ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

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IN THIS ISSUE

INVITATION

Third International Conference on Plants and Environmental Pollution (ICPEP-3) will be held at National Botanical Research Institute (NBRI), Lucknow from 28 November – 2 December, 2005. The Conference will be formally inaugurated by His Excellency the Governor of Uttar Pradesh Shri T.V. Rajeshwar on 28 November at 3:30 P.M. at the Convention Centre of the King George's Medical University, Lucknow.

The scientific programme of the Conference will begin at NBRI auditorium (K.N. Kaul Block) from 29 November at 9:30 A.M. The concluding session/valedictory function will be held on the forenoon of 2 December 2005.

I, on behalf of ISEB and NBRI, feel great pleasure in inviting all the members of International Society of Environmental Botanists to grace the occasion by their presence and active participation in the deliberations.

P. Pushpangadan
President ISEB & Director NBRI

- Informative news, views and popular articles/write-ups on current environmental researches/issues are invited for publication in ENVIRONEWS.
- 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

LETTERS

I would like to pay registration fee for ten Indian students to enable them to participate in the Third International Conference on Plants & Environmental Pollution (ICPEP-3). Please note that this funding is not from my department, federal or provincial government, or my project. This is frommy paycheque. I will not be involved in the selection process. Your committee will make the decision. Please discuss my offer with the Organizing Committee and send me an email. If the offer is acceptable to you, I will get an international money order or bank draft. from a bank in Canada and either give it to you personally when I see you at the **beautiful NBRI campus** or mail it to you (whatever is convenient to you).

Yash Pal Kalra,
*Edmonton, Alberta, **Canada***
President, Bhoovigyan Vikas Foundation (India) Overseas Chapter (2002-present)
President, Soil and Plant Analysis Council, International (2000-02)
President, AOAC International PNW (2001-02)
President, Canadian Society of Soil Science (1996-97)
President, Group of Analytical Laboratories, Canadian Forest Service (1990-92)
President, Western Enviro-Agricultural Laboratory Association (1983-84,1987-88)
Fellow, AOAC International (1997)
Fellow, Canadian Society of Soil Science (1999)
Fellow, Indian Society of Soil Science (1996)

Thanks for all the work you are doing to make successful the ICPEP-3 meeting. I think it is quite important to improve the relations between scientists working in air pollution and your work is in the right direction. I have to communicate to you that unfortunately, I will not be able to attend the meeting, the main reason is that I will be in an official mission to Montreal with a delegation of the Spanish Ministry of Environment during that week (and unfortunately nobody can replace me there), but I am trying to get financial support to send my colleague Vicent Calatayud to the meeting (as you know we submitted two communications). I hope my last minute problem will not cause you a bigger one.

Maria J. Sanz
Chairman of the WG of Air Quality Fundación CEAM,
Parque Tecnológico, C/Charles R. Darwin, 14
*46980 Paterna (Valencia), **Spain***
E-mail: mjose@ceam.es

I am a third year student of an international biotechnology bachelor course and I am interested in bioremediation. The reason I write to you is that I want to do a 6 months internship in this area of research and I would like to ask you if you can send me more information or forward my application to someone concerned with the topic. This internship is foreseen by the course of study I am attending, which was established in 1999 by the cooperation of 10 European universities. Lectures are held in Perugia, Italy, but for completing each year a 3-months internship is obligatory. Thus, I did two internships, the first one in Ecuador investigating Leishmaniasis and its sand fly vector and the second one in Quebec evaluating the effects of several pesticides on mussels. For finishing the last year of my studies I need to do a 6 months internship which I would like to do in the above mentioned research area. If you need more information I´d be glad to answer any upcoming question.

I hope you can help me! Thank you a lot.

Christina Erkelenz
E-mail: chrissy-erkelenz@gmx.net

I always remember the wonderful time I had in your country during ICPEP-2 Conference three years ago and I would like to visit India again. Unfortunately, I received latest information about your forthcoming Conference only yesterday from my colleague Dr. I.M. Kravkina. My e-mail address was changed that is why I could not receive any information about ICPEP-3. I would like to participate in this Conference and am sending my abstract now. If it is not too late, kindly include it in the Conference programme.

Dr. I.M. Kravkina and I would like to know about our manuscripts which were contributed in the proceedings of ICPEP-2.

Dr. I.V. Lyanguzova
Senior Scientific Fellow, Laboratory of Ecology of Plant Communities
*V.L. Komarov Botanical Institute of RAS, St. Petersburg, **Russia***
E-mail: irina@lya.spb.ru

I am contacting you on the advice of Prof. Nigel Bell, Imperial College London to Dr. A. Wahid and me. But unfortunately, I was not able to contact you because I was very much engaged in my Ph.D. thesis writing. Now, I have submitted my thesis for evaluation. I am Very much interested to join your Society. Kindly send me form and full details through mail to my address given below.

Shakeel Ahmad
Lecturer, Department of Mycology and Plant Pathology,
*University of the Punjab, Quaid-e-Azam Campus, Lahore, **Pakistan***
shakil786gcl@yahoo.com

I am working on a project in Brazil on plants and wish to contact some of the people below. I will appreciate your help.

Biomonitoring of Air Pollutants with Plants*

By: Ludwig De Temmerman, J. Nigel, B. Bell, Jean Pierre Garrec, Andreas Klumpp, Georg H.M. Krause & Alfred E.G. Tonneijck

Jorge Otavio Mendes de Oliveira Junek
Bunge Fertilizantes S.A., Meio Ambiente - Araxá / MG
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We are going to organize a International Meeting in honor of Prof. Jim Barber in August 20-26, 2006 in Russia. The title of the meeting is: "Photosynthesis in the Post-Genomic Era: Structure and Function of Photosystems", August 20-26, 2006, Pushchino, Moscow Region, Russia.

The following is the web address: http://psmeeting.ibbp.psn.ru/

I shall be grateful to you if you agree to include our Webster in "Scientific Meetings" menu of your website.

Allakhverdiev Suleyman
Suleyman@issp.serpukhov.su

NEWS FLASH

WATER PRIZE FOR SUNITA NARAIN

Ms. Sunita Narain, noted environmental scientist and Director of Delhi-based Centre for Science and Environment (CSE), has been honoured with the 2005 Stockholm Water Prize. The prize has been awarded for efforts made by CSE in fighting powerful, top-down bureaucratic resource control, empowering women in water and rejuvenating traditional rainwater harvesting.

CSE's work on rainwater harvesting has shown the many ingenious ways in which people learnt to live with water scarcity. The solution, practiced diversity in different regions, lies in capturing rain in millions of storage systems - in tanks, ponds, step wells and even rooftops – and to use it to recharge groundwater reserves for irrigation and drinking water needs.

FELLOWSHIP AWARDED

Dr. R.D. Tripathi, Scientist E-II & Group Leader, Ecotoxicology & Bioremediation Laboratory, National Botanical Research Institute, Lucknow has been awarded Fellowship of Indian Academy of Environmental Biology. Dr. Tripathi is an Editor of ***Environews*** and Organizing Secretary of ICPEP-3.

SCIENCE AWARENESS PROGRAMME

Science awareness programme was organized on August 11, 2005 in the Eco-education Division, NBRI, Lucknow, which was attended by a large number of students invited from Government Inter College, Nishatganj, Lucknow. Students were given demonstration on medicinal and aromatic plants, flowering plants, nutritious vegetables and lesser-known fruits in the garden of Eco-education Division. Dr. P. Pushpangadan, Director, NBRI, delivered a lecture on different aspects of biology, like biotechnology, herbal technology, nano-technology, bioinformatics, etc. He also explained about the concepts of traditional knowledge and modern scientific knowledge, about global biodiversity and its conservation, fair and equitable uses of these resources for human welfare.

Dr. M.R. Suseela, Scientist, Algology Group, NBRI, Lucknow and a Life Member of ISEB attended Interagecy, International Symposium on Cyanobacteria-Harmful Algal Blooms (ISOC-HAB) during September 6-10, 2005 at Research Triangle Park, North Carolina, USA. She was invited to participate as a work group member in the discussion panel of "Cyanobacterial bloom occurrence" by the organizers of Environmental Protection Agency, U.S.A.

WELCOME TO NEW LIFE MEMBERS

Ahmed Khwaja, is a qualified Sugar Technologist, presently retired belongs to a distinguished family of Saharanpur. He is deeply interested in community work and social activities relating to environment and health. Besides joining ISEB as a Life Member, he has made a generous donation to this Society.

Dr. Shivani Chaturvedi, Women Scientist under Department of Science & Technology, New Delhi, working at the National Botanical Research Institute, Lucknow, associated with Biomass Biology Group has joined ISEB as a Life Member. Before joining NBRI she has carried extensive research work on variation in Biochemical composition of vegetable in Kumaon Hills at Agricultural Research Laboratory, Pithoragarh, Uttaranchal under Defence Research & Development Organization. She may be contacted at : d_chaturvedi123@rediffmail.com.

LOOKING AT FIREWORKS FROM ENVIRONMENTAL SCIENCE PERSPECTIVE

ARUN K. ATTRI

Without any hesitation it can be stated that the sparkling and twinkling of coloured lights exhilarates the visual senses of one and all. When this display is coupled with the sound of explosive bursts it is considered an expression of joyous affair; occasion can be marriage, new year, Diwali or any other festival. On the other hand, scientific evidence is mounting to reveal the immediate impact of such firework displays on human health through pollution of air we breathe. Diwali festival had been the focus of scientific investigations related to firework displays and following adverse health impact.

In order to understand the gravity of the adverse health related impact due to the fireworks, it is important to comprehend their basic chemical composition. Firework activation represents a combustion reaction, where the mixed ingredients are burnt. The most basic form of fireworks, known as black powder, was discovered and used in China about 1000 years ago. It was a mixture of potassium nitrate, charcoal and sulfur in 75:15:10 proportion. Black powder, even today, is used as an explosive charge and propellant in shells and bullets. On ignition the mixture produces, instantaneously gases and if the mixture is confined inside a closed space explosion follows. The directed emission of gases can propel the container like a rocket. From chemistry's point of view combustion requires the supply of oxygen; or oxidizing agent capable of supplying large amount of oxygen. Commonly known oxidizers used in fireworks are nitrates, chlorates and

per-chlorate compounds. Reducing agent capable of burning in the presence of oxygen supplied by the oxidizer acts as fuel; sulfur and charcoal are few common reducers used in making the fireworks. The loose mixture of oxidizer and reducer is shaped and held together by using binding agent; starch dextrin or gum arabic are common binders used to make the mixture more evenly homogeneous. Bright sparkling colours emitted by different types of fireworks require the addition of metal salts in black powder. Depending upon the composition of oxidizer and reducer used, fireworks on ignition can achieve very high temperature (1000 to 3000 ^{o}C). Metals, when heated, at such temperatures, emit radiation covering a wide spectral range, which includes the visible light of characteristic colour.

Some of the common metal salts used to achieve the emission of sparkling colours are: (a) Copper Acetoarsenate [Blue], (b) Copper chloride [Turquoise], (c) Cryolite [Yellow], (d) Lithium Carbonate [Brilliant Red], (e) Barium Carbonate [Green], (f) Barium Chloride [Bright green] etc. In addition, the emission of bright white sparkling light flashes effects require the mixing of magnesium and aluminum salts into the mixture. The human eye can only see the radiation emitted in visible spectral region. One of the little known aspects associated with metal salts emitting radiation or light, when heated at high temperature, was revealed in 2001(Nature vol 411, pp 1015).

Experiments clearly provided evidence that in addition to the emitting of visually elating colours, metals at high temperature also emit radiation in spectral region known as ultraviolet or UV. Barium, copper, lithium, strontium, manganese, sodium salts when burnt at temperatures produced by the ignition of fireworks emit significant proportion of light having wavelength less than 240 nm (high energy UV radiation). Consequences of this are alarming. First, the person standing in the vicinity, where fireworks are ignited, will be exposed to harmful UV radiation. Second, the high energy UV radiation are readily absorbed by molecular oxygen present in the air. This results in the splitting of molecular oxygen into atomic oxygen [O_2 + UV(Wavelength <240 nm) à O + O].

Now, this is serious as atomic oxygen (O), thus produced, is chemically very reactive and on reaction with molecular oxygen produces ozone (O_3), a powerful oxidant. The experiments done recorded precisely this. Fireworks emitting colour on ignition produced a burst of O_3 production in the air surrounding the ignited fireworks. This new finding unfolded another dimension associated with firework displays, i.e. in addition to their potential to pollute the air. Air we breathe, if contains ozone (powerful oxidant) will damage the lung lining. The damage is likely to be more among children.

In the wake of new scientific evidence, let us reflect upon what all we know about the consequences of extensive firework displays, as it happens on Diwali, New year, or any community related festive occasion, taking into account the meteorological factors prevailing during their celebrations.

(A) Large scale firework displays coincides with the onset of the winter season. From sunset till morning, atmospheric mixing height is low as compared to summer season. In simple terms, whatever pollutants are injected into the lower atmosphere, have less volume to mix in. This results in the further concentrating the air pollutants.

(B) It is already established that the levels of suspended particulate load (SPM), CO, NO_x, Hydrocarbons, SO_2 increase to an unprecedented levels in air. Pregnant women, children and those having a chronic asthma are most vulnerable to the serious medical condition during firework displays.

(C) UV light and ozone exposure make conditions more undesirable.

(D) Meteorological conditions favour calm winds and this will ensure removal of pollutants produced from fireworks hangs in the air for long duration.

One of the most desirable aspect of our life is to have a good quality of life, this requires that we respect the right of every other individual to pursue the same. So, even if we have a great urgent desire to ignite fireworks to seek personal gratification, we should look again, are we not encroaching on the natural rights of others to seek the availability of pollution free air to breathe? Best celebrations are not at the cost of making others unhappy. It is time to seek pollution free air and water and aspire for better quality of life saying no to the fireworks will be a big step towards attaining it.

Prof. Arun K. Attri is Professor at School of Environmental Sciences, Jawaharlal Nehru University, New Delhi- 110 067, India (attri@mail.jnu.ac.in)

INDIAN VILLAGE: AN ECOLOGICAL PERSPECTIVE

CHANDRA SHEKHAR MOHANTY

India is a vast country spreading over an area of 33.67 million square kilometer, having 7.78 thousand kilometer of coastline. The large variation in climatic condition soil types, water bodies, vegetation types encountered in the countries endows with an endless variety of life between the snow-bound mountains of great Himalayas and the dark tropical forests. To the outsider, baffled by the heterogeneity of its races and their languages, beliefs and traditions, this country means little more than a geographical unit. To its people it is a vast complex world whose organic unity is taken for granted. But, whether one tries to describe India in terms of its geography and natural resources, or explains it historically, the picture remains incomplete, and only a comprehensive view of the wide canvas of Indian life can lead to proper understanding of the country and its people.

The cultural unity of the Indian people

springs largely from the agricultural character of the country. Even today, when industrialization is progressing and large-scale migration taking place from rural areas to cities and towns, majority of the Indian people lives in villages and is dependent on land. Since time immemorial, agriculture has been a kind of religion in the country. The gods that are honored belong to the soil and are more or less the same all over the country. To understand India, one must, therefore, study its village life.

INDIAN VILLAGE LIFE

Rural people are often stereotyped and simple, but they usually know much more about their environment than many well-trained outsiders be they government officials or academic researchers. Farmers know the soils, the plants, the pests, the seasons, and the problems and risks, which they face. Farmers on their fields experience the sequence and conditions of their cultivation as a whole and have or good insight of the problems. Their adaptations are often skillful**,** sensitive, subtle—and sophisticated. Of late, they are also-getting exposed to newer technologies that are relevant to rural setting.

SCIENCE AND TECHNOLOGY FOR RURAL DEVELOPMENT

The principle that "simple is sophisticated" can apply in this scenario to choices made in research and development. Research and development decisions frequently lead to innovations, which are large-scale, costly, difficult to maintain and dependent on greater inputs, which have to come from outside the rural environment. The innovations may be profitable; but they tend to benefit those rural people, who are already better off, rather than the poorer marginal farmers and landless laborers. In contrast, innovations which are small-scale, cheap, easy to maintain and use locally available and renewable materials and inputs, are more likely to benefit the poor. At times, the formal research and development can miss opportunities or point them in the wrong directions. For example, for a rice-breeding concentrated heavily on responses to chemical nitrogen, which is often cornered by the larger farmers, to the neglect of improving nitrogen-fixation in the root zone of the rice plant, a biological technology which may be scale-neutral, cheap, renewable, and more readily available to many more of the smaller farmers. In this scenario, research and development need be directed towards those simple outcomes to which the poorer rural users will have better relative access.

The Indian subcontinent is one of the most fascinating ecological and geographical regions in the world. It lies at the confluence of the African, European and Southeast Asian biological systems.The variety of ecological systems sustain a huge amount of diverse forms. Among such ecological systems are the villages of rural India which support diverse forms of life with their vast natural resources. About 76% of India's population lives in about 5,76,000 villages. In the past,the villages were self sufficient. However, industrial transformation and population growth in the post-independence period accompanied by rising living expectations have resulted in tremendous pressure on the natural resources of the villages. The important life support systems such as cropland, wetland, woodland, grassland and rangeland/wasteland have been misused, overused and degraded. The system is no longer able to function properly.

Conservation and management of bioproductive systems and recycling of resources involve human labour as an important energy input. Sometimes a change in the physical environment disturbs the balance between men and natural resources of a village ecosystem leading to several changes in the socio-economic and cultural life of the people.The aspect of culture that changes most radically is that linked to the environment. Several different methods have been employed to compute the human and animal energy used in work. The total food energy intake of a full-time farm worker (working 40 hours per week) can be used as a measure of the energy utilized in farm labor.

RURAL DEVELOPMENT

Out of the total population, 52.5% live below the poverty line and a majority of them live in Indian villages. Because of the unsatisfactory living condition of rural mass, one of the most formidable and fundamental aspects of India's effort towards development is rural development. Rural development is a dynamic process to improve the socio-economic life of the rural poor. It involves extending the benefits of development to the poorest among those who seek livelihood in the rural areas. In the other words, it implies economic and social uplift of the under -developed and poor people in the rural areas who have been languishing below the poverty line and are unable to meet their basic minimum requirements.

It is imperative that each development program should be viable economically, and should pave the way for activities. The monetary value of natural resources used by rural communities for subsistence is important when addressing issues affecting the livelihoods of impoverished rural households. There is therefore the need to attribute monetary values to non-marketed products from smallholder production systems in order to reliably account for resource availability and usage.

MAJOR ENVIRONMENTAL PROBLEMS IN INDIAN VILLAGES

The following are among the major environmental problems, which seriously affect the Indian villages, and erode the socio-economic and health conditions of the rural poor.

INDOOR AIR POLLUTION

Indoor air pollution caused by burning traditional fuels such as dung, wood and crop residues adversely affects to the health of the villagers, particularly the women and children. There is evidence associating the use of biomass fuel with acute respiratory tract infections chronic obstructive lung diseases in children. Lung cancer has been found to be associated with the use of coal, however, there is no evidence associating it with the use of biomass fuels. Cataract and adverse pregnancy outcome are the

other conditions shown to be associated with the use of biomass fuels. Finally, there is enough evidence to accept that indoor air pollution in India is responsible for a high degree of morbidity and mortality in the rural areas.

LOSS OF BIODIVERSITY

Biological diversity in general and agricultural diversity in particular is being depleted at an unprecedented rate in the past few decades. Much of the agricultural biodiversity that remains on farms today can be found on the semi-subsistence farms of developing countries like India. Even though a variety of plants and animals homestead gardens comprise a variety of plants and vegetables, although the species richness of these gardens has been considerably reduce. Nevertheless, it is heartening to note that, some awareness has now been generated to conserve biodiversity.

CHANGE IN LAND-USE PATTERN

Land-use change has important implications for sustainable livelihood of local communities where traditional crop-livestock mixed farming is sustained with local inputs. Knowledge of recent changes in land use, driving forces and implications of changes within the context of sustainable development is limited. A study analyzed the changes in spatial patterns of agricultural land use, crop diversity, manure input, yield, soil loss and run-off from cropland, and dependence of agroecosystems on forests, during the 1963-1993 period in a small watershed in central Himalaya, India. Data obtained from existing maps, interpretation of satellite imagery, GIS-based land-use change analysis, participatory survey and field measurements were integrated to quantify changes at the landscape/ watershed scale. During the 1963-1993 period the same group found that, agricultural land use increased by 30% at the cost of loss of 5% of forestland. About 60% of agricultural expansion occurred in community forests compared to 35% in protected forests and 5% in reserve forests. Agricultural expansion was most conspicuous at higher elevations (2600m) and on medium slopes (10 -30□).

WASTE MANAGEMENT IN RURAL INDIAN VILLAGES

A micro-level study was carried out in a typical south Indian village to assess the quantity and type of wastes generated and its present mode of management. This information was used to identify the appropriate technologies, which could enhance the value of the waste produced, and at the same time, improve the economic conditions of rural people. The study indicated that nearly 2364 tons of rural wastes in the form of crop residues, animal manure and human excreta are produced annually in the village with a population of 510. About 77% of the waste generated in the village was used as domestic fuel, animal fodder and organic fertilizer for crop production. The rest (23%) was left out in open fields for natural decomposition. The energy balance sheet of the village indicated that the present consumption of biomass resources was 50% less than that actually required for various domestic and agricultural applications. Anaerobic digestion of animal manure and human excreta produced in the village could yield 82% of the domestic energy required besides enriching the waste by 3-4 times as compared to conventional storage on the ground. If the traditional mud *chulha* (stove) were replaced by an improved *chulha*, each family unit could reduce its annual consumption of fuel wood.

The use of non-renewable energy in Indian villages is very low. In the agriculture it is minimal, as it is mostly based on human labor and animal power rather than oil and electricity. Cultivation in large areas is done by hoe and animal draught. The use of tractor for tilling the land is also common in some areas. Ground water is lifted variously by human power and by animal power. The tube well and water pumps are also becoming popular in many areas. Cooking and lighting use local energy sources such as biogas, solar energy, firewood, and dung. Part of the village's income comes from communal energy farming with *Eucalyptus* and different species of *Euphorbia* (a succulent) and other energy crops, which enable the village to be, by a small margin, a net exporter of energy. Even the tools and utensils used in the village are produced nearby in small regional centers using small quantities of non-renewable energy.

Means of transport, used in the villages utilize animal power as well as petrol or diesel. The villages produce little surplus for export to the rest of the economy and import little from several essential items nearby from the town. Most of the villagers do not often travel long distances, (except on the inter-village exchange program) partly because they are notable to afford to travel much.

Mahatma Gandhi, the Father of the Nation, said that "India is in villages". "If villages perish, India perishes". Therefore, village ecosystems need a closer study emphasising on the interactions between societal needs and life support systems. A village, being a typical unit of rural India, can be considered as an ecosystem taking into account its distinctive structure and function.

The term village ecosystem reflects the totality of settlement and its activities as a dynamic and organic whole.The function of a village ecosystem mainly depends on the major bioproductive systems such as agricultural lands, grasslands, forest and wetland, which together form important physical resource base. In developing countries like India, the rural sector with high population density and high level of poverty poses a serious threat to the environment. Impact of human activities on the resource base of an ecosystem sometimes leads to critical situations. Degradation of the environment is closely related to the pattern of resource-use which is influenced by population level, migration pattern, market access and land use practices. Indeed, it is a bitter truth that despite having all the wealth, science and technology in our hands, our society can never escape its dependence,direct or indirect, on the earth's natural resources, and it is particularly true for Indian villages.

The author is a member of ISEB and a scientist at Eco-education Division of National Botanical Research Institute, Lucknow.

TOXIC CONTAMINANTS IN HERBAL DRUGS

VARTIKA RAI AND SHANTA MEHROTRA

Herbal drugs have increasingly been used worldwide during the last few decades as evidenced by rapidly growing global and national markets of herbal drugs. According to WHO estimates, the present demand for medicinal plants is about US $14 billion a year and by the year 2050 it would be about US $ 5 trillion. Now people rely more on herbal drugs because of high prices and harmful side effects of synthetic drugs, and this trend is growing, not only in developing countries but in developed countries too. Unfortunately, the number of reports of people experiencing negative effects, caused by the use of herbal drugs, has also been increasing. There may be various reasons for such problems, like one of the major causes of adverse effects is directly linked to the poor quality of herbal medicines. Therefore, it has been recognized that insufficient attention was being paid to the quality assurance and control of herbal medicines. Although WHO has developed guidelines for the quality control of herbal drugs which provide a detailed description of the techniques and measures required for the appropriate cultivation and collection of medicinal plants. Despite such guidelines, there is still a lacuna between this available knowledge and implementation, because farmers and other relevant persons like producers, handlers and processors of herbal drugs are not much aware of WHO's guidelines and they continue their work as before without any quality control measures which results in inferior quality of herbal drugs with lots of contaminants like heavy metals, pesticides and microbes. Therefore, the training for farmers and other relevant persons is an important measure to be taken to ensure good quality of raw herbal drugs.

Several cases of adverse effects of herbal drugs have been reported in developed countries during the last few years, which are allegedly caused by taking herbal products or traditional medicines prescribed by the practitioners of indigenous systems of medicine. These products may be contaminated with excessive banned pesticides, microbial contaminants, heavy metals and chemical toxins which cause various deformities like congenital paralysis, sensori-neural defects, liver and kidney damage etc. These contaminants may be related to the source of herbal drugs, if these are grown under contaminated environment. Chemical toxins may come from unfavourable post harvest techniques/ wrong storage conditions or chemical treatment during the storage period etc. Some of these environmental factors may be controlled by implementing good source; good agricultural practices and standard operating procedures (SOP) for producing good quality herbal products.

People believe generally that herbal and natural products are safer than the synthetic or modern medicines but even some indigenous herbal products contain heavy metals as essential ingredients. Thus the expanded use of herbal medicine has led the concerns relating to its safety, quality and effectiveness specially for 'bhasmas' as these are usually made of heavy metals like arsenic, mercury, copper, zinc, gold and silver. Therefore, contamination of herbal drugs with heavy metals is of prime concern. The poor quality control of these products causes health hazard as some products may have unusually high concentration of potent and poisonous ingredients that may be fatal if consumed unknowingly. Recently a study conducted by Harvard Medical School on Indian ayurvedic medicines, published in the Journal of American Medical Association (JAMA) reported that ayurvedic medicines bought from 30 South Asian stores in the Boston area had potentially harmful levels of lead, mercury and arsenic. These metals were found in the products like 'Bal Guti', 'Mahayograj Guggulu', 'Mahalaxmi vilas Ras', 'Safi', 'Shilajit' etc. of some of the leading companies within ayurvedic communities. Therefore, users of these medicines may be at risk for heavy metal toxicity. Similarly, Koh & Woo (2000) reported excessive toxic heavy metals in Chinese proprietary medicines in Singapore during 1990-1997. Wong et al. (1993) also reported the concentration of nine heavy metals cadmium, cobalt, copper, iron, manganese, nickel, lead, zinc and mercury in 42 Chinese herbal drugs. The concentration range of the metals was comparable to that reported in many of the East Asian vegetables and fruits. Few samples contained relatively higher concentration of toxic metals such as cadmium, lead and mercury. This report suggested that the presence of heavy metals was probably caused by contamination during air drying and preservation.

A study conducted at National Botanical Research Institute also showed the presence of heavy metals like lead, cadmium, chromium, cobalt, manganese, copper and zinc in some crude herbal drugs. Many of the studied samples had these metals beyond WHO permissible limits. The presence of heavy metals in these samples was probably due to the contaminated sites from where these samples were collected. Besides, some ayurvedic formulations were also tested for the presence of heavy metals. The presence of nickel, cadmium, chromium and lead was also confirmed in these samples too.

In general, medicinal plants may be associated with various kinds of microbial contaminants, in which bacterial and fungal infections are regarded as the two dominating groups. According to WHO and European Pharmacopoeia, herbal drugs must meet the modern hygienic standards, which aim at low microbial load or the absence of pathogenic microorganisms. A study conducted at NBRI revealed microbial contamination in some samples of crude herbal drugs and in some cases it was beyond the WHO permissible limits.

Although herbal medicines have been used for thousands of years, basic research programmes need to be focussed on the quality assurance. To overcome contaminations from pesticide residues and heavy metals there should be control measures to implement necessary standard operating procedures (SOP) at source. Good laboratory practices (GLP) and good manufacturing practices (GMP) are also needed to produce good quality medicinal products. Without all these measures, it is not possible to realize the dream of having a major share of herbal drug industry despite having gold mine of well-documented and well-practiced knowledge of traditional herbal medicines.

Dr. Vartika Rai *is a Project Scientist and ISEB life member, and* ***Dr. S. Mehrotra*** *is an Emeritus Scientist of National Botanical Research Institute, Lucknow*

NEWS AND VIEWS

PLANTS WARM PLANET

A new study shows that durig 2003 heatwave, European plants produced more carbon dioxide than they absorbed from the atmosphere. They produced nearly a tenth as much as fossil fuel burning globally. The study shows that ecosystems, which currently absorb CO_2 from the atmosphere may, in future, produce it adding to the greenhouse effect.

The 2003 European summer was abnormally hot; but other studies show that these temperatures could become common place. In some parts of Europe, 2003 saw temperatures soaring six degrees Celsius above normal; hot enough that estimate of the deaths which it caused into the tens of thousands. It was also significantly drier than usual; and these two factors appear to have had a major impact on plant growth.

The towers, managed through a project called Carbo Europe, measure the flow of carbon dioxide, water and energy between the atmosphere and the ground; most are set up in forests.

About half of the mass of a plant is carbon; so by measuring the flow of CO_2 into the plants, we can see how well they're doing. The result coming from the 18 sites was that during 2003, plants took up less CO_2 from the air and grew more slowly - a finding corroborated by satellite measurements of the area under leaf.

So much for natural ecosystems; but what about farmland? Here, the researchers drew on data from the UN Food and Agriculture Organization, which showed a fall in European crop yields during the 2003 summer. Putting all the data together, the headline figure is that overall, European lands were 20% less productive than during an average year.

It is expected that many crops will be affected by high temperatures, especially during critical phases of development such as flowering. The study showed that particularly thecrops reaching maturity in August were badly affected; some of the fall-off could be related to water stress, but could also have been related to high temperatures during flowering. The heatwave also led to higher levels of ozone at ground level, and that can have damaging effects on plants.

The really surprising finding came with the calculation that during the heatwave, European plants and their ecosystems were putting more carbon dioxide into the air than they were absorbing. In the past it was expected that climate change would benefit European ecosystems because growth tends to be limited by the short growing season but this analysis hadn't taken into account the possibility of extreme events.

The conclusion of this study is that this extreme event meant a loss of carbon across Europe - a loss, which undoes many years of net uptake. Plants can absorb and emit carbon dioxide and oxygen; the process of respiration takes oxygen in and releases CO_2, whereas in photosynthesis, the reverse happens. Other parts of the ecosystem such as soil bacteria can also contribute to the overall flow of these gases to and from the atmosphere. During an average year, the net effect is that European plants absorb around 125 million tonnes of carbon (MtC). But in 2003, according to this analysis, they released 500 MtC in the atmosphere. By comparison, global emissions from burning fossil fuels amount to about 7,000 MtC; by giving rather than taking, European plants were adding about 10% to the global total.

This shows that short-term climatic events, such as the 2003 heatwave, occurring over regional areas like Europe can have major effects on the climate globally. The wider context for all this is a study published last year suggesting that summers as hot and dry as that of 2003 will become commonplace as the global climate changes. Temperature heatwaves as high as the one in 2003 would be occurring every other year by middle of this century.

Plants could, of course, adapt to the changing climate, meaning that the switch from net absorption of CO_2 to net production might not happen but this finding may be a sign of things to come. In the tropics, where it's already warm, higher temperatures are predicted to increase the flux of carbon from plants to the atmosphere.

It is generally assumed that in northern systems, we would see increased carbon uptake; but that might not be the case.

BBC NEWS
By Richard Black

MOST EXPLOSIVE FLOWER ON EARTH

Bunchberry dogwood is the fastest flower on the planet. The flower uses a catapult-like device to hurl pollen with about 4,500 times the acceleration of a car going from 0-60 mph in five seconds. The force is 800 times greater than the G-force felt by astronauts on take-off and the ejection is faster than the snap of the Venus flytrap.

The flower's petals separate and flip back to expose the stamens, which are designed like catapults and eject pollen to a height of around an inch, about 10 times the height of the flower. The plant grows in thick carpets in the vast swampy, spruce-fir forests of the North American taiga. Growing to a height of only 20 cm, the bunchberry needs the explosive push to get its pollen into the forest breeze so that it maximizes its chance of fertilizing other shrubs.

Business Line

GLOBAL WARMING COULD LEAD TO CONFLICT

Rising world temperatures could cause a significant increase in disease across Asia and Pacific Island nations, leading to conflict and leaving hundreds of millions of people displaced, a new report has said.

Global warming by the year 2100

could also lead to more droughts, floods and typhoons, and increase the incidence of malaria, dengue fever and cholera.

Compiled by the Australian Medical Association (AMA) and the Australian Conservation Foundation, the country's leading medical and environment groups, the study predicts average temperatures will rise by between 1 degree Celsius and 6 degrees by 2100.

Climate change will damage our health. People will get sick as a direct result. People will die in larger numbers as our earth, our world, our home, heats up. In Australia, up to 15,000 people could die each year due to heat stress by 2100, up from about 1,000 a year at present, while dengue fever and other mosquito-borne diseases could spread as far south as Sydney.

Dengue fever in Australia is currently confined to the country's tropical and sparsely populated far north. Internationally, higher world temperatures would increase the incidence of violent storms and droughts, and could lead to crop failures, which could cause political and social upheaval.

At the worst case, large scale state failure and major conflict may generate hundreds of millions of displaced people in the Asia-Pacific region, a widespread collapse of law, and numerous abuses of human rights. According to a WHO expert up to 10,000 people in the Asia-Pacific region as a whole could be dying each year as a result of factors associated with global warming such as severe weather and mosquito-borne disease.

Source: Reuters

OZONE LAYER HAS STOPPED SHRINKING, U.S. STUDY FINDS

The ozone layer has stopped shrinking but it will take decades to start recovering, according to a report by U.S. Scientists. They said an international agreement to limit production of ozone-depleting chemicals has apparently worked, but the damage to ozone has not been halted completely.

An analysis of satellite records and surface monitoring instruments shows the ozone layer has grown a bit thicker in some parts of the world, but is still well below normal levels.

Elsewhere, the decline in ozone levels has stabilized, the observed changes may be evidence of ozone improvement in the atmosphere.

The experts credited, at least in part, the 1987 Montreal Protocol which was ratified by more than 180 nations and set legally binding controls for on the production and consumption of ozone-depleting gases containing chlorine and bromine.

The prime suspects in ozone destruction are chlorofluorocarbons, or CFCs, once commonly used in refrigeration, air conditioning and industrial cleaning. These early signs indicate one of the strongest success stories of international cooperation in the face of an environmental threat.

Weather head noted that methane levels, water vapor and air temperatures will continue to affect future ozone levels. Even after all chlorine compounds are out of the system, it is unlikely that ozone levels will stabilize at the same levels.

Chemicals pumped into Earth's atmosphere decades ago still are affecting ozone levels today. This problem was a long time in the making, and because of the persistence of these chlorine compounds, there is no short-term fix.

The ozone layer remains so thin that cancer-causing ultraviolet radiation is still getting through. "But the major cause of skin cancer is still human behavior, including tanning and sunburns that result from a lack of proper skin protection.

Source: Reuters

THIRD INTERNATIONAL CONFERENCE ON PLANTS AND ENVIRONMENTAL POLLUTION (ICPEP-3)

28 NOVEMBER - 2 DECEMBER 2005

LIST OF REGISTERED DELEGATES

Reg. No.	Name	City/ Country
138	Afkari, Farah	**Iran**
278	Agarwal, Manju	Lucknow
75.	Agrawal, M.	Varanasi
74.	Agrawal, S.B.	Varanasi
114.	Ahmad, K.J.	NBRI
266	Ahmad, N.S.	Patna
149.	Ali, Mohd Iftikhar	Simbhaoli, UP
147.	Alikhan, M.A.	Simbhaoli,
	*Priti Kaushik	UP
170	Alirzayeva, Esmira G.	**Azerbaijan**
	*Tarana, A.	
286	Alves, Viviane	**Brazil**
194.	Anushree	Bareilly
35	Arumingtyas, E. L.	**Indonesia**
40.	Arumugam, Deepa	Bangalore
	*Arumugam, A.	
51	Ashfaq, Muhammad	**Pakistan**
	*Khan, R. R.	
208	Atazadeh, Islam	**Iran**
243.	Attri, A.K.	New Delhi
	*4 Ph.D. Students	
222.	Awasthi, Sapna	Lucknow
34	Azrianingsih, Rodliyati	**Indonesia**
154.	Baghel, V.S.	NBRI
189.	Bajpai, Jyoti	NBRI
26.	Banerji, Ranjan	NBRI
143.	Bashir, Fozia	New Delhi
220.	Behera, S.K.	NBRI
300	Behl, H.M.	NBRI
239	Bell, J.N.B.	**U.K.**
	*Lord, M. E.	
240	Betsiashvili, Mariam	**Georgia**
213.	Bhakuni, Gitanjali	Lucknow
198.	Bhargava, R.N.	Lucknow
296	Bhore, N.D.	Pune
241	Blyum, O.B.	**Ukraine**
199	Bolshakov, V.N.	**Russia**
37	Borowiak, K. Anna	**Poland**
204.	Bose, Bandana	Varanasi
175	Buker, Patrick	**UK**
335	C. Sada Siva	New Delhi

Reg. No.	Name	City/ Country
163	Calatayud, Vicent	**Spain**
60	Cao, ZiYi	**China**
297	Carella, Rocco	**Italy**
352	Chakrabortty, S.	Mumbai
202.	Chandra, Prakash	NBRI
172.	Chandra, Ram	
	*Yadav, Sangeeta	Lucknow
298	Chandrashekar	NBRI
273	Chaturvedi, Shivani	NBRI
32.	Chaudhary, L.B.	NBRI
21	Chaudhury, Kabir J.	**Bangladesh**
322	Chauhan, Maridula	Bangalore
351	Chauhan, R.D.	Roorkee
231	Chepulsky, Stanislav	**Uzbekistan**
269	Chevone, B.	**USA**
135.	Chirakuzhyil, P. Abhilas	NBRI
228.	Chishti, Nahida T.	Srinagar, J.&K.
44.	Choudhury Shuvasish	Silchar, Assam
103	Crang, Richard F. E.	**USA**
306	Cuny, Damien	***France***
117	De Zoysa, Mangala P.	**Sri Lanka**
280	Dandigi, M.N.	Gulbarga
8	Dang, Van Minh	**Vietnam**
307	Das, J.V.	Roorkee
121.	Das, M.K.	New Delhi
89.	Das, T.K.	Berhampur
277	Das, Udeshwar Lal	**Nepal**
161.	Datt, Bhaskar	NBRI
54.	Datta, Kalyani	NBRI
55.	Datta, S.K.	NBRI
205	DeSilva, M.P.	**Sri Lanka**
	*DeSilva, Lakshmie	
64.	Dhar, D.W.	New Delhi
254	Dhawan, Shashi	Lucknow
289	Dhumal, K.N.	Pune
27.	Dixit, B.S.	NBRI
137.	Dubey, Smita	NBRI
155.	Dwivedi, Sanjay	NBRI
110	Eensalu, Eve	**Estonia**
174	Emberson, Lisa Dianne	**UK**
338	Farooqui, Aanjum	Lucknow
257	Farzami Seppehr, M.	**Iran**
	* Shokravi, G.	
	* Shokravi S.	
235	Fayyaz, Shahina	**Pakistan**
	*Siddiqui, B.A.	
3	Galal, M. Yehia	**Egypt**
344	Gaur, U.N.	Mussoorie
333	Gautam Ganguly	Burdwan
50.	Gautam, Nidhi	New Delhi
49.	Gautam, V.K.	New Delhi
31.	George, Paul	Coimbatore
255	Ghorbanli, Mahlagha	**Iran**
25.	Ghosh, Amal	Cuttack
218.	Godin, D.J.	Lucknow
268	Godin, L.B.	Lucknow
6.	Goel, A.K.	NBRI
256	Goel, V.L.	NBRI
343	Goswami, S.	NBRI
336	Govil P.K.	Hyderabad
301	Goyal, Arun	**USA**
145	Greenway, Margaret	**Australia**
251	Grill, Erwin	**Germany**
332	Gulati, Rachna	Hisar
178.	Gupta, Amit Kumar	NBRI
46.	Gupta, D.K.	NBRI
41.	Gupta, Pooja	Delhi
224.	Gupta, Poonam	Lucknow
249.	Gupta, R.K.	NBRI
273	Gupta, Supriya	NBRI
7	Haji Moniri A., M.	
	*Haji Moniri A., S.	**Iran**
295	Hase, C.P.	Pune
104	Hitt, Mary Colette	**USA**
247	Huner, Norman P.A.	**Canada**
123.	Husain, Tariq	NBRI
5.	Iqbal, Muhammad	New Delhi
227.	Jabeen, Neelofar	Srinagar, J.&K.
293	Jadhav, S.S.	Pune
324.	Jain Shuchita	
	* Mr. Subodh Jain	Kota, Rajasthan
166.	Jamil, Sarah	NBRI
69.	Jamir, Chubamenla	New Delhi
230.	Jan, Arif	Srinagar, J.&K.
94	JIA Jing-Fen	**China**
58	JIA, Lei	**China**
59	JIA, Xian Hui	**China**
164.	Kadam, D.D.	Kolhapur
	*Kulkarni S.R.	
	*Jadhav, B.S.	
10.	Kala, Mayanka	Jaipur
56	Kalra, Yash Pal	**Canada**
330	Kapila, Sunita	Chandigarh
284	Kapoor, V.P.	NBRI
346	Kar, Sandeep	Kalyani
238.	Kasana, M.S.	Buland Shahar
150.	Kashyap, Kavita	Simbhaoli, UP
128.	Katiyar, R.S.	NBRI
48.	Kaundal, Ruchika	Delhi
184.	Kazmi, Shazia	RaeBareli
339	Khalil-ur-Rahman	**Pakistan**
245.	Khan, Amina	
	*Shaharyar, Yaqoot	Srinagar, J&K
20.	Khan, Anisur Rahman	Patna
33.	Khan, Gohar Islam	NBRI
325	Khan, M.R.	Aligarh
91.	Khan, Modh Sajid	NBRI
341	Khan, Subhi	Lucknow
11.	Khan, T.I.	Jaipur
22	Khanafari, Anita	**Iran**
308	Khanna, Rajni	Amritsar
292	Kirtane, S.A.	Pune
131.	Kishore, Garima	Allahabad
263	Kochhar, Sunita	NBRI
210.	Kochhar, V.K.	NBRI
153	Kostiainen, Katri Maria	**Finland**
177	Krupa, Sagar V.	**USA**
100.	Kulshreshtha, Kamla	NBRI
183.	Kumar, Adarsh	Raebareli
329	Kumar, G.V.	Bangalore
225.	Kumar, Kaushal	NBRI
281	Kumar, Nikhil	NBRI
272	Kumar, Rajesh	Amritsar
262	Kumar, Satendra	NBRI
90.	Kumar, Sushil	NBRI
187.	Kumar, Vishal	NBRI
318	Kumari, Beena	Hissar
70.	Kumari, Ragini	New Delhi
303	Lavania, Seshu	Lucknow
28	Levai, Laszlo	**Hungary**
	*Csiki, Brigti A.	
152	Lyanguzova, Irina V.	**Russia**
140.	Mahmooduzzafar	New Delhi
348	Maity, J.P.	Kolkata
250	Makra, Laszlo	**Hungary**
342	Malhotra, Swadesh	NBRI
158.	Mallick, Shekhar	NBRI
173.	Mandal, S.M.	Midnapore, W.B.
248	Marshall, Fiona	**U.K.**
168	McGrath, Margaret T.	**USA**
141.	Meer, Asiya Hameed	New Delhi
	Mehrodra, N.K.	Lucknow
118	Ming, Yue	**China**
244.	Mir, M.R.	Srinagar, J&K
157.	Mishra, Rohit	NBRI
124.	Mishra, Seema	NBRI
14.	Mishra, Shalini	Srinagar, Uttaranchal
264	Misra, Pratibha	NBRI
340	Misra, Shrinivas	Rewa
265	Mohammadi Galangashi, M.	
	* Altaf Neverian, H.	**Iran**
283	Mohanty, C.S.	NBRI
211.	Mukherjee, Anita	Kolkata
331	Mukhopadhyay, R.	Burdwan
95	Muntifering, Russell B.	**USA**
96	Murooka, Yoshikatsu	
	*Murooka, Hiroko	**Japan**
312	Nath, Pravendra	NBRI
223.	Nautiyal, Nirmala	Lucknow
18.	Nayaka, Sanjeeva	NBRI
	Pal, Amit	Jhansi
61.	Pal, Mahesh	NBRI
171.	Pal, Meera	Faizabad
350	Pal, Mohinder	Lucknow
287	Panda, B.B.	Berhampur
63.	Pandey V.C.	Balrampur, UP
133.	Pandey, Archana	Allahabad
315	Pandey, D.K.	Lucknow

Reg. No.	Name	City/ Country
180.	Pandey, G.C.	Faizabad
105.	Pandey, Nalini	Lucknow
192.	Pandey, Namita	NBRI
337	Pandey, O.P.	Hyderabad
226.	Pandey, Sudhir K.	Varanasi
182.	Pandey, Sunil K.	Varanasi
311	Pandey, V.K.	Lucknow
68	Pant, Shankar Raj	**Nepal**
321	Pathak, Himanshu	New Delhi
98	Pocock, Tessa Hilary	**Sweden**
53	Poorkhabbaz, Alireza	**Germany**
	* S. Arghavani	
	* A. Poorkhabbaz	
	* A. Poorkhabbaz	
106	Prachyanusorn, Poonsuk P.	**Thailand**
	*Prachyanusorn, J.	
167.	Prakash, Anand	NBRI
237.	Prasad, M.N.V.	Hyderabad
276	Prasad, Vishwanath	Nepal
92.	Pratap, Dharmendra	NBRI
200.	Pushpangadan, P.	NBRI
97	Puzon, Juliana Janet M.	**Philippines**
142.	Qadri, Tabasum Nazir	New Delhi
290	Rahi, T.S.	NBRI
232	Rahman, M.M.	**Bangladesh**
310	Rai, A.D.	Lucknow
216.	Rai, Anjana	NBRI
186.	Rai, P.K.	Varanasi
79.	Rai, Richa	Varanasi
81.	Rai, U.N.	NBRI
38.	Rai, Vartika	NBRI
119.	Raiping, Sirawung	New Delhi
129.	Raizada, Purnima	Varanasi
93.	Raj, S.K.	NBRI
195.	Rajauria Gaurav	Agra
16.	Ram, T.	NBRI
82.	Rana, T.S.	NBRI
120.	Rau, Nupur	New Delhi
36	Retnaningdyah, Catur	**Indonesia**
2.	Rout, Jayashree	Silchar,
	*Bhattacharjee, C.R.	
		Assam
127.	Roy, R.K.	NBRI
305	Rzepka, Marie-Amelie	**France**
288	Sachan, Kiran	Lucknow
71.	Sachdeva, Kamna	New Delhi
66.	Sahai, Kanak	NBRI
4.	Sahu, R.K.	
	*Kumar, Narendra	Kanpur
253.	Sahu, Tika Ram	Bhopal
39.	Saji, K.V.	Calicut
52	Sakalauskaite, Jurga	**Lithuania**
47.	Salgare, S.A.	Karjat,
		Maharashtra
345	Samal, A.C.	Kalyani
126.	Sane, P.V.	NBRI
9.	Sarkar, S.K.	Kolkata
	*Sarkar, M.	
	*Sarkar, Prathama	
347	Sarma, Hemen	Guwahati
327	Sathish, B.N.	outh Coorg, Karnataka
112.	Satya	NBRI
206	Schlutow Angela Ruth	**Germany**
181.	Seth, C.S.	Lucknow
233	Shah, F.A.	**Pakistan**
99.	Shah, S.K.	Lucknow
193.	Shakya, Sukrti	Kanpur
65.	Shalini	New Delhi
67.	Shanker, A.K.	Jhansi
242.	Shanker, Chitra	Jhansi
197.	Shardendu	Patna
139	Sharifi, Mozafar	Iran
185.	Sharma, A.P.	Varanasi
229.	Sharma, C.P.	Lucknow
130.	Sharma, G.P.	Varanasi
328	Sharma, Kailash	Lucknow
203.	Sharma, M.K.	Varanasi
76.	Sharma, R.K.	Varanasi
125.	Sharma, S.C.	NBRI
87.	Sheeba	Allahabad
320	Shekhawat, V.P.S.	Jaipur
108	Shirdam, Ravanbakhsh	**Iran**
179	Shrestha, Kanti	**Nepal**
29	Shrestha, Geeta Vaidya	**Nepal**
323	Shrivastava, Neerja	Kota, Rajasthan
309	Shukla, Kanchan	Lucknow
102.	Shukla, M.K.	NBRI
86.	Shukla, O.P.	NBRI
212.	Shukla, Rajni	Lucknow
314	Shukla, Sudhir	NBRI
109.	Shukla, Vertika	NBRI
148.	Siddhu, Geeta	Simbhaoli, UP
304	Siddiqui, Amna	NBRI
299	Sidhu, O.P.	NBRI
156.	Sinam, Geetgovind	NBRI
282	Singh, Ajit Pratap	NBRI
43.	Singh, Amit Kumar	Lucknow
165.	Singh, Amita	NBRI
78.	Singh, Anita	Varanasi
122.	Singh, Anita	Allahabad
201.	Singh, B.P.	NBRI
19.	Singh, Bajrang	NBRI
217.	Singh, Manish	New Delhi
12.	Singh, Mukta	Varanasi
85.	Singh, N.K.	NBRI
42.	Singh, Nandita	NBRI
258.	Singh, Pawan Kumar	NBRI
30.	Singh, Pramod Kumar	Varanasi
355.	Singh Ragini	NBRI
349	Singh, R.P.	Lucknow
319	Singh, Raj Shekhar	Dhanbad
77.	Singh, Rajeev Pratap	Varanasi
88.	Singh, S.K.	Allahabad
215.	Singh, S.M.	Bareilly
136.	Singh, Shraddha	Mumbai
113.	Singh, Sudhir	Mumbai
73.	Singhal, Anjali	New Delhi
334	Singhal, Madhuri	Bhopal
190.	Sinha, Arpita	NBRI
159.	Sinha, Sarita	NBRI
151.	Sirohi, D.S.	Simbhaoli,UP
80	Sliesaravicius, Algirdas	**Lithuania**
317	Snehi, S.K.	NBRI
316	Sofia, P.K.	New Delhi
219.	Solomon, Sanjay	Lucknow
1	Soltan, El montasser M.	**Egypt**
115.	Soni, Prafulla	Dehradun
271	Soodan, A.S.	Amritsar
134.	Srivastava, Kanti	NBRI
252.	Srivastava, Neeta	Lucknow
275	Srivastava, Nupur	Lucknow
57.	Srivastava, Pankaj K.	NBRI
132.	Srivastava, Priya	Allahabad
214.	Srivastava, Rashmi	Raebareli
221.	Srivastava, Ruby	Lucknow
162.	Srivastava, Sudhakar	NBRI
146	Stevens, Carly Joanne	**UK**
209.	Sultan, Phalisteen	Jammu
260.	Suseela, M.R.	NBRI
23	Tabatabaee, Azam	**Iran**
107.	Tambat, Bhausheb	Bangalore
72.	Tandon, Ankit	New Delhi
176	Terry, Norman	**USA**
	*Shui-Chi, Chou	
191.	Tewari Kalpna	NBRI
84.	Tiwari, K.K.	NBRI
13.	Tiwari, O.N.	Imphal
24.	Tiwari, Saurabh	
	*Kumar, P.N.	New Delhi
101.	Tiwari, Supriya	Varanasi
259.	Toppo Kiran	NBRI
270	Toskacheva, G.A.	**Uzbekistan**
116.	Tripathi, A.K.	Dehradun
267	Tripathi, K.P.	Lucknow
160.	Tripathi, R.D.	NBRI
302	Tripathi, R.S.	NBRI
261.	Tripathi-Singh, Shweta	NBRI
313	Trivedi, P.K.	NBRI
279	Tuli, Rakesh	NBRI
111	Tulvam, Inghar	**Estonia**
234	Tunio, Irfanullah	**Pakistan**
236.	Upadhyay, Alka. R	Varanasi
62.	Upadhyay, R.N.	Balrampur
45.	Upadhyaya, Hrishikesh	Silchar, Assam
17.	Upreti, D.K.	NBRI
15.	Uprety, D.C.	New Delhi
294	Vaidya, R.R.	Pune
83.	Vajpayee, Poornima	Lucknow
169	Van Tienhoven, Mieke	**South Africa**
246.	Varshney, C.K.	New Delhi
207	Veres, Szilvia	**Hungary**
188.	Verma, Rishi Kumar	NBRI
196.	Vishnoi, Sukhram	Jodhpur
326	Yadav, B.K.	New Delhi
144	Yapa, Piyasiri A.J.	**Sri Lanka**
291	Yewalkar, S.N.	Pune
285	Zia, Muhammad Anjum	**Pakistan**

* Accompanying person

CONFERENCES

Risk Analysis 2006
Fifth International Conference on Computer Simulation in Risk Analysis and Hazard
19-21 June 2006, Malta

Waste Management 2006
Fifth International Conference on Waste Management and the Environment
21-23 June 2006, Malta

Water Pollution 2006
Eighth International Conference on Modelling, Monitoring and Management of Water Pollution
4-6 September 2006, Bologna, Italy

Sustainable Tourism 2006
Second International Conference on Sustainable Tourism
6-8 September 2006, Bologna, Italy

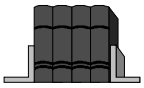
Workshop on Agricultural Air Quality : State of the Science
June 28, 2006 Potomac, Maryland, U.S.A.
Contact: Air Quality Workshop Manager
The Ecological Society of America, Science Porgrams Office
1707 H Street, NW Suite 400, Washington DC 20006, U.S.A.
E-mail:
airworkshop@esamail.org

6th International Conference on Biodeterioration of Cultural Property (ICBCP-6)
(Particular reference to Heritage and Materials)
14 – 17 February 2006 Chandigarh, India
Contact: ICBCP Secretariat, International Council of Biodeterioration of Cultural Property
HIG-44, Sector E, Aliganj Scheme,
Lucknow-226024, India

4th World Water Forum: Local Actions for a Global Challenge
16-22 March 2006 Mexico City
Contact:
ww.worldwaterforum4.org.mx/home.asp

17th Global Warming International Conference & Expo
20-21 April 2006 Miami, U.S.A.
Contact:
gw17@globalwarming.net

BOOKS



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Dr. Rakesh Tuli, along with four of his, then research students - Dr. P.K. Singh, Mr. Mithilesh Kumar, Mr. C.P. Chaturvedi and Dr. Samir V. Sawant at National Botanical Research Institute, Lucknow were awarded "The Technology Prize for Biological Sciences - 2005" for their research work on the **"Development of artificial promoters, novel δ-endotoxin coding genes and transgenic cotton lines for resistance to insect pests".** Dr. Samir V. Sawant is now Scientist C on the staff of NBRI.

Technical details of their research works on the development of Bt-cotton (Singh, P.K., Kumar, M., Chaturvedi, C.P., Yadav, D. and Tuli, R. 2004, Transgenic Research, 13, 397-410.), Bt-pigeon pea (Surekha Ch., Beena, M.R., Arundhati, A., Singh, P.K., Tuli, Rakesh, Datta-Gupta, A. 2005, Plant Science, In press), in vitro regeneration in cotton (Kumar, M and Tuli, R. 2004, In vitro Cell. Dev. Biol. - Plants, 40, 294-298), artificial promoter construction (Sawant, S.V., Singh, P.K., Madnala, R. and Tuli, R. 2001, Theoretical & Applied Genetics, 102, 635-644) and regulation of gene expression (Sawant, S.V., Kiran, K., Singh, P.K. and Tuli, R. 2002, Plant Physiology, 126, 1630-1636; Sawant, S.V., Kiran, K., Mehrotra, Rajesh., Chaturvedi, C.P., Ansari. S.A., Singh P., Lodhi, N. and Rakesh Tuli. 2005, Journal of Experimental Botany, 56, 2345-2353) have been published. Together, these researches comprise various components of the technologies used by the team led by Dr. Rakesh Tuli for developing indigenous technologies for genetic engineering of crop plants at NBRI. This prestigious award has been conferred by the CSIR, in recognition of their distinguished efforts that led to several research publications, patents and technologies for crop improvement through transgenic approaches.

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