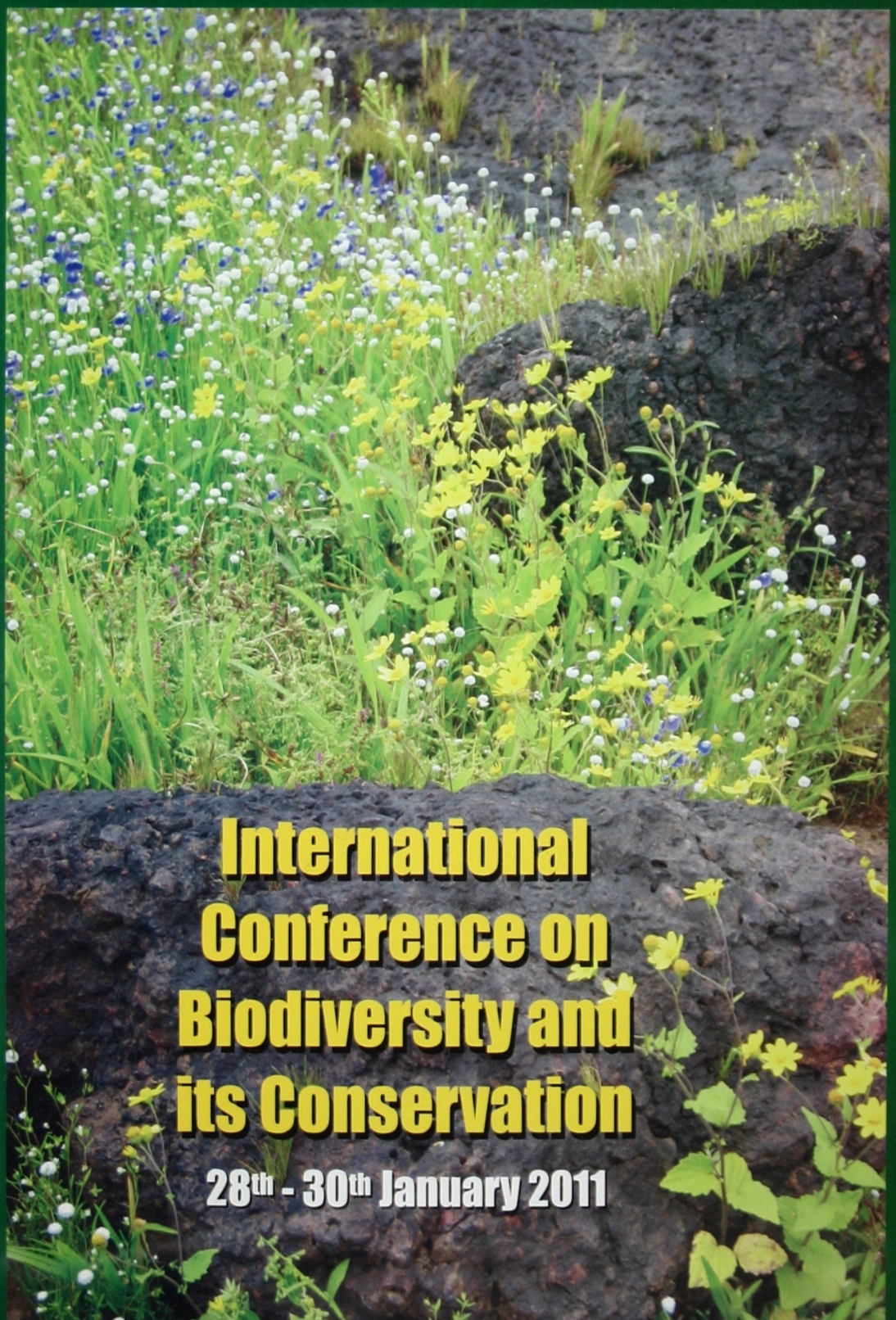
Progressive Education Society's

MODERN COLLEGE OF ARTS, SCIENCE & COMMERCE

Shivajinagar, Pune 411005. Maharashtra, India

Affiliated to University of Pune ♦ NAAC Accredited with 'A' Grade ♦ Best College Award by University of Pune

ABSTRACT BOOK



International Conference on Biodiversity and its Conservation

28th - 30th January 2011

ABSTRACT BOOK

International Conference on Biodiversity and its Conservation

28th - 30th January 2011

Dr. Gajanan R. Ekbote
Chief Organiser &
Chairman, Business Council,
Progressive Education Society, Pune 5.

Dr. Rajendra. S. Zunjarrao
Organising Secretary &
Principal, Modern College, Pune 5.

Dr. Neeta M. Patil
Joint Organising Secretary

Organised By

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Mission

"Our goal is to create and develop 'Modern' youth as responsible citizens with multidimensional personalities by inculcating among students a blending of cultural awareness, compassionate and 'Progressive' attitude, scientific insights and

PRESIDENT'S MESSAGE

जी. के. दास
भारत की राष्ट्रपति का निजी सचिव
G.K. Das
Private Secretary to the President of India

राष्ट्रपति भवन,
नई दिल्ली-110004.
Rashtrapati Bhavan,
New Delhi - 110004.

No.9/Per Cell/2011
17 January 2011

Dear Dr. Zunjarrao,

Kindly refer to your letter dated 7 December 2010 inviting the President of India to inaugurate the International Conference on Biodiversity and Conservtion organised by Modern College of Arts, Science & Commerce on 28th January 2011 at Pune.

While thanking you for the kind invitation, the President regrets her inability to accept the request owing to other commitments already finalized for that time. The President, however, wishes the conference all success.

With regards,

Yours sincerely,

(G.K. Das)

MESSAGE FROM DIRECTOR OF HIGHER EDUCATION

Date- 21.01.2011

Dr. R. V. Kirdak
Director
(Higher Education)

Message

I am happy to know that Modern College, Shivajinagar, Pune -5 is organizing an International Conference on Biodiversity and its Conservation from 28 to 30 January 2011.

It is befitting that the theme of this conference is devoted to current trends in Biodiversity and related areas.

With the new developments in science, the global scenario in the basic research and its applications are throwing open new challenges to young scientists.

I am confident that the deliberations in the conference will provide an excellent opportunity to the industrialist, scientists, teachers and students to interact with each other and discuss recent developments in this field .

On this occasion I convey my good wishes to the Principal and Organizing Secretary and the delegates of the conference.

I wish the conference a great success.

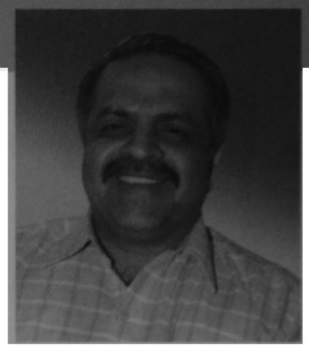
(Dr.R.V.Kirdak)
Director,

Directorate of higher Education,

Maharashtra State, Central Building,

Pune – 411 001.

CHAIRMAN'S MESSAGE



Progressive Education Society is one of the leading educational institutions in Maharashtra. P. E. Society was founded by a well-known dedicated teacher late Shankarrao Kanitkar along with his collegues in year 1934. The team of dedicated teachers with their untiring efforts and sacrifice built up reputation of all its institutions over a period of time. The school, colleges, management and computer institutes run by the society have earned a reputation as institutions imparting quality education all over Maharashtra.

P.E Society runs 56 educational institutions, which include pre-Primary, Primary, Secondary, Higher Secondary School and Arts, Science and Commerce Colleges, Engineering College, College of Pharmacy, Institute of Management, Institute of Computer Science, Information Technology Centre, and Law College etc.

The Modern College of Arts, Science and Commerce, Shivajinagar, Pune 5 was founded by Progressive Education Society, in 1970. The college is affiliated to the University of Pune. The college provides various academic amenities so as to attain Bachelor and Master Degrees in the fields of Arts, Science, Commerce, Computer Science, Computer Application and Biotechnology. The college is a reputed educational institution, which has been known for producing outstanding students who take on different careers, as per their academic merit successfully in the society.

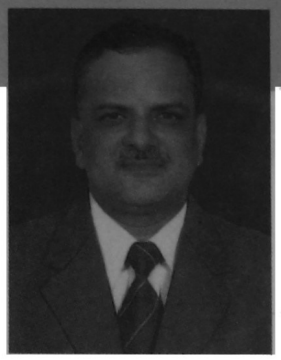
University of Pune has awarded "Best College Award" to the college.

The college not only ensures academic development of the students but also provides them with opportunities to prove themselves by means of extra-curricular and co- curricular activities. Moreover, in the field of Sports, the college has made a name for itself. So far 28 students of the college have won prestigious "Shri. Shiv Chhatrapati Award". The College has a well-equipped gymnasium by which the students are benefited. The Arts circle of the college works hard for the promotion of cultural activities. The Career Guidance Center makes its presence felt by providing necessary information and guidance to the students as and when required. The record of achievements of the college clearly indicates that the college has firmly established itself as a **'Modern'** and **'Progressive'** educational institution. The College is accredited with A grade by NAAC, Banglore. Various educational authorities have noted the achievements & reputation of the college. The Govt of Maharashtra & University of Pune have recently accorded the sanction to increase the intake capacity of the M.Sc Course. The young & highly qualified team of faculty members spares no efforts to keep the students well informed and in updating their knowledge. The students are also reciprocating by their high achievements in academic performance. A large number of students are getting excellent placements in different parts of the country & also abroad. Every year several students are also selected in reputed foreign universities for higher studies.

With the increasing environmental problems and global warming issues, the scientific community is now turning back to conserve the earths biodiversity. It is indeed important to organise an International Conference on such a relevant topic. I congratulate the Principal of Modern College, Dr. Rajendra Zunjarrao and his Organising team for organising this conference and wish them a grand success.

Dr. G. R. Ekbote
Chairman,
P. E. Society, Pune.

PRINCIPAL'S MESSAGE



We are happy to welcome you to the International Conference on Biodiversity and its Conservation organized by Progressive Education Society's Modern College of Arts, Science and Commerce, Pune.5.

Since 1985, P. E. Society has been making pioneering efforts in establishing higher and technical educational institutions under the dynamic leadership if its Chairman, Dr. G. R. Ekbote, a well known surgeon and member of the Senate, Academic Council of the University of Pune. He has been recently appointed as U. G. C. Nominee on University of Health sciences, West Bengal & also on National Institute of Technology, surathkhal, Karnataka. The institution of P.E. Society are progressing remarkably and making their mark in the field of education. It is in this context that the era from 1986 till today is characterized as era of exponential growth and academic development.

Progressive Education Society's Modern College of Arts, Science and Commerce, Shivajinagar, Pune-5 was established in the year 1970. At present we have approximately 8000 students. We run courses in Arts, Commerce and Science including Biotechnology, Microbiology, Computer Science, Electronic Science, etc. College is re-accredited by NAAC, Bangalore with 'A' grade status. College is well known for its academic excellence. Many past students of our college have excelled in the field of academic activities, sports and cultural activities. The College has received **'Best College Award '** of the University of Pune in year 2008.

Our college has maintained tradition of organizing National/International Level Conferences, Workshops, Seminars and Symposiums. United Nations has declared that, year 2010 is to be celebrated as a Year of Biodiversity. With this notion in mind we had submitted proposal to the University of Pune to organize International Conference on 'Biodiversity and Its Conservation' under its Quality Improvement Programme. We are very glad to communicate you that, in response to our proposal University of Pune has given approval and consent to organize the International Conference on the said topic.

The word **'Biodiversity'** is a contracted version of 'Biological Diversity' which can be defined as the diversity among living organisms from all sources including terrestrial, marine, aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems. We rely on diversity of life for medicine, food, fuel and other essentials without which we cannot survive. But due to human activities, we are losing our rich diversity. Before we lose this rich biodiversity, it is necessary to conserve it. In 2002, world leaders had agreed to reduce rate of biodiversity loss by 2010. The United Nations had declared the year 2010 as International Year of Biodiversity.With this background; Modern College, Shivajinagar, Pune 5 has organized an international conference to discuss as to what exactly we have done to conserve our biodiversity.

The political boundaries of India encompass a wide range of ecozonesdesert, high mountains, highlands, tropical and temperate forests, swamplands, plains, grasslands, areas surrounding rivers, as well as island archipelago. It hosts three biodiversity hotspots: the Western Ghats, the Eastern Himalayas, and the hilly ranges that straddle the India-Myanmar border. These hotspots have numerous endemic species. In the conference, the issues related to biodiversity and its conservation will be discussed. The conference will also focus to reduce biodiversity loss rate and develop a platform for benefitting and sharing at regional and national level.

As it is an International event we have invited and expecting the participation of Resource Persons, Subject Experts, Scientists, Eminent Personalities from the academic field and industry, Faculties and Students from the various countries and within the country. On this occasion I convey my warm greetings and felicitations to all the delegates and wish them a scintillating conference.

Dr. Rajendra S. Zunjarrao
Organizing Secretary, ICOBIC, and
Principal, Modern College of Arts Science and Commerce, Pune-5

How Do I Understand Biodiversity?

India covers about 2 per cent of the land area of the world but possesses more than 8 percent of world's biodiversity. This biodiversity is not evenly distributed in India. It is more concentrated in Western Ghats & in the north- eastern states such as Arunachal Pradesh & Assam. These areas are therefore, called "Biodiversity Hotspots." Andaman & Nicobar Islands also have remarkable biodiversity. Indian biodiversity is characterized by high endemism. It means a number of species have limited ranges, being confined to particular areas only & not found anywhere else in the world. Such species obviously have high conservation value, should receive highest priority in any conservation programme as their loss implies that the world heritage becomes so much the poorer.

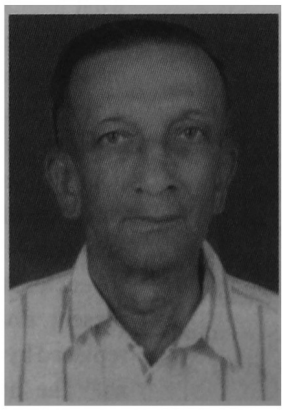
But why should we care to protect and conserve biodiversity, many people would ask. The simplest answer to this question is this: the variety of species provides a gigantic gene bank which becomes an unlimited source of food & fibre, medicines,antibiotics & pesticides and raw materials for different industries, small & large scale. Wild genes are much stronger in resisting diseases & can impart this strength to domesticated plants such as crops to make them pest resistant. Forest food is an important supplement in the diet of many communities in India. Wild plants can also be an additional source of energy as Pongamia (Karanj) and Jetropha have shown. If biodiversity is so useful, how do we account for it? Do we know how many plants and animals are immediately useful to human beings, how many are likely to be useful in future and how many are not directly useful? To account for each & every species of plants from lichens to trees and of animals from bacteria to larger animals like whales and elephants, is a mind-boggling task. No nation has achieved this feat so far. We have initiated an effort to document biodiversity as much as possible by preparing biodiversity registers for the countryside & for urban areas. But it is feared that a lot of biodiversity is going to be lost by the time we complete this task! Why is this so? For biodiversity is not only the number & variety of species & sub- species of plants & animals, higher & lower, but also includes the variety of habitats & niches available in a particular area. Habitat is the address & niche is the Ecological Society profession of each species. It is extremely difficult to separate out & count each & every habitat & niche as they are connected to each other & to larger divisions like biomes in a maze of linkages. Our ecological knowledge is not adequate to understand all these linkages. In our precipitate haste to industrialize & urbanize, we may be unintentionally destroying a number of habitats & niches. The collapse of linkages must be having a devastating impact on biodiversity! This way we are destroying forever not only the gene bank but also the very basis of ecological knowledge & understanding. The reasoning so far makes clear that biodiversity knowledge is not enumeration of species & sub species only. We must also try to understand what habitats & niches species & sub- species represent? The wonderful diversity of attractive flowers that adorns many a lateritic plateau & open area in Western Ghats, during monsoons, is a case in point. These areas are "open" because of unrestricted grazing & trampling by our domestic animals & cutting of wood by human beings. The character of biodiversity on these plateaus when they were not "open" must be quite different from what it is today. If we enclose this area & protect it from grazing & cutting, the present diversity of attractive flowers is likely to be replaced by some other set of plants. Which is important for us? The attractive flowers which is an expression of

nature's reaction to a variety of impacts? Or the more sedate variety of plants which emerges when these impacts are removed?

Cast in this mould, the question of biodiversity enumeration & conservation appears to be quite an intricate one. We must understand that biodiversity is nothing but an expression of certain physical conditions. In a country like India, which boasts of human settlements dating back to thousands of years, human beings have been constantly modifying these conditions. Biodiversity must have been modifying too. In the name of preserving certain apparently "natural" areas, we have evolved a system of protected areas like sanctuaries & national parks. Yet they are not completely immune from human interference. It means that the biodiversity that these areas manifest must have been modified over the years. A study in Germany has shown that 65 % of biodiversity is found outside protected areas. It is likely that this biodiversity is the result of human modification of habitats & in a sense "man- made diversity, while the 35 % Ecological Society which remains within protected areas are an expression of physical conditions which existed some years ago. The significance of biodiversity then seems to depend on decisions made by human beings in a particular country or nation. People must decide how much area they would continue to modify & how much they would leave to relapse into physical conditions that existed in the past. As such biodiversity is quite a dynamic concept.

Enumeration of biodiversity cannot be once for all. Each time we enumerate or document we must put a date on it. We should repeat this exercise every 5 or 10 years.

In fact we should have a census of biodiversity every 5 or 10 years, as we census human beings. If we can describe & quantify physical conditions of the area, each time we enumerate, we may begin understanding the linkages between biodiversity & physical conditions. An NGO from Pune enumerated the biodiversity of Metropolitan Area at the turn of century. In some cases as in birds, they were able to establish the change in the character of biodiversity as some older records were available. If they repeat the exercise, and also record modifications in physical conditions, linkages between these two can be established with much more certainty. Indeed if somehow the scale of human impact can be quantified, the character of biodiversity can be related to the scale of human impact. This is directly useful in restoration & conservation of biodiversity.



Together with physical conditions, biodiversity also helps to define the character of nature's services. If in an area atmosphere, soil and water are polluted, nature's services such as providing atmospheric balance, soil formation & self- cleansing ability of flowing water, will be affected. The existing biodiversity will be an indicator of such disturbed conditions. The linkage between the degree of disturbance & the character of biodiversity can thus be established.

If the restored area is monitored annually we will understand how physical conditions & biodiversity begin to "relapse" to conditions that existed before they were modified by human beings.

Some people have differentiated between the "natural" & "domesticated" biodiversity. In the above sense, it is extremely difficult to locate & define natural & pristine biodiversity. The better differentiation would be between biodiversity that is only Ecological Society indirectly useful to human beings and has more or less intrinsic value and biodiversity which is directly useful & is associated with them.

How then do I understand biodiversity? I feel biodiversity is one of the components of Nature. If we single it out, accord it greater value, try to glorify it, we obtain a distorted view of nature. Biodiversity should be cast in its proper perspective:

the time scale, physical conditions & most important, the character & intensity of human impact.

If conservation of biodiversity through protection & elimination of human impact, is planned, one must accept that it will mean a kind of relapse into conditions that existed sometime in the past. If biodiversity is to be taken care of in a human milieu, we must minimize human impact in certain natural processes such as the drainage pattern, the balance of erosion & deposition and stepping stones & corridors for the movement of life forms.

Prakash Gole

Ex- Professor and HOD Botany,
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CONTENTS

Abstract No.	Title	Page No.
PD-1	**Biodiversity of phytoplankton from T.I.F.R and Nariman Point coastal area of Mumbai (India)** Vishal Rasal and Rehan Tamboli	1
PD-2	**Plankton diversity of Tulsi and Vihar lake, Mumbai** Archana Rangari and Vishal Rasal	1
PD-3	**Status of phytoplankton diversity of Gorai creek, Mumbai** Vishakha N Shingala and Nandini N Patil	1
PD-4	**Phytoplakton diversity of Kashi-Vishvanath pond, Ambejogai, district Beed, Maharashtra, India** S W Bhivgade, B D Deshmukh and A S Taware	2
PD-5	**Fresh water algal (diatoms) diversity from Junnar tehsil of Pune district (Maharashtra)** Radhakishn N Tagad, Subhash D Pingale and Ramchandra H Bhoge	2
PD-6	**The significance of small water ponds for algae biodiversity in postglacial areas** Bogna Paczuska and Ryszard Paczuski	3
PD-7	**Presence of high algal diversity in Pune air** Jogita T Pandkar	4
PD-8	**Chlorococcalean biodiversity of Godavari river, (M.S.), India** R R Sanap, A B Gore and S D Pingle	4
PD-9	**Biodiversity studies of Cyanophyceae of Mausam river of Malegaon city of Nashik district of Maharashtra** S N Nandan, S R Ahuja and Ziya Ansari	5
PD-10	**Algae of river Mosam** Yogesh Shastri	5
PD-11	**Freshwater phycodiversity from Marashtra, India** S D Pingle	6
PD-12	**Seasonal variation in diversity of microalgae and cyanobacteria from Barvi dam, Thane, Maharashtra (India)** Rehan Malik Tamboli and Vishal Rasal	6
PD-13	**Algal flora of Shahdol city, Shahhdol, Madhyapradesh** Santosh Kumar Mishra and Saurabh Madan	6
PD-14	**Diversity of arbuscular mycorrhizal (AM) fungal species in plants surrounding the Bauxite mines from Kolhapur district, Maharashtra, India** Mayura Dudhane, Mahesh Borde and Paramjit Jite	7

PD-15	**Vesicular arbuscular mycorrhizal diversity and distribution in arid climate of Western Maharashtra, India** N N Patil	8
PD-16	**Survey of AM Fungi associated with potato from Pune district of Maharashtra** Manjusha Khanna and B P Shinde	8
PD-17	**Diversity in air borne fungal spores over food grain stored in the ware houses of Nashik district, India** S I Patel	9
PD-18	**Diversity in air borne fungal spores over food grain storage godowns at Ozar, (Nashik), India** S I Patel and M V Shandilya	10
PD-19	**Biodiversity and rhizosphere microfungi of gruondnut (*Arachis hypogea* L.) C.V. SB-11 with special referance to Dithane- Z-78** R S Saler	10
PD-20	**Study of biodiversity and applications of Actinomycetes** Anupriya Chaterjee, Jidnyasa Kedare, Gauri Shetye, Ketki Vaidya and Asmita Pawar	11
PD-21	**Diversity of aquatic fungi from river Mula, Pune city** Ayodhya D Kshirsagar and Venkat R Gunale	11
PD-22	**Occurrence of AM fungi associated with xerophytes from Ghodnadi area of Pune district** A D Kokare and B P Shinde	12
PD-23	**Biodiversity of marine fungi from the Union Territory of Pondicherry** N B Pawar	12
PD-24	**Fungal biodiversity in association with some legume seeds** J A Magdum	13
PD-25	**Marine fungi from Kerala coast (India)** A R Tuwar, B D Borse , S R Kale and B N Sonawane	13
PD-26	**The genus *Physarum* Pers from the North Eastern ranges of Western Ghat** D M Jadhav and S P Nanir	14
PD-27	**Diversity of Hyphomycetous fungi in different soils around Aurangabad** S M Salunkhe and Nilima Wahegaonkar	14
PD-28	**Diversity of aerospores in the sunflower field at Beed district** Jyoti J Kshirsagar	15
PD-29	**Vesicular arbuscular mycorrhizal association in some medicinal plants of Parner region of Ahmednagar district** Rangnath Aher	15

PD-30	**Assessing genetic diversity of *Alternaria alternata* isolates of Indian origin using inter simple sequence repeat markers** S M Kale, S G Kale, S M Patil, V C Pardeshi, G S Gurjar, N Y Kadoo,R T Gohokar, P B Ghorpade and V S Gupta	**16**
PD-31	**Mycological studies on diversity of *Fusarium* species occurring on cereals produced in Karnataka, India** Nagaraja H and S Y Sreenivasa	**16**
PD-32	**Fungal biodiversity in seeds of some cereals of Nashik district, their pathogenicity and control measure** D N Khairnar, A S Kelhe and A B Khairnar	**17**
PD-33	**Studies on BT cotton (*Gossypium hirsutum,* L.) with reference to AM fungi** S W Patale and B P Shinde	**17**
PD-34	**The identity of the lichens *Siphula himalayensis* and *Lecanora teretiusculaf*** Mrunmayi D Adhav and Priyanka P Kulkarni	**18**
PD-35	**Moss biodiversity of Kodaikanal in the Southern Western Ghats** Gauri S Soman	**18**
PD-36	**Seasonal variations in the micronutrient of some pteridophytes in Lonavala area** P S Kadam	**19**
PD-37	**Assessment of genetic diversity amongst *Jatropha curcus L.* using EST-SSR markers** R M Phadke, Bilwa Kulkarni, Sayali Chaudheri, N M Patil and K D Gopale	**19**
PD-38	**Legume diversity in Shrigonda taluka of Ahmednagar district, (M.S.), India** A B Gore, R R Sanap and D R Shirke	**20**
PD-39	**Leaf morphological diversity and its relationship among some plant families** S G Auti, D D Ahire and Tushar Chavan	**20**
PD-40	**Biodiversity of some common Poaceae (Gramineae) members of Amravati (Maharashtra)** Shubhangi Ingole and O S Deshmukh	**21**
PD-41	**Assessment of floristic diversity of Daund tahsil from Pune district (Maharashtra)** J G Bagal and S S Deokule	**22**
PD-42	**Genetic diversity in cowpea [*Vigna unguiculata* (L.)Walp.]** B S Gaikwad and A D More	**22**
PD-43	**Yield characteristics, conservation, genetic diversity in french bean (*Phaseolus vulgaris* Linn)** A T Borkar and A D More	**23**

PD-44	**Genetic diversity in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub.)** M S Shinde and A D More	**24**
PD-45	***Ex-situ* conservation of *Dianthus caryophyllus*** Soniya H Khawale and Nutan Malpathak	**24**
PD-46	**Induction of shoot and callus in *Stevia rebaudiana* var Bertoni by *in vitro* culture technique** N M Patil, and K D Gopale	**25**
PD-47	**Macro and micro propagation of *Jatropha curcas* L.:A biodiesel plant** K D Gopale and R S Zunjarrao	**25**
PD-48	**Exploring metabolome of medicinally important plant *Chonemorpha fragrans*** Pradnya Kedari and Nutan Malpathak	**26**
PD-49	**Seed germination studies in *Chonemorpha grandiflora*, an endangered medicinal plant** A V Kulkarni and N P Malpathak	**26**
PD-50	***In vitro* studies in *Momordica charantia* L** Aniket Bhande, Amit Borate and Shweta Musne	**26**
PD-51	**Somatic embryogenesis in strawberry (*Fragaria ananassa Duch.*)** K Tupe and S S Sheelavantmath	**27**
PD-52	***In-vitro* studies in *Cocculus hirsutus* (L) Diel: A medicinal plant** P V Shelar, U R Wayase and R B Barmukh	**27**
PD-53	**Status and distribution of medicinal plants in Western Ghats, India** S P Khunte and J A Magdum	**28**
PD-54	**Role of herbaria in study and conservation of medicinal plants** S P Khunte and J A Magdum	**28**
PD-55	**Medicinal plant survey of Karanjgaon, taluka Niphad, district Nashik** S V Gosavi, B W Chavre and R K Patil	**29**
PD-56	**Survey of medicinal plants used by local people of Newasa tehsil** Y A Dushing, G B Deore and S S Chowdhury	**29**
PD-57	**Survey of some medicinal plant present in Durga tekdi, Nigdi, Pune (M.S.)** R P Sonwalkar, Y R Ahire and P B Cholke	**30**
PD-58	**Prospecting a herbal folk medicine: *Phansomba*** H B Sonawane, J G Vaidya, S R Bhosle, S A Garad and Gauri Bapat	**30**
PD-59	**Herbal database management: a need in bioconservation of medicinal plants** Sanjay D Pawar, Pravin J Dere, Deepak S Musmade, Nilima S Pawar, and Bharat S Honde	**31**

PD-60	**Studies on the medicinal plants towards the health care management** S S Choudhari	**31**
PD-61	**Role of medicinal and poisonous plants in biodiversity** M W Patale, R M Pawar and Reshma Mane	**32**
PD-62	**Medicinal uses of plants used by tribes of Patalkot (District Chhindwara) M.P.** Sanjay Pawar, Vikas Sharma, and Nikhil Kanungo	**32**
PD-63	**Wild medicinal plant resources of Jaunsar Bawar (Uttarakhand) and their conservation strategies** Veena Chandra	**33**
PD-64	**Observations on some rare and threatened plants, Hoshangabad (M.P.)** Ravi Upadhyay and Sharad Trivedi Upadhyay	**33**
PD-65	**Ethanobotanical diversity of plants used by rural community of Darna region of Nashik district in Maharashtra** D F Nikumbh and V R Kakulte	**34**
PD-66	**Ethnobotanical study of some medicinal plants of Vindhyan region** Amrita Singh, Pratibha Singh and Upama Mall	**34**
PD-67	**Conservation of some important medicinal plants of moist tropics** Upama Mall and G S Singh	**35**
PD-68	**Micropropagation of *Ophiorrhiza rugosa* var. Prostrata** Nilesh Rokade, Priyanka Kadam, Gauri Abhyankar, and Ankur Patwardhan	**35**
PD-69	**Assessing the genetic diversity within flax genotypes using Inter Simple Sequence Repeat (ISSR) markers** Sandip M Kale, Supriya M Patil, Varsha C Pardeshi, Narendra Y Kadoo, Prakash B Ghorpade and Vidya S Gupta	**36**
PD-70	**5'untranslated region diversity of desaturase genes in flax varieties** Gayatri S Gurjar, Ashwini V Rajwade, Narendra P Kadoo and Vidya S Gupta	**36**
PD-71	**Floristic diversity of the Alagar hills of Madurai district, Southern Eastern Ghats of Tamil Nadu** K M Rajasekaran and S Karuppusamy	**37**
AD- 1	**Conservation and management of olive ridley *(Lepidochelys olivacea)* sea turtle population status with special references to Ganjam district of Rushikulya Rookery, Orissa** Patro Lingaraj, Maharana Binod Kumar, Maharana Mamini Kumari and S N Padhi	**38**
AD-2	**Study of inter population variation in fungoid frog *Rana malabarica* from Northern Western Ghats on the basis of morphology** Anand Padhye, Neelesh Dahanukar and Anushree Jadhav	**38**
AD-3	**Identification, distribution and status of square spotted gecko, *Hemidactylus gracilis* in Maharashtra Blanford 1870** Parag H Dandge, Raman Upadhye, Varsha Wankhade and Supriya Gomase	**39**

AD-4	**Climatic change in Western Ghat of Maharashtra and diversity of dung beetles** A S Tamboli, and V S Korad	**40**
AD-5	**Click beetles (Coleoptera: Elateridae) from Maharashtra, India: Diversity, taxonomy and miscellaneous studies** Amol P Patwardhan and R P Athalye	**40**
AD-6	**Diversity and abundance of Coleopteran water beetles (Dytiscidae, Hydrophilidae and Gyrinidae) in Kolkas region of Melghat Tiger Reserve, district Amravati, Maharashtra, India** Vaibhao Thakare and Varsha Zade	**41**
AD-7	**Survey of Dung beetles in Mahad Taluka of Raigad District, Maharashtra** B P Tingare, N S Thorat and S R Aland	**41**
AD-8	**Avian diversity of Baramati, district Pune, Maharashtra** R G Kudale, S S Doshi, A N Shendge and S R Kudale	**41**
AD-9	**Distribution of ant genera around Amravati city** Arvind B Chavhan, S S Pawar, M M Baig and V W Wankhade	**42**
AD-10	**Insect biodiversity in India** A K Singh, H M Singh and Pankaj Kumar	**42**
AD-11	**Butterflies species preference to flower visiting in Mazandaran province, Iran** Raheleh Mehrabi, Alireza Naderi, Alireza Ghorbanian and Kalpana Pai	**43**
AD-12	**Faunastic studies on macro moth (Lepidoptera: Noctuoidea) from North Maharashtra** Sachin A Gurule, Santosh M Nikam and Vinod B Borse	**43**
AD-13	**Butterflies as flagship species for invertebrate conservation** Agnes Kharat, S M Nikam, Jaising Darekar and S P Thorat	**44**
AD-14	**Distribution and species composition of zooplankton in Himalayan ecosystems** Prachi Pandit, B U Patil, and G D Mhaske	**44**
AD-15	**Distribution and seasonal abundance of macrobenthos of Gangavali estuary, Uttar Kannada, West Coast of India** S R Shirodkar and V N Nayak	**45**
AD-16	**Ichthyofaunal diversity of Bhima river** A N Shendge and D V Sarwade	**45**
AD-17	**Cephalopodan biodiversity study along the Harne port near Dapoli, district Ratnagiri, Maharashtra state, India** Devdatta G Lad	**45**
AD-18	**Cestode parasites of some freshwater fishes** R K Nimbalkar, V B Nale and D V Sarwade	**46**

AD-19	**Zooplankton diversity around Arnala island Virar, Maharashtra, India** Abhishek Pawar	46
AD-20	**Rotifer diversity of two temple ponds from Nashik district, Maharashtra** Savita K Tidame, Satish S Mokashe and S S Shinde	47
AD-21	**Study of diversity of compost fauna from different biocompost samples** Gayatri Gujarathi and Madhuri Pejaver	47
AD-22	**Study of meiobenthos in Vaitarna river at Ghodmal, Thane, India, with refrence to sand dredging activity** Shilpa L Patil, and R P Athalye	48
AD-23	**Biodiversity and present status of macrobenthic fauna in Mumbri creek of South Konkan, Maharashtra** Hiren Dekate and S G Yeragi	48
AD-24	**Biodiversity of mites in poultry from Pune** Vaishali M Bansod and Sunita N Borde	48
AD-25	**Biodiversity of vertebrates and the threat to their existence** A K Singh, H M Singh and Pankaj Kumar	49
AD-26	**Daily activity cycle of chital (*Axis axis*) in Pench Tiger Reserve in Cenral India** Naveen Chourasia and Payal Mahobiya	49
AD-27	**Occurrence and distribution pattern of *Ichthyophis spp.* (Gymnophiona-Amphibia) from Koyana basin of Patan tahsil, Satara** B V Jadhav	50
AD-28	**Biodiversity and depletion of fauna from Jharkhand state** Ranjeeta Chatterjee, Dipali Raha, Chitra Sinha and A K Sinha	50
AD-29	**Habitats of the *Ichthyophis spp.* (Gymnophiona- Amphibia) at Koyana river and its tributaries of Patan tahsil, Satara** B V Jadhav	51
AD-30	**Study on aquatic biodiversity in reservoir of Chhindwara district of Madhya Pradesh, India** Sushant Punekar and P R Chandelkar	51
AD-31	**Fish divercity of Panimahal near Naldurg Dist. Osmanabad (M.S.) India** Sushila Chavan, Mohan Babare, Shivaji Chavdhari, Swati Yadav and Hansraj Jadhav	52
AD-32	**Aquatic insect biodiversity in perennial lentic ecosystems of Sinhagad fort** Prajakta J Thakur, Namita M Gujatathi, Chaitanya S Joshi,Tejal R Gujrathi, Sonal K More, Aparna S Gadekar, Dynandeo C Gorakhe, and Peeyush M Pahade	52
AD-33	**Biodiversity of freshwater sponges from Western Ghat: Satara city** Rahul A Jamdade and V Y Deshpande	53

AD-34	**Changes in habit and habitat of poisonous, semi-poisonous and non-poisonous snakes found in and around Bhimashankar National Park, district Pune, Maharashtra, India** S B Patil, M K Ghadage, D R Shinde, T B Walunj and D N Bhirhade	53
AD-35	**Diversity of Arachnid fauna in sugar cane *(Saccharum officinarum* Linnaeus*)* plantations in Lonand region and their importance** Sidharth Kulkarni, V Y Deshpande and Rahul Jamdade	54
AD-36	**Amphibian diversity of Satara tahsil, Maharashtra, India** R B More and V Y Deshpande	54
AD-37	**Species composition and distribution of prawns jumemiles in mangroves habitate of Akshi creek in Raigad district, Maharastra state, India** Sandhya Thakur and S G Yeragi	55
AD-38	**Diversity and population density of various castes in different parts of the mound of the termite *Odontotermes obesus* (Isopteran: Termitidae)** B Vasanthkumar, Pradeep V Khajure, S V Roopa and E B Sedamkar	55
AD-39	**Bio-diversity of butterflies associated with flora of Mithbav creek, South Konkan, Maharashtra** S S Yeragi and S G Yeragi	56
AD-40	**Estuarine diversity of zooplankton of Pondicherry** S Rajalakshmi, G Krishnamoorthy and P V Deepa	56
AD-41	**Importance of nectar sources in conserving butterfly diversity in urban landscapes** Neha Mujumdar, Kruti Chhaya, Prachi Mhaske, Rishikesh Patil, and Ankur Patwardhan	56
AD-42	**Study on diversity of cave bats (Chiroptera) in the Central Western Ghats of Maharashtra** Mahesh Gaikwad and Amol Shinde	57
AD-43	**World of spiders in the Wan Sanctuary** N V Bhatkar and G N Vankhede	58
BC-1	**Contested landscapes in the wet tropics, Australia: sea- and tree-changers' perceptions of trends in biodiversity and ecosystem services** Pam Schultz, James Butler, Iris Bohnet and Steve Turton	59
BC-2	**DNA barcoding: A new tool for delim itation of species boundaries in *Dalbergia* spp** Rasika M Bhagwat, Bhushan B Dholakia, M Balasundaran, Narendra Y Kadoo and Vidya S Gupta	60
BC-3	**Conservation status of narrow endemic plant species from high wavy mountains of Western Ghats of Southern India** S Karuppusamy	60

BC-4	**Ecosystem health of pristine environments: structural and functional assessment** Debipriya Kar	**61**
BC-5	**Climate change and Himalayan ecosystem-impacts, monitoring, vulnerabilities and adaptation integrated research and action for development** Priti D Jadhav	**61**
BC-6	**Scenario of biodiversity in Himalayan ecosystem** Sukhada Thorat	**62**
BC-7	**Biodiversity in national parks and sanctuaries** Jidnyasa Gujar, Monica Valecha and Shital Nikam	**62**
BC-8	**Portrait of the Great Himalayan National Park** Mrunmayi D Adhav	**63**
BC-9	**Biodiversity in Sanjay Gandhi National Park** Kavita Rambal, Sushil Shinde, and Somendra Sharma	**63**
BC-10	**Analysis of physico-chemical parameter of water, to investigate the biodiversity of flora and fauna of Sarkari lake and Sangam lake in Buldana city, Maharashtra, (India)** D S Ingale and S V Ambekar	**64**
BC-11	**Study of diversity of flora in an NGO adopted forest land Bhavale- near Shahapur** M U Borkar and M K Pejaver	**64**
BC-12	**Conservation of mangroves by biofoulers at Mochemad estuary of Vengurla, South Konkan, Maharashtra** V M Patole, S G Yeragi and S S Yeragi	**65**
BC-13	**Status of mangrove ecosystem on eastern suburb coastline of Mumbai** Deeplaxmi Satam and Sunanda Deshmukh	**65**
BC-14	**Conservation with people's participation – a case study** M K Pejaver and M U Borkar	**66**
BC-15	**Biodiversity of Summer hill of Shimla** Ansari Ziya and S N Nandan	**67**
BC-16	**Institutions: conservation hub** A S Sawalkar, S L Vaidya, J J Vidur, S D Vidur, S B Hatagale, A S Devkar, A S Taware, B D Deshmukh and S W Bhiogade	**67**
BC-17	**Phytolith as a tool for sustainable development** S S Deshmukh, S P Eksambekar, and A G Godse	**68**
BC-18	**Sustainable development** Vikram Bochawat	**68**

BC-19	**The tribal way of biodiversity conservation: A case study of Jharkhand** P K Mishra and Hari Shankar Lal	**69**
BC-20	**Role of people in debilitation and conservation of ecosystems** Mrudula Karni, Sushama Khopkar and Rajendra Kulkarni	**69**
BC-21	**GIS - a tool for biodiversity conservation; planning and management in minor tourist areas (a case study)** M M Karnik, and S P Eksambekar	**70**
BC-22	**Arboreal diversity in Hazaribag wild life sanctuary** Hari Shankar Lal, and P K Mishra	**70**
BC-23	**Extinction to conservation: Geospatial modeling for predicting suitable sites for relocation of tiger in Sariska wildlife reserve** S Sinha, M S Nathawat, and L K Sharma	**71**
BC-24	**The impact of a Community Intellectual Property Right (CIPR) on conservation** Jidnyasa Gujar, Monica Valecha and Shital Nikam	**71**
BC-25	**Protection of farmers' rights to preserve plant genetic resources** K J Sophy	**72**
BC-26	**Conservation of bio–diversity: A geographical analysis** S B Sangale and D H Pawar	**73**
BC-27	**Plant and animal diversity in Borgadh, a conservation reserve developed by the Nature Conservation Society of Nashik** S R Gudsoorkar, Janhavi Brahma, Mrinmayee Datar and Prajakta Mahamine	**73**
BC-28	**Symbiotic relation of community with the biodiversity** Jairaj K Dawle	**74**
BC-29	**Ecological impact of encroachment on the avian diversity and resident's conservation perception in Sanjay Gandhi National Park, Mumbai** Meghna Daver, Yogesh Dubey and Vinay K Sinha	**74**
BC-30	**Floristic diversity of Chandoli National Park, Sangali district, Maharashtra** Shrinath P Kavade and Subhash S Deokule	**75**
BC-31	**Biodiversity conservation and legal aspects** Siddharth Deshmukh	**76**
BC-32	**Biodiversity and its conservation in the light of Ayurveda and related sciences** Narayanan	**76**
BC-33	**Floristic study of Dadra and Nagar Haveli and its significance to the tribes** Rajeshwary Nair	**77**

BC-34	**Bird - plant association of Fergusson College campus** S Chowdhury, N Joshi, A Jakati, and Y Lele	**78**
BC-35	**Study of biomass of arboreal tree diversity from Yedshi Ramlingi ghat wildlife sanctuary, Maharashtra, India** Rahul Mungikar, Amol Kulkarni and K R Gandhe	**79**
BC-36	**Angiospermic diversity of Talegaon-D abahde – A probable buffer zone for Lonavala-Khandala biodiversity hotspot** Rahul Mungikar and Anup Deshpande	**79**
BC-37	**Biodiversity and conservation of Seshachalam hill range (Eastern Ghats)** S K M Basha, E Rajya Lakshmi, K Rambabu, and A Rathneswararao	**80**
BC-38	**Improving biodiversity through JFMP in the Rajpipla forests of Gujarat** Preeti Baria and G Sandhya Kiran	**81**
BC-39	**Intellectual property rights and biodiversity conservation** Sheela P Warbhuwan and Anita S Jadhav	**81**
BC-40	**Understanding bamboo biology for their conservation and sustainable utilization** C K John	**82**
BC-41	**How to get a 360 degree buy-in for biodiversity conservation** Paul Schwarz	**83**
BC-42	**Study of endemic, rare, endengered and thretened flowering plants of Kas plateau, district Satara, Maharashtra.** S A Mohite' R R Sabale and D H Jadhav	**83**
BC-43	**Studies on bio-diversity of medicinal plant from newly reported sacred groves (Devrais) from Ahmednagar district, Maharashtra** Mohan Waman	**84**
BC-44	**High resolution satellite image based mapping of mango (*Mangifera indica* L.) plantations at Ranpar, Pawas bay, Ratnagiri, Maharashtra** Rajendra Jagdale, Subhash Mali, Puja Kanwar, Saurabh Verma, Himanshu Ranade, Adhikrao Yewale, Shrikant Kakade and Avinash Sonawane	**84**
BC-45	**Conservation of fast disappearing medicinal lianas / climbers of Western Ghats, India** Subhash Mali	**85**
BC-46	**Role of National Social Service, Rotary Club and Social Forestry in biodiversity conservation** S N Despande, V V Shagalolu, L B Dama, K D Kadam, and K R Rao	**86**
BC-47	**A conservation of medicinal plants: the need for a programme of conservation and sustainable utilization of medicinal plants** B M Pardeshi	**86**

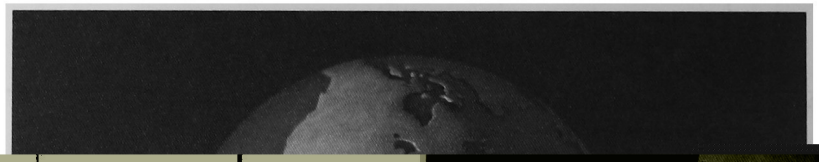
MD-1	**Diversity of of microbiota associated with the gut of house flies (*Musca domestica* L.)** Arvind Kumar Gupta, Dana Nayduch, Ashraf Y Rangrez, Mahesh S Dharne, Pankaj Verma, Bhavin Shah, Hemant V Ghate, Milind S Patole, and Yogesh S Shouche	**88**
MD-2	**Investigation on halophilic microbial biodiversity of Lonar crater lake diststrict Buldana, Maharashtra, (India)** D S Ingale and I M Sayyad	**88**
MD-3	**Exploration of aerobic alkaliphilic bacterial diversity from alkaline soda lake of Lonar, India for production of industrially important cyclodextrin glycosyl transferase enzyme** R S Thombre and P P Kanekar	**89**
MD-4	**Biodiversity of microorganisms in the rhizosphere of medicinal plants in Mamandur forest of Eastern Ghats** T Vijaya, G Kesavareddy and P N Sastri	**90**
MD-5	**Diversity of *Penicillium* and *Curvularia* species from Kopergaon tahsil, district Ahmednagar (M.S.)** A N Siddiqui and A M Bhosale	**90**
MD-6	**Diversity of halophiles from Andaman islands, India** S P Kanekar, P P Kanekar and P K Dhakephalkar	**91**
MD-7	**Antimicrobial potential of endophytic bacterium isolated from *Annona squamosa*** Syed Baker, D Rakshith, H U Kavitha, S Manochaya and S Satish	**91**
MD-8	**Microbiological study of Harni river near Naldurg district, Osmanabad (M.S.) India** N K Kamble, H K Jadhav, and M G Babare	**92**
MD-9	**Diversity of the restriction endonucleases of microorganisms from different ecosystems** Ratnakar Chitte, S V Deshmuk and P P Kanekar	**92**
MD-10	**Study on the diversity of the non-conventional biotechnologically relevant yeast Yarrowia lipolytica in and around Pune city** Sneha Bhide, Madhura Thakar, Ameeta Ravi Kumar, and Smita Zinjarde	**92**
MD-11	**Studies on Occurrence and Distribution of Acinetobacter spp. and other Gram Negative Bacteria isolated from rhizosphere of wheat** B A Chopade and S S Mujumdar	**93**
OT—1	**Screening of traditional rice cultivars grown by tribals of Thane district in Maharashtra** C L Marathe and V V Bhaskar	**94**

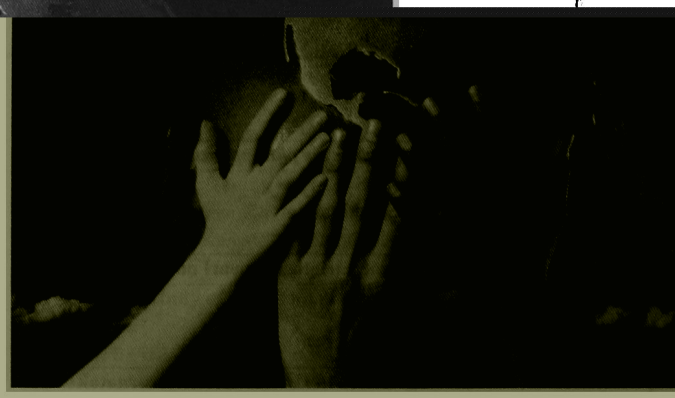
OT-2	**Manipulation of hyoscyamine and scopolamine using stress in *Datura metel* L** S B Zimare and N P Malpathak	**94**
OT-3	***Asterella angusta* St., a liverwort screened for antimicrobial activities with nutrient elements analysis from Western Ghats of Maharashtra** M B Kanade, J K Kashid, A B Tela ve, S S Deokule and S J Chavan	**95**
OT-4	***Targionia hypophylla* L. screened for antimicrobial, physicochemical and biological properties from Western Ghats, Maharashtra - India** A B Telave, J K Kashid, M B Kana de, S S Deokule and S J Chavan	**95**
OT-5	**Influence of AM fungi on growth and biochemical constituents of wheat (*Triticum aestivum* L.)** S L Khapke, R K Aher and B A Patil	**96**
OT-6	**Seed borne fungi associated with maize** D D Shirurkar and Nilima Wahegaonkar	**96**
OT-7	**Edible mushrooms: Facts, problems and solutions** Prasad Y Lamrood and Sachin D Ralegankar	**97**
OT-8	**Some less known ethnomedicinal plants used by the Jaunsaries of Chakrata, Uttarakhand** Veena Chandra	**98**
OT-9	**Renewable energy technology for industry and society** Ramchandra T Jadhav and G D Sawant	**98**
OT-10	**Assessment of bio-contamination of Makani reservoir, Makani, district Osmanabad (M.S.) India** P L Sawant, M G Babare, A D Babare, and R R Jadhav	**98**
OT-11	**A review on economic, environmental and societal impacts of growing crops for biofuels** Adarsh B Vasista	**99**
OT-12	**Study of environment imbalance due to fluoride in ground water** Shirish S Pingale, Dilip B Satpute and Samir S Shaikh	**99**
OT-13	**Acute toxicity study of *Adhatoda vasica* whole plant powder** Shirish S Pingale and Anil G Markandeya	**100**
OT-14	**Biology of grape mealy bug *Pseudococcus maritimus* (Hemiptera: Pseudococcidae) in Nashik district** Ganesh S Shelke, Sachin A Gurule, Santosh M Nikam, and Eknath P Patil	**100**
OT-15	**Bio-agents as effective means for management of woolly aphid, *Ceratovacuna lanigera* Zehntner on sugarcane** Sharad M Galande, Subhedar S Jadhav and Shrirang S Shelke	**101**

OT-16	**Invasion of papaya mealybug, *Paracoccus marginatus* W & G (Hemiptera: Pseudococcidae) and their natural enemies in Maharashtra** A G Chandele, R V Nakat, D S Pokharkar, N D Tamboli and A S Dhane	**101**
OT-17	**Tropical splenomegaly: A rare manifestation of malaria** Karuna Pardeshi, Rahul Marathe, B.R Mane and Pallavi Jog	**102**
OT-18	**Antibacterial assesment of *Asparagus racemosus* and *Hemidesmus indicus* against selected phytopathogens** Roopa Sangvikar and S S Wadje	**102**
OT-19	**Isolation and characterization of *Pseudomonas fluorescens* with potential control of leaf spots caused by *Colletotrichum gloeosporiodes*** Sunita Danai-Tambhale	**103**
OT-20	**Effect of distillery effluents on rhizospohere mycoflora of *Lens culinaris* Medic (Masur)** K M Khalkar	**103**
OT-21	**Ability of immobilized cyanobacterium *Hapalosiphon sp.* in ameliorating selenium toxicity** Rachana Chouhan and Meenakshi Banerjee	**104**
OT-22	**Isolation of *Xanthomonas* spp. from citrus fruits for production of xanthan gum** P Yadav and S Wadwekar	**104**
OT-23	**Antimicrobial screening and rhizosphere analysis of *Cyathodium tuberosum* Kash. from Western Ghats, Maharashtra - India** J K Kashid, M B Kanade, A B Telave, S S Deokule and S J Chavan	**105**
OT-24	**Proteomic study of *Caralluma Fimbriata* cell wall during water stress condition** Sonali P Patil, Vaibhav W Godse, Abhay N Salve and Vijay B Baladhye	**105**
OT-25	**Production of single cell protein by *Aspergillus* spp. using rice bran as a substrate by solid state fermentation** P Shahane and S Wadwekar	**106**
OT-26	**Pharmacological investigations of herbs for the treatment of ulcer in diabetic rats** Bhushan P Pimple	**106**
OT-27	**Biochemical composition of the clam *Meretrix Meretrix* from Kali esturay, Karwar** Sangita R Kudale, Ravindrakumar G Kudale, and Ulh s G Naik	**107**
OT-28	**Inhibition of the activity of polyphenol oxidase in the fruit of*Musa acuminata* and study of the effect of its inhibition on plant biochemistry and growth** P Bhagurkar and S S Sheelavantmath	**107**

OT-29	**Yield enhancement in chickpea (*Cicer arietinum* L. c.v. Vijay) under organic farming condition using soil application of oxygenated peptone** Utkarsha Thakare, Neelam Patil and Nutan Malpathak	**108**
OT-30	**Organic solvent extracts of common Indian weed *Achyranthes aspera* shows antibacterial and antifungal activity against plant pathogens** M S Girase and A D Bholay	**109**
OT-31	**Influence of organic fertilizers on growth and physiology of Garlic (*Allium sativum* L) Var. Phulesafed, G-41, G21 and G2** B B Gawade, V D Bhoge and D S Wadavkar	**109**
OT-32	**Effect of salt stress on proline accumulation in *Cicer arietinum* L. *in vitro*** Monica Lalchan, Bhavya Garg and Rupali Seth	**110**
OT-33	**Bacterial blight disease of pomegranate plant in Nashik district and control measures** D N Khairnar, A S Kelhe and A B Khairnar	**110**
OT-34	**Allelopathic effect of aqueous extract of selected weed species on seed germination and seedling growth of *Sorghum vulgare* Pers. (Jawar)** J A Dhole, S S Bodke and N A Dhole	**110**
OT-35	**Pollution of the mother river Ganga** Mrunmayi D Adhav and Sukhada S Thorat	**111**
OT-36	**First sighting of spot-billed pelican (*Pelicanus phillippensis*) at Nimgaon (M) water reservoir of Solapur District (M.S.)** A C Kumbhar, P S Salunkhe and S Y Shaikh	**111**
OT-37	**Effect of NaCl and Na_2SO_4 on different varieties of pearl millet during germination** K B Jagdale and M G Shitole	**112**
OT-38	**Water quality assessment of Narega l tank in Haveri district, Karnatak** E B Sedamkar and B Vasanthkumar	**112**
OT-39	**Survey of allergic rhinitis cause, care, control at Mulund, Mumbai, Maharashtra** S S Yeragi and S G Yeragi	**113**
OT-40	**Effect of biofertilizers (blue green algae) on yield of chilli (*Capsicum annum* L.) crop** S C Dandwate	**113**

ABSTRACTS





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International Conferen
Biodiversity and its Cons

28th - 30th January 2011

Key note

In Vitro Techniques in Phyto-pharmaceutical Research : Biodiversity Conservation and Utilization

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The subject of "Drug" is as old as "Diseases" and that of disease is as old as of Mankind. Since time immemorial virtually all cultures of world has turned to mother Nature for cure. Plants have formed the basis for the treatment of diseases since pre-historic period. Since then the relationship between man and plants has been intimate throughout the development of civilization. Thus plants played a major role in traditional system of medicine for thousands of years. In the recent past there has been a global trend towards revival of interest in medicinal plants. With the resurgence of herbalism there is growing concern throughout the world about overexploitation and depletion of Earth's natural resources.

Today modern medicine is getting more and more interested in medicinal plant therapies due to various reasons. Most of the natural products are compounds categorized as secondary metabolites, which are the major source of pharmaceuticals, food additives, fragrances and pesticides. There has been renewed interest in screening higher plants for novel biologically active principles particularly to combat such ailments, which have defied synthetic drugs and antibiotics. More than 50 industries all over the world are working on plant biotechnology for wide range of target molecules for pharmaceuticals. Isolation of an active compound is the first stage in the development of new agent, which might be developed as a drug with possible commercial use. Pre-clinical trials necessitate surveys to determine the abundance and distribution of plants of interest. The feasibility of propagation for mass cultivation of high yielding phenotypes is also necessary along with search for alternative source. Thus biodiversity assessment plays a major role in the search of new target molecules.

India is endowed with vast biodiversity due to extreme variations in altitude, climatic and geographical conditions. Among the 18 major hotspots of biodiversity in the World 2 occur in India viz: The Western Ghats and Eastern Himalayas. The need to conserve natural resources, especially plant diversity is possible by the application of in-situ and ex-situ techniques. For large-scale biomass production and propagation, plant tissue and cell culture has played an important role in the medicinal plant research. Besides known compounds plant cell culture serves as a unique source for altogether new compounds, which have not been found in mother plant. The presentation highlights some of the efforts taken for conservation of plants and identification of new lead molecules in this direction of National Chemical Laboratory. The work carried out on some endangered as well as pharmaceutically important medicinal plants occurring in India is included in this presentation.

Diversity of the Sundarbans: More than tigers and trees.

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In my talk I will present the findings of students form TERI University who went to a field trip to the Sundarbans conducting small structured observations on different aspects of biodiversity. At the end of my talk I will discuss field of research that should be taken up regarding the understanding of the Sundarban ecosystem.

The biodiversity of the Sundarbans, the larges mangrove forest of the world, is subject to many discussions and concerns. Measured against the uniqueness of the area as well as the threats it has to face the knowledge available and therefore the research that has been conducted so far is relatively low.

In March 2010 33 Students of TERI University went on a field trip to the Sundarbans where they split up in 11 smaller groups and did two days structure observation regarding biodiversity including fauna and flora, human diversity, threats to biodiversity as well as available systems to monitoring the biodiversity.

The findings of the students indicate that almost all aspects of diversity are closely driven by the disturbance regime of the delta, that the perception on this interaction varies very much among different stakeholders and that no monitoring system is in place to follow these interactions. Reasons for this and ideas to improve the situations will be discussed.

On the ontogenetic diversity and comparative embryology of anuran amphibians: A South Asian perspective

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The data on comparative embryology of anuran amphibians (a huge order which consists of approximately six thousand species) may be important for their conservation as well as the research on their biodiversity. Traditionally, frogs and toads of moderate latitudes of the Northern Hemisphere from the genera *Rana* and *Bufo* were the principal model organisms of embryological studies. The overwhelming majority of the last 40 years works on the developmental biology of amphibians were executed on the South African clawed frog *Xenopus laevis*. This species, like the anurans of moderate latitudes of Europe, Asia and North America, is characterized by biphasic life cycle, with a larval stage of actively swimming and exotrophic tadpole which develops from the laid in water egg. An important feature of the early embryogenesis of all above mentioned frogs is the occurrence of an extensive period of rapid synchronous cleavage divisions consisting approximately of 10-12 cell cycles.

However, these species do not represent all anuran amphibians. Tropical frogs are characterized by enormous diversity of reproductive strategies and developmental modes. During the last 20-25 years, the works on comparative and experimental embryology of neotropical terrestrial-breeding Anura from the families Eleutherodactylidae and Hemiphractidae with the large, yolk-rich eggs and modified cleavage and gastrulation began to appear (Elinson and del Pino 1985; Townsend and Stewart 1985; Callery *et al.* 2001; Desnitskiy 2004). Moreover, almost all

Eleutherodactylidae are characterized by direct development (the miniature froglets hatch from the eggs laid on land), and many Hemiphractidae are marsupial frogs, in which the early stages of development occur in a pouch on mother's back.

On the other hand, it is appropriate to note that there is a relatively small Australian frog family (Myobatrachidae) with a huge ontogenetic diversity, which is comparable with that of the whole order Anura (Desnitskiy 2010).

Among frogs living in South Asia (the families Ranidae, Rhacophoridae, Microhylidae and others), there are numerous species with "nonstandard" reproductive biology and their embryogenesis occurs out of water (Girish and Saidapur 1999; Krishna *et al.* 2004; Kunte 2004; Biju *et al.* 2008; Biju 2009). However, these animals attracted attention of comparative and experimental embryologists extremely seldom. There are no detailed published data on the morphology of cleavage, gastrulation and neurulation.

Therefore, there are great perspectives of thorough morphological studies (including preparation of tables for the normal development) in the field of the early embryology of South Asian frogs which breed beyond water.

Measurement of Biodiversity

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This is a summary of my presentation at the conference on biodiversity in Modern College Pune (28-30 January 2011).

Biodiversity, in addition to being a key concept in conservation biology, is now a crucial aspect of conservation policy and action. Earth Summit at Rio has exhorted governments to ensure monitoring of biodiversity in each co9untry. This is a massive and unprecedented task. It has to cover all taxa of flora and fauna. Assessment has to be done in all different ecotypes. Finally, it has to be based on random sampling of areas.

Monitoring biodiversity requires huge human and financial resources. It also requires a firm scientific basis. In particular, it is necessary to determine the volume of effort needed and an efficient way of deploying the resources.

My presentation offers answers to two key questions in this scenario. Suppose we have selected a taxon, say birds. How much effort do we need to invest to get a good idea of the bird diversity in a given area? This is the first question. Now suppose enough resources are made available, how should they be deployed? This is the second question. It is assumed that the aim is to measure species richness and evenness.

The approach adopted is that of simulation based on real data bases. To answer the first question, we have taken data on 3 populations; trees, mussels and birds and used data on species abundance from published sources. Now random numbers were drawn from the uniform distribution, each number representing sighting of one individual. A simple rule of proportional representation was set up to decide which species that individual came from. Such 'sightings' were then accumulated. At each stage, the number of species 'sighted' was noted and also an estimate of the index of diversity. As the sampling procedure continued, each of the two estimates began to converge towards a value. Once the estimate stabilized, there was no need to continue sampling. It was found that 'sighting' a few hundred individuals was enough to get a stable estimate of a diversity index. A conservative figure of 1000 is therefore prescribed. In other words, if we do enough filed work to encounter about one thousand individuals, so as to note the species in each case, we can get a good estimate of diversity index. On the other hand, news is bad if our aim is to estimate the number of species. The effort required can be one order of magnitude larger (say 10,000 sightings). This is because in a typical natural community, there are some rare species and they are very difficult to locate.

To answer the second question, again we have used data from experts. Here the study area is supposed to be divided into different landscape element types such as grassland, wetland, plantation, hill slope, evergreen forest, moist deciduous forest, etc. A unit of effort is selected; say a line transect of fixed length. Field worker deploys one unit of effort in each landscape element type. This yields 'sightings'. One each landscape type is visited, a second round begins. Initially, most sightings are new species (new to the list being built up) and hence species richness keeps increasing. This process can be called cycle sampling. As the number of cycles goes on increasing, the number of species added to the list begins to fall. A suitable threshold can be selected and if the yield from a particular landscape type falls below that threshold, sampling from that landscape type is terminated. Field work stops when we run out of resources or each landscape type gives a yield that is too low and is dropped from study, thus leaving nothing more to observe. Our suspicion is that the cycle sample strategy proposed above gives a very good 'bang for the buck'. In fact one estimate is that cycle sampling can lead to saving as high as 50%.

The answer to the first question is published in "Effort needed to measure biodiversity" (Anil P. Gore and Sharayu A. Paranjpe) International Journal of Ecology and Environmental Sciences, Vol. 23, Dec. 1977, pp 173-183. The second part is available in a manuscript "Adaptive Sampling Strategy for Assessment of Avian Diversity" Anil P Gore, Sharayu A Paranjpe, Kenneth Gerow, C.Joshi, P.Pramod and K.A.Subramanian, R.J.R.Daniels and still awaits a home.

NISCAIR : The CSIR's Scientific Information Resources for science and society

SUNITA GARG

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National Institute of Science Communication and Information Resources (NISCAIR), a constituent of CSIR, has been involved in dissemination of information through the publication of 19 scholarly journals of international repute, 3 popular science magazines (Science Reporter, *Science-ki-Duniya* and *Vigyan Pragati* in commonly known languages like English, Urdu and Hindi, respectively), books, training courses, various information services, etc. covering all the major disciplines of science and technology. NISCAIR, the erstwhile PID and NISCOM is in the service of the nation for the last more than 50 years. In the fraternity of CSIR laboratories, NISCAIR has a special, and a very important mandate- that of providing a platform to scientists and researchers for communicating scientific achievements for the development of science for society globally. Further to communicate scientific achievements and issues of topical concern and inculcate scientific approach in young and innovative minds, the next major jump in NISCAIR's services to science and society is the online open access availability of its scholarly research journals and magazines. NISCAIR is a proud nodal centre for implementing CSIR e-journals Consortium, a major network project of CSIR. NISCAIR's focus on assertive talent development through the Associateship in Information Science (AIS) programme continues to find favour with students of MBA, B. Tech, MCA, M. Sc, M. Lib, etc. National Science Library (NSL), NSDL, NUCSSI, Indian Patent Database, Bibliometric services, and RHMD are some other information products and services which this institute is providing to the science and society.

Since 1942 NISCAIR has been a custodian of The Wealth of India-an encyclopaedic publication on plants and animals biodiversity and mineral resources of India which is a ready reckoner on natural resources for researchers, entrepreneurs, students and policy planners. Concerted efforts are made to revise and supplement the information to keep it update. Accordingly, original 11 volumes are now available in total 23 volumes encompassing monographic articles on more than 6000 indigenous plant species, 50 on animals and 73 on minerals of economic importance.

SAARC Documentation Centre (SDC), set up in 1994 at NISCAIR is continuing its activities to fulfill its

objectives to disseminate S&T information among SAARC member states. NISCAIR is a recognized study centre for MCA, MLISc and BLISc of IGNOU sponsored programmes. Graphic art and print production division is the backbone of NISCAIR which is supporting not only in-house but consultancy jobs received from many Government and private agencies. The division is maintaining its own printing press in the premises and doing single as well as four colour jobs. A detailed presentation for the purpose of interaction with participants will be given during the conclave.

Impact of climatic change on biodiversity and environment

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Plant diversity provides a buffer against the effect of climate change, and a source of raw material for adaptation. Plants are of particular importance as they are major regulators of global climate and are the keystone of the carbon cycle. Forests are especially important, acting as major sinks by soaking up Co_2 and storing it as biomass and in soils. Conversely, the ongoing destruction, deforestation, developmental activities etc. which today continues at around 13 million ha/yr, is a major source of Co_2 emissions. Because of Co_2 emission there is unequivocal evidence that the earth's climate is warming at an unprecedented rate.

The climate system is currently warming at an global average temperature have risen by on an average o.74° over the past century (1906 to 2006). It is predicted that an ice free Arctic will appear in summers by 2040. (Holland et. al. 2000). Melting ice masses (overland) will contributed sea level rise and the release of carbon and methane, long locked in ice. Cumulative loss of glacier mass is currently occurring ubiquitously and uncharacteristically rapidly (Manning 2007) with increasing rates of ice loss since mid- 1980's in India. The Himalaya mountain ranges are known as the water towers of Asia Since the glacier fed rivers originating from the mountains comprise the largest river run off from any single location in the world. Changes in these influence water recourse, agriculture infrastructure, live hood, biodiversity, and cultures and would affect the lives of about 40% of word's population (UNEP-2007 a) such as all these aspect will be discussed

Global average sea level will rise; higher ocean levels will contaminated underground water sources particularly in smaller island states including Indian oceans is the Caribbean sea and some of the most productive deltas, arid and semiarid regions are becoming drier which will result prolonged droughts. On the other hand atmosphere water content is increasing globally and mid to high altitude are becoming wetter, possibilities of extreme weather events such as heat waves, wild fire, storms, and flash, floods etc , loss of Biodiversity.

Conservation of two critically endangered tree species from Western Ghats, India

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Western Ghats is one of the 25 hotspots of the world. It is spread over 3 states viz., Maharashtra, Goa and Kerala. It

harbors several endemic plants of which many of them are listed in RET category. Two such species viz., *Abutilon* ranadei Woodr. ex Stapf., and *Erinocarpus nimmonii* Grah ex Dalz. et Gibbs., are selected for reintroduction at the historical sites of occurrence.

Abutilon ranadei, Malvaceae, is small tree or larg shrub, endemic to Maharashtra State. It differs from rest of Abutilon species in having pendulous flowers, profuse nectar formation, and capsule valves 5 seperating nearly to base. This species is practically on the verge of extinction as only 7 populations are reported with 15 25 individuals in each population. It is spread over a belt of about 500 x 50 km of Western Ghats. The other species *Erinocarpus nimmonii*, Tiliaceae, is a tall tree occurring in along the Western Ghats in all the three state on stretch of about 1250 km. The tree species, although fairly common throughout the Western Ghats at one time, is very fast disappearing from most of the localities and have been assigned critically endangered category (CR).

Probable cause of the threat of extinction of Abutilon ranadei may be degeneration of gene pool due to genetic isolation of populations resulting in inbreeding. It is evident by very low viability of seeds. The second species viz. Erinocarpus nimonii is exploited for its timber value to in huge quantities. Hence both the species are on the verge of extinction.

Objectives of the project are A) In-situ conservation of both the species under studies. B) Propagation by both conventional and tissue culture methods. C) Identification and characterization of different populations. D) Strengthening of gene pool. E) Developing viable populations at historical sites of occurrence.

Both these species are taken up for reintroduction in their natural habitat. The methodology adapted is: 1) Collection and recording of the localities of occurrence. 2) Propagation by seed germination and cuttings. 3) Standerdisation of tissue culture and DNA-fingerprinting protocols. 4) Propagation by tissuculture. 5) Reintroduction at identified localities. 6) Monitoring of plantation sites. 7) DNA-fingerprinting of naturally occurring various populations.

Plantlets are being raised from several populations through tissue culture, seed germination and cuttings. The populations are being characterized by molecular methods and exomorphology. The strategic plantation, selection of sites, and indirect methods for strengthening the gene pool etc. are discussed in the present paper, along with details of methodology and findings so far.

Extremophiles A treasure of planet earth

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The beauty of the mother earth lies in diversity of life borne by her. Whether it is human being, animals, plants or tiny microorganisms, variations in them are just amazing. Geological activities create a variety of habitats that add to the richness of the earth. Some of such habitats exhibit themselves as very extreme environments which are far remote from the normal environments. By virtue of their adaptability, microorganisms thrive in such harsh environments e.g. saline water bodies, thermal springs, soda lakes, acid mine waters, etc. These special groups of microorganisms, popularly known as extremophiles, existed in the nature since long although known to man only recently. Based upon the type of environment they inhabit, they are classified as thermophiles (occurring in thermal springs, oil wells and growing optimally above 55° C); alkaliphiles (from alkaline environments like soda lakes, optimally growing above pH 9.0); halophiles (from saline environments e.g. saltern pans and ponds, soda lakes, deserts, hypersaline soils, salted foods, optimally growing above 2-30% NaCl), acidophiles (from acid mine water, optimally growing at pH 1.8 to 2.0) and many others like psychrophiles (surviving at low temperatures, from high

altitude lakes, glacials etc.), osmophiles (tolerant to high sugar concentration from sugar syrups, honey, jams and jellies) barophiles or peizophiles (surviving at pressure more that 0.1 MPa growing at high atmospheric pressure such as from deep sea sediments, oil wells), radiophiles (tolerant to high levels of radiations), metallophiles (surviving in presence of high concentration of metal ions e.g. from mining regions) etc.

Physiological features of the extremophiles contribute to their resourcefulness. They are been looked upon as a treasure of biomolecules, biomaterials and metabolites. To protect themselves against the extreme or harsh environment, they synthesize certain biochemicals e.g. glycine betaine in halophiles, heat shock proteins in thermophiles, polyamines in acidophiles, cold adapted enzymes in psychrophiles; biomaterials like exopolysaccharide in alkaliphiles, polyhydroxyalkanoate (PHA i.e. biodegradable polymer) in haloalkaliphiles; metabolites like novel antimicrobial compounds from extremophiles.

Biotechnological potential of extremophiles is enormous. They also contribute to environmental management e.g. bioremediation of saline, alkaline, acidic wastewaters. They are thus looked upon as a treasure of planet earth.

Keywords. Extremophiles, thermophiles, halophiles, alkaliphiles, psychrophiles, acidophiles, biomolecules, biomaterials, antimicrobial compounds, extremozymes

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Rare, endangered and threatened (RET) plant species of Western Ghats and their conservation

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Climate change and biodiversity are the two important issues of present and there is an urgent need to minimize the climate change and conserve biodiversity as much as possible. Year 2010 was declared as the biodiversity year and 2011 to 2020 is declared as the decade of biodiversity. Human activities are the major cause of climate change and biodiversity degradation and loss. Prioritization of species for conservation is essential which resulted in recognition of RED list categories by IUCN.

Western Ghats, one of the eight hottest hotspots of biodiversity is under tremendous pressure of developmental projects and increased human activities. Taking into consideration the treat to biodiversity of the region, government of India has undertaken strong steps in declaring protected areas (PAs) along Western Ghats for *in-situ* conservation. There are several other endemic and RET species which occur outside protected areas which need conservation for which Ministry of Environment and forests (MOEF) is providing financial assistance to existing botanical gardens and establishing Lead Botanical Gardens in various parts of the country (*ex-situ* conservation).

Western Ghats harbor over 4500 species of flowering plants of which 1500 are endemic to the region. Most of the endemic species are narrow endemics and need priority for *in-situ* and *ex-situ* conservation. The present lecture highlight the important RET and endemic species of Sahyadri ranges and the efforts made in their conservation by various institutes, universities, colleges and individuals.

Some of the RET and Endemic species of Sahyadri ranges which need immediate conservation are *Abutilon ranadei, Aponogeton bruggenii, A. satarensis, Crinum brachynema, Ceropegia anantii, C. attenuata, C. anjanerica, C. fantastica, C. bhatii, C. panchganiensis, C. rollae, C. santapaui, C. sahyadrica, C. lawii, C. huberi, C. oculata, C. vincaefolia, C. odorata, C. mohanramii, C. mahabalei, Brachystelma bourneae, B. malawanense, Frerea indica, Heterostemma urceolatum, H. dalzellii, Dipcadi concanense, D. saxorum, Drimia razii, Camtorrhiza indica, Iphigenia*

mysorensis, Chlorophytum borivilianum, C. gothanens, Begonia concanensis, B. phrixophylla, Platanthera sussanae, Barleria grandiflora, B. gibsoni, B. tomentosa, B. lawii, Ipomoea clarckei, Merremia rhynchorhiza, Operculina tansaensis, Calacanthus gradiflorus, Supushpa scrobiculata, Pancratium stanctae-mariae, P. donaldii, Eleiotis trifoliate, Arisaema sahyadricum, A. sivadasanii, A. murrayi, A. caudatum, Wiesneria triandra, Pinnanga diksonii, Cryptocoryne cognata, Hyphaene dichotoma, Vigna khandalensis, Disoxylum binectariferum, Myristica malabarica, Blepharistemma membranifolium, Xylocarpus granatum, Hubbardia heptanerón, Silentvalleya nairii, Pseudoglochidion anamalayanum, Amorphophallus mysorensis, A. longiconnectivus, C. spiralis var cognatoides, C. sivadasanii, pinda concanensis, Flemingia nilgheriensis, Jatropha nana, Blumea sericans, Embelia ribes, Cyathocline purpurea, Uraria picta, Rauvolfia serpentina, Phyllanthus talbotii, Semecarpus kathalekanensis, Cyperus cephalotus, Eleocharis wadoodii, Bidaria khandalense, Phoenix robust etc. Every RET species has some potential value. They are of botanical interest.

[PD-1] Biodiversity of phytoplankton from T.I.F.R and Nariman Point coastal area of Mumbai (India)

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Coastle areas of Mumbai are highly poluted. Phytoplanktons are the important components of aquatic flora, serves as a base to aquatic food chain. Also it maintain key role in maintaining proper equilibrium between biotic and abiotic components of aquatic ecosystem. During present investigation phytoplanktons of T.I.F.R (Tata Institute of Fundamental Research) and Nariman point coastal area of Mumbai were assessed during the period August to December 2009. The results showed that at least 38 genera. In August 2009 maximum number of Genera, whereas in October 2009 minimum number of genera were observed. TIFR shore is more diverse.

Keywords. T.I.F.R, Nariman point, phytoplankton's diversity, species

[PD-2] Plankton diversity of Tulsi and Vihar lake, Mumbai

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Tulsi and Vihar Lake are two main feeder lakes of Mumbai. Planktons are indicator of ecological condition of any water body. The present investigation deals with Comparative the plankton diversity of these two lakes. in phytoplankton Bacillariophyte form largest group .Among the zooplanktons rotifer were found dominant over other groups.

Keywords. Plankton, Tulsi and Vihar, diversity

[PD-3] Status of phytoplankton diversity of Gorai creek, Mumbai

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Plankton forms an important part of biotic component of an aquatic ecosystem. Phytoplankton are one of the most important plants in the sunlit zone of water. In any aquatic system phytoplankton have definite role in enhancing biological wealth of water for fishes and constitutes a vital link in the food chain.

The intertidal zone of Gorai creek (Location: 19°10' N-19°20' N and 72°46' E-72°55' E) of Northwest coast of Mumbai was assessed from September-'06 to August-'07 for its phytoplankton diversity with respect to hydrological

profile and influence of fauna present in the ambient environment at two stations.Station-1, facing anthropogenic threats, showed annual average population of phytoplankton as 82663 cells/litre while station-2, farther from human disturbance, was found with 580581 cells/litre. Further, 26 genera of phytoplankton were recorded both at station-1 and station-2 of Gorai creek.

Statistical analysis showed positive correlation between Phytoplankton Density and Availability of Light (r = 0.525 at station-1 and r = 0.710 at station-2). Other parameters were found to have very little association with the profile of phytoplankton in Gorai creek. Richness indices like R1 (Margalef, 1958), R2 (Menhinick, 1964) and R3 (Odum, 1971) were studied to understand alteration in biodiversity of phytoplankton at Gorai creek.

Keywords. Phytoplankton, Gorai creek, biodiversity, light, richness indices.

[PD-4] Phytoplakton diversity of Kashi-Vishvanath pond, Ambejogai, district Beed, Maharashtra, India

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The phytoplankton and water quality of Kashi-Vishvanath pond has been studied for one year. In this species composition and population dynamics of phytoplankton and productivity have been correlated with seasonal variation physio-chemical characteristic of the water.

Among phytoplankton, members of Chlorophyceae and Cyanophyceae occurred dominantly, whereas Bacillariophyceae were subdominant and Euglenophyceae constituted a minor component. The phytoplankton showed abundance during post monsoon season and minimum number in summer and monsoon seasons. Relative values of temperature, alkalinity, penetration of light and nutrients were the factors responsible for abundance in post monsoon season.

The commonly occurred genera were *Oscillatoria. Closterim, Cosmarium, Oedogonium, Spirogyra, Ulothrix and Euglena.*

Keywords. Phytoplakton, Kashi-Vishvanath pond, physio-chemical.

[PD-5] Fresh water algal (diatoms) diversity from Junnar tehsil of Pune district (Maharashtra)

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Monthly collection of algal plant's from the Vadaj Dam, Manikdoh Dam, Yedgaon Dam, Pimpalgaon Joge Dam as

well as Rivers, Lake's, Puddles, Pulls etc. from Junnar Tehsil. Sampling stations were carried away. The samples were bringing to laboratory for identification; identification had been done with the help of Indian Monographs and standard literatures. The collected algal forms had been preserved in 4% formalin.

Phytoplanktons were investigated in between April 2010 to September 2010. Samples were collected with the help of Plankton net of 25 mesh blotting silk net.

While studying the diatoms from polluted and fresh water habitats of Junnar tehsil of Pune District, Maharashtra, the authors collected about 56 diatoms from Dams and River regions of Junnar tehsil during April 2010 to September 2010. The present paper concerns with the systematic study of 56 diatoms. It consist 10 genus representing 44 species, 9 varieties and 3 forms. All these taxa are new records from this region. Navicula and Cymbella are more densely occur in Junnar tehsil.

Keywords. Diatoms, Junnar tehsil, Pune, Maharashtra.

[PD-6] The significance of small water ponds for algae biodiversity in postglacial areas

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Areas of North Poland are a typical example of recently formed post-glacial landscape, with very large number of small ponds. The ecology of these ponds is very rarely an object of studies, especially when we compare it with data of research from lager post-glacial lakes. The aim of our study was to determine significance of small ponds for algae biodiversity.

These type reservoirs contain relatively small volume of water, and its level changes very quickly depending from weather conditions. In relation to this factor the physical and chemical parameters of water changes extremely. Sometimes drying out is observed.

In years 1996-2002 we carried phycological studies of 14 small ponds located among fields and forests. During the study period we recorded presence of 492 algae taxa specific for different microenvironments: heloplanctonic, benthos, and epiphytic. The most frequent were taxa of *Chlorophyta* 186, *Bacillariophyceae*-106 and *Cyanoprocaryota* 79. The flora of algae was in each one of them different and unique comparing to others. Another important observation was frequent total and rapid "rebuilding" of algae flora. Both the variability of algae communities and its changes were much higher than observed in typical big lakes. Another typical phenomena for big lakes in this area the blooms, in small ponds were observed sporadically only. For this reason its ecology should be considered as more related to natural conditions than in big lakes.

Statistical analyses revealed some other important facts including the significance of small ponds for algae biodiversity. The mean number of taxa recorded for individual reservoir was 54, thus much less then recorded usually in typical big lakes. But when we take into account the big number of small ponds it occurs that they consist more than 95% of algae populations and for this reason thy have the basic significance for their biodiversity.

Keywords. Post-glacial landscape, algae biodiversity.

[PD-7] Presence of high algal diversity in Pune air

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Aero-algal sampling of Pune was done from 13/05/10 to 03/06/10 with a rotarod sampler. Sampling was carried out at six different sites at and around Pune. Total fourteen samples were collected during 210 minute sampling period. Out of 14 samples thus collected; 364 algal forms were recorded. Thus an average of 26 algal forms was recorded per sample. This indicates a high incidence of algal forms in the Pune air. Out of 364 forms, 361 were identified upto class level, 57 were identified to generic level and 15 were identified upto species level. 3 forms were unidentified. Cyanophyta was predominant and was represented by 355 forms (334 coccoid Cyanophyta and 21 filamentous Cyanophyta) followed by 4 forms from Chlorophyta and 2 forms from Bacillariophyta. Maximum numbers of aero-algal forms were recorded from agricultural field at Walha.

Results clearly indicate the dominance of Cyanophyta followed by Bacillariophyta and Chlorophyta respectively. Genera such as *Gloeocapsa* (20), *Chroococcus* (9), *Merismopedia* (6), *Lyngbya* (5), *Microcystis* (5), *Phormidium* (3), & *Aphanocapsa* (2) were recorded. Similarly *Schizothrix, Microcoleus, Aphanotheca, Pediastrum, Protococcus, Chlorella & Pinularia,* were reported one each. Forms such as *Chroococcus* (3), *Gloeocapsa* (2), *Aphanocapsa* (2), *Lyngbya* (2), *Schizothrix* (1) , *Phormidium* (1) & *Aphanotheca* (1) were identified upto species level, were as forms such as *Merismopedia, Microcystis, Microcoleus , Protococcus, & Chlorella, Pediastrum & Pinnularia* were identified upto generic level only.

Forms such as *Schizothrix, Microcoleus, Lyngbya Pediastrum & Pinularia,* were reported from slides only. Similarly *Microcystis, Protococcus, Chlorella, Aphanocapsa & Aphanotheca* were reported from culture only.

Forms such as *phormidium, Microcystis, Schizothrix & Lyngbya* reported to be allergenic to human being has been encountered from the Pune.

Keywords. Aero-algae, Pune, allergenic, asthama, human-being

[PD-8] Chlorococcalean biodiversity of Godavari river, (M.S.), India

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Godavari river is the largest river flowing through South India. Lotic water bodies like rivers and streams play very pivotal role in maintaining biodiversity and biological balance in nature. In India, most of perennial rivers and their tributaries are being used as sites for disposal of domestic and industrial wastes which impair their water quality by favours the growth of algal blooms and jeopardizing the survival of aquatic life.

During present investigations, water qualities of riverine ecosystem like Godavari river was monitored for two year (August 2008-July-2010). From ten sampling stations algal samples were collected and monitored for qualitative analysis.

Present studies revealed that, in all 26 genera and 58 specis of Chlorococcales have been reported from all 10 sampling stations. Chlorooccalean flora was found to be dominant during summer. Its umber was declined during monsoon and again incrased during winter. The commonly found genera were *Ankistrodesmus, Scenedesmus, Pediastrum, Chlorella, Crucigenia, Merismopedia, Golenkinia* etc. Disposal of muncipal sewage and agricultural run-off favours the growth of Chlorococcalean flora. The commonly found pollution tolerant genera were *Ankistrodesmus, Scenedesmus,Chlorella* etc. Their flourished growth indicates pollution status of river at certain stations. The water flow and physico-chemical parameters influenced the occurance and abundance of Chlorococcalean diversity in the Godavari river.

Keywords. Godavari river, Chlorococcalean flora, pollution.

[PD-9] Biodiversity studies of Cyanophyceae of Mausam river of Malegaon city of Nashik district of Maharashtra

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The Mausam river is the northern kanour tributary of Girna river. It rises in the western ghat in the vicinity of Mangi-Tungi Hills at 4300ft altitude above MSL. The Mausam river is flowing through Malegaon city of district Nashik of Maharashtra. It is situated North-South direction of Malegaon city. Four stations of river were selected for collection of algal samples for two years (1992-1994). The different forms of algae also were collected in acid wased bottles & they were present in formalin for further study of investigation. In present investigation, biodiversity study of Cyanophyceae (Blue-Green algae) was made during 1992-1994. Fourty one algal taxa belonging 12 genera of Cyanophyceae were recorded from Mausam river flowing through Malegaon city of Nashik district of Maharashtra. In present study, the class Cyanophyceae is mainly represented by species of *Microcystis, Aphanocapsa, Gleocapsa, Synecoccus, Dactylococcopsis, Merismopedia, Arthrospira, Spirulina, Oscillatoria, Phormidium, Lyngbya* and *Rivularia*. Twenty one species of Oscillatoria, were recorded to present study.

Keywords. Biodiversity, algae, Cyanophyceae.

[PD-10] Algae of river Mosam

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The present investigation deals with diversity of algae in a river Mosam, Malegaon, Dist. Nasik, Maharashtra. This study was carried out from (January- December 1997). In all 141 algal taxa comprising of 33 Cyanophyceae, 41 Chlorophyceae, 44 Bacillariophyceae and 23 Euglenophyceae have been recorded. The diatoms dominated over other classes of algae.

Keywords. Algae, diversity, pollution, river Mosam.

[PD-11] Freshwater phycodiversity from Marashtra, India

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Maharashtra is one of the western states of India. Two districts (Pune and Ahmednagar) were under taken for the exploration of fresh water algal diversity. During these studies fresh water algae were mainly collected from lakes, Dams, Stagnant water bodies as well as lotic water bodies such as rivers and streams. Collections were made during last three decades. Collected algae were observed under low high powers and oil immersion. During fist decades camera Lucida drawings were made and in last decades micro photographs were taken. Collected algae were identified with help of Indian Monographs of different authors Such as Desikachari, Desikachari, Iyengar and Balakrishnan, Randhawa, Suxsena, Philipose, Krishnamurti, Anand, Ramnathan, Kamath and Sarode , Gonzalwies, Pal et. al., Gandhi, as well as foreign authors such as Prescott, Fott, P Bourely,Smith, Skuja. Algae belonging to following different divisions were collected identified and documented in the present paper. Division: Chlorophyta:2 classes, 11 orders, 28 families and 94 genera, 218 species, Division: Euglenophyta: 1 order, 1 family,06 genera 27 species, Division Chrysophyta:3 classes, 8 order, 19 families, 36 genera 69 species, Division Pyrrophyta:1 class, 2 orders, 03 genera 07 spp, Division:Cyanophyta:5 Orders, 13 families,38 Genera 121species,Division: Rhodophyta: 01 Sub class, 03 Genera and 05 spp.

Keywords. Fresh water, phycodiversity, Maharashtra.

[PD-12] Seasonal variation in diversity of microalgae and cyanobacteria from Barvi dam, Thane, Maharashtra (India)

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Algae constitute base of food pyramid in aquatic ecosystem. Barvi dam (21° 43' 41" North, 77° 59' 31" East) is built on Barvi river in Badlapur, Ulhasnagar Taluka Of Thane District. Dam supplies water to adjoining MIDCs townships and to Navi Mumbai.This paper investigates seasonal change in algal diversity in Barvi dam. Monthly sampling was done from three sampling sites during June 2009 to February 2010. There were 24 genera of chlorophyceae, 9 genera of diatoms, and 13 cyanobacterial genera were observed.

Keywords. Diversity of microalgae, Cyanobacteria, Barvi dam, seasonal variation.

[PD-13] Algal flora of Shahdol city, Shahhdol, Madhya Pradesh

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From Shahdol of Shahdol district, seventy three species of freshwater algae belonging to Cyanophyceae,

Cholorophyceae, Xantophyceae and Bacillariophyceae have been recorded and described along with their distributional pattern in other regions of India. Of these 39 taxa occurred in Murna River and Tanki river of Shahdol town. Maximum numbers of taxa were diatoms and unicellular green algae under desmids.

Shahdol city, located in Eastern region of Madhya Pradesh, is covered by Son Through, Shale-Sandstone Plateaus, The Inter Plateau Basins, and Sohagpur Pindari Basins. Its mean sea level height is about 459 meters. Surrounding of it has numerous interesting and unexplored localities like ponds, streams, cataracts and so off freshwater reservoirs like habitat. There are many floristic accounts even on district levels in other states, but Madhya Pradesh which has more natural and undisturbed sites are little investigated at least from view point of algae, Shahdol district has unique position in Vindhyan range and it has attracted many workers on higher plants, bur practically no work has been done on algal flora in this district. However, some work was done by Agarkar (1969, 1971, and 1972) from different parts of Madhya Pradesh.

Keywords. Freshwater algae, Shahdol city, Cyanophyceae, Cholorophyceae, Xantophyceae, Bacillariophyceae

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[PD-14] Diversity of arbuscular mycorrhizal (AM) fungal species in plants surrounding the Bauxite mines from Kolhapur district, Maharashtra, India

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The aim of this work was to evaluate the qualitative and quantitative distribution of arbuscular mycorrhizal fungal (AMF) species diversity in rhizospheric soil from bauxite mine contaminated areas and in natural forest soils in Kolhapur District, Maharashtra. Indigenous AM species existing naturally in heavy metal-polluted soils are more tolerant than isolates from non-polluted soils and are reported to efficiently colonize plant roots in heavy metal-stressed environments. Thus, it is important to screen indigenous and heavy metal-tolerant isolates in order to guarantee the effectiveness of AM symbiosis in restoration of contaminated soils. In this study total 20 different angiospermic plants were studied to observe the root colonization by AM, so that the sturdier ones would be utilized for restoration of contaminated soils. It was observed that the spore population was very high in *Pleocolus richee* (222 spores/ 100 gm of soil) followed by *Pongamia pinnata* (220 spores/ 100 gm of soil) from KSD localities. The highest percentage was observed in Kesarkheda (KSD) site (81%). The species of *Glomus, Gigaspora* and *Acaulospora* were dominant in rhizosphere of KSD and in Durgamanwadi (DMW) area the species of *Acaulospora*, *Gigaspora* and *Scutellispora* were dominant. *Glomus* and *Gigaspora* sporulated abundantly regardless of tree species and sites selected followed by *Scutellispora*.

Keywords. Arbuscular mycorrhizal fungi, *Glomus, Gigaspora, Acaulospora.*

[PD-15] Vesicular arbuscular mycorrhizal diversity and distribution in arid climate of Western Maharashtra, India

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Diversity can be defined as variety and variability of species. The present paper deals with the Vesicular Arbuscular Mycorrhizal fungal species diversity from Rehakuri, Parner and Shirur Tahashil of western Maharashtra. The VAM fungi isolated from rhizosphere soil of *Acacia arabica* Willd, *Azadiracta indica Juss, Prosopis specigera* L from three localities had five genera and 25 species. These included *Acaulospora bireticulata, A. denticulata, A. foveata, A. laevis, A. scrobiculata, Gigaspora gigantea, G. persica, G. rosea, Glomus aggregatum, G. australe, G. boreale, G. fasciculatum, G. fromosanum, G. fulvum, G. geosporium, G. halon, G. microcarpum, G. mosseae, G. occultum, Sclerocystis pakistanica, S. sinuosa, Scutellispora alborosea, S. auriglobosa, S. flugida, and S. nigra.* The occurrence *Glomus* constituted 44% followed by *Acaulospora* 25% from all localities. The soil pH ranged between7.2 to 8.7 and available soil P varied between 4 to 24 kg/ha in the rhizosphere of different plant species. Natural alkaline pH seems to favour the predominance of *Glomus* species. Generally a poor correlation between spore number and mycorrhizal infection has been reported in natural ecosystem. However, in the present investigation spore number was linearly related to mycorrhizal colonization levels.

The existence of strongly inverse relation between soil K, Zn, Cu and Fe and spore count was in accordance with the fact that increasing soil K, Zn, Cu and Fe availability decreased VAM spore count.

Enhancement in spore count with higher nitrogen content and electrical conductivity of rhizosphere soil was reported during study.

However, neither root colonization nor spore count was related to soil pH. Indigenous AM fungal species are well adapted to changes in soil pH and hence marked effect of soil pH could be expected in natural soil.

Keywords. VAM fungi, *Acaulospora, Gigaspora, Sclerocystis, Glomus*

[PD-16] Survey of AM Fungi associated with potato from Pune district of Maharashtra

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Rhizosphere soil samples of three different sites from Pune district were screened for Arbuscular Mycorrhizal (AM) fungi to find its relevance in agricultural lands. Estimation of AM spores per 100gm soil was carried out along with analysis of percent root infection. Maximum (1127spores/100g) number of spores was observed in the rhizosphere soil of site 2 whereas minimum (390spores/100g) number of spores was observed in site 1. Cent percent root infection was observed in the roots of plants collected from Site 2, whereas, 95% root infection was observed in the roots of plants isolated from Site 2 and 3. The isolated spores were identified up to species level. Five genera, *Glomus, Acaulospora, Gigaspora, Scutellispora* and *Sclerocystis* were reported from the selected sites with 22

species. Glomus was the most abundant genus with 12 species. Gigaspora was found to be least abundant with 1 species. High spore count and Cent percent root infection was observed in the stressful period of summer.

Keywords. AM fungi, survey, potato

[PD-17] Diversity in air borne fungal spores over food grain stored in the ware houses of Nashik district, India

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The present investigation deals with aeromycological studies over indoor environment of Maharashtra Ware House Corporation commonly known as 'Vakhar Mahamandal'. The godown of ware house was specially selected to know the incidence of various fungal spores during the period investigations. Incidence of air borne fungal spores in the food grains stored ware houses of Nashik district was conducted during July to October 2008 by using Tilak's air Sampler (Tilak & Kulkarni 1970) and petri plate exposure method. *Aspergillus, Penicillium, Cladosporium, Mucor, Basidiospores, Smut spores, Alternaria, Curvularia,* and *Pleospora* shows great abundance during rainy and humid days of July to October 2008. *Aspergillus, Penicillium, Cladosporium & Alternaria* shows maximum concentration and dominance and all time occurrence which causes infection to the food grains and also responsible for allergic disorder to the workers of ware houses. In addition to pathogenic fungal population, insect parts, pollen grains, algal filaments, spores of lower non vascular plants, hairs and scales of rodents ware also recorded during the studies.

During the period of investigation, spore belonging to group Phycomycotina contributed 2.81%, Ascomycotina, 4.44%, Basidiomycotina 8.26%, Deuteromycotina 78.04% and other types 6.45% to the total air-spora respectively. Among all these types of spores, the group Deuteromycotina contributed highest percentage contribution and lowest percentage contribution was found in group Phycomycotina.

The studies reveal that the spores of *Aspergillus, Alternaria, Cladosporium, Curvularia, Helminthosporium, Penicillium, Periconia* and *Fusarium* were recorded in all the months of investigation with highest concentration in the post rainy period. More spore catch was recorded in the month of August (18.56 %) and September (27.68 %) 2008. Highest percentage of *Aspergillus* and *Penicillium* in the present studies might be due to infected and decaying food grains which was treated as debris and thrown at the corners of warehouse. They have contributed 11.75% to the total air-spora. Rainfall has indirect effect on the indoor environment of ware house which increases relative humidity and enhanced growth and dissemination of Aspergillus and Penicillium spores. These spores were caught in clumps along with conidiophores and sterigmata. The incidence of pathogenic spores noted in the present studies is also of considerable help to farmers and cultivators and ware house management as it would serve the purpose of alarming them for likely occurrence of fungal diseases so that they can plan for the proper preventive measures.

Keywords. Pathogenic flora, aeromycoflora, weather variation, ware house.

[PD-18] Diversity in air borne fungal spores over food grain storage godowns at Ozar, (Nashik), India

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Incidence of air borne fungal spores in the food grains stored ware houses of Nashik district was conducted during July to October 2008 and January to April 2009 by using Tilak's air Sampler (Tilak & Kulkarni 1970) and petri plate exposure method. *Aspergillus, Penicillium, Cladosporium, Mucor, Basidiospores, Smut spores, Alternaria, Curvularia, and Pleospora* shows great abundance during rainy and humid days of July to October 2008. *Aspergillus, Penicillium, Cladosporium & Alternaria* shows maximum concentration and dominance and all time occurrence which causes infection to the food grains and also responsible for allergic disorder to the workers of ware houses. In addition to pathogenic fungal population, insect parts, pollen grains, algal filaments, spores of lower non vascular plants, hairs and scales of rodents ware also recorded during the studies.

During the period of investigation, spore belonging to group Phycomycotina contributed 2.81%, Ascomycotina, 4.44%, Basidiomycotina 8.26%, Deuteromycotina 78.04% and other types 6.45% to the total air-spora respectively. Among all these types of spores, the group Deuteromycotina contributed highest percentage contribution and lowest percentage contribution was found in group Phycomycotina.

Keywords. Pathogenic flora, aeromycoflora, weather variation, ware house.

[PD-19] Biodiversity and rhizosphere microfungi of gruondnut (*Arachis hypogea* L.) C.V. SB-11 with special referance to Dithane- Z-78

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Use of fungicides has become an integral and economically essential part of agriculture when resistance against a pathogen in a variety fails. Many fungicides are directly introduced into agricultural lands for management of soil borne diseases. Some part of the fungicide compounds administered as spray or dusts ultimately reaches into the soil as run off or drift and thus influence the microbial balance of soil. There fore, the study of tolerance of pesticides by micro-organisms has got much practical importance in maintaining the survival of saprophytic micro flora in soil. Now- a-days, the necessity of such study is emphasized all over the world. In order to understand tolerance of Dithane-Z-78 present study under taken. Dithane-Z-78 fungicide is generally used in the management of groundnut leaf spot and rust diseases of groundnut.Dithane-Z-78 used and tolerance was studied by serial soil dilution plate count technique. Altogether 39 species of fungi were recorded from rhizosphere (R) and soil (S) of treated plants. This is clearly indicating nearly sixty percentage reduction in the number of micro fungi. The effect of this fungicide on biodiversity of micro fungi was as follow. Some species of microfungi more or less unaffected in their counts in rhizosphere (R) and soil (S) and rhizosphere and soil (R,S) while some were eliminated or decreased in their counts. Some fungal species showed variable response to the compound in the rhizosphere (R) and soil (S) and rhizosphere and soil (R,S).

Keywords. Fungi, fungicide, biodiversity, rhizosphere (R) soil (S)

[PD-20] Study of biodiversity and applications of Actinomycetes

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Actinomycetes comprise a large and diverse group of Gram positive filamentous bacteria known to produce many bioactive compounds. Most of the extensively studied genera are mesophilic although thermophilic genera have been reported. They are found predominantly in soil, lake & marine sediments. A large variety of mesophilic and extremophilic (thermophilic, alkaliphilic & halophilic) actinomycetes have been exploited for large scale enzyme productions e.g: chitinase *(Streptomyces viridificans)*, cellulase (*Thermonospora* sp.), proteases *(Nocardia)*, amylases *(Thermonospora curvata)*, ß- xylanase *(Microbispora)*, L- asparaginase, lignolytic enzymes *(Nocardia autotropica)*. These chemoorganotrophs also produce a wide variety of potential antibiotics (Streptomycin, neomycin, chloramphenicols), auxins, herbicidal compounds, vitamins, enzyme inhibitors, anti- parasitic, anti- tumor agents & anti- cancerous compounds *(Salinospora tropica CNB 440)* & immunomodulating agents. Actinomycetes have been instrumental in bioremediation e.g., Streptomyces sp. is reported to degrade hydrocarbons, cellulose, chitin & biosorption of effluent dyes. Our present study focused to isolate Actinomycetes from various collected soil samples, characterize, optimize their growth at various pH, temperature & salinity conditions and study production of various antibiotics, enzymes (amylase, protease, chitinase, cellulase, etc.). Eight actinomycete cultures were isolated from various soil samples collected from extreme environment soils all over India. Isolation was superior on Casein Starch Agar than on KMM agar. The isolates have been so far classified on the basis of their colony characteristics, time of growth & spore colour on CSA. All the cultures grew on sterile CSA & KMM agar of various pH 7, 9, & 11 at both temperatures 250 C & 370C. The mycelial growth has been remarkably faster in liquid media (Casein Starch Broth) under shaker conditions (170rpm) at 370C. Characterization of all the isolates is yet to be confirmed. Two Isolates have shown antibiotic production against Gram positive bacteria. One isolate has been studied for its magenta pink water soluble pigment production in CS broth culture. Maximum pigment was produced at 370C at shaker (170 rpm) conditions. Two isolates have demonstrated dye adsorption properties. The study of properties and quantification of antibiotics, pigments produced are under current research. The bioremediation properties w.r.t dye & chromium reduction of all isolates are under research. Further study into its capacity to fix N2, production of thermophilic & alkaline Proteases, amylases, cellulases, chitinases, identification of antibiotics produced & optimization studies is in process. Thus the abundance & potential of Actinomycetes diversity on our globe can prove economic and contribute to sustainable development of mankind.

Keywords. Actinomycetes, CSA, pH, enzymes, antibiotic, bioremediation, pigment

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[PD-21] Diversity of aquatic fungi from river Mula, Pune city

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The present study deals with the fungal flora from river Mula from Pune city from selected sampling stations isolated during October 2007 to September 2008. Total 64 fungal species belonging 42 genera of hyphomycetes,

zygomycetes, oomycetes, ascomycetes were isolated from selected sampling stations. The fungal genera found in the study area; *Aspergillus, Mucor, Fusarium, Penicillium, Curvularia, Trichoderma, Alternaria, Acremonium, Paecilomyces, Cunninghamella, Rhizopus, Cephaliophora, Monilia, Aphanomyces, Thraustotheca, Chaetomium, Achlya, Scopularopsis, Sporothrix, Populospora etc.* Maximum number of fungi was recorded during monsoon season, while minimum number of fungi was observed during summer and winter season. It was observed that the quality of water influence to the diversity of fungi from river Mula. There was less number of fungi at station II and III which was polluted due to domestic and industrial waste. The results showed that the diversity and the number of individuals were lower in the more polluted station as compared to non polluted station. *Aspergillus terrus, A. niger, Thraustotheca sp., Cunninghamella sp.* and Rhizopus sp. are the most tolerant and could be regarded as pollution tolerant fungus and be used as a biological indicator for water pollution. These studies indicate that, the fungal species are specific to the environmental quality and therefore can be used as agent in bioremediation.

Keywords. Aquatic fungi, Mula river, physico-chemical parameters, water pollution.

[PD-22] Occurrence of AM fungi associated with xerophytes from Ghodnadi area of Pune district

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An attempt has been made to survey biodiversity of arbuscular mycorrhizal (AM) fungi associated with five xerophytes from Ghodnadi area Dist. Pune, Maharashtra. The xerophytes surveyed were Argemon Mexican, Linn., Aristolochia bracteata, Rrtz., *Chlorophytum tuberosum, Baker., Scilla indica, Baker., Tribulus terestris, Linn.*, Soil samples and roots of these plants were collected from four different localities. Five genera with twenty one species were reported from Ghodnadi area. The genus Glomus was dominant with 13 species. It was followed by Acaulospora with 4 species, two species of *Scutellospora* were reported. Whereas one species each of *Gigaspora* and *Sclerocystis* was reported from above area. The maximum number of AM propagules per 100 gm soil was 1980 and minimum was 4 per 100 gm soil. The percentage root infection was ranging between zero and 90 percent.

Keywords. AM fungi, xerophytes, Ghodnadi area.

[PD-23] Biodiversity of marine fungi from the Union Territory of Pondicherry

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Marine fungi is a heterogeneous assemblage of of species growing in intertidal marine habitats. They appear to be cosmopolitan in distribution and are abundant in the coastal eusturian and in vicinity of Mangrove vegetation. They are collected on intertidal wood and submerged part of the Mangroves and foam samples along the sandy beaches.

The present studies reveals total 42 different species of the marine fungi that includes 26 species from Ascomycotina (65 %), 2 species from Basidiomycotina (3 %), and 14 species from Deuteromycotina (32 %).

Arenariomyces majusculus Kohim et Volkm- Kohim, *Arenariomyces purvulus* Koch, *Arenariomyces trifurcates* Hohnk, *Corolospora* angusta, *Corolospora Nakagiri, Corolospora cinnamimea, Corolospora calossa, Corolospora intermedia, Corolospora meritima Corolospora quinqueseptata* are the most abundant and new record from the region of Pondicherry.

Keywords. Marine fungi, Pondicherry, *Corollospora, Arenariomyces*

[PD-24] Fungal biodiversity in association with some legume seeds

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Seed samples of five different legumes were screened for ectophytic and endophytic fungi .Qualitative and quantitative estimation of fungi associated with these seed samples collected from different localities was carried out .In the present investigation 10 genera and 25 species were recorded . maximum spore count observed in *Glycin max* where as minimum in *Phaseolus mungo*. It was also observed that endophytic and ectophytic fungi reduced the percentage of germination and caused seed rot seedling rot in these and pulses.

Keywords. Ectophytic, endophytic, fungi, biodiversity

[PD-25] Marine fungi from Kerala coast (India)

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The present paper deals with the marine fungi from Kerala coast (the Arabian Sea). The dead and decayed samples of mangroves plants, intertidal wood, drift wood and submerged wood collected and examined for the colonization of marine fungi. Nine species of higher marine fungi (Six Ascomycetes and three mitosporic fungi) were isolated and identified. Among 9 species, two species from Ascomycota viz, *Acrocordiopsis patilii* Borse & Hyde, *Trematosphaeria mangrovei* Kohlmeyer, and two species from Mitosporic fungi viz, *Bacterodesmium linderi* (Shearer & Crane) Palm & Stewart and *Cerrenalia psuedomacrocephala* Kohlmeyer are new records for Kerala coast.

Keywords. Ascomycetes, mangrove, mitosporic, marine, fungi, Kerala

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[PD-26] The genus Physarum Pers from the North Eastern ranges of Western Ghat

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The genus *Physarum pers.* is largest genus of the Myxomycetes, constitute 100 species from the world over. Up till now about 61 species have been described from Indian flora mostly from Assam, Chandigarh, Himachal Pradesh, and West. Bengal. From the Indian flora the genus was reported for the first time by G. Lister in 1924.from the state of Maharashtra the genus was remained unrecorded until Patil &Ranade(1977), who described the typical form of *P. pussilum* (Berk& curt.)Lister. Recently Nanir & Balkhannde reported two species from the region of the Maharashtra. In the present paper *Physarum leucopheum* Fries and *Physarum megalosporum* Macbr.have been recorded first time and constitute new report to the Indian myxomycetes.

Keywords. Fungi, Myxomycetes, *Physarum*

[PD-27] Diversity of Hyphomycetous fungi in different soils around Aurangabad

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Biodiversity of fungi is an important aspect to be dealt with utmost scientific accuracy. One third of fungal diversity of the global exists in India. Only a fraction of total fungal wealth has been subjected to scientific study and there is a need to explore this hidden wealth.The present study aims at exploring the below ground fungal diversity with special reference to Hyphomycetes. Above 100 species belonging to 32 genera of Hyphomycetes have been isolated and identified from different soils around Aurangabad. A few new species of Hyphomycetes have been identified which are new records for the region while some are new to India.

Species of *Aspergillus, Penicillium, Cladosporium, Trichoderma, Alternaria, Fusarium, Curvularia, Paecilomyes* were found abundantly in all soil samples.

A few rare and interesting genera found were *Auriobasidium, Candida, Cylindrocarpon, Cephalosporium, Epicoccum, Emmonsia, Gilmaniella, Gliocladuim, Gloeosporium, Gliomastix, Gliocephalis Goniobotrium, Humicola, Nigrospora, Periconia, Papulospora, Staphylotrichum, Thermomyces, Stachybotrys & Verticillium.*

Keywords. Hyphomycetous fungi, Aurangabad

[PD-28] Diversity of aerospores in the sunflower field at Beed district

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Aerobiology is deal with the science which provide information from various discipline like ecology, mycology, plant pathology, palynology, bio-chemistry immunology and clinical medicine.

Aerobiology conducted by keeping Tilak Air Sampler in the Sunflower field at Rajuri (N), Dist. Beed, Nearly 4 acres of land has under Sunflower cultivation in the season mentioned.

The studies were conducted over the hybrid sunflower (Mahyco) fields for two winter and two summer season. The air sampling over sunflower fields was started one week before the sowing date and continued for one week after the harvesting of the crop.

During the period of investigation, daily records of temperature, relative humidity, wind velocity and rainfall were obtained from Water and Land Management Institute (WALMI) Aurangabad.

It is evident from the observed total airspora types that 39 belongs to the group Deuteromycotina, 4 to Basidiomycotina, 23 Ascomycotina, 3 to Zygomycotina and other types. During the two winter season Deuteromycotina is contributed with the highest percentage.

While in the Summer season, airspora types group contributed the lower percentage as compared to the Winter season as higher temperature, low humidity, average wind velocity and no rainfall.

Keywords. Sunflower field, diseases, meteorological data

[PD-29] Vesicular arbuscular mycorrhizal association in some medicinal plants of Parner region of Ahmednagar district

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VAM association of medicinal plants from Parner region of Ahmednagar district was examined. 110 medicinal plants were investigated vesicular arbuscular mycorrhizal association in a survey. Vesicular arbuscular mycorrhiza was found to be of universal occurrence in all plants located at different habitats. Species of medicinal plants examined were colonized by VAM fungi having colonization levels ranging from 28% to 78% of the root length. The spore numbers in the soils ranged in between 26 to 68 spores/50 g soil. Great variations were found in the VAM infection percentage, spore number and the extent of hyphal infection.

Keywords. VAM colonization, vesicular arbuscular mycorrhizae, medicinal plants, Parner region

[PD-30] Assessing genetic diversity of *Alternaria alternata* isolates of Indian origin using inter simple sequence repeat markers

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The objective of this study was to investigate the genetic relationship using ISSR markers, among 20 isolates of Alternaria *alternata*. Nine ISSR primers were used for the analysis yielding 87 loci, of which 86 (98%) were polymorphic. The average number of amplified and polymorphic loci per primer was 9.6 and 9.5 respectively. The range of polymorphic information content (PIC) scores per primer was 0.09 - 0.5, with an average of 0.35. A high level of genetic differentiation among isolates was detected based on Nei's genetic diversity analysis (32%) and Shannon's diversity index (48%). The Jaccard's similarity coefficient among the isolates ranged from 0.14 to 0.87. A dendrogram was generated by the Unweighted Pair Group Method with Arithmetic Mean (UPGMA), wherein twelve *Alternaria* isolates were grouped in two clusters while eight remained un-clustered. Two isolates of *Curvularia* were used as out-group. First cluster includes isolates from south India as well as Nagpur area while cluster 2 includes isolates from Vidarbha province of Maharashtra. Interestingly, the Mehkar, Kalamb and Amravati isolates from Vidarbha area did not group with either of these clusters indicating diverse nature of these isolates. The present study suggested that the ISSR markers can be used for the genetic diversity studies of *Alternaria alternata*. However, larger sample size including more isolates from each hotspot region and from various geographic regions of India need to be analysed to have better insight in to the diversity existing in this pathogen of flax.

Keywords. Genetic diversity, *Alternaria*, ISSR marker, linseed

[PD-31] Mycological studies on diversity of *Fusarium* species occurring on cereals produced in Karnataka, India

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The contamination of agricultural commodities with fungi is often unavoidable and of worldwide concern. Of the fungi involved, species of *Fusarium* are the most common fungi associated with cereals in world. The *Fusarium* spp. is one of the most economically important groups of fungi causing disease on a wide variety of plants and plant derived products. Cereal samples such as maize, sorghum, barely, wheat, paddy and bajra samples collected from different districts of Karnataka state during the year 2010. All the samples were analyzed for diversity of Fusarium species by direct plating method on MGA 2.5 agar medium. The fungal colonies expressed on grains were visualized using stereo-binocular microscope. Representative isolates of *Fusarium* species were transferred onto Potato Dextrose Agar to study the macro and micro morphological characteristics. All the isolates of *Fusarium* species were identified up to the species level by using fungal keys. The study revealed the occurrence of seven diverse species of *Fusarium*

in maize and sorghum samples collected from different districts of Karnataka. The species identified were *F. oxysporum, F. verticellioides, F. graminarium, F. sporotrichioides, F. poae, F. cerealis and F. anthophilum* respectively. The data on the diversity of Fusarium species would be of great significance for predicting the extent of post-harvest deterioration and subsequent accumulation of toxins in cereals produced in Karnataka, India.

Keywords. *Fusarium*, Karnataka, post-harvest deterioration

[PD-32] Fungal biodiversity in seeds of some cereals of Nashik district, their pathogenicity and control measure

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Twenty seven fungal species were found associated with seeds of six cereals. Maximum fungi were reported from seeds of *Pennisetum typhoides* and *Sorghum vulgare.*

Aspergillus flavus, Fusarium moniliformae and *Fusarium oxysporum* were found pathogenic causing seed rot, seed discolourations and germination inhibition. Captan and Dithane M-45 proved best for cereals dressing.

Keywords. Cereals, *Pennisetum typhoides, Sorghum vulgare, Aspergillus flavus, Fusarium moniliformae*

[PD-33] Studies on BT cotton (*Gossypium hirsutum*, L.) with reference to AM fungi

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The survey of Arbuscular Mycorrhizal fungi from rhizosphere and non-rhizosphere soil of cotton (*Gossypium hirsutum*, L.) from ten different localities of Yeola taluka, Nashik district of Maharashtra was carried out. The maximum number of AM propagules (1580 per 100 g of soil) and highest root infection (95 %) was reported from Bharam locality and minimum number of AM propagules (82 per 100 g of soil) and lowest root infection (50 %) was reported from Patoda locality. The number of AM propagules per 100 g soil reported from other two localities Saigaon and Mukhed was 1278 and 1124 and the percentage root infection was 92% and 93% respectively. The other localities, Golhewadi, Kotamgaon, Mukhed, Kusur, and Gawandgaon showed intermediate results. Three genera with forty one species were isolated from rhizosphere and non-rhizosphere soil of cotton. The genus *Glomus* was dominant with twenty two species. The other genera reported were *Acaulospora* with seven species and *Scutellospora* with twelve species. The number of AM propagules was more in the rhizosphere soil than non-rhizosphere soil.

Keywords. Arbuscular mycorrhizal fungi; diversity; *Gossypium hirsutum*, L.; rhizosphere; non-rhizosphere; cotton

[PD-34] The identity of the lichens *Siphula himalayensis* and *Lecanora teretiusculaf*

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The lichens *Siphula himalayensis* (Rasanen) Kantvilas and *Lecanora teretiuscula* Zahlbr., both recorded from the southeastern Himalayas and adjacent Tibetan rejoins, are regarded as conspecific with the widespread Arctic-alpine species *Lecanora geophila* (Th.Fr.) Poelt. The chemical constituents of this lichen include usnic acid, zeorin, traces of ethylplacodiolic acid, some fatty acids and, frequently in Asian specimens, prophyrilic acid. The development of a fruticose habit by normally crustose genera and species growing under extreme environmental conditions is discussed briefly. The lichen *Siphula ceratites* var.

Keywords. Taxonomy, lichenized Ascomycetes, *Lecanora geophila*, Tibet, Himalayas, lichen chemistry

[PD-35] Moss biodiversity of Kodaikanal in the Southern Western Ghats

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Mosses are highly developed groups of Bryophytes having a unique position between lower cryptogams and vascular cryptogams.

Kodaikanal is a beautiful hillstation in the Southern Western Ghats admist the Palani hills in Tamilnadu,India.

About two decades ago,mosses were abundant and growing luxioursely in Kodaikanal.The abundance of mosses revels unpolluted environment and is indicator of forest condition.

However the area has undergone through tremendous physiognomic changes.So a survey was carried out to study the existing moss diversity of Kodaikanal.The mosses were collected and identified from various locations in Kodaikanal such as Tiger Shola Falls,Chettiyar garden,

Bryant Park,Pillar rocks,Silver Cascade Falls,Kodaikanal Lake,Dolphins Nose Point etc.

A total number of forty four species of mosses were recorded.The present paper highlights their diversity,ecological habitats along with their growth form patterns.

Keywords. Mosses, diversity, Kodaikanal

[PD-36] Seasonal variations in the micronutrient of some pteridophytes in Lonavala area

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Analysis of micronutrients was carried out perodically i.e from the mouth of August to sept from the pteridophytes

growing in Lonavala area. It has been found that magnesium content was marimum followed by zinc, iron, magnese and copper. The maganese content was reduced in all the species exept in Nephrolepis and pleopeltis copper content also has been remarkably reduced in all the species whereas iron content was highest in pleopltis followed by zinc.

The micronutritents like Md, Mn, Cu, Fe and Zn were analysed by AAS from the month of August to October and it has been found that Magnesium content was maximum followed by zinc, iron, Magnesium and copper. There has been a decline in Mg content from Aug to Sept in all the sp. Mn also has declined in all the sp. except in ferns and pleopells Remarkable inCu content in all the sp has been observer. Iron content was highest in pleopeltis followed by zinc.

Keywords. Micronutrients, pteridophytes

[PD-37] Assessment of genetic diversity amongst *Jatropha curcus* L. using EST-SSR markers

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The assessment of diversity of ten accessions of different ecoclimatic zones of Maharashtra was carried out using EST-SSR markers in Biotechnology Department of Biotechnology, Modern College, Shivajinagar, and Pune-05.

The EST-SSR markers used were trinucleoitde repeats from cassava (Manihot esculenta) of Euphorbiceae family. The sizes of amplicons for EST-SSR markers range from 120-600 bps. The markers generated 12 alleles out of which 80% were polymorphic.

Keywords. Jatropha curcus, EST-SSR markers

[PD-38] Legume diversity in Shrigonda taluka of Ahmednagar district, (M.S.), India

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Regional plant studies are very important. It can be acheived by intensive exploration of smaller areas.This gives information about floral diversity of plant species and contribute in the exploration in regional floras. The location of Shrigonda taluka is 180. 27' North to 180 .54' North latitude and 740. 23' East to 740. 56' East longitude with an elevation of about 630 meters above the mean sea level. It has occupied an area of 1599 square Km..The vegetation of the study area is of dry deciduous type and most of the species exhibit xeromorphy. The irrigation facilty is made by Kukadi and Ghod dam canals, wells and bore wells made for agriculture.

The family leguminosae is economically important for protein richness diet and symbiotically associated nitrogen fixer bacteria. It comprises three sub families as Fabaceae,Caesalpiniaceae and Mimoceae.The present paper gives an account of total 48 genera and 63 wild and cultivated species of legumes.The subfamily Fabaceae comprised 26 genera and 34 species,Caesalpiniaceae comprised 7 genera and 16species, and Mimoceae comprised 7 genera and 13 species species.They were explored by frequent visits to locality selected observations made and interviewing of native people in this area. The economically important legume plants in this area were used as food , fodder, timber, fuel,edible fruits,medicine and to increase soil fertility by crop rotation method species were documented.

Keywords. Legume, Shrigonda

[PD-39] Leaf morphological diversity and its relationship among some plant families

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Leaf morphological study is important in order to understand the diversity existed among the different plants and their families. Leaf morphological diversity among ninety angiospermic trees belonging to 31 plant families were studied by using different morphological characters. All the 90 specimens were collected from western ghat region of the Nashik division. Morphological diversity of leaves were studied by using 14 important leaf characters viz. bearing of leaves, leaf phyllotaxy, leaf length, leaf angle, stipules and their types, leaf attachment, leaf shape, leaf venation and surface and texture of leaf and 71 binary characters. Relationships among them were analyzed by similarity matrix and cluster analysis by following SPSS (Version 9.0) statistical analysis software. A dendrogram of 90 specimens was constructed by Hierarchial cluster analysis using between groups linkage cluster method with Square Euclidean Distance Interval. The 90 specimens were clustered into 16 main groups with similarity matrix ranging from 0.004-1.00. The highest similarity (1.0%) was observed between specimen 54 with 75, 7 with 24, and

86 with 30. Very less similarity (>0.050%) was appeared between specimens 15 with 17 (0.039%) and 19(0.028%), 78 with 5(0.013%) and 26 with 76(0.0004%).

Obtained results from the dendrogram showed that leaves from plants belonging to same family shows variation, while leaves from plants belonging to different families showed resemblances in their morphological characters. It is interesting to note that leaf specimens from the same family rarely comes together in one group, while leaves from different families shows maximum resemblances. This concludes existence of morphological relationship between the leaves of the plants from different families.

Keywords. Leaf morphological variation, diversity, cluster analysis

[PD-40] Biodiversity of some common Poaceae (Gramineae) members of Amravati (Maharashtra)

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The family Poaceae (Gramineae) is one of the largest and most diverse in plan kingdom and certainly one of the most important. It is most widely distributed family of the world. Taxonomically Poaceae is a very difficult group of plants and hence often neglected from floristic studies. In the present study they are identified on basis of life span, habit, growth form, indumentums type, details regarding leaf sheath, lamina, ligule, etc. Inflorescence and floral parts displayed great diversity and used for separating tribes, sub-tribes, groups, genera and species, which seems perfectly logical. The characters of panicles, spike, spikelet, pedicels, rachis, palea, awn, lodicules, stamens, styles are of diverse type and found useful in identification. Several grass species were collected from July 2009 to March 2010 from diverse habitats of Amravati like Campus of Vidarbha Institute of Science and Humanities, S.G.B. Amravati University Campus, play grounds, city area, grasslands, cultivated fields, Chatri and Wadali lakes and the neighbouring hills. The total number of species occurring at this place appears to be more than 60. However only 21 like *Eragrostis japonica* (Thunb.) Trin., *Dactyloctenium aegyptium* (L.)Willd., *Sporobolus indicus* (L.) R. Br. Willd., *Cynodon dactylon* (Linn.) Pers., *Chloris virgata* Sw., *Aristida adscencionis* Linn., *Digitaria ciliaris* (Retz.) Koel., *Paspalidium flavidum* (Retz.) *A. Camus, Setaria pumila* (Poir.) R. and S., *Sehima nervosum* Stapf., *Iseilema laxum* Hack., Themeda laxa Stapf. etc. are found more common and hence selected for detailed study, along with 6 cultivated graminaceous crop plants of which systematic descriptions, and the data regarding their habitat, phenology, specific association, relative abundance, local names etc. were recorded. The species studied found belonging to 9 tribes like Hordeae, Eragrosteae, Sporoboleae, Chlorideae, Stipeae, Oryzeae, Paniceae, Andropogoneae, Maydeae and majority are from Paniceae and Andropogoneae of sub-family Panicoideae.

Keywords. Poaceae, Amravati

[PD-41] Assessment of floristic diversity of Daund tahsil from Pune district (Maharashtra)

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The regional floristic studies are very important and it can be achieved by exploration of smaller areas. This is useful in the revision of existing flora. In present paper assessment of floristic diversity of Daund Tahsil is highlighted. Daund Tahsil lies in Pune district. This region extent from 18o18' to 18 o 41' North latitude and 74 o 07' to 74 o 51' East longitude, covering and area of 1290 sq. km. This region experience semi-arid climate.

Taxonomic analysis of flowering plants shows that the area is occupied by 730 species belonging to 499 genera under 125 families. Out of 730 species, 580 species are distributed among 387 genera and 100 families belonging to dicotyledonous. While 150 species are included under 112 genera of 25 families belongs to monocotyledonous. The ratio of the monocotyledonous to dicotyledonous species is 1 : 3.86, genera 1 : 3.45 and that of families is 1 : 4. The family namely poaceae, Fabaceae and Asteraceae are dominant families in this region.

Keywords. Floristic diversity, Daund Tahsil

[PD-42] Genetic diversity in cowpea [*Vigna unguiculata* (L.)Walp.]

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Cowpea [*Vigna unguiculata* (L.) Walp.] originated in Africa and is widely grown in Africa ,Latin America, Southeast Asia and in the Southern United states .Cowpea is an important annual crop in tropical and subtropical regions worldwide especially in Sub-Saharan Africa, Asia and central and south America. Cowpea [*Vigna unguiculata* var. Spontanea is wild variety which is progenitor of cultivated Cowpea (Pasquet 1999) There are five cultivar groups of cultivated Cowpea based on pod and seed characteristics these are Unguiculata, Melanophthalmus, Sesquipedialis, Biflora and Textitis(Purseglove 1966, Pasquet1998). Cowpea (2n=2x=22) is an important grain legume used as vegetable and fodder crop in many tropical and subtropical countries.

During domestication the Cowpea gene pool may be narrow because of genetic bottleneck .Genetic variation within specific breeding programmes may be further restricted due to breeding methods, 'founder effects' and limited exchange of germplasm between breeding programs. As wild Cowpeas only exists in Africa and Madagascar Cowpea is presumed to have evolved in Africa (Steele 1976).Although the centre of diversity of wild *Vigna sps.*is in southeastern Africa (Padulosi and Ng 1997),west Africa is a major centre of diversity of cultivated Cowpea (Faris 1965 ,Padulosi and Ng 1998).The use of induced mutation had long been recognized as a rapid source of producing genetic variability in crop(Harris 1979).Presents phenotypical variability and in order to study the genetic diversity of cultivated Senegalese varieties, two experimental approaches were used first a physiological characterization based on nitrogen fixation was used to assess Cowpea breeding lines and second genetic characterization based on DNA polymorphism

to screen . Twenty landraces of Cowpea scattered throughout Algeria were compared morphological and genetic characterization. By using 11 random amplified polymorphic DNA (RAPD) and 12 inter simple sequence repeat (ISSR) genetic diversity was analyzed.

Cowpea [*Vigna unguiculata* (L.) Walp.] var.Phule Pandhari(PCP 9708) was selected for induction of mutation, the seed material was treated with EMS, Gamma rays and combination of EMS and Gamma rays. The present investigation was planned for 4 generations. In present work M1 biological parameters, chlorophyll mutants and macromutations were studied in all 4 generations. The result obtained was quite satisfied.

Keywords. Cowpea, genetic diversity, phenotypic variability

[PD-43] Yield characteristics, conservation, genetic diversity in french bean (*Phaseolus vulgaris* Linn)

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French bean (*Phaseolus vulgaris* Linn.) belongs to Family Fabaceae. It is widely cultivated in temperate and semi-tropical region. French bean is tropical legumes that diverged from temperate legumes 3555 million years ago in the Tertiary period (Doyle and Lockow2003). It presents a great diversity of phenotypes regarding seed size, colour and compositions, reflecting the great genetic diversity within the species (Papa et al 2005; Goncalves Ceolin et al., 2007).

Genus *Phaseolus* of the50 described *Phaseolus* species five *(P.vulgaris, P.lunatus,P. coccineus, P. acutifolius, P. polyanthus)* are grown for humans consumption; of these P. *vulgaris* Linn. is most cultivated worldwide, accounting for 75% of the food legumes traded in the world (Broughten et al.,2003). The natural occurrence of *P.vulgaris* Linn. range from Mexico to Argentina, across tropical and sub tropical regions of the America (Debouck et al., 1987).

French bean genomes has an estimated size of 650 millions base pairs (Mb) per haploid genome; distributed among 11 chromosomes (Arumuganatham and Earle, 1991).Garci et al (1997) found that correlations among morphological and agronomical traits were lower in domesticated bean than in a wide population, suggesting the domestication process has changed the genetic structure of the species.

French bean *(Phaseolus vulgaris Linn.)* the enhance induced variability in quantitative characters was recorded in M1 to M4 generations for the present studied in different mutagens treatments. The mutagens used in present investigation and it proved successfully developing the genetic base to an appreciable extent. This can help improve the chance for further effective selection in mutation breeding studies. The primary purpose of mutation breeding is to increase genetic variability available to the plant breeder.

Keywords. French bean, genetic diversity

[PD-44] Genetic diversity in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub.)

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Fabaceae is the third largest flowering plant family after Orchidaceae and Asteraceae (Compositae). Family has 727 genera and 19323 species. Fabaceae is distributed into three subfamilies with e\unequal distribution of genus and species namely Papilionoideae (476 genera and about 14000 species), Cesalpinoideae (162 genera and about 3000 species), Mimosoideae (77 genera and approximately 3000 species).

Cyamopsis DC (Candolle,1925) tribe, *Indigofereae* (Leguminoseae) is very small genus with 4 species which are errect annuals. They are *C. tetragonoloba, C. dentata, C. senegalensis, C. serrata. The species C. dentata, C. senegalensis, C. serrata* are belive to be originated in Africa because of their extensive and wide range on the Continent. The origin of *C. tetragonoloba* is not exactely known and it is not reported in wild state also. *Cyamopsis tetragonoloba* (L.) Taub. Syn Cymopsis psoraliodes DC commonely known as Cluster bean or Guar. It is thought that Cluster bean is introduced to Asia via South India by Arab Traders. *C. tetragonoloba* is only domesticated as compare to another 3 species.

Cymopsis tetragonoloba (L.) Taub, variety P.N.B. has been selected for induced mutation. In the present investigation the seed material were treated with EMS, Gamma rays and combination both EMS and Gamma rays at different conc/doses. The research work was planed for 4 generations. The data obtained on M1 biological parameters, chlorophyll mutants and viable mutants. The results are quite satisfied to obtain the ideal genotypes.

Guar or Cluster bean (*Cyamopsis tetragonoloba* (L.) Taub.) (2n=14) is multipurpose legume. The importance of legume has been highely appreciated as a source of guar gum. It is also used as vegetable , fodder, green manure. The work of hybridization and induced mutagenesis on the inheritance of various phenotypical traits on Guar has been studied by many plant breeders. In future induced mutation is very important tool in plant science to generate more desirable genetic variation for the traits of economical and biochemical importance.

Keywords : Genetic diversity, mutagenesis, cluster bean

[PD-45] *Ex-situ* conservation of *Dianthus caryophyllus*

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Dianthus caryophyllus. L is one of the most important floriculture crops in the world commonly known as Carnation. It has an important share in flower market in terms of high number of stems sold worldwide. Dianthus caryophyllus shows the presence of Antiviral Protein. This antiviral protein is capable of depurinating HIV-I RNA and inhibiting HIV-I replication in human peripheral blood nuclear cell. It also shows inhibition of protein synthesis in HEp 2 cells infected with Herpes simplex virus I (HSV-I) or polio virus. As the name suggests it has antiviral properties it has been exploited to engineer resistance to plant DNA virus for e.g. *Tobacco Mosaic Virus in Nicotiana. glutinosa and African Cassava Virus in N. benthamiania.* Considering the medicinal importance of this plant, Effort has been

made to establish high regeneration protocol by direct and indirect organogenesis and the *in-vitro* cultures have been checked for the presence of antiviral protein.

Keywords. *Ex-situ* conservation, *Dianthus caryophyllus*

[PD-46] Induction of shoot and callus in *Stevia rebaudiana* var Bertoni by *in vitro* culture technique

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The effect of different plant growth regulators on explants was studied by In vitro culture technique in *Stevia rebaudiana* var Bertoni, an important medicinal, zero-calorie value, sweet tasting and antidiabetic herb. For effective shoot initiation, nodal segments were cultured on Murashige and Skoog's (MS) medium supplemented with varying plant growth regulator combinations. The control was compared with the medium supplemented with different concentrations of NAA and BAP for shoot induction and 2, 4-D and IAA for callus induction. The best results were obtained from MS medium supplemented with BAP and NAA at the concentrations of 2.0 mg/l and 0.5 mg/l respectively for shoot initiation and 2.5mg/l and 1.5 mg/l 2,4-D and IAA for callus induction. Further study on development of plantlets *in vitro* and their hardening are in progress.

Keywords. *Stevia rebaudiana,* MS medium

[PD-47] Macro and micro propagation of Jatropha curcas L.: A biodiesel plant

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Greenhouse gas (GHG) is the major cause of global climate change. Deforestation accounts over 20% of the world's GHG emission. *Jatropha curcas* L. (Euphorbeaceae) is an important biofuel plant,which has attracted the attention of the world in the last few years. It is capable of growing on degraded land. It provides biodiesel of high quality. *Jatropha* is distributed throughout the country. In order to develop the technique of propagation of elite plant material, experiments were carried out to observe the effect of lengths of cutting, concentration of rooting hormone, suitable substratum and to develop protocol for micropropagation. It was observed that 20-25 cm long stem cuttings with minimum two axillary buds show highest sprouting of shoots, while IAA + IBA(100mg/l each) was better growth hormone for the development of root system. sand, soil and vermicompost (1:2:1) was the suitable substratum for micropropagation this biodiesel plant was micro propagated using nodal explants on MS medium supplemented with BAP (1.5 mg/l), kinetin (0.5 mg/l) and IAA(0.1Mg/l).

Keywords. *Jatropha curcas* L., length of cutting, rooting hormone, substratum, micropropagation

[PD-48] Exploring metabolome of medicinally important plant Chonemorpha fragrans

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Chonemorpha fragrans (Moon), Alston. is an unexplored medicinal plant belonging to Western Ghats. It is included in the Red data book. The plant is commonly used in Kerala ayurvedic system for fever and stomach disordes. Metabolic profiling of ethanolic plant extract was carried out to study various chemical constituent. This analysis of metabolome will give us an idea about the pharmacologically important constituents which can help us in exploring different Ex Situ conservation methods.

Keywords. Metabolome, *Chonemorpha fragrans*

[PD-49] Seed germination studies in *Chonemorpha grandiflora*, an endangered medicinal plant

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Chonemorpha grandiflora (Roth) M.R. and S.M. Almeida syn *C. fragrans* (Apocynaceae) has been included in the list of an endangered medicinal plant. Low seed viability and low *germination* rate curtail propagation in C. grandiflora. 100% seed germination was obtained *in vivo* and *in vitro*. MS medium supplemented with BAP and NAA had a positive effect on *in vitro* seedling growth. Entire plantlets *in vitro* were raised using seedling nodal sectors. IBA was found to be the most suitable for root induction. Entire plantlets raised *in vitro* were hardened and showed 70% survival. This would help in conservation of *Chonemorpha grandiflora*

Keywords. Apocynaceae, *Chonemorpha grandiflora*, in *vitro*, in *vivo*, seed germination

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[PD-50] *In vitro* studies in *Momordica charantia* L

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Momordica charantia or Bitter Melon, also known as balsam pear or Karela, is a tropical vegetable, and has been used extensively in folk medicines. The fruit is considered as tonic, stomachic, stimulant, emetic, antibilous, laxative. Biologically active phytochemicals including triterpenes, proteins & steroids are known to occur in *Momordica charantia*. The phytochemicals have been shown to possess antiviral activity against numerous viruses. Antiprotozonal and antibacterial activity of the plants have been demonstrated. Thus *in vitro* cultures of this plant were raised. Hypocotyle, cotyledons, epicotyle & leaves were inoculated on MS medium in combination with BAP, NAA & 2,4-

D. Callus developed from cotyledon, epicotyle & leaf explants only on the medium supplemented with with 2,4-D. The regenerative ability of the callus from different explants was assessed & the chemical constitution is being studied.

Keywords. *Momordica charantia*, phytochemicals, *in vitro* cultures

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[PD-51] Somatic embryogenesis in strawberry (*Fragaria ananassa* Duch.)

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Strawberry, *Fragaria ananassa* is an important fruit of family Rosaceae. It is rich in vitamin c, sugars, organic acids, anthocyanin, phosphorus, iron, other minerals, etc. And its flavour is characterised as fruity, sweet and tart utilised in purees, juices, jams, preserves, wine, etc. Somatic embryogenesis in strawberry plant was induced from leaf explants by culturing on MS basal medium supplemented with BAP and 2,4-D. 0.5mg/l BAP conc. and at different conc. of 1mg/l, 2mg/l, 3mg/l, 4mg/l, 5mg/l of 2,4-D were studied. Among the combinations of the two hormones, the maximum growth of callus and the highest percentage response can be obtained from the combination 0.5 mgl-1 BAP+ 1.0 mgl-1 2,4-D. Reliable protocol for *invitro* propagation through somatic embryogenesis of most important Strawberry plant will be established.

Keywords. Somatic embryogenesis, *Fragaria ananassa*

[PD-52] *In-vitro* studies in *Cocculus hirsutus* (L) Diel: A medicinal plant

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Indiscriminate use of synthetic drugs and antibiotics has resulted in serious symptoms all over the world. The demand for plant-based raw materials for pharmaceuticals has increased enormously. Overexploitation leads to destruction of natural resources. Hence, the present investigation focused on developing a micropropagation protocol in *Cocculus hirsutus* (L) Diel., (Menispermaceae), a climber useful as anti-hyperglycemic, diuretic, aphrodisiac, expectorant, tonic, antipyretic, leprosy, hypertension, and acute rheumatism and veneral diseases. The explants were excised from naturally growing populations on the campus of University of Pune. Nodal sector explants were cultured on MS medium supplemented with BAP (0.0-3.0mg/l) and IAA (0.0-3.0mg/l) alone and in various combinations. The highest number (4.2 ± 0.19) of shoots per explant was produced on MS + 1.5mg/l BAP in combination with 1.0mg/l IAA, which was the most optimum combination. For root induction, *in-vitro* grown shoots were cultured on MS medium supplemented with IAA (0.0-3.0mg/l), MS + 1.0mg/l IAA resulted in a large proportion of rooted micro-shoots and early rooting. For callus induction, leaf explants were cultured on MS medium supplemented with NAA (0.0-3.0 mg/l) and 2,4-D (0.0-3.0 mg/l) alone and in various combinations. Maximum callus induction was reported at MS medium supplemented with 0.5 mg/l NAA + 2.0 mg/l 2,4-D.

Key words. *Cocculus hirsutus* (L) Diel., micropropagation, shooting hormones

[PD-53] Status and distribution of medicinal plants in Western Ghats, India

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In India, recent studies show that more than 10,000 plants species have been used by various communities for diverse medicinal purpose. The annual marketing if herbal medicine in this country has been estimated as worth about 270 million and exported crude drugs worth Rs. 145.00 Crores in 2005-2006. However there no organized cultivation for a large number of medicinal plants in our country and the collection is still made from wild, so the population of many of these species dwindling in a shocking way along with the traditional knowledge on folk medicines. M.S. Swaminathan Research Foundation, National Chemistry Laboratory, Botanical Survey of India is currently involved in the documentation and conservation of such knowledge widespread with the tribal and rural communities of Maharashtra, Kerala, Tamilnadu states. The result shows that many of medicinal species with unique usage and properties are getting rare or threatened in the wild due to various reasons., A case study from Warandha Ghat(Maharashtra highlighting those reasons for local endangerment of medicinal plants is discussed in this paper. The study recommends the needs for field verifications, evaluation and demonstration of medicinal plants involving local people for ensuring the long term conservation of valuable medicinal genetic wealth).

Keywords. Angiospermic plants, Warandha Ghat

[PD-54] Role of herbaria in study and conservation cf medicinal plants

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The present papers deals with the detailed information regarding all aspects of herbaria e.g. what is herbarium? It is only collection of dried plants specimens which are used as principle tool by the Taxonomists...? What are the types of herbaria available in India and abroad ..? And functions of these herbaria including its role in conservation of plants particularly medicinal ones. Herbarium is just like a conservatory of plants or living materials and a sort of data bank providing all necessary information from lower groups to the higher plants for teaching and research. And ideal herbarium sheet includes a good specimen with correct botanical and local name, if any of the plant along with its family, its extract location, information on habitat and habit, phonological data, frequency, flower colour, other important notes and uses if any. These specimens are accessioned and preserved in cupboards according to and accepted systems of classification for study by botanists, environments, conservationists, phytogeographers and for various other aspects including medicinal plants etc, Besides these studies on plant diversity, even loose duplicates specimens of the herbaria are useful and important source of correct material for modern taxonomical research in various branches of Botany viz, anatomy palynology, chemotaxonomy, embryology and cytology etc.

Good herbaria also act as one of the major for conservation by providing basic information on endemic , rare and threatened plants. There are c 17000 flowering plants of which c 5500 are endemic , c 2200 species are endangered. Out of c 2000 important medicinal plants c 500 plants are rare and c 50 species are threatened e.g. *Acacia hohenekeri, Aconitum spp., Arnebia benthami, Artemisia acuminate, Berberis aristata, Commiphora wightii, Dioscorea deltoidea,*

Nardostachs jatamansi, Podophyllum hexandrum, Rheum emodi, Saussurea spp., and *Valeriana wallichii* etc.

Usually an ideal herbarium is also having or connected with a Museum, Tissue culture laboratory and Botanical garden or arboretum which serve indirectly in *ex-situ* conservation of plants. Thus herbaria are very important conservatories for future studies for posterity. Hence every possible step should be taken for its proper preservation and maintenance (e.g. cleaning, poisoning, fumigation and careful handling of specimens etc,) to protect the valuable National heritage that our Biodiversity offers to us.

Keywords. Herbaria, *ex-situ* conservation

[PD-55] Medicinal plant survey of Karanjgaon, taluka Niphad, district Nashik

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The present investigation focuses on some medicinal plants of Karanjgaon village of Niphad tehsil belonging to Nashik district. The medicinal survey was carried out in the surrounding area of the karanjgaon, which is situated on the bank of Godavari River. Karanjgaon has got very rich plant diversity. A considerable number of medicinal plants found grown on the bank of river and surrounding area of the village. Though much development has been taken place in the allopathy, some rural people still relay on the local medicinal plants to cure many severe and common ailments like jaundice, tumour, skin diseases, tooth problems, fever, headache etc.

To study the medicinal plants during survey, many visits were given to selected site and local people to accumulate the information of medicinal plants and their traditional uses. In the present survey authors gathered information of at least 63 plants belonging to different families. The plants like *Aegle marmalos, Aloe vera, Calotropis procera, Catharanthus roseus, Lawsonia inermis, Sapindus emerginatus, Tribulus terrestris* etc were found in the survey and local people use these plants as their medicine. The plants were collected and identified by using the local flora. The each plant is studied with respect to its, Botanical name, local name, family, morphological characters, parts used in medicine and medicinal use. The plants are arranged by alphabetical order.

Keywords. Medicinal plants, Karanjgaon

[PD-56] Survey of medicinal plants used by local people of Newasa tehsil

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In India, most of the people, especially in rural areas use traditional medicine of plant origin, to treat various diseases. Even though modern medical facilities are available, people in villages still use phytotherapy to a considerable extent. The present paper deals with the documentation of the medicinal plants found in the rain fed eastern area of Ahmednagar district from Newasa Tehsil. The data was collected by extensive interactions with the local people of

the area through a structured questionnaire. Six common diseases like jaundice, asthma, arthritis, diabetes, eczema and dysentery were taken into consideration. The plants were grouped according to their medicinal uses for these diseases. About 35 species belonging to 24 families have been found useful in the said diseases. The paper includes botanical names, common names, local names, parts used, preparation and mode of administration of these plants. It has been seen that out of the plant parts used, the predominant part used is the leaf (48%) in various forms followed by fruit (17%) and root (14.2%). The majority of the remedies are employed by oral means, particularly in liquefied form. Literature survey indicates that these plants contain flavanoid, polyphenols and other active compounds, which show antioxidant properties. Hence, this information can prove to be useful for protection and conservation of the plants.

Keywords. Phytotherapy, medicinal plants, jaundice, arthritis, diabetes, dysentery, Newasa

[PD-57] Survey of some medicinal plant present in Durga tekdi, Nigdi, Pune (M.S.)

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Durga Tekdi which is commonly known as Appu Ghar is one of the famous family park of Pimpri Chinchawad area of Pune District. Many people visit this park for entertainment, to get fresh air and to enjoy with their family. The present investigation gives an account of some medicinal plants available in Durga Tekdi. Frequent visits were conducted to know diversity of medicinal plants. During this survey, total 23 plants belonging to 17 families with their botanical name, family and its medicinal values were described. As many people visit this place for personal enjoyment and during these activities various medicinally important plants are becoming threatened. The main objective of this investigation is to make awareness about availability of medicinal plant and to conserve the diversity of Durga Tekdi by providing these data to Garden Incharge of PCMC.

Keywords. Survey, Durga Tekdi, medicinal plants, conserve

[PD-58] Prospecting a herbal folk medicine: Phansomba

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Mankind, during his evolution has developed a good weapon against curing ailments, diseases and disorders. 'The traditional medicinal system,' as called, is comprised of variety of elements from the environment. Different civilization settled globally have focused mainly on plant parts and its products, hence called herbal drugs. Fungi have nowadays placed in a separate kingdom, but they were also included in these systems, specifically macro fungi are generally termed as 'Mushrooms'. 'King of the Herbs' or 'Herb of Immortality', is a mushroom *'Ganoderma'* (Reishi, Ling zhi Chinese, Mannentake - Japanese) no wonder captures the top position in Traditional Chinese Medicine. Although

Chinese, Japanese and other south eastern countries emphasizes in using mushroom in regular diet and medicine system, even in India people use mushrooms in diet and as medicine. Preparations are now available from *Phellinus linteus* herbal drug of Korea known as 'Sanghwang'.

This article is a case study of such a fungus, a mushroom, a folk medicine from Western Ghats of Maharashtra, known as *'Phansomba'*. The exploration of research carried out for more than a two decade and future voyage in exploiting the folk drug and steps in opening up the drug to world by commercializing it. The exploitation of *'Phansomba'* could be in the form of biomass, extracts or formulation with other known plant origin drug to enhance their activities. This may be looked as mycelium powder, extract, gel or cream preparation to cure ailment like diabetes, ulcers, cancer, wound healing, cosmetics, diet control in animal nutrition etc.

Keywords. *Phansomba*, herbal folk medicine

[PD-59] Herbal database management: a need in bioconservation of medicinal plants

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Herbal database management is one of the emerging trends nowadays. There are many agencies working on herbal database management. This system helps to overcome many adverse reactions of drugs and their interactions. The safety profile of an herbal is maintained in this database which is very useful for appropriate use of herbal medicine. Here, an attempt is done to enlist various herbal database management agencies and their applications toward the use of herbal drugs for the benefit of mankind.

Keywords. ADR, drug interactions, herbal databases, pharmacovigilance, safety profile traditional medicines

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[PD-60] Studies on the medicinal plants towards the health care management

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Plants have proved to be the best friend of man in alleviating his pains and sufferings by providing him with natural drug since the dawn of life on earth. The plants of medicinal value are in the study area in this paper. These plants have many medicinal properties that are conductive to health to secure the best result from the use of plants as remedial agenCies. An attempt has been made a field study of medicinal plants to identify, characterize and documents the local medicinal plants. plants name family, vernacular name parts used and mode of administration have been tabulated.

Keywords. Natural drugs, health care management

[PD-61] Role of medicinal and poisonous plants in biodiversity

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The medicinal and poisonous plants are used in Ayurvedic preparation. Thevetia neriifolia , used and act directly on the muscular system, especially upon the heart and blood vessels causing great constriction of the latter and distention of the longer arteries. Plant is deadly poisonous and can be used as suicidal purpose and poison for livestock.

Present study includes macroscopy, microscopy, Histopathology, phytochemical study and qualitative analysis has been carried out. It has more importance in biodiversity conservation as a poisonous plant.

Keywords. Biodiversity, medicinal and poisonous plants

[PD-62] Medicinal uses of plants used by tribes of Patalkot (District Chhindwara) M.P.

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Chhindwara district lies between latitude 21 to 22° North and longitude 78 and 79° East. It is located in south-west of Madhya Pradesh and is a well known tribal district. Patalkot valley is spread over an area of 79 Sq.Km. at an average height of 2750-3250 feet above Mean Sea Level lies between 22.24 to 22.29° North, 78.43 to 78.50° East. The place is located at a distance of 62 Km from the district headquarter in the North-West direction, and 23 Km from Tamia in North-East direction. People living in interior and inaccessible remote rural areas of Patalkot have excellent knowledge about medicinal utility of local flora for curing their various health disorders, due to low cost and sometimes it is a part of their social life and culture. The main tribe found in the area belongs to Bhariya and Gond. The most common medicinal plants of the region includes *Boerhavia diffusa, Tinospora cordifolia, Sida cordifolia, Phyllanthus niruri, Curculigo orchioides, Butea monosperma, Helicteres isora, Zingiber officinalis, Bauhinia variegata, Barberis asiatica, Eclipta alba* and *Vitex negundo* with their scientific name, family name, Hindi names, vernacular names, active ingredients and medicinal uses. A few decades back these herbs was very common in this region but due to commercial exploitation, the natural population is decreasing at an upsetting rate, some herbs has become almost wiped out in these parts.

Keywords. Chhindwara, Bhariya, Gond, medicinal plants

[PD-63] Wild medicinal plant resources of Jaunsar Bawar (Uttarakhand) and their conservation strategies

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Evolution of human life and culture has been closely associated and influenced by the surrounding environment. From time immemorial plants have been used by human being for their existence. The tribal people in India have age old knowledge system about plant wealth of their surroundings. Such type of knowledge has immense importance in the conservation of biological resources and advancement of modern sustainable technology. The Jaunsar Bawar region of Uttarakhand represents rich diversity of medicinal plants along with varied population of locales and tribals. The main tribal communities inhabiting the area are the Jaunsaries. Herbal medicines or traditional health care system has played major role in the societies of tribals and they still depend upon it for treatment of various ailments. They are the real custodians of the indigenous knowledge about various uses of medicinal plants. Therefore the proper documentation of such knowledge is important for proper conservation. These medicinal plants after phytochemical investigations could be used for future prospects. The paper deals with some important medicinal plants of Jaunsar-Bawar, used by the tribal communities for the treatment of various ailments. The present communication pertains to the medicinal uses of 60 plants belonging to 27 families of angiosperms. Some of the common medicinal plants of the area are *Achyranthes aspera, A. bidentata, Aconitum heterophyllum, Ainsliaea aptera, Amaranthus blitum, A. spinosus, Anemone obtusifolia, Barleria cristata, Bergenia ciliate, Carduus nutans,, Cissampelos pariera, Daphniphyllum himalayens,* etc whereas plants of rare utilization pattern includes *Celastrus paniculatus, Berginia ciliata, Colebrookia oppositifolia, Clinopodium umbrosum,* etc. These plant species require due attention for pharmacological investigation, future prospects and conservation strategies, in order to develop sustainable development. Conservation strategies have also been proposed for endangered plants of the region.

Keywords. Jaunsar Bawar, Jaunsaries, herbal medicines

[PD-64] Observations on some rare and threatened plants, Hoshangabad (M.P.)

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Hoshangabad district is located on the southern bank of river Narmada in Madhya Pradesh between, between 21o 53" to 22o 59"N and76o 47" to 78o 44" E. The adistrict has uneven topography with plain region in the north and hilly region in the south. The average height of the land is 331m from sea level with highest peak of 1434m at Dhoopgarh. Average annual rainfall is 1363.6mm supporting Tropical semideciduous forest. District has rich biodiversity; Pachmarhi biosphere reserve also is present here with many rare and threatened plants. More than 400 plants with ethno-medicinal importance are found in this region. The present paper focuses on the threaten plants found in this region like *Alsophila balakrishnanii, Ficus cupulata, Cythea gigntia, C. spinulosa, Psilotum nudum, Leptochielus lanceolatus, Actinopteris helferiana, Actinopteris radicata, Litsea sps.*, and 22 species of orchids found in this district. Paper reports the ecology, distribution and ethnobotanical significance. Some plants are endemic to the area.

Keywords. Rare and threatened plants, Hoshangabad

[PD-65] Ethanobotanical diversity of plants used by rural community of Darna region of Nashik district in Maharashtra

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An ethano botanical survey on medicinal plants and their indigenous uses was carried out in Darna region of Nashik District in Maharashtra. These areas are floristically rich areas where plants of various categories are growing spontaneously in their natural habitat. The rural community of these regions used some of the plants as medicine for the treatment of human ailments. In a floristic survey 31 ethno medicinal plants species belonging to 25 families were recorded from this region. These medicinal plants are listed in alphabetically order of Latin names, local names along with family & part used as medicine.

Keywords. Baidya, herbal medicines, Indigenous knowledge, Ojhas

[PD-66] Ethnobotanical study of some medicinal plants of Vindhyan region

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Medicinal plants play an important role in supporting health care system in India .According to World Health Organization (WHO) 80% of rural population in developing countries utilizes locally available medicinal plant for their primary health care needs. The site selected for the survey is Vindhyan region. About 6500 different species of medicinal plants are found in Vindhyan region .The climate is sub-tropical to dry. The main aim of our survey is to study different varieties of medicinal plants and to characterize them naturally. The information was collected from herbal healers and local ayurvedic vaidhyas residing in and nearby different selected area using semistructured interviews. On the basis of the survey and interview various important data and information are gathered involving traditional knowledge of herbal plants to the livelihood, environmental aspects, income generated by the local people from same medicinal plants. With the help of the above survey, we can easily demonstrate the bio-diversity of important medicinal plants. Along with the awareness of the need for bio-diversity conservation, conservation of medicinal plants in particular is one of the most burning issues. Through conservation, plants along with their varieties are preserved and protected from various environmental hazards, including those caused by human interference.

Keywords. Biodiversity, medicinal plant, Vindhyan region, ethnobotanical study, conservation

[PD-67] Conservation of some important medicinal plants of moist tropics

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This paper will show the ethnobotanical study and conservation of some medicinal plants which are present in different ecosystems of moist tropics of north-eastern Uttar Pradesh. These important medicinal plants are used to cure various diseases like headache, scabies, wounds, skin allergies, stomachache, scorpion bite, diarrhoea, leucoderma, asthma, jaundice, dysentery rheumatism, etc. These plants can be conserved in natural environment through study of soil seed bank. The viable seeds of plants which are present in soil under dormant condition are known as soil seed bank, so this study can help in conservation of medicinal plants. The seed bank estimation is done by seedling emergence method which is carried from June 2007 to December 2009. Total mean seed bank of all these medicinal plants are greatest in grassland and decreases in natural forest then in agro-ecosystem and plantation. These medicinal plants are *Achyranthes aspera, Ammania baccifera, Andrographis paniculata, Blepharis repens, Biophytum sensitivum, Centella asiatica Clitoria ternatea, Euphorbia hirta, Rauvolfia serpentine, Terminalia arjuna.* So we can predict that soil seed bank help to conserve these medicinal plants in their natural condition in situ at some extent.

Key words- Conservation, medicinal plants, ethnobotanical study, soil seed bank, moist tropics

[PD-68] Micropropagation of *Ophiorrhiza rugosa* var. Prostrata

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Ophiorrhiza rugosa var. prostrata is known for the production of Camptothecin (CPT) that is used against cancer cure. It is a rare herb and has got low seed viability and germination rate. Present study looks into Micropropagation of the species using leaf, internode, node, inflorescence stalk, flower and fruit as explants. Explants were inoculated on Murashige and Skoog (MS) medium supplemented with different plant growth regulators BA, Kinetin, 2, 4-D and NAA. Nodal segments inoculated on MS medium supplemented with BA and Kinetin showed callus formation in 15% explants within 25 days. Callus formation along with multiple shoots (25-30 shoots) was observed in 35% explants within 40 days. Inflorescence stalk showed callus formation and multiple shoots (40-45 shoots) on MS medium supplemented with BA and Kinetin. Further subculture on same medium showed multiple shoots. MS medium supplemented with 2, 4-D exhibited only callus formation in 30% explants.

Keywords. *O.rugosa var. prostrata,* camptothecin, micropropagation

[PD-69] Assessing the genetic diversity within flax genotypes using Inter Simple Sequence Repeat (ISSR) markers

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The 95 germplasmic resources provided by the Indian council of Agricultural Research (ICAR) were analyzed by Inter Simple Sequence Repeat (ISSR) markers. Total 100 ISSR primers were screened and 12 showed amplification whereas four showing reproducible amplification and polymorphism were used for further analysis. Total 31 bands were amplified and 21 of them were polymorphic accounting for 67.74%. The average number of amplified and polymorphic loci per primer was 7.75 and 5.25 respectively. Nei's gene diversity (H), Shannon's information index (I) and effective number of alleles (NE) were 0.24, 0.36 and 1.42 respectively. The range of polymorphism information content scores was 0.040.5, with an average of 0.24.The Jaccard's similarity coefficient among all the tested genotypes ranged from 0.53 to 0.96, averaging 0.85, which indicated that the genetic basis was relatively rich. A dendrogram was generated by the Unweighted Pair Group Method with Arithmetic Mean (UPGMA), wherein 87 genotypes grouped in 6 clusters while 8 were highly diverged and remained unclustered. Further, the genotypes were analyzed for 10 agronomically important phenotypic traits and correlated with the clusters obtained in the dendrogram. The unclusterd genotypes showed significant variation in the phenotypic traits analyzed. Based on the genetic diversity and phenotypic trait analysis, the flax germplasmic resources showed significant diversity. In conclusion, ISSR makers in combination with phenotypic markers can be used in marker-associated breeding programs for flax crop improvement.

Keywords. Linseed; Molecular markers; Diversity assessment; Phenotypic traits

[PD-70] 5'untranslated region diversity of desaturase genes in flax varieties

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Flax or linseed is a nutritionally significant crop due to the presence of high levels of ?-linolenic acid (ALA), which is an essential fatty acid and acts as a precursor for biologically active polyunsaturated fatty acids (PUFA). Two distinct flax types are known, fiber flax and oilseed flax. Predominantly, Indian flax varieties are oil type; but they differ in their total oil and the ALA content. Varieties like Padmini show very high ALA content (54%) as compared to Ayogi which shows ALA content of about 30%. The difference in the oil production can be attributed to the differential expression of deaturase genes ($\Delta 9$, $\Delta 12$ and $\Delta 15$) which are the key genes of lipid biosynthesis pathway. Our preliminary analysis shows that the genic sequences of these desaturases are almost identical amongst all varieties. It is known that the structural diversity within the promoter region of a gene may lead to differential expression of

the gene by various effector molecules. Identification of cis-acting sequences regulating differential gene expression, and factors that interact with these sequences will lead to reveal the mechanisms of desaturase gene regulation. Here, we present the diversity analysis in promoter region of desaturase genes in ten flax varieties differing in their ALA content. We have used MatInspector tool as well as TRANSFAC database for analyzing the promoter and for determining different transcription factor binding sites. We also have made an attempt to correlate the diversity in promoter region of desaturase gene with ALA content in these flax varieties.

Keywords. Desaturase genes, linseed

[PD-71] Floristic diversity of the Alagar hills of Madurai district, Southern Eastern Ghats of Tamil Nadu

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Alagar hills is located 22 km north east of Madurai city and lying between 77030' 78020' E longitude and 10005' - 10009' N latitude. The hill has covered with unique vegetations of scrub forest, dry deciduous forests and savannah type of grassy wood land in elevated areas. The pioneer floristic workers Subramanyam and Henry (1959) have collected and preserved about 380 plant species from Alagar hills. In 1984 Prof. Sriganesan has prepared detailed account on flora of Alagar hills with its sharp floristic notes about 875 plant species. The present investigation was undertaken to make recollection of Flora of Alagar hills and it was estimated about 953 species in the same area. Further it was analysed the geographical distribution of some endemic and endangered plants species in this area. The results were quite interesting and some new distributional records were made for at least 30 plant species. It may be extended their distribution form adjoining areas of hills and plains through various agencies. Some noteworthy endemic species collected in this area are *Andrographis ovata* (Acanthaceae), *Cinchona succirubra* (Rubiaceae), *Calamus sp.* (Arecaceae), *Capparis shevaroyensis* (Capparidaceae), *Caralluma adscendens* var. adscendens (Asclepaidaceae), *Ceropegia elegans* (Asclepiadaceae), *Clerodendrum balakrishnanaii* (Verbenaceae), *Dalbergia volubilis* (Fabaceae), *Eulophia graminae* (Orchidacae), *Glochidian velutinum* (Euphorbiaceae), *Reissantia grahamii* (Hippocrateaceae), *Syzygium alternifolium* (Myrtaceae), *Tropidia thwaitesii* (Orchidaceae), *Vanda spathulata* (Orchidaceae) and *Wendlandia thyrsoidea* (Rubiaceae).

Keywords. Alagar hills, floristic diversity

[AD-1] Conservation and management of olive ridley (*Lepidochelys olivacea*) sea turtle population status with special references to Ganjam district of Rushikulya Rookery, Orissa

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A largest population of Olive Ridley (*Lepidochelys Olivacea*) Sea turtles migrates towards the east coast of India. Three of the world's six known major mass nesting beaches for this turtle are located in Orissa. Among the three rockeries : Gahirmatha and Devi River mouth of Orissa , the Rushikulya nesting of Ganjam District was discovered in 1994 and recorded the 2nd largest nesting site for Olive Ridley during last 3-4 years . The nesting done during the year between 2005 to 2009 varies between 90,000 to 2,60,700 number respectively. Substantial nesting in Gahiramatha beach in most years is 100,000 and peak year over 600,000 turtle. The onshore nesting beach monitoring at the three rookeries were divided into 100m segments with either side marked wooden poles on cemented pillars, patrolling by foot night during nesting season. Use of fiber glass tape to measure the beach width between high tide line of the sea and estuary. Both hatching success and emergence success were calculated as - Hatching success (%) = (H ÷ Clutch size) × 100, Emergence success (%) = {[H - (LIN + DIN)] ÷ Clutch size} × 100, the table -1 determines incubation of excavated nests at Gahirmatha and Rushikulya were 124.4±20.9 (range = 55 to 177, n=277) and 127.9 ± 19.2 (range = 66 to 199, n=600) respectively. The mean percentage of hatching success and emergence success shown in table 2 both the rookeries were 47.7 to 94.4 and 39.8 to 84.3 and in Rushikulya varied from 83.8 to 97.01 and 69.78 to 96.1 respectively recorded in the consecutive years of 1995 to 1998.The low incubation success at Gahirmatha and the higher rate of Rushikulya because of major physical differences in characteristics of the two beaches. The extensive destruction of nests by turtles during arribada by promoting proliferation, predators and beach erosion and due to high tides disturbance by other nesting females. Considering the rapid fragmentation and erosion of nesting habitats of Olive Ridley's at Gahirmatha, stable beaches like Rushikulya can play a vital role in sustaining a variable population of ridleys in future. Among the major threats to this species are impacted by industry and human intrusion in the breeding ground. The recent oceanic Environmental threats of oil spill from ship near Gopalpur have a serious damage to these delicate species thousand were dead by this toxins oil on the sea surface. The overall goal of this research paper was to provide scientific information that is needed for developing and implementing the long term conservation, management and legal support of the olive ridley sea turtle population in Rushikulya rookeries of Orissa.

Keywords. *Lepidochelys Olivacea,* conservation, management, Ganjam district

[AD-2] Study of inter population variation in fungoid frog *Rana malabarica* from Northern Western Ghats on the basis of morphology

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Rana malabarica is widely distributed frog over peninsular India. While studying the taxonomy of Rana malabarica it was realized that some specimens are a little different than others. There exists a wide morphological variation

within the individuals of same species that inhabit the same as well as different localities. Analysis of morphometric measurements given in the description of fifteen specimens of this species by Boulenger (1920) also shows that there are two significantly different clusters of individuals, which are different from each other with respect to their morphologies, independent of their gender and geographic locations. This observation suggests that there is a possibility that the species described as Rana malabarica may actually be composed of two different closely related species.

In the study we tried to explore this possibility using multivariate analysis of morphological measurements of *Rana malabarica* collected from different localities from Western Ghats. For this extensive sampling has been carried out. *Rana malabarica* from Amboli, Ghatghar and Kolvan are closely related, and may be *Rana malabarica* populations in these localities are somewhat similar, while populations from Tamhini and Dhamapur are showing a totally different group.

The main characters involved in separating these populations from each other were Head length and Eye to tympanum distance. Other important conclusion from the morphological studies is that, locality wise population variation can be observed but not to an extent that would describe a new species.

This study would lead to the better understanding of process of speciation and the ecological factors driving it. Ultimately it will contribute to a better understanding of the phylogeography of such widely distributed species.

Keywords. *Rana malabarica*, speciation

[AD-3] Identification, distribution and status of square spotted gecko, *Hemidactylus gracilis* in Maharashtra Blanford 1870

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Hemidactyalus gracilis is one of the poorly known geckos from India. Earlier it was reported that *Hemidactyalus gracilis* is distributrd in Pune and Satara district from Maharashtra, Mandala & Shivpuri from Madhya Pradesh and Sarguja & Raipur from Chhattisgarh. Murthy (1986) reported some localities for Hemidactyalus gracilis in Andhra Pradesh (Kalavabugga).

H. Gracilis was considered to be of indeterminate status by Sanyal et al. (1993) it has been considered threatened by Molar & Walker (1998) and Bambardeniya & Samarasekara (2001). We observed that it is locally abundant & common in eastern Maharashtra & some parts of central Maharashtra. We collected 34 specimens of *Hemidactyalus gracilis* from seven different localities of Maharashtra and they were released after the measurement of the required parameters to identify the species. We found that the species is abundant in Amravati, Jalna and some parts of Nagpur district of Maharashtra.

Very little is known about the habitat of *H. gracilis*. We take this opportunity to provide some notes on it. We also take this opportunity to provide some information about identification and its distribution in Maharashtra state on the basis of 34 specimens, recently studied from seven localities in Maharashtra.

Keywords. *Hemidactylus gracilis*, habitat

[AD-4] Climatic change in Western Ghat of Maharashtra and diversity of dung beetles

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Dung beetles play an important role as a natural cleaning machine Study of dung beetles (Coleoptera) from W.G.was performed for understanding the diversity and distribution of this fauna.

The dung beetles are found to be active in monsoon and post monsoon seasons in Western ghat of Maharashtra state. Their activities are very much synchronized with the Monsoon in Weastern Ghat region.

The survey performed for last two years (2008-2010) has revealed that this important fauna of the forest of Western ghat is very much sensitive to the Monsoon and particularly to the humidity in the environment. The observations indicate that the activity of dung beetle fauna is suggestive to the climate change in the Western ghat region which is becoming successively dry mainly due to deforestation and low precipitation in the Monsoon (occasional paper Korad et. al 2010).

Keywords. Dung beetles, W.G.

[AD-5] Click beetles (Coleoptera: Elateridae) from Maharashtra, India: Diversity, taxonomy and miscellaneous studies

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Total 52 species of click beetles were reported from different parts of Maharashtra in ongoing studies since 2002. Specimens were collected from different forest regions of the state. The specimens were brought to the laboratory and kept alive in the terrarium as far as possible. They were fed with different types of food. A preliminary study of the jump was also carried out. The dead specimens were preserved in 70% alcohol. They were studied for their taxonomy.

Keywords. Click beetles, Elateridae, diversity, taxonomy, Maharashtra

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[AD-6] Diversity and abundance of Coleopteran water beetles (Dytiscidae, Hydrophilidae and Gyrinidae) in Kolkas region of Melghat Tiger Reserve, district Amravati, Maharashtra, India

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A study was conducted from May 2009 to Oct. 2009 at 3 different sites of Kolkas forest region to study the diversity and abundance of aquatic beetles. Kolkas is located in the Melghat Tiger Reserve (MTR) in the state of Maharashtra. Total 13 species of water beetles belonging to families Dytiscidae, Hydrophilidae & Gyrinidae were recorded from the study area. Dytiscinae was the dominant subfamily with respect to species diversity (10 species) and abundance.

Keywords. Coleoptera, beetles, Insecta, Dytiscidae, Melghat Tiger Reserve, Amravati

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[AD-7] Survey of Dung beetles in Mahad Taluka of Raigad District, Maharashtra

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Surveys and collection of dung beetles in Mahad Taluka of Raigad District was carried out from July 2009-March 2010. During the study period, 22 species of dung beetles belonging to 12 genera representing 03 subfamilies namely Aphodiinae, Geotrupinae and Scarabaeinae were reported. Subfamily Scarabaeinae represent 19 species.

Keywords. Diversity, dung beetles, Mahad Taluka, Western Ghats, Maharashtra

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[AD-8] Avian diversity of Baramati, district Pune, Maharashtra

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The avifauna of Baramati (Pune) is surveyed. Sixty six species belonging to 37 families and 16 orders are recorded. Order Passeriformes reports maximum numbers i.e.30, it is followed by order Coraciformes -06 species, whereas Order- Pelecaniformes, Order Gruiformes contributes single species. Sixty three species of birds are found to be local in this region occurring throughout the year, while three species are reported as migratory.

Keywords. Avifauna, Baramati, migratory birds

[AD-9] Distribution of ant genera around Amravati city

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The ants deserve a special place in the study of ecology. Forest, Grassland and Human habitat, these three habitats were studied for the present study. In this study, we tried to explore the distribution ants in three habitats located around Amravati city. Thirty four species of ants in twenty genera were identified in the study area belonging to five subfamily; Formicinae, Myrmicinae, Ponerinae, Dolichoderanae and Pseudomyrmicinae. The dominant genera was identified in this study area is *Crematogaster* followed by genera *Pheidole* and *Componatus*. Among these three habitats, the similarity index of ant species between Forest and Human habitat was highest. The indices of dominance in forest and human habitat indicate that the genera crematogaster is most adapted genera in Forest and Human habitat. *Oecophylla smargdina* of subfamily Formicinae is reported first time in the Amravati region.

Keywords: Formicidae, ants, genera, habitat, diversity, Vidarbha

[AD-10] Insect biodiversity in India

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The Indian sub-continent has been recognized as one of the 12 mega biodiversity centres of the world. The total number of living species identified in India so far is 1,26,188. The insects are estimated to comprise more than 75% of the known species of the animals and approximately 0.9 million species of insects have been distributed throughout the world. However, 59,353 species under 619 families and 27 orders are known in India (Varshey, 1998). This represents 6.08% of the global insect diversity (Ghosh, 1996). Thus more than 90% of the biodiversity specially of the smaller organism is yet to be identified. In many parts of the country the insects have been studied along with the Indian fauna and is in the fragmentary state. Similarly in case of mites despite of diverse habitat only 5% species have been recorded in India. In spite of very rich biodiversity the studies on taxonomy and biosystematics is declining in India. Therefore the detailed systematic surveys of unexplored and under explored areas of the country should be undertaken for assessing the biodiversity of the country.

Keywords. Insects, Indian subcontinent

[AD-11] Butterflies species preference to flower visiting in Mazandaran province, Iran

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The Lepidoptera constitutes one of the biggest groups of insects. Butterflies (order Lepidoptera) exhibit an extensive dispersion and distribution due to the fact that they have the evolutionary capability to adapt themselves morphologically and physiologically to different natural conditions. They developed into resistant and often almost invisible animals that have been continuing life vigorously and successfully on earth from time immemorial. There is an intimate relation between butterfly survival and host plants, as there are reports of butterfly preference for plant species.

Almost 400 species of butterflies have been identified in Iran. There are several reports for butterflies' host plants at different places all over the world; however, there is no report about host plants of adult butterflies in Iran.

We studied regional butterflies' and their host plants in Mazandaran province, Iran, with reference to climes. So a relatively large number of adult species were collected by using sweep net and subsequently identified by using identification keys. The collection period covered approximately 150 day between May 2009 and September 2009. Every locality was visited 2-5 times during this period. Flower visiting was recorded on 25 species of plants; *Anthemis brachystephana* BORNM & GAUBA being the most commonly visited plant. This study is the first survey of host plants of adult butterflies of Iran.

Our observations showed that flowers of family Asteraceae were most visited by butterflies. Studies of Scott (1983) with butterflies of North America are in concurrence with our observations that butterflies visited the flowers of family Asteraceae. It becomes imperative to study butterfly preference for host plants in the light of conservation efforts.

Keywords. Lepidoptera, Iran, Asteraceae

[AD-12] Faunastic studies on macro moth (Lepidoptera: Noctuoidea) from North Maharashtra

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India includes a diverse environment and vegetation, which comprises of different ecosystems. India is gifted with rich moth fauna, about 4438 moths recorded by Cotes E.C., Swinhoe C. in catalogue of moths of India & 5277 moths recorded by Hampson G.F. in Fauna of British India. Moths are known to be one of the most appropriate taxonomic groups for environmental evaluation and have great economic importance. Further they act as a good bioindicator of particular vegetation as they are host specific. The study attempted to identify macro moth species

diversity of superfamily Noctuoidea in north Maharashtra. A total 372 species are collected from various families; 154 species of moths identified from superfamily Noctuoidea which represent the most diverse group includes family Noctuidae, Erebidae and Notodontidae. A preliminary checklist of Noctuoidea moth species collected from the north Maharashtra is presented based on studies carried out from July 2008 to June 2010 in various localities. The moth fauna is also very rich comprising mostly of arboreal feeding forms indicating a fairly undisturbed forest patch in the area. Although 789 species have been recorded from Maharashtra state particularly; from Pune, Satara, Mumbai & Khandala (Cotes & C. Swinhoe 1887,89) but, no record of moths found from Nashik, Dhule, Jalgaon & Nandurbar districts.

Keywords. Macro moth, bioindicators, Noctuoidea

[AD-13] Butterflies as flagship species for invertebrate conservation

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Veneration of nature entrenched deeply in Indian psych. Religious, cultural and mythical background indicate a strong alliance with fauna and flora as sacred symbols. Flagship species is required for conservation of invertebrates. Butterflies are popular charismatic species of order Lepidoptera. As flagship species butterflies can be used to attract varying degrees of support among different stakeholders. Being host specific rich diversity indicates good health of a particular habitat. Insect ecologists also focus on butterflies as the best group of insects for examining the patterns of biodiversity. Thus butterflies can be used to stimulate conservation awareness in society.

Keywords. Flagship species, butterflies, invertebrates, conservation

[AD-14] Distribution and species composition of zooplankton in Himalayan ecosystems

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The zooplankton communities of lakes, Sars, wetlands and ponds in Jammu-Kashmir Himalayas were examined. The waters are situated between 600-3800 m a. s. l. and, in the ordinates 30-36 N. Significant variations in Rotifers and Crustacean distribution patterns were encountered. Some species having wide tolerance limits are more frequent while a few species due to their rigid environmental demands are restricted to few water bodies. Such species serve as good indicators of tropic evolution. The general distribution of these groups and their ecological implication has been discussed in the paper.

Keywords. Himalayan lakes; wetlands; ecology; zooplankton distribution; species composition; tropic evolution

[AD-15] Distribution and seasonal abundance of macrobenthos of Gangavali estuary, Uttar Kannada, West Coast of India

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Distribution and seasonal abundance of Gangavali estuary was studied for one year from September 2007 to August 2008. The diversity, abundance and biomass of macro-benthos were observed selecting four stations along the Gangavali estuary and eleven benthic organisms were encountered in the present study. Polycheates were observed at all four stations with maximum faunal distribution. The diversity of macro benthos was at maximum numbers towards lower reaches of the estuary. The benthic faunal components exhibit bimodal pattern of distribution with monsoon as a period of minimum density and post-monsoon and early pre-mansion with maximum density.

Keywords. Gangavali estuary, macro-benthos, seasonal abundance, biomass, Polycheata, faunal distribution and diversity

[AD-16] Ichthyofaunal diversity of Bhima river

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The fish fauna of Bhima river were collected for the present study. The result of present investigation confirmed the occurrence of twenty four fish species belonging to eight orders. The order Cypriniformes was dominant with ten species followed by order Perciformes with four species and order Siluriformes with three species while the order Osteoglossiformes and order Synbranchiformes were represented by two species each and rest of the orders (Clupeiformes, Mugiliformes and Aulopiformes) by single species. The fishes recorded were found to be widely distributed and had good numbers in the dam.

Keywords. Ichthyofauna, Ujani dam, Cypriniformes, Siluriformes, Perciformes

[AD-17] Cephalopodan biodiversity study along the Harne port near Dapoli, district Ratnagiri, Maharashtra state, India

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The Cephalopod fauna is an important aspect of fishery potential of any marine water body. So the Cephalopodan

biodiversity study was undertaken during January 2008 to December 2008 at the Harne port near Dapoli town of the Ratnagiri district of Maharashtra state. The present paper deals with the variety and abundance of Cephalopods in the nearby marine water of the Harne port where they are being caught and brought to the Harne port for marketing. The results of present study reveal the occurrence of 12 species belonging to 3 orders & 4 families. The family Sepiidae was found to be dominant with 8 species, followed by family Octopodidae with 2 species and then by families Loliginidae and Onychoteuthidae with one - one species each. Most of the species identified were of high economic importance as they are being utilized as commercial food by the local people.

Keywords. Cephalopods, biodiversity, Harne, Sepia, Loligo

[AD-18] Cestode parasites of some freshwater fishes

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Fifty freshwater fishes, *(Clarias batrachus 20, Wallago attu16, Mystus seenghala 08 and M. armatus 06)* were collected from Ujani dam and brought to the laboratory. All fishes were examined for the presence of cestode parasites in the digestive tract. The study revealed that (60%) *Clarias batrachus*, (50%) *Wallago attu*, (25%) *Mystus seenghala* and among *M. armatus* (20%) were infected with cestode parasites.

Keywords. Freshwater fishes, Cestode parasite, Ujani dam

[AD-19] Zooplankton diversity around Arnala island Virar, Maharashtra, India

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Vaitarna River off Arnala fishing village .It is one of major fish landing site in Thane district. Zooplankton diversity around Arnala island was studied during Jan 2008 to Dec 2009. Total 28 types of zooplankton were recorded. Copepod form largest group of zooplankton population followed by rotifer ,Nauplli , and fish egg.

Keywords. Zooplankton, Arnala island, diversity

[AD-20] Rotifer diversity of two temple ponds from Nashik district, Maharashtra

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Very little work is done on temple tanks in Maharashtra state, particularly in Nashik district. Temple tank has unique place in mythology as well as a distinct aquatic ecosystem. The present investigation was carried out on zooplanktons during Sept. 2009 to Nov 2010. Various types of zooplanktons were noticed among them rotifers were dominant than others. We have observed at about 17 genera of rotifers. The density of Brachionus sp. was maximum where as Philodina was least. The variation in density and diversity of rotifers are in line with human disturbances, physico-chemical parameters as well as morphometry of water body.

Keywords. Rotifers, diversity, temple tanks, Nashik

[AD-21] Study of diversity of compost fauna from different biocompost samples

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Bio-composting is one of the most beneficial and eco-friendly activity in current age to cope up with the increasing pollution in all the strata. It is the purposeful biodegradation of organic matter by micro-organisms with the help of macro- organisms under controlled aerobic conditions. Compost houses a large population of helpful macro organisms, along with the microbes. Although micro-organisms act as primary consumers and initiate the process of composting, it's also the secondary and tertiary consumers including worms, insects, snails and their associates that transform this semi converted organic matter into stable and cured compost. They help keeping the compost pile cleaner and enhance the process of composting. However, the data available on these macro-organisms is fragmentary and it is necessary to have a detailed investigation of the same. Hence, the present work was undertaken to study the diversity and role of invertebrate fauna in 6 different biocompost samples. The samples included compost prepared from household kitchen waste, garden waste, mixture of these two etc. Since the feedstalk in composts was different, it was thought to study the diversity in them. Hence these biocompost samples were compared. Total 22 organisms were found in the comparative study. Among the 4 major phyla i.e. Nematoda, Annelida, Arthropoda and Mollusca; Phylum Arthropoda was dominant with 19 organisms. This unfolds the diversity of organisms that have created their niche in the compost as well as their contribution in the making and development of compost. The present work thus concludes that the compost shelters organisms other than microbes which are equally helpful for the formation of compost. Hence, further study regarding these macro-contributors needs to be done.

Keywords. Compost fauna, compost

[AD-22] Study of meiobenthos in Vaitarna river at Ghodmal, Thane, India, with refrence to sand dredging activity

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Study of Meiobenthos at two sites- sand dredged (D) and Undredged (UD) of Vaitarna River at Ghodmal, Tal.-Vada, Dist. Thane, Maharashtra, India was carried out during period Oct. 2007 to Sept. 2008. The study included assessment of environmental physico-chemical parameters and qualitative & quantitative aspect of Meiobenthos. During study period physico-chemical parameters of two sites did not show significant difference except higher hardness at 'D' site,-higher SiO3-Si at 'UD' site. Both sites recorded with alkaline PH 9.

In the Meiobenthos 16 faunal types were recorded with the dominance of Ostracodes followed by Eggs, Nematodes, Cypris & Protozoans. In general density of Meiobenthos was high at UD site & diversity was high at D site.

Keywords. Vaitarna river, dredging, meiobenthos

[AD-23] Biodiversity and present status of macrobenthic fauna in Mumbri creek of South Konkan, Maharashtra

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The present investigation was carried out in Mumbri Creek of Sindhudurg district (Lat. 16° 21' N. Long. 73° 25' E). The main aim of this work is to find out the productivity of the said creek. The macrobenthic fauna is an important part of food chain and food web. Most of these include Arthropods (Crustacea, Malacostraca), Molluscs (Gastropods, Bivalves), Pisces are the dominant macrofaunal groups encountered in the area. The occasional inhabitants like nemertines, sipunculids, ophiuroids and fish larvae were mostly restricted to offshore regions. Biomass and population density of macrofauna were moderate and showed fluctuating trend. The work was investigated in 2009-2010.

Keywords. Mumbri creek, macrobenthic fauna

[AD-24] Biodiversity of mites in poultry from Pune

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Poultry mites are one of the important pests of poultry industries that affect the live stock and their production. In the

present investigation diversity of poultry mites from Pune area have been carried out for one year from June 2009 to November 2010, every fortnight, from poultry farms located in region of Pune. During this investigation around 200 mite specimens were screened for qualitative and quantitative assessment of biodiversity of mites in these poultry. Out of these specimens about 85% specimens were of *Cheyletus eruditus* .The remaining specimen were of *Dermanyssus galinae* (10%), *Dermatophagoides pteronyssinus* (05%), *Dermatophagoides farinae* (05%). *Cheyletus eruditus* remained abundant in both the poultry. Mites were found more during rainy season that is from June to September, moderate during winter season that is October to January, and is minimum during summer season that is February to May. Weather parameters like temperature, relative humidity and rainfall affect significantly in percentage population of mites in dusts of poultry.

Air sampling studies was also carried out by Tilak Air Sampler in the poultries during the same period of investigation which however revealed more number of *Dermatophagoides* as compared to *Cheyletus* and other genera.

Keywords. Biodiversity, population, poultry mites, Pune

[AD-25] Biodiversity of vertebrates and the threat to their existence

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About 55,000 living species of vertebrates are found in the world. Among these one species out of every five species is facing the threat of the existence. These include the amphibians, reptiles, birds and the mammals. The threat to the tiger and the gorillas are highlighted but the other endangered species are not being noticed. This report has been prepared by the International Union for Conservation of Nature. The Union has examined more than 25,000 species of the red list facing the threat of existence. Twenty per cent of the existing vertebrates are struggling for their existence. Among these twenty per cent are mammals, thirteen per cent birds, twenty two per cent reptiles and forty one per cent are amphibians. About 33 % of soft boned fishes including sharks are also on the verge of extinction. Thus 11,000 vertebrate species are under this category of endangered species and their conservation is warranted.

Keywords. Vertebrates, endangered species

[AD-26] Daily activity cycle of chital (*Axis axis*) in Pench Tiger Reserve in Cenral India

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Field experiments were conducted from 2005-2006 to find out different activities like feeding, resting, standing etc. were observed during the different hours and in different seasons at all the three entities of study area. The only difference noted was in % which was some what different in different seasons. It was observed that chital become

active at or just before the sunrises and normally before 0700 hours in the morning they appear at their grazing places and begin to graze. They were observed resting from 03·00 am to the time of sunrise. They rest in the forest where normally the place is some what warmer. During summers it was observed in between 7·00am to 8·00am in the morning and at 6·00pm in the evening at site-I, site-II and site-III have also reported the similar results. . In the morning, after they have reached cover, some of them spend some time just in loitering under the trees before seeking their day-beds.

Keywords. Chital *(Axis axis)*, activity, Pench Tiger Reserve

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[AD-27] Occurrence and distribution pattern of *Ichthyophis* spp. (Gymnophiona-Amphibia) from Koyana basin of Patan tahsil, Satara

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Survey of *Ichthyophis* was carried out at the basin of Koyana River and its tributaries of Patan Tahsil of Maharashtra from June to October of each year in 2005 to 2010. Western Ghats of India is well known for biodiversity hotspot. Koyana River and its tributaries situated in northern Western Ghats. *Ichthyophis spp.* was encountered at the basin of Koyana River and its tributaries at altitude between 500 to 630 m above the sea level. In this paper, the attempt has been made on occurrence and distribution pattern of *Ichthyophis* from Koyana basin. The *Ichthyophis* was frequently occurred at Adul and Vihe region than the Koyana and Helwak.

Keywords. Koyana river, *Ichthyophis*, occurrence, distribution, Patan tahsil

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[AD-28] Biodiversity and depletion of fauna from Jharkhand state

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The Jharkhand state is rich in biodiversity because of its diverse physiographic and climatic conditions. The state conforms tropical dry deciduous, moist deciduous, dry peninsular and dry mixed deciduous forest. The total forest cover of the state is approximately 23605.5 sq. km. (reserved forest 4,387.20 sq. km., protected forest 19,184.78 sq. km. and unclassified forest 33.49 sq. km.), which offers excellent cover for its inhabitants including 39 mammalian species, 12 reptilian species (8 snake species and 4 lizard species) and about 15 insect species. The mammals include elephants, tigers, leopards, sloth bears, barking deer, mouse deer, monkey, giant squirrel, porcupines etc. The major trees are sal, mahua, silk cotton, teak, palas, babul, etc. The biodiversity is under serious threat from various factors like industrialization, urbanization, agricultural activities, stone quarrying, unrestricted grazing by free range cattle, mining activities, construction of railway tracks, roads, dams and other developmental activities.

In the present study, survey of mammalian diversity was carried out and has been found that it is continuously declining indicating the need of conservation.

Keywords. Jharkhand, Dalma, mammalian diversity, biodiversity depletion

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[AD-29] Habitats of the *Ichthyophis* spp. (Gymnophiona-Amphibia) at Koyana river and its tributaries of Patan tahsil, Satara

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Survey of Indian caecilian i.e. *Ichthyophis* was carried out at the Basin of Koyana River and its tributaries of Patan Tahsil of Maharashtra from June 2005 to October 2010. Western Ghats of India is well known for biodiversity hotspot. Koyana River and its tributaries situated in northern Western Ghats. *Ichthyophis cf. bombayensis* was encountered at the Basin of Koyana River and its tributaries, at altitude between 500 to 630 m above the sea level. In this paper, studied distribution pattern, rain fall, temperature, PH, altitude, latitude, longitude and habitats. The soil becomes red, porous and moist. PH of soil is positively acidic; contain rich humus and organic matter.

Keywords. Koyana river, *Ichthyophis,* habitats, Patan Tahsil

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[AD-30] Study on aquatic biodiversity in reservoir of Chhindwara district of Madhya Pradesh, India

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Madhya Pradesh is an inland state having vast aquatic resources, can be better way utilized for augmenting fish production. The fish production and productivity in he state is still low compared to other fish producing states. Major reason for this has been lack of adequate and effective extension support. The state at Madhya Pradesh is endowed with rich and varied inland fisheries resources, which include ponds, reservoirs and rivers. It has got 1.19 lakhs hectare of water area in the form of pond, reservoirs, river etc. agriculture, forest and craft was the only source of livelihood of fish farmers for sustainable fisheries development, but fisheries being and allied activities could not be development much. Fish production treads in India, the reservoirs are under exploited with an average annual fish yield of 20.15kg/ha with mean production is small, medium and large reservoirs being 48.50 kg/ha/yr, 12.39 kg/ha and 11.31 kg./ha, respectively. In case of small reservoirs, Madhya Pradesh (47.26 kg/ha/yr) and Rajesthan (46.43 kg/ha/yr) are important states in terms of fish production. In the Chhindwara district, It highly significant in the discovery of the both reservoirs due to high nutrient input through agricultural wastewater in the Kanhargaon reservoir and increase of nutrient due to non-polluted Mohi reservoir of Chhindwara district of Madhya Pradesh.

The biological characteristics such as primary productivity, chlorophyll-a, planklton species diversity and biomass estimations, periphyton, benthic invertebrate, fauna diversity and microbiological characteristics such as total heterotrophic bacterial population, *Escherichia coli* and total coliforms and fish catch particulars has analysed by collecting samples from the above selected reservoirs. The sediment quality characteristics such as texture, pH, specific conductivity, available nitrogen and available phosphorous and organic carbon were analysed for the collected samples of these two selected reservoirs Kanhargaon and Modi of Chhindwara district. Based on the primary production data the suitable stocking density of seeds had decided for better annual fish yield. The finding had helping the water quality for fish stocking, animals drinking, domestic use and irrigation purpose. Side by side the finding had remedial measures of contamination detection.

Keywords. Aquatic biodiversity, Madhya Pradesh, Chhindwara district

[AD-31] Fish diversity of Panimahal near Naldurg Dist. Osmanabad (M.S.) India

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The present paper deals with the diversity of fishes from Panimahal during the year 2009. (Jan to Dec.). During the study period 21 species of fishes were recorded which belongs to five orders, nine families, and fifteen genera.

Keywords. Fishes, Panimahal

[AD-32] Aquatic insect biodiversity in perennial lentic ecosystems of Sinhagad fort

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Sinhagad fort has a very large number of perennial as well as transient water bodies. The perennial Lentic water bodies have an aquatic biodiversity which has been studied for the past one year. The prominent insect orders include Odonata, Hemiptera and Coleoptera. The ponds had a varied vegetation pattern ranging from free floating vegetation, or submerged or weedy ponds. Odonata and Coleoptera are the dominant groups. Diverse forms of Hemiptera in relatively small numbers have been found in the study. The sampling was done bimonthly. The aquatic diversity declined during rainy season from July to October and has slowly increased October onwards this year. The study will help us to understand the distribution of these forms at altitudes.

Keywords. Aquatic insects, Odonata, Hemiptera, Coleoptera

[AD-33] Biodiversity of freshwater sponges from Western Ghat: Satara city

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The present study determines Biodiversity of freshwater sponges studied during 2007-09 from Freshwater habitats in Krishna, Venna, Urmodi rivers and eleven reservoirs from Satara District (MS). Freshwater sponges belong to family Spongillidae and India has a total of 31 species under 11 genera (Soota, 1991) and out of that 6 species were found in Satara; namely *Ephydata meyeni, Dosilla plumose, Stratospongilla bombayensis, Spongilla lacustris, Eunapius carteri & Radiospongilla cerebelleta.* The identification and classification of sponges was done using Nelson Annandale's Fauna of British India and recent nomenclature was adopted from Penny and Racek's comprehensive revision of a worldwide collection of freshwater sponges. Biogeographical distribution and specific richness between the different seasons represent high diversity of freshwater sponges, at the scale of zoogeographic regions recorded in the Western Ghat.

Keywords. Sponges, spongillidae, biodiversity, biogeography, specific richness, zoogeography

[AD-34] Changes in habit and habitat of poisonous, semi-poisonous and non-poisonous snakes found in and around Bhimashankar National Park, district Pune, Maharashtra, India

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Man has always feared & worshiped snakes in India. The snakes are elongated, limbless, earless, reptiles with scaled body. A majority of snakes are non poisonous & they are beneficial to man. Since they destroy insects as well as rhodents. There are very few snakes which are deadly poisonous &cause death from snake bites according to estimate of WHO every year 10000 People die in country because snake bite majority of people die because sheer fright about snakes and some due to ignorance & unscientific method of treatment.

We know that scales on the body of snakes is remarkably supple and able to make to twisting and other movement impossible for other vertebrates and arrangement of back bone does not give much latitude for vertical movement and vertical andulatry movements are impossible for snakes and lateral movement are typical snakes movement, skin is shade periodically and shade skin is often unbroken and maintain its form remarkable degree.

The distribution of species, diversity across habitat nearly ¾th of total species, Inhabit while few confined low impact zone comparison to forest shrub & grass land habitat that large no. of species in habitat the high impact zone of plantation, Agriculture & habitation the forest species are also recorded the human habitation is most species [illegible] Habitat loss resulting from Urbanization posses threat to nearly half the reptilian species .The Bhima River

[AD-39] Bio-diversity of butterflies associated with flora of Mithbav creek, South Konkan, Maharashtra

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No other insects can attract the mind of the human than the wonderful world of insects. There are about 15000 species of butterflies in India. The quality and quantity is always related to the habitat because of feeding and breeding. Now a-days due to lack of the habitat the population is density of them are under decline manner. The monsoon is the favorable season for them to wonder and feed on the required species of plants. In the studied areas, they are more abundant in the

[BC-2] DNA barcoding: A new tool for delimitation of species boundaries in Dalbergia spp

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DNA barcode is a short segment of a gene sequence used to identify different species. Although DNA barcoding is well established in animals, a universally accepted barcode is still lacking in plants. Accurate identification of species, especially cryptic species that are difficult to differentiate can be detected using this technology. The Western Ghats (WG) in India are well known for their rich and unique assemblage of flora and fauna, and are amongst the 25 biodiversity hotspots identified in the world. *Dalbergia* [from the family of pea (Fabaceae)] is an important member of the WG flora; valued for decorative and often fragrant wood (rosewood, African blackwood, sisu) and is rich in aromatic oils. There is taxonomic confusion with respect to several *Dalbergia* species as these often have more than one species names. Hence, the size of the *Dalbergia* genus remains disputed. The theme of this research work is to

Thane district (Yeoor hills) .The Park encompasses two lakes, Vihar Lake and Tulsi lake water of these lakes is lifted for purposes. It is acclaimed to be the lungs of Mumbai, since it purifies the city's pollution. Visits are paid by students for studying flora of the area. In short it caters to educational and recreational needs of the people.

Keywords. Biodiversity, national park, flora, prime location, educational, recreational

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[BC-10] Analysis of physico-chemical parameter of water, to investigate the biodiversity of flora and fauna of Sarkari lake and Sangam lake in Buldana city, Maharashtra, (India)

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An effort was made in order to compare the biodiversity of Flora and Fauna of Sarkari Lake and Sangam Lake which is situated in the heart of Buldana City. Water qualities of both the lake were investigated for year 2009-10, to assess the suitability of water for luxuriant growth of certain bottom animals, phytoplankton and mosquito fishes. Several parameters such as rainfall, temperature, pH, dissolve oxygen (DO), total alkalinity, sulphate and phosphate have been studied.

Investigation of Sarkari Lake showed that the water quality parameter like, temperature, pH, dissolved oxygen (DO), total alkalinity, sulphate and phosphate are within the permissible limit, and hence Sarkari Lake is Biodiversity rich and shows luxuriant growth of Flora and Fauna in the lake.

On the other hand, Investigation of water quality of Sangam Lake showed that the total alkalinity and phosphates were higher than the desirable limits, and it causes decline in the Biodiversity of Flora and Fauna in the lake.

This study concluded that the Anthropogenic activity and discharged of domestic and industrial sewage into Sangam lake is responsible for decline in the biodiversity of Flora and Fauna.

Keywords. Water quality, physicochemical parameter, biodiversity

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[BC-11] Study of diversity of flora in an NGO adopted forest land Bhavale- near Shahapur

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Biodiversity study was conducted to collect the baseline data from Bhavale where part of the terrain has become barren due to soil erosion and denudation. On one side is a small hillock and the other side is the plateau. It is a rocky terrain a part of which is used for quarrying.

In the present study observations were made to record the occurrence and diversity of the flora in the region as it was found to be unique for that particular area. Survey was conducted in summer and in monsoon season. In summer the plants that were noted were *Hyptis sauveolens, Lepidagathis*, dried fruits of *Dioscorea, Cryptostegia*, grasses, etc . After the first showers of rain the ground flora became visible in the barren region. There were extensive patches of

[BC-17] Phytolith as a tool for sustainable development

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Roadside dust samples from five different locations around Pune city were examined for the presence of Phytoliths. A rapid and inexpensive methodology was adopted for the extraction of phytoliths from dust samples. Analysis of the samples showed presence of significant number of different types of Phytoliths. This clearly indicated that Phytoliths can remain suspended in the dust samples and using simple laboratory procedures they can be extracted. The automobile exhaust and other air borne particulates that are released in the environment can cause serious changes in the silica accumulation pattern which in turn can affect the plant growth and development of the roadside plant species. Further analysis of the dust samples collected along roadside can be used to identify plant species that can capture toxic emissions emitted from automobiles. It can also be used to inspect the mechanism of phytolith dissolution within a system and the potential impacts of polluting dust on various environmental parameters. The robust phytolith record in dust can prove to be a vital informative source in determining the ecological diversity of a particular area, conservation of natural resources and ultimately achieve the goal of sustainable development.

Keywords. Phytoliths, dust, ecological diversity, sustainable development

[BC-18] Sustainable development

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At the 1992 UN Conference on Environment and Development (the Earth Summit), the Convention on Biological Diversity (CBD) was born. 192 countries, plus the EU, are now Parties to that convention. In April 2002, the Parties to the Convention committed to significantly reduce the loss of biodiversity loss by 2010.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The idea of sustainable development grew from numerous environmental movements in earlier decades. Summits such as the Earth Summit in Rio, Brazil, 1992, were major international meetings to bring sustainable development to the mainstream.

Sustainable development in India now encompasses a variety of development schemes in social, cleantech (clean energy, clean water and sustainable agriculture) and human resources segments, having caught the attention of both the Central and State governments and also public and private sectors.

As per a report by UN Environment Program (UNEP), 'Global Trends in Sustainable Energy Investment 2010', released on July 2010, India was ranked eighth in the world in terms of investment in sustainable energy. The report further stated that India invested around US$ 2.7 billion in sustainable energy in 2009.

Wind energy attracted 59 per cent of financial investment in clean energy in India. India was placed fifth in the world for installed wind power during the year.

Biomass and waste was the second largest sector recipient of investment, generating US$ 0.6 billion of new financial investment or 22 per cent of the total.

Keywords. Biological diversity, sustainable development

[BC-19] The tribal way of biodiversity conservation : A case study of Jharkhand

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A tribal & ethnic people are closely attached with plants & they have been using them for various proposes like a religion, rituals, food & drink medicine, shelter, etc. it is however noteworthy that tribal have been maintaining their repored with biodiversity & have always belived in rational use & proper management of plant diversity. Their concept of "Sharana asthal" is an ideal example in this regard." Sharna Asthal" are specific patch of forest area which are consider sacred & biodiversity of this area is maintained by following certain rule & regulations framed by them. Various regulations & taboos are popular among tribal which directly or indirectly help in conservation of plant diversity.

The paper deals with some specific ways of conserving plants which are quite common in tribal of Jharkhand.

Keywords: Ethnic, sharna asthal, tribal

[BC-20] Role of people in debilitation and conservation of ecosystems

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Man lives in ecosystem. Unlike other members of the ecosystem, man is never satisfied with the basic needs. He craves for more and more with a never ending greed. This has led to debilitation of ecosystem. The 20th century was a period of tremendous global change. The number of people living on the earth quadrupled. The economy grew 14 times larger, energy use increased 15 times, carbon dioxide emission increased 17 times and water use increased nine times. The area of cropland doubled, whereas forested area declined by 20%. Current projections of global population growth estimate that there will be 7.8x109 people living on the planet by 2025. These people are likely to live in a world that is substantially different from the world today due to changes in climate, disease, technology, trade patterns, societal values and population structure. This will produce radically different transformations. About 99.98% of human effort goes to debilitate the ecosystems. In other words for every single step taken to restore the natural life support services, humans take 6400 steps in opposite direction, destroying the planet's ability to maintain life. Our planet can be saved by massive global action that must be taken immediately.

Present paper takes an account of various factors leading to debilitation of ecosystems and various means of conservation of ecosystems. Such an account would be a guideline to prepare a roadmap for individuals involved in it.

Keywords. Ecosystem, conservation, debilitation of ecosystems

[BC-21] GIS - a tool for biodiversity conservation; planning and management in minor tourist areas (a case study)

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The paper discusses the importance of Tourism, the current effects of uninhibited tourism and the significance of the GIS as a decision supporting tool for sustainable planning and management in tourism industry especially in minor tourist's areas from biodiversity conservation view point. This study gives the basic understanding of the applicability of GIS maps in creating Environmental Awareness amongst the local policy makers and the local masses which in turn will help to undertake apposite measures for protection and conservation of the biodiversity that is being affected due to the emancipated practices by the ever growing tourism industry. This study will simultaneously bolster in efficient planning and management of the locally available biodiversity by putting forth a clear picture of the present scenario.

Keywords. Ecotourism, biodiversity, conservation, GIS

[BC-22] Arboreal diversity in Hazaribag wild life sanctuary

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Hazaribagh wild life sanctuary is situated in Hazaribagh dist of Jharkhand state .It lies 20 km from district Head quarter on NH33.The sanctuary spreads 186.25 Sq km areas and lies Latitude 23°17'00":24°22'30" Longitude 85°03'00": 85°25'45". The sanctuary has good diversity of trees species and most of them are of great economic medicinal importance. It is however unfortunately that because of human activity and lack of proper attention from forest officers this natural vegetation is being destroyed at rapid rate during a study conducted in year 2009 .The authors spotted 109 trees species, most of them having importance in one way or other .It is important to note that the area is tribal dominant & these trees play a vital role in various aspects of tribal life. Tribal have a great knowledge of ethno medicinal uses of this natural resources.

The paper deals with economic medicinal importance of trees diversity of Hazaribagh wild life sanctuary & strategies to conserve them.

Keywords. Ehtnomedicinal, arboreal, tribal

[BC-23] Extinction to conservation: Geospatial modeling for predicting suitable sites for relocation of tiger in Sariska wildlife reserve

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Sariska Wildlife Reserve of Rajasthan was and is still an excellent wildlife habitat and is a rich heritage site, but due to poor protection the number of tigers started dwindling in the middle 1990s. The primary reason for the cruel culling of the tigers in Sariska was human-caused conflict, and this has not been fully redressed as yet. Anthropogenic conflicts arise due to commercial poaching of tigers which led to their disappearance from Sariska during 2005. Geospatial techniques provide a cost-effective and quick means to make these decisions. The aim of the study is to model the actual/potential tiger habitat suitability with or without the current human impacts with integrated Geospatial technology. A methodology integrating remotely sensed data into Geographic Information System (GIS) model is developed that classify suitable sites for tiger. Major parameters responsible determining the suitable site is identified using reconnaissance study, field investigation, literature survey and expert knowledge. To decrease the complexity of the study, prey availability is not considered among the weighted input parameters; however, in order to annul the factor, it has been established from available secondary wildlife habitat data that Sariska have strong prey base with high prey density and homogeneously distributed. Weights for the parameters are assigned via fuzzy AHP and fed in GIS-MCDA with proximity and overlay analyses in GIS modeling are used to assess the suitable sites. Ten suitability classes have been designed in the order of increasing suitability following kriging interpolation. Habitat suitability index (HSI) is generated that determines the suitable site for tiger habitat. Approximately 322 km2 accounting to 27.2% is found to be highly suitable for tiger habitat and relocation. . However, 2% of the area is found to be conducive for their breeding concentrated in scattered pockets. Results show a continuous stretch of corridor of nearly 300 km2 for tiger movement. The average mean HSI is calculated to be 0.88 ± 0.06. Chi-Square tests the effect of fuzzification on result maps and found to be highly relevant for Wide Trapezoidal. Among the methods applied for assigning weights, fuzzy AHP Wide Trapezoidal seems to be best suited for the study as shown by Bland-Altman analysis and confirmed using ANOVA. The outcome may fit with conservation strategies of wildlife in the coming future to be taken by authorities.

Keywords. Geospatial modeling, Sariska Wildlife Reserve

[BC-24] The impact of a Community Intellectual Property Right (CIPR) on conservation

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International agreements like Convention on Biological Diversity and the Trade-Related Intellectual Property Rights have called for increased mutual transfer of biodiversity and biotechnology between poor and rich countries. These agreements also offer protection to intellectual property rights (IPR) of community of biotechnology transferors in the receiving countries providing physical access to foreign consumers of biodiversity. The grant of a community

intellectual property right (CIPR) can contribute significantly in maintenance of traditional ecological knowledge and in-situ conservation. The major advantage of CIPR is that it acts as a disincentive when certain groups of stakeholders are denied participation in the distribution of benefits that accrue from preservation of genetic resources and conservation of biodiversity. However, CIPR also has the potential to distort or undermine the symbiotic relationship between communities and their immediate environment to an extent which may affect the incentives for in situ conservation and sustainable use of biodiversity. Rights protection and resource access must, therefore, be developed carefully by biodiversity-rich countries to successfully balance their domestic conservation and socioeconomic goals. Thus proving IPRs as the best economic incentive society could have and encourage the production of useful information.

Keywords. CIPR, conservation

[BC-25] Protection of farmers' rights to preserve plant genetic resources

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This study intends to analyze 'why we need a law that concern with rights of farmers' and 'whether such protection helps in conservation of protection of plant genetic resources'. The lives and livelihoods of farmers are intertwined with Plant Genetic Resources. Farmer is the first link in the food security especially in India where 70% of population is engaged in agrarian activities. Farmers develop local varieties over a long period of time through keen selection and cultivation. Farmers act as stewards and innovators of genetic diversity. Recognizing and rewarding them is significant considering their vast practical knowledge in conserving and improving plant genetic resources to adapt to climate and environmental changes. A WWF-India survey, 1994, conducted in six districts of southern West Bengal, recorded 137 local rice varieties surviving in marginal farms through traditional farming. Therefore farmers' knowledge, skill and innovation have to be protected in the parlance of Intellectual Property Rights. Farmer is there from the dawn of civilization with sincere hard work and genuine affection to the land. Yet he is very poor.

This paper intends to do a legal analysis focusing on five international agreements which directly or indirectly regulate the use of plant genetic resources. These five agreements are placed in two broad categories, i.e. environmental/conservation agreements and trade and property related agreements. The first category includes the Convention on Biological Diversity of 1992 and the International Treaty on Plant Genetic Resources for Food and Agriculture, 2001. The second category includes the Convention for the Protection of New Varieties of Plants of 1991, the Agreement on Trade Related Aspects of Intellectual Property Rights of 1994, and other treaties of the World Intellectual Property Organisation. The interesting factor is that these Conventions also deal with protection of farmers and their contribution to protect and maintain plant genetic diversity. This paper also asks the question, "Does intellectual property law regulate the use of plant genetic resources for food and agriculture so as to enable equity among nations in accessing these resources and sharing the benefits which arise from them?"

Keywords. Farmer's right, conservation agreements, trade related agreements

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[BC-26] Conservation of biodiversity: A geographical analysis

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Radhanagari Sanctuary is one of the 35 sanctuaries in Maharashtra. This area is also recognized as Dajipur reserve forest. Radhanagari wildlife sanctuary is situated in greenly ranges of Sahyadri of Western Ghat in Kolhapur District. Previously this forest was specially used as favorite hunting spot by the king of Kolhapur Chhatrapati Shahu Maharaj. In the year 1958 the total 19.61 sq.km area is declared as bison sanctuary including the surrounding places from south and west.

Radhanagari sanctuary has a slight dumbbells shape extended in the Bhogaratt and Doodhanagar basin, The areas lies between 16°10' North and 16°30' North latitudes and 73°52' East and 74°05' East longitude at the height of 550 to 1000 mts. Above mean sea level. It has eastwest and northsouth stretch of about 23 and 31 km respectively. The total area covered by sanctuary is 351.16sq.km. Annual rainfall fluctuates between 2500 and 5000 mm.

In the present paper fully discussed on the conservation of Biodiversity in RWS, Radhanagari Wildlife sanctuary is abode of variety of wild animals and extremely rich flora and fauna sanctuary has revealed that there are 419 faunal species including 20species of amphibians, 58 species and 47 species of mammals. Similarly this area has a total 325 floral species which includes 200 trees, 70 shrubs and herbs, 40 creepers and 15 epiphytes.

The main objective of the present study is identified and balance of biodiversity. To study the floral and faunal diversity. Biodiversity can be conserved by in situ and exsitu methods. The inferences and conclusion are based on exhaustive field survey verifying the land much features from toposheets and remote sensing imageries.

Keywords. Radhanagari sanctuary, biodiversity conservation

[BC-27] Plant and animal diversity in Borgadh, a conservation reserve developed by the Nature Conservation Society of Nashik

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Nashik is surrounded by the Sahyadri Ranges and Borgadh, a part of it is 16 km away from Nashik City. The Borgadh hill is 3579ft tall and covers an area of 349.77 hectares, which is under the Indian Air Force. The area comes under the jurisdiction of Dindori Forest Range of East Nashik Forest Division. The GPS Position of the hill top is 20°07.566 N and 73°45.826 E. altitudinal variation is from 2317-5379 above sea level. Geological formation is Deccan trap with basalt rock. The texture of soil is loam to sandy loam. Depth of soil varies from 30-75cm. The Nature Conservation Society of Nashik has taken initiative to plant various forest trees and fruit bearing trees. With the help of Forest Department and the Air Force, they have succeeded in planting 1 lakh trees in the last 3 years. As a result of this effort the biodiversity of this area has increased dramatically in the last 3 years. In this paper the distribution of plant biodiversity and the different animal and bird species which are attracted and have become the

native of this area is discussed. Large number of plants included in the IUCN Category, have been found flourishing and regenerating. Nearly 30% threatened species of plants have been conserved by the efforts of Nature Conservation Society of Nashik. Many endangered species of plants have been recorded. An endangered plant *Ceropegia hirsuta* is abundantly found in this region. Various animal species like Jungle Cat, Monitor Lizard, Green Pit Viper, are commonly found in this conservation reserve. Nearly 30 species of birds have been identified and we could record the black bird arriving in this area in the month of May and breeding upto December. The details have been discussed in the paper.

Keywords. Plant diversity, animal diversity, conservation

[BC-28] Symbiotic relation of community with the biodiversity

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The creation of biodiverse life across the globe along with an important element-the humans- is itself synonymous with the intention of symbiotic relations between the two. Biodiversity has been playing an important role to conserve the human community centuries together, on the contrary, it is expected by the community to conserve the biodiversities of the globe.

As expected by UNCBD & IPCC, the biodiversity should be conserved at the genetic specific ecosystem level by the community at every stratum, as bio diverse ecosystem provide many goods and services that are crucial to human survival; but the earth is subjected to many human induced pressures from increased resource demand, selective exploitation or destruction of species, land - use and land cover change, to urbanization, industrialization etc.

There is a great need to correct the community activities towards the conservation of biodiversity.

Keywords. Biodiversity, conservation

[BC-29] Ecological impact of encroachment on the avian diversity and resident's conservation perception in Sanjay Gandhi National Park, Mumbai

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Sanjay Gandhi National Park is one of the largest protected areas within the city limits of Mumbai facing management issues in light of encroachments that have surrounded the park from all three sides since 1990. In this regard, this

research is an attempt to understand the impact of encroachment on the biodiversity of the park using indicator species of birds. It also tries to find out the conservation ethics of the residents.

The ecological survey was carried out to assess the presence of indicator species of birds based on the generalist-specialist concept. The presence of eleven birds indicators were compared in the three disturbance regime using line transects methodology. Eight transects from the periphery of park perpendicular towards the core were laid. Perception survey was done using the questionnaire to understand the value that the residents attached to the park with respect to impact of encroachment on the ecology of the park prior to, after encroachment and post- encroachment eviction.

The results have suggested the negative impact of disturbance on the bird assemblage. They show an increase in species richness in the low disturbance regime as compared to the high disturbance regime. The presence of birds reduced from low disturbance transects to a high disturbance one. Perception survey highlighted the change in value that residents attach to the park. The residents are for the encroachment eviction and want to protect the park as they are aware of the ecological services that it provides. It would benefit the Civil Society Organizations who educate and spread awareness to stress more on such target groups as even their perception can tilt the balance in favor of the encroachment eviction and protection of Sanjay Gandhi National Park (SGNP).

Keywords. Encroachment, birds, Sanjay Gandhi National Park, perception survey, disturbance, transects

[BC-30] Floristic diversity of Chandoli National Park, Sangali district, Maharashtra

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Chandoli National Park (earlier a Chandoli Wildlife Sanctuary) is situated in the heart of Northern Western Ghats of Maharashtra State, ear-marked as a future UNESCO World Heritage site. The study area spreads over an area of 317.67 sq. km. along the backwater of Varana river across the Sahyadri range. Chandoli NP lies between Latitude 017° 3' 29? to 017° 17' 00? north and Longitudes 073° 41' 55? to 073° 51' 55? east. The altitude above mean sea level ranges from 589 to 1044 m. In an attempt to assess floristic diversity of Chandoli NP, 957 species, 551 genera 20 varieties and 7 sub species representing 138 families of flowering plants have been studied and collected. Out of 957 species 514 species are herbaceous, 204 are trees, 184 are shrubs and 55 species are climbers. The Dicotyledons are represented by 106 families, 428 genera and 718 species while Monocotyledons by 31 Families, 122 genera and 238 species. Only one Gymnosperms has been recorded in the study area. From 957 species recorded in the study area, 222 species have been found to be endemic, which represent 23 % of total taxa. Threats to endemic taxa were assessed as per the revised IUCN criteria. The floristic composition is categorized: Critically Endangered (8), Threatened (12), Vulnerable (35) and Low risk taxa (26). During the present study one taxon has been proposed to be new. One species rediscovered after a lapse of sixteen decades and one after a lapse of eight decades have been encountered. The extended distribution range of the 17 taxa has also been recorded from Chandoli NP.

Keywords. Chandoli National Park, floristic diversity.

[BC-31] Biodiversity conservation and legal aspects

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Biodiversity is the hallmark of life on earth. From past few years a range of significant developments related to biological diversity and intellectual property rights (IPRs) came in to limelight. The two major international agreements which deal with this issue are the Convention on Biological Diversity (CBD) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) of the World Trade Organisation (WTO). The World Intellectual Property Organisation (WIPO) and other international institutions are increasingly becoming active on this field. Increasingly species-wide IPRs (transgenic cotton and soybean) could suppress even public sector and small-scale private sector crop variety development. Progress in resolving these complex issues has been slow but collective steps should be taken in developing and implementing domestic legislation which protects the interests of biodiversity conservation. Livelihood security of the local community is fairly achieved with the conservation of biodiversity.

Keywords. Biodiversity conservation, IPR

[BC-32] Biodiversity and its conservation in the light of Ayurveda and related sciences

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AYURVEDA is the ancient scientific subject dealing with the health. It is the upa Veda of Atharva Veda . Charaka , Susrutha , Vagbhata , Madhava ect had done great contribution for the treatment of human beings . Hasthyayur veda, Ashwayur veda ect deals with the other animals like elephant , horse ect . Similarly we have a detailed system of treatment of plants , for conserving the biodiversity .

Vedic rishis define agriculture as a method of distraction from un-necessary impulses & attraction towards development. says Yajur veda,
KRISHYE THWA KSHEMAYA , THWA RADHYE THWA POSHAYA

What all are the instrument to be used & how ? says Rig veda

SHUNAM NAH PHALAH VIKRUSHANTHU BHOOMIM
SHUNAM KINASHA ABHIYANTHU VAHA (R.V- 3-8,9)

Plough should be used properly just like the sickles.

Where should be cultivated ? In the KSHETHRAM .What is kshethram ? The place which is suitable for cultivation. Vasthu sasthra also agrees this . says,
BHOOREVA MUKHYAM VASTHU SYAT
THATHRA JATHANI YAANI HI (Vathu sasthram -1- 2)

This LAND is divided into ARTHANA , AGNASWATHI , URVARA & KHILA in Atharva veda (Atharva veda -7-

115-4) . Ayurveda classifies more scientifically as ANOOPAM , SADHARANAM , ...(Ashtamga hrudaya) .The Chakrapani teeka explains the importance of land qualities for each plants in this sloka description in a deep way which is now accepted by many Agricultural Universities .

The SEED used should maintain high quality . The Atharva veda hymn starting with ,
AAKSHITAM BEEJAM...

Explains how to conceive seeds . Application of MANNURE should be done with great care . The qualities of manure described are increasing the fertility & increasing the water level. It should also provide BIOEXISTANCE for bacteria (Rig veda- SATHA PATHA BRAHMANA 2-1-7)

It also explains the importance of KAREESHA .it is a natural manure which I is now easily developed in kerala in large quantities .

IRRIGATION has a scientific application. says,
SUKASHETHRA KRUNVAN ATYANTHA SINDHOON,
DHANVADHISHYAN OUSHADHEER NIMNAM AAPAH...

Ayurveda explains a series of methods for the irrigation of herbal plants . Cultivation should follow the seasonal rules . Yajurveda (8-1-20) explains the seasonal cultivation .But ASHTAMGA HRUDAYA has a full chapter on the SEASONS & the cultivation and consumption to be done .

Ayurveda also explain s PROTECTION from FLOODS & INSECTS in a ecofriendly method . Explanation of ECO FRIENDLY INSECTISIDES by Charaka is praised & applied by many agricultural universities . Vrukshayurveda (Parasara) deals with the ANATOMY & MORPHOLOGY of plants(ARISHTASHOKA PUNNAGA....) . There is a beautiful explanation of GRAFTING also (AJATHA SHAKHAAN SHISHIRE JATHA SHAKHAAN...)

So AYURVEDIC approach to plant science is excellent for conserving the biodiversity, NATURALLY.

Keywords. Biodiversity, Ayurveda, conservation

[BC-33] Floristic study of Dadra and Nagar Haveli and its significance to the tribes

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Union Territory of Dadra and Nagar Haveli is rich in vegetation and has predominance of tribal forming a major chunk of 62% of the total population. The study was carried out in the entire territory. Over 800 plants belonging to more than 100 families were studied. In this study it was observed that even though modern facilities are available in the territory but still the tribes are dependent on plants and use the plant products (as medicine, firewood, dyes, timber, etc) more frequently as they are cheap and easily available. The major reasons that the tribes use plants may be that they want to be in association with their nature which perhaps gives them a feeling that nature will never betray them. The present area of Dadra and Nagar Haveli is selected for the floristic studies because it has not been given attention despite of its luxuriant vegetation enumerated by Rao (1986) in his 'Flora of Goa, Diu, Daman and Dadra and Nagar Haveli'. and T.G. Gohil (1996) in his work 'Floristic studies of the Bonta Round Forest, Dadra and Nagar Haveli'. The ethnobotanical study of this area has been done by Subnis and Bedi (1983) who made a list of

about 25 species used by adivasis from Dadra, Nagar Haveli and Daman. It is evident from this that the area has remained botanically virgin and not explored extensively and intensively even though rich in vegetation. The total geographical area of Dadra & Nagar Haveli is 491 Sq.Kms. Of this 40% is covered by forests. The forests here are classified as Group 3 B C 2, South Indian Tropical Moist(Mixed) Deciduous Forest. The forests are comprised of *Teak, Terminalia, Acacia catechu, Adina cordifolia, Delbergia species, Madhuca indica,* etc.in top canopy. *Emblica officinalis,* Bamboo etc. in the middle canopy. The undergrowth consists of *Calycopreris floribunda,* and several climbers like *Tinospora cordifolia, Combretum ovalifolium, Vitis repanda* etc.

The paper deals with the plants found in Dadra and Nagar Haveli and which are commonly used by the tribes for various purposes like medicine, firewood, timber etc.

Keywords. Dadra and Nagar Haveli, ethnobotanical, Varli, Dhodia

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[BC-34] Bird - plant association of Fergusson College campus

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Plants form an integral part of the habitat of birds. Most birds depend on plants for their survival. In turn, the plants are dependent on a number of birds for pollination and seed dispersal. For establishing a specific relation between certain plants and birds, this particular preliminary study has been undertaken. Fergusson College has been an established heritage in the heart of the city of Pune well known for its biodiversity, amidst the sprawling concrete jungle of the city. Hence, a large number of local birds and a considerable number of migratory birds have been sighted in the campus.

Observations were made at four different locations in the campus Botanical Garden and the area around the main gate, the area around Mathematics department, Geology department, and the area near the library. These roughly covered the entire campus. The observations were made in the morning (peak time for bird activity), afternoon and evening, beginning from the onset of spring (later part of winter), and continuing in the spring, summer and pre-monsoon seasons.

With respect to the seasons studied, a significant change was seen in the type of birds as well as their activities. Winters saw the advent of migratory birds like Paradise fly-catcher and Munia. In the summers, trees like *Cassia* and *Samanea saman* mainly attracted Rose-ringed Parakeets due to the availability of pods and seeds. The massive trunk of the *Samanea* tree provided a good nesting spot for Grey Hornbills and Spotted Owlets. The fruits of *Ficus benjamina* also attracted flocks of Parakeets as well as Barbets. In the pre-monsoon period, birds like Cuckoo and Tailor Bird were spotted. The differentiation with respect to exotic plants and indigenous plants was also studied. Indirect association of birds with plants was seen. Many birds were seen feeding on insects living on particular trees. Ficus attracted many insectivorous birds like Tickell's Blue Fly-catcher and Ashy Prinia. The study of this association has shown that if either of the plant or bird is affected, the other is also directly or indirectly affected. For example, a Golden Oriole nest was spotted on *Peltophorum*, which was later cut down. This resulted in the migration of the Oriole, whose nest has not been spotted in the campus since then. Hence this preliminary study provides basic information regarding the bird-plant association which could be useful for their conservation.

Keywords. Migratory birds, Fergusson College campus, bird-plant association

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[BC-35] Study of biomass of arboreal tree diversity from Yedshi Ramlingi ghat wildlife sanctuary, Maharashtra, India

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Yedshi Ramlingi Ghat Wildlife Sanctuary, on the border of Solapur - Osmanabad districts, Maharashtra, has tropical thorn forest with 13 dominant indigenous arboreal tree species. *Anogeissus latifolia* was dominant followed by *Acacia catechu* (115 trees/ha and 103 trees/ha respectively). These are some of the typical indicators of tropical thorn forest. However, *Boswellia serrata* and *Lannea coromandelica* though recorded from this area are actually the members of dry deciduous forest (10 trees/ha, 43 trees/ha respectively). Approximately, 360 trees/ha with average girth (29.2 cm) and height (3 m) were noted. *Azadirachta indica* showed maximum basal area while that of *Santalum ablum* had minimum. From present sanctuary, 12.45 tons/ha above ground tree biomass was calculated. Plantation of non indigenous *Gliricidia* sp. was observed which will affect the present tropical thorn forest ecosystem of the sanctuary in the long run.

Keywords. Wildlife sanctuary, forest ecosystem

[BC-36] Angiospermic diversity of Talegaon-Dabahde - A probable buffer zone for Lonavala-Khandala biodiversity hotspot

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Lonavala-Khandala is one of the 'Local Biodiversity Hotspots' in Western Ghats of India and declared as a one of the IBAs in Maharashtra. Talegaon Dabhade, a place which is about 30 km in the east of Lonavala, sustains about 40% plant species, which are similar to that of the Lonavala-Khandala biodiversity hotspot. Though climatic conditions of these the places are different but have similarity with the topography thus the angiospermic diversity of Talegaon-Dabhade region has great significance. If the proper attempts for conservation of habitats and species diversity in surrounding area like Talegaon Dabhade are made; then it will help to develop as a buffer zone around the Lonavala-Khandala hotspots. Nowadays scenario of ecosystem at Lonavala-Khandala hotspot is turning to worst due to increasing anthropogenic and developmental pressure and unmanaged tourism. It caused serious damage to the habitats for many species, which put many important species of birds and plants in peril.

Keywords. Western Ghats, biodiversity hot spot, Talegaon-Dabhade region, buffer zone

[BC-37] Biodiversity and conservation of Seshachalam hill range (Eastern Ghats)

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Seshachalam hill range of Eastern ghats is the richest floristic hot spot harbouring many endemic and rare plants. This area is not properly explored due to prohibition and religious importance because the holy shrine of Lord Sri Venkateswara or Balaji situated here. Namalagadhi, Dharmagiri, Gogarbham, Srivarimettu, Microwave station and adjacent forests like Marnandur, Kukkaiadhodi, Nagapatla and Talakona to mention a few are endowed with a very rich flora and also abound in many medicinal plants of importance. Varied micro-climatological, undurlating topographical conditions prevailing at various waterfalls (theerthams) situated at different heights, provide a very favourable habit and support the growth of the plant species. The present study the basis of hebarium collection a short account of different plant resources is presented here. Its dry deciduous type of forest with patches of moist deciduos forest. It is famous for plant species like sandalwood, redsanders, shorea thumbergia, shorea talura, terminalia pallida, cycas beddomei, syzygium alternifolium etc. it has about 1500 plant species belonging to 176 families.

Mammals: Seshachalam hill range is famous for very rare slender Lorises and the rare endangered golden Gecko, Indian Giant Squirrel, Tree shrew and Flying lizards. There are other mammal species like the Nilgai, Wildboar, Lepoard, hyena etc.

Birds: There are more than 100 species of birds in Seshachalam hill range including crested serpant Eagle, Ashy crowned finch lark, Indian roller, King fishers, white bellied Woodpecker etc.

Endangered plants: *Homalium zeylanicum, Buteamonosperma, Rhynchosia heynei, Tephrosia colophylla, Saraca asoca, Entada rheedii, Heracleum regins, Plumbago indica, Stryhnos colubrina, Cerapegia spiralis, Decalepis hamiltonii, Pectranthus barbatus, Pipernigrum, Santalum album. Vanilla wightiana and Acorus calamus.*

Critically endangered plants: Rauvolfia scrpentina and Litsea glutinosa.

Vulnerable plants: *Hildegardia populifolia, Sterculia urens, Aegle marmelas, Rubia cordifolia, Gymnema sylvestre. Oroxylum indicum, Euphorbia fusiformis, Phyllanthus indofischeri. Stemona tuberosa and Gloriosa superba.*

Near threatened plants: *Shorea robusta, celastrus paniculatus, Pueraria tuberosa, Holostemma ada-kodien and Costus speciosus.*

Endemic plants: *Shorea tumbaggaia* (Dipterocarpaceae), *Boswellia ovalifoliolata* (Burseraceae), *Indigofera barberi, Pteroarpus santalinus, Rhynchosia beddomei* and *Sophora interrapta* (Fabaceae). *Terminalia pallida* (Combretaceae), *Syzygium alternifolium.* (Myrtaceae), *Pimpinella tirupatiensis* (Apiaeae), *Leucas indica* var. *nagaiapuramiana* (Lamiaceae) and one gymnosperm *Cycas beddomei* (Cycadaceae) are endemic to this geographical area.

Keywords. Seshachalam hill range, biodiversity, conservation

[BC-38] Improving biodiversity through JFMP in the Rajpipla forests of Gujarat

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Forest management has changed considerably over the last few centuries, with rapid changes from the 1980's onwards reaching now to a sustainable forest management. Foresters who practice sustainable forest management focus on the integration of ecological, social and economic values, often in consultation with local communities and other stakeholders. A new plantation forest paradigm which is based on the hypothesis that minor improvements in management can better conserve biodiversity, with the management of the state forestlands jointly by the state and the local community with joint sharing of benefits has lead to the formation of Joint Forest Management (JFM). Generally, local feels that these plantations have very little structural and compositional diversity and are not particularly rich in biodiversity. However, there are also many examples where JFM planted forests served as nurse crops, allowing shade-adapted, late succession species to develop. JFM guidelines emphasize species richness as an important factor of forests under joint management. They can also protect habitats, restore the ecology of degraded sites, and improve the quality of water, air, and soil. These JFM forests regenerate naturally and are self-perpetuating in the absence of catastrophic stand-replacing disturbances, such as the wildfires. Besides rehabilitating degraded hills, improving environment and contributing to the rural livelihoods, community forestry like JFM is claimed to be a major means of biodiversity conservation.

This paper is based on the findings from JFM forest villages from Rajpipla taluka of Gujarat and suggests practicing of polycultures plantations over monocultures plantations by planting multiple crop species and/or leaving some native trees unharvested. Native species should generally be favored over exotics. JFM Plantations that have already been established by traditional design can also conserve biodiversity via small modifications. The Paper also argues users' active and innovative practices of forest management for favoring biodiversity conservation.

Keywords. Biodiversity; conservation; JFM plantation, livelihoods community forestry

[BC-39] Intellectual property rights and biodiversity conservation

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Biodiversity is the variability of all living organisms from all sources and ecological complex of which they are a part. It is the basis of our sustainability. The conservation of biological diversity is now widely recognized, in the developed countries very few measures are taken to protect endangered species and habitats. As these countries have advanced technology but less biogenic resources, thus they use resources form the developing countries due to which there is unprotected flow. The Intellectual Property Rights (IPR) promotes protection of new plant varieties, microorganisms, and genetically modified organisms, flora and fauna. As a result rich biogenetic diversity is being explored irreversibly thus alternative approach should be found that will bring a balance between formal Intellectual Property (IP) system and sustainable aspects of biodiversity.

Keywords. IPR, biodiversity, conservation

[BC-40] Understanding bamboo biology for their conservation and sustainable utilization

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Bamboos are valuable natural resources, important for both environment and economy. This multipurpose bio-resource is one of fastest growing plants on earth (as much as 3.0 m per 24 h), and has great potential for creating employment and generating income for rural communities. In the past two decades bamboo has emerged as a valuable wood substitute. Globally bamboos support the livelihoods of more than 1.5 billion people. Annual trade in bamboos (both raw and finished products) is estimated at more than 5.0 billion dollars. Wild populations of bamboo play a significant role in biodiversity conservation. Conservation and expansion of bamboo forests can mitigate deforestation, prevent soil degradation and restore degraded lands. Survival of the giant panda (*Ailuropoda melanoleuca*) is also dependent on the conservation of bamboos in their native habitats. In recent years, with the looming threat of global warming, there is much interest in bamboo as a carbon sink.

Worldwide there are about 1400 species of bamboos under 101-118 genera. They are classified under three tribes: Bambuseae, Arundinarieae, Olyreae. India has the second largest bamboo biodiversity in the world (after China) with about 130 species under 24 genera. In India the North-Eastern region is rich in diversity of bamboos. In Maharashtra most common bamboos are species of Bambusa *(B. arundinacea, B. vulgaris)*, *Dendrocalamus (D. strictus)*, and *Pseudooxytenthera (P. monostigma, P. stocksii)*. Of these *D. strictus* is widespread in distribution whereas species of *Pseudooxytenthera* are found in the forests of Western Ghats.

Large scale propagation of bamboos is difficult because of their peculiar flowering behaviour only at very long intervals, and sterility in some species. Floral biology and breeding behaviour were studied in *B. arundinacea, B. vulgaris* and *D. strictus*. The inflorescence in *B. arundinacea* is a large branching panicle. Anthesis took place in the morning hours. It was more or less synchronized and was dependent on the atmospheric temperature and humidity. The lemma and palea opened to expose both androecium and gynoecium to the pollinating agent (wind). Pollen fertility was approx. 93%. Seed production was profuse. In *B. vulgaris* lemma and palea did not open-up to expose androecium and gynoecium to the pollinating agent. This may be due malfunctioning of lodicules. No seed-set was observed in this species. *D. strictus* is dichogamous (protogynous). The gynoecium matured 34 days before the androecium, effectively preventing self pollination. Anthesis took place in the morning over a period of 2 to 3 h, depending on air temperature. Pollination was mostly through wind. Insects visited flowers in the male phase, but completely neglected the flowers at the female phase. The insects fed on the pollen and were not pollen vectors. Pollen fertility was about 98%. There was profuse seed production. Seeds of *B. arundinacea* and *D. strictus* did not have any dormancy and lost viability gradually on storage.

Conventional vegetative propagation methods in bamboos are: seedling multiplication; offset and clump division; rhizome, culm and branch cuttings; layering, etc. Most of these methods pose difficulties such as: large propagules, difficulty in extraction and transport, lack of sufficient numbers for raising large-scale plantations, and extraction of popagules lowering the productivity of parent clumps. Micropropagation methods are available in *B. arundinacea, D. strictus, and P. stocksii. In B. arundinacea and D. strictus* methods are available for propagation from both juvenile (seedling) as well as mature explants. However, use of micropropagated plants is restricted to Forest Departments and large-scale plantations.

Keywords. Bamboo biology, Bambuseae, Arundinarieae, Olyreae, sustainable utilization

[BC-41] How to get a 360 degree buy-in for biodiversity conservation

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To protect the beautiful natural marvels around the globe for generations to come it is absolutely critical that every single stakeholder in a given eco-system strongly believes in the benefits of conserving it rather than the incentives of capitalizing on it solely from a resource standpoint.

The main stake holding parties are the local communities surrounding the environment, the regional and national government and arguably the most important one: the remote urban citizens, whose increasingly sophisticated demands drain natural resources beyond sustainability.

This presentation looks into the various buy-in strategies one could pursue supplemented with positive examples from around the world where these were successfully implemented already. I find that full transparency around a product's origins, motivating local communities and effective communication via education and various other avenues are the key ingredients to a successful approach. The final aim is to leave the reader/audience not only with thought-provoking ideas and mere passion to act, but also with actionable next steps.

Keywords. Biodiversity conservation

[BC-42] Study of endemic, rare, endengered and thretened flowering plants of Kas plateau, district Satara, Maharashtra.

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The Western Ghats is internationally recognized as a region of immense global importance for the conservation of biological diversity. The Ghats characterized with every peculiar high altitude plateaus. Rocky lateritic plateaus locally called sadas is the unique feature of the Sahyadri. The Kas Plateau is one of the important plateau in Sahyadri ranges of Western Ghats located in Satara district of Maharashtra state at an elevation of about 1,213 ASL. The plateau possesses very unique herbaceous ephemeral vegetation. It is botanically rich and characterized with high degree of endemism. Large number of plant communities exits on the plateau with highly specialized niche requirement. Due to high endemism and species richness, this region has been globally recognized is one of the hot spot of biodiversity, and nominated for word's natural heritage.

The present paper deals with assessment of ENDEMIC AND RET flowering plants of KAS PLATEAU. The thorough and exhaustive survey of KAS PLATEAU shows very important data analysis of ENDEMIC AND RET Flowering plants. Angiosperms on KAS PLATEAU are represented by 310 species out of these 102 species endemic and 46 species are RET, that means among total angiosperms found on plateau 32% are endemic and 14% are RET species. At present, the floristic diversity of Kas plateau is threatened by mass tourism, developmental activities and overgrazing.

Keywords. Western Ghats, endemic plants, Kas plateau

[BC-43] Studies on bio-diversity of medicinal plant from newly reported sacred groves (Devrais) from Ahmednagar district, Maharashtra

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The tribals of the Kalsubai Harichandragad wild life sanctuary have beliefs and respect for the sacred groves. These sacred groves are preserved forest due to various deities. The various components of vegetation are under the prodection of the local deity of that forest groves. Kalsubai Harishchandragad wild life sanctury acquire an area of 361.17 square kilometer and it lies between 18020', 19059' North latitude and 70040', 75059' east longitude with in Ahmednagar, District Maharashtra.

The sanctury with hilly topography having mansonic climex, heavy rain fall. The soil in chiefly latetitic, mixed with dry and humus under dense patches of vegetation. It is exposed to the full blast of the south west mansion and gets a maximum rainfall 2000 to 3000 mm annually. Also maximum temperature 350C to 410C and minimum 40C to 150C the hottest month of the year are April and May. The lowest temperature is recorded in month of January.

During the ecological studies of Kalsubai, Harishchandragad, wild life sanctury located in Western ghat if shyhadri ranges with in Ahmednagar district Maharashtra. The highest picks points of sayhadri (Western Ghat) are present in this area. Kalsuai 1654 meters Harichandragad 1424 meters and Ratangad 1297 meters during this studies with come across some sacred groces (Deavaris)

In the sanctury five sacred groves are situated in forest area by the various deities name. these are Kaloba Ban near the village Ratanwadi, Maruti ban near the village Udadwane, Ragoba ban near the base of Harichandragad and Ghatandevi near Ghatghar.

These five sacred groves are rich in plant diversity and leaving museums of plants and resources to carry out research also supplu fresh medicinal plant to tribles.

The present paper include bio-diversitical information about medicinal plants used by tribal communities to cure human ailments. These plants are preserved in above sacred groves. The information of medicinal plants was collected by discussion with local people, Vaidya and leyman and other such herbal practitioners from the wild life sanctury. The newly reported sacred groves described with area of scared groves, map locality, nearer village of sacred groves its distance from cillage or Wadi. Name of deity big trees with hight and diameter local name ofamily of tree.

Keyword: Biodiversity of sacred grove (Devrais)

[BC-44] High resolution satellite image based mapping of mango (*Mangifera indica* L.) plantations at Ranpar, Pawas bay, Ratnagiri, Maharashtra

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Utilization of very high resolution remote sensing data finds a good place in studies related to density estimation and

counting of commercially important trees. A high resolution multispectral Quick Bird satellite image of spatial resolution 2.37 m dated 3rd May, 2008 was used to count and calculate density per hectare of mango plantations. An eleven km buffer was generated considering Ranpar village, Ratnagiri District, Maharashtra as the centre point of the study area. For counting of orchard mango population, visual interpretation technique was used whereas, for counting non-orchard mango population stratified random sampling technique at 1.29 percent sampling intensity within non-plantation, mixed vegetation and settlement areas was adopted. Fifteen land use land cover classes including orchard and non-orchard mango were discerned from the satellite image. Orchard mango plantation area was calculated to cover 18.61 hectare constituting 8.59% of the total area, whereas Non-orchard Mango trees covered area of 6.08 hectare constituting 2.81% of the total area. Buffer wise (1 km buffer each out of the total 11 km area) count and area for orchard and non-orchard mango plantation were also calculated. The total count of orchard mango population was estimated to 61887 whereas, 98421 for non-orchard mango plantation in whole study area.

Keywords. Satellite image, orchard mango population, non-orchard mango population, buffer area, image interpretation

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[BC-45] Conservation of fast disappearing medicinal lianas / climbers of Western Ghats, India

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For more than 70% of the population of Southeast Asia, traditional medicine (TM) forms a part of primary health care. TM is increasingly gaining popularity in the Western countries. Looking at the number of individuals practicing traditional / complementary / alternative Medicine (TM) and number of patients benefiting from it, it is proved beyond the doubt that the traditional medicines are gaining popularity across the globe. Traditional medicines are fully integrated into the health systems of China, North and South Korea and Viet Nam while in other countries like India and Japan they are parallel to mainstream health system. Over the years, the numbers of patients that rely upon TM for preventive or curative purposes are increasing. This can be evident from the fact that over 75% of the population of France has used TM at least once, while in Germany, 77% of pain clinics provide acupuncture. In China, traditional herbal preparations accounts for 30%-50% of the total medicinal consumption. In Ghana, Mali, Nigeria and Zambia, the first line of treatment for 60% of children with high fever resulting from malaria is the use of herbal medicines at home. In spite of such a large dependence on the traditional medicines, its natural source often remained neglected and in many cases overexploited. Overexploitation coupled with the increasing demand is causing great concern towards the conservation of these resources. Just to make the situation worse there are many medicinal species that are more vulnerable just because they do not fall under tree category. In fact they are selectively felled as a part of management practices. The paper addresses concerns of rapidly disappearing medicinal lianas.

Keywords. Medicinal lianas, Western Ghats

[BC-46] Role of National Social Service, Rotary Club and Social Forestry in biodiversity conservation

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Biodiversity conservation at a global scale often starts with small human activities. Tree plantations, reforestation and cleanup are all human activities that contribute to biodiversity conservation. The involvement of local people facilitates the viability of biodiversity monitoring also. the present paper explores the role of various social organisations in biodiversity conservation in and around Solapur district. Solapur district is a region in South Western part of Maharashtra state (India) occupying an important position in terms of area and population. Various social organisations in Solapur like NSS, Educational Institutions, Rotary club, Social Forestery etc, have found to be creating sense of conservation of plant and animal species by encouraging local people to sponser tree, seed or spread seeds on open land,create nurseries and plant a tree on different occassions. This activity from its commencement has shown the encouraging resultsin increasing and conserving biodiversity.

Keywords. NSS, Rotary Club

[BC-47] A conservation of medicinal plants: the need for a programme of conservation and sustainable utilization of medicinal plants

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All cultures from ancient times to the present day have used plants as a source of medicines. Today, according to the World Health Organization (WHO), as many as 80% of the world's people depend on traditional medicine for their primary health care needs. The greater part of traditional therapy involves the use of plant extracts or their active principles. However, no concerted effort has been made to ensure this, in the face of the threats posed by increasing demand, a vastly increasing human population and extensive destruction of plant-rich habitats such as the tropical forests, wetlands, Mediterranean ecosystems and parts of the arid zone.

Today many medicinal plants face extinction or severe genetic loss, but detailed information is lacking. For most of the endangered medicinal plant species no conservation action has been taken. For example, there is very little material of them in genebanks. Also, too much emphasis has been put on the potential for discovering new wonder drugs, and too little on the many problems involved in the use of traditional medicines by local populations.

For most countries, there is not even a complete inventory of medicinal plants. Much of the knowledge on their use is held by traditional societies, whose very existence is now under threat. Besides the identification and selection of medicinal plants for use in health services, there is the potential that plants hold as an inexhaustible reservoir for the identification and isolation of useful chemical compounds for syndromes such as AIDS, for which there is yet no known cure. In the light of this situation, WHO, IUCN, and WWF decided that it would be timely to collaborate in convening an International Consultation on the conservation of medicinal plants, bringing together leading experts in different fields to exchange views on the problems, determine priorities and make recommendations for action. The experts at the meeting included administrators and policy-makers in health and conservation, and covered the

disciplines of ethnomedicine, botany, education, pharmacology, nature conservation and economics. For IUCN and WWF, this meeting was an important part of their Plant Conservation Programmes.

The aim of these guidelines is to provide a framework for the conservation and sustainable use of plants in medicine. To do this, the guidelines describe the various tasks that should be carried out to ensure that medicinal plants are conserved effectively for the future and that where medicinal plants are taken from the wild, they are taken on a basis that is sustainable.

No single sector, private or public, can undertake the conservation of medicinal plants alone. The job requires a team effort, involving a wide range of disciplines and institutions.

The best was to start such a process is for each country to prepare a national strategy for the conservation and sustainable use of its medicinal plants. The process of preparing a Strategy will help in:

- developing a consensus on what needs to be done;
- assigning tasks to different institutions;
- motivating participants to undertake the tasks; and
- monitoring progress.

[MD-1] Diversity of of microbiota associated with the gut of house flies (*Musca domestica* L.)

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House flies (*Musca domestica* L.) are cosmopolitan, ubiquitous, synanthropic insects that serve as mechanical or biological vectors for various microbes. To fully assess the role that house flies play in the epidemiology of human diseases, it is essential to understand the range of microbiota harbored by natural fly populations. This study aimed to identify the diversity of house fly gut bacteria, by culture-recovery and culture-independent approaches. A total of 102 bacterial strains were isolated from the gut of 65 house flies collected from various public places including a garden, public park/environmental, garbage/dump area, public toilet, hospital, restaurant/canteen, mutton shop/ market and house/human habitation. Molecular phylogenetic analyses placed these isolates into 22 different genera. The majority of bacteria identified were known pathogens of the genera *Klebsiella, Aeromonas, Shigella, Morganella, Providencia and Staphylococcus.* Culture-independent methods involved the construction of a 16S rRNA gene clone library, and sequence analysis supported culture-recovery results. Bacterial taxa not determined by culture-recovery were members of the classes *Alphaproteobacteria, Deltaproteobacteria,* and the phylum *Bacteroidetes.* Thus house fly gut is demonstrated to be an environmental reservoir for a vast number of potentially problematic bacterial species from human point of view.

Keywords. House fly, gut bacteria, *Alphaproteobacteria, Deltaproteobacteria*

[MD-2] Investigation on halophilic microbial biodiversity of Lonar crater lake diststrict Buldana, Maharashtra, (India)

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The phylogenetic Biodiversity of microorganisms at high salty condition is surprising. halophilic microorganisms are found in each three domain Archaea, Bacteria and Eucarya. The metabolic Biodiversity of halophilic

microorganisms is a great as well as they include oxygenic ,anoxygenic ,phototrophs, aerobic heterotrophs, fermenters, denitrifieres, sulphate reducer, and methanogens.

To study the microbial Biodiversity of the Lonar Lake, Soil sample and water sample were collected from temple area of "Kamalja Devi" and isolation were done from both Lake Sediments as well as water samples. Total viable count (TVC) of sample was determined by inoculating the samples on nuterient agar containing 0.1g % glucose at various salt concentration (0.5-5%) and various Temperature, and well isolated colonies were selected and identified. The bacteria belong to genera of Bacillus, Staphylococcus, and Alcaligens etc were identified .The Bacterial genera like Holomonas, Planococcus and Micrococcus were obtained by enrichment of sample in various nutrient agar medium.

In some cases such as production of ectoine the product is directly related to halophilic behavior of producing microorganism. In other cases, such as extration of beta-carotene from Dunaliella or the potential use of Haloferax species for the production of poly beta hydroxyalkanoate or extracellular polysacchride.

Several halophilic microorganism identified from both the sample are being highly used in Industrial microbiology and biotechnology. And hence we have to conserve such precious microbial flora by avoiding pollution due to sewage, pesticides, insecticide and human activities like tourism.

Keywords. Halophilic microorganisms, biodiversity, Lonar crater

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[MD-3] Exploration of aerobic alkaliphilic bacterial diversity from alkaline soda lake of Lonar, India for production of industrially important cyclodextrin glycosyl transferase enzyme

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Lonar lake is situated in Lonar village in the Buldhana district of Maharashtra State, India (Latitude 19o58', Longitude 76o36').The aerobic cultivable microbial diversity of Lonar lakes has been studied previously. The alkaliphiles were screened for production of industrially important enzyme cyclodextrin glycosyl transferase (CGTase; EC 2.4.1.19). This enzyme acts on starch and produces ß-CD which is composed of seven a-D-glucopyranoside units linked by a, 1- 4 linkage. ß-CD is used as drug carriers and tabletting vehicle in pharmaceutical industry. It is also used in nutraceutical applications, to stabilize emulsions of fats and oils and in the preparation of bread spreads, dairy ice creams and breads. We have explored the aerobic alkaliphic bacterial diversity for CGTase production using phenolphthalein assay. Three isolates *Bacillus firmus, Bacillus fusiformis* and *Bacillus licheniformis* were identified and used for cyclodextrin production. The enzyme activity and specific activity of CGTase produced by the bacteria was estimated. The cyclodextrins produced by CGTase were analysed on HPLC. Alkaliphilic *Bacillus licheniformis* from Lonar Lake showed maximum CGTase activity and was hence used for further studies.

Keywords. CGTase, alkaline bacterial biodiversity, Lonar lake

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[MD-4] Biodiversity of microorganisms in the rhizosphere of medicinal plants in Mamandur forest of Eastern Ghats

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Micro organisms inhabit virtually every ecological niche in the biosphere. Physical, chemical and biological properties of soil contribute to microbial population. In the present study the occurrence and diversity of microorganisms was studied in the rhizosphere soil of medicinal plant growing in Mamandur forest area in Andhra Pradesh. The results revealed rhizosphere of medicinal plants inhabit less microbial population than plants with non medicinal properties which attributes to the release of root exudates by medicinal plants. The findings of the same will be discussed in detail.

Keywords. Rhizosphere, Mamandur forest, microbial diversity

[MD-5] Diversity of *Penicillium* and *Curvularia* species from Kopergaon tahsil, district Ahmednagar (M.S.)

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Nine sites selected for soil sampling from Kopergaon tahsil were irrigated, semi irrigated and aried. Soil samples were collected during summer rainy and winter seasons for two years and were analyzed by soil dilution method. Soil samples were tested for various media and analyzed for different seasons. Among different media Czapek Dox Agar and Lactose Yeast Extract Agar were found to be better for isolation of maximum number of *Penicillium* and *Curvularia* species .About five species of *Penicillium* and six species of *Curvularia* were isolated from nine localities, *P. frequentance*, *P. simplicissimum*, *P. chrysogenum* were isolated during summer, rainy and winter season. *P. waksmani* was isolated during winter season, however *P. implicatum* was isolated during rainy season. Among *Curvulariaa species C. palascens, C. catenulata, C.tritici*, *C.clavata* were isolated during winter season Curvularia ricaardii was isolated during summer, rainy and winter season and *Curvularia lunata* was isolated during summer and rainy seasons.

Keywords. Fungal diversity, media, seasons, *Penicillium spp, Curvularia spp*

[MD-6] Diversity of halophiles from Andaman islands, India

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Halophiles are diverse group of organisms that thrive extreme saline environments. Depending upon their requirement for salt concentration, they are classified as halotolerant, moderately halophile and extreme halophile. They are routinely isolated from solar salterns, saltern pans, seawater and sand. Halophiles have wide range of biotechnological potential in industry e. g. biosurfactant production, biopolymers in oil recovery, proteases and amylases in detergent industry, poly-beta hydroxy alkanoate as biodegradable plastic, exopolysaccharide etc. and bioremediation of contaminated hypersaline brines. The present paper reports isolation of diverse group of halophiles in coastal area of Andaman Islands, India which is a group of archipelagic islands in the Bay of Bengal and are part of the Andaman and Nicobar Islands Union Territory of India. We report here for the first time the isolation of halotolerant, moderately halophiles and extreme halophiles from Andaman Islands. These halophiles indicated potential in production of industrially important enzymes like amylase, cellulase, protease, caseinase and polyhydroxyalkanoates, exopolysaccharide, pigments.

Keywords. Halophiles, Andaman Islands, halotolerant

[MD-7] Antimicrobial potential of endophytic bacterium isolated from Annona squamosa

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Endophytes are microorganisms that colonize internal tissues of all plant species, create a huge biodiversity. The present study confers the undefined richness of microbial world encompasses the plethora of endophytic entities occupying utterly millions of unique biological niches (higher plants). An endophytic bacterium associated with medicinal plant *Annona squamosa* was screened for antimicrobial activity. Based on the 16s rRNA and various physiological tests isolated bacteria belong to *Pseudomonas* species. Fermentation broth was extracted with ethyl acetate and tested for antimicrobial activity. Crude extract of the isolate showed inhibitory activity against most clinically important Gram-positive and Gram-negative bacteria as well as against *Candida albicans*. TLC separation using hexane: ethyl acetate gradient resulted in five major active fractions with different R_f values. Fractions with R_f value 0.3 and 0.7 exhibited zone of inhibition against all the tested pathogens. The results showed a potent antimicrobial activity in the isolated fractions. Further purification and characterization of these fractions will be promising enough to reveal any novel metabolite of pharmaceutical importance. The recent development and implementation of new technologies offers unique opportunities in the screening of natural products from plants and microbes will reestablish them as a major, ultimate, readily renewable, reproducible and inexhaustible source of novel structures bearing pharmaceutical potential for drug discovery.

Keywords. Endophytes, antimicrobial potential, *Annona squamosa*

[MD-8] Microbiological study of Harni river near Naldurg district, Osmanabad (M.S.) India

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In the year 2009, (Jan to Dec.), the seasonal variation in coliform bacteria, faecal coliform and *E. coli* were studed. The study shows that Harni water is not suitable for drinking purpose. The details were discussed in the text.

Keywords. Harni river, coliform bacteria

[MD-9] Diversity of the restriction endonucleases of microorganisms from different ecosystems

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Diversity of the restriction enzymes with respect to their recognized sites generally found in endonucleases which are isolated from the different sources is wide. Depending on the recognization site type II Reases is wide have further subtypes as orthodox type IIP, type IIE, type IIF and type IIS. The enzyme is most likely found in microorganism to sustain eco environmental factors which may be atributed to production of the endonucleases. It also protects the cells against the foreign invading DNA.

Streptomyces sp. was isolated from the untouched ecosystem of the western coast of Maharashtra. The *Streptomyces sp.* showed the restriction endonucleases activity. Here we highlight the substrate recognization of this isolated thermophilic restriction endonuclease with different assay conditions. The restriction activity assay was carried out using different buffer and temperature conditions. The 37 0C temperature is found to be optimum for the restriction endonuclease activity.

Keywords. Restriction endonucleases, *Streptomyces*

[MD-10] Study on the diversity of the non-conventional biotechnologically relevant yeast *Yarrowia lipolytica* in and around Pune city

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Yarrowia lipolytica is a fungus that degrades hydrophobic substrates efficiently. It is able to utilize n-parrafins and

triglycerides on account of its ability to produce enzymes such as oxygenases and lipases. *Y. lipolytica* has several biotechnological applications. It can also be used in treatment of wastes, bioremediation of hydrocarbon contaminated soils and biotransformation of economically important products. The present study highlights the diversity with respect to *Y. lipolytica* in and around Pune. Samples from various sites and environmental conditions were collected and used for the isolation procedures. These were enriched in Yeast Nitrogen Base medium supplemented with oil/ n- hexadecane and the yeasts were isolated on MGYP medium (Malt extract Glucose Yeast extract Peptone). In all, 29 hydrophobic substrate degrading yeast isolates were obtained. These were tested for their ability to assimilate sugars and not ferment them (a characteristic typical for *Y. lipolytica*). 5 isolates assimilated glucose without fermenting it. These 5 isolates were further characterized by the RAPD technique and the patterns that were observed were compared with standard patterns for *Y. lipolytica*. From the RAPD analysis, 4 isolates were tentatively confirmed to be strains of *Y. lipolytica*.

Keywords. *Yarrowia lipolytica*, hydrophobic substrate, diversity

[MD-11] Studies on occurrence and distribution of *Acinetobacter* spp. and other Gram negative bacteria isolated from rhizosphere of wheat

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Four Gram negative bacterial genera were isolated from rhizosphere of wheat. They were identified as *Pseudomonas, Acinetobacter, Moraxella* and *Serratia*. Thirty seven *Acinetobacter* spp.were isolated from rhizosphere of wheat and confirmed by chromosomal DNA transformation assay. Members of genus *Acinetobacter* were found to be one of the dominant bacteria (31.3 %) next to Pseudomonas (35.7 %) in the rhizosphere of wheat. Number of *Moraxella* (28 %) was found less than *Acinetobacter* and *Serratia* was present in least (4.5 %) number as compared to others in wheat rhizosphere. Percentage of these bacteria in rhizosphere of wheat was found to be : *Pseudomonas* 35.7 % , *Acinetobacter* 31.3 %, *Moraxella* 28 % and *Serratia* 4.5 %. Interesting reciprocal interaction between number of *Acinetobacter* and *Moraxella* spp. was also observed. AMM and Holton's medium without cefsulodin was found to be the most suitable media for isolation of *Acinetobacter* spp. from rhizosphere of wheat. Maximum numbers of *Acinetobacter* spp. were found in rhizosphere soil of wheat plant than rhizoplane and non-rhizosphere soil. Growth stages of wheat plant affected the populations of these bacteria at inflorescence and fruiting stages. Number of all four genera were found to increase at inflorescence and fruiting stage of wheat plant that suggest that root exudates of wheat plant affect on natural population of rhizobacteria in the rhizosphere. Soil analysis of RS and NRS soils at each life stage of wheat plant showed clay texture and alkaline pH (7.8-8.2) of both the soils. It was observed that increase or decrease in macro and micro nutrients of RS and NRS soils of wheat plant was found to depend on life stage of wheat plant. It was also found that there was close relationship between growth stage of wheat plant, rhizosphere of wheat and rhizobacterial population in rhizosphere of wheat.

Keywords. *Acinetobacter*, wheat, rhizosphere

[OT-1] Screening of traditional rice cultivars grown by tribals of Thane district in Maharashtra

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Thane is one of the major and tribal district of Maharashtra. Tribals of northern part of Thane district have conserved 28 land races of rice on farm by traditional methods of cultivation. Efforts are made to screen these 28 cultivars of rice for their yield characteristics and nutritional values. Findings of this work include Scented, long grain, short and bold grain, high protein, high carbohydrate and high lysine content cultivars of the rice . The importance of conservation of such rich rice diversity from this fast changing agro-ecosystem of Thane district is discussed. Both in situ and ex situ conservation steps are necessary to conserve these cultivars of rice crop.

Keywords. Land races, rice, diversity, nutritional values, yield characteristics, conservation

[OT-2] Manipulation of hyoscyamine and scopolamine using stress in *Datura metel* L.

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For optimization of biomass cell suspension cultures of D. metel L. were raised on different growth regulators with different concentrations as IAA (0.5, 2 mg/l), NAA (0.5, 2 mg/l), BAP (0.5, 2 mg/l), 2, 4-D. (0.5, 1, and 2 mg/l). Highest biomass in terms of Fresh Weight (FW) and Dry Weight (DW) obtained on 2, 4-D (1 mg/l) for all studied medium. The cell suspension cultures were harvested after every seven days for checking of alkaloid content up to three weeks. On the basis of production of alkaloids i.e. hyoscyamine and scopolamine we found that 2, 4-D, BAP (0.5, 0.5 mg/l) was the best medium for manipulation of alkaloids using different stress producing agents (elicitors) and therefore it was used to carryout further experiment. Highest hyoscyamine and scopolamine content was obtained at 0.25mM treatment of SA which was 0.254 mg/g DW and 8.588 mg/g DW respectively, at 36 h. High level of hyoscyamine (0.224 mg/g DW) and scopolamine (8.490 mg/g DW) was obtained at 200 mg/l of YE treatment at 36 h. Highest hyoscyamine and scopolamine content was obtained at pH 5.5 at (12 h) and it was 0.217 mg/g DW, 8.333 mg/g DW respectively.

Keywords. *Datura*, elicitor, salicylic acid, yeast-extract, pH

[OT-3] *Asterella angusta* St., a liverwort screened for antimicrobial activities with nutrient elements analysis from Western Ghats of Maharashtra

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The thalloid liverwort *Asterella angusta* St. collected from Lonawala region of Western Ghats of Maharashtra, screened for antimicrobial properties. Extractions were made with different organic solvents and extracts used to determine cidal activity against the organisms viz. *Aspergillus niger, Fusarium moniliformae, Fusarium oxysporum,* and *Rhizopus stolonifer* as fungal strains whereas, *Bacillus substilis, Escherichia coli, Pseudomonas aeruginosa,* and *Staphylococcus* aureus as bacterial strains. By employing 'disc diffusion assay,' zone of inhibitions for each extract were observed. Amongst these, the broadest spectrum of antifungal and antibacterial activity shown by ethanolic extract. In addition, rhizosphere soil analysis was made for physicochemical and biological properties.

Keywords. *Asterella angusta* St., antimicrobial activity, nutrient elements, rhizosphere, Western Ghats, Maharashtra

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[OT-4] *Targionia hypophylla* L. screened for antimicrobial, physicochemical and biological properties from Western Ghats, Maharashtra - India

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The present investigation focusing on the evaluation of thalloid liverwort *Targionia hypophylla* L. extracts screening for antimicrobial activity from Sinhagad and Rayreshwar forts of Western Ghats, Maharashtra in India. Acetone, ethanol, petroleum ether and distilled water extracts were examined for inhibitory activity against each of four fungal strains viz. *Aspergillus niger* (NCIM 507), *Fusarium moniliformae* (NCIM 1276), *Fusarium oxysporum* (NCIM 1072), *Rhizopus stolonifer* (NCIM 1139) and *Bacillus substilis* (NCIM 2697), *Escherichia coli* (NCIM 2067), *Pseudomonas aeruginosa* (NCIM 2200), *Staphylococcus aureus* (NCIM 2492) as bacterial strains. The disc diffusion assay used to screen extracts. The ethanol extract shows maximum antifungal and antibacterial inhibitory activity whereas, minimum activity to acetone, petroleum ether and distilled water extracts, respectively.

Keywords. *Targionia hypophylla* L., antimicrobial activity, rhizosphere properties, Western Ghats, Maharashtra

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[OT-5] Influence of AM fungi on growth and biochemical constituents of wheat (*Triticum aestivum* L.)

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Mycorrhiza is the mutualistic symbiosis between soil borne fungi and roots of plants. The most important and widely distributed type of mycorrhiza is arbuscular mycorrhiza (AM). The present study was undertaken to find out the effect of the AM fungi on the growth and biochemical constituents in wheat. Due to AMF association, the survivability of the wheat was very high as compared to wheat grown under control condition. In this study it was observed that plants inoculated with AMF have grown taller compared with non-inoculated plants. The growth parameters such as shoot length, root length, dry weight of roots, dry weight of shoot, stem girth and number of leaves per plant were found increased due to the influence of AM fungi as compared to control plants. There was significant increase in per cent root colonization and total chlorophyll content in AM inoculated plants than control plants. The present investigation conforms that inoculation of AMF was found to be more promising to induce the growth of wheat plant.

Keywords. AMF, chlorophyll, dry weight of root, dry weight of shoot, *Glomus mosseae*. root length, shoot length, *Triticum aestivum*

[OT-6] Seed borne fungi associated with maize

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Seed borne mycoflora of maize was tested by using blotter technique and agar plate method. Agar media (PDA, CZA, and RBA) were found to be more favourable for the growth of seed borne fungi. Whereas the media like SEA and blotter techniques were less favourable for the isolation of seed borne fungi. In all nine species of fungi are isolated from different maize varieties like Amber, Local, Karvir and African Tall.All types of agar media and blotter technique were favourable for isolation of *Aspergillus flavus, Aspergillus niger, Aspergillus terreus and Aspergillus oryzae* isolated on PDA media from all varieties of maize, and from African tall on blotter and RBA, from Amber variety on MEA, from Karvir variety on CZA. Aspergillusornatus isolated from local variety and karvir variety on MEA and CZA, Amber variety on MEA and RBA, while it is not isolated from African Tall variety. Fusarium sp. isolated from all varieties except Karvir.MEA is the best media for isolation of *Fusarium sp. Fusarium verticillioides* is isolated from all varieties on different agar media except SEA. Non-sporulating fungi only isolated on CZAfrom Karvir variety. During isolation following fungi were recovered-Aspergillus flavus, *Aspergillus niger, Aspergillus terreus,Aspergillus oryzae, Aspergillus ornatus, Fusarium verticillioide. Fusarium sp. Penicillium sp.* and non sporulating fungi.

Keywords. Seed borne mycoflora, maize, *Aspergillus, Fusarium, Penicillium*

[OT-7] Edible mushrooms: Facts, problems and solutions

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Mushrooms have been used since antiquity for both food and medicinal purposes. Wild edible fungi (WEF) are not only food in their own right but also add flavour to bland staple foods. They also have medicinal properties, some of which are found in edible species. Wild fungi therefore contribute towards diet, income and human health. There are more than 2000 mushroom species from 110 countries are used as food, edible and medicinal purpose.

Most of the information on the biology and ecology of edible mushrooms is based on research carried out in developed countries. The literature mainly highlights the value and usefulness of WEF found in the Northern hemisphere. However, there is much less knowledge, about the many species of mushrooms from a biological, social or economic perspective from the third world countries and India as well.

Income from WEF is an important source of revenue for rural communities, especially in developing countries. The overall importance of WEF to such societies, and indeed the potential for increased local incomes, is small compared to local use and markets in the developing world.

However, in recent years, due to over exploitation (inadvertently or deliberately) of the WEF, it has become necessary to address the management of WEF and their sustainable production. Successful management of wild edible fungi balances the impact and effects of collection and harvesting against the wider aims of forest management.

Furthermore, edible fungi are mainly studied from pure mycological aspects and, there still remain the most significant gaps in information and knowledge concerning social and economic aspects of their uses. Little is known about collectors and collecting practices and relative importance of wild edible fungi compared with alternative sources of food or income. Sustainable production of wild edible fungi is not only about how to maximize yields but how to balance this resource with other uses and users of forests.

Despite significant gaps in knowledge it is also important to emphasize that significant advances have been made in describing the features of commercial harvesting in different countries such as United States, Canada, China, central, southern and now west Africa, Mexico and Turkey. However, the Indian perspectives are not overwhelming.

Now is an appropriate time to identify the most important topics that need further investigation such as research priorities in mycology, diet, fungal ecology (mycorrhizas) and storage how to make better use of annual production. These are key areas where more information and research is needed which will help in achieving the best management of wild edible fungi and their sustainable production.

Keywords. Edible mushrooms

[OT-8] Some less known ethnomedicinal plants used by the Jaunsaries of Chakrata, Uttarakhand

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Jaunsar - Bawar forms the northern half of Dehradun District and the people living there are called the Jaunsaries. They are probably of very pure Aryan stock. This area had links with the ancient cultural waves, which swept over the northern part of India, particularly during the Vedic, Mahayan, Kushan and Gupta periods of ancient Indian history. The people follow many of the old customs even today, distinct from their compatriots elsewhere in Garhwal, Kumaon and Himachal Pradesh. Their physical features, customs, traditions and dress are distinctly different. Even the art and architecture has its unique features, with profound use of woodwork.

A field survey was conducted during 2005-2008 to study the plants of ethnobotanical importance. The first hand information about utilization of some less known plant resources for the trearment of various common diseases by the Jaunsaries, was collected. In the present communication, ethnomedicinal uses of 24 plant species are reported along with their local formulations for the treatment of different diseases.

Keywords. Ethnomedicinal plants, Jaunsaries

[OT-9] Renewable energy technology for industry and society

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Energy is an essential pre- requisite for the economic and social development of the country. Energy and environment are the two basic components of the new global of sustainable development. Development involves improving the material condition and the total quality of the vast majority of the human race living in developing countries. Since the down of civilization, man has been dependent on energy in one form or the other. The story of the energy starts with wood, wood came to be replaced by coal and coal by oil only partially. Now a stage appears to have been reached when oil may also have to be substituted by biomass.

Keywords. Renewable energy

[OT-10] Assessment of bio-contamination of Makani reservoir, Makani, district Osmanabad (M.S.) India

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The present communication deals with assessment of bio-contamination of Makani reservoir. The study was carried

out during the year 2009 (Jan to Dec.). The water temparature ranged from 20 to 35 0C. pH ranged between 7.3 to 8.1 .Alkalinity 81 to 112 mg/lit. D.O ranged from 6.9 to 9.5 mg/ lit. MPN counts between 50 to 550, Protozoan represents 7 to 12 / lit.. Helminthes eggs , rotifers , Arthropod's were recorded.

Keywords. Makani reservoir, bio-contamination

[OT-11] A review on economic, environmental and societal impacts of growing crops for biofuels

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Global energy sector has been dependent on fossil fuels for fulfilment of its needs. But, many studies have shown that these fossil fuels will no longer be able to do this in future, as they are limited and may be worn out in next 20 years. So, this nature of fossil fuels has inevitably led us to search an alternative. Fossil fuel based alternatives, such as oil shale or coal liquefaction may provide additional transport fuels, but their production will have large negative impacts on Green House Gas (GHG) emissions and on water resources. Many developed countries like United States (U.S) and rapidly developing countries like China view biofuel as a major contributor for reducing dependency on fossil based fuels, maintain a balanced atmospheric conditions and achieving rural development goals. Furthermore, U. S has passed many acts, thus making biofuels as a mandatory blend to power vehicles by 2020.Hence; worldwide production of biofuels has been increased drastically from 4.4 to 50.0 billion litres from 1980 to 2005. Biofuels are fuels derived from biomass. Recently, many research personnel have reported that increased biofuel production may have negative impacts on environment. The diversion of food crops or crop lands to produce biofuels has been blamed for global food

problems and certain biofuel production techniques may lead to increased GHG emissions, have negative Net Energy Value (N.E.V). Nevertheless, some biofuel feed stocks do represent potential source of energy and can be harnessed. This paper analyses economic, societal and environmental impacts of either generation of biofuels on local, national and global scale paying attention towards new techniques (e.g., *Pyrolysis*) and feed stocks (e.g., *Waste Biomass*) for their production.

Keywords. Biofuels, net energy value, bioethanol, *Jatropha curcas*, biodiesel

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[OT-12] Study of environment imbalance due to fluoride in ground water

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The aim of the present work is to study the fluoride content in ground water by performing simple method. Experimental observations indicate that the fluoride content is gradually increasing from west side to east side along the river bank

of river Pravara near Sangamneer. The increased fluoride content had adversely affected the sugar-cane yield. The data is found to be below the toxic level in the area. The cause of this imbalance is over irrigation. If it is not stopped immediately and proper irrigation systems were not implemented, the conditions may leads to infertility of soil as the fluoride content is very harmful to health.

Keywords: fluoride, ground water

[OT-13] Acute toxicity study of *Adhatoda vasica* whole plant powder

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Adhatoda vasica is an evergreen perennial shrub commonly found in India. It is commonly used in traditional medicines. Acute toxicity studies were carried out for whole plant powder of *Adhatoda* vasica as per OECD guideline in Swiss mice weighing 35 to 55 gm by administering a dose 2, 4 and 6gm/kg body weight orally in the form of aqueous slurry. The groups were almost continuously observed for mortality and behavioral changes during first 24 hr and then daily for a fortnight. The observations of changes in body weight, food and water intake as well as cage side observations were reported. There was no abnormality observed in any of these three groups. The whole plant powder was found to be nontoxic.

Keywords: *Adhatoda vasica,* vehicle, acute toxicity

[OT-14] Biology of grape mealy bug *Pseudococcus maritimus* (Hemiptera: Pseudococcidae) in Nashik district

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Studies on the biology of the grape mealy bug, Pseudococcus maritimus were carried out under laboratory conditions. The mealy bug *Pseudococcus maritimus* (Hemiptera: Pseudococcidae), attacks grapes garden, ornamental and fruit crops in the Nashik. All the methods seen to be insufficient for mealy bug pest even strong insecticides failed to penetrate the heavy layers of wax that protect the insect's body; so they are counted among the most destructive and serious pest of grapes garden in Nashik. It is very necessary to study the biology of such destructive pest which may help to control their population in certain stages of lifecycle. This study is useful towards integrated approach of mealy bug pest management.

Keywords. *Pseudococcus maritimus*, grapes garden, mealy bug management

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[OT-15] Bio-agents as effective means for management of woolly aphid, *Ceratovacuna lanigera* Zehntner on sugarcane

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Outbreak of sugarcane woolly aphid (SWA), *Ceratovacuna lanigera* Zehntner (Homoptera : Aphididae) was recorded in July, 2002 in many sugarcane fields in the state of Maharashtra and Karnataka, which drastically reduced cane area and sugar production during 2003 to 2006. The losses in cane yield were highest in Co 86032 variety (21.41 %) and losses in sugar recovery were higher in Co 94012 variety (2.04 units) due to SWA. The natural enemy, *Dipha aphidivora* Meyr. (Pyralidae : Lepidoptera) was recorded during December, 2002 in Kumbhi-Kasari sugar facory area in Kolhapur district (Maharashtra), whereas brown lace wing, *Micromus igorotus* Banks. (Haemerobidae: Neuroptera) and syrphid fly, *Eupeodes confrater* Wal. (Syrphidae: Diptera) were recorded in T.K.Kore, sugar factory area of Warnanagar and Kalkundri village of Daulat SSK, Halkarni area, Chandgad Tahsil of Kolhapur district in July and August, 2003, respectively. The feeding potential of D. *aphidivora* (42- 48 aphids per day) was found to be more than *M. igorotus* (19 - 25 aphids per day) and *E. confrater* (16 - 21 aphids per day).

Keywords. Sugarcane woolly aphid, *Dipha aphidivora, Micromus igorotus*

[OT-16] Invasion of papaya mealybug, Paracoccus marginatus W & G (Hemiptera: Pseudococcidae) and their natural enemies in Maharashtra

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The exotic papaya mealybug, Paracoccus marginatus (W & G.) recorded first time in Maharashtra in papaya orchards at Regional Fruit Research Station, Ganeshkhind, Pune, on 14th July, 2010 and soon, it assumed the status of major pest of papaya at 15 locations in Pune, Thane, Nandurbar, Dhule and Jalgaon districts of Maharashtra. The record of their parasitoid, *Acerophagous papayae* (N. & S.) reported first time in India on papaya mealybug in papaya orchard at IARI Regional Station, Baner, Pune, Maharashtra on 23rd August, 2010 which is found to be effective Biocontrol agent for controlling the papaya mealybug. Besides the parasitoid, the other natural enemies such as *Spalgis, Scymnus, Anthocorids,* Lady bird beetles, *Mallada, Syrphid, Brumoides, Cryptolaemus* beetles and spiders were observed in association with PMB in papaya ecosystem.

Keywords. Iinvasion, papaya mealybugs, Paracoccus, Acerophagus, natural enemies

[OT-17] Tropical splenomegaly: A rare manifestation of malaria

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Tropical splenomegaly syndrome is an idiopathic disorder includes spleenic enlargement, hyperspleenism, liver involvement, hepatomegaly and severe anemia found in endemic malarial area. Higher titrs of Igm antibodies to *Plsmodium vivax* and reduced level of circulating T- lymphocyte, kuffre cell hypreplasia also seen in liver in these cases. This syndrome is usually due to an abnormal immune response to repeated attacks to malaria. Leucopenia and thrombocytopenia can also be seen. It occurs in adults usually and fever is not the presenting feature. A 38 years female was complaining of weakness, anorexia and intermittent fever since 1year. Giving history of unexplained mild grade fever since 2 years.

After an examination she found severe paller was there (Hb-6.1 grms), weight was 33 kg. Abdomen was distended; liver was palpable 2cms below the right costal margin and was firm in consistency and non tender. Spleen was palpable 14 cm below left costal margin and was firm in consistency. Other systems were normal. CBC reveled Hb: 6.1, TLC: 6100, Platelets: Normal, Anti TB test is also normal, ESR 64mm/1" st hr, PS -S/o Microcytic severely hypochromic- Anisopoikilocytoisis. Normoblasts seen and are 6% of total TLC , Platelets are adequate. No abnormal leucocytes seen.

Keywords. Tropical splenomegaly syndrome, hepatomegaly, maleria

[OT-18] Antibacterial assesment of *Asparagus racemosus* and *Hemidesmus indicus* against selected phytopathogens

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Asparagus racemosus L. and *Hemidesmus indicus* L. are medicinal plants used in traditional Indian medicine.These plants were selected to evaluate their potential antibacterial activity of aqueous,ethanol and acetone extracts against four phytopathogens by agar cup method.Results revealed that ethanol extract of *Hemidesmus indicus L.,Asparagus racemosus* L. showed strong antibacterial activity followed by ethyl acetate extract, showed strong antibacterial activity compared to standard antibiotic.Aqueous extract showed no zone of inhibition.Present study reveals potential use of these plants for developing new antibacterial compounds against pathogenic microorganisms.

Keywords. Antibacterial assessment, *Asparagus racemosus L., Hemidesmus indicus* L

[OT-19] Isolation and characterization of *Pseudomonas fluorescens* with potential control of leaf spots caused by *Colletotrichum gloeosporiodes*

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Colletotrichum gloeosporiodes is a facultative parasite known to infect a wide variety of host. It is one of the most common plant pathogenic fungi to occur and is found worldwide. It causes anthracnose spots on various fruits, vegetables, on woody plants and plays an important role in agriculture subsistence economics. The disease is regularly seen in the field on ripe or overripe fruits. The disease caused by *C. gloeosporiodes* is commonly seed borne.

Biological control programmes aimed at controlling anthracnose caused by *C gloeosporiodes* depend on either establishing the antagonist preharvestly to prevent infection or post-harvestly to inhibit disease symptoms development. An attempt is made to identify the most suitable biocontrol agents such as *Pseudomonas fluorescens* from soil rhizosphere of various crops from Maharashtra soil.

Keywords. Anthracnose, biological control, *Colletotrichum gloeosporiodes, Pseudomonas fluorescens*

[OT-20] Effect of distillery effluents on rhizospohere mycoflora of *Lens culinaris* Medic (Masur)

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In India there are nearly 292 distilleries with a total production of 34,87,492 K.lit,of alcohol per year. It is also estimated that about 12 to 14 liter of water is released for every liter of alcohol. The population equivalent to distillery waste water in India is near by 7 times more than entire population.

The distillery effluents affect quality of surface and ground water & soil. The effect is also seen on soil and water quality in various ways. The effluent affected water and soil may have certain impact on microbial diversity of water and soil. The role of biodiversity of different organisms in maintaining gene poll has not been well established.

Lens culunaris Medic. (Masur) is the economically important crop plant. The Seeds of lentil are valued for high percentage of protein content. They may be employed as a Source of Commercial Starch for use in textile and Calico printing industries. The rhizosphere & soil mycoflora of every plant play an important role in the growth and productivity of the plant.

The rhizosphere & soil mycoflora of different concentration from distillery effluent was studied by serial dilution technique. A total of 16 fungal species were recorded in the rhizosphere and soil of water and distillery effluents treated at different concentration. Our result suggests that, the soil and water polluted by distillery effluents shows adverse effect on rhizosphere and soil mycoflora of Lentil plant.

Keywords. Distillery effluents, rhizosphere mycoflora, *Lens culinaris* Medic

[OT-21] Ability of immobilized cyanobacterium *Hapalosiphon* sp. in ameliorating selenium toxicity

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Cyanobacteria comprise an ancient, large and morphologically heterogeneous group of photosynthetic oxygen evolving, nitrogen fixing, cosmopolitans microorganisms, which play significant roles in diverse ecosystems. They also have a unique potential to contribute in productivity of a variety of agricultural and ecological situations and their extraordinary repertoire of activities, especially their beneficial role as biological agents in remediation and amelioration of soil and water environment have made them a subject of research worldwide. To further improve cyanobacterial biofertilizer technology it would be of great interest to investigate the performance of immobilized cyanobacteria in the presence of rice field selenium. With this aim present study has been attempted to compare the effect of selenium on growth and nitrate reductase activity of free and immobilized cells of *Hapalosiphon sp.* and amelioration of selenium toxicity. The observations of the present study clearly demonstrate the protective effect of cell immobilization in *Hapalosiphon sp.* against selenium toxicity. This paper also discusses the role of immobilization in mitigating selenium toxicity and also concludes that the presence of selenium in any ecological niche with immobilized *Hapalosiphon sp.* will not affect the nitrogen economy of that ecosystem.

Keywords. *Hapalosiphon sp.*, nitrate reductase, immobilization, amelioration, selenium

[OT-22] Isolation of *Xanthomonas* spp. from citrus fruits for production of xanthan gum

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Xanthan gum is an extra cellular polysaccharide produced by the gram-negative bacterium *Xanthomonas* species. This biopolymer has unique rheological properties resulting from its high viscosity, pseudoplasticity and tolerance to a wide range of temperature, pH and salt concentration. Xanthan Gum is a slimy gel causes cankers having characteristic lesions on leaves, stem and fruits with raised brown, water soaked margins, usually with a yellow ring effect around the lesion. It also causes black rot disease on broccoli, cauliflower and other leafy vegetables. The *Xanthomonas* species was isolated from cankers of citrus fruit, collected from vegetable market which are usually wasted. The production of Xanthan gum is done using oil mill wastewater and molasses as a substrate from *Xanthomonas* species.

Keywords. *Xanthomonas*, xanthan gum

[OT-23] Antimicrobial screening and rhizosphere analysis of *Cyathodium tuberosum* Kash. from Western Ghats, Maharashtra - India

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The present study describe, the antimicrobial activity and rhizosphere soils nutrient element analysis of *Cyathodium tuberosum* Kash. from Lonawala-Khandala and Kas, Satara. The extracts were prepared with organic solvents like acetone, ethanol, petroleum ether and distilled water. Antimicrobial activity assessed by applying 'filter paper disc diffusion assay method' against *Aspergillus niger* (NCIM 507), *Fusarium moniliformae* (NCIM 1276), *Fusarium oxysporum* (NCIM 1072), *Rhizopus stolonifer* (NCIM 1139) as fungal strains and *Bacillus substilis* (NCIM 2697), *Eschericia coli* (NCIM 2067), *Pseudomonas aeruginosa* (NCIM 2200), *Staphylococcus aureus* (NCIM 2492) as bacterial strains. The screening tests revealed, the most pronounced antibacterial activity against *B. substilis*. The tested bacterial and fungal strains were most sensitive to acetone extract. Out of the 4 test fungi, *A.niger* and *F. moniliformae* were most sensitive to ethanol extract. Ethanol extracts exhibited maximum antifungal activity. The rhizosphere soil analysis was made for physicochemical and biological properties.

Keywords. *Cyathodium tuberosum* Kash., Antimicrobial activity, organic solvent extracts, rhizosphere, physicochemical, biological properties, Western Ghats, Maharashstra

[OT-24] Proteomic study of *Caralluma fimbriata* cell wall during water stress condition

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Proteomics is the study of entire protein complement expressed by genome at given time and at given condition. It includes isolation, purification, identification and characterization of proteins. In the present study we have selected

Appeal for contributing digital photograph(s) of twigs of angiospermic plants

Dear Sir/Madam,

The term herbarium, used in the strictest sense today, is a collection of dried specimens. The importance of herbarium as a teaching learning resource has been established from time to time in colleges, universities and research institutions as well.

However, there are many constraints in following the traditional technique of herbarium preparation. Considering such advantages of digitalization techniques for the benefit of Botany teachers, students as well as researchers, **we have planned to develop a 'Digital Herbarium' of angiospermic plants found in India.**

Owing to the enormous diversity in angiosperms we come across in different parts of India, thousands of photographs will be required to give adequate justice to the angiosperm diversity in our country. This is a huge task, which cannot be accomplished by just a handful of people, but demands dedicated efforts from everyone who is attached to the Botany subject in one or the other way.

The contribution of each digital photograph will be duly acknowledged on every digital herbarium sheet. For uniformity in the digital herbarium sheets, following guideline are to be followed:

1. *A suitable fresh flowering twig be collected, arranged properly against a white background, preferably a white paper, and the photograph be taken.*
2. *All photographs are to be taken with a digital camera with minimum of 5 megapixel image density.*
3. *In case of a flowering herb, entire plant is to be photographed.*
4. *A scale be placed near the twig arranged on a white background in order to get clear idea of dimensions of the object.*

Such photographs with relevant information that includes botanical name, common name in Marathi and English, family, uses, locality and name of the contributor should be sent on mail ***sales@versatile.biz*** and ***info@indianflora.org***.

To make this project a big success, which will ultimately benefit everyone studying plant taxonomy, we request you to encourage your colleagues, students, friends and nature loving people you know, to contribute a digital photograph(s) for the proposed **'Digital Herbarium'**.

With regards,

Yours sincerely,

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Modern College of Arts, Science and Commerce,
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Mobile: 9922 760069

Modern College of Arts, Science and Commerce, Pune 5, established in 1970, has made considerable progress in last few decades. It is affiliated to University of Pune. The college stands as one of the best colleges in Pune. It has both Grant-in aid as well as self-financed courses, approved by the Government of Maharashtra and University of Pune. It is situated in the heart of Pune city and has courses for undergraduate and postgraduate students in various disciplines. It also has University approved research centers, which carry out excellent research leading to M. Phil. and Ph.D. degrees. It also runs a few certificate courses and a diploma course. It has twenty six departments , Gymkhana, Library, etc. The college mainly runs University of Pune courses .

The College has received **'BEST COLLEGE AWARD'** of University of Pune in 2008 and is accredited by **NAAC** with **'A'** grade in 2010.

The college is well connected by city buses and local trains. It is within a walking distance from Shivajinagar Railway and Bus terminus.

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