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NEW PRESIDENT OF ISEB

On reaching the age of superannuation, Dr. P. Pushpangadan laid down the office of the Director, National Botanical Research Institute (NBRI), Lucknow on 31 January 2006. In his place Dr. Rakesh Tuli, Head of the Molecular Biology & Genetic Engineering Division of NBRI, has been appointed as the Director of the Institute. Consequently, Dr. Tuli takes over as the President of International Society of Environmental Botanists (ISEB). Born on 21 September 1953, Dr. Tuli is a leading molecular biologist, microbial geneticist and biotechnologist of the country. In his distinguished research career he has carried out extensive researches on transgenic plants for agricultural and medicinal applications, edible and plant-based vaccines, genomic diversity in plants, biological nitrogen fixation, secondary metabolism and regulation of gene expression. He has filed several patents and won national and international honours and awards. He is a Fellow of Indian National Science Academy; National Academy of Science, India; Indian Academy of Science and National Academy of Agricultural Sciences besides other academies and societies.



Dr. Tuli has visited a number of foreign countries like U.K., U.S.A., Germany, France, Austria, Switzerland etc. to participate in conferences, seminars, fellowships, as a member of Indian delegation or on invitation to deliver lectures/talks.

Dr. Tuli has been a life member of ISEB and was actively associated with the organization of ICPEP-3 as chairman/member of its various organizational committees. He was a lead speaker and chaired a session during the Conference deliberations.

- Informative news, views and popular articles/write-ups on current environmental researches/issues are invited for publication in ENVIRONNEWS.
- Environews is published quarterly on the first of January/April/July/October; and is supplied free to all members of ISEB.
- Environews is also supplied in exchange for scientific literature published by reputed organisations.
- All correspondence should be addressed to : **The Secretary, International Society of Environmental Botanists**, National Botanical Research Institute, Lucknow - 226 001 (India).
- **E-mail** : isebnbrilko@satyam.net.in • **Website** : <http://www.geocities.com/isebindia/index.html>

MESSAGES



Message

I am happy to know that the National Botanical Research Institute is organizing the third International Conference on Marine and Environmental Pollution (ICMEP-3) in collaboration with the International Society of Environmental Botanists (ISEB) during November 28, 2005 to December 2, 2005 at Lucknow.

With the continuing rise in the price of fossil fuels, the world is increasingly looking to scientists and technologists to discover and innovate sources and processes for sustainable and clean energy. This gathering can discuss creative solutions through multidisciplinary analysis. The participants could address critical issues on environmental pollution, role of plants in mitigating pollution and providing alternative energy sources such as bio-fuel.

I wish the Conference all success.

New Delhi
November 25, 2005

कपिल शर्मा
KAPIL SHARMA



राज्य मंत्री (पर्यावरण विभाग)
विज्ञान एवं पर्यावरण विभाग, उत्तर प्रदेश सरकार
भारत सरकार, नई दिल्ली
MINISTER OF SCIENCE (ENVIRONMENTAL CHANGE) FOR
SCIENCE & TECHNOLOGY AND OTHER DEPARTMENTS
GOVERNMENT OF U.P.,
NEW DELHI



Message

I am glad to know that the International Society of Environmental Botanists (ISEB) and the National Botanical Research Institute (NBRI), Lucknow, are jointly organizing Third International Conference on Plant and Environmental Pollution (ICPEP-3).

Today, the threat of global warming is felt across the world cutting through the geographical and political boundaries. Besides the industrialization and exploitation of natural resources as the principal causes responsible for environmental pollution, it is the burgeoning population and resulting poverty that has worsened the environmental pollution across the globe.

India, because of its sheer size and population, has had an impact in the areas of environment, biodiversity conservation and sustainable development. It therefore becomes very pertinent that the global community support the country's effort in protecting the environment and biodiversity conservation. It is therefore very appropriate that several international organizations have come forward in supporting this Conference aimed at serious deliberations on the burning problem of environmental pollution.

I wish the Event all success.

(KAPIL SHARMA)

United Nations Educational, Scientific and Cultural Organization

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Message

The idea that studies of living organisms can provide information about environmental hazards is coming of age. The recent development of analytical protocols that can do much more than simply provide general markers of ecosystem health, garnered with advances in ecological studies have provided a considerable drive on the part of governments to integrate biological and chemical monitoring. Although assessments based on community ecology are good at exposing severe pollution events, they are not very useful at providing subtle warning signs that our ecosystem is coming under pressure. But combining ecological observations with chemical measurement of pollutants accumulated by animals and plants can provide a much more sensitive and predictive analysis, which will be an imperative step towards environmental sustainability.

In that connection, UNESCO's Man and the Biosphere Programme (MAB) was designed to promote environmental sustainability and its activities over the years have enhanced the management of natural resources and the protection of the environment. One of the important recommendations made during the South and Central Asia MAB Network (SACAM) meeting of experts in 2002 was to strengthen the knowledge base of important issues like environmental protection through establishing national MAB focal points in countries where they do not exist. I am very glad to learn about the "3rd International Conference on Plants and Environmental Pollution" organised by the International Society of Environmental Botanists and the National Botanical Research Institute in Lucknow and wish that the outcome of this event would also serve UNESCO's Man and the Biosphere Programme.

I extend my best wishes for the success of this International Conference.

Minja Yang
Director and UNESCO Representative

Farewell Message



Dear All

The turn of events in human life has to reconcile with the ins and outs of the life process itself. There are pleasanties competing with awful episodes, which condition actually the life of every one of us. The story of the life of humankind is replete with these conditions. Happiness and sadness are always part of the human life and this balancing wheel goes on to shape the wheel of destiny.

From birth to death the phases of human existence have some stirring and luminous events while some are traumatic and tragic. In this whirlpool of destiny there is a luminous message from ancient India. That the pain and the pleasure, rights and duties have got to be taken alike in a spirit of service and service above self is the content of the message of 'doing your duty without aspiring for the result thereof'. This message has been abundantly enriched in the introduction of Warren Hastings in the English Translation of Bhagvad Gita way back in 1773 "when the majesty and greatness of the British Empire are thrown into oblivion this scripture and the lessons it contains will continue to inspire millions of people in the world". This message of Gita has always been a source of inspiration, strength and courage throughout my life.

I recall my fairly eventful career as a student and as a research scholar, as a scientist and finally as a science manager. I have enough to relate in cheering and inspiring your younger generation. The echelons of excellence are nothing but our dedication to the service of the human kind, transcending the artificial frontiers of geography, culture and narrow regimental fellowship. Friends, I am bidding adieu to all from the official tenure of service, which got inaugurated in Jan 1969 and ended up in Jan 2006. During this long innings of a career, I have been jacked up with events of all sorts, but I count now only the pleasanties and success stories which I owe largely to my esteemed colleagues and patron saints/teachers, well-wishers and my family who extended their unflinching support to make my career smooth and successful. Space is a constraint for me to name all these benevolent well-wishers, who have directly or indirectly, supported me throughout my career. However, I will be failing my duty if I do not mention here a few names with whom I have a fortunate interaction.

I am deeply indebted to all of you, big and small, and my message today to all my successors and fellow scientists and more particularly the young scientists is: Think above yourselves and be worthy of the cosmic process which demands absolute and abiding commitment and ensuring and improving upon the destiny of humankind so as to enable to live in peace, tranquility and harmony and closer fellowship with one another. With these few words let me once again thank you all for your best cooperation and blessings extended to me during the course of my career as a scientist and also as a science administrator. May the Lord Almighty shower His blessings to enable us to live as worthy human beings and lead lustrous and matchless life in this mundane world!

Thank you,

Dr. P. Pushpangadan
Director
National Botanical Research Institute &
President, International Society of Environmental Botanists

*Dr. P. Pushpangadan laid down the office of Director, NBRI and President I.S.E.B. on attaining the age of superannuation on 31 January 2006.

LETTERS

I would like to thank you for your invitation and supports in all respect for my participation in the highly successful ICPEP-3 Conference in Lucknow. It was very nice to meet you. I am highly grateful for your kindness and personal attention. I had a unique opportunity to be introduced and to meet well-known scientists from different countries and to get very useful scientific information and discuss some interesting points with them.

I got colossal and unforgettable impression in your ancient and great country.

I hope for our further scientific contacts.

Dr. Esmira Alirzayeva

*Institute of Botany, Azerbaijan National Academy of Sciences,
Patamdar sh. 40, Baku, AZ1073, AZERBAIJAN
Email: hh_esmal@hotmail.com*

Congratulations for successful completion of ICPEP-3. I enjoyed the conference, the foreign delegates company, especially, Grill, Krupa, Margaret, Viviane etc. I gained lots of information out of that.

Thanking you once again.

Dr. M N Dandigi

*Selection Grade Lecturer, Civil Dept, PDA Engineering College,
Gulbarga-585102, Karnataka, INDIA
E-mail: mndandigi@yahoo.co.in*

I wish to express my cordial gratitude for your kind hospitality and help in my participation in the Conference. I have a very good impression of the conference organized by you and your colleagues at a very high level. I also had a very good opportunity to see some places of interest of your city and get more acquainted with your culture.

Dr. Oleg Blum

*Head of the Laboratory of Bioindication & Chemosystematics,
National Botanical Garden, Acad. of Sci. of Ukraine
Timiryazev'ska St. 1, 01014 Kyiv, UKRAINE
E-mail: blum@cbg.freenet.kiev.ua*

I was really fortunate to participate in the Third International Conference on Plants & Environmental Pollution (ICPEP-3) during November 28-December 2, 2005 at the National Botanical Research Institute, Lucknow. The conference proved to be an excellent opportunity to sensitize the young minds to current issues in environmental pollution and new developments in related fields of research. It is gratifying that the presentations, discussions and deliberations at this conference have resulted in implemental recommendations and better knowledge on environmental issues, the role of plants as pollution indicators and bioremediators and allied fields. It provided an international forum at home for mutual exchange of knowledge and experience. I am sure that this purposeful conference has led to conscious understanding of the problem of environmental pollution and stimulated new initiatives of research in the field. I congratulate you for hosting this successful important meet in India and thank you for giving me an opportunity to be a part of this.

Ms. Pooja Gupta

*Environmental Biology Laboratory
Department of Botany, University of Delhi
Delhi-110 007, INDIA*

The International Conference was very much informative. I was able to meet useful persons who were very much interested in my subject. Thanks to you for your kind cooperation and for giving me this opportunity.

Dr. Geeta Shrestha

*Royal Nepal Academy of Science & Technology, (RONAST)
GPO Box. 3323, Kathmandu, NEPAL
Email: geetashrestha1@hotmail.com*

Thank you very much for everything you have done for me so I could attend your great ICPEP-3 conference and I had many useful experiences at this conference.

Catur Retnaningdyah

*Department of Biology
Faculty of Mathematics & Natural Sciences
Brawijaya University
Jl. MT. Haryono 169 Malang 65145 East Java, INDONESIA*

I would like to appreciate you warmly and sincerely for your seminar and your attention. Indian people are very kind and nice. I hope to see you again.

Dr. Ms. Azam Tabatabaee

*Marine Biology Department, Islamic Azad University,
North of Tehran, IRAN
Email: az492003@yahoo.com*

I am a stranger to you, but I am contacting you for a noble cause. I am in the process of writing a book, entitled: SO YOU WANT A CLEAN ENVIRONMENT!

I have enjoyed reading an article (Enviro News, Vol. 5 No. 3 - July 1999) published by International Society of Environmental Botanists (ISEB), NBRI, Lucknow, India). I would be most grateful, if you could authorize me to use your text, either in part or fully. I find the article full of important material. You would, naturally receive a free copy of the book. I started agitating about the use of polythene: plastic bags and other utensils in my country in 1987, when I raised the issue with the President of Uganda himself, i.e. H.E. President Yoweri Kaguta MUSEVENI. After some research, I have decided to write a book.

You might be interested to learn that the preface to the book will be written by the President of Uganda.

Patrick Y. Bulenzi

*Ugandan, ex-UNESCO staff member, UGANDA
E-mail: mkangulumo@yahoo.com*

I am a university student in Sri Lanka and would like to join International Society of Environmental Botanists (ISEB) as a member. Various environmental problems, which affect you, also affect us equally and I would like to support the aims and objectives of your Society..

Subasingha S.I.S.

*University of Peradeniya, Peradeniya, SRI LANKA
E-mail: amatharaya@yahoo.com*

I greatly enjoyed ICPEP-3 meeting organized by you at Lucknow during 28th November to 2nd December 2005. Thank you for your hospitality.

D.D.Kadam

*Kolhapur, Maharashtra, INDIA
E-mail: kadam_d1958@rediffmail.com*

I am Reader and Head of the Department of Botany, Wilson College, Mumbai. I have completed my Ph. D. in environmental sciences. I would like to be a member of International Society of Environmental Botanists. Please send me the details and the procedure to become a life member with an application form.

Dr. Satish Bhalerao

*Reader, Head, Department of Botany,
Wilson College, Chowpatty, Mumbai - 400 007, INDIA*

Congratulations to you for the grand success of ICPEP-3. All my students have appreciated the excellent arrangement in the conference. They came in contact with a large number of academicians, which benefited them at large. But unfortunately, because of University examination duties, I could not attend the same. Once again hearty congratulations to all the members of NBRI involved in the conference. Hope you will be bringing out proceeding of the seminars and publication of full papers if so please inform us so that we can send full-length papers.

Dr. K. N. Dhumal

*Reader,
Department of Botany, University of Pune
Pune- 411 007 (MS), INDIA*

At first I congratulate organizers for organizing such an important conference ICPEP-3 which was a big success in all respects. I am highly thankful for inviting me to the conference and the hospitality provided. Kindly let me know about the papers for the proceedings. When it should be submitted?

Vijendra Pratap Singh Shekhawat

*Biotechnology Lab., Department of Botany,
University of Rajasthan, Jaipur- Rajasthan-302004, INDIA*

I am writing to you along with the submission of my application for membership of International Society of Environmental Botanists (ISEB), in hopes that you might be able to assist me.

I am a horticulture and biotechnology student here in Nashville, Tennessee, U.S.A and I am trying to plan out my scholastic future, networking, and attempting to locate an individual that I might be able to look to as a mentor. I am coordinating a few classes for the Master Gardener program, AVSA, AGGS, and fellow students to learn how to perform basic TC in their clean kitchens. My passion is palms, my enjoyment has been tissue culture, and my drive is helping others. I am looking at applying to the University of Hawaii as it is doing very useful work on tropical horticulture.

This country has a tremendous economic and illegal immigration problem, and I wish to help where I can. My dream is to assist such countries as Guatemala who use many palms/palm products in their mainstay, with a view to help them to stabilize their economy. Many Central American countries use many palms and palm products as a main part of their existence, although they haven't or don't know how to maintain these plants. I would like to create these plants, and then help to educate these people on how to take care of their new Arecaceae crops. This would help allow these people to stay in their home countries and, in turn, reducing the illegal immigration into the United States. Although this is just a dream, I am sure that forms of it could actually prove to be realistic. My problem is that I am not finding any guidance as to a way to get close to that dream.

Through an Internet search, I happened upon ISEB website,

and felt compelled to send in my application. So, here I am. I have no formal schooling for palms, just home experience, self-studying, and passion. When I finish my biotechnology degree, there will be limited formal training with tissue culture. Would you be able to offer suggestions of any sort to help me proceed in the right direction? Or groups that I should align myself with, anything! I was hoping that you might have some suggestions of either scholastic destination or individuals that I may contact directly in regards to my scholastic destination and network alignments.

I greatly appreciate any and all suggestions that are sent my way. Feel free to pass my contact information to not only anyone who might have suggestions or information, but also to others who might be sharing a similar situation. I hope to hear from you soon, as I anxiously await word from you.

Jennifer Lorraine Carr

*1501 Lischey Avenue, Nashville,
Tennessee 37207, U.S.A.*

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I have visited your very interesting website. I am doing research on plants as bioindicators and bioaccumulators of pollution for an Italian company in Trieste that is interested in environment. I am looking for concrete experience and experimentation of the use of plants as bioindicators and bioaccumulators in Europe and outside Europe. Can you help me in this way? Do you know any kind of experimentation or address where I can find more information?

Thank you in advance for your collaboration.

Nicoletta Fornasari

*via dei Porta 71, 34100 Trieste, ITALY
E-mail: nforasari@yahoo.it*

I wish you Happy New Year and scientific success. With pleasure I remember Lucknow and interesting conference. It will be very nice to see you in Lithuania. Please inform me if you would like to visit Lithuania. I am going to send you invitation to some conference in Lithuania.

Prof. Algirdas Sliesaravicius

*Department of Crop Science and Animal Husbandry
Faculty of Agronomy, Lithuanian Agricultural University
Studentu g. 11, Akademija, 4324 Kauno raj., LITHUANIA
E-mail: Algis.Sliesaravicius@lzuu.lt*

I enjoyed presenting a paper and chairing a session at the Third International Conference on Plants & Environmental Pollution (ICPEP-3) held at NBRI, Lucknow, November 28 - December 2, 2005. It was a very well-organized conference. The Organizing Committee is to be complimented for an excellent scientific program. I had the opportunity of talking to several international delegates. The unparalleled Indian hospitality made it a memorable event for all of us. My stay in the City of Nawaabs was a pleasant experience.

Yash P. Kalra

*Canadian Forest Service, Natural Resources Canada
Edmonton, Alberta, CANADA*

For Joining International Society of Environmental Botanists (ISEB)

Please download relevant information and membership form from our
website : <http://www.geocities.com/isebindia/index.html> or
write to : Secretary ISEB at <isebnbrilko@satyam.net.in >



ICPEP-3

Third International Conference on Plants & Environmental Pollution

28 Nov - 2 Dec, 2005



Report on Deliberations of Third International Conference on Plants & Environmental Pollution (ICPEP-3)

***R.S. Tripathi, R.D. Tripathi, Kamla Kulshreshtha, Nandita Singh, K.J. Ahmad & S.V. Krupa**

The fast pace of industrialization, galloping demand for energy and reckless exploitation of natural resources during the last century have been mainly responsible for aggravating the problem of environmental pollution, which is now set to pose serious threat to biodiversity and ecosystem processes.

The widespread poverty, illiteracy and burgeoning population in most of the developing countries have further confounded the problem, and have caused environmental pollution at a pace which was unimaginable only two decades earlier. The threat of global warming is now being felt across the world, and geographical or political boundaries are no longer relevant in the present scenario. When it comes to the hazards of environmental pollution, there is only a very thin dividing line between developed and developing countries, as the impact of most of the environmental problems is all pervading.

Keeping in view the enormity of the problem and with a view to highlight its impact and to seek possible solutions, and in pursuance of the recommendations

made during the Second International Conference on Plants and Environmental Pollution (ICPEP-2) held in February 2002, the ICPEP-3, was organized by The International Society of Environmental Botanists and National Botanical Research Institute Lucknow during 28th November to 2nd December 2005.

The Conference provided a vibrant forum for serious discussions and deliberations on the burning problem of environmental pollution, and the role of plants as bio-indicators of pollution and its remediation. The other important environmental issues that were deliberated upon during the Conference included biodiversity conservation, ecosystem degradation, eco-restoration, sustainable development, climate change and effects of pollution on agricultural crops, food production, forest and human health.

The entire global community has a vested interest in supporting and sustaining any move for the protection of environment and biodiversity conservation. Taking cognizance of this, several National and International Scientific Organizations supported and co-

sponsored ICPEP-3.

Leading experts from different R & D institutions of India and other countries were invited by the organizers to participate in this Conference.

The deliberations during the Conference revolved around the following themes:

1. Bio-indication and Bioremediation
2. Environment and Biodiversity
3. Environmental Education, Mass Awareness and Legislation
4. Environmental Impact Assessment
5. Environmental Biotechnology
6. Contemporary Environmental Issues.
7. Plant Responses to Environmental Pollution
8. Climate Change, Plant Productivity and Food Security

The Conference was inaugurated by His Excellency Shri T.V. Rajeswar, the Governor of the State of Uttar Pradesh on the afternoon of 28 November, 2005 at the Convention Centre of King George's Medical University, Lucknow. The colourful inaugural function was attended by over 500 guests including delegates from some 30 countries and distinguished

*Prof. R.S. Tripathi is INSA Senior Scientist at NBRI, Lucknow, India; Drs. R.D. Tripathi, Kamla Kulshreshtha and Nandita Singh are senior scientists at NBRI; Dr. K.J. Ahmad, former Scientist 'G' & Emeritus Scientist, NBRI is the Secretary of ISEB and Prof. S.V. Krupa is at the Department of Plant Pathology, University of Minnesota, St. Paul, U.S.A.

citizens of Lucknow. The Chief Guest, His Excellency Shri T.V. Rajeswar, lighted the traditional lamp to kickstart the function. Dr. P. Pushpangadan, the then Director of the National Botanical Research Institute and President of International Society of Environmental Botanists (ISEB) welcomed the guests and delegates.

Dr. K.J. Ahmad, the Secretary of International Society of Environmental Botanists (ISEB) introduced the members of the Executive Committee of ISEB to the audience. Dr. R.D. Tripathi, Organizing Secretary of ICPEP-3 explained the genesis of the conference and Dr. Kamla Kulshreshtha, the other Organizing Secretary of ICPEP-3 proposed the vote of thanks.

Prof. Sagar V. Krupa, University of Minnesota, USA and Prof. Erwin Grill, Technical University of Munich, Germany, who were the guests of honour also addressed the gathering and lauded the objectives of the conference.

H.E. Shri T.V. Rajeswar in his address expressed his deep concern about the problem of environmental pollution, which was adversely affecting the global environment.

The inaugural function was followed by a 'High Tea', at the green, well manicured lawns of the Convention Centre which provided a salubrious environment to the delegates and guests for a chitchat during the tea party. It was followed by a colourful cultural programme of music and dances presented by students of Bhatkhande Music University, Lucknow.

The glittering inaugural function was followed by absorbing Scientific Programme that commenced at the main Auditorium and Conference Hall at NBRI Campus on the morning of 29th November and continued till 2nd December mid day.

The Conference was attended by over 400 delegates, representing R & D organizations, from India and around 30 countries. The scientific programme was divided into 8 technical sessions each of which was largely attended and lively. In addition to the technical sessions, a poster session was also organized in which a large number of delegates presented their valuable scientific results.

Technical Sessions Highlights

Most of the technical sessions were

held concurrently in two halls, and the plenary and special lectures were delivered in the Auditorium of NBRI. Some of the highlights of the various technical sessions are mentioned as under:

Session I

In Session I dealing with "Bioindication and Bioremediation" Dr. Margaret Greenway from Australia discussed the role of macropytes in nutrient (soluble inorganic nitrogen and phosphorus) removal using constructed wetlands. Prof. Erwin Grill from Germany discussed the role of PCS enzyme in detoxification of heavy metal by phytochelatin synthesis and also in detoxification of xenobiotics by catalysing the cleavage of GS-conjugates. A well known scientist from Japan Prof. Yoshikatsu Murooka, discussed a novel bioremediation technique called symbiotic engineering for heavy metal using symbiosis between leguminous plants and Rhizobia. Nodule-specific expression of metallothionein gene (MTL4) and Arabidopsis PC synthase (AtPCS) in mesorhizobium heavily increased the ability of cells to bind Cd²⁺ by 9-19 fold. In the presentation of Prof. Norman Terry from USA, the role of constructed wetland and genetically engineered plants in phytoremediation of Se and other trace elements was highlighted. He showed that overexpression of gene such as PCS, and ATP sulphurylase increased the uptake of Cd, and overexpression of selenocysteine methyl transferase, gene responsible for Se hyperaccumulation, gave good result. Dr. E.G. Alirzayeva from Azerbaijan discussed the ability of plants to accumulate toxic metals growing in metal contaminated areas. *Artemisia spicum*, *Orgusia sibirion*, *Gamanthum piosus*, *Atriplex tatarica*, *Kallidium cospicum*, *Bassia hyssopsifolia*, accumulated good amount of metal. In another presentation Dr. Oleg Blum from Ukraine reported the use of plants in phytodetections of ambient ozone toxicity. Ukraine clover and tobacco showed visual toxicity symptoms after 10-14 d' exposure. A number of scientists from India participated in the session and presented their valuable research work. Dr. Ram Chandra from India showed the accumulation and tolerance of heavy metals by aquatic plants such as *Typha*, *Phragmites* and *Cyperus*. The concentration of heavy metals in plant parts was 20 times greater than that in

distillery water as reflected by his results. Dr. Anjum Farooqui from India, on the basis of palynology, mineralogy and geochemistry, established that late Pleistocene marine and terrestrial palynomorphs in Changanacherry (Kottayam district, Kerala) are good palaeoclimatic and palaeoshoreline indicator. Dr. U.N. Rai from the host organization presented his work dealing with the integrated phytoremediation techniques for the removal of metals from industrial wastes. He mentioned that several chromate tolerant bacterial strains isolated from tannery effluent showed high Cr accumulation potential and also some aquatic plants like *Hydrilla verticillata*, *Pistia stratiotes* and *Vallisneria spiralis* can reduce the level of Cr from tannery effluents. Dr. C. Retnaningdyah from Indonesia discussed the scope of use of river benthic microinvertebrates as a bioindicator of detergent pollutants in terms of acute and sub-acute toxicity. Dr. M.A. Rzepka from France presented his findings on the assessment of air quality in industrial area using plants like tobacco, *Petunia* hybrids and *Tradescantia* by monitoring the biomarkers such as GSH, MDA and SOD. Dr. S.A. Salgare from India discussed the monitoring of herbicide toxicity using pollens of *Phaseolus aureus* as indicator. Dr. Angela Schlutow from Germany presented the BERN (Bioindication for Ecosystem Regeneration towards Natural Conditions) model, which enables to assess the current regeneration ability, to quantify the critical limits and critical loads of natural and semi-natural plant communities, to determine the dynamic change of vegetation structure in the past and future. Ms. A. Tabatabaee from Iran showed that four marine bacteria isolated from east Anzali marsh sediments of Caspian sea accumulated good amount of Cd, Ni and Vanadium and are resistant to these heavy metals. Thus they could serve as good agent for bioremediation. Dr. D. Cuny from France presented the paper dealing with the effects of atmospheric nitrogen and ammonia on epiphytic lichen communities. All the studied sites showed better growth of the nitrophilous species. Dr. R.D. Tripathi from NBRI showed accumulation of heavy metals by various aquatic plants including *Hydrilla*, *Bacopa* and *Ceratophyllum*. He emphasized the role of PCs in metal

detoxification and mentioned that the research work on cloning and over-expression of PC Synthase gene to enhance phytoremediation potential is in progress. Dr. M.N. Dandigi from India discussed the role of *Typha latifolia* in treatment of municipal wastewater in a constructed wetland.

Session II

In Session II on "Environment and Biodiversity" Prof. R.S. Tripathi, INSA Senior Scientist, NBRI, India delivered the lead lecture on "Sacred groves of north-east India and their significance in conserving biodiversity". He mentioned that several sacred groves are in existence in northeast India since time immemorial and are considered to be the relic of the original forest vegetation. Many sacred groves are still undisturbed having dense canopy cover. They serve as the treasure house of biodiversity. Over the past few decades these sacred groves which were protected on the grounds of religious and cultural beliefs have been undergoing degradation, although out of ca. 80 sacred groves of Meghalaya studied by him and his associates, 57.5% are still in good condition. These sacred groves are extremely rich in floral and faunal diversity. The species content of these sacred groves are very high. They contain several valuable medicinal and other economically important plants. Some of the endangered taxa are to be found only in the sacred groves. He highlighted the existence of several regeneration guilds in the sacred groves which ensures the coexistence of a large number of primary and secondary successional tree species. He emphasized that these sacred groves need to be conserved by external interventions as the religious beliefs and taboos, which were central to sacred grove conservation have been eroding fast. He mentioned that if the religious beliefs and traditional wisdom contributing to forest protection could be suitably integrated with modern scientific management practices, these sacred groves could become a very useful model for biodiversity conservation. He suggested several measures for the conservation of sacred groves and argued that there is a strong need to perpetuate and promote the concept of sacred groves.

Besides the lead lecture, there were

invited lectures by Dr. Gautam Ganguly (University of Burdwan, West Bengal) on spatial distribution of pteridophytes in southern Sikkim, by Dr. (Mrs.) Prafulla Soni (FRI, Dehradun) on Floristic composition of iron ore mine areas of Saranda-Bonai forest range in Jharkhand state, by Dr. Dolly W. Dhar (IARI, New Delhi) on biodiversity analysis of cyanobacterial germplasm, by Dr. P. Pothiruckit-Prachyanusorn of Thailand on biodiversity and bioactivity in hydrocarbon contaminated sediments and by Dr. Anil K. Goel of NBRI, Lucknow on the importance of Indian plant diversity as a vital source for new ornamentals.

Session III

This post lunch session on "Environmental Education, Mass Awareness and Legislation" was chaired by Prof. S.V. Krupa, University of Minnesota, USA. The lead lecture was delivered by Dr. Margaret T. McGrath of Cornell University, USA on "Communicating Air Quality-Plant Effects Science to the Public and User sector". During her lecture she emphasized the need for increasing the awareness about the impact of pollutants on the environment while learning how to do scientific research. She mentioned that hands-on activities and visuals, such as plants with injury and pollutant monitoring equipment, are more effective educational tools than written documents. She mentioned that communicating effects of air quality on plants should target children, parents and teachers. According to her, the US National Parks provide an ideal opportunity to educate adults as well as children about impact of air quality on plants. She also laid emphasis on the need for ground level ozone bio-monitoring.

Besides, three invited lectures were also delivered during this session. Dr. Bandana Bose (BHU, Varanasi) made presentation on multiple effects of nitrate seed treatment on germination, growth and yield on maize, wheat and mustard. Dr. D. D. Kadam (Kolhapur) spoke about Neem.

Session IV

Session IV on "Environmental Impact Assessment" was chaired by Prof. Gregor. The lead lecture was delivered by Dr. L.D. Emberson of University of York, U.K. on "Assessing the impacts of air pollution on crops in south Asia and Southern Africa".

She emphasized that current levels of air pollution and particularly the general level of ozone are contributing significantly to crop yield losses in parts of South Asia and may be adversely affecting the crop productivity in Southern Africa. She mentioned that although the impact of air pollution on crop productivity has been adequately studied in India, there is lack of such studies in other South Asian countries making it difficult to develop dose-response relationships that could be used to perform risk assessments for this region. She postulated the need to maintain and expand the Air Pollution Crop Effect Network (APCEN), which comprises a network of air pollution effects practitioners, atmospheric modellers, socio-economic experts and policy makers.

Session V

The Session V on "Environmental Biotechnology" was chaired by Prof. Erwin Grill and Co-chaired by Dr. Rakesh Tuli. Prof. Boris Chevone in his lead lecture discussed the role of ascorbate in plants in response to ozone. A new gene VCF1 controls foliar ascorbate level resulting in ozone tolerance in young leaves. Genetic enhancement of ascorbate may produce plants that are more resistant to oxidative stress. Prof. Arun Goyal from USA discussed the carbon concentration mechanism in plants and algae including carbon transporters. He discussed a novel approach on identifying and characterizing inducible membrane inorganic carbon transporter. A genetically engineered active inorganic carbon transporter system may reduce photorespiration. In another lead lecture, Dr. Rakesh Tuli from NBRI discussed the importance of insect-resistant transgenic plants in pollution abatement in view of greater use of pesticides in India. Some transgenic crops like cotton, pigeonpea, chickpea, castor, groundnut and tomato are being developed jointly by NBRI and other institutions. Dr. Usha Mina from New Delhi presented her findings on the effect of transgenic plants on soil biodiversity and soil processes. Transgenic plant products that they release in soil may affect soil biota (invertebrates and microorganisms) and soil processes. Dr. Rana Pratap Singh from Lucknow presented his paper dealing with organic matrix-based, cost-effective, eco-friendly, slow release fertilizer. He

emphasized that these fertilizers release nutrients especially nitrogen in form of ammonium up to 45 days after application and enhance productivity and quality of produce in wheat, rice and other crops. Dr. Neeta Sharma from Lucknow discussed the eco-friendly technique for management of post-harvest disease using yeasts.

Session VI

In the Session VI on "Contemporary Environmental Issues" Chaired by Prof. R.S. Tripathi, Dr. Yash Pal Kalra (Northern Forestry Centre, Edmonton, Alberta, Canada) in his lead lecture emphasized the need for standardizing the methods for analyzing soil and plant samples. The analytical techniques should be developed for specific requirements of the users. He also presented the efforts made by soil science laboratories in Canada. The lead lecture was followed by five presentations covering different aspects relevant to the theme of the conference. The presentation was made by Dr. Mridula Chauhan (India) on application of spectrometric data in identification of radioactively contaminated water sources such as Mahanadi and other rivers. Dr. A. Ghosh from Central Rice Research Institute (CRRRI), Cuttack talked about the environmental concerns related to excessive use of nitrogenous fertilizers, and impact assessment and risk management of nitrogenous fertilizers with reference to rice cultivation in India.

Dr. S.K. Datta (NBRI, India) discussed the role of gamma ray irradiation in inducing mutation and mentioned that a large number of promising varieties have been developed in different ornamentals, particularly Chrysanthemums and Rose by Floriculture Section of NBRI. Dr. V.P. Kapoor (NBRI, India) made presentations relating to natural dyes extracted from different plant species and discussed the positive attributes of eco-friendly plant-derived chemicals for use as textile dyes.

During the morning session (Chairman: Dr. Y.P. Kalra, Canada), the lead lecture of the theme "Contemporary Environmental Issues", was given by Dr. H.M. Behl, Scientist, NBRI. He discussed adverse effects of indiscriminate use of fertilizers and pesticides on soil properties, which leads to reduction in production. He emphasized on a paradigm shift in tilling land, agricultural practices and

food consumption pattern by the society. He suggested least tilling of land, organic cultivation and minimum use of pesticides could contribute to sustainability in agriculture.

Dr. Rodiyati Azrianingsih of Indonesia presented her paper on the biology of *Cyperus brevifolius*, an invasive species having a large phenotypic variability which confers an adaptive advantage on this weed and makes it highly successful in different geographical regions. She discussed its life history, phenotypic variability and response to soil water contents.

Dr. Neerja Srivastava gave an account of ethnobotanical importance of some weeds of Kota district of Rajasthan. Dr. O.P. Pandey delivered a lecture on "Neotectonic uplifting of Hyderabad granitic region and environmental pollution". He explained the theory and highlighted the role of underlying geoprocesses like neotectonic uplifting in contaminating water bodies. V. Prasad of Nepal gave an account of UV effect on *Chlorella vulgaris* and discussed how the effect could be minimized by sodium dithionite and sodium chloride.

Samantak Mani from of Tata Motors, Lucknow showed how the effluent treatment techniques at their factory are successful in separating oil from the effluent.

Geeta Shrestha Vaidya of Nepal presented her paper on the use of organic matter made from locally available plant materials such as *Lantana* etc. She also discussed how its efficiency can be increased through micorrhizae.

Dr. O.N. Tiwari of Imphal discussed the effects of cyanobacterial toxins on aquatic organisms including mammals. The presentation by Suchita Jain focused on the biodiversity of Ranthambhore National Park of Rajasthan and the importance of National Park in biodiversity conservation.

In an invited talk Dr. Fiona Marshal from UK presented the findings of her collaborative research with Prof. Madhoolika Agarwal of BHU, Varanasi on the heavy metal contamination of vegetable crops in Varanasi and Delhi. According to their findings in the samples of spinach and cauliflower collected from the market and field sites, the mean heavy metal levels exceeded the limits of Prevention of Food Adulteration (PFA) Act

for Cu, Cd and Zn. However, Pb did not exceed the PFA limits.

Dr. B.K. Tiwari from Shillong presented the results of a long term research carried out in collaboration with Prof. R.S. Tripathi on the ecology of coal mining areas in Jaintia hills of Meghalaya. He discussed the changes in soil properties, microbial population and plant diversity during natural recovery of coal mine spoils in Jaintia hills. He mentioned that coal mining has caused the shrinkage of agricultural and forest area, deterioration of water quality in streams and rivers, increase in respiratory diseases and vast income disparity. After 14 years of natural recovery the number of plant species and microbial population increased and physico-chemical characteristics of soil improved. It was mentioned that the people of the area have taken a number of initiatives for the ecorestoration of the landscape damaged due to coal mining.

Dr. Laszlo Makra of Hungary discussed the relationship between twelve meteorological parameters with daily pollen concentrations of twenty four species over Carpathian Basin in Hungary.

Dr. Nikhil Kumar of NBRI, Lucknow presented the evolution of fully protected cultivation technology of betel vine in subtropical India.

Session VII

In the Session VII on "Plant Responses to Environmental Pollution" Prof. J.N.B. Bell from UK talked about the influence of air pollution on plant fungal diseases. He established that air pollution reduced the severity of biotrophic fungi. Prof. R.B. Muntifer from USA discussed the interaction of tropospheric ozone with elevated CO₂, NO_x, NH₃, N₂ and SO₂ under different meteorological conditions and showed how the plant nutritive quality could be affected by such interactions. The magnitude of total economic impact of ozone to ruminant livestock, and wildlife is a function of cumulative effect of plant yield and nutritive quality. Dr. S.B. Agarwal from India elucidated the role of ethylene diurea in assessing impact of ozone on growth and yield of wheat and mungbean. EDU alleviates the unfavourable effects of ozone in both crops. The treated plants maintained higher levels of pigment, protein, ascorbic acid in foliage as



Glimpses of ICPEP - 3





Glimpses of ICPEP - 3





Glimpses of ICPEP - 3





Group Photograph of Participants of ICPEP - 3

compared to the non-treated plants. Dr. V. Calatayud from Spain emphasized the effect of ozone on physiology of endemic Mediterranean plant, *Lamottea diana*. Ozone exposure caused significant reduction in CO₂ assimilation, water use efficacy and an increase in intracellular CO₂ concentration without any significant decline in stomatal conductance and maximum quantum efficiency of the photosystem II. He showed that CO₂ fixation capacity by Rubisco and maximum RuBP regeneration capacity declined in the treated leaves. These changes demonstrate that ozone induces senescence. Dr. Swadesh Malhotra from NBRI talked about the possibility of improving the quality of essential oils using different soil conditions and agro-techniques. Dr. S.N. Mishra from Rohtak demonstrated that putrescine, a di-amine, alleviates the growth of Indian mustard under salinity by inducing the level of nitrogenous metabolites and nitrate reductase activity. It also suppressed free radical generation which hampers plant growth under stress condition, through inducing antioxidant enzyme system. Dr. B.B. Panda from Berhampur, Orissa presented an account of adaptive responses induced in root meristem (*Allium cepa*) or embryonic shoot (*Hordeum vulgare*) by Cd, Al, H₂O₂, paraquat and salicylic acid to three different types of genotoxins namely malic hydrazide, ethylmethanesulphonate and methylmercuric chloride. The findings showed the possible involvement of a H₂O₂-independent signal transduction pathway in the underlying adaptive response to genotoxic stress. Dr. I.P. Pandey from Dehradun presented a paper on the impact of environmental pollution in Doon Valley on plant growth and development. Dr. Nalini Pandey from Lucknow discussed the changes induced in the roots of green gram in response to Ni toxicity over a period of 16 days and showed that oxidative damage was related to the magnitude of Ni accumulation in the roots. Dr. A. Poorkhabbaz from Germany showed the changes in morphological and anatomical characteristics of two urban trees (*Platanus orientalis* and *Fraxinus omas*) by the deposition of heavy metals due to air pollution in Mashhad town in the Province Khorassan, Iran. Dr. J. Sakalauskaite from Lithuania demonstrated the tolerance of radish plant to

ozone. A dose-dependent response of the plant was observed on O₃ exposure. O₃ inhibited various biochemical processes but plants quickly regenerated by induced homeostasis. Dr. Manjula K. Saxena showed that salicylic acid, which is an important constituent of *Lantana camara* has a strong potential to kill water hyacinth. The results of an experimental study indicated that salicylic acid killed water hyacinth at 10⁻² and 10⁻³ M concentration. Dr. S.M. Singh from Bareilly evaluated the impact of three types of vermincompost transformed from three different organic wastes (biocon, dairy and pharmaceuticals) using the worm *Eisenia fetida* on the germination of radish and mung seeds and showed that vermincomposts have favourable effect on germination. Dr. Leena Trivedi (Ahmedabad) studied the interactive effect of Cu and Cd on yield and mucilage content of seeds of Isabgol and on various biochemical parameters of Isabgol spikes. Cu and Cd inhibited all the biochemical parameters and when given in combination, they had a synergistic effect. Ms. Fozia Bashir from New Delhi showed in her presentation that deltamethrin induces oxidative stress in *Glycine max* plants in a dose-dependent manner and altered ascorbate glutathione cycle.

Session VIII

In the Session VIII dealing with "Climate Change, Plant Productivity & Food Security", Prof. Sagar Krupa from USA discussed the issue of food security in the world in the context of continuously increasing population and changing climate. He stated that deteriorating air quality and changing climate will play a critical superimposing influence on how our future will be shaped. Dr. Geetika Sirhindi, Patiala presented her findings on the physiological responses of coniferous plants growing in botanic garden in northwest India and showed adaptive changes in response to the weather conditions. Dr. H. Pathak from New Delhi presented the Denitrification and Decomposition (DNDC) model and discussed its ability to simulate the emissions of methane, N₂O and CO₂ from Indian rice fields under various agronomic management, soil and climatic conditions. Dr. Yue Ming from China in his presentation on the effect of UV-B radiation on physiology, growth and quality of

Gentiana macrophylla showed an increase in gentiopicoside content of the plant due to UV-B radiation. However, there was no significant effect on the growth and chlorophyll content. Dr. D.C. Uprety from New Delhi told about the establishment of a simple cost-effective MID-FACE facility at Indian Agricultural Research Institute, New Delhi to meet the needs of agriculture science community of the South-Asian countries. The facility has been established by IARI and NPL, New Delhi, India in collaboration with Italian group of scientists. He presented the findings on the response of *Brassica* and rice to elevated CO₂ under water stress conditions and concluded that elevated CO₂ ameliorated the adverse stress on growth and water relations in both crops.

Special Session on Air Pollution and Crops

ENVIS-NBRI, in collaboration with Regional Air Pollution in Developing Countries (RAPIDC) organized an Air Pollution Crops Effect Network (APCEN) 'start-up' meeting at National Botanical Research Institute, Lucknow on November 29, 2005. This meeting was intended to disseminate information about phase III on the crops component of the RAPIDC programme. About 30 delegates of ICPEP-3 Conference attended this meeting.

Dr. Lisa Emberson (Stockholm Environment Institute) gave an overview of the RAPIDC programme and mentioned that the project on air pollution and crops is only one of the several projects that are being carried out within RAPIDC, which aims to investigate all aspects of air pollution in developing countries. The main aims of the phase III of the project were also described by her.

Dr. Patrick B  ker (Stockholm Environment Institute) gave a comprehensive overview of the bio-monitoring campaigns that are proposed for the crops project and that will be piloted at few sites in India.

Dr. Madhoolika Agrawal (BHU, India) described the impacts of air pollution on crops from the South Asian perspective.

Dr. Mieke van Tienhoven (APINA) described the limited evidence of impacts that exist in Southern Africa. In fact, maximum modeled one-hour surface ozone concentration identified areas in Zimbabwe, South Africa and Mozambique with ozone concentrations well above 60 ppb.

Dr. H.M. Behl and Dr. Nandita Singh (NBRI) offered the ENVIS-NBRI website (www.envisnbri.com) as a location for a dedicated website to collate information on key crop studies showing air pollution impacts. Several participants stressed the importance of addressing the existing links between assessing air pollutant impacts on crops and climate change in the ongoing work of APCEN. The wealth of expertise in assessing air pollution impacts on crops that exists within India was highlighted and the potential of colleagues in India to act as the foci for capacity building exercises in neighbouring South Asian countries was seen as having the potential to offer huge benefit both to the RAPIDC project and also in providing policy-relevant information on the regional scale.

Special Lectures

In addition to the lead lectures, oral presentations and poster sessions, following three special lectures were delivered: Prof. Huner of the University of Western Ontario, Canada emphasized that the effects of global climate changes in the biosphere is difficult to assess. He described a new research facility located on the Campus of University called Biotron, which is dedicated to experimental climate change research on organisms as diverse as plants, microorganisms and insects.

Dr. H.M. Behl of NBRI, Lucknow emphasized the strategic potential of biodiesel as a non-conventional source of energy. He analyzed the current scenario from scientific, technological, commercial and economic viewpoints, with particular reference to developing countries like India. He proposed a road map for holistic development. He mentioned the significance of biodiesel in environmental management and employment generation. He was optimistic that biodiesel will be indispensable energy source in running automobile in the world.

Dr. P. Pushpangadan, the then Director of NBRI in his lecture, discussed the future agenda of environmental biodiversity. He stressed that the biodiversity is on decline at all the levels and geographical scales, however, a targeted strategic plan, involving the management of protected areas and natural resources and pollution prevention programmes can reverse this trend.

Achieving the 2010 biodiversity target requires not only a redoubling of efforts but a firm commitment to act according to the priorities identified through a strategic plan. The conservation and sustainable use of biodiversity need to become an integral element of planning, policy and practice for all economic and social sectors of society.

Poster session

There was an enthusiastic participation of delegates in presenting their research findings through the posters. The poster session was inaugurated by Dr. P.V. Sane, Former Director of NBRI. In total 117 posters were presented. The presentations were rich in research content. A team of experts was requested to select two best posters for the purpose of giving prize. The poster on "Ozone and crops in Mediterranean climatic condition" presented by M.J. Sanz of Spain (Authors: M.J. Sanz and S. Krupa) was awarded the first prize and the poster on "Immature Pea Embryo Response to Variable Manganese in Tissue Culture" presented by Sapna Awasthi of Lucknow University (Authors: Nirmala Nautiyal and Sapna Awasthi) was awarded the second prize.

International Society of Food, Agriculture and Environment, Helsinki, Finland offered to provide one year free subscription of their publication, 'International Journal of Food, Agriculture and Environment' to the two winners of the best poster prize.

Valedictory

A valedictory function was organized after the scientific sessions on the afternoon of 2nd December 2005 wherein Dr. P. Pushpangadan, Dr. P.V. Sane, Dr. K.J. Ahmad, Dr. R.D. Tripathi and Dr. Kamla Kulshreshtha expressed their views about the outcome of the conference. Prof. S.V. Krupa and Prof. Erwin Grill, who were the guests of honour and some of the distinguished delegates from different countries also expressed their appreciation and thanks to the organizers of the Conference.

Recommendations

The following recommendations were formulated at the final plenary discussion session of ICPEP-3 for strengthening and widening the activities of ISEB:

- Seek funding through national and international institutions to strongly support and sustain the scientific and educational efforts of ISEB.
- Initiate ways at the outset, to develop strong international research collaboration and information exchange among scientists to address common environmental issues. A relevant exemplary operative model for addressing such issues between different countries already exists within the United Nations Commission of the European Communities (UN-CEC). ISEB should explore ways to establish links with the CEC efforts.
- Develop a strong mechanism to promote environmental education among young people (e.g. school) and environmental literacy among the public, particularly in the user sector, through outreach. India can provide the leadership in developing geographic institutional networks for disseminating the needed information. That can be achieved by initiating local science fairs for young people (e.g. school children), increasing the support and opportunity for graduate and post graduate students to highlight their research work, organizing regional workshops focusing on specific environmental issues and collaborating with the media sector to attract attention of the public and the policy makers. An added strength in that direction is the ongoing outreach programme initiated by the Eco-Education Division of NBRI (National Botanical Research Institute) at Lucknow.
- In a systematic fashion, map the specific types (e.g., occurrences of critical levels of ground level ozone and particulate matter in the air, soil and water pollution by industrial effluents) and geographic magnitude of various environmental problems where considerable gaps exist in our current knowledge for developing countries. In addition to observational studies, these objective can be achieved through the use of simple, but elegant proven methods (e.g., use of passive samplers for quantifying air pollutants and the use of sensitive, indicator plants and other biota for identifying measurable adverse effects). Such an effort is a

prerequisite for environmental risk analysis and assessment, cost-benefit relationships and the development of mitigation policies.

- Develop collaborative research efforts, both regionally and globally, to define the adverse effects of environmental pollution on food and crop productivity and quality. Such activities, in addition to the specific local questions, must be holistic and integrative within the context of multiple stress factors (both non-biological and biological) identified within the framework of local and global climate change. In that context, research efforts should be initiated to determine the extent to which air pollution may be exacerbating other better-known stresses of crops (pathogens and pests).
- Persistent Organic Pollutants (POPs) and heavy metals are major environmental problems, both in the developing and the developed countries. Production and application of pesticides and the presence of pesticide residues in crops as well as in the atmosphere is a grave health hazard. Organic cultivation is the only viable and lasting solution to this problem and it should be encouraged and promoted at all levels. Experts present at the conference highlighted the significance of organic cultivation and use of bio-pesticides, bio-fertilizers, etc. It was recommended that R&D efforts in the area should be strengthened and India should provide a leadership in that direction, with active participation by the members of ISEB.
- Develop ways to control or prevent the presence of invasive alien species and promote the preservation of native biological diversity. In that context, the 'Farmer's Right' model of India can serve as an example. Of additional consideration are the issues of "Ethnobotany" and critical importance of sustaining medicinal species in overall sustainable development of ecosystems.
- Develop and evaluate the comparative success of various cost-effective pollution mitigation strategies appropriately suited for acceptance by the local community. Examples include bio-remediation of salinity (responsible for major crop losses in semi-arid and irrigated agriculture) and phyto-

remediation of soils and surface waters contaminated by industrial waste (responsible for the transport of toxic chemicals in the food chain). Here, application of rapidly evolving methods of biotechnology offers much promise. To address the issue of food security associated with the growing populations in the developing countries, biotechnology also offers the mechanism to develop crop cultivars for food production on marginal lands. The overall outcome should be the transfer of successful methods to the user community for implementation.

- Organize the Fourth International Conference on "Plants and Environmental Pollution, ICEP-4" during next 3-4 years to exchange information on the progress of work, based on the aforementioned recommendations. Emphasis should be on invited state-of-the-art reviews by recognized experts, focusing on specific themes, with in-depth discussions, followed by opportunities for young scientists to showcase their research. The overall proceedings of the conference should be used as another mechanism to promote awareness among the public and the policy makers.

Satellite Session Session on Herbal Drugs and Environmental Pollution

A satellite session was organized by the Botany Department of Jamia Hamdard (Hamdard University), New Delhi, on the 4th December 2005. The day-long seminar, focusing specially on medicinal plants in relation to environmental pollution, was inaugurated by the then Chairman, University Grants Commission, Prof. V.N. Rajasekharan Pillai. Speaking on the occasion, Professor Muhammad Iqbal, Convener of the seminar, welcomed the delegates, referred to the environmental and botanical research carried out at Jamia Hamdard, elucidated the theme of the seminar and thanked the International Society of Environmental Botanists (ISEB) for holding the Satellite Session at Hamdard University. Prof. Sudhir K. Sopory, Group Leader in Plant Molecular Biology at the International Centre for Genetic Engineering & Biotechnology,

New Delhi was the Guest of Honour, and Dr. S. Ahmad, Vice-Chancellor of Jamia Hamdard presided over the function. They underscored the significance of evaluating the impact of environmental factors on the medicinal properties of plants and emphasized upon the need for using modern technologies for augmenting the efficacy and credibility of our traditional medicines, which already have stood the test of time.

The first Session of the invited lectures was chaired by Prof. R.S. Tripathi (NBRI, Lucknow) with Prof. S.V.S. Chauhan (B.R. Ambedkar University, Agra) as the co-chair. The speakers included Prof. P.S. Srivastava (Jamia Hamdard, New Delhi), Prof. P.K. Gupta (CCS University, Meerut), Prof. C.K. Varshney (Jawaharlal Nehru University, New Delhi), Dr. A.H.A. Farooqui (CIMAP, Lucknow) and Prof. Norman Terry (Berkeley, U.S.A.).

Professor P.S. Srivastava spoke on herbs, environment and productivity, laying emphasis on the role of proteomics in studying the abiotic stress-related variations in metabolites of medicinal plants. Prof. P.K. Gupta highlighted the role of molecular markers in relation to the estimation of genetic diversity and the determination of marker-trait associations in lemongrass (*Cymbopogon*). The markers developed from multigene families were expected to prove more useful than those developed from single copy gene. Prof. C.K. Varshney spoke on ozone pollution and its effects on plants. He mentioned that ozone and ethylene diurea not only affected the growth and physiology of medicinal plants, but also the quality and quantity of their metabolites. Dr. A.H.A. Farooqui explained that understanding the gene to metabolic networks in primary and secondary metabolism can lead to identification of gene function and improve the production of secondary compounds. Prof. N. Terry talked about the use of plant-based systems for cleaning up polluted environments elucidating specially the use of medicinal plants in remediating the polluted industrial or agricultural waste.

In the poster presentation session, 52 posters were displayed. A free and frank interaction between the presenting authors and the visitors was the hallmark of this session. A panel of evaluators inspected all the posters and identified three of them for the first, second and third prize.

The speakers of the second session of invited lectures included Prof. R.S. Tripathi (NBRI, Lucknow), Dr. Carly Stevens (Lancaster, UK), Dr. László Lévai (Debrecen, Hungary), Dr. Esmira Alirzayeva (Baku, Azerbaijan) and Prof. K.K. Baruah (Tezpur, Assam), Prof. Tripathi spoke on the ecology of mine-affected areas of Meghalaya. He gave a detailed account of the ecological degradation of the landscape of Jaintia Hills district and loss of several valuable medicinal plants. He presented the salient findings of a comprehensive study on the natural recovery pattern of the coalmine spoils. He mentioned that most of the soil properties improved and plant diversity as well as soil microbial population increased considerably after 14 years of natural recovery of the coalmine spoils in that area. Dr. Stevens showed the negative impact of nitrogen deposition on the

species richness and soils of grassland in the UK. Prof. Lévai spoke on the use of bacteria containing fertilizers as a tool to reduce the environmental pollution. Dr. Alirzayeva spoke on phytoremediation of contaminated soils in Azarbaijan using several medicinal plants like *Artemisia* spp. (*A. fragrans*, *A. scoparia*, *A. arenaria*, *A. szovitsiana*, *A. caucasica*), *Argusia sibirica*, *Gamanthus pilosus*, *Atriplex tatarica*, *Kallidium caspicum*, and *Bassia hyssopsifolia*. Prof. Baruah highlighted the allelopathic effect of medicinal weeds of the rice-growing environment in the upland rice agroecosystem. Prof. P. Pardhasaradhi (Delhi University) gave his observations about the seminar on behalf of the participants. The second session was chaired by Prof. W. Husain (Aligarh) and Dr. R.P. Singh (Lucknow) was the co-chair. Professor Singh gave away prizes for the three best posters.

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Group photograph of a function organized by 'International Society of Environmental Botanists' to bid farewell to outgoing President Dr. P. Pushpangadan and to welcome new President Dr. Rakesh Tuli on 1st February 2006.

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- ♦ Indian National Science Academy, New Delhi
- ♦ Indo-US Science & Technology Forum
- ♦ International Union of Biological Sciences, Paris
- ♦ United Nations Educational, Scientific & Cultural Organization, Paris
- ♦ Council of Scientific & Industrial Research, Govt. of India, New Delhi
- ♦ Department of Biotechnology, Govt. of India, New Delhi
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- ♦ Ministry of Non-Conventional Energy Sources, Govt. of India, New Delhi
- ♦ Council of Science and Technology, Govt. of Uttar Pradesh, Lucknow, India
- ♦ AMITY, Noida, India
- ♦ International Society of Food, Agriculture & Environment, Helsinki.

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Awasthi, Sapna	Lucknow	Dhawan, Sachin Sriganganagar Rajasthan		Kashyap, Rekha	Ahmedabad
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Baghel, V.S.	NBRI	Dixit, B.S.	NBRI	Kaundal, Ruchika	New Delhi
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Bapat, Priyadarshan	Thane, MS	Eensalu, Eve	Estonia	Khan, Gohar Islam	NBRI
Bashir, Fozia	New Delhi	Emberson, Lisa Dianne	UK	Khan, Mohd. Sajid	NBRI
Behera, S.K.	NBRI	Farooqui, Anjum	Lucknow	Khan, Subuhi	Lucknow
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Bell, J.N.B.	UK	Gaur, U.N.	Mussoorie	Khanafari, Anita	Iran
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Bhore, N.D.	Pune	Gautam, V.K.	New Delhi	Kishore, Garima	Allahabad
Bishnoi, Savina	Rohtak	George, Paul	Coimbatore	Kostiainen, Katri Maria	Finland
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Bose, Bandana	Varanasi	Goel, V.L.	NBRI	Kumar, Adarsh	Rae Bareli
Buker, Patrick	UK	Goswami, S.	NBRI	Kumar, G.V.	Bangalore
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Chandra, Prakash	NBRI	Gregor, H.D.	Germany	Kumar, Rajesh	Amritsar
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Pandey, G.C.	Faizabad	Seth, P.K.	Lucknow	Singh, S.M.	Bareilly
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Srivastava, Kanti	NBRI	Tulva, Inghar	Estonia	Gondor, Magdolna Bodnarne	Hungary
Srivastava, Neeta	Lucknow	Upadhyay, Alka. R	Varanasi	Heka Etelka Kenez	Hungary
Srivastava, Pankaj K.	NBRI	Upadhyay, R.N.	Balrampur, UP	Nagy, Ivanna	Hungary
Srivastava, Priya	Allahabad	Upadhyaya, Hrishikesh	Silchar, Assam		
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Srivastava, Ruchi	NBRI	Vaidya, R.R.	Pune	Chakraborty, D.K.	
Srivastava, Shishir	NBRI	Vajpayee, Poornima	Lucknow	Chaturvedi, Daya	
Srivastava, Sudhakar	NBRI	Van Tienhoven, Mieke	South Africa	Das, Partha	
Stevens, Carly Joanne	U.K.	Verma, Rishi Kumar	NBRI	Haq, Tamanna	
Sultan, Phalistineen	J&K	Vikas	NBRI	Jitendriyan, C.P.	
Suri, R.K.	New Delhi	Vishnoi, Radha	NBRI	Kumar, Rakesh	
Suseela, M.R.	NBRI	Vishnoi, Sukhram	Jodhpur	Mote, H.V.	
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Tabatabaee, Azam	Iran	Yadav, B.K.	New Delhi	Nayak, Pradeep	
Tambat, Bhausheb	Bangalore	Yadav, H.K.	NBRI	Nimisha	
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Terry, Norman	USA	Yunus, Mohammad	Lucknow	Sane, Vidhu	
Tewari, Kalpana	NBRI			Saxena, Nirmal	
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Thakur, J.P.	Silchar, Assam	Arghavani, S.	Germany	Shukla, D.B.	
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Tiwari, Saurabh	New Delhi	Lord, Margaret, E.	U.K.	Wahal, Deepak	
Tiwari, Supriya	Varanasi	Murooka, Hiroko	Japan	Yadav, Vijay	

NEWS FLASH

Prof. Muhammad Iqbal of Jamia Hamdard, New Delhi, a member of ISEB Executive, has been selected as Fellow of the National Academy of Sciences, India, in recognition of his research work in developmental and environmental botany. He has developed a new insight of the cambial dynamics in woody plants by showing that the elongating tips of the fusiform initials grow along the tangential walls of radially adjacent cells rather than between the radial walls of tangentially adjacent initials, and that the intrusive growth of the fusiform initials has a role in establishing boundaries of horizontal tiers of the fusiform initials in storeyed

cambium, and also in the process of "elimination of the initials". He identified intrinsic relationships between leaf emergence and cambial activation. Prof. Iqbal also demonstrated that environmental pollution could modify plant growth pattern, production of secondary metabolites, composition of seed oils, as well as the cambial periodicity and wood biology.

Professor Iqbal was also invited by the Bangladesh Botanical Society to deliver a key note address in the 3rd International Botanical Conference held at Dhaka (Bangladesh) in December, 2005. He participated in the conference and delivered a talk on the "Challenges in research on medicinal plants: The Indian perspective".

*Welcome
New Life Members*

Ms. Ruchika Kaundal

Department of Botany, University of Delhi
Delhi-110007, India

Ms. Anamika Tripathi

Department of Botany, Hindu College
Moradabad-244001, U.P., India

CONFERENCES

National Conference on Forest Ecology & Environment-Priorities in 21st Century

27-28 February, 2006, Dehradun (Uttaranchal), India

Contact: Dr. (Mrs.) P. Soni

Organizing Secretary, Head, Ecology & Environment Division, FRI, Dehradun 248006, India.

E-mail: sonip@cfre.org

International Conference of the Aquatic Ecosystem Health and Management Society

Ecosystem Health of Large Rivers: The Majestic River Ganga - Past, Present and Future

10 - 12 March 2006, Patna, India

Contact: Organising Secretary

R. K. Sinha, Department of Zoology, Patna University, Patna-800 005 (Bihar), India

E-mail: rksinha_54@sanchamnet.in

4th World Water Forum: Local Actions for a global challenge

16-22 March 2006, Mexico City, Mexico

Contact:

www.worldwaterforum4.org.mx/home/home.asp

3rd Conference on Future Urban Transport

2-5 April 2006, Goteborg, Sweden

Information: www.fut.se

Workshop on Economic Impacts of Air Pollution on Cultural Heritage

6-7 April 2006, Sicily, Italy

Information: www.unici.org/env/ltrap

The 38th Air Pollution Workshop

9-13 April, 2006 Charlottesville, Virginia (USA)

Contact: John H. Skelly

jms34@psu.edu; <https://www.apworkshop.org>

17th Global Warming International Conference and Expo

20-21 April, Miami, USA

Contact: gov17@globalwarming.net

14th International Conference on Environmental Bioindicators and 2nd Annual Meeting of the International Society for Environmental Bioindicators

24-26 April, 2006, Linthicum, Maryland

Contact: James R. Newman

Pandion Systems, Inc., 4603 NW 6th Street, Gainesville, Florida, 32609

phone: 352-372-4747; fax: 352-372-4714;

e-mail: jnewman@pandionsystems.com

International Workshop on Crop Frog Production using Saline Water in dry areas

7-10 May 2006

Place: Birjanal, Iran

Contact: Prof. Aran P. Kulshreshtha

Director, Centre for Science and Technology on and other developer Council Care

6A, 11th Floor, India

Halibari --- Lodhi Ram, New Delhi - 110003, India

E-mail: apknam@gmail.com

Coastal Environment 2006

Sixth International Conference on Environmental Problems in Coastal Regions Including Oil and Chemical Spill Studies

5-7 June 2006, Rhodes, Greece

Contact: Charlotte Bartlett

Conference Secretariat

cbartlett@wessex.ac.uk

Wessex Institute, Ashurst Lodge, Ashurst, Southampton SO40 7AA, UK.

<http://www.wessex.ac.uk/conferences/2006/coast2006/4.html>

Challenges and Innovation for Environment, Transport and Tourism

30-31 July 2006, Vienna, Austria

Information: www.eco-travel.at/english

International Conference on Regional Carbon Budgets

16-18 August, Beijing, China

Contact: www.icrcb.org.cn

Agroenviron-2006

International Symposium Agriculture Constraints within the Soil-Plant-Atmosphere Continuum

4-7 September 2006, Ghent Belgium

Contact: Agroenviron-2006 Symposium Secretariat
Ghent University, Faculty of Bioscience Engineering,
Department of Soil Management &
Soil Care, Coupure Links 653, B-9000 Ghent, Belgium

Forests under anthropogenic presence: Effects of air pollution, climatic change and urban development

10-16 September 2006, Riverside, California (USA)

Contact: Dr. Andrzej Bytnerowicz

E-mail: abytnerowicz@fsfed.us

<http://www.fs.fed.us/psw/program/atdep/>

Environmental Toxicology 2006

First International Conference on Environmental Toxicology

11-13 September 2006, Mykonos, Greece

Contact: Charlotte Bartlett Conference Secretariat

E-mail: cbartlett@wessex.ac.uk

<http://www.wessex.ac.uk/conferences/2006/toxic2006/1.html>

Environmental Economics 2006

First International Conference on Environmental Economics and Investment Assessment

13-15 September 2006, Mykonos, Greece

Charlotte Bartlett Conference Secretariat

Email: cbartlett@wessex.ac.uk

<http://www.wessex.ac.uk/conferences/2006/economics2006/1.html>

2nd International Young Scientists' Global Change Conference

7-8 November, Beijing, China

Contact: ysc@agu.org

Global Environmental Change: Regional Challenges

9-12 November 2006, Beijing, China

Contact: www.essp.org/essp/ESSP2006/

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