



# University of Pune

Board of College and University Development



**AVISHKAR**  
2009-10

*A Success Story*



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**Dr. Mohan Waman, OSD, BCUD**

**Printed & Published by :**

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## FOREWORD



**Dr. Raghunath Shevgaonkar**  
Vice-Chancellor

The Culture of research is very vital in the higher education system. There is a need to develop scientific temperament & research culture in the University and the affiliated colleges. India is poised to become a knowledge superpower in next few decades. It has demographic advantage and innovative minds compare to many developing and developed countries. However these strengths have to be properly nurtured and effectively utilized. There has to be a focused effort at every level of education systems for achieving global excellence in research. The research aptitude has to be inculcated in the students from their young age. The potential researchers need to be provided adequate facilities and funds for carrying frontline innovative research.

On this background, University of Pune has taken important initiatives to introduce research culture amongst the students and teachers of affiliated Colleges and Institutes since last few years. Avishkar is one of the unique research project competitions which has been initiated by Govt of Maharashtra since 2006 and is implemented through Board of College and University Development. I am happy that BCUD has implemented this activity in the best possible manner and maintained the first rank since its inception which has resulted into an overall championship since last four consecutive years. University of Pune has also made a mark at the National research project competition, ANVESHAN-2010, held at Punjab University, Chandigarh, won the first and second prizes during the year 2009-10.

I would like to congratulate all the winners and compliment the efforts taken by the BCUD under the guidance of Prof. W. N. Gade, Director, BCUD and active participation of Dr. Mohan Waman, OSD, BCUD.







## MESSAGE



**Prof. W.N. Gade**  
Director, BCUD

India has done reasonably well in scientific research. We had the galaxies of scientists like C.V. Raman, Homi Bhabha, Vikarm Sarabhai, Ramachandran and so on who have made India proud with their scientific discoveries. India has a very large pool of scientific and technical manpower. There is a huge amount of budgetary provisions for scientific research. But still the outcome is not impressive. The brightest students were earlier attracted towards research. Currently the majority of this breed is moving away from basic subjects and is driven to professional courses which bring better financial gains within a short span of time. In the process the quality research and technology which is vital for national development suffers.

Realizing this danger the Government of Maharashtra launched a major initiative, called 'Avishkar' in 2006 to inculcate the research interest among University and College students. Avishkar is a research project competition among the students. Students compete at the college, University and state level. The winners are suitably awarded. I am extremely happy to note that University of Pune has emerged winner every year since the beginning of this program. Not only this, our students have won the first and second prize this year at the National level 'Anveshan' program also.

We realize the importance of high quality research for technology development for nation building. We also realize the importance of knowledge of basic subjects and strengthening of concepts for formulating innovative research proposals. Therefore, at the University level we have launched many initiatives to promote creativity and originality among the students. Syllabi have been appropriately revised; projects have been funded with University resources, laboratory infrastructure has been strengthened etc. The results are encouraging. This Avishkar 2010 is also step in this direction.

I thank the Hon'ble Vice Chancellor, Prof. R.K. Shevgaonkar for his continuous support and congratulate my colleagues in BCUD Dr. Mohan Waman, OSD and his team for carrying out this program successfully.







## From the Desk of OSD



**Dr. Mohan Waman**  
OSD, BCUD

It gives me an immense pleasure to present the abstract book of the student's research projects participated in the Avishkar competition during the year 2009-10. Avishkar is a state level research project competition initiated by the Chancellor office of Government of Maharashtra during the year 2006. This activity is unique in its nature and gained a momentum during the last four years. I took a charge as Officer on special duty during the year 2009-10 and tried my best to maintain the performance of students in various competitions. This was possible due to my involvement in organizing research project competitions at zonal and state level since the year 2007-08 with the then Director of BCUD, Prof. Pandit Vidyasagar and OSD, Dr.K.C.Mohite.

The Research competitions were successfully conducted both at zonal and state levels. It was applauded across the University for providing a platform to the young students for unfolding their talents. Innovative research projects were invited from bonafide, full time undergraduate, Postgraduate and Research students as well as research teachers of colleges/Institutions affiliated to University of Pune.

I am happy that University of Pune has displayed the outstanding performance by winning the overall championship fourth time in a row in the state level research project competition, Avishkar 2010 held at Solapur University, Solapur. Also I would like to mention that University has made a mark by winning the first and second prizes at National level research convention, ANVESHAN organized by Association of Indian Universities at Punjab University, Chandigarh.

The success in Avishkar was possible due to the support of all the Principals, Academic Research Coordinators and team managers and constant encouragement of Dr.K.C.Mohite throughout the year.

I am thankful to Hon'ble Vice Chancellor, Prof.R.K.Shevgaokar, Prof.W.N.Gade, Director BCUD and all the authorities for their support and guidance for conducting these activities.







## AVISHKAR – A Success Story

### “Research-Innovation with Excellence”



**Dr. K. C. Mohite**

Co ordinator Avishkar & OSD BCUD  
(2006-2009)

The journey of this success story begins with His Excellency, Governor of Maharashtra, initiating a novel research project competition named Avishkar in the year 2006. It is a novel idea which provides a suitable platform for the students to showcase their talent, expertise, innovative thinking and understanding of the things in a holistic manner. Also it was initiated to promote "original thinking and research" at the university and college level, besides providing a platform for industry-institute interaction. This activity, unique in its nature, is being implemented through Board of College and University Development of University of Pune.

Certainly, Avishkar has proved to be an activity which would help Universities to link higher education to the needs of industry and make it more relevant. It would also help students and teachers to remain vibrant, up-to-date and at par with the international community. If India has to face the global challenges in a most effective manner such activities like Avishkar should be spread to the remotest colleges in the University and the students from remote areas should be brought to the main stream. Hence special efforts have been taken by the University to increase the participation of the talented students from rural and urban areas. University of Pune has taken the initiative to reach to the maximum number of students by organizing regional competitions at four different places in Pune, Ahmednagar and Nashik Districts in the year 2006-07, at seven places in the year 2007-08 and at nine places in the year 2008-09. In past three years University of Pune has been successful in reaching out to more than 100,000 students and this year it has reached out to a staggering students.

University of Pune has also organized special workshops for the selected students to provide them with necessary help and guidance to enhance their abilities to present their work in an effective manner before they compete at the state level. Extensive efforts were also taken to organize regional competitions, special training sessions for these students. This activity has generated a lot of enthusiasm amongst students and the participation is ever increasing.

The fact that the number of projects participated in 2006 were 216 ( Two hundred and sixteen), in 2007 the number increased to 535 ( Five hundred and thirty five) and reached 780 ( Seven hundred Eighty) in 2008 and in 2009 the number was 920, bears testimony to the efforts taken to inculcate an atmosphere conducive to research.



In the first year of Avishkar 2006-07, the competition was held at Rashtra Sant Tukdoji Maharaj University, Nagpur and about 250 projects participated from nineteen universities. University of Pune won two discipline wise trophies in Engineering & Technology and Agriculture & Animal Husbandry and one in sharing in commerce and along with Overall Championship Trophy. In the second year 2007-08, the competition was held at S.N.D.T. University Mumbai and in all 312 projects participated in this competition. University of Pune bagged three categorywise trophies and one sharing along with overall Championship. In the third year 2008-09, Avishkar was organized at Sant Gadgebaba Amravati University Amravati and about 500 projects participated in this competition. A team with 36 projects from University Pune participated in this competition and won 14 prizes with four categorywise trophies and one in sharing along with Overall Championship trophy and made a HAT-TRICK. Winning the overall championship third time proves the infiltration of a spirit of research right up to the Under Graduate level. The same performance was continued in the year 2009 at the Solapur University Solapur and bagged seven first prizes and three second prizes.

This motto of University of Pune has created wonders with the spectacular performance of its students in "ANVESHAN 2009" at the Nationals held at Kolkatta. The research and innovative skills of the University of Pune students are once again in the limelight, with the varsity securing three prizes at ANVESHAN, an annual National-level inter-varsity research competition. Also in ANVESHAN 2010, held at Panjab University Chandigarh, Pune University have won one first prize in basic science and one second prize in Engineering and Technology.

The project on "Hybrid Electric Vehicles" by a team consisting of Manmad Kharade, Achal Agarwal, Abhay Kela and Ishit Patel bagged the 2<sup>nd</sup> position and a cash award of Rs.75,000/-in the Engineering Technology category. The 3<sup>rd</sup> prize (PG) in the pure sciences bagged by Ramakant Sharma for his project on "CdTe nano-solar cells".He also secured a cash award of Rs.50,000/-for his project while Vikram Bhosale secured the 3<sup>rd</sup> position and a cash award of Rs.50,000/-in the Agriculture Category. In ANVESHAN 2010, first prize bagged by Gopal Deore and Second prize by Gitesh Mutha.

Further University of Pune plans to integrate the project activities undertaken for Avishkar, research projects being carried out by college and University teachers and interaction of these researchers (both students and teachers) to the Industry by organizing a road show. This would help in identifying potential ideas which could be explored for commercial exploitation.

It is a matter of pride that all these extensive efforts of the University have borne fruit not only by way of the prizes won in Avishkar but also by the tremendous enthusiasm shown by students and teachers from all affiliated colleges and the exponential rise in quality of the projects. Kudos to the Hon'ble Vice Chancellor, Dr. Raghunath Shevgaonkar, Prof. W. N. Gade, Director BCUD, Dr. Mohan Waman, OSD BCUD and all authorities of University of Pune.





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**DETAILS OF AVISHKAR & ANVESHAN**
**AVISHKAR : State level Research Project competition**

AVISHKAR is an Inter University research project competition for Under graduate, postgraduate and M.Phil/ Ph.D. students. This activity is initiated by Hon'ble Governor of Maharashtra Shri. S.M. Krishna in 2006 which is on similar line as that of ASHWAMEDH, and Indradhanushya. The main objectives of AVISHKAR are follows:

- To inculcate research Culture among the College/ University Students.
- To encourage original and novel thinking.
- To provide an opportunity for expression of academic talent.
- To promote interaction among academia R & D Institutes and Industries.

**Criteria for Participation**

All Universities including Agriculture, non agriculture, Medical and Technology from state of Maharashtra can participate in this competition. Every University can send the entries in following categories for U.G., P.G. & Post P.G. level. There are no any boundaries of subjects and faculty for participation. Any student from any discipline can participate under any one of the following categories.

- |  |                                     |
|--|-------------------------------------|
| 1) Humanities, languages, Fine Arts Etc. | 2) Commerce, Management, Law etc.   |
| 3) Pure Sciences                         | 4) Agriculture and Animal Husbandry |
| 5) Engineering and Technology            | 6) Medicine and Pharmacy            |

**Age Limit**

- |                                      |   |                |
|--------------------------------------|---|----------------|
| 1) U.G. level category               | : | Up to 25 years |
| 2) P.G. level category               | : | Up to 30 years |
| 3) Post P.G level (M.Phil. / Ph. D.) | : | No age limit   |
| 4) Teachers                          | : | No age limit   |

**Number of Entries and Contingent**

University can send maximum two entries in each category at the U.G., P.G. , Post P.G. level (M.Phil. / Ph. D .) & Teachers with a total contingent up to 48 members excluding the team managers.

**Unique Model Developed by University of Pune**

University of Pune has implemented the activity in the best possible manner. University of Pune has taken special efforts to increase the participation of the talented students from rural and urban areas. Special efforts were taken to organize regional competitions, organize special training to these students and provide them necessary help and guidance to enhance their abilities to present their work in an effective manner. University of Pune has developed an unique model for implementation of AVISHKAR which resulted in the winning overall championship every year since beginning at the state level competition. This activity has generated a lot of enthusiasm amongst students and the participation is ever increasing. University of Pune has developed a three phase Model as follows

- PHASE-I : College level Competitions  
 PHASE –II : Zonal Competitions  
 PHASE-III : University level Competitions

**PHASE-I: College level Competitions**

All the colleges and Institutes do organize research project competitions at their colleges and use the same to select about five projects for Zonal competitions.

## **PHASE-II : Zonal Competition**

University of Pune organizes two day's zonal/regional competitions through BCUD at nine places in Pune, Ahmednagar and Nashik districts during the month of **September**. The information about details of the competition including the Place and the coordinator will be communicated to Principals of the colleges and also put up on website. ([www.unipune.in](http://www.unipune.in); [www.unipune.ac.in](http://www.unipune.ac.in) )

The students are advised to register for the competition through Principal of the college. Lectures of experts from different discipline are also organized during the competition.

## **PHASE-III: UNIVERSITY LEVEL COMPETITION**

To select the competitive students from various regions for state level competition, University of Pune organizes University Level competition during the month of **November /December**. Students selected from zonal competitions are allowed to participate at University Level Competition. A detail information about the competition including the Place, date and Time will be communicated to Principals of the colleges as well as zonal coordinators and also put up on website. ([www.unipune.ac.in](http://www.unipune.ac.in) )

**First round** : In the first round of competition Poster presentations of selected students are organized. About five posters are short listed by experts for oral competition.

**Second Round** : Short listed projects from Poster presentations are given 8-10 minutes for oral presentation. Two projects are short listed from each discipline and category for state level competition. From second round Maximum 5 Students from each category are short listed for workshop at university level.

## **STATE LEVEL COMPETITION**

The state level Competition is organized for **three days** as per the directives of office of Governor of Maharashtra. Host University provides local hospitality to the team members and also provides the infrastructure for exhibition and exhibits of research projects.

**Day1:** Poster/ Model display of research projects in the form of exhibition to be judged by three judges, is the elementary round.

**Day2:** Oral presentation using LCD for the students of the selected /short listed research projects in each category.

**Day3:** Discourse by the eminent judges on various aspects of research projects in relevant areas followed by prize distribution ceremony in the evening

*Note: exhibition gets dismantled only on the fourth day and activities of all the three days get open to the students, academia and general public.*

### **Important Instructions:**

- Each team should come with preparation for poster and oral presentation of 10 minutes duration; it is followed by discussion. LCD or Overhead Projector is provided.
- The short listed participants will have to make oral presentation of their research projects.
- The project/ Exhibits are evaluated by the nationally reputed experts and their decision will be final.
- Participants will be allowed to the Exhibit only after the confirmation of College/ University Identity Card.
- Participating Universities must send list of participants (Students & Teachers) before 10 days of competition.
- The awards in each category are as follows:-
  - o First Prize Rs. 5000/-
  - o Second Prize Rs. 3000/-Individual category wise trophies are awarded as per the more number prizes won by particular University and the **Overall Championship Trophy** to the University getting maximum prizes.
- Certificate of participation is given to the participants.

## ANVESHAN : National Student Research Convention

The Association of Indian Universities (AIU) has taken a pioneering initiative to organize student research conventions for the aspiring researchers throughout the country to inculcate research culture in higher education institutions. These conventions aim at identifying the young and rising talents who would be promoted through proper encouragement and incentives. Also an attempt shall be made to commercialize their research projects with industrial collaboration. The endeavour may accelerate scientific research and innovation and their application towards community development percolating to the grassroot level. Anveshan enters the second year after its immense success at the first stint. **Anveshan 2008** was applauded across the country for providing an innovative platform for students and generating particularly a culture of research among young students.

### Objectives

- To identify young talents with research aptitude and interest to take up research as a career.
- To promote the talent in research throughout the country.
- To nurture the talent through specialized training and education in some of the nationally and internationally reputed premier institutions of higher learning in the country.
- To augment financial and physical resources through collaboration with different sponsors for supporting education and training of the young researchers.
- To provide proper incentives to enhance the skill of potential students
- To initiate an intensive research culture in a selected group of institutions

### Areas/Fields

The areas/fields in which Projects (**Individual and group projects\***) are invited:

- Basic Sciences
- Engineering & Technology
- Allied Sciences

\* In case of a **Group project**, only three members [one principal investigator and two major contributors] are allowed to participate in the zonal/ national convention.

### Type of Project

Projects on the above mentioned areas must have undergone some exploration/ ground work in order to show its impact

### Methodology

The duration of the convention is **three days**

The convention is held in **three phases**.

- I. In the **First Phase**, all universities in the country will be requested to organize an exhibition of research projects at **University level** in which students from **affiliated/constituent colleges, research institutions and university post graduate departments** will participate. The exhibited projects are scrutinized by a team of experts.
- II. In the **Second Phase**, the exhibition is held at **Zonal level** for which four universities, one in each zone, have been identified (calendar enclosed for details). From each zone **best 15** projects are given entry to compete at the **National level**.
- III. In the **Third Phase**, the exhibition/competition are held at **National level**. The Association of Indian Universities invite for the successful projects, selected through the zonal competition, for National level competition. A total of **60** selected projects are displayed for assessment at the National level out of which **15 projects** are finally selected.



### **No. of Projects**

Each university is allowed to send a maximum number of **five** projects for the zonal level Student Research Convention.

In case of the universities/ institutes not having courses/ programmes in all the above mentioned categories, entry of five projects in their respective fields are also entertained.

The projects are assessed by a panel of experts drawn from various disciplines. The students whose projects are selected in the final stage at national level convention will be promoted through proper incentives for career development in research.

### **Criteria for Assessment of Projects**

All the projects are assessed on the basis of following criteria. Each criterion is assigned some weightage. The final selection of projects is based on the cumulative weightage based on all criteria.

#### **Criteria**

- Scientific Thoughts and Principles
- Creativity
- Thoroughness
- Skill
- Relevance
- Cost Effectiveness
- Teamwork

Apart from the above criteria, **Scope of Commercialization** of the projects will be considered as an **additional merit**. However, there will be no weightage point for this criterion. In case of the projects having scored equal cumulative weightage point, this criterion will be considered for making the final decision.

### **Eligibility for Participation**

Entries of the research projects are purely **Institutional** and only bonafide fulltime students from undergraduate to Doctoral degree level are eligible to take part in the convention.

### **Entry/Registration Fee for Zonal level Convention**

Entry - Rs. 500/- (per member including accompanying staff)

(The entry fee for **zonal** level competition in the form of **Demand Draft** drawn in favour of **Association of Indian Universities, New Delhi** and the **Registration form** should be sent to the Coordinator, Research Division, Association of Indian Universities, New Delhi with a **copy** to the coordinator of the **Organizing University**) **There is no registration fee for National level convention.**

### **Boarding and Lodging**

At zonal level, the host university will make the arrangement for accommodation; break fast, lunch and dinner at reasonable rates on payment. Those requiring such facilities may contact the Coordinator of the host university (**Pl. see the calendar for the name and contact details of the zonal coordinators**)

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## Bio-prospecting of Weeds as a Chelating Agent

**Mr. Gopal Bhagwan Deore**

Dept. of Botany, Fergusson College, Pune

*Pure Sciences (Research) AVISHKAR- 09*

*First Prize at Research level in Basic Sciences Category, ANVESHAN-10*

### ABSTRACT

Common weeds such as *Alternanthera*, *Achyranthus*, *Cassia*, *Desmodium*, *Cynadon*, *Parthenium*, *Paspalum*, *Sida* sp. were collected from local fields around Pune city. An assembly was made to ferment the weeds. These weeds were cut into small pieces and made into homogenate in blender. The homogenate was incubated at 80<sup>0</sup>C for 12 hours, hot water was provided by solar water heater. The heat treated homogenate was fermented in bottles after adding cane sugar for 8 days. The broth was filtered and used for chelating the micronutrients, such as Zn, Cu, Mn, Mg, and Fe. The formation of micronutrient chelates was monitored visually by observing change in colour and precipitation. The chelates were confirmed by FTIR analysis. Micronutrient chelates were evaluated for their effects on growth in chilli. The results are promising and suggest that weeds can be used as natural and inexpensive source for the production of organic chelating agents for organic farming. **Key Words:** weeds, solar water heater, fermentation, micronutrients, chelate, FTIR organic farming.



## **Development of Vehicle Simulation Model for Performance and Mass Emission Study**

**Mr. Gitesh Mutha**

Sinhagad College of Engineering, Pune

*First Prize at PG level in Engineering & Technology, AVISHKAR-09*

*Second Prize in Engineering & Technology Category, ANVESHAN-10*

### **ABSTRACT**

The vehicle development is a complex task and is accompanied by challenging technical problems in design and testing of engines and vehicles. The customer expects excellent fuel economy and drivability from the vehicle while the legislative requirements limit the maximum amount of emissions from the vehicle. Any changes done in the vehicle to reduce emissions or improve the fuel economy directly influences the vehicle drivability. Hence in the areas of design and development, the conflicting interrelationship between emission, fuel economy and drivability call for careful design strategy of various engine and vehicle parameters. Different permutations and combinations of these parameters result in a large no of design options, which need to be tested before finalizing the vehicle configuration. Designing and proto manufacturing of these various design options is a costly and time consuming affair. These problems often require the use of alternate parallel approaches to provide necessary solutions. Computer based simulation is a tool which can be developed into an inexpensive, efficient, rapid approach to analyze and evaluate systems or operations.

A computer based model of the entire vehicle is to be prepared for simulation of static and dynamic driving conditions of the vehicle. The vehicle drivetrain is discretised into individual components like engine, clutch, gearbox etc. The characteristics of all the components are evaluated/measured and input into the model. Appropriate data flow paths are defined to simulate the real life conditions. The test ambient conditions, load on the vehicle, driver behavior, driving cycle etc. are defined in the model. Depending on these parameters, the model will calculate the total force on the vehicle. Taking into consideration the frictional and inertia losses of each component it will calculate the power requirement from the engine. The engine maps will be superimposed on this power requirement and thereby the vehicle performance, fuel economy and mass emissions will be predicted. To study the effect of change of design parameter of any vehicle/engine component, the related input parameters of the model are to be changed and the model will predict the vehicle performance for that configuration.





## Ancient Insights Modern Discovery: *Cassia Auriculata* on Type 2 Diabetes

**Mr. Amrutesh S Puranik,**

Interdisciplinary School of Health Sciences, University of Pune

Medicine and Pharmacy Pharmacy (Ph. D.) AVISHKAR-09

Allied Sciences Category, ANVESHAN-10

### ABSTRACT

Type 2 Diabetes Mellitus (T2DM) is a global epidemic and has rapidly growing incidence rate, both in developing and developed nations. India is diabetes capital of world.

T2DM is a progressive disease in which the risks of myocardial infarction, stroke, microvascular complications and mortality are strongly associated with hyperglycemia. Multi-modal therapies are required to arrest the complications surrounding T2DM. Herbals offer an exiting opportunity for multi-modal therapeutics. However, studies on standardization, safety and mechanistic aspects of Herbals are sparse. We have integrated the Ayurvedic wisdom from classical Ayurvedic texts with modern biological methods to investigate different activities of *Cassia auriculata* that might be useful in treatment of T2DM.

Here we standardized Hydro-alcoholic extract of CA for various polyphenols using HPLC-MS-MS. Further we identified and isolated a phytomarker specific to CA (Cassia peak) using techniques like HPLC-MS-MS, C13, H1 NMR and Flash chromatography. We employed supercritical fluid extraction to maximize the yield of Cassia peak.

We subjected CA extracts to safety pharmacology evaluation. CA extract was found to be safe at therapeutic doses. In vitro studies on H9c2-cardiomyocyte cell line and in vivo studies on diabetic multi-generational caloric restricted rat were carried to elucidate mechanistic aspects of CA. Gene and protein expression demonstrates, CA arrests hyperglycemia induced cardiac dysfunction by inhibiting pro-inflammatory mediators like TLR-4, TNF-alpha, IL-6, NF-kB, MMP-9 and promoting adiponectin receptor, AMPK, SIRT1, IRS-1. CA also improved insulin sensitivity, adiponectin and prevented rise in homocysteine. We propose CA could be a potential lead in treatment of T2DM.

Thus the present study demonstrates that Ancient Insight when coupled with Modern Discovery approach can accelerate herbal drug research for T2DM.



## Production of Bio-fertilizer from Mycorrhiza

**Ms. Ketaki Vaidya**

Dept. of Botany, Fergusson College, Pune

*First Prize at Research Level in Agriculture and Animal Husbandry, AVISHKAR-09*

*Allied Sciences West zone-ANVESHAN-10*

### ABSTRACT

Rhizosphere soil samples of ten different plants were screened for Arbuscular Mycorrhizal (AM) fungi. Estimation of AM spores per 100gm soil was carried out along with analysis of percent root infection. 6 genera and 22 species were reported from rhizosphere soil. *Glomus* and *Scutellospora* were most abundant genera. *Gigaspora*, *Sclerocystis* and *Acaulospora* were moderate whereas *Entrophospora* was found the least abundant. *Glomus fasciculatum* and *Glomus aggregatum* were most frequent species. Maximum spore count was observed in the rhizosphere soil of *Paspalum canarae* whereas minimum was observed in *Santalum album* L. Cent percent root infection was observed in *Paspalum canarae* whereas minimum, 35% root infection was observed in *Bambusa arundinacea*. Using the pot culture technique the spores were multiplied and finally a low cost but best quality biofertilizer was prepared.



## **Pharmacogenetics of Methotrexate (MTX) in Rheumatoid Arthritis (RA)**

**Yogita Ghodke**

Interdisciplinary School of Health Sciences, University of Pune  
*First prize at Research level in Medicine and Pharmacy AVISHKAR-09*

### **ABSTRACT**

MTX is the most widely used disease modifying anti-rheumatic drug (DMARD) for the treatment of RA because of its cost and experience in its use. The major drawbacks of MTX therapy are the large interpatient variability in clinical response and the unpredictable appearance of a large spectrum of side-effects. This significant variability in MTX response, and the presence expensive, alternative therapies, has led to approaches to identify predictive markers for drug response (efficacy and toxicity) prior to the initiation of MTX therapy. Pharmacogenetics can help in assessing drug response by determining an individual's risk of developing an adverse drug reaction, predicting pharmacological variability and thereby preventing adverse drug reactions. Much data has emerged on MTX from the West; however little is known about Indian population. Here, we present results relevant to the MTX toxicity in the Indian scenario. We observed that genes regulating MTX metabolism contribute to toxicity in Indian RA patients.





## **Development and Application of Keratinase Technology in Poultry Industry**

**Mr. Vishal Gawade**

Ahmednagar College, Ahmednagar

*First Prize at PG level in Agriculture and Animal Husbandry, AVISHKAR-09*

*Allied Sciences West zone-ANVESHAN-10*

### **ABSTRACT**

Feather degrading organisms were isolated from poultry waste with high Keratinase activity. Among 16 strains, 3 representative strains Actinomycete (*Streptomyces* sp), Fungi (*Gyomoascus* sp) and bacterial (*Bacillus* sp) showing high keratinolytic activity were used for further studies. The production of enzyme was done in medium containing feathers as substrate. The enzyme activity of three strains was determine and found to be 142 U, 117 U, and 112 U per ml of medium respectively on 7<sup>th</sup> , 8<sup>th</sup> and 4<sup>th</sup> day of incubation at room temperature. The effect of pH and temperature on enzyme activity was also studied.



## **Palaeomonsoon Record of Bhatodi Historical Tank, Ahemednagar District, Maharashtra**

**Mr. Arun S. Magar**

Ramkrishna More ACS College, Pune

*Second Prize at Research level in Humanities, Arts and Languages, AVISHKAR-09*

### **ABSTRACT**

Investigating the climate of the past is the key to understanding the effects of human activities on climate change. Lakes located in the semi-arid and arid regions are particularly suitable for palaeoclimatic studies, because of their high sensitivity to shifts in precipitation. Therefore, lakes in semi-arid and arid environments have been investigated to reconstruct hydrologic changes based on analysis of physical, chemical or biological properties of the lake sediments.

There are no natural lakes in the rainshadow zone of the Western Ghat in Maharashtra. The Bhatodi Tank was selected because it is one of the oldest known historical tanks in the semi-arid zone of the Deccan Volcanic Province. Available records indicate that this tank, located near Ahmednagar, was constructed in the late 16<sup>th</sup> century. The main objective of this study is to analyze and interpret the records of Bhatodi Tank and to determine the nature of changes in sediment flux and fluvial dynamics on account of monsoon variability and/or human activity.

In order to interpret the sedimentary records, a deep trench (ca. 4.5 m) was excavated and sediment samples were collected at close interval (5 cm) for laboratory analysis. Grain size, magnetic susceptibility, XRF and other types of analyses were carried out in the laboratory.

Texturally, the tank sediments were found to be dominated by silts. The grain size parameters show subtle to minor variations within the section. Magnetic susceptibility, which is the degree to which a material can be magnetized in an external magnetic field, shows an increase towards the top. Similarly, weathering indices, viz. CIA, CIW and RR, also do not reveal either distinct breaks or a noteworthy vertical trend. The major conclusion that emerges from the analyses is that no major or dramatic changes in the rainfall or monsoon conditions have occurred in the catchment area of the Bhatodi historical tank, at least, during the last hundred years or so.



## **Production of Value Added Organic Liquid Fertilizer**

**Dr. S. L. Laware**

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*Pure Sciences (Teacher), AVISHKAR-09*

### **ABSTRACT**

The organic raw materials viz. rice straw, neem cake, FYM, poultry waste, fish waste, press mud were mixed and decomposed aerobically with composting microbes for 50-60 days. After decomposition nitrogen fixing microbes (2 kg/tonne) were mixed with decomposed material and the material was cured for 40 days. The soluble nutrients were extracted and a concentrate was used for further formulation. The chelating agents were extracted from household organic waste. Organic waste was homogenized with blender, heat treated and then fermented to release the chelating agents. The individual micronutrients (1g/ 100 ml chelating solution) were chelated on rotary shaker. Individual micronutrient chelate was added in concentrated organic mix as per the requirements. The homogenate was analyzed for physicochemical parameters and nutrients. This organic fertilizer is well-heelled with required nutrients along with growth promoting substances. Foliar sprays (10ml/l) in tomato, chilli and okra under pot experiment study gave satisfactory results.





## **Correlating Past & Present: A Practical Approach for Conservation of Mangrove Ecosystem in Maharashtra**

**Dr. Mahesh Shindikar**

College of Engineering, Pune

Pure Sciences (Teacher) AVISHKAR-09

### **ABSTRACT**

Mangrove, an ecotonal ecosystem along the tropical and subtropical coasts, has attracted attention of scientists and managers across the globe. Their significance in coastal economy and ecological sustenance is thoroughly studied by the workers. This valuable ecosystem is under tremendous threat because of direct and indirect human interventions. Along the west coast of India, Maharashtra harbours a special position supporting mangrove forests along the 68 habitats. An attempt has been made to understand their current distribution with the studies on their past records. Palynology and environmental magnetism are the tools useful for paleoecological understanding while field work and remote sensing was useful for present analysis. Results obtained from this exercise, have helped establishing north south climatic gradient and east west topography-salinity gradient influencing the distribution of species along the coast. The paleoecological studies have highlighted loss of sheltered habitats and species along the coast. Interpretation of present with the background of past thus, proved to be very useful towards assessing the real challenges before the mangroves.



## Novel Conversion of Multistep Reactions into Rapid One Pot MCr under Mwi for Synthesis of Potentially Bioactive Heterocycles

**Dr. Jain K. S.,**

Sinhgad College of Pharmacy, Pune

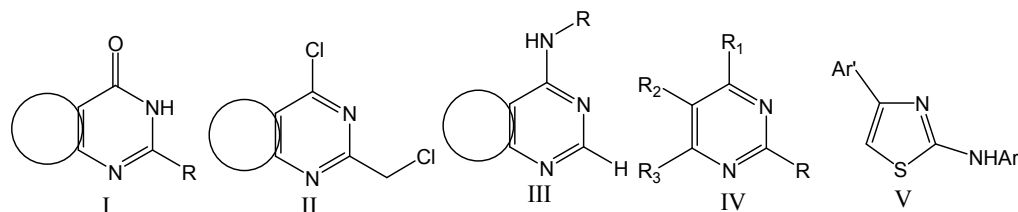
Medicine and Pharmacy Pharmacy (Teacher) AVISHKAR-09

### ABSTRACT

New Drug Discovery Research holds key position in medicinal chemistry and health sciences. To discover a new drug approximately 1500 million US \$ and 15-20 years required. About  $10^4$ - $10^5$  new compounds need to be synthesized. In today's world speed is the essence for success and both synthesis and biological testing are automated and high throughput.

Microwave irradiation (MWI) has really turned out to be a boon to organic synthesis in recent 10 years. Reactions can be completed in few minutes under MWI and the technique also falls under **Green Chemistry**.

The present work is a successful attempt for the ultra-rapid one pot MWI based synthesis of a variety of heterocycles (**I**, **II**, **III**, **IV**, **V**) listed below



The compounds have exhibited great potential for antihyperlipidemic (**I** & **II**), antitumor-anticancer (**III**), antifungal & antimicrobial (**III** & **IV**) and antifungal (**V**) activities.

This methodology can be successfully made adaptable to automated parallel synthetic protocol. The reaction rates for entire multistep synthesis have been reduced from 6 – 48 hrs to just 10 -50 minutes! This has been achieved by judicious selection of reactants, reagents, solvents, reaction conditions and MWI technique.



## Vesicles: A Novel Carrier for Gene Therapy and Drug Delivery

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Medicine and Pharmacy (P.G.) AVISHKAR-09  
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### ABSTRACT

*Acinetobacter* is a known nosocomial pathogen harboring multiple plasmids contributing to its multi-drug resistance, a biofilm-former leading to recalcitrant and persistent infections showing increased resistance to antibiotics. Gram negative bacteria are known to form vesicles i.e subcellular structures budding off the outer membrane. The vesiculation process in *Acinetobacter* spp and the contents of such vesicles with respect to DNA encapsulated in them was studied. Outer membrane vesicles were isolated from clinical isolates of *A. baumannii* from different hospitals by ultracentrifugation and localized by TEM, SEM and AFM. Vesicles were found to be in the range of 50-200 nm. plasmid DNA and genomic DNA as also RNA was found encapsulated in the vesicles. 16S-rRNA and *blaPER-1* specific-PCR assay showed presence of these genes on genomic DNA and plasmid DNA respectively. This is the first report on production of vesicles by *Acinetobacter* sp. The experimental evidence strongly directs towards the phenomenon of 'Horizontal Gene Transfer' through vesicles, an important mode of gene transfer and vesicles carry genes, specifically in multidrug-resistant and pathogenic organisms, as DNA is protected from external degradation and small size of the vesicles allows easy diffusion through even biofilms.

Taking it further, we also propose here a new mode of artificial transfer of genes and drugs using such bacterial vesicles having better diffusion capability and cellular compatibility compared to existing carriers.

**Key Words:** *Acinetobacter* spp, vesicles, multi-drug resistance, gene transfer





## Biological Control of *Fusarium solani* and *Alternaria alternata*

**Mr. Rahul Adhav**

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*Agriculture and Animal Husbandry (U.G.) AVISHKAR-09*

### ABSTRACT

*Fusarium solani* is an important pathogen causing wilt of chili, tomato, brinjal, muskmelon, chickpea, pigeon pea etc. Mandhare et al., (1989) reported *Fusarium solani* causing wilt of brinjal. *Alternaria alternata* causes leaf blight in tomato, leaf spot on papaya, marigold, chilli and green gram. Tandon and Shivkumar (1974) reported *Alternaria alternata* to be pathogenic on fruits of tomato, apple, bean, lemon and carandas (*Carissa carandas*). Singh and Suhag (1983) reported that *A. alternata* isolated from radish were pathogenic on spinach, sarson, cabbage, cauliflower and tomato. Madan and Chand (1986) reported *Alternaria alternata* to be pathogenic on phalsa, peach, pomegranate, chickpea, linseed, papaya, bottlegourd and tomato.

The plant extracts can be used as a biological agent to control the plant diseases instead of harmful synthetic fungicides that are the pollutants of the biosphere. These plant extracts will be available to the farmers easily and also will be economically beneficial. It would be easy to lower down the indirect harmful effects of the chemicals on the human beings and the animals. The residue of the plant can be used as bio-fertilizer as these are having the biodegradable properties. Out of five plant species tested, *Boswellia serrata*, *Ocimum americanum* and *Woodfordia fruticosa* can be used as biofungicides to control pathogens like *Alternaria alternata*, and *Fusarium solani*. These biofungicides are economical; they are easily available in the tribal villages, they are ecofriendly and non hazardous to animals and humans.

**Keywords:** Biocontrol , *Fusarium solani* , *Alternaria alternata*



## ***Stenotrophomonas koreensis*: A Novel Biosurfactant Producer for the Abatement of Heavy Metals from the Environment**

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*Pure Sciences (P. G.) AVISHKAR-09*

*Allied Sciences West zone-ANVESHAN-10*

### **ABSTRACT**

Surfactant is an important class of chemicals with wide domestic and industrial application. However, these chemicals pose the problem of toxicity to living organisms and have significant issues related to disposal of industrial wastes. Hence the production and use of surface acting agents derived from biological sources has attracted worldwide attention. These environment friendly, biodegradable molecules have potential uses in large oil recovery operation, removal of oil spills, biodegradation of hydrocarbons from soil, production of detergents, agro industries and manufacture of pharma products. An important area that remains unexplored is the removal of heavy metal contaminants using biosurfactants. The molecular nature of biosurfactant offers the possibility of interaction with metals in solution aiding in their subsequent removal and/or recovery. In the present studies systematic isolation and screening program was undertaken for obtaining biosurfactant producing bacteria. The selective isolates were grown under optimized condition to achieve enhanced production of biosurfactant and their ability to remove heavy metals from solution was explored.

**Key Words:** Biosurfactant, Oil recovery, Heavy metal, Hydrocarbons



## **Romancing the Classical Performative Arts for Delivering the Modern Emotive**

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*Humanities, Arts and Languages (P.G.) AVISHKAR-09*

### **ABSTRACT**

The research project is all about Dance because, “Dancing is the loftiest, most moving, the most beautiful of the arts, because it is no mere translation or abstraction from life; It is life itself!”

This Project aims to create social awareness about the reality of contemporary social life through Dance – A form of art which is related to humans at an emotional level. The work is compiled with various objectives like: To fuse various dance forms without altering their originality, to represent contemporary characters through dance, to use color codes, imitations, various assets and music / lyrical songs for effective representation of the current society, to classify audience groups on the basis of their understanding capabilities of particular performances, to target the classified audience groups for thriving consciousness about the present-day society. The key-stone of the project is the deep study of the past and the present social and cultural conditions. This study leads to the important innovation that:

‘Through centuries dance has been used as a mode of entertainment or worship etc. But if dance is to play its civil role, join the struggle against the hindrances in the social development, then...Dance must use its expressive and persuasive power to become more thematic in the contemporary milieu.’

Implementation of the project put forth the following distinct features of it as; Dance then remains not just a mode of entertainment but inculcates socio-cultural education along with awareness of global contemporary situations, it performs its civil duty, Such Innovative choreography appeals to the viewer’s mind, heart and ultimately touches the soul, extends the ongoing practices of Dance from representing the mythology till representing the recent trends, encourages the Artistic faculty in dance, application of extended existing ideas into a diversified field of new choreography, has relevant application in the field of knowledge, pertinent innovation in the field of dance. The Scope for further generation through this project is; Encourages the systematic study of history and originality of various dance forms, provides a platform for choreographers, artists and lyricist for their innovative ideas and themes, scope for ‘Every’ dance form and so for the artists of that particular form. This project has been implemented from year 2004 in various places of Maharashtra. I would like to specially thank my College namely, K.T.H.M. College, Nasik for the precious guidance and inspirational support.





## **Control of Location of Hydraulic Jump in a Rectangular Channel**

**Mr. Rohit Rathi**

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*Engineering and Technology (U.G.) AVISHKAR-09*

### **ABSTRACT**

For maximum energy dissipation the hydraulic jump should be formed at the foot of spillway. Existing techniques use the design discharge of spillway for designing energy dissipating arrangement (weir, end sill, flip bucket etc.). But the weir is subjected to variable discharges. So, its efficiency decreases causing damage to spillway and apron (hydraulic jump sweeps out or is formed on the spillway). So we have designed a broad crested stepped weir which works for a wide range of discharges (100% to 20 % of design discharge). Laboratory scale and pilot scale (scale 1:50) study of Bhama Asked dam is done and the weir gave satisfactory results for wide range of discharges and the jump is formed at the foot of spillway resulting in maximum energy dissipation.



## A Novel Approach in Printing Technology

**Mr. Manmohan Bhoomkar**

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*Engineering & Technology (Ph.D.) AVISHKAR-09*  
*Allied Sciences West zone-ANVESHAN-10*

### ABSTRACT

Due to technology advancement and globalization policies technically perfect aesthetically attractive, quality products are available in market. To meet expectations of quality the World Class Manufacturing (WCM) approach is need to be considered. WCM is the disciplined application of a set of proven tools, techniques and approaches to achieve manufacturing excellence and lift the standards of business to the world-class level.

In order to survive small and medium scale printing industry (SMPI) in the present global competition, this industry should also be world class, as it directly related to advertising, packaging and newspaper industries. Printing is the process of uncertainty minute change in the process parameters like ink properties, paper quality, machine performance and operator skills may cause drastic variation in print quality. The print quality is measured by density, dot gain, print contrast, trapping, hue error and grayness using instruments like spectro-photometer.

In this research work an attempt is made to experimentally investigate the trend of variation of above-mentioned parameters by using Taguchi's Design Of Experiments (DOE) to control the process variation and modification suggested for roller modification by Computational Fluid Dynamics (CFD) in the machine to control the quality which consider ergonomic aspect of operator as one of his task to regulate the dampening system is reduced.

The inking unit temperature control device provides a constant temperature in the inking unit. Thus increase the process stability and it reduces the start-up time to 8 to 10% and less waste sheets at the beginning which causes saving from 5 to 7 %. Print density achieved under temperature controlled condition is closer to the target densities as mention below. Higher output since the blankets needs to be washed less frequently, avoidance of scumming due to heat.

Thus water cooled oscillator roller system compensate the effect of surface temperature on the roller which yield no need for operator to regulate dampening system for ink water balance thus reduces the stresses on the operator .

**Key words:** CFD, DOE, SMPI, WCM



## Synthesis, Characterization and Gas Sensing Performance of SnO<sub>2</sub> Thin Films Prepared by Spray Pyrolysis

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*Pure Sciences (Ph. D.) AVISHKAR-09*

### ABSTRACT

In this work, SnO<sub>2</sub> thin films were deposited onto alumina substrates at 350°C by spray pyrolysis technique. The films were studied after annealing in air at temperatures 550°C, 750°C and 950°C for 30 min. The films were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and optical absorption spectroscopy technique. The grain size was observed to increase with the increase in annealing temperature. Absorbance spectra were taken to examine the optical properties and band gap energy was observed to decrease with the increase in annealing temperature. These films were tested to various gases at different operating temperature ranging from 50°C to 450°C. The film showed maximum sensitivity to H<sub>2</sub>S gas. The H<sub>2</sub>S sensing properties of the SnO<sub>2</sub> films were investigated with different annealing temperatures and H<sub>2</sub>S gas concentrations. It was found that the annealing temperature significantly affects the sensitivity of the SnO<sub>2</sub> to the H<sub>2</sub>S. The sensitivity was found to be maximum for the film annealed at temperature 950°C at an operating temperature 100°C. The quick response and fast recovery are the main features of this film. The effect of annealing temperature on the optical, structural, morphological and gas sensing properties of the films were studied and discussed.

**Keywords:** Spray pyrolysis, SnO<sub>2</sub> thin films, H<sub>2</sub>S, Gas sensor.



## **Application of Biometric Technology in Core Banking**

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*Commerce and management (U.G.) AVISHKAR-09*

### **ABSTRACT**

Today's core banking system includes various functions and services which are used through multiple channels like ATM's etc. The extensive use has created problems and threats which can lead to high risk situations. Therefore, Biometric system is the solution to this question. Biometrics is a science of identifying a person by way of unique biological characteristics like fingerprint, voice etc.

Hence, biometric will play a crucial role in maintaining security, it will improving banking as well and enhance customer satisfaction.





## Organophosphorus Pesticide Fighters: Microbial Artillery

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### ABSTRACT

Organophosphorous pesticides, malathion and parathion are widely used to control pests in agricultural fields. So the importance of its use, behavior and degradation of pesticides is of great concern. Current methods to detoxify pesticides rely on chemical treatment, incineration and landfills. These methods have various drawbacks, so soil microflora can be a potent candidate to detoxify pesticides. Organophosphorous pesticides have toxic effects in both insects and mammals by inhibiting acetylcholinesterase a neurotransmitter in the nervous system and its subsequent accumulation to a toxic level. They cause muscarinic, nicotinic and central nervous system disorders. Based on this background we have isolated four malathion and five parathion degraders from six different pesticide contaminated soil samples. Turbidometric analysis was performed to test the ability of the degraders to utilize these pesticides as a sole source of carbon in minimal medium. *Bacillus sp.* and *Serratia sp.* showed maximum increase in OD for malathion and parathion respectively. The ability of isolates to degrade Malathion was checked by determining the increase in enzyme activity and specific enzyme activity, it was found that ***Bacillus sp.* ( $0.63 \times 10^6$ ), Isolate 4 ( $960 \times 10^2$ ) showed maximum increase in** enzyme activity and specific enzyme activity respectively. Further the ability of isolates to degrade parathion was checked by the formation of the byproduct p-nitrophenol which is formed when parathion is degraded. It was seen that as the parathion was utilized by the organisms, an increase in p-nitrophenol concentration appeared as a function of time in days. We further hypothesize to purify microbial enzymes degrading pesticides and their subsequent use to detoxify malathion and parathion. A consortium based biofertilizer can be designed for more effective and faster degradation of these pesticides. Thus bioaugmentation of malathion and parathion will lead to ecofriendly approach to eliminate this pesticides from the environment.

**Keywords:** organophosphorous, malathion, parathion, biofertilizer



## प्रकल्पाचे नाव: -आधुनिक मतदानयंत्रणा

Mr. Jayesh G. Choudhary,

D.Y. Patil, I. M. C. A., Pune

Commerce and Management (P.G.) AVISHKAR-09

### ABSTRACT

भारतातील सध्याच्या मतदानयंत्रणेतील उणीवा व दोष लक्षात घेवून सध्या सॉफ्टवेअर बनवण्यात आले असून त्यात सर्व उणीवा व दोषांवर मात करण्याचा प्रयत्न केला आहे.

सध्या सॉफ्टवेअर ऑनलाईन असल्यामुळे मतदानाची सर्व माहिती एका ठिकाणी संग्रहित करून ठेवता येते व यात कोणालाही हस्तक्षेप करता येत नाही. त्यामुळे सुरक्षितता व गोपनीयता पाळता येते.

### सध्याच्या मतदानयंत्रणेतील उणीवा व दोष:-

- एका व्यक्तीस अनेक वेळा मतदान करता येवू शकते.
- बोगस मतदान करता येते.
- मतदाराची पूर्णपणे ओळख पटवण्यास सक्षम नाही.
- एका व्यक्तीचे नाव दोनवेळा समाविष्ट करता येते.
- नविन मतदाराचे नाव समाविष्ट करण्यात अडचणी येतात.
- एका विशिष्ट मतदान केंद्रावर जाऊन मतदान करावे लागते.
- वाहतूकीवर व संरक्षणावर खूप पैसा खर्च होतो.

### ह्या सॉफ्टवेअरच्या वापराचे काही महत्वाचे फायदे:-

- मतदान प्रक्रियेत सुरक्षितता करता येते.
- बोगस मतदानावर आळा घालता येतो.
- मतदारास कोठेही मतदान करण्याची सुविधा देता येईल.
- मतदान प्रक्रियेतील खर्च कमी करण्यास मदत होईल .
- सरकारकडे मतदाराचा वैधानिक पुरावा निर्माण करता येईल .



## Novel application of Onion skin as a dye

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### ABSTRACT

Dried onion skin about 5 gm mixed with 15 and 20 ml of hexane and keep for 24 hour for removal of terpens, after 24 hour it is filter and terpene free anion skin is taken for studying.

Terpene free onion skin was mixed with 150 ml of water and boiled at 80<sup>0</sup>C for 1 hour and filter that water solution is act as dye bath. To calculate percent of dyeing agent whole water present is evaporated to get solid powder which weigh on analytical balance to know amount. Basically wool contain proteins. It is necessary to activate the protein the dyeing. This can be done by using mordant. There are various mordant are used such as,

i) NaOH ii) CH<sub>3</sub>COOH iii) Fe<sub>3</sub>SO<sub>4</sub>.7H<sub>2</sub>O iv) Na<sub>2</sub>CrO<sub>4</sub> v) K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>

Dying of wool is carried out using three different methods such as pre-moderation, together moderation, last moderation.



## **Production of Algaeoleum as a Non-conventional Diesel Source**

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### **ABSTRACT**

Renewable transport fuels are necessary for environmental & economic sustainability. In recent days large scale bio-diesel production from edible oil seeds has put a burden on edible food stock. Algae have emerged as one of the most promising source for bio-diesel production. Bio-diesel is biologically degradable & contribute to solve the problem of air pollution. Using of bio-diesel reduces CO<sub>2</sub> & NO<sub>x</sub> emission to considerable amount. This study was undertaken to know the proper trans-esterification, amount of algaeoleum production (ester) & physical properties of bio-diesel. In this process of bio-diesel production, oil extraction from algae was carried out. Then oil was trans-esterified by using methoxide solution. The biomass remained after oil extraction from algae can be used in ethanol production. The byproduct glycerol obtained from trans-esterification process can be used for soap production.

**Keywords:** Algaeoleum, algal oil, ester, bio-diesel, trans-esterification





## **Design and development of clinostat to study the effects of simulated microgravity on plants**

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### **ABSTRACT**

Various environmental stimuli such as light, water, temperature and gravity influence the growth and development of plants (Hoson, 1998). Gravity, as a constant environmental factor, has fundamental influences on plant growth and development (Masson, 1995; Chen et al., 1999). Several studies concerning with the effects of microgravity conditions on plant growth have already been carried out using spacecrafts. Clinostat has been used to compensate for the unilateral influence of gravity for a long period of time in the field of plant physiology. Many studies have been carried out on a slow rotating (ranging from 0.25 – 3 rpm) clinostat. In the present study, we have designed and developed a 1-D horizontal clinostat used for the simulation microgravity condition. Several studies have been carried out to study the effect of clinorotation (simulated microgravity) in our laboratory.

## **Cultivating Research Culture through Avishkaan Innovative Movement to Popularise Research Aptitude amongst Students**

**G. Syamala**

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*Commerce and Management (Ph.D.) AVISHKAR-09*

### **ABSTRACT**

An innovative experiment to develop research aptitude amongst students is what AVISHKAR is all about. It is an exercise merely to evaluate the projects, experiments and research conducted by students. It is not only to evaluate, but the basic crux is to bring out the innovation, ideas and talent out of them.

The PUNE model is an excellent platform to encourage, exhibit and bring out the innovative ideas, original thinking, scientific attitude and creativity among the students for their all round development.

The following paper highlights the structure, the PUNE model, the features, the nature, the success rate, the insight gained from Avishkar to one and all.

## **Emotional intelligence and life satisfaction: Re-examining the link and mediating role of affectivity and personality in India**

**Dr. Nutankumar S. Thingujam**

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*Humanities, Arts and Languages (Teacher) AVISHKAR-09*

### **ABSTRACT**

This study re-examines whether the life satisfaction-emotional intelligence linkage observed in predominantly individualistic western cultural context is generalizable in predominantly eastern collectivistic cultural context of India after controlling for affectivity and personality traits of five factor personality theory. Three hundred young adult participants responded to the scales of the emotional intelligence, life satisfaction, affectivity, and personality. Results indicated that life satisfaction's correlation with emotional intelligence is generalizable across the cultures but unlike earlier findings the association is not independent of affectivity or personality (neuroticism, extraversion, agreeableness, and conscientiousness).

**Keywords:** emotional intelligence; life satisfaction; affectivity; personality; India

## Quorum Sensing Detection in Bacterial Endophytes

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### ABSTRACT

The bacterial cell-to-cell signaling mechanisms through which bacteria regulate gene expression via cell density is collectively termed as quorum sensing. The functions controlled by quorum sensing are symbiosis, virulence, competence, conjugation, antibiotic production, motility, sporulation and biofilm formation etc. Quorum sensing involves the production and detection of extracellular signaling molecules called autoinducer. In Gram-negative bacteria acylated homoserine lactones act as autoinducer and Gram-positive bacteria use post transcriptanally modified oligopeptides to communicate.

Endophytic bacteria have been found in virtually every plant studied, where they colonize the internal tissues of their host plant and can form a range of different relationships. Bacterial quorum sensing regulates many physiological activities in plants in response to abiotic and biotic stress and also playing important role in plant growth and yield, increase plant nutrient uptake.

In endophytic bacteria simple Petri plate method and Tube method are used for qualitative analysis of biofilm as characteristic of quorum sensing. For detection of quorum signaling autoinducer molecule the bioassays as TLC (Thin Layer Chromatography) method, Agar well plate method, T-streak method, employing biosensor *Chromobacterium violaceum* (CV026) are performed.

Quorum sensing studies of endophytic bacteria will exploits their potential use in modern medicine, agriculture or industry.

**Keywords:** Quorum sensing, Biofilm detection, Endophytic bacteria, *Chromobacterium violaceum* (CV026),



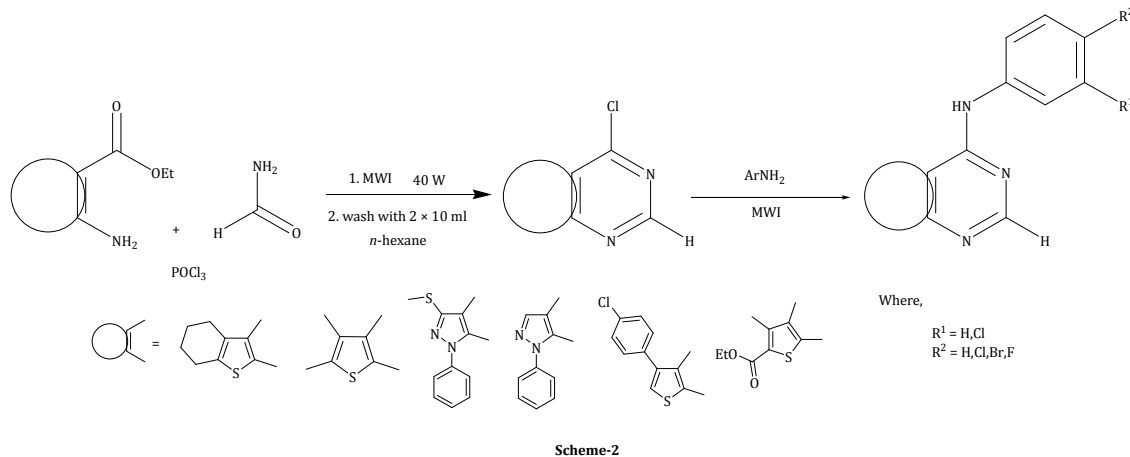
## Microwave Assisted Synthesis of Compound Libraries of Condensed 2h-Pyrimidines and their Evaluation

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### ABSTRACT

The present study reports the development of a novel, one pot protocol for the rapid, highthroughput synthesis of condensed 2H-4-arylaminopyrimidines, adaptable to parallel synthesis of their compound libraries. The overall three step reaction protocol has been converted to one pot, single step reaction, reducing the overall reaction time from 42 to 76 min, and increasing the yield to 89.10% from 59.50%. A total of 30 derivatives were synthesized and evaluated for antibacterial and antifungal activities using Ciprofloxacin and Ketoconazole as standards, respectively.



he compounds exhibited excellent activities (MIC values) as compared to the standards.

## ***Achyranthes aspera* accelerates diabetic wound healing and its protein expression**

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### **ABSTRACT**

**Objective:** To study the potential of *Achyranthes aspera* in diabetic wound healing in experimental animals along with protein expression of wound granulating tissue.

**Method:** The ethanolic extract of *Achyranthes aspera* (EEAA) was prepared by maceration. Diabetes was induced in wistar rats with intraperitoneal injection of alloxan (120 mg/kg) and after eight days of diabetic confirmation excision wound is induced. Wound was treated externally with 20 % ointment prepared from extract and mupirocin ointment (20%) used as a standard drug. Animals were treated for two weeks daily. Antidiabetic activity of EEAA evaluated by various biochemical parameters along with Body weight and blood glucose level of animals and different protein expression of wounded tissue is studied with Sodium Dodesil Sulphate- PolyAcrylamide Gel Electrophoresis(SDS-PAGE).

**Result:** Two weeks repeated dose treatment of EEAA (20% ointment) significantly reduced wound area compared to diabetic animals, orally treated animals restored body weight. Diabetic condition precisely shows the high expression of low molecular weight proteins. Evaluation of various biochemical parameters shows positive signs of recovery from diabetic condition in diabetic wound treated orally group.

**Conclusion:** *Achyranthes aspera* accelerates wound healing process and posses sound antidiabetic activity.

## Construction of cDNA library from *Aegle marmelos* (Bael) seeds

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Allied Sciences West zone-ANVESHAN-10

### ABSTRACT

*Aegle marmelos* has been widely used in indigenous systems of Indian medicine due to its various medicinal properties. All parts of this tree, viz. root, leaf, trunk, fruit and seed are used for its curative, pesticidal and nutritive properties. Bael fruit is mildly astringent and used to cure dysentery, diarrhoea, hepatitis, tuberculosis, dyspepsia and good for heart and brain. Seeds have antidiarrhoeic, antidote to snake venom, anti-inflammatory and wound healing properties. The seed oil has antimicrobial, antifungal, pesticidal properties. Several secondary metabolites synthesized in Bael plant, conferred this medicinal property. Therefore by creating the cDNA library we can determine the sequences of several proteins (enzymes) expressed and identify the genes involved in secondary metabolite biosynthetic pathway. cDNA can then be cloned in expression vector and transformed into the suitable hosts to express those proteins and to get secondary metabolites invitro. Thus a new *Ayurvedic* cum allopathic therapy for curative diseases can be developed.

The total RNA was isolated from bael seeds by the CTAB method. cDNA was synthesized by Gubbler and Hoffman Method. It uses reverse transcriptase enzyme and oligodT as a primer first strand of complementary DNA was synthesized and using taq polymerase and random primers second strand of complementary DNA was obtained. The amplified complementary DNA was then size selected and around 600 bp fragments were cloned in linear TA cloning vector using ligase enzyme. The ligated vector was then transformed in competent *E.coli DH5 $\alpha$*  by chemical method and transformants are screened using ampilcillin resistance gene marker on LB medium with ampicillin.

**Key Words:** cDNA library, secondary metabolites, reverse transcription

## **An Adaptive LAN Intrusion Detection System using Improved Negative Selection Algorithm Based on Bloom Filter**

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### **ABSTRACT**

Intrusion detection systems are installed to identify potential attacks and to react, usually by generating an alert or blocking the unscrupulous data. Current intrusion detection systems employ data mining methods and give a series of false alarms, in cases of a noticeable system environment modification. To overcome this limitation, an intrusion detection system must be capable of adapting to the changing conditions typical of intrusion detection environment.

Computer immunology can be used to develop such adaptive intrusion detection system. Computer immunology is biologically inspired computational field which tries to develop features of human immune system in the field computers. It is found in large amount of research that when immune theory is applied in intrusion detection, the most pivotal and difficult problem is how to generate effective antibodies. At present, the negative selection algorithm advanced by Forrest and his colleague is mainly used to solve this problem. Negative selection algorithm is used to identify self and non-self data in computer immunology. Negative selection algorithm can be implemented using bloom filter to reduce time and space complexity.

The project work focuses on implementation and experimentation of adaptive LAN IDS with improved negative selection algorithm based on bloom filter.



## **Anaerobic Bioreactor Landfill for Bio- stabilization and Green Renewable Energy Generation from Municipal Solid Waste**

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Engineering & Technology *West zone-ANVESHAN-10*

### **ABSTRACT**

The problem of MSW Management (MSWM) has acquired alarming dimensions in India, especially over the last decade. The present study aims at accelerating the sequential phases of waste stabilization by combining two perspectives. The first one by Americans which attempts to maximize landfill gas production and the second approach by Europeans which focuses on the achievement of Final Storage Quality (FSQ) status of residues within a generation time frame. Characterization study carried for twelve months at landfill site of Pune city (located at *Urali Devachi*) shows that major portion of MSW is compostable matter (70%). Simulated anaerobic bioreactors (laboratory scale 20 lit, trial 74.22 lit & pilot 84.82 lit) were used to stabilize the solid waste. The experimentation was carried out on different combinations of waste (organic and mixed waste) and the effects of operating conditions (aeration at starting of the process, variation in density, mixing of gravel, and addition of culture, anaerobic digested sludge) were observed in order to achieve FSQ of residues as well as comparative analysis for gas generation. The results of the experimentation revealed that it was possible to achieve biological stabilization within 150 days with the characteristics of leachate almost meeting the effluent standards mentioned in MSW 2000 rules and the gas generation rate recorded was 212 lit per kg of dry waste.

## Performance Assessment of HC-290 in Airconditioner

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### ABSTRACT

HCFC-22, widely used in room air conditioners, has to be phased out by 2030 under Montreal Protocol. HC-290 is being considered as alternative to HCFC-22.

A 5.13 kW capacity split air conditioner designed for HCFC-22 was considered. After establishing the baseline performance data with HCFC-22, the unit was retrofitted with HC-290. Under the drop-in test, the cooling capacity with HC-290 was lower by 6% and COP higher by 14%. The optimized charge of HC-290 was about 50% of HCFC-22 by weight. A 30% larger condenser gave 1.6% lower capacity and 10% higher COP. With a 10% higher capacity compressor, the cooling capacity was improved by 2.8% and COP was lower by 1.1%. In the case of 10% higher capacity compressor and 14.7% longer capillary, the cooling capacity was 5.2% higher with 2.9% lower COP. ORNL Heat Pump Design Model was used to predict the performance of the systems with HC-290 and to optimize the system.

Keywords: hydrocarbons, HC-290, HCFC-22, room air conditioner.

## Novel method for methanol production

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### ABSTRACT

According to methanol market service Asia, over this five years, methanol demand by the Asia-Pacific region has increased from 13 million metric ton to 18 MM ton. China is responsible for most of the new demands. By 2010, China will be the largest global consumer of methanol. Molasses is converted into ethanol by means of yeast which produces enzymes invertase and xymase responsible for fermentation. It is two step processes:

**Step I:** Hydrolysis of sucrose to glucose and fructose:



**Step II:** Decomposition of glucose of glucose to alcohol:



During the fermentation of molasses when is added as enzyme, then ethanol (molasses is converted into methanol).

## Temperature Estimation Using Photographic Technique

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*Engineering & Technology (Ph.D.), AVISHKAR-09*

*Engineering & Technology West zone-ANVESHAN-10*

### **ABSTRACT**

Present work proposes a novel, low cost, non-contact temperature measurement technique using consumer grade digital still camera. At present contact-type sensors or pyrometers are used to measure the temperature of various sources of heat. With several visible sources the sensor installation is difficult. Whenever fast measurement is needed, conventional sensors like RTD, thermocouples do not meet the demand. Thermal scanners though available have prohibitive costs. A non-intrusive measurement has an edge over the conventional measurement technique, as it does not affect the thermal distribution. An attempt is made to meet the demands using a photographic technique. Most of the heat sources emit light as a function of temperature. In the technique developed, a consumer grade digital camera is used to photograph various heat sources. The images of various visible heat sources are captured. Using colour image segmentation, source zones are identified. The actual temperature is measured by placing a miniature thermocouple in each zone. The colour temperature correlation is established by applying various analytical techniques. Different equations are formulated for different zones observing colour dominance in respective zone. The results indicate that the image-based measurements agree with the corresponding contact measurements within an error range of about +/- 5% for most of the sources. The technique is successfully used for measuring the temperature distribution of different industrial applications like muffle furnace, salt bath furnace, induction furnace etc.

## **Image Retrieval: An integrated approach using Color, Texture and Shape Features**

**Ms. Vaishali Salgar**

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*Engineering & Technology (P.G.) AVISHKAR-09*  
Engineering & Technology *West zone-ANVESHAN-10*

### **ABSTRACT**

With the exponential increase in the size of digital image databases in the past few years, traditional way of manually annotating the images with text and then using text-based queries for image retrieval has been giving way to Content-based Image Retrieval (CBIR) Systems. CBIR Systems use the visual contents of the images to automatically index and retrieve digital images. Image content based retrieval is emerging as an important research area with application to digital libraries and multimedia databases. Examples of applications can be found in everyday life, from museums for archiving images or manuscripts, to medicine where millions of images are generated by radiologists every year. Accessing effectively and efficiently desired images from large and varied image databases is now a necessity. The goal of Content-Based Image Retrieval (CBIR) systems is to operate on collections of images and, in response to visual queries, extract relevant image.

**CBIR** or **Content Based Image Retrieval** is the retrieval of images based on visual features such as color, texture and shape. In CBIR, each image that is stored in the database has its features extracted and compared to the features of the query image.

An integrated system using color, texture features, and shape features are hereby proposed. The system accepts the query image; perform feature extraction and then by using similarity measure compare the query image with all database images. The system retrieves the topmost similar images and displays it as result.

□□



## Arbuscular Mycorrhizal Fungi – A Boon For Agriculture

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scindiab2002@gmail.com

### ABSTRACT

*Mycorrhiza is an integrated development between a photoautotroph and heterotroph. It represents an excellent system of compatibility between a carbon rich photoautotroph and a carbon deficient heterotroph belonging to two diverse kingdoms Plantae and Mycetae. They are universally associated symbiotically with roots of most agricultural crops. Around 90% of earth's vegetation is associated with Arbuscular Mycorrhizal Fungi (AMF). AMF exhibit strong biotrophic dependence on hosts. They are host preferential, not dependent. More than one species / genus of AMF can infect same plant root. They are more abundant in cultivated than virgin soil. They transform un or less available P to available form. They also absorb other elements like Cu, Zn etc. and supply to host plant. They can accelerate nitrogen fixation in legumes.*

*The AM fungi are resistant to water stress,*

*They can play a significant role in the cycling of nutrients, productivity and plant succession in ecosystems.*

*AMF are useful in*

- 1. Nurseries to inoculate seedlings to be transplanted*
- 2. Low input agricultural soils, which are acidic and non-fertile*
- 3. Soils polluted with heavy metals*
- 4. Areas which are drought prone and with abiotic stress.*



Dr. Wasudev N. Gade, Director, BCUD addressing the audience on zonal level AVISHKAR 2010 at HPT Arts and RYK Science College, Nasik

Dr. Wasudev N. Gade, Director, BCUD addressing the gathering on zonal level AVISHKAR 2010 at Kalvan College, Kalvan, Nasik



Dr. Wasudev N. Gade, Director, BCUD & Dr. Mohan Waman, OSD, interacting with the participants during poster session at zonal level AVISHKAR-2010 at Kalvan College, Kalvan, Nasik

Felicitation of winners at University of Pune by Student Welfare in presence of Hon'ble Vice Chancellor Dr. Raghunath Shevgaonkar, Dr. M. L. Jadhav, Registrar, Dr. Sambhaji Pathare, Director, Student Welfare & Dr. Deepak Mane, Director of Sports







Participant from Sinhgad College, Vadgaon demonstrating experiment to Dr. W. N. Gade, Director, BCUD and other delegates

Dr. Wasudev N. Gade, Director, BCUD interacting with the participants during poster session at zonal level AVISHKAR-2010 at Kalvan College, Kalvan, Nasik



Hon'ble Vice Chancellor Dr. Raghunath Shevgaonkar, Dr. W. N. Gade, Director, BCUD & Mohan Waman, BCUD with organizing committee members of AVISHKAR 2009

Felicitation of Mr. Gopal Deore, winner of 3rd National Research Convention-ANVESHAN -2010, by Hon'ble Vice Chancellor Dr. Raghunath Shevgaonkar, and Dr. W. N. Gade, Director, BCUD







## पुणे विद्यापीठ गीत

ज्ञान बनो कर्मशील, कर्म शानवान

पुण्यमयी दे आम्हा अक्षर वरदान  
ज्ञान बनो कर्मशील, कर्म शानवान

जातिभेद, धर्मभेद, वंशभेद दूर  
लाख लाख कंठांनुनि हाच एक सूर  
करुणेच्या चरणांशी नत हो विशान

माणुसकी धर्मचा अर्थ जाणतो  
श्रमनिष्ठा हें पवित्र तीर्थ मानतो  
हृदयांनुनि समतेचा निर्भय अभिमान

सेवेतच मुक्ती ही मंगल दीक्षा  
न्यायास्तव जागृति ही सखपरीक्षा  
हें विश्वचि प्पर अमुचे मंत्र हा महान

मंगेश पाउगांवकर







Hon'ble Mr. Sushil Kumar Shinde, Union Minister of Power giving a Winner trophy of AVISHKAR-2009 to Team Managers of University of Pune



Team members and team managers with winning trophies of AVISHKAR-2009