosophers, psychologists and linguists] and the computer scientists. We know about computers that given a set of rules written in the programming language of the computer, the rules will always be obeyed exactly. So human scientists can test their theories about human behaviour by converting their rules to computer programs and seeing if the behaviour of the computer in executing these programs is like the natural behaviour of a human being, or at least that small subset of human behaviour they are studying.

Computer scientists should model human behaviour as a challenge to their programming abilities:

Predictions that human-like artificial intelligences are soon to be built are often just media sensationalism, and have so far proved wrong. So the emphasis of the Artificial Intelligence will be from the Computer Scientist's angle i.e. knowledge representation. It is not merely data storage in database systems, but able to manipulate and draw conclusions. If the knowledge is well-structured, we can use conventional database or data structure techniques to represent it.

Human knowledge is not well structured. Hence we must have some more sophisticated way of doing than a straightforward data structure of the type studied at a undergraduate level. Perhaps the most important form of knowledge representation is **predicate logic**. It defines sentence in logic and define precise rules for drawing further conclusions from sets of sentences in logic. The logic was devised as a notation to formalize human reasoning; rules for the manipulation of logic can be obeyed automatically by a computer. This leads to the suggestion that logic itself may be used as a programming language. The language **Prolog** was devised as a cut-down form of logic that could be used directly as a programming language. Unlike conventional programming languages, Prolog is based on the idea of starting with human mathematical notation and rules to manipulate it, and moving down towards implementing it on the machine hardware. It gives solution in terms of relationships. For this reason, functional and logic languages are grouped together as "declarative languages". An alternative form of knowledge representation is **semantic networks**. Semantic networks are graphs where the nodes represent individual items or concepts, and the arcs represent relationships between them. Another form of knowledge representation is **Truth Maintenance Systems**. The importance of these systems is that they enable us to draw conclusions based on things we assume to be true, rather than only on things we know to be true as with predicate logic.

NATIONAL LEVEL SEMINAR
ON
INFORMATION TECHNOLOGY, CONVERGENCE AND SERVICES – ITCS
2012

ORGANISED BY
DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS

29th November 2012

A Report

A National Level Seminar on '**Information Technology, Convergence & Services**' was organized by the Computer Science and Mathematics Departments of

Royal College, Mira Road in collaboration with the **IT Department of University of Mumbai** on 29th November 2012. A total of 67 delegates—30 post graduate students and 37 teachers attended this seminar. This was a part of our celebrations of the 125th birth anniversary of **Sri Ramanujan** and the 100th birth anniversary of **Alan Turing**.

The seminar started with the keynote speaker **Dr. M. Sasikumar, Director at C-DAC, Pune**, who spoke on **Personalizing teaching with technology**. He highlighted the importance and challenges in the use of modern technology in education with emphasis on individual needs. Looking at the current trend where the web caters personally to an individual, so can education be personalized to the abilities of a student. The topic helped to shed light on this line of research very well.

Dr. P. S. Hiremath, Chairman, Department of Computer Science, Gulbarga University spoke about **Web Mining** and its vital role in the current competitive user-centric e-commerce industry.

What the world is currently making of the web is a huge mass of varied information, and Web Mining is the skill to seek and dig out exact relevant information from this heap. The

topic helped to stage the research done so far, and the problem areas which may be addressed by other researchers.

The Seminar continued with the topic **How It happened, Internet and Search Engines** by **Dr. Ajay Patil** from the **Department of Computer Science, North Maharashtra University, Jalgaon**. He focused on the emergence of what the Internet is today, and how it came to be. He led the delegates through an excited historical journey, which resulted in the revelation of many facts and points of note.

Prof. S. B. Patil, Ex Dean, Science faculty, University of Mumbai, spoke about **Artificial Intelligence**. What people are trying all over the world is to create a machine that can pass the famed Turing Test; the scope of what is still left to be accomplished to achieve this is enormous. His elaboration on the challenges faced, highlighted the near-impossible task of duplicating the human brain, and the relentless research on various areas to achieve this goal, nonetheless.

The expertise of the resource persons enlightened the delegates about the ongoing research and also opened up a lot of avenues for research in this ever growing dynamic field of IT.

Study of Heavy Metal Tolerance of Halophilic Bacteria

Ms. Vilasini Gaode
Department of Microbiology,
Royal College of Arts, Science and Commerce, Mira Road

Abstract:

Heavy metal pollution represents an important environmental problem due to the toxic effects of metals. The remediation of metal contaminated environments by physico-chemical methods involves high energy consumption and high costs. Biosorption of heavy metals by microorganisms is an alternative method that involves low costs. Halophilic bacteria require high salt concentrations for growth and inhabit hypersaline environments (solar salterns, salt lakes and salt mines), where the NaCl concentration is very high or reaches saturation. Hypersaline environments too are subject to contamination with toxic heavy metal compounds due to anthropogenic activities. Therefore, microorganisms able to degrade toxic agents in the presence of high salt concentrations will be desirable, especially for biological treatment of highly saline industrial waste effluents. Also, some metal-resistant halophilic microorganisms could be used as indicator organisms in saline polluted environments. The aim of this study was to determine the metal tolerance levels of some isolates obtained from hypersaline environments. Halophilic bacteria capable of growing in presence of 1M – 2M NaCl were isolated from 12 different hypersaline sampling sites. Their ability to tolerate salts of chromium, copper, cobalt and zinc (3.125mM to 100mM) was determined. Out of the 27 isolates studied, 15 were found to be tolerant to chromium (3.125mM to 25 mM), four to 3.125mM cobalt and none to copper and zinc.

Keywords: Halophiles, metal tolerance, wetlands

Introduction

Halophiles are organisms that require high salt concentration for growth. Extreme halophiles require at least 1M NaCl (approx. 6% w/v), and grow optimally at NaCl concentrations above 3M (Kushner 1978; Grant et al. 1998). Moderate halophiles are organisms that grow optimally between 0.5M and 2.5M salt. Microorganisms that are able to

Study of Heavy Metal Tolerance of Halophilic Bacteria, Vilasini Gaode

grow in the absence as well as in the presence of relatively high salt concentrations are designated halotolerant. They inhabit a wide range of habitats such as saline lakes, saltern ponds (salt pans), desert and hypersaline soils, and salted foods.

Hypersaline wetlands are lands transitional between terrestrial and aquatic ecosystems with shallow water (Prasad, 2002) and containing salt concentrations in excess of seawater, eg salt pans. (Ramsar Convention, 1996, Rai, 2008). They are important for both surface extension and ecological significance. They are useful in recovering and recycling nutrients; by releasing excess nitrogen; deactivating phosphates; treating wastewater; and removing toxins, chemicals, and heavy metals through absorption by its flora. Mangrove wetlands in coastal regions act as a buffer against devastating storms. (Rai, 2008)

Due to rapid rate of civilization, these hypersaline environments are subject to pollution by anthropogenic activities. Industrial and municipal effluents are often discharged into saline and hypersaline depression and intertidal zones. (Lefebvre, 2004). The main contaminants in these wastes are aromatic and polycyclic hydrocarbons, halogenated hydrocarbons, organic solvents, organophosphorus compounds, azo dyes, as well as heavy metal salts like chlorides of cobalt, copper, nickel, zinc, chromates, selenites etc. (Le Borgne, 2008).

Heavy metal pollution is an important problem due to its toxic effects. These toxic materials may be derived from mining operations, refining ores, sludge disposal, fly ash from incinerators, the processing of radioactive materials, metal plating, or the manufacture of electrical equipment, paints, alloys, batteries, pesticides or preservatives. They directly or indirectly compromise DNA, protein, and membrane integrity and function. Thus their accumulation throughout the food chain leads to serious ecological and health problems.

Microorganisms play a major role in bioremediation or biotransformation processes of these toxic compounds, converting them to less toxic or non-toxic compounds (Amoozgar, 2005). Hence, the search for halophilic organisms from hypersaline wetlands, which are capable of tolerating heavy metals and can help in bioremediation. Also, some metal-resistant halophilic microorganisms could be potentially used as bioassay indicator organisms in saline aquatic polluted environments or as biological detoxicans

Study of Heavy Metal Tolerance of Halophilic Bacteria, Vilasini Gaode (Popescu,2009).

In this project, the focus was to isolate, characterize and preserve moderate

halophiles **Study from of Heavy hypersaline Metal wetlands Tolerance with of an Halophilic intention Bacteria Vilasini to study their toler Gaode**nce to heavy

metal salts. The tolerant strains can then be used in bioremediation of these heavy metals from polluted environment.

Materials and Methods:

A) Sampling:

12 Samples were collected from marshes and salt pans of Mira Road, Uttan, Bhayander, Naigaon, Vasai and Nala Sopara in Thane District. Water and soil samples were collected in sterile containers (bottles and plastic bags respectively) from various polluted sites in the marshes and salt pans at different stages of salt production. The samples were immediately brought to the laboratory within 90 minutes of collection and refrigerated.

B) Isolation of halophilic bacteria:

The samples were diluted 10-fold and plated on **Oren's Halophilic medium** (MgSO_4 –20 g/l, K_2SO_4 –5 g/l, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ –0.1 g/l, Yeast extract–5 g/l, Agar–20 g/l) with 1 M, 1.5 M, 2 M, 2.5 M and 3 M NaCl to isolate the halophiles. (Ventosa, 1994). The plates were incubated at ambient temperature for upto 2 weeks. 35 isolates obtained from the various samples on media with 2 M NaCl were subcultured on the same medium. 27 isolates which survived on subculture were selected on the basis of difference in colony characteristics and their origin.

C) Characterization:

Colony characteristics of the isolates on Oren's Halophilic medium with 2M NaCl were studied. Morphology was observed by Gram's staining. The cells were fixed using 2 % acetic acid before the staining. (Dyall-Smith, 2009). Gram's nature, size, shape and arrangement of cells were studied. Biochemical properties like starch degradation, nitrate reduction, gelatin liquefaction, catalase activity, oxidase activity and indole production, were studied. (Collins & Lyne, 1995). Oren's Halophilic Medium with 1M NaCl was supplemented with appropriate substrate to study the biochemical properties: (Starch degradation –1 % starch, Gelatin liquefaction – 15 % gelatin, Nitrate reduction – 1 % KNO_3 , Indole production – 1 % Tryptone) Activity of above biochemicals was checked by standard methods.

D) Preservation:

All isolates were sub-cultured on slants of Oren's Halophilic Medium with 1M NaCl and stored under refrigeration. Suspensions of cells in 1 M NaCl were also preserved under refrigeration.

E) Determination of heavy metal salt tolerance

The heavy metal salts chosen for study were CoCl_2 , CuSO_4 , K_2CrO_4 and ZnCl_2 . 1M solutions of salts were prepared in sterile distilled water. The solutions were diluted 2-fold upto $1:2^5$ in sterile distilled water. 10 ml each of these dilutions were added to 90 ml of sterile Oren's Halophilic medium (solid) with 1M and 2M NaCl and plates were prepared. (Neito, 1989) The final concentrations obtained were 100 mM, 50 mM, 25 mM, 12.5 mM, 6.25 mM and 3.125 mM. The 27 isolates were inoculated by minute streaks on these plates. Incubation was done at 37°C for upto 12 days. Appearance of growth and change in growth pattern and pigmentation was observed every second day.

Results:

Isolation and characterization of halophilic bacteria from 12 different sites in the saltpans and marshes of Mira Road, Naigaon, Uttan, Vasai, Nala Sopara in Dist. Thane were done. The water and soil samples were collected in sterile containers (bottles or plastic bags respectively). The samples differed in their origin and degree of salinity.

Isolation was done on Oren's Halophilic Medium with varying concentrations of NaCl by surface spreading serial dilutions of the water samples. The plates were incubated at ambient temperature for upto 2 weeks. 35 different types of colonies of halophilic bacteria from medium containing 2M NaCl were selected. However, only 27 of them survived on subculture on the same medium with 2 M NaCl. The colony characteristics of these isolates were studied.

Table 1: Characteristics of the isolate

| Isolate | Colony characteristics | | | | | Gram's Nature |
|---------|------------------------|-----------------|----------------|------------|---------|-----------------------|
| | Size | Color | Margin | Shape | Texture | |
| WL-1 | 2 mm | creamish yellow | crenate margin | flat | | Gram +ve coccobacilli |
| WL-2 | 1 mm | cream | Regular | low convex | muroid | Gram +ve cocci |

| | | | | | | |
|-------|----------|-----------------------------|---|------------|--------|------------------------|
| WL-3 | 2 mm | cream | Regular | low convex | dry | Gram +ve rods |
| WL-4 | 1 mm | creamish white | Regular | low convex | | Gram +ve cocci |
| WL-5 | 2 mm | creamish yellow | Irregular | low convex | soft | Gram +ve rods |
| WL-6 | 3 mm | yellow | Irregular | low convex | soft | Gram +ve cocci |
| WL-7 | pinpoint | colourless | Regular | flat | soft | Gram +ve short rods |
| WL-9 | 2 mm | golden yellow | Regular | flat | sticky | Gram +ve short rods |
| WL-10 | 2 mm | colourless | Regular | flat | soft | Gram +ve short rods |
| WL-11 | 3 mm | cream | irregular wavy | flat | soft | Gram +ve rods |
| WL-12 | 3 mm | white | Crenate | flat | dry | Gram +ve rods |
| WL-13 | 1 mm | colourless | Regular | flat | soft | Gram +ve short rods |
| WL-14 | 2 mm | white | Irregular | flat | dry | Could not be studied |
| WL-15 | pinpoint | orange | Regular | low convex | soft | Gram +ve short rods |
| WL-16 | pinpoint | colourless | Regular | low convex | soft | Gram +ve short rods |
| WL-17 | pinpoint | creamish white | Regular | flat | soft | Gram -ve variable rods |
| | | Study of Heavy Metal | Tolerance of Halophilic Bacteria, Vilasini | | | Gaode |
| WL-18 | 2 mm | creamish white | Irregular | flat | soft | Gram +ve short rods |
| WL-19 | 3 mm | yellow | Regular | low convex | soft | Gram +ve short rods |
| WL-20 | 2 mm | cream | Regular | flat | soft | Gram -ve short rods |

| | | | | | | |
|-------|------|-----------------|---------|------------|--------|------------------------|
| WL-21 | 1 mm | colourless | Regular | low convex | sticky | Gram -ve variable rods |
| WL-24 | 4 mm | white | Crenate | flat | soft | Gram -ve short rods |
| WL-25 | 1 mm | colourless | Regular | low convex | soft | Gram -ve cocci |
| WL-26 | 2 mm | colourless | Regular | low convex | soft | Could not be studied |
| WL-27 | 2 mm | creamish yellow | Regular | flat | soft | Gram -ve cocci |
| WL-29 | 2 mm | creamish yellow | Regular | low convex | mucoïd | Gram -ve cocci |
| WL-30 | 3 mm | cream | Regular | raised | soft | Gram -ve cocci |

WL-22, WL-23 and WL-28 did not survive after initial subculture.

Biochemical activities of the 27 isolates were checked. They are as follows:

Table 2: Biochemical characteristics

Study of Heavy Metal Tolerance of Halophilic Bacteria, Vilasini Gaode

| Isolate | Amylase | Nitratase | Gelatinase | Catalase | Oxidase | Indole |
|---------|---------|-----------|------------|----------|---------|--------|
| WL-1 | - | - | - | - | - | - |
| WL-2 | - | + | + | - | - | - |
| WL-3 | - | - | - | - | - | - |
| WL-4 | + | - | - | - | + | - |
| WL-5 | + | - | - | - | - | - |
| WL-6 | + | + | - | + | + | - |
| WL-7 | - | - | - | - | - | - |

| | | | | | | |
|-------|---|----------|----------|--------|--------|---|
| WL-8 | - | - | - | - | - | - |
| WL-9 | + | + | - | - | + | - |
| WL-10 | + | + | + | + | + | - |
| WL-11 | + | + | + | + | + | - |
| WL-12 | + | + | - | + | + | - |
| WL-13 | + | + | <u>+</u> | + | + | - |
| WL-14 | + | + | - | + | + | - |
| WL-15 | + | + | + | + | late+ | - |
| WL-17 | + | + | - | + | - | - |
| WL-18 | - | + | - | + | - | - |
| WL-19 | - | - | - | - | - | - |
| WL-20 | - | - | - | + | - | - |
| WL-24 | - | <u>+</u> | - | + | - | - |
| WL-25 | + | + | - | Late + | Late + | - |
| WL-26 | - | + | - | Late + | - | - |
| WL-27 | - | - | - | - | - | - |
| WL-29 | - | - | - | + | - | - |
| WL-30 | - | - | - | + | - | - |

The capability of these isolates to grow at higher salt concentration (more than 2M NaCl) was studied. Isolate WL-12 and WL-19 were found to grow at 3M NaCl after 3 days and 11 days of incubation respectively. Isolate WL-20 was found to grow at 2.5M NaCl after 5 days of incubation. All other could grow only upto 2M NaCl.

Isolates which survived after second subculture were checked for their tolerance to heavy metal salts. 1M solutions of CoCl₂, CuSO₄, K₂CrO₄ and ZnCl₂ were diluted 2-fold upto 1:2⁵. 10% of these were incorporated in Oren's Halophilic medium with 1M NaCl and plates were poured. Isolates were streaked on them and growth was checked on alternate days for 12 days.

- **Tolerance to different concentrations of K₂CrO₄**

| Isolate | 100 mM | 50 mM | 25 mM | 12.5 mM | 6.25 mM | 3.125 mM |
|---------|--------|-------|-------|---------|---------|---------------------|
| WL-2 | - | - | - | - | - | 2 nd day |
| WL-3 | - | - | - | - | - | 5 th day |

| | | | | | | |
|-------|---|---|---------------------|---------------------|---------------------|---------------------|
| WL-4 | - | - | - | - | - | 5 th day |
| WL-5 | - | - | - | - | - | 5 th day |
| WL-6 | - | - | - | - | - | 2 nd day |
| WL-9 | - | - | - | - | - | 5 th day |
| WL-10 | - | - | - | - | 7 th day | 5 th day |
| WL-11 | - | - | - | - | 7 th day | 2 nd day |
| WL-12 | - | - | - | - | 7 th day | 5 th day |
| WL-13 | - | - | - | - | 7 th day | 5 th day |
| WL-14 | - | - | - | - | 7 th day | 5 th day |
| WL-15 | - | - | - | - | 7 th day | 5 th day |
| WL-17 | - | - | 7 th day | 5 th day | 5 th day | 2 nd day |
| WL-18 | - | - | 7 th day | 7 th day | 5 th day | 5 th day |
| WL-19 | - | - | - | - | 7 th day | 5 th day |

Isolate nos. WL-1, WL-7, WL-8, WL-16, WL-20, WL-21, WL-24, WL-25, WL-26, WL-27, WL-29 and WL-30 did not show any significant tolerance towards K_2CrO_4 .

- **Tolerance to different concentrations of $CoCl_2$**

Almost all the cultures showed poor or no tolerance towards $CoCl_2$. Only four of the 27 cultures tested were able to tolerate 3.125mM of $CoCl_2$. All the four cultures showed delayed **Study of Heavy Metal Tolerance of Halophilic Bacteria, Vilasini Gaode** growth. WL-1, WL-4 & WL-17 showed detectable growth after 9 days of incubation, whereas for WL-9, growth appeared within 7 days of incubation.

- **Tolerance to different concentrations of $CuSO_4$ and $ZnCl_2$**

No growth was seen in any dilution of $CuSO_4$ and $ZnCl_2$ for any of the isolates even after 12 days of incubation.

Discussion:

Hypersaline wetlands i.e. lands transitional between terrestrial and aquatic ecosystems with shallow water and containing salt concentrations in excess of seawater are subject to pollution by anthropogenic activities. Industrial and municipal effluents are often discharged into saline and hypersaline depression and intertidal zones. (Lefebvre, 2004). Heavy metal salts like chlorides of cobalt, copper, nickel, zinc, chromates, selenites etc. are common pollutants in such environments (Le Borgne, 2008).

Halophiles are organisms which can grow at high salt concentration (at least 1M NaCl), commonly found in a wide range of habitats such as saline lakes, saltern ponds (salt pans), desert and hypersaline soils, and salted foods. Microorganisms play a major role in bioremediation or biotransformation processes of these toxic compounds, converting them to less toxic or non-toxic compounds (Amoozegar, 2005). Hence, the search for halophilic organisms from hypersaline wetlands, which are capable of tolerating heavy metals and can help in bioremediation.

Sampling was done from marshes and salt pans from different regions in Mira Road, Uttan, Bhayander, Naigaon, Vasai and Nala Sopara in Thane District. The sites chosen were more polluted than the other regions. Both water and soil samples were collected. They were isolated by spreading appropriate dilutions on Oren's Halophilic medium with different concentrations of NaCl.

Isolation

A large number of isolates, both bacterial and fungal, was obtained on primary screening on Oren's Halophilic medium with different concentrations on NaCl. However only 27 isolates survived when subcultured on slants of Oren's Halophilic medium with 2M NaCl. These were further characterized and their heavy metal tolerance tested.

Characteristics

The isolates obtained had varied Gram's nature. Eleven of the isolates were Gram positive rods of variable size. Four isolates were Gram positive cocci. Four isolates were Gram negative rods. Three isolates were Gram negative cocci. Gram's nature of five isolates could not be clearly understood. The colonies ranged from colourless to white to different shades of yellow and orange.

Biochemical characteristics of the isolates were studied. Twelve isolates were capable of hydrolyzing starch. Thirteen isolates were capable of reducing nitrates. Only four isolates could liquefy gelatin. Twelve isolates were catalase positive and eight, oxidase positive. None of the isolates could produce indole. Seven isolates did not show positive result for any of

the biochemicals tested. Four isolates showed positive results for all biochemicals except indole. However they were not sufficient for identification.

Heavy Metal Tolerance

Tolerance of the 27 isolates to six 2-fold dilutions of 1M solutions of CuSO_4 , CoCl_2 , K_2CrO_4 , and ZnCl_2 was studied by streaking them on Oren's Halophilic media with 1M NaCl containing 10% of each dilution of each heavy metal salt separately. Growth was checked on alternate days for 12 days.

Amongst the four heavy metals tested, the isolates were most tolerant to chromate. Six isolates were found to grow in 3.125 mM K_2CrO_4 , viz. WL-2, WL-3, WL-4, WL-5, WL-6 and WL-9. Seven isolates were found to tolerate 6.25 mM K_2CrO_4 , viz. WL-10, WL-11, WL-12, WL-13, WL-14, WL-15 and WL-19. Two isolates WL-17 and WL-18 were able to tolerate as high as 25 mM K_2CrO_4 .

Only four isolates were found to tolerate 3.125 mM CoCl_2 , viz. WL-1, WL-4, WL-9 and WL-17. No isolate was able to grow in higher concentrations.

None of the study isolates of heavy metals were able to tolerate any of the halophilic bacteria, concentrations of CuSO_4 and ZnCl_2 . Thus the isolates were sensitive to the concentrations tested.

Isolates WL-17 and WL-18 are promising candidates to be used in bioremediation of chromium waste as they were found to tolerate upto 25 mM K_2CrO_4 . Isolates WL-10, WL-11, WL-12, WL-13, WL-14, WL-15 and WL-19 could tolerate 6.25 mM K_2CrO_4 , while WL-2, WL-3, WL-4, WL-5, WL-6 and WL-9 could tolerate only 3.125 mM. Thus they can also be considered. They may probably be more effective if used in consortium.

Isolates WL-1, WL-4, WL-9 and WL-17 were capable of tolerating 3.125 mM CoCl_2 . Other isolates can be further tested with higher dilutions of CoCl_2 .

All isolates need to be checked for tolerance with still higher dilutions of CuSO_4 and ZnCl_2 . The concentrations encountered in environment, even when highly polluted, are lower than 3 mM. Thus some more promising isolate might be identified.

The tolerance capabilities in consortia can also be checked, if the isolates are to be used in bioremediation or as bioassay indicator organisms in saline aquatic polluted environments or as biological detoxicants.

Thus it is concluded that salt pans and marshes in Thane district are inhabited by halophiles that possess chromate tolerance which can help in bioremediation. Only analysis of degree of heavy metal salt tolerance was done in this project. The mechanism of tolerance is required to be studied. The quantitative estimation of their metal binding abilities can be done to detect how effective they will be in the bioremediation. Identification and classification of the isolate is also necessary to know more about the other characteristics of the organisms. It may yield some more beneficial information.

The isolates have been preserved on Oren's Halophilic Medium with 5 % NaCl under refrigeration for such further studies.

Study of Heavy Metal Tolerance of Halophilic Bacteria, Vilasini Gaode

References

1. **Ahalya N., Ramachandra T.V. , Kanamadi R.D.** (2003) Biosorption of Heavy Metals *Res. J. Chem. Environ.* **7** (4):71-79
2. **Amoozegar M.A., Hamedi J., Dadashipour M. and Shariatpanahi S.** (2005) Effect of salinity on the tolerance to toxic metals and oxyanions in native moderately halophilic spore-forming bacilli. *World Journal of Microbiology & Biotechnology* **21**: 1237– 1243
3. **Collins C.H., Lyne P.M., Grange J.M.** (1995): Microbiological Methods
4. **Dyall-Smith M** (2009): The HaloHandbook, Protocols for Haloarchaeal Genetics
5. **Iyer A, Mody K, Jha B,** (2005) Biosorption of heavy metals by a marine bacterium, *Marine Pollution Bulletin* **50**:340–343
6. **Kushner D. J.** (1978). Life in high salt and solute concentrations: halophilic bacteria, p. 317–368. In D. J. Kushner (ed.), *Microbial life in extreme environments*. Academic Press, Ltd., London, United Kingdom
7. **Le Borgne S., Paniagua D, Vazquez-Duhalt R** (2008). Biodegradation of organic pollutants by halophilic bacteria and archaea. *J Mol Microbiol Biotechnol*, **15**:74–92.
8. **Lee E.Y., Lim J.S., Oh K.H., Lee J.Y., Kim S.K., Lee Y.K. and Kim K.** (2008). Removal of heavy metals by an enriched consortium., *J. Microbiol.*, **46**: 23-28

9. **Lefebvre O, Moletta R** (2006). Treatment of organic pollution in industrial salinewastewater: a literature review. *Water Res*; **40**: 3671– 3682.
10. **Lovley Derek R.:** (1995). Bioremediation of organic and metal contaminants with dissimilatory metal reduction., *Journal of Industrial Microbiology*, **114**: 85-93
11. **Nieto J.J., Fernandez-Castillo R., Marquez M.C., Ventosa A., Quesada E.** (1989): Survey of Metal Tolerance in Moderately Halophilic Eubacteria. *Applied and Environmental Microbiology*. **55(9)**:2385-2390
12. **Nieto J.J., Ventosa A., and Ruiz-Berraquero F.** (1987): Susceptibility of Halobacteria to Heavy Metals. *Applied and Environmental Microbiology*. **53(5)**: 1199-1202
13. **Popescu G. and Dumitru L.** (2009) Biosorption of some heavy metals from mediawith high salt concentrations by halophilic archaea, *Biotechnol. & Biotechnol. EQ*. 23/SE: 791 – 795
14. **Prasad S.N., Ramachandra T.V., Ahalya N., Sengupta T., Alok Kumar, Tiwari A.K.** (2002) **Study of Heavy Metal Conservation of Halophilic Bacteria, reviw, Tropical Ecology** of Tolerancewlands of India– **Vilasini Gaode** **43(1)**: 173-186
15. **Rai P.K.** (2008): Heavy Metal Pollution in Aquatic Ecosystems and its Phytoremediation using Wetland Plants: An ecosustainable approach, *International Journal of Phytoremediation*, **10**:2, 133-160
16. **Ventosa A, Nieto J.J, Oren A** (1998) Biology of moderately halophilic aerobicbacteria. *Microbiol. Mol. Biol. Rev.* **62**: 504-544
17. **Ventosa A.** (1994): Taxonomy and phylogeny of moderately halophilic bacteria, p.231–242. In F. G. Priest (ed.), *Bacterial diversity and systematics*. Plenum Press, New York, N.Y.

EFFECT OF LONG TERM USE OF SYNTHETIC FERTILIZERS ON
Study of Heavy Metal Tolerance of Halophilic Bacteria, Vilasini Gaode
THE CATION EXCHANGE CAPACITY OF FARMING SOILS OF

VASAI REGION

Dr.Juliet Miranda,Dr.Chitrlekha Amin

Department of Chemistry,

Royal College of Arts, Science and Commerce

ABSTRACT

India's food grain self-sufficiency is largely due to more efficient land management practices. Among them the use of synthetic fertilizers has been a key input in augmenting food production. However studies around the world have shown that inappropriate or prolonged use of synthetic fertilizers has deleterious effects on soil health. As soil health is best assessed by changes in the physico-chemical parameters, the study undertook to measure the variation in pH, electrical conductance (EC), exchangeable Na, exchangeable K and CEC in farming soil samples fertilized with 2 different brands of synthetic fertilizers, urea and biocompost .

Introduction :

In India fertilisers are the most widely used form of agrochemicals. Though their use is beneficial, inappropriate or overuse of these fertilizers is causing serious environmental problems associated with emission of harmful gases, contamination of ground and surface water resources and deleterious effects on the quality of soil. Degeneration of soil health is marked by changes in pH, electrical conductance, texture, and increased loss of nutrients. Studies have shown that properties of arable soils including their cation exchange capacity are affected by the long term application of fertilisers¹.

CEC is used as a measure of fertility retention capacity and the capacity to protect ground

**EFFECT OF SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE
CAPACITY OF FARMING SOILS OF VASAI REGION, J.M.MIRANDA,
C.S.AMIN**

water from cation contamination. Soils with a higher CEC will tend to hold on to nutrients better than soils with a lower CEC.

Several studies have been carried out to determine the effect of fertilizers on the cation exchange capacity of soil²⁻⁴. It has been reported that ammoniacal fertilizers significantly reduce the cation exchange capacity of soil⁵. The use of synthetic fertilizer can result in several adverse effects on the soil, these being soil acidification, soil imbalance, depletion of organic matter and damage to soil biology. Decrease in the microbial diversity of soil with the application fertilizers has been observed⁶.

Field experiments have shown that the concentration of Ca, K, Mg and Mn were higher in soils amended with alternative fertilisers than synthetic fertility amendments⁷. Higher the amount of these base cations more is the acidity neutralizing capacity of the soil⁸⁻¹¹. However studies have shown that over fertilization with synthetic fertilisers actually causes these base ions to leach out of the soil¹².

Materials and Methods:

A few random soil samples collected from farming fields in Vasai, were obtained from the plough layer by digging upto a depth of 15 cm. The well mixed air dried samples were

ground to break up aggregates and sieved . The bulk sample was divided into 5 sub-samples that were amended with biocompost , urea and 2 different brands of synthetic fertilizer .

| | | |
|------------|------------------------------------|--|
| Sub-sample | A – control | B – Soil+ urea + fertilizer ₁ + fertilizer ₂ |
| | C –Soil+ urea | D – Soil+ fertilizer ₁ |
| | E - Soil + fertilizer ₂ | F - Soil + biocompost |

[Fertilizer₁ = Maharashtra Krushi Udyog (NPK), Fertilizer₂ =Garud Chaap (NPK)]

EFFECT OF SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE CAPACITY OF FARMING SOILS OF VASAI REGION, J.M.MIRANDA, C.S.AMIN

21 days post fertilization, physico- chemical analysis of the following parameters was done:

pH of 1:2 soil water suspension was determined using digital pH meter having combined electrode assembly for each of the sub-samples.

Electrical Conductance (EC) of the soil samples was determined for each of the sub-samples using 1:2 soil water extract and digital conductivity meter.

Exchangeable Sodium was determined in ammonium acetate extract of soil sub-sample using flame photometer. 30.0 g of air dried soil sample was extracted with 250cm³ of 1.0 N ammonium acetate (pH 7) .A standard curve was obtained by aspirating blank (d/w) and standard NaCl solutions of 5, 10, 15, 20 and 25 ppm. The flame photometer reading for each of the soil sub-sample extracts was noted and the concentration of Na read from the standard curve.

Exchangeable Potassium was determined in ammonium acetate extract of soil using digital flame photometer. 30.0 g of air dried soil sample was extracted with 250cm³ of 1.0 N ammonium acetate (pH 7) .A standard curve was obtained by aspirating blank (d/w) and standard KCl solutions of 5, 10, 15, 20 and 25 ppm. The flame photometer reading for each of the soil sub-sample extracts was noted and the concentration of K read from the standard curve.

Cation Exchange Capacity (CEC) Calcium :30.0 g of air dried soil sample was successively washed with 1N sodium acetate pH 5 and 7. A final washing was given with acetone. The washed samples were extracted 250m³ of 1N ammonium acetate (pH 7). The

amount of calcium was determined using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES).

Results and Discussion

Table 1: pH

| Soil Sample | A | B | C | D | E | F |
|-----------------------------|------|-------|-------|-------|-------|-------|
| pH | 6.44 | 7.78 | 8.76 | 7.74 | 8.07 | 7.02 |
| Variation w.r.t. control | - | +1.34 | +2.32 | +1.30 | +1.63 | +0.58 |

In soil chemistry pH is a measure of the hydrogen ion activity of the soil -water system and expresses the acidity/alkalinity of soil. It is an important factor as it determines the availability of nutrients, microbial activity and physical condition of soil. Soil pH in the range 6.0-7.5 is found to be most favourable for plant growth as it ensures maximum availability of beneficial microbial activity and decomposition of organic litter.¹³ however highly acidic or alkaline soils (pH <5 and >8.5) are considered limiting factors for plant growth and development ³⁻⁷. Table 1 shows the effect of synthetic inorganic fertilizers and biocompost on the pH of the soil in comparison to the control. In general the soil amendments used increased the pH ^{14,15}. An average increase of 1.65 pH units was observed in the case of inorganic synthetic fertilizers while in the case of biocompost amended soil the increase was marginal and the pH was well within the favourable pH range of 6.0-7.5

Organic soil amendments have been known to act as soil conditioners due to their buffering capacity¹⁶. The overall reaction for soil amendment and uptake of the nutrients with a calculated amount of fertilizer is neutral. However use of excess fertilizer would decrease the pH while inadequate microbial activity would result in fertilizer residues thus making the soil alkaline¹⁴

Table 2: Electrical Conductance (EC)

| Soil Sample | A | B | C | D | E | F |
|---|-------|--------|--------|--------|--------|--------|
| Electrical Conductance mS cm ⁻¹ | 1.084 | 3.712 | 3.63 | 4.95 | 5.84 | 1.62 |
| Variation w.r.t. control | - | +2.628 | +2.546 | +3.866 | +4.856 | +0.536 |

Soil electrical conductivity is a measure of the ability of the soil water system to carry an electrical current. It is an effective indicator of soil texture and nutrient availability¹⁷. Soil EC is useful to explain variability in grain crop production in conjunction with climatic factors and topography of the land¹⁸. The variation in electrical conductance (EC) of soil on addition of fertilizers and compost are summarized in Table 2. An increase in EC of all the soil samples w.r.t. the control was observed indicating a corresponding increase in soluble salt content of soil via fertilization, which may persist for upto >4years after amendment application has ceased¹⁹. EC values were lower in soils under organic management as compared to soils fertilized with synthetic fertilizers²⁰. Soil sample C amended with urea showed the smallest increase among the synthetic fertilizers used w.r.t. the control while samples D and E showed a sharp increase of 3.866 and 4.856 mScm⁻¹ respectively. Sample B amended by using a mixture of 3 synthetic fertilizers showed

an intermediate variation in EC by registering an increase of 2.628 mScm^{-1} . High EC of soil after fertilization indicates high soluble salt content other than nitrates and may result in N depletion, reduced nutrient cycling and impaired crop growth ²¹. EC values of upto 2 mScm^{-1} are regarded as non-saline while EC values of $>4 \text{ mScm}^{-1}$ are known to create problems for crops ²².

Table 3: Exchangeable Sodium

| Soil Sample | A | B | C | D | E | F |
|--------------------------------|-------|-------|-------|------|-------|------|
| Reading of Flame Photometer | 44 | 42 | 41 | 47 | 40 | 34 |
| Conc. (ppm) | 11.0 | 10.5 | 10.3 | 12.2 | 10.0 | 8.5 |
| Conc. (me/L) | 0.478 | 0.457 | 0.447 | 0.53 | 0.435 | 0.37 |

Na^+ concentration and transport studies are undertaken in context of salinity stress and not as a limiting micronutrient due to the abundance of the element in soil and soil solutions ²³. Under typical physiological conditions, plants maintain a high K^+ / Na^+ ratio. Increase in Na^+ concentrations of soil has been associated with salinity of soil and sodium toxicity. It imposes 2 types of stress on plant tissues i.e. i) water deficiency ii) ion specific stress due to altered K^+ / Na^+ ratios. This is due to competition by Na^+ for K^+ binding sites ²⁴. High sodium concentration causes sodicity of soils and adversely affects soil structure,

**SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE CAPACITY OF FARMING
SOILS OF VASAI REGION, J.M.MIRANDA, C.S.AMIN**

physical and chemical properties of soil, water availability and soil infiltration²⁵. High Na⁺ concentrations have also been reported to interfere with K⁺ and Ca⁺ nutrition²⁶.

The concentration of sodium in the control and amended soil samples is summarized in Table 3. The application of synthetic fertilizers showed a negligible change in sodium levels, however compost amended soil showed a decrease in sodium levels resulting in increased fertility.

Table 4: Exchangeable Potassium

| Soil Sample | A | B | C | D | E | F |
|-----------------------------|-------|------|-------|-------|------|------|
| Reading of Flame Photometer | 08 | 26 | 09 | 35 | 36 | 24 |
| Conc. (ppm) | 2.0 | 6.25 | 2.25 | 8.25 | 8.5 | 5.75 |
| Conc. (me/L) | 0.051 | 0.16 | 0.058 | 0.211 | 0.22 | 0.15 |

Potassium is a macronutrient like N and P that is required by crops in large amounts. But unlike N and P, K is used almost exclusively as a tool for plant growth. K is used by plants to activate enzymes for photosynthesis, starch formation, and protein synthesis. K is also very important as a tool to control water balance in the plant through maintenance of internal salt concentrations in cells and controlling the opening and closing of leaf stomata. Table 4 shows the variation in K levels post fertilization w.r.t the control. Soil samples modified with synthetic and organic fertilizers showed an increase in the K

levels of Sample F amended with biocompost maybe due to potassium in organic manure being in an inorganic highly soluble form and has been reported to be 90-100% available as synthetic fertilizer K¹³

Table 5 : CEC (Calcium)

| Soil Sample | A | B | C | D | E | F |
|------------------------------------|---------|--------|---------|---------|---------|---------|
| Conc.of Ca ⁺² (ppm) | 440.755 | 457.48 | 438.351 | 514.546 | 541.312 | 458.356 |
| Conc.of Ca ⁺² (me/L) | 22.038 | 22.874 | 21.918 | 25.727 | 27.066 | 22.918 |
| CEC (meq/100 g) | 18.365 | 19.062 | 18.265 | 21.439 | 22.555 | 19.098 |
| Variation in CEC w.r.t. control | - | +0.697 | -0.1 | +3.074 | +4.19 | +0.733 |

The relative capacity of soils to store cations is referred to as Cation Exchange Capacity (CEC). Both clay and organic matter have a net negative charge that can attract and hold cations. CEC is an important criterion of soil fertility reflecting maintenance capability and regulation of nutrients and can be used as a guide for fertility management²⁷. CEC is expressed in meq/100g of soil or the SI unit of cmols/kg.

The CEC for the samples was calculated by the following formula:

$$\text{CEC Ca}^{+2} = \frac{\text{Ca conc. in meq/L} \times 100}{\text{Vol. of extract}}$$

Wt. of soil

1000

Table 5 shows significant improvements in soils amended with synthetic fertilizer₁ (Sample D) and fertilizer₂ (Sample E) and a marginal improvement with biocompost (Sample F). Use of ammoniacal fertilizers like urea shows significant decrease in CEC thus having a negative impact on soil fertility.

Conclusion :Results of the study have shown that organic and inorganic soil amendments have a pronounced effect on the physico-chemical properties of soil. Synthetic fertilizers increased the soil pH beyond the favourable limit of 6.0-7.5 thus making the soil-water system alkaline. As soil pH plays an important role in nutrient availability, a long term benefit of organic fertilizer use is the stabilization and buffering of soil pH.

The high Electrical Conductivity (EC) of soils amended with inorganic fertilizers warns against repeated use of high EC fertilizers that may result in N depletion, reduced nutrient cycling and impaired crop growth. The EC values were comparatively much lower in soil fertilized with biocompost as compared to soils fertilized with synthetic fertilizers and their use may therefore be recommended.

Na⁺ concentrations are almost unaffected by the addition of synthetic fertilizers but a small but significant reduction in Na⁺ concentration by 0.09 me/100g of soil was observed in the case of soil amended with biocompost. This translates into better nutrient availability, particularly of K⁺ and Ca⁺ in soils fertilized with organic fertilizer.

All the soil amendments used except urea (sample C) showed an appreciable increase in the concentrations of K⁺, an important macronutrient for plants. Cation Exchange Capacity (CEC) in terms of Ca⁺² showed significant improvements in the case of soils fertilized with

EFFECT OF SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE CAPACITY OF FARMING SOILS OF VASAI REGION, J.M.MIRANDA, C.S.AMIN

synthetic fertilizers except urea which showed a decrease of 0.1 me/100g of soil, thus having

a negative impact on the fertility of soil. Biocompost amended soil showed a marginal increase in CEC values.

Thus although an increase in exchangeable K^+ and CEC observed in soils amended with NPK fertilizers (fertilizer₁ and fertilizer₂) indicates higher fertility but a corresponding increase in pH and EC may hamper the uptake of nutrients by plants and in general may not be beneficial for plant growth. Urea as a soil amendment had a deleterious effect on pH, EC, exchangeable K^+ and CEC (Ca^{+2}) and in general has a negative impact on soil health. However organic soil amendments like biocompost have an overall positive impact on soil health as they act as pH buffers, do not cause appreciable variation in soil EC and increase exchangeable K^+ and CEC.

REFERENCES

1. M. Simek, D.W. Hopkins, J. Kalak, T. Picek, Biological and Chemical properties of arable soils affected by the long term application of organic and inorganic fertilisers, *Biology and fertility of soils*,29(3), 300-308, 1999.
2. P.N.C. Murphy, P.N.C. R.J. Stevens, P.Christie, Long term application of slurries on grassland, *Soil Use and Management*, 21, 240-244, 2005.
3. Lal.R., Long term tillage and maize monoculture effects on a tropical crops in Western Nigeria, *Soil and Tillage Research*, 42 (3), 161-174, 1997.
4. B.W.Bache, R.G.Heathcote, Long term effects of fertilisers and manure on soil and leaves of cotton in Nigeria, *Experimental Agriculture*, 5: 241-247, 1969.
5. Barak.P, JobeSOILS.B.O, **SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE CAPACITY OF FARMING**
KruegerOFVASALA.REGION,J,Peterson.M.L.MIRANDA,,A,PlantandC.S.AMINSoil,197, Issue-1, 61-69, 1997.

6. S.U.Sarathchandra, A.Ghani, G.W.Yeats, G.Birch, N.R.Cox, Effect of Nitrogen and Phosphate fertilisers on microbial and nematode diversity on pasture soils, *Soil Biology and Biochemistry*,33(7-8), 953-964, 2001.
7. L.R.Bulluck, M.Brosius, G.K.Evanylo, J.B.Ristaino, Organic and Synthetic Fertility Amendments Influence Soil Microbial, Physical and Chemical Properties on Organic and Conventional Farms, *Applied Soil Ecology*, 19, 147-160, 2002.
8. R.C.Turner and J.S.Clark, Lime potential in acid clay and soil suspension, *Trans. Comm. II & IV Int. Soc. Soil Science*, 208-215, 1996.
9. Ecological Society of America, Human Alteration of the Global Nitrogen Cycles Causes and Consequences, *Issues in Ecology*1, Spring 1997.
10. G.A. Thomas, R.C. Dalal, J. Standley; *Soil and Tillage Research*, 92(2), 2007.
11. A.Pernes Debuyser, D.Tessier, *European Journal of Soil Science* 55(3), 505-512, 2004.
12. Dr.Tilman, The Greening of the Green Revolution, *Nature*, 396, Nov 19, 1998.
13. J.J Shoenou J.G. Davis; Optimizing soil and plant responses to land applied manure nutrients in the Great Plains of North America, *J. Soil Sc.*, 2006, 86, 587-595.
14. V.C. Keith, T.A. Moore; Cumulative effect of NPK fertilizer on soil respiration, pH and organic matter content, *Soil Science Society of America Journal*, Jan. 1978, 42(1), 121-124.
15. P. Barak, B.O. Jobe, A.R. Krueger; Effects of long term soil acidification due to nitrogen fertilizer inputs in Wisconsin, *Plant and Soil*, Nov. 1997,197(1), 6-69.
16. B. Ulrich, Stability, elasticity and resilience of terrestrial ecosystems with respect to matter balance; *Potentials and Limitations of Ecosystem Analysis*, Springer, New York, 11-49.

SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE CAPACITY OF FARMING

17. R.N. Barbosa, ^{SOILS} C.Overstreet, ^{OFVASAI} Soil ^{REGION,J} Conductivity ^{M.MIRANDA,} available ^{C.S} at ^{AMIN} www.ISU.Ag.Center.com.

18. N.R. Kitchen, K.A. Sudduth, S.T. Drummond; Soil Electrical conductivity as a crop productivity measure, *Soil Science Society of America Journal*, 12(4), 607-617
19. E. Bahman, D. Ginting, J.E. Giley; Residual effects of manure and compost application on corn production and soil properties; *Soil Science Society of America Journal*, Mar. 2004, 96 (2), 442-447.
20. D.G. Patriquin, H. Blackie, M.J. Patriquin; On farm measurements of pH and electrical conductivity in soil extracts for monitoring coupling and cycles, *Biological Agriculture and Horticulture*, 1993, 9(3), 231-272.
21. S. Stamatiadis, M. Werner, M. Buchanan; Field assessment of soil quality as affected by compost and fertilizer application in a broccoli field, *Applied Soil Ecology*, 1999, 12, 217-225.
22. C. Chang, T.G. Sommerfeld, G. Tenz; Soil chemistry after application of cattle manure, *J. Environ. Qual.*, 20, 475-480.
23. Munns, C.A. Termatt; *Aust. J. Plant Physio.*, 1986,13,143-160.
24. E. Blumald, G.S. Aharon, M.P. Apse; Soil transport in plant cells, *Biochimica et Biophysica Acta (Review)*, 2000, 1465, 140-151, Elsevier.
25. E.I. Ratner; Influence of exchangeable sodium in soil on its properties as a medium for plant growth, *Soil Science*, Dec. 1935, 40(6), 459-472.
26. E. Tavakkoli, P. Rengasamy, G.K. McDonald, *Journal of Experimental Botany*, Aug. 2010, 61(15), 4449-4459.
27. M.D.David; *Fundamentals of Soil CEC, Agronomy Guide*,

www.extension.purdue.edu/extmedia/ay/ay-238.

SYNTHETIC FERTILIZERS ON THE CATION EXCHANGE CAPACITY OF FARMING SOILS OF VASAI REGION, J.M.MIRANDA, C.S.AMIN

**QUALITATIVE AND QUANTITATIVE ASSESSMENT OF
COMMERCIAL SAMPLES OF ABHARAK AND TRIVANGA BHASMA**

Dr. Chitrlekha Amin, Dr. Juliet Miranda

Department of Chemistry

Royal College of Arts, Science and Commerce

INTRODUCTION

Bhasmas are unique ayurvedic metallic/mineral preparations treated with herbal juices or decoction and exposed for certain quantum of heat as per the puta system of Ayurveda¹. There are 30 types of Bhasmas which are frequently used. Such formulations are held to be safe, efficacious and when manufactured and used following certain specified classical guidelines do not lead to any untoward effects. According to an estimate of the World Health Organization (WHO), about 80% of the world population still uses herbs and other traditional medicine for their primary health care needs². Herbal formulation have reached widespread acceptability as therapeutic agents for diabetics, arthritics, liver diseases, coughs remedies, memory enhancers and adoptogens³. The number of people experiencing negative effects caused by the use of traditional medicine has been increasing. There is evidence that insufficient attention is being paid to the quality assurance and control of these products. This may be due to the poor quality of traditional medicine being used.

The poor quality of Ayurvedic medicines could be due to contamination with excessive banned pesticides, microbial contamination, heavy metals and chemical toxins⁴.

The reasons are insufficient attention being paid to the quality assurance and control of these products. The need of the hour is thus to critically analyse these formulations. In the present study we propose to carry out qualitative and quantitative assessment of Abharak and Trivanga Bhasmas used in Ayurvedic formulations.

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND

Since ancient times mica is

used TRIVANGA in the form BHASMA, of Abharak C.S. AMIN, Bhasma J.M. MIRANDA in Ayurveda system of medicine

to cure various ailments as treating of anaemia, hepatitis dysfunction, jaundice chronic dysentery⁵.

Abharak Bhasma is also a component of various anti diabetic formulations.

Trivanga Bhasma consisting of three metals namely Sn, Pb and Zn is used traditionally for the treatment of diabetes mellitus and other disorders.

Clinical trials have shown that trivanga bhasma is an ideal drug for the management of diabetes mellitus⁶. Since the control and management of diabetes mellitus requires lifetime use of medication, it is very essential that medicines consumed should be of good quality

MATERIAL AND METHODS

Abharak and Trivanga Bhasma of three different manufacturers were procured. The Bhasma samples were analysed by routine physico chemical analysis. The various physicochemical evaluation include colour, odour, pH, taste, fineness, loss on drying at 105°C, total ash, acid insoluble ash, water soluble ash.⁷⁻¹⁰ The various microbiological evaluation includes total viable aerobic count, total Enterobacteriaceae and total fungal count, test for specific pathogen: E. coli, Salmonella spp., S. aureus, Pseudomonas aeruginosa¹¹

The metal content in the samples were analysed by ICP-AES methods. The samples were also subjected to TGA analysis.

Estimation of Total Ash

A suitable quantity of the sample was weighed accurately in a silica crucible. The sample was spread uniformly on the bottom of the crucible, incinerated, cooled and weighed.

Difference between the empty crucible weight and crucible with incinerated sample gives the total ash value¹²

IVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

total ash value¹²

Estimation of Acid Insoluble Ash

The residue from total ash estimation was boiled with hydrochloric acid. The insoluble matter was washed with hot water, transferred to a crucible, dried and weighed. Difference between the empty crucible weight and crucible with incinerated ash gives the acid insoluble ash value¹².

Estimation of Water Soluble Ash

The residue from total ash estimation was boiled with distilled water. The insoluble matter was washed with hot water, transferred to a crucible, dried and weighed. This weight was subtracted from the total ash taken which gives the water soluble ash content¹²

Determination of Loss on Drying (LOD)

The accurately weighed sample was dried in an oven at 105°C, cooled and weighed¹²

Determination of Bulk Density

A known mass of the sample was carefully poured into a long measuring jar and the volume corresponding to top level of the sample was noted, from which the bulk density was calculated as the ratio of mass of the sample to the volume.

Floatability Test

A pinch of the bhasmawas sprinkled on water taken in a beaker and the floating tendency of the bhasmawas observed¹³.

Metal Irreversibility Test

A known amount of silver was heated in for 15minutes with the commercial *bhasma* at various temperatures in a silica crucible. The silica crucible was cooled to room temperature and the weight was recorded¹³.

Thermogravimetry

The thermo gravimetric analysis was carried out using TG-DTA (PERKIN ELMER USA: DIAMOND TG/DTA). About 5mg of sample was placed in alumina cup and heated up to 1000° C at the rate of 10° C per minute. Weight changes during this period were recorded. A plot of weight change versus temperature of time results from the programmed Operation of the thermo balance. TGA curve gives information how much weight loss of th e sample taken place.

ICP-AES METHODS

ICP-OES(ARCOS from M/s. Spectro, Germany) was used for the determination of elements. About 0.1-0.2 g of the sample was digested using HNO₃: Per chloric acid (2:1). After the digestion was complete, the flask was allowed to cool and the contents were transferred to a beaker and heated to remove all the acid. The resulting solution was diluted to 50 mL with deionized water. Per chloric acid was used because it does not form complexes with metals.

MICROBIOLOGICAL EVALUATION

The procured samples of abharak and trivanga bhasma were subjected to microbiological evaluation. They were tested for total yeast and mould count, total viable aerobic count and for the presence of E. coli, S. aureus and for P. Aeruginosa. The total yeast and mould count of the samples were carried out using sterile malt extract agar media. The plates were incubated for duration of one week and R.T observations of the plate were done at an interval of 24 hrs daily. The viable aerobic count of the samples was carried out on sterile glucose yeast extract agar plate by IVANGA pour plate BHASMA, method C.S.AMIN, J.M.MIRANDA

The plates were incubated for a period of one week and observations were made at a daily interval of 24 hrs. The detection of E. coli, S. Aureus and P. aeruginosa was carried out using the media Salt. Mac Conkey and sterile salt mannitol agar and sterile centrimide agar. The plates were incubated at 37⁰c from 24-48 hrs.

RESULTS AND DISCUSSION

TABLE NO-1

| ABHARAK BHASMA | SAMPLE NO-1 | SAMPLE NO-2 | SAMPLE NO-3 |
|----------------|-------------|-------------|-------------|
| LOSS ON DRYING | NO LOSS | 3% | Negligible |

TABLE NO-2

| TRIVANGA BHASM | SAMPLE NO-1 | SAMPLE NO-2 | SAMPLE NO-3 |
|----------------|-------------|-------------|-------------|
| A | | | |
| LOSS ON DRYING | NO LOSS | 4.4% | 2.96% |

TOTAL ASH

TABLE NO-3

| TRIVANGA BHASM | SAMPLE NO-1 | SAMPLE NO-2 | SAMPLE NO-3 |
|-----------------|-------------|-------------|-------------|
| A | | | |
| TOTAL ASH VALUE | 95.45% | 99% | 99.80% |

TABLE NO-4 QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

| ABHARAK BHASMA | SAMPLE NO-1 | SAMPLE NO-2 | SAMPLE NO-3 |
|-----------------|-------------|-------------|-------------|
| TOTAL ASH VALUE | 96.25% | 99.21% | 98.62% |

ACID INSOLUBLE RESIDUE

TABLE NO-5

| TRIVANGA BHASMA | SAMPLE NO-1 | SAMPLE NO-2 | SAMPLE NO-3 |
|------------------------|-------------|-------------|-------------|
| ACID INSOLUBLE RESIDUE | 27.09% | 25.14% | 31.36% |

TABLE NO-6

| ABHARAK BHASMA | SAMPLE NO-1 | SAMPLE NO-2 | SAMPLE NO-3 |
|------------------------|-------------|-------------|-------------|
| ACID INSOLUBLE RESIDUE | 56.80% | 67.78% | 69.84% |

APPEARANCE, FLOATABILITY ON WATER, BULK DENSITY TABLE NO-7

ABHARAK BHASMA

| SAMPLE NO | Appearance | Lustre | Bulk Density (g/cm ³) | Floatability on Water |
|-----------|------------|-----------|-----------------------------------|-----------------------|
| 1 | DARK BROWN | No Lustre | 1.026 | No floatability |
| 2 | DARK BROWN | No Lustre | 1.043 | No floatability |
| 3 | DARK BROWN | No Lustre | 0.985 | No floatability |

TRIVANGA BHASMA

TABLE NO-8

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

| SAMPLE NO | Appearance | Lustre | Bulk Density (g/cm ³) | Floatability on Water |
|-----------|-------------|-----------|-----------------------------------|-----------------------|
| 1 | Pale Yellow | No Lustre | 0.983 | No floatability |
| 2 | Pale Yellow | No Lustre | 2.168 | Partial |
| 3 | Pale Yellow | No Lustre | 1.114 | No floatability |

Table 1-6 shows the total ash, acid insoluble ash, water soluble ash and moisture content of Abharak and Trivanga Bhasma samples. Total ash value is useful in determining the purity of *bhasma* since higher total ash content indicates the absence of free organic moieties.

During the preparation of *bhasma*, herbal ingredients are added resulting in the formation of complexes between the herbal constituents and the metal. The formation of coordination compounds will be precluded however, if the bhasmas are not prepared properly, resulting in lower total ash content. Acid-insoluble ash is an indicator of quantity of acid non-digestible mass in the Sample¹⁴ Hence, lower acid-insoluble ash indicates higher bioavailability of the drug¹⁴. Lower value of loss on drying indicates the absence of moisture in the drug.

The abharak *bhasma* was found to be a brown powder without any metallic lustre. The trivanga bhasma samples were found to be pale yellow in color without any metallic lustre. (Table 7-8), conforming to the specifications of Ayurvedic Formulary of India¹⁵ Trivanga Bhasma is expected to be Pale yellow; in colour due to the presence of white Plumbous oxide(PbO), Yellow, white, Stannic sulfide SnS₂ and zinc sulfide are yellow. (Lead: tin: zinc 1:1:1 ratio)

Mica after repeated burning is turned into abharak bhasma which is an ayurvedic medicine Commonly used against many diseases including hepatitis, respiratory tract infections and animals¹⁶. In India mica obtained is white, brown or black in colour. The abharak bhasma Under analysis was found to be a brown powder without any metallic lustre.

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABH
ARAK AND TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

The absence of lustre (Table 2), in both set of samples conforms to the specifications of Ayurvedic Formulary of India¹⁵

The floatability test for *bhasma* is to observe the floatability of a powder sprinkled on the surface of water. If the bhasma floats on water it is to be regarded as a standard one.¹⁷ and is considered to be of the best quality, otherwise some more putas are to be given to make the Bhasma upto the standard. Here the surface tension of the water plays an important role. i.e, the particles of the Bhasma have to become so fine that they cannot break the surface tension of the water in the ordinary way. After attaining this stage the Bhasma should be recommended for internal use. ^{18,19}.

The results of floatability test on the samples under analysis is summarised under table no 7-8. Except for sample no 2 of trivanga bhasma the other samples of abharak and trivanga bhasma did not conform to the specifications of an ideal bhasma.

The metal irreversibility test was carried out where the commercial bhasma samples were heated with known weight of silver wire. The test yielded results where no change in the weight of Ag wire was observed. This indicated the absence of alloy formation which in turn indicated the absence of free metal component in the bhasma.

The results obtained were according to Ayush specifications.

ELEMENTAL COMPOSITION

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND

ABHARAK BHASMA

TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

TABLE NO-9.

| SAMPLE N | Fe ppm | Ca ppm | K ppm | Al ppm | Mg ppm |
|----------|---------|---------|---------|---------|--------|
| O | | | | | |
| 1 | 744.661 | 70.628 | 630.634 | 344.779 | 5.552 |
| 2 | 753.067 | 127.218 | 44.465 | 262.352 | 4.776 |
| 3 | 357.145 | 246.482 | 151.368 | 283.448 | 3.872 |

TRIVANGA BHASMA

TABLE NO-10

| SAMPLE NO | Zn ppm | Pb ppm | Sn ppm |
|-----------|---------|---------|--------|
| 1 | 8.03 | 0.076 | 0.549 |
| 2 | 1012.18 | 1048.38 | ND |
| 3 | 1011.59 | 1115.66 | ND |

The different samples of abharak bhasma showed wide variation in metal content (Table 9). Fe is the main component in all brands of abharak bhasma. There is a wide variation in

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND
content of different elements such as Ca, K, Al, Mg, between the three different brands of
TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

abharak bhasma. Minor variations could be explained on the basis of the difference in the amount of plant juices added during preparation by different manufacturers.

But the present investigation shows a wide variation in the composition of the metals.

Medicines under the Indian system of Medicine (ISM) are required to be manufactured in sanitized environs following good manufacturing practises (GMP) norms laid down by Government of India. The dept. of Ayurveda, Yoga and Naturopathy Unani Siddha and Homeopathy is the regulator of ISM manufacturers in the country²⁰.

Ayush has set limits on the concentration of heavy metals in particular (Table no11)²¹.

The ISM medicines must pass the laboratory tests for these limits. The heavy metals listed in the table are the most implicated in heavy metal poisoning.

PERMISSIBLE LIMITS OF HEAVY/TOXIC METAL (ppm)

TABLE NO-11

| METAL | CONCN IN PPM |
|-------|--------------|
| Pb | 10.0 |
| Cd | 0.30 |
| Hg | 1.00 |

| | |
|----|------|
| As | 10.0 |
|----|------|

A study of available literature indicates that Trivanga bhasma contains *Plumbous* oxide (PbO), Stannic sulphide and zinc sulfide in (1:1:1) ratio²². Our present investigation of three samples of trivanga bhasma have yielded totally different results. All three samples do not conform to the expected Zn:Pb: Sn ratio of 1:1:1. Samples 2 and 3 exhibited some amount of uniformity in the metal concentration values. However the values obtained for sample 1 were totally variant. Moreover samples 2 and 3 showed high concentration of Pb (1048.38ppm and 1115.66 ppm) which is much above the permissible limits. Ingestion of such medicines with high concentration of Pb could prove fatal^{23,24}. A significant finding in the study of elemental composition of trivanga bhasma was that sample no 2 and 3 both showed below detection limits for Sn which is a primary constituent of trivanga bhasma.

MICROBIOLOGICAL EVALUATION

The following observations were concluded from the microbiological evaluation of the samples of abharak and Trivanga Bhasma. It was concluded that all the samples of abharak bhasma except sample no 3 and all samples of trivanga bhasma were of good quality as far as the total yeast and mould count is concerned.

Abharak sample no3 is concluded to be of a satisfactory quality due to the formation of colony formation unit of 52.2×10^6 org/ml. During the total viable aerobic count it was concluded that all the samples of abharak bhasma were of good quality.

Trivanga Bhasma sample 3 was found to be of good quality as far as the total viable aerobic count is concerned. Trivanga Bhasma sample no1 and 2 were found to be of poor quality due to formation of colonies of magnitude 3.5×10^5 org/ml and 1.24×10^7 org/ml respectively.

The results for the detection of *Escherichia coli*, *S. aureus* and *Ps. Aeruginosa* have been summarised in the table no 12 below. The permissible load of micro organismal is given below in table no 13.²⁵

TABLE NO 12

| ORGANISM→ SAMPLE | e. Coli | S.Aureus | Ps. Aeruginosa |
|---------------------|---------|----------|----------------|
| ↓ | | | |
| Abharak sample 1 | - | + | - |
| Abharak sample 2 | - | + | - |
| Abharak sample3 | - | - | - |
| Trivanga sample1- | - | + | - |
| Trivanga sample2 | - | + | - |
| Trivanga sample3 | - | + | - |

TABLE NO-13 Permissible limits of microbial load and pathogens

| | | |
|---|-------------------------------|---|
| 1 | Total Viable aerobic count | <10 ⁷ cfug-1 <10 ⁵ cfug-1 |
| 2 | <i>E.Coli</i> | 10 ⁴ g-1 10 ² g-1 10 ³ g-1 |
| 3 | Total yeast mould count | 10 ⁵ g-1 10 ⁴ g-1 10 ³ g-1 |
| 4 | Total Enterobacteriaceae | 10 ⁴ g-1 10 ³ g-1 |
| 5 | <i>Salmonellae spp</i> | None |
| 6 | <i>S.aureus</i> | None |
| 7 | <i>Pseudomonas Aeruginosa</i> | Absent |
| 8 | <i>Coliforms</i> | Absent |

TGA ANALYSIS

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND TR

IVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

An analysis of TGA curves of abharak samples yielded the following results. Sample A shows no weight loss up to 780°C. This shows the absence of moisture in the bhasma sample. A 2% weight loss was observed between 750- 900°C. This could be attributed to minor decomposition reactions. Sample B Showed negligible weight loss upto 100-200°C. This again shows the absence of moisture. A significant weight loss of 4% is observed between 400-800°C. Sample C shows negligible weight loss from 0-200°C. This once again indicates the absence of moisture in the sample. A significant 4% weight loss is observed from 400-600°C.

The TGA analysis of trivanga bhasma samples showed interesting results.

Sample D showed a 1% weight loss from 0-100°C due to the presence of moisture.

A significant 2% weight loss is observed from 400-600°C. Sample E exhibited no weight loss from 0-100°C A significant weight gain is observed from 200-820°C. Weight gain may be attributed to adsorption, solid gas reactions and indicating decomposition reaction. Sample F showed negligible weight loss from 0-100°C due to negligible moisture content. A negligible weight gain is observed from 300-800°C. A significant weight loss is observed from 820°C.

CONCLUSION

The physico chemical properties of commercially available abharak and trivanga bhasma have been studied based on classical parameters and through the use of modern analytical techniques. Variation in the properties exhibited was observed between the bhasmas of different manufacturers. The Bhasma were found to conform to few of Ayush specification while deviations were observed in others. The study however underlines the importance of standardization of bhasmas to confirm its identity and to determine its quality and purity. The present scope of study however has not yielded complete chemical finger print of the bhasmas. Further analytical evaluation including Atomic Force Microscopy (AFM), X-Ray Diffraction (XRD), X-Ray Fluorescence (XRF), X-Ray photo electron microscopy, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Energy Dispersive X-Ray Analysis (EDAX), Infrared spectroscopy (IR), FT-IR are required to arrive at the complete chemical finger print of the bhasma samples.

REFERENCES

1. Prasanta Kumar Sarkar, Anand Kumar Chaudhary, Journal of Scientific and Industrial Research Vol 69, Dec 2010,901-905
 2. <http://www.who.int/research/en>
 3. Patel PM, Patel NM, Goal RK, Quality Control of Herbal Products, The Indian Pharmacist,2006,5(45),26-3
 4. Aneesh.T.P, M.Hisham, Sonal.Sekhar M, Manjusree Madhu, Deepa T. International Journal of Green Pharmacy , July 2009,184-189.
 5. Mishra Amrita, Mishra Arun, Ghosh Ashike, Jha Shivesh, International Journal of Research in Ayurveda & Pharmacy,389-392,2(2) 2011.
 6. Anonymous,The Ayurvedic Pharmacopoeia of India, Part I, Voi-I, Govt of India, N
- QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA
7. Bhanu Prakash,Use of metals in Ayurvedic medicine, Indian Journals of history ofsci

- ence32(1),1997,1-7.
8. Sunil Kumar Singh, Preparation and Characterization of a mercury based Indian traditional drug, Ras Sindoor, Indian Journal of Traditional Knowledge,8(3)2009, 346-347
 9. Tridib Kumar Bhomwick, Physico chemical Characterization of an Indian Traditional medicine, Jasada Bhasma, Detection of nanoparticles containing non stoichiometric
 10. Prasanta Kumar Sarkar, Ayurvedic Bhasma, The ancient applications of nanomedicine , Journal of scientific and Industrial research,2010,901-905.
 11. Arun Sudha, Standardization of Metal based herbal medicines, American Journal of Infectious Diseases, 5(3),2009,193-199.
 12. Anonymous, The Ayurvedic Pharmacopoeia of India, Part –I Vol-I, Govt of India, New Delhi,2001,143
 13. Kulkarni D.A, Vagbhattachariya's Rasa Ratna Samucchaya, (Meharchand achchmandas Publications, New Delhi),1998,198.
 14. Chaudhary A, Prakash B, Scientific Validated approach for application of Mandura Bhasma, A review, Electron J, PHarmacol Therapy, 2010,3: 35-40:
 15. Specifications of ayurvedic formulary of India
 16. Mishra A, Mishra AK, Ghosh A,K,Jha Shivesh, Significance of Mica in Ayurveda and Pharmacy 2(2) 2011,389-392.
 17. Vagbhatta Acharya,Acharya, Rasa Ratna, Samuchaya, Edited by Dattatreya Anatha Kulkarni, New Delhi,Meharchand Lachmandas Publications,1998,148.
 18. Damodar Joshi, Rasa Shastra, Vijaylakshmi, Amma. ,Trivandrum,1986.
 19. MohapatraS, Jha Cb, Physicochemical characterization of ayurvedic bhasma [Swarna

QUALITATIVE Makshika AND QUANTITATIVE Bhasma] An

approach ASSESSMENT to OF standardization COMMERCIAL SAMPLES International OF ABHARAK Journal AND of TRIVANGA Ayurveda BHASMA, C.S.AMIN, J.M.MIRANDA

- Research,1,2010,82-86.
20. Anonymous, Ayush, Ministry of Health and Family Welfare M. (indianmedicine.nic.in)
 21. R.C.Kapoor, Indian Journal of Traditional Knowledge, Vol9(3) July 2010,562-575.
 22. Arun Rasheed, Anvesh Marri, M.Madhu Naik, Journal of Pharmacy Research,2011,4(6) 1931-1933
 23. Kales SN, Saper RB. Ayurvedic lead poisoning : An under-recognized, international problem. Indian J Med Sci [serial online] 2009 [cited 2012 May 15];63:379-81 Available from: <http://www.indianjmedsci.org/text.asp?2009/63/9/379/56108>
 24. Singh S, Mukherjee KK, Gill KD, Flora S. Lead-induced peripheral neuropathology following ayurvedic medication. Indian J Med Sci 2009;63:408-10
 25. Shukla S.S, Approach towards standardization and quality assessment of herbals J Res Edu Ind Medicine,15(1) 2009,25-32.

QUALITATIVE AND QUANTITATIVE ASSESSMENT OF COMMERCIAL SAMPLES OF ABHARAK AND

TRIVANGA BHASMA, C.S.AMIN, J.M.MIRANDA

**SOCIO-ECONOMIC PROFILE OF KOLI WOMEN: A STUDY OF
NAIGAON VILLAGE, VASAI TEHSIL.**

Minor Research Project sponsored by University of Mumbai

2012-13

Raju Kurian and Ravishri Mishra

**Department of Sociology, Royal College of Arts, Science and
Commerce ABSTRACT**

All through the history, the sea has been providing for the sustenance of the fisher folks living along the coastal regions with plenty of marine plants and fish. A major chunk of the world's population rely on fisheries as the main source of protein and millions worldwide are directly engaged in fishing activities as a source of livelihood. However, the members of the fishing community who represent a major segment of the world's population are considered to be among the poorest of the poor. They are marginalized from the mainstream economy with little access to education, social services, infrastructure and markets. The growth of the market owing to the ever growing consumption of fish in tandem with the increase in world's population has not done much to improve the situation of the fishing community.

This study on the socio economic profile of the Koli women stems from our curiosity to know more about a segment of the working female population that has always projected itself as markedly different from the rest of women. These women are distinctly independent, strong, bold, outgoing, able to do their work and manage their money-attributes that do not go with our general understanding of women in the patriarchal society. Feminist standpoint

has been that capitalism has led to the privatization of domestic labour and exclusion of women from social labour which results in the reproduction of the subjection of women. That ,under capitalism women's labour is in the home associated with the reproduction of male labour power for the market. That, activities within the home are feminine and those that take place outside the home like business and politics are masculine

This line of thought is corroborated by sociologist Parsons' theorizing of the distinction between expressive and instrumental roles- the former relating to the roles undertaken by women such as managing of household chores and rearing and caring for children that require qualities that are generally associated with women and the latter relating to the roles usually undertaken by men outside the frontiers of home. The Koli women have always stood out as an exception to this general historical perception gender roles and gender attributes.

This investigative study looks into the Koli women's socio-economic status, their sense of empowerment, role in decision making process, participation in political processes and the role of self help group if any, in their lives. **The study involves field investigation.** The primary data for the study has been collected through survey and questionnaire based interviews. Investigators undertook visits to the field on weekends during August-March, 2012-13. During these visits, the investigators personally interviewed and interacted with the members of the fishing community in the field. After a preliminary survey of the field was done, seventy households were selected at random for data collection through interview with the help of questionnaire. The questionnaire contained questions on the demographic profile of the respondents, their work as fisher women, problems associated with their work, their income and spending habits and their dreams for their children. Interview was conducted in and around the households of the respondents.

A unique feature of the village is Naigaon fish market: The major peculiarity of this fish market is its operating system during night hours without any discrimination between men and women. Fish landing, sorting, packing, icing, price fixing, distribution to retailers and all other essential operations of the market dynamics are conducted at night between 1 am to 4.30am.

The naigaon fish market began app.25yrs back with auctioning and wholesale distribution as the major activities. Fishes go to the locations such as satpati, arnala, vasai, dombivili, uttan etc., It essentially comprises 3 fishing villages and 450 boats operating dolnets generally of duration 7-9 days. The society gains 1000Rs for providing the yard and 5% selling items will be for the auctioneers. Boat owners take to the proportion of 4 and others take to the proportion on 1. Labourers get 40,000 for 5 months. Average working days are 12 in a month and 6 days per fortnight.

The auctioning process is very dynamic involving tremendous group efforts. Even the women auctioneers do play a vital role in the business. Big baskets of fish is kept side only sample is exhibited for auctioning. There is a syndicate for rating and August to December is a peak season with tremendous export and January –May season has medium export.

This unique system of marketing and adequate infrastructure makes it different from other fish market. 70-80% of the product is taken by wholesalers and only 20% by the local vendors. Another significant feature is women participation in each and every stage of operation. As it operates during night hours the delay in transportation to terminal market is minimized to a great extent. Therefore the quality of fish does not deteriorate. It is beneficial to both the producers as well as consumers. By 6-6.30 am it reaches the local destination and within 3 hrs it reaches far of places like Surat, Baroda etc. As the berthing charges are low the wholesalers prefer to take from Naigaon fish market.

It is community whose most members are doing economically well. Households generally have sources of income straddling between fisheries and other occupations like work on the construction sites. While at least one female member of the household continues to be engaged in fish marketing earning anything over a thousand rupees a day, many men have moved out into other occupations. The younger generation is not inclined to be in the community's traditional occupation; even the parents do not want their children to be in the traditional fishing. If this is any indication to go by, only a fraction of the community will continue in fishing in the days to come while the majority will look for regular jobs with predictable incomes.

The functioning of the market has been such that it has led to the empowerment of women members of the community. These women not only participate actively in the dynamics of the fish market on a daily basis it has also led to their financial independence and empowerment. In fact, the daily lives of these women straddle between their households and the market.

It is, however, clear that women's participation in fishing activities in the community may end with the present lot as the growing generation is neither inclined nor initiated in to this field. Therefore, it is only a question of time as how long will this village retain its identity as a Koliwada by virtue of the community continuing with its traditional occupation.

**STUDY OF DIVERSITY OF SOIL MICRO ANTHROPODS NEAR
AND
AROUND MIRA ROAD REGION**

Ravindranath G

Department of Zoology

Royal College of Arst, Science and Commerce

Abstract:

The soil diversity with respect to microarthropods from three sites was studied for four months in this short duration project. The mangrove site had more 'evenness' although the Dhobhi Ghat site near S.G. National Park showed more numbers of mites.

Introduction:

Soil is a vital support system for all forms of terrestrial life. Agriculture and therefore food security of the country is dependent on the status of soil ecosystem. Soil contains myriads of micro-arthropods, mostly from the groups –Acarina, Collembola, Coleoptera etc. Other less abundant groups are Symphyta, Pauropoda, Protura, Diplura, Hymenoptera, Chilopoda, Diplopoda, Isopoda, Isoptera, Dermaptera, Orthoptera, Diptera, Pesudoscorpionida, etc. Micro-arthropods have an indispensable role in the recycling of soil nutrients and are a part of the complex food web in the soil. (Dey *et al*, 2008, 2010)

Three different sites to study soil diversity were chosen. The first was the region off "dhobhi ghat" near Sanjay Gandhi National Park. The second was a stretch of mangrove inhabited region near Royal College, Mira Road. The third was within the Royal College campus. All the three sites are within a radius of 7Km and are subjected to the same weather pattern that is a monsoon season from June to September, a mild winter season from November to February and summer season from March to May.

Site Areas:

1. The region off “dhobhi ghat” near Sanjay Gandhi National Park (NP) was chosen because of its close proximity to the National Park. Latitude 19.25⁰N and Longitude 72.91⁰E. Since it is close to Dahisar River that flows through the National Park it was felt that there will be a rich biodiversity in that region.
2. The stretch of mangrove (M) inhabited region near Royal College, Mira Road. Latitude 19.28⁰N and Longitude 72.85⁰E. Mangrove soil contains considerable water and it was expected that the organisms in this region of the mangroves would be different from the first site. However this site is full of debris, sewage that is illegally dumped and the garbage keeps increasing each month in a most obvious manner.
3. The soil in the large campus of Royal College (RC) which has many planted trees, shrubs and herbs that is looked after by two gardeners. Latitude 19.28⁰N and Longitude 72.85⁰E. This site was chosen as a contrast to the Sanjay Gandhi NP site.

Methodology:

1. Soil Sampling: A device similar to a bulb planter was used. Soil was sampled from a depth of about 5-6 cm. The diameter of the device was 5 cm and therefore the volume was approximately 100 cc. Three different samples were drawn; the soil was mixed to treat as one sample and carefully transferred to polythene bags and taken to the laboratory. The second site near mangroves presented some difficulties while sampling. Mangrove soil is soggy, wet and the site was also full of debris. Collection was done in October, December, January and February.
2. Extraction of microarthropods: This was done by the modified Berlese method. This is also called as Tullgren funnel method (Walters D.E). There are many variants of this **STUDY OF DIVERSITY OF SOIL MICRO ANTHROPODS NEAR AND AROUND MIRA ROADREGION, Ravindrananth .G** method. The soil was placed into single unfolded cheese cloth which was then carefully placed in a large plastic funnel of 26cm diameter. The funnel was chosen in such a way

that the outlet could easily be fitted into a small plastic bottle with 70% alcohol. A 40 Watt bulb was placed about 15 cm above the funnel and was kept for about three days.

3. pH of soil: It was measured by taking 5g of air dried soil, adding 20mL distilled water, mixing well, standing for about 30 minutes and pH observed using Equiptronics pH meter. Three repeats were drawn from the same sample and the average was recorded.
4. Temperature of soil: It was measured using digital soil thermometer. It was inserted about 6 cm into the soil and measured. Three readings were taken and the average was recorded.
5. Organic content: This was done by the method of Walkley and Black. 0.5 g of soil was taken in a conical flask, 5mL of K₂Cr₂O₇ and 1mL of H₂SO₄ was slowly mixed. To this 5mL of 80% orthophosphoric acid and 50mL distilled water was added. This was titrated against Ferrous ammonium sulphate (FAS) using DPA as indicator. The average of three readings were taken and the calculations were done as:

$$\text{Organic Carbon} = \frac{0.03 \times 5 (B-C) \times 100}{B \times 0.5} \text{ g\%}$$

6. Moisture content. 50 g of soil was taken and put into oven at 105⁰c for 24 hours. This was again weighed and the calculation was done as:

$$\frac{\text{Initial weight} - \text{Final Weight}}{\text{Initial weight}} * 100 \%$$

7. Microscopy: The microarthropods were collected into 70% ethanol and then transferred into lactic acid which is a good clearing agent. These were observed and classified as

STUDY OF DIVERSITY OF SOIL MICRO ANTHROPODS NEAR AND AROUND MIRA
mites, spring tails which ROADREGION, are the main Ravindrananth organisms. After G
observation they were

transferred back. Photographs were taken using camera attachment 3V Micro vision-
Microscopy Image Projecting Device (MIPD)

8. Scanning Electron Microscopy: This was done at SAIF, IIT, Mumbai. The mite specimens were mounted on stubs, plated with thin coating of platinum and SEM done on FEG-SEM-JSM-7600F.
9. Data: For presentation the data was pooled to find out averages, standard Excel package was used for display and calculations. Soil invertebrate biodiversity and evenness was calculated using the Shannon index (H'), (Brower et al 1998). It measures both **richness** (the number of species) and **evenness**, or how evenly individuals are distributed among species. High values of H' denote high biodiversity. The equation for Shannon's index is

$$H' = -\sum_{i=1}^s p_i \ln(p_i)$$

Results and discussions:

pH

| | Royal College | Mangrove | Dhobh Ghhat |
|---------|---------------|----------|-------------|
| October | 6.4 | 5.6 | 6.7 |

| | | | |
|----------|-----|-----|-----|
| December | 6.0 | 5.8 | 6.6 |
| January | 6.2 | 5.6 | 6.7 |
| February | 6.3 | 5.6 | 6.7 |

Temperature ($^{\circ}\text{C}$)

STUDY OF DIVERSITY Royal OF College SOIL MICRO ANTvHROPODS Mangrove NEAR Dhobh AND AROUND Ghhat MIRA

| | ROAD REGION, Raindranth .G | | |
|----------|----------------------------|------|------|
| October | 25.8 | 23.2 | 27.5 |
| December | 26.7 | 28.0 | 24.0 |
| January | 25.4 | 26.0 | 26.0 |
| February | 25.2 | 25.8 | 27.0 |

Organic Content (g %)

| | Royal College | Mangrove | Dhobh Ghhat |
|----------|---------------|----------|-------------|
| October | 21.4 | 16.9 | 12.1 |
| December | 20.4 | 15.7 | 11.7 |
| January | 21.0 | 16.0 | 12.0 |
| February | 21.0 | 16.9 | 13.0 |

Moisture content (%)

| | Royal College | Mangrove | Dhobh Ghhat |
|----------|---------------|----------|-------------|
| October | 17.0 | 36.0 | 19.5 |
| December | 15.0 | 34.0 | 17.6 |
| January | 16.0 | 35.0 | 18.0 |
| February | 17.0 | 35.8 | 18.9 |

| Month | Sites | Mite A | Mite B | Mite C | Mite D | Sp-tail (B) | Sp- tail (W) | H Shannon Index |
|-------|-------|-----------|-----------|-----------|-----------|----------------|--------------------|-----------------------|
| | | | | | | | | |

| | | | | | | | | |
|-----|----|----|----|----|----|----|----|------|
| Oct | NP | 33 | 36 | 43 | 51 | 0 | 0 | 0 |
| | RC | 15 | 13 | 10 | 10 | 0 | 0 | 0 |
| | M | 5 | 2 | 9 | 6 | 15 | 9 | 0.6 |
| Dec | NP | 31 | 32 | 30 | 43 | 0 | 0 | 0 |
| | RC | 4 | 7 | 13 | 4 | 0 | 0 | 0 |
| | M | 3 | 2 | 0 | 6 | 13 | 17 | 0.6 |
| Jan | NP | 27 | 33 | 4 | 37 | 0 | 0 | 0 |
| | RC | 8 | 7 | 9 | 8 | 0 | 0 | 0 |
| | M | 3 | 2 | 3 | 5 | 10 | 9 | 0.6 |
| Feb | NP | 34 | 28 | 41 | 37 | 0 | 0 | 0 |
| | RC | 13 | 10 | 11 | 12 | 0 | 0 | 0 |
| | M | 4 | 2 | 6 | 5 | 11 | 12 | 0.68 |

pH: The pH of the mangrove soil is the least while the one from near the NP dhobhi ghat is nearly 7.0.

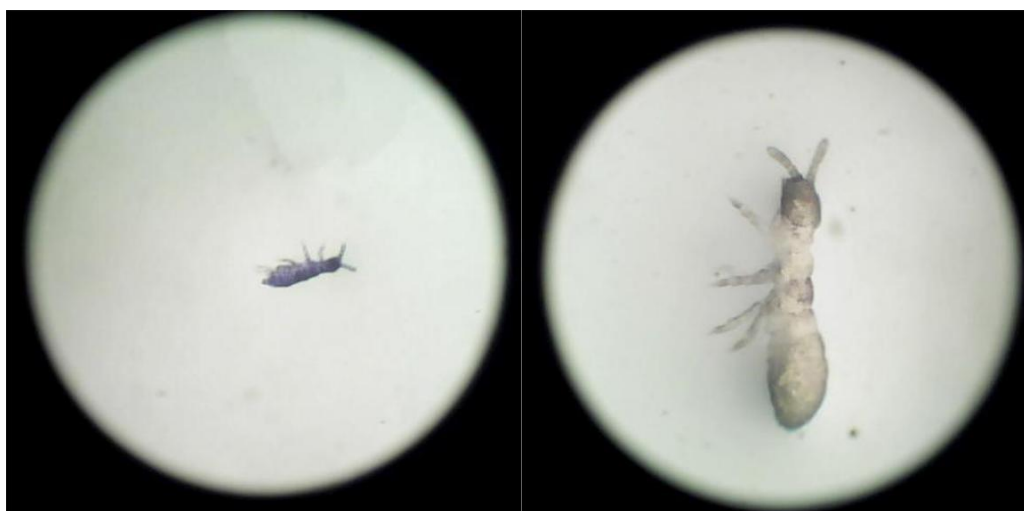
Temperature: The temperature is nearly the same i.e about 25⁰C. The collection was done at 4.0 pm in the evening; the temperature of the mangrove region rises but those of the college garden and dhobhi ghat near NP become slightly cooler. Perhaps sampling should be also done at other times to get a wider representative sample of different ranges.

Organic content: The organic content of the college soil is quite high because it is looked after by two gardeners and fertilisers are added regularly. The flip side is that pesticides are also added which has substantially reduced the mite numbers and diversity. These observations are not quantified; these are qualitative observations while examining the mites under microscope.

Moisture content: Predictably the moisture content in the mangrove soil was quite high at 36%. Many spring tails were found in this area.

Distribution: Although number of mites are more near the dhobhi ghat area the mangrove region has more evenness and a higher diversity although statically interpretation would be far too simplistic considering the less number of replicates.

STUDY OF DIVERSITY OF SOIL MICRO ANTHROPODS NEAR AND AROUND MIRA ROAD REGION, Ravindrananth .G



Collembola black

Collembola

Order Arthropleona

Order Arthropleona

Superfamily Poduroidea

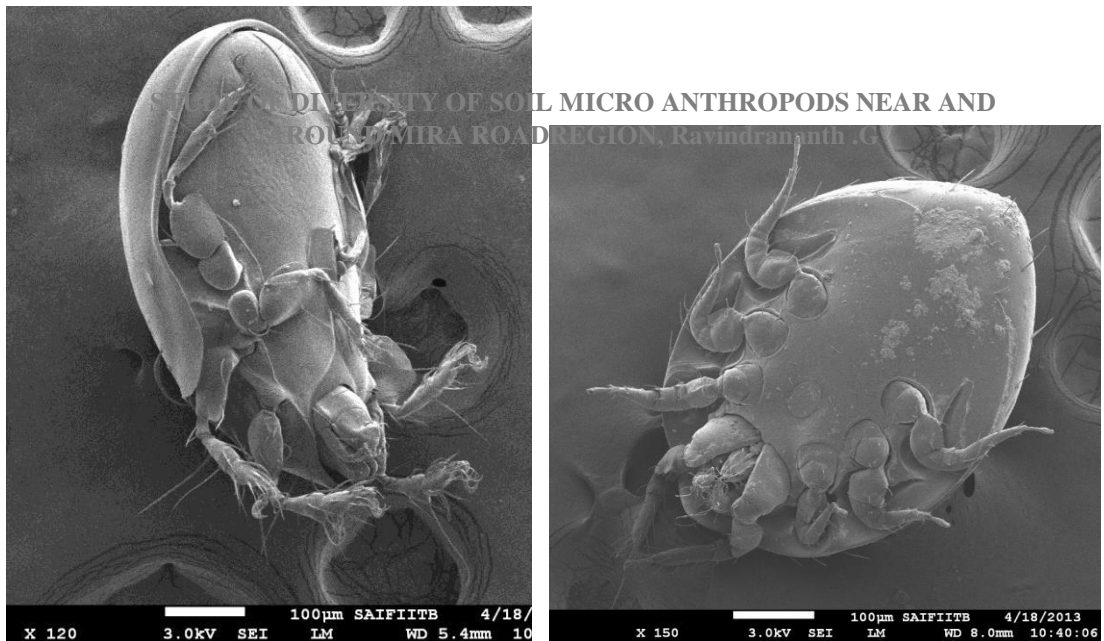
Superfamily Poduroidea

Family: Ebtomobryidae

Family: Isotomidae

Genus: Lepidocyrtus sp.

Genus: Isotoma



Oribatid mite; Right- Ventral view

CONCLUSIONS:

This project could not be conducted as initially envisioned. Local expertise on identification of mites is not available. Classification of oribatid and mesostigmatid mites as also other mite groups is quite difficult as admitted even by experts in the field.

General observation is that at Royal College garden the diversity of mites is less because of pesticides being regularly added there are many numbers of springtails.

The most diversity of mites is seen in the region of dhobhi ghat near SGNP. However statistically speaking, the Shannon Index is higher in the Mangrove region. Oribatid mites feed on fungi and are important component of soil ecosystem. We need to develop more expertise in identification of oribatidae. This will help in cataloguing the species and studying biodiversity.

References:

STUDY OF DIVERSITY OF SOIL MICRO ANTHROPODS NEAR AND AROUND MIRA ROAD REGION, Ravindrananth .G

1. Brower, J. E., J. H. Zar, and C. N. von Ende. 1998. *Field and laboratory methods for general ecology*. 4th edition. WCB/McGraw-Hill, Boston.
2. Dey, M.K., Hazra, A.K. and Chakraborty, C.K., 2008. Diversity of Microarthropods and their role in the plant litter decomposition in the coastal tract of East Midnapore District, West Bengal, India. *Zoological Research in Human Welfare*, 20. pp, 207-226.
3. Dey, M.K., Hazra, A.K. and Chakraborty, C.K., 2010. Functional role of microarthropods in nutrient cycling of mangrove-estuarine ecosystem of Midnapore coast of West Bengal, India. [*International Journal of Environmental Technology and Management*, 12. pp 67 -84.](#)
4. Sanyal, A.K. (1995). Oribatid mites (Acari : Cryptostigmata). *Fauna of Meghalaya, Part 2* (Ed by Director, ZSI), pp. 51-92, Zoological Survey of India, Calcutta.
5. Walters, D. E. and Proctor C. H. –Mites in soil -user guides.

Acknowledgements:

The author is grateful to University of Mumbai, BCUD (13,500) for financial assistance, Principal Prof. A.E. Lakdawala of Royal College, Mira Road for encouragement and support, teaching and non-teaching Staff of Zoology Department, SAIF centre, IIT, Mumbai for Electron Microscopy, ZSI, Kolkatta for help in

identifying some of the mites and Dr Ruqaiya Bano of ZSI, Pune for identifying springtails.

**STUDY OF DIVERSITY OF SOIL MICRO ANTHROPODS NEAR AND AROUND
MIRA ROADREGION, Ravindrananth .G**

ISOLATION AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT
ORGANISMS HAVING THE POTENTIAL TO PRODUCE XYLANASE

ZAMANAT FATIMA S. H. SYED

DEPARTMENT OF MICROBIOLOGY

ROYAL COLLEGE OF ARTS, SCIENCE AND COMMERCE

Introduction :

Xylanase is the name given to a class of enzymes which degrade the linear polysaccharide beta-1,4-xylan into xylose. Xylan is the second most abundant polysaccharide present in nature as the component of plant cell wall. The enzyme has potential applications in paper and pulp industry, textile industry, food industry and in environmental science i.e. in bio-fuelling, effluent treatment and agro-waste treatment, etc.

Most xylanases that show stability under extreme conditions are produced by micro-organisms which have colonized environments that may be said to be extreme and which produce enzymes adapted to these extreme habitats. Of the extremophilic xylanases, the thermophilic, alkaliphilic and acidophilic have been the most extensively studied while cold-adapted xylanases have been much less investigated (Collins *et al.*, 2005).

Few xylanases from marine micro-organisms have also been reported. It has been suggested that the enzymes derived from halophilic and halotolerant organisms are not only halostable but may also be alkalistable (Setati, 2010). Halophilic xylanase from *Chromohalobacter* has been reported to have maximum activity at pH 9.0 and 65°C in the presence of 15–25% NaCl. Xylanase from *Gracilibacillus* sp. isolated from the salt fields near Sambhar district of Rajasthan exhibited maximal activity in presence of 3.5% NaCl at pH 7.5 and 60°C (Poosarla *et al.*, 2010). The thermophilic bacterium *Thermoanaerobacterium saccharolyticum* has been reported to produce xylanase with optimal activity at 63°C, pH 6.4 and NaCl concentration 12.5% (Hunga *et al.*, 2011). A novel halophilic bacterium has been reported to produce two halotolerant endoxylanases with pH stability between 4-11 and temperature

optima at 60°C and 65°C (Wejset *et al.*,2003). Both xylanases showed optimal activity at 1 M NaCl, but substantial activity was retained by both the enzymes even at 5 M NaCl. This extremophilicity makes the enzyme suitable candidates in various fields of biotechnology and may even open up new application opportunities.

The purpose of this investigation was to screen organisms from marine environment for their potential to produce xylanase. Various parts of marine mangroves were used as source of xylanolytic microorganisms. The cultures producing significant amount of xylanase were subjected to characterization and partial identification.

Materials & Methods:

Enrichment and Isolation:

Water samples from marine environment including salt pans located in Mira Road-Virar coastal region were collected in sterile glass bottles for enrichment of xylanolytic organisms. Roots, stems and leaves of marine mangroves; *Acanthus*, *Avicennia marina*, *Sonneratia* and *Rhizophora* were also collected in sterile containers.

The samples were inoculated in 250ml Erlenmeyer flasks containing 50 ml of modified Han's medium (Mehjabeen *et al.*,2012) having 0.4% birchwoodxylan (Himedia) as the sole source of carbon (Suneetha *et al.*,2011). The medium contained ammonium sulphate 1g/l, magnesium sulphate 0.2g/l, dipotassium hydrogen phosphate 0.5g/l, potassium dihydrogen phosphate 0.5g/l, calcium chloride 0.1g/l, yeast extract.2g/l. birchwoodxylan, 4g/l. NaCl was used at the concentrations of 70g/l and 150g/l. The flasks were incubated under static condition at 37°C for five days. Subsequently two subcultures were done using fresh enrichment medium and finally the enriched samples were isolated on solid medium having same composition as the enrichment medium. The plates were incubated at 37°C for 5 to 7 days.

Pure cultures from well isolated colonies were transferred to slants containing the same medium and preserved by refrigeration at 4°C.

Production of xylanase and preparation of crude enzyme extract

ISOLATION AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT ORGANISMS HAVING
THE POTENTIAL TO PRODUCE XYLANASE, Z.SAYYED

Xylanase production for quantitative enzyme assay was done by inoculating 0.1ml of purified culture suspension having optical density of 0.05 at 530nm in 50ml of the medium having same composition as the enrichment medium. The medium was dispensed in 250ml Erlenmeyer flask. Incubation was done at 37°C. (Dorraet al.,2011, Prakashet al,2012). Presence of reducing sugar in the fermentation medium was detected qualitatively by using DNSA method, wherein 1ml of supernatant was boiled with 1ml of DNSA reagent for 10min. Development of orange brown color indicated presence of reducing sugar. Spent medium after five days of incubation was centrifuged at 3000 rpm for 30min and it was used as crude extract of xylanase for enzyme assay

Enzyme assay to detect xylanase activity

The xylanase activity was assayed using DNS method by measuring the amount of reducing sugars (xylose equivalent) liberated from xylan using 3,5-dinitrosalicylic acid (Baileyetal.,1992;Miller,1959).The reaction mixture containing 0.5ml crude enzyme extract in 0.05 MtrisHCl at pH 8 and 0.5ml of 1% xylan was incubated at 60°C for 10min. The reaction was terminated by adding 1ml of 3, 5-dinitrosalicylic acid reagent and heating in boiling water bath for 10 min. The absorbance of the resulting colour was measured against the control at 540 nm (Nagaret al.,2011). Two controls were used (i) reaction mixture without enzyme and (ii) reaction mixture without xylan.

A standard curve for estimation of pure xylose by DNS method was plotted and used for calculation of enzyme activity. One unit (IU) of xylanase activity is defined as the amount of enzyme that catalyzes the release of 1 µmol of reducing sugar as xylose equivalent per minute under the specified assay conditions.

Preservation of the cultures

The working cultures were preserved by serial subculture technique using solidified medium. The subcultured slants were preserved at refrigeration temperature. The stock cultures were maintained in 15% glycerol below freezing temperature. Saline suspensions were maintained at refrigeration temperature and used for characterization and biochemical studies.

Results:

ISOLATION AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT ORGANISMS HAVING THE POTENTIAL TO PRODUCE XYLANASE, Z.SAYYED

Enrichment and Isolation:

Enrichment and isolation of xylanolytic organisms from marine habitat yielded thirty seven isolates capable of growing on Han's modified medium using xylan as the sole source of carbon. These isolates were obtained on agarified media plates containing 7% and 15% NaCl.

Production of xylanase and preparation of crude enzyme extract

Eighteen of the thirty seven isolates failed to grow in the liquid fermentation medium containing 7% NaCl and 0.4% xylan. Subculture from the solid medium to fresh solid medium also yielded negative result.

Nineteen isolates grew in the fermentation medium at 37°C under static conditions. The medium was checked for presence of reducing sugar qualitative. All of the nineteen isolates yielded positive result for presence of reducing sugars.

Enzyme assay to detect xylanase activity

Xylanase activity was detected after five days of incubation at 37°C under static conditions for nineteen isolates. Nine of the isolates did not show any activity or almost negligible activity in the crude preparation even though the fermentation medium had shown presence of reducing sugars as detected by DNSA method.

The experiment was repeated in triplicate and mean of the three values was determined. The activity is represented as mean of three values \pm SD in table1.

One unit (IU) of xylanase activity is defined as the amount of enzyme that catalyzes the release of 1 μ mol of reducing sugar as xylose equivalent per minute under the specified assay conditions

SISOLATION. AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT ORGANISMS HAVING THE POTENTIAL TO PRODUCE XYLANASE, Z.SAYYED

Table 1: Quantitative detection of xylanase activity

| Isolate No. | Enzyme activity U*/ml of crude extract (Mean of 3 values \pm SD) |
|-------------|--|
| 1 | 6.3 \pm 0.7 |
| 2 | 19.3 \pm 1.5 |
| 3 | 3.6 \pm 0.7 |
| 4 | 2.7 \pm 0.7 |
| 5 | 11.3 \pm 1.6 |
| 14 | 6.3 \pm 0.3 |
| 16 | 5.7 \pm 0.98 |
| 23 | 21.3 \pm 2.4 |
| 34 | 13 \pm 0.7 |
| 35 | 13.3 \pm 1.2 |

Use of low cost hemicellulosic waste for xylanase production

Isolate number 2, 23, 34 and 35 were checked for their ability to utilize wheat bran as the sole source of carbon and show xylanolytic property. In case of all the four isolates, the supernatant from spent medium showed presence of reducing sugar, as detected by DNSA method.

Characterization of xylanolytic culture

The cultures showing detectable xylanase activity in the cell free extract were characterized with respect to salt tolerance, growth at pH 9, and morphological characteristics. Table 2 lists morphological and cultural characteristics of these isolates.

Table 2: Morphological and cultural characterization

| Isolate No. | Source | Growth on media containing various conc. of NaCl | | | Growth at pH 9 | Morphological characteristics |
|-------------|----------|--|----|-----|----------------|-------------------------------|
| | | 0% | 7% | 15% | | |
| 1 | Acanthus | + | + | - | + | Gram negative thin rods |

| | | | | | | |
|----|-------------------|---|---|---|---|---|
| | stem | | | | | |
| 2 | Saltpan water | + | + | + | - | Fungal colony, green spores, presence of conidiospores detected |
| 3 | Rhizophora stems | + | + | - | + | Gram negative filaments |
| 4 | Sonneratia roots | - | + | - | + | Gram negative rods |
| 5 | Sonneratia roots | + | + | - | + | Gram positive rods |
| 14 | Salt pan water | + | + | - | + | Gram positive, coccobacilli to rods and filaments |
| 16 | Sonneratia | + | + | - | + | Gram positive rods |
| 23 | Sonneratia leaves | + | + | - | + | Gram positive spore bearer |
| 34 | Sonneratia | - | + | + | + | Gram negative elongated cocci |
| 35 | Saltpan water | + | + | - | + | Gram positive irregular rods |

Identification of cultures with significant xylanase activity

Bacterial Isolate number 23 yielded comparatively higher xylanases activity. Hence it was subjected to identification on the basis of morphological, cultural and biochemical characterization. It formed irregular smooth colourless colony on solid medium. The cells were gram positive with central oval spore formation.

Table 3: Biochemical characterization of isolate 23

| Test | Observation |
|-------------|-----------------------------------|
| Catalase | TO PRODUCE XYLANASE, +ve Z.SAYYED |
| Lecithinase | - ve |
| Glucose | + (Acid) |
| Lactose | - |

| | |
|---------------------|-------------|
| Maltose | + (Acid) |
| Mannitol | - |
| Xylose | + (Acid) |
| Indole | - ve |
| VogesProskauer | - ve |
| Citrate utilization | +ve |
| Starch hydrolysis | +ve |
| Urease | Delayed +ve |

The isolate was identified to be Bacillus. However species could not be confirmed.

Isolate number 2 was a fungus. It could tolerate salt concentration upto 15%. It formed compact white cottony colonies on Han's modified solid medium. Green spores were observed on prolonged incubation. Wet mount revealed presence of branched conidiophores bearing short phialides attached to conidiospores. Possibly the fungus belongs to genus Penicillium.

Isolate number 34 was a gram negative slightly elongated big cocci. Biochemically it was found to be nonresponsive. It fermented only glucose and no other sugars. Most other biochemical tests were given negative by this culture. The culture couldn't be identified biochemically. .

Isolate number 35 was a gram positive irregular rod. It tolerated NaCl moderately. It couldn't be assigned a genus based on the biochemical tests.

Preservation of the cultures

The cultures were initially preserved on Han's modified agar slant under refrigeration. Many of the cultures stopped growing after two / three subcultures. These cultures could not be rejuvenated. Subsequently the cultures were preserved as saline suspension (Dyall-Smith, 2009) for routine study. The stock cultures were preserved by suspending the cells in 15%

ISOLATION AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT ORGANISMS HAVING THE POTENTIAL
TOPRODUCE XYLANASE, Z.SAYYED
glycerol and deep freezing the same .

Discussion:

Han's modified medium with 0.4% birchwoodxylan and 7% NaCl was used to enrich and isolate xylanolytic organisms. The sources used for isolation included roots, stems and leaves of marine mangroves (*Avicennia marina*, *Acanthus*, *Sonneratia* and *Rhizophora*) as well as saltpan water. Thirty seven isolates capable of using xylan as the carbon source in presence of 7% or 15% NaCl were obtained. Of these 29 isolates were obtained from body of mangroves. Of the 10 cultures which produced detectable xylanolytic activity in liquid medium under experimental conditions, seven were obtained from marine mangroves. Thus mangroves proved to be a good source of xylanolytic cultures.

Maintenance of the culture was the main problem through out this study. Eighteen of the thirty seven isolates failed to grow after a couple of subcultures. They could not be rejuvenated. Most of these organisms which did not grow on subculturing were tolerant to NaCl upto 15%. Literature cites preservation of halophiles in saline suspension. Hence saline suspension was prepared and maintained for routine studies.

Xylanase production was done under static condition using Han's modified liquid medium and DNSA method was used to detect presence of reducing sugar in the cell free extract prepared from the fermentation medium. Cell free extract after five days of incubation was used as the crude source of enzyme for enzyme assay.

Nine of the isolates used for xylanase production showed no activity or almost negligible activity in the crude enzyme preparation even though the fermentation medium had shown presence of reducing sugar as detected by DNSA method. Possibly the activity in these cases was located within the cells. The organisms probably had endoxylanases. These cultures were not taken for further studies

Remaining ten isolates had yielded enzyme activity ranging from 2.7 ± 0.7 U/ml to 21.3 ± 2.4 U/ml. The highest activity was given by the organism which was identified as *Bacillus* on the basis of morphological cultural and biochemical characteristics as per Bergey's Manual of ISOLATION AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT ORGANISMS HAVING THE POTENTIAL TO PRODUCE XYLANASE, Z.SAYYED Determinative Bacteriology. Confirmation of the species will be done by 16s rRNA analysis. The activity given by the culture was 21.3 ± 2.4 U/ml after five day of incubation at 37°C under static incubation condition during primary screening. Growth conditions and medium composition were not optimized. Optimization of these parameters is likely to improve the yield. Further, the organism was tolerant to 7% NaCl and showed good growth at pH of 9. There is a likelihood that xylanase from the organism will also be able to tolerate and function under alkaline condition. Most of the applications of xylanase demand its ability to

function under adverse environmental conditions including high pH and temperature. Hence following optimization if substantial improvement in yield and activity of xylanase is obtained, the same may be considered for commercial exploitation in paper and pulp industry and in detergent industry.

Comparatively high enzyme activity was also given by a fungus which resembled *Penicillium* morphologically as well culturally. Identification of the fungus needs to be confirmed using molecular methods. Xylanase activity level shown by the fungus in the crude extract was 19.3 ± 1.0 U/ml. The fungus was able to tolerate salt concentration as high as 15%. However it did not grow at pH of 9. The optimization of production conditions and medium composition for xylanase production by the fungus is yet to be undertaken. As the organism is not tolerant to alkaline condition, xylanase from the same may prove useful in food and feed industry for clarification of fruit juices and preparation of animal feed respectively, but not in paper and pulp industry. It may also be useful in waste treatment and in conversion of agricultural waste into fermentable substrate.

Isolate number 34 yielded 13 ± 0.7 U/ml of xylanase activity in the crude extract. It was both salt tolerant as well alkali tolerant. Isolate number 35 was moderately salt tolerant as well as alkali tolerant. It yielded 13.2 ± 1.2 U/ml of the enzyme activity in crude extract. Both the cultures may be considered for optimization of production conditions and further study.

Conclusion:

xylanases stable at extreme conditions of pH and temperature are potential candidates for industrial applications. Marine isolates are especially promising due to their tolerance to extreme conditions. Marine mangroves seem to be a good source of salt tolerant xylanolytic bacteria.

The high salt and pH tolerance of the *Bacillus* isolated from *Sonneratia* leaves makes it a desirable candidate for biotechnological exploitation. Its ability to grow on wheat bran and express xylanase activity further enhances prospects of its application. Wheat bran is an economically feasible substrate that can cut down the cost of production—the main factor that limits the use of xylanase at industrial level. However, a lot remains to be investigated. Since

it was a short term project, optimization of various parameters such as medium composition, type of substrate, incubation conditions, duration of incubation, inoculums density etc. could not be completed.

The fungal isolate obtained from saltpan water yielded 19.3 ± 1.5 U/ml of xylanase activity in the cell free extract. However, fungal xylanases are generally associated with cellulases (Haltrich *et al*; 1996) and hence their uses are restricted to food/feed industries and waste treatment processes.

Optimization of production conditions and detection of associated cellulase activity are required to be carried out for the fungal isolate as well as the bacterial isolates (Isolate number 23, 34 & 35).

One major problem encountered during the course of this study was maintenance of the cultures obtained from marine environment. Development of adequate preservation technique is an important aspect to be considered.

References

- Bailey M. J., Biely P., Poutanen K.J. (1992) Laboratory testing of method for assay of xylanase activity. *J. Biotechnol.* **23**, 257–270.
- Collins T., Gerday C., Feller G. (2005) Xylanases, xylanase families and extremophilic xylanases. *FEMS Microbiology Reviews*. **29**, 3–23.
- Dorra D., Bhiria F., Elleucha L., Bouly N., Stals I., Miled N., Blibecha M., Ghorbela R., Chaabounia S. E. (2011) Purification and properties of an extracellular acidophilic endo-1,4- β -xylanase, naturally deleted in the “thumb”, from *Penicillium occitanis* Pol6. **TO PRODUCE XYLANASE, Z.SAYYED**
Process Biochemistry. **46**, 1299–1306.
- Ghose T.K., Bisaria V.S. (1987), *Pure & Applied Chemistry*, 59(12), 1739-17522
- Hunga K. S., Liub S. M., Tzoua W. S., Lina F., Panc C., Fange T., Sund K., Tang S. (2011) Characterization of a novel GH10 thermostable, halophilic xylanase from the marine bacterium *Thermoanaerobacterium saccharolyticum* NTOU1. *Process Biochemistry*. **46**(6), 1257–1263.

- Haltrich D., Nidetzky B., Kulbe K. D., Steiner W., Zupancic S. (1996) Production of fungal xylanases. *Biores. Technol.* **58**, 137–161.
- John G.Holt, Noel R.Krieg, Peter H.A. sneath, Jamesa T. Staley, Stanley T. Williams (1994), Bergey's Manual of determinative Bacteriology 9th Ed
- KambleR. D,JadhavA. R. ,Isolation, Purification, and Characterization of Xylanase Produced by a New Species of Bacillus in Solid State Fermentation (2012), *International Journal of Microbiology*. 2012 (2012), Article ID 683193
- Prakash P., Jayalakshmi S. K., Prakash B.(2012) Production of alkaliphilic, halotolerent, thermostable cellulose free xylanase by *Bacillus halodurans* PPKS-2 using agro waste. *World J Microbiol.Biotechnol.***28**,183–192.
- MahjabeenS., Farheen A., Muhammad S. A., Mohsin T., Muhammad I. R. (2001) Characterization of a thermostable and alkaline xylanase from *Bacillus* sp. and its bleaching impact on wheat straw pulp.*World J Microbiol.Biotechnol.***28(5)**, 513–522.
- Miller, G.L. (1959) Use of dinitrosalicylic acid reagent for determination of reducing sugar. *Anal. Chem.***31**, 426–428.
- Nagar S., Mittal A., Kumar D., Kumar L., Kuhad R. C., Gupta V. K. (2011) Hyper production of alkali stable xylanase in lesser duration by *Bacillus pumilus* SV-85S using ISOLATIONwheatANDbranIDENTIFICATIONundersolid OFstateHALOPHILIC/fermentationHALOTOLERANT.*NewBiotechnologyORGANISMS.***28(6)**HAVING),581-587THE. POTENTIAL TO PRODUCE XYLANASE, Z.SAYYED
- Navi S.,Bandyopadhyay R., Hall A., Paula J., Bramel-Cox (1999), A Pictorial Guide for the Identification of Mold Fungi on Sorghum Grain, Information Bulletin no. 59
- Nestmann, E.R. (1985) Detection of genetic activity in effluent from pulp and paper mills: mutagenicity in *Saccharomyces cerevisiae*. In *Testing in Environmental Pollution Control* (Zimmerman, F.K., ed.), 105–117, Horwood

- Poosarla V. G., Chandra T.S. (2010) Production of novel halo-alkali-thermo-stable xylanase by a newly isolated moderately halophilic and alkali-tolerant *Gracilibacillus* sp. *Process Biochemistry*. **45(10)**, 1730–1737.
- Setati M. E. (2010), Diversity and industrial potential of hydrolase producing halophilic/halotolerant eubacteria. *African Journal of Biotechnology*. **9 (11)**, 1555-1560.
- Singh S., Dutt D., Tyag C.H., Upadhyaya J.S. (2011), Bio-conventional bleaching of wheat straw soda–AQ pulp with crude xylanases from SH-1 NTCC-1163 and SH-2 NTCC-1164 strains of *Coprinellus disseminatus* to mitigate AOX generation , *New Biotechnology*, 28 (1).
- Suneetha V., Ram K., Bishwambhar M. and Pravesh C. (2011) An overview of Screening and Tentative Optimization of Microbial Xylanase from soil Samples Collected from Chittoor Paper Industry. *Indian Journal of Fundamental and Applied Life Sciences* 1 (2011) , 173-177.
- Wejse, Ingvorsen, Mortensen (2003) Purification and characterisation of two extremely halotolerant xylanases from a novel halophilic bacterium. *Extremophiles*. 3 **7(5)**, 423-431.

ISOLATION AND IDENTIFICATION OF HALOPHILIC/ HALOTOLERANT ORGANISMS HAVING THE POTENTIAL TO PRODUCE XYLANASE, Z.SAYYED

Paper Presented at

National Level Conference

On

Indian Business Scenario and the challenges ahead

At

Saraph College

On

26-27 November 2012.

Changing Face of Corporate Governance

SanchitaDatta, RenuKhandelwal

Department of Commerce

Abstract

The issues of governance, accountability and transparency in the affairs of the company, as well as about the rights of shareholders and role of Board of Directors have never been so prominent as it is today. The corporate governance has come to assume a centre stage in the Board room discussions. India has become one of the fastest emerging nations to have aligned itself with the international trends in Corporate Governance. In the years to come, corporate governance will become more relevant and a more acceptable practice worldwide.

The concept is becoming more of importance when corporates, in the process of increasing profits and fast growth, misutilised the weaknesses of Accounting Standards to inflate profits and understate liabilities. Such mismanagements were found to be supported by the corporate structures leading to corporate failures. The new paradigm, while maintaining the supremacy of shareholders, pushes the interests of non-core stakeholders by a few notches.

Companies are expected to meet the reasonable expectations of all stakeholders and address their concern. They are also expected to create positive externalities and reduce negative externalities. Ideally, they should absorb all the costs of operation, including social costs.

There are two ways to look at the sustainability issue. One is to take it as a constraint within which to create shareholder value. The second is to consider participation in improving the living of this and future generations as a corporate responsibility and to embed sustainability in decision-making processes. Responsible companies are expected to adopt the second approach. Companies need to consider board oversight of the CEO's activities, the company safety record, and the division of responsibilities before such tragedies can occur. They should re examine and evaluate their corporate governance practices and performance now to determine any changes that would help them fulfil their roles and responsibilities more effectively.

Key Words: governance, accountability, responsibility, performance, tragedies

Paper Presented at
National level Conference on
PAPER PRESENTATIONS (2012-13)
India and Sustainable Development
At
Thakur College of Commerce and Science
20-21 November 2012
Ecopreneur- The Need of the 21st Century
SanchitaDatta, RenuKhandelwal
Department of Commerce, Royal College of Arts, Science and
Commerce

Abstract

The adoption of environmentally responsible business practices can, conceivably, open up an additional range of opportunities for entrepreneurs. The move to a sustainable business framework provides numerous niches that enterprising individuals and firms can successfully identify and service. These include, among other things, the development of new products and services, improvements to the efficiency of existing firms, new methods of marketing and the reconfiguration of existing business models and practices.

Environmentally responsible businesses come in two basic varieties: 'green businesses' and 'green-green businesses'. Ecopreneurship is not just anybody's existentialism. Businesses that are not designed to be sustainable decrease our health, shorten our time on Earth and destroy the heritage we leave for our children, no matter where we are located globally. In contrast, greengreen businesses are models that can help show the way to increase productivity while reducing resource use in a manner that is harmonious with human health and the sustainability of non-human species as well. Green start-ups make it easier to 'fix' environmental components and processes from the outset. Green subsidiaries of larger firms can foster innovation and bring back the heightened motivation of social solidarity to businesses where it may be all too easy to slip into cynicism in an era of global economic crises. Sustainability is the ultimate political commitment and epitomises common sense from the perspective of corporate citizenship. Every time we invest we should think of our own personal values and use a 'blended value' approach combining social and environmental as well as financial objectives. Only by so doing can we enable 'serial ecopreneurship' to thrive and be cultivated. The key is to bring green-green businesses to a critical mass and thereby assure global sustainable development.

Keywords: Entrepreneurial process, Opportunity recognition, Resource acquisition, Growth strategies, Activism, Environmental management, Environmental entrepreneurship, Social responsibilities, Sustainable development

GENDER INEQUALITIES IN THE FIELD OF EDUCATION.

SanchitaDatta

Department of Commerce

Abstract

The socialization of gender within our schools assures that girls are made aware that they are unequal to boys. Every time students are seated or lined up by gender, teachers are affirming that girls and boys should be treated differently. When an administrator ignores an act of sexual harassment, he or she is allowing the degradation of girls. When different behaviors are tolerated for boys than for girls because 'boys will be boys', schools are perpetuating the oppression of females. There is some evidence that girls are becoming more academically successful than boys, however examination of the classroom shows

that girls and boys continue to be socialized in ways that work against gender equity. Beyond teacher responses, special services in education appear to be applied more liberally to boys than to girls. Boys represent more than two-thirds of all students in special education programs and there is a higher the proportion of male students receiving diagnoses that are considered to be subjective. While medical reports indicate that learning disabilities occur in nearly equal numbers of in boys and girls, it may be the case that, "Rather than identifying learning problems, school personnel may be mislabelling behavioral problems. Girls who sit quietly are ignored; boys who act out are placed in special programs that may not meet their needs." Nevertheless, gender inequalities still manifests itself in different forms in India, of which inequalities in access to education is one such aspect. There is a need to understand the forces that shape female access to education, especially in the context of the recent rapid structural transformation of Indian society. The education landscape is also changing within this wider social transformation, and a better understanding of these changes would help identify new spaces and language to promote greater gender equality. Monitoring the existing resources reach their intended recipients is important, there is a wider question about the value of incentive schemes in terms of their actual impacts on demand and participation.

Keywords: gender, recipients, inequalities, transformation, impact.

**Paper Presented at National Seminar on
Aspects of Mathematics in collaboration with Bombay Mathematical
Colloquim
14-15 December 2012.
At
RamniranjanJhunjunwala College.**

**Fuzzy Morphological Image Processing
KomalWategaonkar
Department. Of Mathematics, Royal College of Arts, Science and
Commerce**

In this paper, fuzzy morphological image processing is explained and reviewed.

Morphological operators transform the original image into another image through the interaction with the other image of certain shape and size which is known as the structure element. Morphology provides a systematic approach to analyze the geometric characteristics of signals or images, and has been applied widely to many applications such as edge detection, objection segmentation, noise suppression and so on. Morphology aims to extend the binary morphological operators to grey-level images. The fuzzy morphological operations extend the ordinary morphological operations by using fuzzy sets where for fuzzy sets, the union operation is replaced by a maximum operation, and the intersection operation is replaced by a minimum operation.

Based on the mathematical morphology rules, which are based on fuzzy sets and fuzzy logic theorem fuzzy morphology operations are defined. In general mathematical morphology operation definitions are similar structures set theory and set operations definitions. For this reason fuzzy set theory is easily applied to the mathematical morphology. Fuzzy morphology operations are defined and implemented in two steps.

Initial step **PAPER** is the fuzzification **PRESENTATIONS** process which

(2012 is constructed -13) over the fuzzy membership functions. Second step is the

realization process of the fuzzification process via the alpha cuts of the fuzzy membership functions. With the help of this theorem image processing techniques gain many opportunities for different operations. Since the gray scale images are discrete structures which have 1 and 0 sets, fuzzification process is a good application for transforming the discrete set to the fuzzy set. In this study a gray scale image is fuzzified according to the SAKAWA's and YUMINE's fuzzy membership functions. Basic mathematical morphology operations which are "EROSION" and "DILATION" implemented and inspected via the fuzzy membership functions alpha cuts.

Research topic : FUZZY MORPHOLOGICAL IMAGE PROCESSING

Prof. Komal Wategaonkar

Objective : To demonstrate the use of Fuzzy logic in Morphological Image Processing.

INTRODUCTION

Mathematical Morphology is a method for quantitative analysis of spatial structures that aims at analyzing shapes and forms of an object. Mathematical morphology is based on set theory. The shapes of objects in a binary image are represented by object membership sets. Objects are connected areas of pixels with value 1, the background pixels have value 0. Since the mathematical morphology is originally defined on binary images, most of the theories for extending the mathematical morphology tried to broaden this fact to the grayscale and color scale images. There are many such theories. One of them is Fuzzy Logic Approach.

In this method fundamentals of fuzzy set theory and the fuzzy logic is used to define the mathematical morphological operators. The content of mathematical morphology is completely based on set theory. By using set operations there are many useful operators defined in mathematical morphology. For instance erosion, dilation, opening and closing are these kind of operations which are beneficial when dealing with the numerous image processing problems.

Reflection and transmission are used extensively to formulate operations based on so-called structuring elements (SEs), small sets of sub images used to probe an analyzed image for properties of interest. Examples of structuring elements: shaded square denotes a member of the SE. The origins of SEs are marked by a black dot. When working with images, SEs should be rectangular: append the smallest number of background elements.

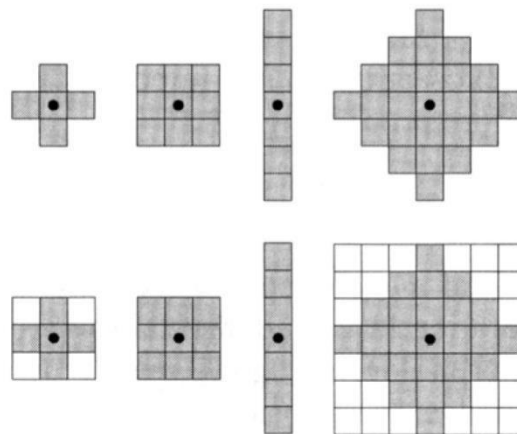


Figure 1. Structural Elements (SE)

Erosion

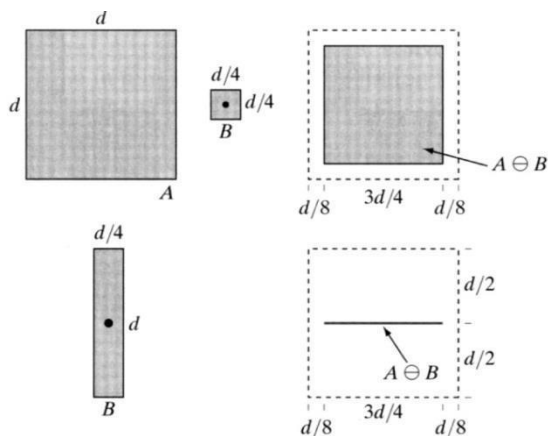


Figure 2.Erosion(Shrinking)

The erosion of the binary image A by the structuring element B is defined by:

$$A \ominus B = \{z \in E \mid B_z \subseteq A\},$$

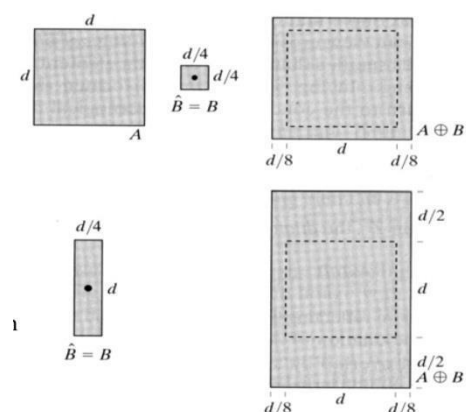
where B_z is the translation of B by the vector z , i.e.

$$B_z = \{b + z \mid b \in B\}, \forall z \in E.$$

When the structuring element B has a center (e.g., B is a disk or a square), and this center is located on the origin of E , then the erosion of A by B can be understood as the locus of points reached by the center of B when B moves inside A . For example, the erosion of a square of side 10, centered at the origin, by a disc of radius 2, also centered at the origin, is a square of side 6 centered at the origin.

The erosion of A by B is also given by the expression:

$$A \ominus B = \bigcap_{b \in B} A_{-b}.$$



Example application: Assume we have received a fax of a dark photocopy. Everything looks like it was written with a pen that is bleeding. Erosion process will allow thicker lines to get skinny and detect the

hole inside the letter "o".

Dilation

The [dilation](#) of A by the structuring element B is defined by:

$$A \oplus B = \bigcup_{b \in B} A_b$$

$$A \oplus B = B \oplus A = \bigcup_{a \in A} B_a$$

The dilation is commutative, also given by:

Figure 3. Dilation

If B has a center on the origin, as before, then the dilation of A by B can be understood as the locus of the points covered by B when the center of B moves inside A . In the above example, the dilation of the square of side 10 by the disk of radius 2 is a square of side 14, with rounded corners, centered at the origin. The radius of the rounded corners is 2.

The dilation can also be obtained by: $A \oplus B = \{z \in E \mid (B^s)_z \cap A \neq \emptyset\}$,

where B^s denotes the symmetry of B , that is, $B^s = \{x \in E \mid -x \in B\}$.

Example application: Dilation is the dual operation of the erosion. Figures that are very lightly drawn get thick when "dilated". Easiest way to describe it is to imagine the same fax/text is written with a thicker pen.

The [opening](#) of A by B is obtained by the erosion of A by B , followed by dilation of the resulting image by B :

$$A \circ B = (A \ominus B) \oplus B \quad \text{OR} \quad A \circ B = \bigcup_{B_x \subseteq A} B_x$$

This means that it is the locus of translations of the structuring element B inside the image A . In the case of the square of side 10, and a disc of radius 2 as the structuring

element, the opening is a square of side 10 with rounded corners, where the corner radius is 2.

Example application: Let's assume someone has written a note on a non-soaking paper and that the writing looks as if it is growing tiny hairy roots all over. Opening essentially removes the outer tiny "hairline" leaks and restores the text. The side effect is that it rounds off things. The sharp edges start to disappear.

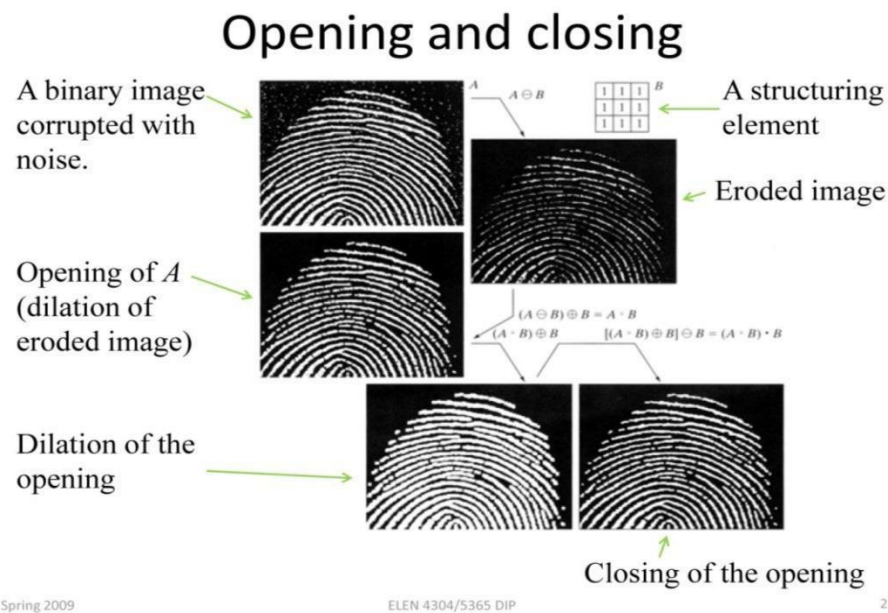
Closing

The closing of A by B is obtained by the dilation of A by B , followed by erosion of the resulting structure by B :

$$A \bullet B = (A \oplus B) \ominus B \quad \text{OR} \quad A \bullet B = (A^c \circ B^s)^c,$$

where X^c denotes the complement of X relative to E (that is, $X^c = \{x \in E | x \notin X\}$). The above means that the closing is the complement of the locus of translations of the symmetric of the structuring element outside the image A .

Figure 4



What is Fuzzy Set Theory?

Fuzzy set theory is the extension of conventional (crisp) set theory. It handles the concept of partial truth (truth values between 1 (completely true) and 0 (completely false)). It was introduced by Prof. Lotfi A. Zadeh of UC/Berkeley in 1965 as a mean to model the vagueness and ambiguity in complex systems.

The idea of fuzzy sets is simple and natural. For instance, we want to define a set of gray levels that share the property dark. In classical set theory, we have to determine a threshold, say the gray level 100. All gray levels between 0 and 100 are element of this set, the others do not belong to the set (left image in Fig.5). But the darkness is a matter of degree. So, a fuzzy set can model this property much better. To define this set, we also need two thresholds, say gray levels 50 and 150. All gray levels that are less than 50 are the full member of the set, all gray levels that are greater than 150 are not the member of the set. The gray levels between 50 and 150, however, have a partial membership in the set (right image in Fig.5).

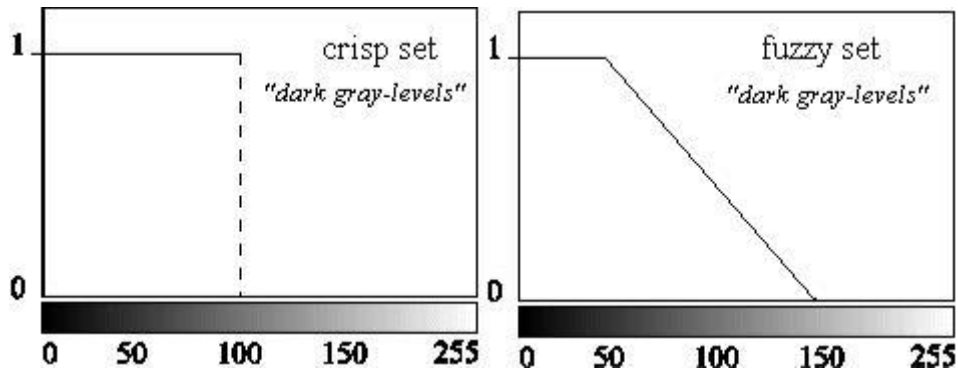


Fig.5. Representation of "dark gray-levels" with a crisp and a fuzzy set

Binary mathematical morphology is based on two basic operations, defined in terms of a structuring element, a small window that scans the image and alters the pixels in function of its window content: a dilation of set A with structuring element B enlarges the objects, an erosion shrinks objects.

What does Fuzzy Image Processing mean?

Fuzzy image processing is not a unique theory. It is a collection of different fuzzy approaches to image processing. Nevertheless, the following definition can be

regraded as an attempt to determine the boundaries:

Fuzzy image processing is the collection of all approaches that understand, represent and process the images, their segments and features as fuzzy sets. The representation and processing depend on the selected fuzzy technique and on the problem to be solved.

(From: [Tizhoosh, Fuzzy Image Processing, Springer, 1997](#)) Fuzzy image processing

has three main stages: image fuzzification, modification of membership values,

and, if necessary, image defuzzification (see Fig.1.).

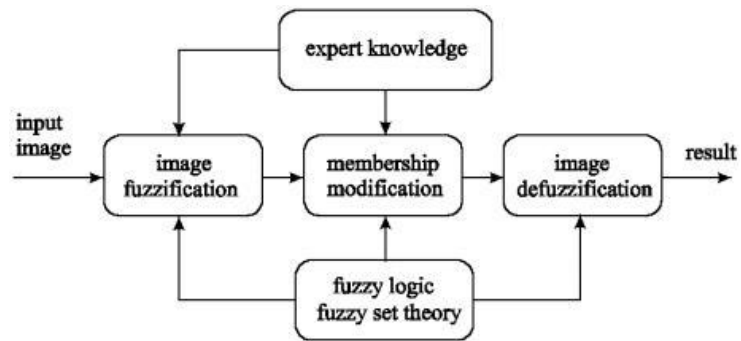


Fig.6. The general structure of fuzzy image processing.

The fuzzification and defuzzification steps are due to the fact that we do not possess fuzzy hardware. Therefore, the coding of image data (fuzzification) and decoding of the results (defuzzification) are steps that make possible to process images with fuzzy techniques. The main power of fuzzy image processing is in the middle step (modification of membership values, see Fig.2). After the image data are transformed from gray-level plane to the membership plane (fuzzification), appropriate fuzzy techniques modify the membership values. This can be a fuzzy clustering, a fuzzy rule-based approach, a fuzzy integration approach and so on.

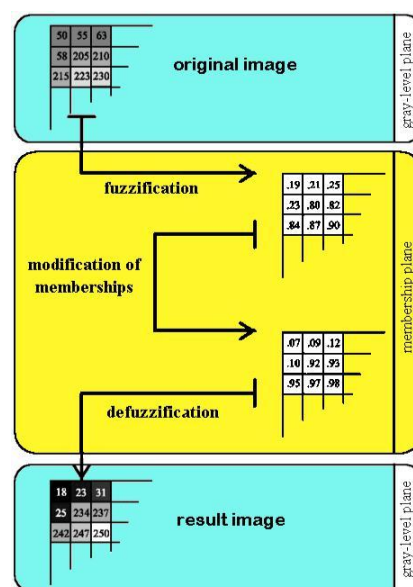


Fig.7. Steps of fuzzy image processing.

Why Fuzzy Image Processing?

Many colleagues (not only the opponents of fuzzy logic) ask why we should use fuzzy techniques in image processing. There are many reasons to do this. The most important of them are as follows:

1. Fuzzy techniques are powerful tools for knowledge representation and processing
2. Fuzzy techniques can manage the vagueness and ambiguity efficiently

In many image processing applications, we have to use expert knowledge to overcome the difficulties (e.g. object recognition, scene analysis). Fuzzy set theory and fuzzy logic offer us powerful tools to represent and process human knowledge in form of fuzzy if-then rules. On the other side, many difficulties in image processing arise because the data/tasks/results are uncertain. This uncertainty, however, is not always due to the randomness but to the ambiguity and vagueness. Beside randomness which can be managed by [probability theory](#) we can distinguish between three other kinds of imperfection in the image processing.

- Grayness ambiguity
- Vague (complex/ill-defined) knowledge

These problems are fuzzy in the nature. The question whether a pixel should become darker or brighter than it already is, the question where is the boundary between two image segments, and the question what is a tree in a scene analysis problem, all of these and other similar questions are examples for situations that a fuzzy approach can be the more suitable way to manage the imperfection.

As an example, we can regard the variable colour as a fuzzy set. It can be described with the subsets yellow, orange, red, violet and blue:

$$\text{colour} = \{\text{yellow, orange, red, violet, blue}\}$$

The non-crisp boundaries between the colours can be represented much better. A soft computing becomes possible.

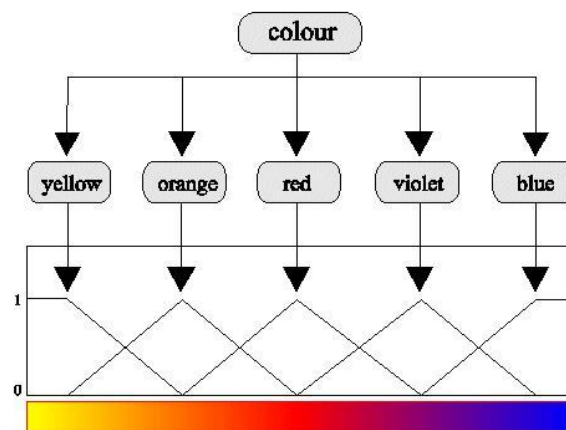


Figure 8.Colours as a fuzzy sets.

Alpha Morphology :

The initial trial who combined the mathematical morphology and fuzzy logic was Kaufmann in 1988, Kaufmann proposed alpha cuts approach for further fuzzy set operations. For $\alpha \in [0, 1]$ the α – cut consists of those value of x for which the membership function value $\mu(x) \geq \alpha$.

$$\text{Thus } = \{x / \mu(x) \geq \alpha.\}$$

By the help of this definition of α – cuts, fuzzy sets operations are easily derived. For example, a union set operation of two fuzzy sets $\mu(x)$ and $\nu(x)$ is defined as

$$[\mu \vee \nu](x) = \max[\mu(x), \nu(x)] \text{ which implies } (\mu \vee \nu)\alpha = \mu\alpha$$

Now to define Minkowski's addition of two sets A and B translate = $\{y / y = x - \alpha, x \in X\}$

A /

This operation reminds the "eroding" the shape of A by the shape of B. By using these ideas we can define the erosion and dilation operations over α -cuts. To realize this we, have to fuzzify the image pixels to create a fuzzy set image. With the help of this fuzzy set image we will define a α -cut from that fuzzy set image as a threshold value. So the image $f(x,y)$ will be defined as $g_{\alpha}(x)$. This makes us to remember the scale of a grayscale image has been selected over the threshold α .

Then if we define a structuring element mask for instance a 3x3 fuzzified weighted mask $\mu_{\alpha}(x)$ over the α -cut. The definition of a 2-D α -cut Bloch and Maitre dilation and erosion as follows with the help of the Minkowski addition and subtraction

$$[g(x) \mu(x)]_{\alpha}(x) = \sup \min [g(x-y), \mu(x)] \text{ where}$$

y X: Dilation

$$[g(x) \mu(x)]_{\alpha}(x) = \inf \max [g_{\max} - g(x-y), \mu(x)]$$

where y X :Erosion

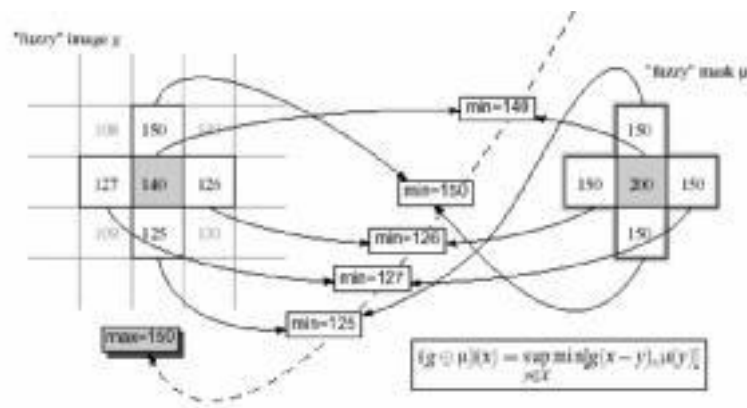


Figure 9. Understanding the Bloch-Maitre Formula on Erosion-Dilation Operations [4]

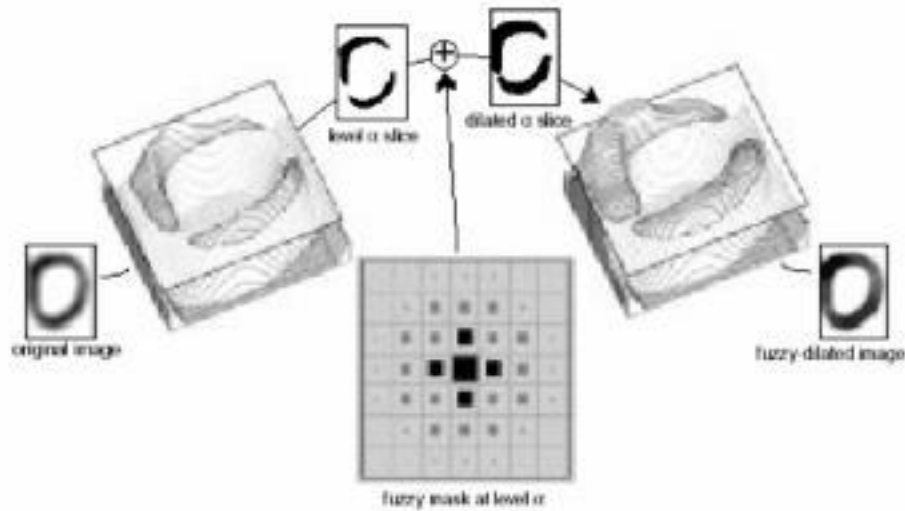


Figure 10.A fuzzy dilation with an α -cut fuzzy structuring element mask.

The Sinha and Dougherty Morphologies:

Sinha and Dougherty proposed the first group of morphologies which broaden the concept of α -cut

morphologies. The base rule of these morphological approach can be found in the translation of τ_x of a set

B and the degree, to which it is covered by the set A . For the Minkowski subtraction it is required that

$\tau_x(B) \subseteq A$ for taking x into the result set. But in this approach there exist a drawback of x belonging to the

result set fails even all the elements besides or only one of the translated B belong to A . To

resolve this drawback it can be used a more flexible measure for “subthood”, which is 1 for the case of crisp subthood. Sinha and Dougherty proposed “*inclusion indicator*”.

Inclusion indicator represents the degree of a fuzzy set which is a subset of another fuzzy set. Some of the necessary rules are stated below and they were

updated by Popov[4]. The fuzzy subsets of Universal set U shall be denoted by $F[U]$ and $FR[U \times V]$ is the

class of the fuzzy relations in $U \times V$. When it is said that $RFR(F(U) \times F(U))$ is an inclusion grade between

fuzzy subsets when the following axioms in $U \times V$ [Fuzzy Morphological Operators]:

1. $R(A, B) = 1 \iff A \subseteq B$
2. $R(A, B) = 0 \iff \exists x \in U$ such that $A(x) = 1$ and $B(x) = 0$
3. R is non decreasing in its second argument ($B \subseteq C \implies R(A, B) \leq R(A, C)$)
4. R is non increasing in its first argument ($B \subseteq C \implies R(C, A) \leq R(B, A)$)
5. $R(A, B) = R(BC, AC)$
6. $R(AB, C) \geq \min(R(A, C), R(B, C))$
7. $R(A, B \cap C) \geq \min(R(A, B), R(A, C))$

All of these axioms are conformant with the ordinary set operations. A fuzzy erosion and dilation can be constructed by providing the result value at image position x as $[g\mu](x) = [g', (-\mu)']$ where g' represents complement of g and $I(A, B) = 1$ iff $B \subseteq A$ and 0 otherwise: *Dilation* $[g\mu](x) = I[\tau x(\mu), g]$ where $I(A, B) = 1$ iff $B \subseteq A$ and 0 otherwise: *Erosion*

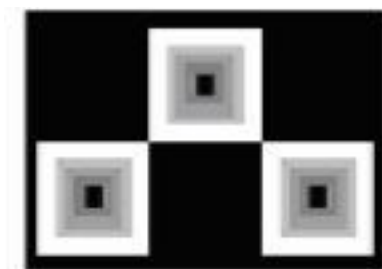


Figure 11

Initial

Image

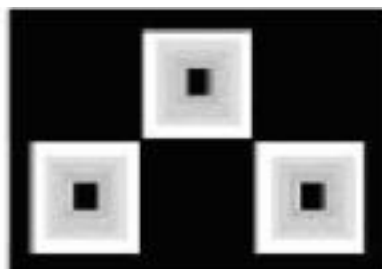


Figure 12.

Erosion

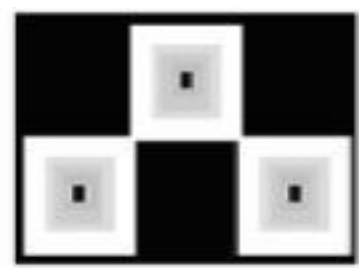


Figure 13.

Dilation

The Figures 11-12-13 shows the applications Erosion and Dilation of the Sinha and Dougherty morphologies on

the initial image [1].

CONCLUSION

From all the information stated above fuzzy logic and fuzzy set theory provide many solutions to the mathematical morphology algorithms. They have extended way of processing the grayscale images by the help of the fuzzy morphological operators. Fuzzy set and fuzzy logic theory is a new research area for defining new algorithms and solutions in mathematical morphology environment.

References:

- [1] Burillo P., Frago N., Fuentes R. "Fuzzy Morphological Operators in Image Processing", 2003,
- [2] Gonzales C. Rafael, Woods E. Richard, "Digital Image Processing", 1998, Second Edition,
- [3] Image Processing Toolbox, "Structuring Elements", 1994-2004 MathWorks, Inc, Webpage retrieved from "<http://www.mathworks.com/access/helpdesk/help/toolbox/images/morph5.html>"
- [4] Köppen Mario, Franke Katrin, Unold Olgierd, "A Tutorial on Fuzzy Logic", 1999, Fraunhofer
- [5] NATO (North Atlantic Treaty Organization) Research and Technology Organization, "Advanced Pattern Recognition Techniques", RTO Lecture Series 214, 1998, Printed by Canada
- [6] University of Waterloo, Canada, "Homepage of Fuzzy Image Processing", June 1997, Webpage Retrieved From "<http://pami.uwaterloo.ca/tizhoosh/fip.h>"

**Paper Presented at
International Conference**

On

Green India, Vision 2020

On

March 23, 2013

Gender and Sustainability: A study on the Role of Women in Sustainable Development.

Ravishri Mishra

Department of Sociology, Royal College of Arts, Science and Commerce

Abstract:

Women play a significant role as stewards of national and global natural resources and biodiversity. Yet, they are marginalized in decision making for management and preservation of the resources with which they are more acquainted. This categorised exclusion results in neglect of their needs, denial of their interests and retarding of their potentials. For sustainable development and preservation of natural resources role of both men and women are equally significant. Women's participation in management of natural resources is not only an equity issues but is also a more effective, efficient and time tested way of preserving the eco-diversity. Their traditional roles and knowledge in natural resource management and food security are very crucial. They are the worst affected when soil erosion and diminished soil fertility results in decreased crop and livestock productivity which impacts their income through sources derived from these products.

PAPER PRESENTATIONS (2012-13)

The objective of this paper is to investigate the role of women in management of natural resources and to investigate the impact of resource degradation on women.

Key Words: Exclusion, Equity, Sustainability, roles, Gender

PAPER PRESENTATIONS (2012-13)

Paper Presented at
State level Seminar on
Growth of Real Estate in India, Pros and Cons
At
Adarsh College of Arts and Commerce
December 12, 2012
Issues of Urbanization and its impact on Real Estate
Prof. (Mrs.) RenuKhandelwal
Department of Commerce

Real estate developers play a leading role in the industry, bridging the gap between construction ability and the customer's need. Developers offer value in terms of design, cost, functionality and location. They work hard to absorb international trends, analyze the customers' expectations and deliver quality realty products based on their experience. In India, real estate developers fulfill a critical need for infrastructure to serve a growing economy in areas like housing, office space, retail and entertainment, among others. The Government realizes the need to upgrade the infrastructure of various Indian cities, to de-congest the city centers and unlock the development potential of locations on the city fringes. Due to a lack of available land within cities, suburbanization has accelerated in several metropolitan areas during the past decade. Suburban issues and the very high cost of **real estate** in India might be to a great extent due to policy, law and beaurocracy. In the fastprocess of urbanization the thrust to deliver benefits to people especially to the poor have to a large extent been neglected d by the large real estate developers that underlie the real estate sector in India.

PAPER PRESENTATIONS (2012-13)

This paper tries to explain the present scenario of real estate in India, fundamental factors affecting development of urbanization and the suggestions and future prospects of real estate in the country. The contents of this paper are based on research reports and other eminent published sources. This paper will be useful to a cross-section of readers, more particularly so to those associated with the real estate sector.

Keywords: Real estate, urbanization, property, prices, market, income etc

Introduction

The term 'real estate' is defined as land, including the air above it and the ground below it, and any buildings or structures on it. It is also referred to as realty. It covers residential housing, commercial offices, trading spaces such as theatres, hotels and restaurants, retail outlets, industrial buildings such as factories and government buildings. Real estate involves the purchase, sale, and development of land, residential and non-residential buildings. The activity of the real estate sector encompasses the housing and construction sectors also. Well-developed real-estate economy contributes to the conversion of unused or underused resources into productive capital to reduce poverty. The unique features of the real estate market include durability, heterogeneity, high transaction costs, long time delays, immobility and both investment good and consumption good product.

The main players in the real estate market are the landlords, developers, builders, real estate agents, tenants, buyers, renovators etc. The real estate sector in India has assumed growing importance due to the following factors:

1. Flourishing Indian Economy
2. Growing IT Sector
3. Liberating Economic Policies
4. Developing Middle Class

5. Massive NRI Investments
6. Substantial FDI Investments

With the liberalization of the economy., the consequent increase in business opportunities and migration of the labour force has, in turn, increased the demand for commercial and housing space, especially rental housing. Developments in the real estate sector are being influenced by the developments in the retail, hospitality and entertainment (e.g., hotels, resorts, Cinema theatres) industries, economic services (e.g., hospitals, schools) and information technology (IT)-enabled services (like call centers) etc. and vice versa. The real estate sector is a major employment driver, being the second largest employer next only to agriculture and it accounts for about 6% of the country's GDP. This is because of the chain of backward and forward linkages that the sector has with the other sectors of the economy, especially with the housing and construction sector. About 250 ancillary industries such as cement, steel, brick, timber, building materials etc. are dependent on the real estate industry. Limited land being made available in the periphery of cities, low Floor Space Indices (FSIs) which planners use, restrict the rate of expansion of supply so that real estate booms very quickly translate into high price increases in comparison to similar booms elsewhere for instance in East Asia. Additionally in many cities supply of urban land is largely controlled by state-owned development bodies leaving very limited developed space free, which is controlled by a few major players in each city. Restricted supplies of from these agencies keep prices high.

This sector is unregulated on dimensions such as quality, terms of delivery; information provided to potential buyers etc. This industry is constrained by archaic laws as well as government policies both at the central and state levels. There are more than 100 laws governing different aspects of this sector and most of these are dating back to the 19th century. The most common problems witnessed by this sector in urban areas are as follows::

Urban Land Ceiling Regulation Act (ULCRA)

The central government has replaced this archaic law in 1999-2000, but the state government has not followed the lead. Some states like Punjab, UP, MP, Rajasthan, Gujrat and Orissa are yet to act on it. This law has failed and this is the right time to act on it and to release more land into the market. This will definitely lower the price of land, which accounts for about 50% of the price of real estate property in India,

Clear Title or transparency

90% of the lands in India do not have clear title. The ownership is unclear, thereby creating a scarcity of land. This is due to poor record keeping and outdated complaint processes. All updated records must be computerized to increase transparency in land ownership. And special fast track courts must be set up to clear all legal land disputes in a short period of time.

Stamp Duty & Registration

The cost of transferring land titles must be reduced from rates of 10% stamp duties to reasonable levels of 3 to 5%; similar to prevailing rates in developed countries. This will encourage sellers to pay stamp duties, instead of trying to cheat the government, thus increasing the revenue for the country. The high duties have also encouraged unaccounted money being used in most real estate transactions in India. The registration procedure should also be made transparent and simple so that corruption can be minimized.

Rental Laws

Obsolete tenancy and rental control laws keep a large part of the urban properties off the market. The rental laws must be revised to protect the owner and his/her property from the tenant. The tax laws must be revised to make renting of properties a financially viable option. Some states like Maharashtra, Goa, Bengal and Karnataka have already made amendments to the rent act.

Foreclosure Laws

Though the level of foreclosure for the housing finance companies are relatively low at around 1.5 to 2%, these must be revised and made up-to-date to suit the current context. The laws for non-payment of Equated Monthly Installments (EMIs) and consequent foreclosure and repossession of the property law must be revised so that the financing companies have the final rights on the property, which is collateral for the housing loan.

Building Codes, Standards & Permissions

There are several building guidelines and standards in various cities and states, however they are neither followed by the developers nor implemented by the authorities. Development and Planning In India development and planning concerned with real estate sector is not up to the mark. The city or state authorities must use professionals to plan and

execute all development plans for cities and towns, with future development in mind. This must be done without political compulsions. This will allow proper zoning within cities and towns, green areas and other infrastructure systems to fall into place as **the development plans unfold.**

The Eleventh Five Year Plan estimated a shortage of 36.5 m dwelling units. Over the next 10 to 15 years, it is estimated that 85 to 90 million housing dwelling units will have to be constructed with a majority of them catering to the middle and lower income groups. Real estate has not yet emerged as a significant (market) asset class, owing to both legal restrictions and lack of transparency among those companies operating in the sector.

The urban Sector in India

The urban sector more broadly considered has its own problems emerging out of problems in the real estate sector. But far more importantly the problems in urban governance, regulation (of land use and building bye laws as already mentioned) have had constraining effect of the development of real estate in urban areas. These may be briefly stated as follows:

- There is little responsibility embedding in the municipalities and urban local bodies despite the 74th Amendment to the Constitution. Since the power of decision making are dysfunctionally split between the elected and the career civil servants, and neither can be held accountable in a task/functional sense, so that urban citizens have little recourse when urban services are inadequate or poorly provided. Most problems arise out of this basic institutional/organizational problem.
- Poor planning, either in the form of over ambitious land use restrictions or very little planning at all, result in sprawls with inadequate usage of public services/spaces.
- Indian cities are woefully short on drinking water provision, public toilets, and sanitation and sewage services, and other public health measures. These failures have resulted in urban India having very high morbidity rates.
- There is almost no linkage between area/land use planning and transport planning so that movement within cities is problematic and provision of roads and communication links ex-

post development becomes difficult or very expensive, and remain unprovided.. Public transport and especially rapid transport like Metros and bus systems then become problematic since the cities then have too low a density to support public transport especially metros or rapid bus.

- Operational management of cities is without any scientific basis. There is little scientific regulation of parking, hawking, road use, allocation between public and private transport use, etc. Road and street geometrics, kerb and pedestrian ways over bridges and cross over's are so poorly and unscientifically designed and executed that Indian roads especially city roads are a major safety hazard. The movement of traffic in cities is so unsafe that people who can afford to own a four wheeler would avoid to walk even small distances and this has led to a decline in non-motorized modes like bicycles even when distances involved are small.
- There is almost a complete absence of multi-modal transport, and the lack of any institutional basis to bring about the coordination required across the many departments and functions of government. This creates further biases against public transport, adds to congestion and slows down movement to levels far lower than they need be given the actual road spaces in Indian cities.
- The quality of manpower available at all levels in ULBs but especially at the top is either poor or not rooted in the organisation, given the administrative structure of the country.
- Urban governments in India face the challenge of creating the right frameworks for PPPs that include models for PPP backed by appropriate law in such sectors as water, sanitation, roads and bridges, parks, parking, sewage systems, bus services, etc .Indian ULBs would need much hand holding from higher levels of government and from policy advisory groups, and institutions to be able to use PPPs effectively.
- The weaknesses of the urban governance mechanism is structural and deep rooted. This has been revealed by the response and working of the ULBs when fairly large funds were made available by the central government under the JNNURM. In most cities the sudden flush of funds has led to wasteful and inappropriate expenditure. And the rules for construction applied on contractors being devoid of any regulatory reference to the nuisance and disturbance that construction can cause, the pain imposed on citizens by the construction in the wake of the JNNURM has been very high and almost entirely avoidable with rational governance and contracting.

- Methods of land acquisition for urbanisation, changing use, and town planning models are prone to rent generation on a scale unmatched in either the developed west or even in South East Asia. Better examples such as the Ahmadabad TP Scheme or transfer of development rights which have been used widely despite their proven success are not being actively considered by other cities, since either the vested interests spawned by rents are quite strong or as is most likely there is little awareness among the few who could have made the decisions.
- Indian urbanisation would increase by leaps and bounds. Until the eighties it had been constrained by slow growth of the economy when compared to East Asia. growth now exceeding 8%, urbanization would happen at a accelerated pace, and Indian ULBs and governance structures are ill equipped to handle the challenge that lies ahead.
- There is a lack of proper data and management of the real estate sector so govt. should take the corrective steps in this regard so that the proper estimation and management of the real estate can be made possible.

The issues discussed above in reference of real estate are obviously related to urbanization and any actions taken to correct them would require a proper understanding and an integrated approach that will cover areas of logistics, supply chain management, economics, and public administration. Without improving infrastructures and transparency in working it will be difficult for India to face the challenges of urbanization that lies ahead.

BIBLIOGRAPHY

1. Shirley and Bimal Patel (2009), "Using the Development Plan- Town Planning Scheme Mechanism to Appropriate Land", in Mohanty Nirmal, Runa Sarkar and Ajay Pandey (eds.) (2009).
2. Mohanty Nirmal, Runa Sarkar and Ajay Pandey (eds.) (2009), India Infrastructure Report 2009: Land –A Critical Resource for Infrastructure", 3iNetwork, Oxford Univ.Press.New Delhi
3. Morris Sebastian, and PAPER Rajiv Shekar PRESENTATIONS (eds.) (2004), India Infrastructure (2012-13) Report – overnance Issues for Commercialisation", 3inetwork, Oxford University Press. New Delhi
4. Morris, Sebastian and Ajay Pandey (2010). "The Question of Land and Infrastructure Development in India: Urgently Required Reforms For Fairness and Infrastructural

Development”, W.P. No. 2010-03-02, March 27, 2010, Indian Institute of Management
Ahmedabad.

PAPER PRESENTATIONS (2012-13)

Paper Presented at
National Level Conference
On
India- A fallen Angel or poised to soar
At
Dahanukar College
14-15 December 2012.
Rural marketing in India
SanchitaDatta,
Department of Commerce,
Royal College of Arts, Science and Commerce

Abstract

The rural market in India is not a separate entity in itself and it is highly influenced by the sociological and behavioral factors operating in the country. The rural population in India accounts for around 627 million, which is exactly 74.3 percent of the total population. Post the economic slowdown, policymakers and companies are busy designing strategies to sell products and services to larger markets. While boosting profits quickly is no longer the essential parameter, Atmanand, MDI Dean of Executive Post Graduate Programs, believes that revisiting age-old management theories and sticking to basics is the most cost-effective marketing tactic. The disposable income of the rural populace is relatively low as compared to urban areas, seasonal, unstable and affected by uncontrollable factors like floods and droughts. This makes purchase of bulk consumer products rare. Hence people prefer goods that are low priced, or offer a good value for money. Small-unit packets are readily accepted as they represent convenience and affordability. Purchases in rural India are meant for consumption by the entire family as opposed to individual preferences. In this scenario, it is essential that products are developed such that they are fit for general purpose by all the members. This results in loss of opportunities for firms that gain by customization.

PAPER PRESENTATIONS (2012-13)

Marketers are often unable to obtain a true picture of the needs and wants of the rural people due to difficulties in conducting market research. Wide geographical spread and vast variation in languages increase the time and costs involved. Moreover, a conservative outlook often restricts women from taking the surveys. Marketers will have to understand the rural customers before they can make inroads into the rural markets. The size of the rural market is fast expanding. The rural market is fascinating and challenging at the same time. It offers large scope on account of its sheer size.

Keywords: customization, opportunities, expanding, challenging, preferences.

**Paper Presented at
National Level Conference on
PAPER PRESENTATIONS (2012-13)**

Women Empowerment and Entrepreneurship

At

Tolani College of Commerce

24 November 2012

**Women Entrepreneur and their problems and development measures in
India**

SanchitaDatta

**Department of Commerce, Royal College of Arts, Science and
Commerce**

Abstract

Women entrepreneurs face a series of problems right from the beginning till the the enterprise functions. Being a woman itself poses various problems to a woman entrepreneur, The problems of Indian women pertains to her responsibility towards family, society and lion work.

The tradition, customs, socio cultural values, ethics, motherhood subordinates to ling husband and men, physically weak, hard work areas, feeling of insecurity, cannot be tough etc are some peculiar problems that the Indian women are coming across while they jump into entrepreneurship.

Women in rural areas have to suffer still further. They face tough resistance from men. They are considered as helpers. The attitude of society towards her and constraints in which she has to live and work are not very conducive.

Self determination, expectation for recognition, self esteem and career goal are the key drivers for taking up entrepreneurship by women (Moore & Buttner, 1997). Sometimes, women chose such career path for discovering their inner potential, caliber in order to achieve self satisfaction. It can also provide a mean to make best use of their leisure hours. However, dismal economic conditions of the women arising out of unemployment in the

PAPER PRESENTATIONS (2012-13)

family and divorce can compel women into entrepreneurial activities. However, in practice most of the upcoming women entrepreneurs face problems that are of different dimensions and magnitudes than that faced by their male counterparts. These problems, generally, prevent these women entrepreneurs from realizing their potential as entrepreneurs.

Keywords: counterparts, potential, gender, self esteem, entrepreneurship.

International Indexed & Refereed Research Journal, March, 2013,
ISSN 0975-3486, (Print), E-ISSN- 2320-5482, RNI- RAJBIL- 2009-
30097, VOL- IV *ISSUE -42

PAPER PRESENTATIONS (2012-13)

E- Commerce in India A little fly extensive threats

*** DrJyotsna Haran ** Rishi Nepalia**

***Department of Economics, Royal College of Arts, Science and
Commerce**

****Aishwarya College of Education, JNVU**

Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices social media, and telephones as well. Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions. More and more companies are facilitating transactions over internet. There has been tremendous competition to target each and every computer owner who is connected to the Web. However, eCommerce has unavoidably invited its share of trouble makers. As much as eCommerce simplifies transactions, it is occasionally plagued by serious concerns that put at risk its security as a medium of exchange in money and information.

PUBLICATIONS (2012-13)

International Indexed & Refereed Journal, March, 2013, ISSN 0974-2832 (Print), E-
ISSN- 2320-5474, RNI RAJBIL, 2009/29954, VOL –V * ISSUE- 50

Surrogate Advertising -Hard Product and Soft Promotion

*** Dr. Jyotsna Haran ** Rishi Nepalia**

***Department of Economics, Royal College of Arts, Science and Commerce**

****Aishwarya College of Education, JNVU**

Advertisement is a form of communication for marketing and used to encourage, persuade, or manipulate an audience (viewers, readers or listeners; sometimes a specific group) to continue or take some new action. Most commonly, the desired result is to drive consumer behavior with respect to a commercial offering, although political and ideological advertising is also common. In Latin, ad vertere means "to turn the mind toward." The purpose of advertising may also be to reassure employees or shareholders that a company is viable or successful. Advertising messages are usually paid for by sponsors and viewed via various traditional media; including mass media such as newspaper, magazines, television commercial, radio advertisement, outdoor advertising or direct mail; or new media such as websites or text messages

Management of Management Education in India

Dr. Jyotsna Haran* & Surabhi A. Kapadia**

***Department of Economics, Royal College of Arts, Science and Commerce**

****Aditya Institute of Management**

Management Education was very much considered as elitists as it was attracting students for the positive results associates with management education in India. In India Management Education was gaining an exponential momentum but lately, many management institutes are facing many problems such as good faculty crunch, students crunch etc. This paper tries to understand and explore the problems by the mushrooming management institutes across the country and what steps can be undertaken to solve the emerging issues of management education. This paper will also deal with possible direction and policy towards improvement of management education in India.

PUBLICATIONS (2012-13)