



ENVIRONNEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

LUCKNOW (INDIA)

VOL 9 No 4

OCTOBER, 2003

IN THIS ISSUE

ISEB Executive	01
Letters	02
News Flash	03
Peer Review? What? And Why? by S.V. Kuupa	04
Plastics Recycling and the need for Bio-polymers, by Almitra H. Patel	06
Biotechnology : Past, Present and Future by Lalji Singh	08
News and Views	09
Books	11
Forthcoming Conferences and Seminars	11
Killing the High end Killer Sunita Narain	12

ISEB Executive Council

A meeting of the Executive Council of International Society of Environmental Botanists was held at the National Botanical Research Institute, Lucknow on September 12, 2003. Dr. P. Pushpangadan, President ISEB & Director NBRI presided over the meeting and conducted the proceedings.

At the outset, Dr. K.J. Ahmad, Secretary ISEB presented his report in which he briefed the members about the ongoing activities of the Society and steps being taken to further improve its working and increase its reach at the global level. Dr. Prakash Chandra, the Treasurer, in his report, sought members' cooperation in putting financial status of the Society on a sound and firm footing, as there was severe resource crunch. Dr. R.D. Tripathi, Convener Publications Committee (Proceedings ICPEP-2), informed the members that reviewing and editorial work of the publication is proceeding at a brisk pace and the manuscript of the publication was expected to be press ready by the end of December 2003.

Prof. C. K. Varshney's suggestion to celebrate World Wetland Day in February 2003 in collaboration with Ministry of Environment & Forests, Govt. of India was accepted by E.C. Professors H. N. Verma and C. K. Varshney gave several practical suggestions for overcoming current resource crunch faced by the society and for augmenting its financial resources in a well-planned way. Introduction of electronic version of *Environews* for overseas members/readers was one of the suggestions that were welcomed by the members and accepted by the E.C.

The E.C. considered a proposal to start a research journal, but in view of the unsatisfactory financial status of the Society, the matter was deferred and will be considered only when ISEB's financial position improves.

Dr. P. Pushpangadan, President ISEB, summing up the discussions and elaborating the decisions taken by the E.C., gave some useful suggestions for future growth and development of the Society.

Besides President ISEB, the following Executive Councillors and invitees were present at the meeting: Professors H.N. Verma, C.K. Varshney; Drs. Prakash Chandra, S.C. Sharma, K.J. Ahmad, R.D. Tripathi, Kanti Srivastava, Kamla Kulshreshtha, Anjum Farooqui, Amit Pal and Mukta Singh.

K. J. Ahmad
Secretary ISEB

- 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).



LETTERS

Thank you for the July 2003 issue of ENVIRONEWS. It is wonderful to see that the newsletter is getting published and distributed well before time; congratulations to you and the entire editorial/production team.

Through the newsletter I also wish to bring to the notice of ISEB members that the Department of Biotechnology, Govt. of India, New Delhi has recently released a publication entitled "Innovative Environmental Biotechnologies; From Research to Application". This deals with many aspects of successfully completed and ongoing projects on the general theme of bioremediation. All those interested can obtain a copy of the same by writing to Dr. S. Natesh or Dr. (Mrs.) Suman Govil, editors of this publication at their DBT address. Those interested in initiating such projects can also obtain proforma/application procedure, guidelines and other details for submitting projects by writing to Dr. Govil.

Dr. L.M.S. Palni,

*Senior Scientific Adviser-Biotechnology & Project Director
State Biotechnology Programme, Govt. of Uttaranchal, T.D.C.
Building, P.O. Haldi, Pantnagar,
(U.S. Nagar) 263146, Uttaranchal.*

The International Society of Environmental Botanists at the National Botanical Research Institute Lucknow in its July 2003 issue of Environews (Vol 9 No 3) has an article on the remarkable ability of the Chinese Brake Fern (*Pteris vittata*) to take up and bioaccumulate huge quantities of arsenic in non-toxic form. The article was written by Dr Nandita Singh (a Scientist at NBRI Lucknow) and Dr Lena Q Ma (Prof at Soil and Water Science Dept, University of Florida, Gainesville, USA).

Given this tendency, there appears to be an opportunity for low-cost relatively maintenance-free arsenic removal from drinking, irrigation and fishery water by the method followed for campus waste-water treatment at the Indira Gandhi Institute of Development Research (IGIDR) at Borivli, Mumbai. Here, an open concrete tank with some weep-holes in the side walls is sunk about 2 meters into the ground at a low point in the garden, to which sewage and sullage water from nearby quarters flows by gravity in pipes. The area around the tank is densely planted with canna flowers, drip-irrigated with this polluted water flowing out through perforated pipes. The water flows down through the soil past the canna roots, which act as fixed-film bioreactors that purify the percolating water entering the collection tank through the weep-holes. This water is odour free (and probably pathogen-free) and is used for watering the garden.

A similar concept can be used for arsenic removal from water by planting a suitably calculated area with Chinese brake fern (*Pteris vittata*) watered in distributive fashion by the arsenic-contaminated source. It is highly likely that the output water that seeps into the concrete tank through the weep-holes will contain significantly less arsenic than the input source. The residence time will depend on the nature of the soil. This seems ideal for isolated hamlets remote from technology or replenishment of

conventional arsenic-removal media supplies. But it will not be a good idea for bioremediation if the Chinese brake fern is browsed by any local livestock or wildlife, since fencing is costly and its maintenance imperfect. Care will be necessary to explain to villagers how to regularly harvest ferns to ensure continuing uptake, and how to dispose of their harvested fronds or its ash (immobilize by mixing ash in burnt-clay bricks or concrete blocks?).

Mrs Almitra H. Patel

*Member
Supreme Court Committee for Solid Waste Management
50 Kothnur, Bagalur Road, Bangalore 560077*

Thanks for the *Environews*. It is an informative issue and I am interested in the article entitled "Chinese Brake Fern - a potential phytomediator of arsenic contaminated soil and water" by Nandita Singh and Lena Q. Ma. Is it possible to get this article by e-mail?

I would like to be member of International Society of Environmental Botanists Lucknow. Please send me an application form. I would also like to exchange publications of Ecological Society (ECOS), Nepal with your Society. I congratulate you for your contributions and activities.

Prof. P.K. Jha

*Head, Central Department of Botany
Tribhuvan University, Kirtipur, Kathmandu, Nepal.*

The electronic version of the newsletter is very impressive. Carry on. You are doing a great service. Best wishes.

Prof. P.K. Seth

*Scientist-in-Director's Grade
& CEO, Biotech Park Lucknow
Industrial Toxicology Research Centre
P.O. Box 80, M.G. Marg, Lucknow-226001*

I am grateful to you for keeping my name on the mailing list of your esteemed newsletter, '*Environews*', which I have been getting regularly. This publication is also very useful for our science teachers and students of the Bharatiya Vidya Bhavan Public School, Lucknow.

R.K. Gupta, I.A.S. (Retd.)

*Honorary Secretary & Director
Bharatiya Vidya Bhavan, Gomti Nagar, Lucknow-226010*

Kindly send to me a sample copy of *Environews*, a valuable journal being published under your kind control. I will be personally obliged for this favour.

Dr. Abdul Wahid

*Environment Research Laboratory, Department of Botany,
Government College, University of Lahore, Pakistan.*

I am visiting Poland under the Scientists Exchange Programme sponsored jointly by the Indian National Science Academy and the Polish Academy of Sciences. At present I am working in the Department of Biophysics and Cell Biology of the Silesian University at Katowice with an eminent group of workers trying to understand the dynamics of the cambial cell ends growth in woody plants and the changes in orientation of cell ends during

their intrusive growth. Evidences seem to suggest the possibility of a new mechanism for apical intrusive growth of cells of the vascular cambium, which is dependent more on a variety of pressures in the tissue than on the local chemical influences.

I will also work in the Plant Conservation Biology Centre at Warsaw and in the Department of General Botany of the Wroclaw University. I am likely to deliver lectures in a few universities and participate in three conferences.

I shall be in Vienna, Austria for about a week and return to India in November. Unfortunately, I will not make it to attend the forthcoming Executive meeting of ISEB. I send my best regards to members of ISEB and readers of *Environews*.

Prof. Muhammad Iqbal
Head, Department of Botany,
Hamdard University, New Delhi
Visiting Scientist: Silesian University,
Katowice, Poland

I returned today from South Africa, where I attended a meeting at Durban. It was very interesting visit not only from the scientific point of view, but also for the fact that I had the opportunity of visiting a country where so many ethnic groups live together. I am sending you a copy of my letter to Prof. Krupa seeking information about our manuscript entitled "Aquatic Vegetation as Indicator of the Sustainability of Fresh Water Systems: Interactions with the Land Surface", which I had submitted for publication in the Proceedings of ICPEP-2. I will appreciate some information about the status of this manuscript.

Prof. Osvaldo A. Fernandez
CERZOS-CONICET
Casilla de Correo 738,
800-Bahia Blanca (Argentina)

I am sorry for not being able to get back to you all these days. We have been really overwhelmed by the responses that we have been getting from various people from all over India and abroad. These findings are only the tip of the iceberg, our campaign for regulations for clean water and pesticide will continue and we will look forward to your support to carry on this campaign.

Sunita Narain
Director,
Centre for Science & Environment,
41 Tughlakabad Institutional Area,
New Delhi-110062

NEWS FLASH



NBRI LAUNCHES PROJECT FOR MANAGEMENT OF MUNICIPAL SOLID WASTE

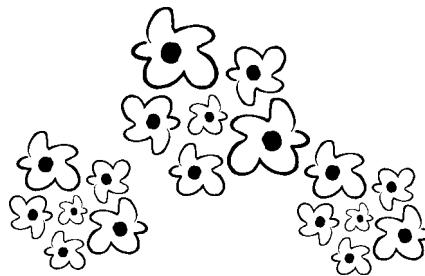
Eco-education Division of the National Botanical Research Institute, in association with the Lucknow Municipal Corporation, and the National Cadet Corps, has launched a pilot project on community based municipal solid-waste management in Lucknow city. Under the project, housewives, for proper disposal, will capacitate one city ward to segregate household solid waste into biodegradable and degradable parts. Solid waste will be further used for generation of electricity. City Mayor Dr. S.C. Rai is taking personal interest in the scientific management of municipal waste. About 300 NCC cadets are involved in this programme.

MASHELKAR GETS AHILYA NATIONAL AWARD

Dr. R.A. Mashelkar, Director General of India's Council of Scientific & Industrial Research (CSIR) has been awarded the 'Ahilya Rashtriya Puraskar' for the year 2003. The award is in recognition to his pioneering contribution to nation building through Science & Technology. The award, which comprises a citation, Rs. 100,000/- is given to one whose work has made a major impact on the nation.

WELCOME LIFE MEMBER

ISEB family extends a warm welcome to **Mr. Jatinder Chadha**, Research Fellow (Environment), Punjab State Council for Science & Technology, Chandigarh, who has joined International Society of Environmental Botanists as a Life member.



Prof. M. Iqbal Head, Department of Botany, Hamdard University, New Delhi and a Life member of ISEB has been elected Vice-President of the Academy of Environmental Biology, Lucknow for the term 2003 – 2006.

Dr. R.D. Tripathi, Scientist, NBRI and Member of E.C. of ISEB attended one day Consultative Workshop on State of Environment, Uttar Pradesh, sponsored by the World Bank on 27th August 2003 at Hotel Taj, Lucknow.

Dr. Amit Pal one of the Editors of **Environews** has been elected Joint Secretary of the Academy of Environmental Biology, Lucknow for the second consecutive term (2003 – 2006).

BIOTECH PARK IN LUCKNOW

A prestigious state-of-the-art Biotechnology Park is being set up in Lucknow under the aegis of Department of Biotechnology, government of India. The Hon'ble Atal Behari Vajpayee Prime Minister of India laid the park's foundation stone on 21 May 2003. It is coming up at a fast pace on 8 acres of land on the outskirts of the city, in the salubrious surroundings of Remote Sensing Applications Centre, Kursi Road.

The park will have industrial modules, bio-business center and training laboratories. The Biotech Park would focus on the following areas of intensive growth: Health Care, Agriculture, Environment, Industrial Application and Energy.

The Biotechnology Park is being planned, organized and developed by its Chief Executive Officer, Dr. P.K. Seth, who is the former Director of Industrial Toxicology Research Centre. Dr. Seth is one of the founders of International Society of Environmental Botanists. Dr. Mrs. Manju Sharma, Secretary, Department of Biotechnology conceptualized and nurtured the idea of setting up this park in Lucknow, which had been declared as the 'Biotechnology City of India' during 89th Session of the Indian Science Congress.

PEER REVIEW? WHAT? AND WHY?

(A COMMENTARY)

SAGAR V. KRUPA

Since attending ICPEP-2 (International Conference on Plants and Environmental Pollution) in Lucknow, India in 2002, I have been asked on several occasions about the "Peer Review" process associated with the Conference papers, prior to their acceptance and publication. Some from the developing countries felt that their reputation and stature were being challenged, while others believed that it was an unnecessary irritation.

I have served for some 20 years as an Associate Editor of the journal "Environmental Pollution" and I am also the Chief Editor for the Book Series "Developments in Environmental Science." Elsevier Science of Amsterdam, Netherlands, publishes both. I also act as a peer reviewer for manuscripts from some 10 different international journals. Thus, when Dr. K. J. Ahmad (Secretary, ISEB) invited me to write this article regarding the aforementioned subject, I readily agreed.

A "peer" is defined as "a person of equal standing." Scientific recognition, reputation and respect among others are intimately associated with peer opinion. Peer reviews are used in, 1. Selecting an employee, determining promotions, 2. Awarding funding (grant) for a particular cause, 3. Assessing the quality of teaching in a classroom and 5. Determining the merits of a particular work for publication. There are other examples as well.

Peer review can be conducted in several different ways. They include: 1. Seeking the opinions of individuals in a population, as in human epidemiological research, 2. Using a panel of experts to select which research proposal should be funded or writing an authoritative document that has wide implications, 3. Using student opinions, coupled with those of the peer colleagues in determining the quality of teaching by an individual in a classroom and 4. Using two or more experts in assessing the quality of a manuscript for its publication in a journal. No doubt, there are still other ways of

conducting peer reviews, as in human medicine and in Biotechnology.

Peer review is a mechanism for preserving the originality, authenticity, validity and quality of a particular work. It is also a way to prevent "plagiarism". Certainly some of those issues have led to controversy. Nevertheless, peer review is the standard and widely accepted method for evaluating the quality of papers submitted for publication, even in electronic publishing.

Peer reviews have their own problems. In some cases there can be a conflict of interest or a pre-determined scientific view on the part of a reviewer that may influence his or her review. Many peer review processes require the reviewer to disclose such information *a priori*, so that such individuals are not included in the overall process. Failure to disclose such information can frequently lead to disservice and penalties. Another source of the problem can be, when the Editor of a journal who serves as an adjudicator errs in selecting the reviewers.

Although many peer reviewers are dedicated and take their task very seriously, others do not. At least in some US Universities, there are no institutional rewards for the time spent in peer reviews. That makes it difficult for young faculty members seeking promotion. I was quite impressed by a young scientist who expressed his profound apologies to me for his inability to perform a review, because he was too involved at that time in collecting field data for a publication (one of the requirements for his promotion), but given another opportunity, would enjoy the effort and would welcome it. What an honest response? Another young faculty member produced a 5-page review on a 10- page manuscript. The most impressive aspect of that review was, every one of the comments was directed at making the paper better. How can the authors of the paper get any more unsolicited help?

In contrast, some potential reviewers

never respond to a request *a priori* for assistance, in spite of repeated queries. However, once agreed, the reviewer should provide his or her comments expediently. There are reviewers who neither provide their comments nor return the copy of the manuscript after agreeing to do the review. That is a total disservice to the authors and to the scientific community. As such things happen, names of the individuals involved are removed from future consideration for requesting help. As one of my colleagues put it, peer review preserves the quality of science and you owe it to your colleagues to be helpful to them. Otherwise, you are doing a disservice to your profession. There have been suggestions by members of some scientific societies to penalize delinquent peer reviewers by delaying their publications and rewarding others, who are diligent and prompt in their obligations, by expediting their papers after acceptance. As a person (***speaking for myself***) ***who faces those issues every day, what a refreshing thought for future consideration?***

All international journals require manuscripts to be reviewed by two anonymous peers. For example, Editors maintain a directory of scientists and their areas of specialization for use in the process. If the comments from the initial two peer reviewers are contradictory in their nature (happens about 20% of the time), then a third peer reviewer is requested to help, but without providing the benefit of the comments from the first two. It is important to realize that the identities of the peer reviewers are not disclosed to the authors and is a part of the confidentiality of the process to promote scientific integrity.

If the initial two reviewers recommend the paper for publication, but have questions and suggest revisions, then the authors should respond to those by providing an itemized listing of their responses to the Editor in submitting their final or revised version. The Editor always

examines the author's responses to see whether they are satisfactory before accepting a paper.

Some authors do not readily accept peer review comments. Once I was forced into a debate with an author, who essentially informed me that I did not know the subject matter of his paper. The author used data on carbon monoxide concentrations at traffic intersections to discuss carbon dioxide emissions in global climate change.

Peer reviewers are requested to provide constructive, unbiased, but candid comments regarding: (1) Appropriateness of the manuscript content to the mission of the journal, (2)

Relevance of the study, (3) Rigor and soundness of the science, (4) Importance of the results in advancing the science, (5) Appropriateness of the methods used and the conclusions reached in addressing the objectives. There are still other criteria.

Many authors seek to publish their papers in the most appropriate and leading journals in their field. Different journals implement peer reviews with different degrees of rigor. Top international journals have manuscript rejection rates of 40-60% of the total number submitted by the authors. That is reflected in the quality of papers published and the established

reputation of the journal. An experienced scientist can assess the quality of a publication even without reading it, by simply looking to see where it is published.

A manuscript rejected by one journal may appear in another journal that has less rigorous standards or because a different set of peer reviewers were used, who perhaps examined the paper less rigorously. For example, strictly based on scientific reasons, I once rejected a paper twice. At first it was sent to me by one journal and after my rejection, coincidentally it was sent to me again some months later by another journal. After the second rejection, the paper subsequently appeared in a journal that I seldom consult. Thus, without doubt there is a hierarchical order of quality among journals.

It is not uncommon that a paper written by a reputed scientist can be subjected to serious questions from peer reviewers. In such cases, to sustain their reputation, although it might take extra time and effort, the authors generally re-submit their paper for consideration, responding to all of the peer comments,

Some journals also allow re-submission of a paper for the second time after major or significant revisions, for a re-evaluation by the original peer reviewers. Such a process must be

approved *a priori* by the journal Editor. However, that practice is not very common (perhaps 5%) and some journals, do not allow a re-submission.

Publishers themselves use what is known as the "impact factor" to assess the quality of their journals. For example, according to the Institute for Scientific Information (ISI), the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years. In that context, for example, Elsevier Science publishes each year, a listing of the most down loaded articles in their journals.

In summary, peer review is usually a constructive process that assures the quality of a work. To be challenged by your peers can only improve the contents of your work and its merit. In a sense, every true democracy in the world has a peer review of its political and socio-economic status by its eligible populous. At the appropriate time, an elected leader is evaluated for his or her performance to be reelected to office or to be rejected.

Prof. Sagar V. Krupa is the Professor of Plant Pathology at the, University of Minnesota Twin City Campus, St. Paul, Minnesota, U.S.A.

EARTH HITS '2,000-YEAR WARMING PEAK'

The Earth appears to have been warmer since 1980 than at any time in the last 18 centuries, according to the studies carried out by Prof. Philip Jones of University of East Anglia and Prof. Michael Mann of the University of Virginia. They reconstructed the global climate from data derived from ice cores, vegetation, and other records. They believe their research provides unequivocal confirmation that humans are affecting the climate. But sceptics still insist that any human contribution is likely to be too small to explain what is happening. Their study supports recent findings from the Intergovernmental Panel on Climate Change. After studying temperature data from up to 1,000 years ago, the panel said the late 20th century had been the warmest period on record. To test the strength of claims by some scientists that the world had in fact been warmer before 1000 AD, Professors Jones and Mann sought to reconstruct the global climate over the last two millennia.

The researchers examined the trunks of ancient trees from different regions to compile a record of local conditions - the thickness of the trees' annual growth rings is determined by the climate. They also studied cores drilled from the icecaps of Greenland and Antarctica, examining the trapped air bubbles for information about the climate prevailing at the time the ice formed. A third source of information was historical records, especially from the Netherlands, Switzerland and China. The authors were unable to find enough information to work out what the southern hemisphere's climate had been, but are satisfied their conclusion that the northern half of the planet is in the warmest period of the last 2,000 years is sound. While some parts of the Earth may have been warmer than they are now, they say, average temperatures were cooler. They say the Earth has warmed by at least 0.2C in the last 20 years or so - the amount by which it has warmed or cooled over the space of a century in the past.

It just shows how dramatic the warming has been in recent years. We can't explain it in any other way - it's a response to a build-up of greenhouse gases in the atmosphere. Some scientists believe the recent temperature increases are explained by solar radiation, with emissions of carbon dioxide and other greenhouse gases too small to account for the changes observed. Others say the historical record proves the climate fluctuates naturally, with human influence irrelevant to global trends. To the argument that northern Britain was warm enough 1,000 years ago for vineyards to flourish, the authors say there are far more now.

They also reinterpret the fact that the river Thames used to freeze over more often, saying the design of the original London Bridge affected the river and made it freeze more easily. We can't say the whole world was once warmer than it is now just because Europe was warmer. We have to aggregate the records together, as we've done. We'd like more records, especially from the tropics, but we have enough information to say the world is now warmer than it's been for 2,000 years. **-BBC News Online**

PLASTICS RECYCLING AND THE NEED FOR BIO-POLYMERS

ALMITRA H. PATEL

Indians have a remarkably small ecological footprint compared to citizens in advanced countries. Non-biodegradable waste in large Indian cities averages just 50 – 100 gm per capita per day, compared to 1-2 kg in the West. Sadly, this is often disparaged as “backwardness” or under-development, rather than recognizing and appreciating the natural conservation culture of Indians, who will repair and use appliances and cars for years, hand down clothing to relatives or servants, waste no food, and even save paper and string for re-use. However, the sheer abundance of thin-film plastics has broken this habit. The sheer availability of not just carry bags, but bread wrappers, packaging of fresh foods and provisions like rice, dal etc, shrink-wrap, micro-packs of cosmetics and pan parag etc is far beyond the need or capacity of families to re-use them. So they get thrown away, and this has overwhelmed the ability of cities to handle this waste. Only low-gauge low-value plastic is a problem, as milk pouches etc are rarely thrown away; they still find their way directly to waste-buyers.

Organic waste has been a valuable resource for centuries, returning nutrients and micronutrients to the soil in a sustainable cycle. For this reason, the composting of biodegradable municipal waste is now mandatory for every urban local body under the MSW Rules 2000. But thin-film plastic packaging is creating a major problem.

In 1993 it was estimated that 1.5-2% by weight of municipal waste reaching the dumpsites and compost plants is thin-film plastic. Some recent estimates are as high as 7-9%. What is worse is, that regardless of the weight content in waste, by volume thin plastics are equal to or even more than the volume of compost produced. The capital cost and operating cost of machinery to separate out plastics from processed waste currently makes the compost unaffordable high-priced for farmers.

Almost all plastics are in fact recyclable, but are not recycled in practice. Why not? We need to study this, and see

whether, where and how biodegradable plastics can substitute the non-recycled items.

RECYCLING GIVEN LEGAL BACKING

Waste picking is a well-established urban-survival tactic in mega-cities that act as magnets for the poorest, and recycling is a flourishing business in the informal sector in India. It supports up to 0.5 % of the population in million-plus cities, and saves the city 10-15% of its total waste-management costs through reduction in waste volumes handled. Yet small-scale cottage industry recycling is still a mostly-unauthorized twilight activity as recyclers often operate behind closed windows and doors and avoid registration.

WHAT IS RECYCLED?

i) *Thin-film plastic*

Today, India's landscapes are littered with so much thin plastic that many citizens desire a total ban on its use, with some initial success that fades with time. Since a few hundred carry-bags are required to make a kilo of saleable scrap, it is simply not economical for waste-pickers to collect such ultra-thin waste, even if it is 20 micron or more, so it remains in the garbage in increasing quantities.

This will change as soon as higher prices for waste-pickers are possible, say Rs 5 per kg to a rag picker. This may happen because the year 2002 has seen an exciting new use for such waste. The KK Process chops thin-film road-waste into tiny flakes, and its customized dosing machine can introduce this light fluff uniformly into viscous bitumen in hot-mix plants. Tests at Bangalore and the Indian Road Research Centre proved that resultant roads will have as much as three times better life and resistance to both heat, cold, rutting and cracking.

ii) *PET bottles*

Globalisation has flooded Indian cities with packaging that is theoretically recyclable but is not in practice recycled. PET bottles for soft drinks and mineral water are the biggest problem, as they end up in gutters and block surface and

underground drains, causing flooding in low-lying areas and enormous economic loss annually, especially to the poorest that normally live in the worst-affected areas. The US and EU have stringent laws for take-back of such wastes, so they dump their PET waste almost free in India for recycling mainly by IOC's Futura Industries at Chennai. They recycle this and post-producer waste from PET bottle factories, leaving our own post-consumer waste uncollected and unrecycled, because we have no laws at present to prevent such waste dumping into the country.

WHAT IS NOT RECYCLED?

i) *Tetrapaks*

These popular and convenient multi-film juice cartons, made of cardboard-plastic-film-metal-foil combinations are hard to recycle conventionally. Worldwide, Tetrapaks are converted into a hardboard product in very many countries.

Presently there is no recycling market for Tetrapaks. There are already machines which pulp and strip the paper portion of the LDPE films for recycling them, but the foil layer interferes with recycling of either the paper or the plastic layers. It is worth exploring whether metallised biopolymer films can substitute for the existing layers, to make the whole multi-film product more recyclable. This application should be technically easy, because the bio-polymer is sandwiched between other layers and is not exposed to liquids or light.

ii) *Multi-film packaging, metallised BOPP*

Metallised-film packaging for biscuits, chips and namkeens are a similar major problem waste. The problem is made worse by hundreds of products packaged in tiny 5-10-gram pouches, mostly metallised or heavily printed, that are physically impossible to collect at all. If trials prove that BOPP (like unrecyclable Coke-Pepsi labels) or metallised BOPP can also improve the tackiness and durability of asphalt roads, a better street price may make them worth collecting. Micro-packaging sachets are the most needed

and most promising mass market for biopolymers. This is technically a difficult application that requires research, because these sachets are invariably hung up for display and exposed to light and perhaps rain. Their shelf life is also fairly long, posing a challenge to biopolymer designers.

iii) Styrofoam

EPS or Expanded Poly-Styrene is rarely recycled in India, mainly because so much of this ends up as dispersed bulky waste thrown out from homes or offices that buy equipment packaged in this. Worldwide, the foamed polystyrene packaging for TVs, computers, washing machines etc is being replaced by pulp shapes, or ingeniously folded cardboard shapes, or bubble-plastic, or, literally, packets of biodegradable popcorn. This is in response to a ban on the use of polystyrene packaging in 20 US States, with Europe following. If biopolymers can be foamed, this is a worthwhile niche worth exploring.

iv) Use-and-throw Catering Consumables

Tea-and-coffee cups, ice cream and yoghurt cups etc are made of HIPS (high impact poly-styrene), which is recyclable.

The problem here is not the recyclability, but the sheer bulkiness of scattered cups, which again are not worth a rag picker's effort to collect and sell. The problem is even worse for railway meals, where all such cups get thrown out of the windows all along the tracks. This is an application that badly needs biodegradable plastics. It is technically very easy, as the products are exposed to light and liquids for a very brief period. It is also important to promote or even require the use of biopolymer disposables at tourist spots, in sanctuaries etc.

v) e-Waste from the Electronics Industry

Recycling mobile phones, computer hardware and the control panels in equipment like washing machines is an extremely complex recycling issue, and technically very difficult, because of the tremendous range of equipment involved and the huge number of different materials that are made into the composites which go into a single piece of equipment, or even a single chip. Currently, most e-Waste is burnt in bulk to recover the trace

quantities of gold, silver, platinum, copper etc present in different components. In the process, the PVC coating on very thin connecting wires gets burnt too, forming deadly dioxins. Non-chlorinated substitutes for PVC insulating coatings do exist, but are not used because they are somewhat costlier than PVC. In spite of this, their use should be made mandatory in order to improve the eco-friendly recyclables of the products, which use such micro-wires.

Biopolymers could be explored if any exist that have good insulating properties, are cost-effective, and can be disintegrated in acidic or alkaline media to recover the copper wires without burning.

WHERE NOT TO USE BIO-POLYMERS !

A moneymaking racket is going on in cities like Pune, where degradable bags are required to be used for biomedical waste management. Since this is destined for almost immediate incineration, it is totally meaningless to insist on or require the use of either degradable or biodegradable bags. The bags only need to be chlorine-free like the usual LDPE or HDPE bags. Such unethical commercial exploitation needs to be put a stop to, otherwise it will give biopolymers in general a bad name.

On the technical front, some research is currently going on to make PVCs degradable through the blending of biopolymer components. This is disastrous, and the question needs to be asked, Why PVC items need to be made degradable. PVCs and similar chlorine or halogen containing polymers, when in contact with organics in soil, generate dioxins in situ. This will get accelerated if the PVC is broken down over time into minute fragments. Presently there is hardly any PVC to be found in general municipal waste because (like milk pouches) it fetches a high price from waste-buyers (kabadiwalas) and is very extensively recycled.

ECO-LABELLING NEEDS REFORM

India launched 'Ecomark' as a voluntary eco-labelling scheme from 1992 onwards for up to 14 industry categories to encourage industry to adopt eco-friendly production methods and consumers to pursue sustainable consumption patterns. Unfortunately, not a single Indian or foreign industry has "volunteered" to sign up.

There is need for streamlining and reforming the whole Ecomark procedure. Once it catches on, biopolymers can find a place in the packaging of Ecomark products, because their packaging aspects also figure in the granting of the Ecomark.

NEW LEGISLATION

India urgently needs policy concepts and legal requirements like those in the EU countries and USA to prevent its cities from drowning in non-biodegradable waste. There is need for new legislation and market strategies in the Indian context to promote product stewardship, producer responsibility and waste minimization. Many lessons can be drawn and adapted from similar legislation around the world. It is only a matter of time before India is required to adopt waste minimization and eco-friendly packaging rules. So there is a need to study the US, EU and other world legislation on biopolymers and draft suitable legislation for consideration by our lawmakers from now.

Mrs. Almitra H Patel is a Member, Supreme Court Committee for Solid Waste Management, 50 Kothnur, Bagalur Rd, Bangalore 560077

IRELAND IMPOSES PUNITIVE TAX ON PLASTIC BAG

Ireland which has drawn environmentalists praise for its taxing crackdown on plastic bags, announced plans to introduce punitive fees on three other key resources of litter namely, chewing gum packets, receipts from cash machines and polystyrene packing from fast food chains.

Last year, Ireland imposed a 15 Euro cent (17 U.S cent) surcharge on every plastic bag provided by grocery stores and other shops. As a result, the use of the once-free bags has plummeted, and they no longer linger as wind blown litter or Irish sheets and rural hedgerows. The money collected has gone to an Environmental Fund that plans to spend 35 million Euros (US \$ 40 million) this year on recycling centers. It is proposed to remove gum, polystyrene packaging and cash-machine receipts by the same punitive tax.

Environment Nepal

BIOTECHNOLOGY : PAST, PRESENT AND FUTURE

LALJI SINGH

In our present day world, personalized medicine, individual genomes on CD, drugs without side-effects, organ replacement with biologically synthesized cells look to be some of the important possibilities in the near future, given the revolutionary advances being made in the field of Biotechnology. The knowledge of biotechnology goes as far back as the beginning of human civilization and has been progressively practiced ever since. Most pronounced activities involving the use of biotechnology until the close of the Nineteenth Century were fermentation, curd making, and brewing. In the Twentieth Century, the mankind witnessed the most spectacular advances over the past millennium - elucidation of the mechanism of heredity. This select knowledge allowed numerous manipulations for intelligent breeding of plants and animals for survival in the competitive environment, for betterment of the mankind.

Some of the important milestones which have formed the bases for further advances in biotechnology in the Twentieth Century include Mendel's theory of evolution in 1865, discovery of chromosomes (1882), verification of Mendel's laws (1900), genetic mutations (1927), transformation of one strain to another (1928), DNA-heredity material (1944), X-ray diffraction data DNA (1952), discovery of the double-helical structure of DNA by James Watson and Francis Crick (1953), DNA-a double helix, genetic engineering (1973), DNA Fingerprinting for identifying individuals (1984), first physical map of human genome (1987), first cloning of a sheep named Dolly (1997), the first genetically-engineered primate (2000), and completion of the first sequence of the entire human genome (2000).

Human genome sequence information would lead to discovery of new targets, which could be used for discovering and designing of drugs. U.S. Food & Drug Administration has approved 348 biomedicines so far and 370 are in development phase.

Among the new challenges, we have the important task of finding out the functions of most of the genes. There were 40,000 protein-coding genes and the functions of only 1,500 genes were known so far. More than 98 per cent of DNA in human genome was non-coding and the scientists regarded a major part of it as junk. The answer to puzzling question that why are we so different from one another lies probably in the non-coding DNA. Therefore, it is very important to understand functioning of the remaining genes. It is much known today that the interaction of gene with the environment makes people behave differently. It is environment that is responsible for criminal tendency of a person.

We also know today that identical twins behave differently in different environments. It is our important experience that it is technology that drives science and not the other way round. Technological breakthroughs hold answers for most of our problems. The exploits of micro-array technology, proteomics, functional and comparative genomics based on bioinformatics and structural biology such as X-ray Crystallography and the Transgenic Gene Knock-out technology.

These facilities are available at the Centre for Cellular and Molecular Biology Hyderabad (CCMB), which are on par with the international standards.

To make use of the knowledge in these areas for drug discovery, there was a need to set up transgenic animal models for human diseases. The imported animal models are very expensive. In India, there are some institutes of science such as CCMB that have these models and are being used by pharma companies for testing purposes. To ensure that such facilities are adequately available in the country it is important to set up Resource Centres which may be sponsored by the government or the private sector and share them by networking. Individual companies could send their proposals that could be screened by funding agencies. The selected proposals could be provided

grants and the Resource Centres asked to provide all facilities for which payment might be made by the government from the grants.

One of the major developments awaited in the near future is in the area of personalized medicine based on individual genotype. At present, patients suffering from the same disease are put on same medication. The current therapeutic approach elicits response from some while others remain unresponsive, which is attributed to inherent difference in their genetic make-up.

In some cases, the medicine could be fatal. Therefore, the physician finds it important to know the genotype before prescribing the medicine.

For a country like India with a large section of the population facing economic challenge, such hi-tech medicine would carry much significance if it could be made affordable to the masses rather than to the affluent sections alone.

Advances in basic research in plant and animal sciences would yield information about the genes that control life processes. Advances in medicine would help understand the genetic control of health and disease. Further progress in bioinformatics would result in the creation of large databases, which would require complex software programming for structural analysis and recognition of patterns.

There are immense possibilities ahead in medicine and health, agriculture, food technology, industrial technology that would tackle complex problems of human and animal diseases and disorders, world food security, and, thus, redefine the human comfort.

Dr. Lalji Singh is the Director of Centre for Cellular & Molecular Biology, Hyderabad.

(The article, reproduced from AIBA Newsletter, is based on a talk delivered by the author at a meeting of the All India Biotech Association – Southern Chapter at Hyderabad)

NEWS AND VIEWS



BACTERIA TO RECYCLE OLD TYRES

Motorists in U.K. discard 50 million tyres every year, 18 million of which are dumped in landfill sites. The rest are burned as fuel by power stations, recovered for use as retread tyres or ground down to produce absorbent playground surface. Potentially recyclable material has been going to waste in landfills that can be processed to yield as fuel oil. But relatively low price of refined crude means that, till recently, it made little economic sense to devise and commercialize tyre-derived products.

Under a new European Union directive, by the end of 2003 it will be illegal to dump tyres in landfill sites. Efforts are now being made to fund environmentally friendly ways of getting rid of used tyres. Scientists of Napier University in Edinburgh are developing a process that will use bacteria to convert tyres into reusable rubber. They plan to extract high-quality rubber from old tyres, which could then be used to make new tyres or other rubber products.

Rubber gains its strength through a process called vulcanization, which adds sulphur to rubber molecules. The bacteria which is found naturally on former coal mining and oil production sites, can de vulcanize the rubber tyres by eating the sulphur. A tyre is made of 85 per cent rubber, 12 per cent steel and 3 per cent fabric. The 'Napier process' involves grinding the old tyres down and removing the metal and fibre before the resulting rubber chunks are added to a tank of liquid containing the bacteria. The bacteria acts on the rubber chunks at a molecular level and the resulting liquid rubber can be processed into new rubber products including quality tyres. The high temperatures, used in the manufacturing process, and then kill the bacteria in the liquid rubber.

London Press Service

FLY ASH: RESOURCE MATERIAL OF THE MILLENNIUM

Smoke belching chimneys add an environmental hazard through the fly ash they produce. Apart from atmospheric pollution, it is a big headache for the settlements around such industries. The fine debris of fly ash has to be domed at some place.

Researches carried out by leading scientific institutions of India indicate that fly ash is a wonder resource material. Some of the uses it has been successfully put to include: embankment for road, flyover, bridge and rail, as filler material for low lying areas, as an additive for making high weight concrete, as a substitute for wood and granite, multiple uses in agriculture and forestry, for making ceramic tiles.

Amongst many uses the best perhaps, is making fly ash bricks as a reliable substitute for conventional bricks. Machines are now available that churn out uniform compact, fire resistant and light weight fly ash bricks. Cellular concrete blocks using 40 to 60% fly ash as a cement replacement are already in vogue in Hyderabad. The technology helps in saving cement up to 50% on such blocks. These light weight, strong blocks are economical and eco-friendly.

Some organizations are actively involved in promoting the use of fly ash to enrich the soils, augmenting the crop yield, increase forest productivity and reclamation of arid lands. The increased use of fly ash has paved a way for converting an environment pollutant in to an eco-friendly multipurpose resource material.

Hindustan Times

PREGNANT WOMEN EXPOSED TO WORLD TRADE CENTRE POLLUTION MAY HAVE HAD SMALLER BABIES

Efforts are going on to track the health effects from air pollution caused by the attack on World Trade Centre in U.S.A. on 11 September 2001. Some reports have found respiratory problems and post-

traumatic disorders in people who survived the attacks. Preliminary research suggests that it may have resulted in delivering smaller babies among pregnant mothers who were in or near the collapsing towers. The pregnant women exposed to dirt and soot faced double the risk of delivering babies who were up to about a half-pound smaller than babies born to non-exposed women. While the duration of the exposure was relatively short, the intensity of exposure to air pollutants was extraordinarily high. The study appears in a recent issue of Journal of the American Medical Association.

Follow-up studies are planned to see if the children face heightened risks of health problems, as they get older.

Lindsey Tanner (Associated Press)

BIO-FUEL

With the concerns about the depleting levels of petroleum as well as rising air pollution, the world is fast moving towards alternative fuels. Brazil has already converted wholesale to ethanol, and soybean oil and palm oil are blended in U.S.A. and Malaysia respectively.

Since January 2003 nine states in India have introduced ethanol-blended petrol, which brings down costs, by 75 paise per litre. As an additive, ethanol helps petrol burn efficiently. A petrol-ethanol blend can reduce carbon monoxide and hydrocarbon emissions by 35-55 per cent. Ethanol is produced from various raw materials such as molasses (in India) or cane juice (in Brazil). Ethanol has the potential to reduce volatile organic compounds by 27 per cent, nitrogen oxides by 5 per cent and particulate matter emissions by as much as 41 per cent.

However, when it comes to diesel, ethanol has its limitations and cannot be blended. Solutions come in the form of biodiesel that blends various natural oils into diesel to obtain the same effects as ethanol.

Daimler Chrysler in association with CSIR has launched a programme for biodiesel extracted from Jatropha plants

cultivated on eroded soils. Indian Railways have grand plans to grow *Jatropha* on their own land.

According to a study at Hohenheim University in Germany, biodiesel would be the most cost effective and sustainable fuel source for India. Biodiesel being sulphur free will help reduce soot emission by up to 50 per cent and will give 3-4 per cent better fuel consumption. According to an estimate, two tonnes of *Jatropha* seed per hectare would be cultivated with 25-30 per cent yield, which roughly translates into 500-750 kg of biodiesel per hectare. In India, we can fulfill all our diesel requirements just by cultivating *Jatropha* on barren land.

Hindustan Times

CHEAPER HYDROGEN FUEL FROM BIOMASS

A major roadblock to widespread use of hydrogen-powered electric vehicles, which emit water vapor as a by-product and could cut greenhouse gas emissions substantially, is the cost and trouble associated with producing a suitable supply of hydrogen. Recently, scientists developed a technique to harness the fuel from biomass, but the catalyst required for the reaction was too expensive to be commercially viable. The researchers have discovered a different catalyst that works just as well – at a fraction of the cost.



Scientists at the University of Wisconsin-Madison, tested more than 300 materials in search of one that could catalyze the reaction of hydrocarbons derived from biomass to form hydrogen - a process known as aqueous-phase reforming (APR) - as well as a platinum-based catalyst does. The APR process can be used on the small scale to produce fuel for portable devices such as cars, batteries and military equipment.

But it could also be scaled up as a hydrogen source for industrial applications, such as the production of fertilizers or the removal of sulfur from petroleum products.

Sarah Graham in New Scientist

POLLUTION AFFECTS HEALTH AND ECONOMY

PM_{10} (particles with a diameter of less than 10 micrometers) cause 700,000 premature deaths each year in developing countries, 500,000 new cases of chronic bronchitis globally each year.

According to World Bank estimates, China lost between 3.5% and 7.7% of its potential economic output as a result of the health effects of pollution on the country's workforce in the late 1990s. Similarly, according to a M.I.T. estimate, Mexico City could see economic benefits of \$ 2 billion a year, if concentrations of particulate matter in the air are reduced just by 10%.

OZONE DAMAGES LUNGS

It has been known that exposure to ozone can have acute effects on health. The relationship between high concentrations and the number of patients admitted to the hospitals is well documented. Ozone is a highly reactive gas that causes, among other effects, irritation of the airways and lung tissue.

But it appears from researches carried out in USA that the serious effects can result from long-term exposure even at low concentrations. Young apes that have been exposed alternately to peak concentrations and normal levels have been shown to develop the same symptoms as in human asthmatics. Moreover their lungs did not develop properly, the number of airway branching remaining at nine instead of the normal thirteen.

Tests have been carried out by American scientists on children and teenagers, who were exposed to varying concentrations of ozone while growing up. These studies suggest that over a period of time, ozone permanently and irrevocably alters the lungs. Exposed children develop lungs that are functionally smaller and stiffer than they should be and have lesions and scars similar to those found in tobacco

smokers. They bear many of the hallmarks of asthma, handicaps that they may well carry for their entire lives.

Acid News

AIR POLLUTION CAUSES HEAT WAVE

Air pollution may have been the cause of death for thousands of French people who died in a heat wave that struck Europe this August, several hundreds or thousands could have been affected, may be between 1,000 and 3,000, according to President of France's Conseil National De l'air, an air quality agency attached to the Environment Ministry Hit by the hottest weather in some 60 years, France recorded around 11,400 more deaths than usual in the first two weeks of August.

Elderly persons have been the worst affected, with many struck down by hyperthermia and dehydration as temperatures rose over 40 degrees Celsius (104 Fahrenheit).

A recent study suggests that pollution may also have been a key cause of death, as searing temperatures and a lack of wind left a cloud of smog hanging over Paris. The European Union has also recognized high ozone levels as a health concern in a study published before the heat wave.

Kerstin Gehmilch (Reuters)

ORANGE JUICE PREVENTS ULCER

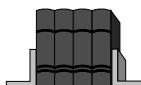
In a study of 7,000 Americans, researchers found that the lower the level of Vitamin C in a person's blood, more likely that he will be infected by the bacteria *Helicobacter pylori* which is linked to ulcers and stomach cancer. The researchers do not know whether a low Vitamin level is the cause or the effect of *H. pylori* infection but they recommend that it would be prudent for people who test positive for the bug to increase their Vitamin C intake.

TIME Magazine (U.S.A.)

FACTOIDS

- During 1990s, 2.4% of world's forest destroyed
- World's population to reach 8 billion by 2025
- By 2025, 50% of world's population to face water shortages
- In 1981, fossil fuels generated 86% of energy; today it's 81%

BOOKS



- Bioenergy-Vision for the New Millennium**
By R. Ramamurthy, Satish Kastury & Weyne H. Smith - 2000
Science Publishers Inc. (U.S.A.),
ISBN 1-57808-141-6, Price: US \$ 49.50
- AAAS Atlas of Population and Environment**
By Paul Harrison and Fred Pearce - 2001
The University of California Press,
ISBN 0-520-23081-7, Price: \$ 65.00
- Biodiversity and Conservation**
By Gabriel Melchias - 2001
Science Publishers Inc. (U.S.A.),
ISBN 1-57808-146-7, Price: US \$39.50
- Bioindicator and Biomarkers of Environmental Pollution and Risk Assessment**
By Kaiser Jamil - 2001
Science Publishers Inc. (U.S.A.),
ISBN 1-57808-162-9, Price: US \$ 63.00
- The Illustrated Encyclopedia of Trees**
By David More & John White - 2002
Timber Press, Portland, Ill. (U.S.A.),
ISBN 0-88 192-5209, Price: US \$ 79.95
- Use of Biomarkers for Environmental Quality Assessment**
Edited by Laurent Lagadic *et. al* - 2002
Science Publishers Inc. (U.S.A.),
ISBN 1-57808-095-9, Price: US \$ 85.00
- Biological Invasions - Economic Environmental Costs of Alien Plant, Animal and Microbe Species**
Edited by D. Pimentel - 2002
CRC Press, Atlanta, GA (U.S.A.),
ISBN 0-8493-0836-4, Price: US \$ 129.95
- The Evolution of Plants**
By K.J. Willis & J.C. Mcalwain - 2002
Oxford University Press, U.K.,
ISBN 019-850065-3, Price: US \$ 45.00
- Chromosome Botany**
By A. Sharma & S. Sen - 2002
Publisher Intercept Ltd. Hampshire, U.K.,
ISBN 1-898298-89-0, Price: £ 35.00
- The Names of Plants**
By D. Gledhill - 2002
ISBN0521-52340-0, Price: US \$ 25.00
- Natural Wetlands for Waste-water Treatment in Cold Climates**
Edited by U.Mander & P. Jenssen - 2002
WIT Press, C/o. Computational Mechanics Inc.
25 Bridge ST, Bellerica, MA
ISBN1-85312-859-7, Price: US \$ 139.00
- Weed Ecology in Natural and Agricultural Systems**
By B.D. Bood, S.D. Murphy & C.J. Swanton - 2003
Oxford University Press, New York,
ISBN 0-85199-528-4, Price: US \$ 60.00
- Introduction to Bioinformatics: A Theoretical & Practical Approach**
Edited by S.A. Krawetz & D.D. Womble - 2003
Humana Press NJ, U.S.A.,
ISBN 1-588 29-064-6, Price: US \$ 135.00

CONFERENCES

- National Symposium on Recent Trends in Biology and Biotechnology**
October 9 – 11, 2003, Shivaji University, Kolhapur, Maharashtra
Contact : Prof. S. G. Nanaware
Organizing Secretary
Department of Zoology,
Shivaji University, Kolhapur
– 416 004, India
Phone : +91 – 231- 2690 571 ext.
2547 (O), 2528754 (R).
Fax : +91 – 231- 2691 533
E-mail : shivdasgn@yahoo.com
- National Symposium on Emerging Trends in Indian Medicinal Plants**
October 10-12, 2003, Lucknow, India.
Contact : Dr. S.A. Siddiqui
Organizing Secretary
Phone: 0522 - 236 8064
E-mail : dr_shameem@zyberway.com
- Institute-Industry interaction research in unani medicine to identify areas of collaboration**
October 22 – 23, 2003, Hamdard University, New Delhi
Contact : Dr. Zainul Abidin,
Department of
Biotechnology, Hamdard
University, Hamdard Nagar,
New Delhi – 110 062, India.
- International Scientific Conference on Water-related Diseases**
November 1-8, 2003, Abuja (Nigeria)
Contact : ktavakol@howard.edu
<http://www.gcowd.com>
- Wastewater hygienisation in Constructed Wetlands, Ponds and Related Systems**
November 6-7, 2003, Leipzig-Halle, Germany
Contact : www.ufz.de/spb/phyto
E-mail : hygienisation@rz.ufz.de
- Asian Conference on Environmental Education - Environmental Education and Civil Society**
November 7-9, 2003, New Delhi, India
Contact : Dr. Desh Bandhu
U-112, 3rd Floor, Vidhata
House, Vikas Marg,
Shakarpur, Delhi-110092,
India
E-mail : iesenro@del2.net.in
Website : iesgiobal.org
- National Seminar on Biodiversity, Conservation and Commercial Exploitations of Medicinal Plants**
November 8-10, 2003, Hyderabad, India
Contact : Prof. K. Janardhan Reddy
Organizing Secretary
Department of Botany,
Osmania University,
Hyderabad-500007, India.
E-mail : kjreddy50@yahoo.co.in
- RAPIDC (Regional Air Pollution in Developing Countries) Workshop: Air Pollution in Asia Assesing impacts on agricultural and forest productivity**
December 9 - 12 2003, Pathumthani, (Nr. Bangkok) Thailand
Contact : Elnora M. de la Rosa
SEI Bangkok Office
Asian Institute of Technology,
P.O. Box 4, Klong Luang
Pathumthani 12120, Thailand.
E-mail : nora@ait.ac.th,
Fax : +66(0)2516 2125
- National Symposium on Plant Biodiversity in Changing Environment**
December 29-31, 2003, New Delhi, India
Contact : Prof. Muhammed Iqbal
Convenor
Department of Botany,
Hamdard University,
Hamdard Nagar,
New Delhi – 110 062, India.
E-mail : iqbalg5@yahoo.co.in
Web : www.jamiahamdard/seminar.org
- 91st Indian Science Congress**
January 3 - 7, 2004, Punjab University, Chandigarh
Contact : Dr. B. P. Chaterjee
The General Secretary (HQ)
Indian Science Congress
Association, 14, Dr. Biresw
Guha Street, Kolkata – 700
017, India
Phone : +91-33-2240255
Fax : +91-33-22402551
Email : iscacal@vsnl.net.in
Web : www.sciencecongress.org
- International Conference on The Great Himalayas**
January 12-15, 2004, Kathmandu, Nepal
Contact : Dr. Subodh Sharma
Organizing Secretary
Department of Biological and
Environmental Sciences,
Kathmandu University,
Dhulikhel, Nepal.
E-mail : kuhimal@ku.edu.np,
Fax : 00977-11-661443:
Tel : 00977-11-661399
URL : www.geocities.com/sharmaku
<http://www.aehms.org>

This issue of Environews is sponsored by

 **Reliance**
IndiaMobile
Kar Lo Duniya Mutthi Mein

KILLING THE HIGH END KILLER

SUNITA NARAIN

Prof. Kirk Smith at East-West Centre Hawaii, who monitored kitchen smoke in Gujarat villages in 1980s with a hand held smoke monitor revealed that women were exposed to total suspended particulates of about 7000 microgrammes per cubic meter ($\mu\text{g}/\text{cum}$) in each cooking period (compare this to annual standards for outdoor air at 140 $\mu\text{g}/\text{cum}$). Worse, how the exposure to benzo(a)pyrene – the carcinogen in cigarette smoke and found in biomass smoke – was equivalent to smoking 10 packets of cigarettes in a day.

What did this do to women's health? What were the options of cooking on stoves? Using either fuel wood, or twigs, dry leaves, crop residues or cow dung.

In the 1990s as pollution from vehicles increased, the impact of tiny particulates, in a cooking cycle, than the inhabitants of the most polluted city in the world – a 24-hour concentration measured inside homes can be above 2000 $\mu\text{g}/\text{cum}$. Compare this to the standard for air pollution: 60 $\mu\text{g}/\text{cum}$ daily average.

Today, the WHO estimates that there are over 1.6 million premature deaths each year from cook stove pollution. Some 400,000 to 550,000 women and under-five children die prematurely each year in India because of this deadly smoke.

The burden of disease from cook stoves comes right after dirty water and lack of sanitation (which contribute over 10 per cent of the disease burden and malnutrition, over 22% of the disease burden in India).

In other words, by providing access to clean water, sanitation, food and ventilated homes, we could wipe out over half the disease and premature deaths in the country.

Deadly smoke swirls indoors. What are needed quite simply, are a well-designated stove and a chimney.

The burden of disease from cook stoves comes right after dirty water and lack of sanitation (which contribute over 10 per cent of the disease burden and malnutrition, over 22% of the disease burden in India). In other words, by providing access to clean water, sanitation, food and ventilated homes, we could wipe out over half the disease and premature deaths in the country. Deadly smoke swirls indoors. What are needed quite simply, are a well-designated stove and a chimney.

We will have to invest in many options – from biomass gasification through generating electricity in rural areas to many more designs of chulahs that work. After all, this is not a programme about a low-end technology called chulah. This is a programme about stopping the century's third largest killer of human beings.

In the 1990s, as pollution from vehicles increased, the impact of tiny, respirable particulates was better understood. What also became clear is that women are exposed to more toxic tiny particulates, in a cooking cycle, than the inhabitants of the most polluted city in the world - a 24-hour concentration measured inside homes can be above 2000 $\mu\text{g}/\text{cum}$. Compare this to the standard for ambient air pollution: 60 $\mu\text{g}/\text{cum}$ daily average.

Dr. Sunita Narain is the Director, Centre for Science & Environment, New Delhi and Editor of Down to Earth. This article is reproduced from a 'Down to Earth' editorial.

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS
(National Botanical Research Institute, Lucknow-226001, India)

President :
Dr. P. Pushpangadan

Vice Presidents :
Dr. S.C. Sharma
Prof. C.K. Varshney
Prof. H.N. Verma

Secretary :
Dr. K.J. Ahmad

Joint Secretaries :
Dr. Mrs. Kamla Kulshreshtha
Dr. Mrs. Seshu Lavania

Treasurer :
Dr. Prakash Chandra

Executive Editor :
Dr. H.M. Behl

Members of the Executive :
Dr. Mrs. Madhoolika Agrawal
Dr. Ms. Shashi Dhawan
Dr. Mrs. Anjum Farooqui
Prof. M. Iqbal
Prof. Shashi Kant
Prof. N.K. Mehrotra
Dr. L.M.S. Palni
Prof. S.H. Raza
Dr. R.D. Tripathi
Prof. C.L. Verma
Prof. Mohd. Yunus

Advisors :
Prof. J.N.B. Bell
Prof. Richard F.E. Crang
Prof. S.V. Krupa
Prof. Sir Ghillelan T. Prance
Dr. P.V. Sane
Dr. B.P. Singh

Awareness Programme Committee :
Ms. Kanti Srivastava (Convener)

Printed and Published by
Dr. K.J. Ahmad
for International Society
of Environmental Botanists,
National Botanical Research Institute,
Rana Pratap Marg, Lucknow-226001, India

Executive Editor :
Dr. H.M. Behl

Editors :
Dr. Mrs. Kamla Kulshreshtha
Dr. Amit Pal
National Botanical Research Institute
Lucknow, India.

Tel. 2205831-35 Extn. 223, Fax : 2205836
E-mail : isebnbricko@satyam.net.in