



ENVIRONNEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

LUCKNOW (INDIA)

VOL 20 No 4

October, 2014

IN THIS ISSUE

Letters.....	02
News Flash.....	03
Economic development and saving environment Rajni Kant (India)	04
Problems of Ganga—a holistic view K. Chandramouli (India).....	07
Interior Plantscaping for Cozy and Healthy Indoor Environment Shilpi Singh and R.K. Roy (India) ..	09
Indiscriminate botanical specimen collection: A serious threat to endangered species of plants Saikat Kumar Basu (Canada).....	10
News & Views.....	11
Conferences.....	12
Books.....	12

IMPORTANT NOTICE ICPEP-5 RESCHEDULED

Due to some technical reasons, Organizing Committee of ICPEP-5 has decided to reschedule Fifth International Conference on Plants & Environmental Pollution to February 24-27, 2015

Consequently, the following extended deadlines will henceforth be applicable:

Submission of abstracts: 15 December 2014

Submission of Registration forms (with concessional fee):15 December 2014

Registration (with normal fee) permitted with prior intimation, at the Reception Desk: 23-24 February 2015

Inconvenience caused to delegates is deeply regretted. Detailed information can be accessed from our website: <http://isebindia.com>

Kindly drop in a line to confirm that you will attend this conference as per revised schedule. In that case the Registration form, the registration fee (if paid) and the Abstract submitted by you will remain valid and you will not have to submit them again.

Registration forms and Abstracts already submitted by the delegates will remain valid for the rescheduled conference.

INFORMATION REQUIRED FROM FOREIGN DELEGATES

As per Government of India guidelines, we have to obtain clearance from Government for holding an international conference which involves the participation of foreign delegates. For seeking this clearance, we are required to provide some basic information about foreign delegates. You are, therefore, requested to provide the following information to us by e-mail at the earliest.

(1) Name of Participant, (2) Father's/Husband's Name, (3) Nationality, (4) Date of Birth, (5) Place of Birth, (6) Passport Number (7) Date & Place of issue of Passport (8) Date of Expiry of Passport, (9) Full Mailing Address, (10) Brief background of the delegate suiting for participation in the event (about one paragraph only)

This will facilitate your participation and processing of visa requirements expeditiously.

Organizing Secretaries ICPEP-5

CSIR-National Botanical Research Institute, Lucknow 226001, India

Email: isebnbrilko@gmail.com, Tel: +91-522-2297821



LETTERS

I thank you very much for the attachment. I have printed out the pages regarding my husband, Sagar Krupa. He had wished to attend the ICPEP-5 Conference in December but his colon cancer became very aggressive in its spread. He was actively working with his research team up to one week before his death. He went to his oncology appointment expecting to return home, but that did not happen. I thank all his colleagues for their condolences and their kind words of praise. Sagar's email account will be deactivated by the university beginning July 1, 2014. Any correspondence can be directed to me at

Nancy Krupa
nancykrupa@comcast.net

Today (July 17, 2014 Thursday) I received our quarterly newsletter "ENVIRONEWS" July 2014 and learnt about the sad demise of an internationally reputed Plant Scientist (Environmental Botanist) Professor Sagar V. Krupa on May 12, 2014 at the age of 73. As a delegate of the last 4th International Conference on Plant and Environmental Pollution (ICPEP-4) during December 8-11, 2010. I had an opportunity to have a brief interaction with him which was very interesting, meaningful and fruitful to me. I am planning to attend and participate in the coming ICPEP-5 meeting during coming December 3-6, 2014 and certainly I will feel his absence in the conference. Anyway we have to accept the truth. May his pious soul rest in peace – I pray before the almighty Lord Jagannath of our Puri Dham, Odisha.

Prof. Sushil Pradhan, FBS
Green Paradise, **Vivekananda Nagar, Sonepur**
(Odisha) India
drsushilpradhan@gmail.com

Thank you very much Dr Ahmad for the beautiful and meaningful July 2014 issue of Environews. It will be a pleasure to write for the magazine as and when I have some fresh and latest material.

Vijay K Joshi
Havelock Road, Lucknow, India
<joshi.vijaykumar@gmail.com>

You would be glad to note that in addition to my duties as Executive Director, Punjab State Council for Science & Technology and Member Secretary, Punjab Biodiversity Board; I have been given charge of Director General, Pushpa Gujral Science City, Kapurthala. The Science City is a wonderful place to create scientific temper in the society especially children. It is spread in 70 acres area and one of the best facilities in the country. More information can be obtained at www.pgsciencocity.org. I would like to share this facility with my colleagues of ISEB.

Dr. Neelima Jerath
Neelima Khosla - Batch 1977)

Executive Director, Punjab State Council for Science and Technology,
Member Secretary, Punjab Biodiversity Board &
Director General, Pushpa Gujral Science City, Sector
26, Chandigarh, India
neelimakj@yahoo.co.uk

Thank you very much for your mail. I apologize the delay in my response due to short in and out travel to Chennai and Kolkata. As I notice from the mails you forward, the possible sources have been adequately covered. Private companies will not provide support for the Conference. They may be interested in supporting some demonstration activities under their Corporate Social Responsibility Programs. They look for "visibility" and benefits to the people that can be quantified. After the Conference, the Society may identify a few such programs. Society or the scientists (developers of the technology) will have to get involved. It could be either on one time technology transfer model or continued support (the latter is preferred). Development of *Usar* lands (NBRI) and other technologies enhancing the survival of planted saplings bring a highly "visible" effect. I was once asked how can we make these barren hillocks green in the shortest possible time. My suggestion was to plant *Prosopis juliflora*. After the rains, hillocks did look greener. After the abstracts are in, possibilities can be identified.

Dr. C.R. Bhatia
(Former Secretary, Department of Biotechnology,
Govt. of India), Navi Mumbai
crbhatia.bhatia@gmail.com

Thanks so much for the excellent coverage of several aspects of botany and environmental biology in your esteemed newsletter ENVIRONEWS that I have been following for the past couple of years and found it to be an excellent source of news related to several neglected topics. I wish to extend my heartiest congratulations to the editorial board for such dedicated and comprehensive coverage on several important topics highlighted in the past couple years covering all modern and frontier aspects of Environmental Botany in particular. I sincerely believe that this great effort will surely and certainly help bridging the wide information as well as awareness gap between the students, researchers and general academics and the public at large in highlighting the importance and significance of Botany and Plant Science to our life and society. Once again my sincere best wishes to you for carrying forward this endeavor and will read with interest every upcoming issue of your newsletter.

Saikat Kumar Basu
University of Lethbridge, Lethbridge AB Canada T1K 3M4
saikat.basu@alumni.uleth.ca

Global Education Society's International Association of Science Impact is an ideal association of Academicians, Teachers, Doctors, Researchers, Scientists and Students. The broad objective of the association is to provide a scientific platform to the scientists, teachers and students. The association consists of International Journal of Science Impact and Science Impact Publication. The Association will organize International/ National/ State Level Conferences/ Seminars/ Workshops in the Research Institutes/ Universities/ Colleges. The Associate Members can publish Research Papers / Reference Books / Conference Proceedings, etc. The Members will be honoured with Fellowship i.e. F.I.A.S.I. The Fellow Members will also

receive International or National or State Level Award for their research work, academic achievement, and contribution to scientific achievement. It gives me immense pleasure to invite you as a Member of International Association of Science Impact. Please send your bio data, summary of your research work to the office of the International Association of Science Impact by E-Mail:

internationalscienceimpact@gmail.com

Dr. Sayyed Iliyas
President

International Association of Science Impact, Pune (MS),
India

internationalscienceimpact@gmail.com

WELCOME NEW LIFE MEMBERS

Ms. Surabhi Awasthi, PA-II, Plant Ecology & Environmental Science Division, CSIR-NBRI, Lucknow.

surabhi18dec@gmail.com

Ms. Reshu Chauhan, CSIR-Inspire-JRF, Plant Ecology & Environmental Science Division, CSIR-NBRI, Lucknow.

reshu.biotech.87@gmail.com

Dr. (Mrs.) Avinash Kaur Nagpal, Professor, Department of Botany & Environmental Sciences, Guru Nanak Dev

University, Amritsar, Punjab

avnagpal@rediffmail.com

Dr. Manish Kumar Verma, Assistant Professor, Department of Botany, Veerbhumi Govt PG College, Mahoba.

mani655@yahoo.co.in

Dr. Rana D.P. Singh, Head Division of Plant Breeding, Sugarcane Research Station Kunraghat, Gorakhpur.

singhranadp@gmail.com

WELCOME NEW PATRON MEMBER

DAV University, Sarmastpur, Jalandhar, Punjab

DAV University at Jalandhar traces its roots to the legacy that has been reforming and redefining India's educational scenario for 127 years. The university is the culmination of the movement that started with the founding of the first DAV institute to propagate the ideals of the religious and social reformer Swami Dayanand Saraswati in Lahore on June 1, 1886. Lala Hansraj was its first Honorary Headmaster.

DAV University is a multi-disciplinary institution, home to faculties of teaching excellence in subjects from engineering technology to languages and history to life sciences. The university encourages interdisciplinary study and believes that all areas of study can inform and enrich each other.

dean.academics@davuniversity.org



NEWS FLASH

Dr. S.C. Sharma delivered a talk on "Biodiversity and Role of Foresters" on May 22, 2014. He emphasized on the need to save the tiger, the National Animal of India and rare, endangered and threatened species. He emphasized that if we sincerely commit to save our forests then only we will be able to save the tiger.

He was invited by the Principal, Jhunjhunwala Post Graduate College, Faizabad (U.P.) as the Chief Guest and keynote speaker. He delivered a talk on "Global Warming, Urban Pollution and Solution" on September 4, 2014 and interacted with the faculty members and students of the College. On this occasion Dr. Sharma also joined the Plantation drive in the College campus. He delivered a talk on "Bio-aesthetic Planning and Healthy Living" on September 12, 2014 at CSIR-Institute of Microbiological Technology (IMTECH),

Chandigarh. Dr. Sharma shared his experiences on the impact of the Neuro-aesthetics on healthy life. He mentioned that gardening is the best exercise for the senior citizens.

Dr. D.K. Upreti, Chief Scientist CSIR-NBRI and Treasurer, ISEB delivered two lectures, (1) Taxonomy of Indian lichens and (2) Bioprospection of Indian lichens, at the Science Academies Lecture Workshop on "Vistas in Biology – Biotechnology & Biodiversity" organized by Mizoram University, Aizawl during 14-15 October 2014.

Dr. R.D. Tripathi, Chief Scientist CSIR-NBRI & Additional Secretary, ISEB has been inducted as a Member of the 'Review Committee on Genetic Manipulation' (RCGM) constituted by the Department of Biotechnology, Government of India, New Delhi.

Dr. Prabodh K. Trivedi, Principal Scientist CSIR-NBRI and a

Life member, ISEB has been elected a Fellow of National Academy of Sciences, India (FNASc.). This recognition has been given to him for his significant contributions in the area of pathway engineering of secondary plant products. He has carried out biochemical and genome wide expression analysis and demonstrated involvement of various processes in detoxification of heavy metals in rice.

Prof. C.K. Varshney, Professor Emeritus, School of Environmental Sciences (JNU), and a Member of the Advisory Committee of International Society of Environmental Botanists (ISEB), was invited by IUCN to participate at a "Regional Consultation: An India –Pakistan Initiative", held on 18-19 September, 2014 at Bangkok, Thailand. Professor Varshney also Chaired a Workshop on "Options for Air Quality Management in NCR Delhi", held under the auspices of the Indian Association of Air Pollution Control (IAAPC)-Delhi Chapter in association with Central Pollution Control Board (CPCB), held on 23 September, 2014, at India International Centre (IIC), Lodi Estate, New Delhi.

Dr. P.C. Abhilash, Life Member of ISEB and Assistant Professor, Institute of Environment & Sustainable Development, BHU, Varanasi, India has joined recently the Editorial Board of the Plant Biology section of Scientific Reports (Nature Publishing Group) and Restoration Ecology (Wiley).

Dr. R.K. Roy, Life Member of ISEB and Sr. Principal Scientist, Botanic Garden, Floriculture & Landscaping Division, CSIR-National Botanical Research Institute, Lucknow, India has been elected as new Vice-Chairperson, Commission Landscape and Urban Horticulture (CMUH) by International Society for Horticulture Science, Belgium (www.ishs.org/elections). This will come in force during International Horticulture Congress, August 2014 to be held in Brisbane, Australia. With this, he will get opportunity to serve globally on Landscape and Urban Horticulture while the main task would be: guiding working groups, organization of symposia, publication besides various other scientific activities and interests of the ISHS.

Prof. R.S. Tripathi, FNA, Life Member and Advisor ISEB was an Expert member of the Committee, constituted by Indian Science Congress Association for the following two prestigious awards viz., B.P. Pal Memorial Award for

Biodiversity and Prof. Sushil Kumar Mukherjee Commemoration Lecture Award for the year 2013-2014.

He delivered two lectures at Indian Institute of Remote Sensing, Dehradun (Department of Space, Government of India on: (i) Implications of Invasive Alien Plant Species on Biodiversity and (ii) Millennium Ecosystem Assessment, on 12th and 13th March, 2014.

Summary of the Programme on Seminar: Plants and Present Day Environment October 14-15, 2014.

On the Invitation from, Isabella Thoburn College, Lucknow, **Dr. S. C. Sharma**, Vice President, Dr. Mrs. Kamla Kulshreshtha, Executive Councillor and Dr. Shekhar Mallick, Member, International Society of Environmental Botanists, (ISEB), CSIR-NBRI, Lucknow, participated in the Seminar on "Plants and Present Day Environment" on October 14, 2014. Dr. S. N. Joseph, HOD, Botany welcome the Members of the ISEB and gave the genesis of the Seminar. Dr. Panzy Singh gave the introduction of Dr. Kamla Kulshreshtha. Dr. Kulshreshtha asked the students of Botany to take the following Environmental Oath: "I will switch off the lights before leaving the place. I will close the water taps after use. I will never throw the food and remember that I cannot eat money. I will not make my house a junk and give extra things to a needy person. I will plant a tree on the World Environment Day." Dr. R. K. Jain introduced Dr. Shekhar Mallick, Senior Scientist CSIR-NBRI. Dr. Mallick gave a presentation on: Green GDP and Ecosystem followed with the Interactive Session with the students. Dr. Kamla Kulshreshtha, Principal Scientist, CSIR-NBRI delivered her talk with colourful slides on "Garden for visually Impaired", which was followed by an interactive session. Dr. S. Saini introduced Dr. S. C. Sharma former Chief Scientist and Emeritus Scientist, CSIR-NBRI, Lucknow to the audience. Dr. S.C. Sharma delivered the talk on "Impact of Climate Change, Urban Pollution and Solution" with the educative and colourful slides. Dr. Sharma emphasized on the Sanitation, which helps in the prevention of diseases like Malaria, Dengue, Typhoid, Cholera and Diarrhoea. Dr. Sharma's talk generated lot of interest among the students and faculty members of the I.T. College. Dr. S. N. Joseph, Head, Botany Department proposed a vote of thanks to the ISEB Members for their active participation in the Seminar.

Economic development and saving environment

Rajni Kant

Ex-Chief Engineer, UPSEB, Lucknow, India

kantrajni0@gmail.com

Introduction

The developing and poor countries are characterized by population explosion, disorderly growth marked by deforestation, overharvesting of croplands and wood lands, lack of pastures/ grazing ground for animals,

overexploitation of ground water (thereby lowering of ground water levels), soil degradation, excessive urbanization resulting in cities having highly inadequate infrastructure. The disparity and high degree of inequality and massive poverty caused by

disorderly growth forces the poor people to struggle hard for obtaining even minimum requirement for survival like clean water, food, fuel, shelter, etc. The countries are confronted with a choice between perpetual poverty entailing violence, internal strifes,

exploitation, instability, etc. on one hand, and expeditious economic development on the other hand with many of its adverse effects.

The economic development is a process which uses the resources to meet the needs and aspirations of human beings both individually and collectively. Production of electricity or other forms of energy, industrialization to produce good quality cheap products for use, mining of minerals/ coal / petroleum, creating infrastructure like roads, means of transportation, irrigation facilities, etc are important. In the process the people would get employment.

The quality of life in material sense and human welfare depend on many different goods and services. The most pertinent physical indicators of levels of living of 'developing societies' are:

- (1) Food and Nutrition, (2) Clean Drinking Water Supply, (3) Clothing, (4) Housing,
- (5) Sanitation, (6) Roads and transport facilities, (7) Education facilities, (8) Energy supply facilities (for cooking, light & fan, domestic power, etc.), (9) Easy and cheap availability of all required goods and services, (10) Employment, Enterprises, Productivity, etc. and equality of opportunity, (11) Equitable distribution of income [for fulfilling at least minimum needs of every citizen for a reasonable standard of living, health, education, etc.]

Economic development alone is not enough to contribute to the quality of life of human beings although it is necessary to eliminate the abject poverty. The development should be able to enhance status of the above parameters and also provide healthy, safe and pollution-free environment for living as well as working.

Adverse Effects of Development

The adverse effects of developments may include the following:

- Deforestation, and denudation of mountains and other terrains
- Continued reduction of availability of land for agriculture because of continued demand of land for

construction of roads, mining activities, power stations, factories/ industries, offices, business establishments, housing, etc.

- Overwithdrawal of water from hydrological cycle
- Interference with ground water recharge system, accelerated use of ground water with consequent fall of ground water levels.
- Destruction of top fertile soil by construction and mining activities rendering the land unsuitable for agriculture
- Land and soil pollution by discharge of pollutants from various industries or other human activities.
- Pollution of natural ponds, lakes, rivers, and even ground water due to industrial effluents or other activities like use of pesticides, spilling of oils or chemicals, improper / untreated disposal of sewage, etc.
- Improper drainage of land, water logging, and soil alkalization
- Soil erosion and landslides (because of construction activities and cutting down of trees and denuding the slopes), and consequent siltation of reservoirs, lakes, ponds, canals and riverbeds.
- Rise of 'Greenhouse gases (Carbon dioxide, Nitrous oxide, chlorofluorocarbons, Methane, Sulphur hexafluoride, etc.) in atmosphere' and 'Global warming'
- Air pollution due to 'Emissions' (from industries, vehicles and fuel burning power stations) of polluting gases like oxides of sulphur (SO_x), oxides of nitrogen (NO_x), unburnt hydrocarbons, carbon monoxide, volatile organic compound (VOCs), chlorine and its gaseous compounds, etc. and air pollution due to emission of smoke/ particulate matter. The particulate matter besides unburnt carbon may contain toxic/heavy metals.
- Acidification of sea water due to higher amount of absorption of carbon dioxide and other acidic gases because of rise in emissions
- Acid rains due to rise of emission of

acidic gases in atmosphere.

- Increase in radioactivity and radiation due to industrial activities or atomic accidents,
- Pollution of environment by chemicals due to their unsafe production, transport and use and Chemical disasters.
- Increased incidence of many serious diseases due to pollution of air, water and land. This may adversely affect humans, animals and plants are also adversely affected.]
- Depletion of 'Stratospheric Ozone layer' resulting in rise of UV radiation on earth. Higher Ozone content in troposphere due to various air pollutants in atmosphere adversely affect the agriculture as well as human and animal health.
- Destruction of flora and fauna, extinction of certain species of plants and animals. Deforestation for various purposes causes loss of habitat and its fragmentation. There may be overexploitation of biotic communities including plants and animals, or there may be introduction of alien/exotic species of plants and animals in existing ecosystem, which suppress and destroy the already existing flora and fauna. The organisms, plants and animals may not be able to adjust/ survive in the new chemical regime in water, soil, and air due to pollution and climate change.*

**Note: Besides anthropogenic causes, the extinction of species may be due to natural causes also. The 'natural causes' may be: climate changes, jungle fires, continental drifts, earthquakes, volcanic eruptions, lava flow, avalanche, landslides, droughts and famines, cyclones, storms, floods, Tsunami, sea level rise, striking/falling of meteors on earth, or other 'disasters'.*

Ecological Changes because of Global Warming resulting from Development

- Global warming ie an increase in average temperatures leads to climate change all most all over earth involving the following types of problems which lead to changes in regional ecology and ecosystems

- Global rise surface temperatures over land and oceans
- Increase in temperature as we go towards poles, spread of temperate region and subtropical regions towards pole.
- Decrease in snow cover of mountains and retreat of glaciers
- Melting of ice in Northern and Southern regions of earth like arctic sea, tundra, Antarctica, etc.
- Increase in sea level and submergence of land
- Shift of plant and animal ranges towards higher latitude and higher altitude.
- Oxygen depletion of sea water due to lower solubility of oxygen with rise of temperature of water.
- Increase in frequencies and severities of temperature extremes, cloud bursts / very severe rain, droughts, cyclones, storms, floods and flash floods.
- Change in distribution of rainfall and consequent droughts in some areas and increase in rainfall in other areas.
- Spread of pests and pathogens to large areas.
- Adverse effects on aquatic plants, fish and aquatic animals and other organisms in waters
- Adverse effects on agriculture and food output in most regions.:

Need for Minimizing Adverse Effects of Development on Ecology

With the global population growth, accelerated consumption of finite natural resources, and high carbon life style (producing more carbon dioxide and green house gases than the nature can absorb or process), the humanity is standing on the upper slope of the curve leading to ecological disaster.

There is no doubt that vigorous developmental activities are needed for providing quality of life to every citizen as mentioned above, but it must be understood that there are consequential adverse effects of developments and therefore there is a need for caution and modify the development process so that these bad consequences are minimized. The changes in ecology affect the biodiversity. The complex ecological

processes are also affected by biodiversity and in turn, they also affect the quality of human life. Prevention of extinction of any species of flora or fauna is very important for ecological balance.

The value and importance of biodiversity are normally seen in terms of benefits which the human race gets directly or indirectly from different microorganisms, plants, and animals. The direct benefits include those products from biotic communities like plants and animals such as food, seeds, timber, fuel, medicines, vitamins, fibres for clothes, skins, raw materials for various industries and processes, etc.

The indirect benefits include: ecotourism of natural bio-paradise, various ecosystem services, genetic storehouse for future researches for improving the food crops, fruits, seeds, raw materials, etc. for increasing productivity and quality improvement. The importance of biodiversity has increased due to progress in biotechnological field.

The ecosystem services include:

- Air purification, carbon dioxide absorption,
- Moderation and regulation of climate and weather,
- Improvement of ground water level, water conservation, regulation of hydrological cycle,
- Regulation of biochemical cycle,
- Improving soil fertility, protection and conservation of soils, conservation of soil moisture content,
- Aesthetic value, healthy environment, etc.
- Some religious faiths and significance are also associated with biodiversity.

Sustainable Development

Human society needs economic growth and development for fulfilling needs of increasing population, and also for improving the quality of life. But one of the important conditions for preservation and stability of human institutions is the stability of ecological balance which in turn depends on human desire, efforts and ability to maintain ecological balance via proper

environmental planning and management. It is very desirable to prolong the supply of finite natural resources, to efficient use of renewable resources, to discover new resources and non polluting efficient technologies, to progressively use clean technologies with an aim to detoxify the environment, and to get a sustained supply of ecological resources for development.

Sustainable development has to strike a balance between human material growth, and preservation of environmental quality and ecology. The physical and biotic components should remain in healthy conditions in long term for future generations, in spite of, exploitation and utilization of natural and ecological resources for development.

Among other things, the sustained development would need:

- 1) Meticulous environmental planning, environmental management, and monitoring of quality of air, water, and soil/land;
 - 2) Strict implementation of environmental controls on emissions and effluents;
 - 3) Agro-forestry on large scale;
 - 4) Land restoration after mining for plantation or agriculture;
 - 5) Wasteland restoration and proper use;
 - 6) Restoration of soil productivity by increased use of bio-manures / bio-fertilizers / compost (instead of chemical fertilizers) /planting of suitable species of vegetation, plants or crops.
 - 7) Development of new plantations, and green belts even on degraded land;
 - 8) Restoration of degraded forest;
 - 9) Development and use of renewable sources of energy like hydroelectric, solar energy (both solar heating and solar power) and wind energy, ocean energy systems, etc.
- Development and use of other 'non carbon dioxide emitting power sources' like atomic power station with top class safety measures are also important.
- 10) Promotion of economical use of biomass for making compost, production of useful products like

paper/ boards / liquid fuels / gaseous fuels / chemicals. Use of biomass as energy source may be done if it can be spared from use for other economical uses. However the use of biomass for making compost must be preferred.

11) Using the already known suitable cleaning technologies for domestic sewage and industrial effluents before discharge in environment.

12) Using already known suitable gas cleaning technologies for control of emission from thermal power stations, industries, vehicles, etc.

13) Replacement of environmentally harmful technologies by latest available efficient, nonpolluting and environmentally friendly technologies in the fields of agriculture, industries, transport, and power generation,

14) Continuous research and development to find most efficient, nonpolluting and eco-friendly technologies for use in all fields and their continuous adoption in relevant field;

15) Social awareness for environmental and ecological values, and environmental education for all.

Green Engineering as a Tool for Sustainable Development

Sustainability is possible through sustainable development which is in turn possible through 'Green engineering', which is defined (by US EPA) as follows:

Green engineering would require that 'the design, commercialization, and use of processes and products are feasible and economical, while minimizing (i) generation of pollution at the source and (ii) risk to human health and environment. The discipline embraces the concept that decisions to protect human health and environment can have the greatest impact and cost effectiveness when applied early to the design and development phase of a process or product.

Green engineering attempts to achieve

following goals

- i) Reduction of waste of materials, energy, and resources,
- ii) Material management,
- iii) Pollution prevention,
- iv) Reduction of greenhouse gas emissions,
- v) Product enhancement.

The principles of green engineering would cover the following:

- Waste Prevention - To prevent waste, there are following options/ methods:

(a) Selection of processes which leave the least waste material and are very efficient

(b) In already operating industries, first carry out waste audit and then take actions that are mentioned below.

- i) operational changes,
- ii) change of raw materials and other consumable and other materials; change over to better superior materials,
- iii) change of fuel,
- iv) Change for better technology and process modification and system modification; plant modifications,
- v) recovery of material from the wastes for recycling,
- vi) converting waste into saleable products.

- Safe design-Design of process which is safe for men, material, and plant. Use of products which have safe design (for use and also after use).
- Low hazard chemical use/ manufacture. [Highly hazardous chemicals should not be used or manufactured. Select processes which work with low toxicity chemical reagents. Substitute hazardous chemicals by low toxicity chemicals.]
- Use of renewable materials and fuels as far as feasible.
- Minimizing waste of energy or material
- Improved energy efficiencies [i) Adopt more efficient processes/ technologies/ systems, ii) Adopt

efficient machines and efficient processes, iii) Change to more efficient fuel, iv) Better operation and maintenance, v) Renovation and modifications in plant.]

- The product should be degradable after use as far as possible.
- Accident prevention to be included in process technology (such as simulator based technique can be used to simulate various situations). Also primary, secondary, and tertiary protections should be provided against accidents
- Control of greenhouse gases and control of pollution of environment. [This includes prevention, control, and monitoring of emission of greenhouse gases and prevention, control and monitoring of pollutants ejected or emitted from various processes, systems, industries, communities, offices, etc. The design and engineering should incorporate the above in the design itself.]
- Products and processes to be continuously improved in performance, safety, and efficiency and to be made pollution-free through research and development. [The cost should also be reasonable.]
- Carrying out frequent efficiency tests, energy audits, use diagnostic techniques and also detailed inspections to continuously monitor condition of various machines and equipment. This would be useful for keeping the plant performing well at desired efficiency without breakdowns.
- More and more power generation from renewable energy such as solar, wind, biomass, biofuels, etc. Also more and more use of renewable sources for heat and power in domestic, transport and industrial sectors.

Problems of Ganga--a holistic view

(Summary of Problems & action plan)

K. Chandramouli

kcmvcm@gmail.com

Who does not know the Problems of Ganga? Presently, it is essential to know how to prepare and implement an Action Plan to Save Ganga. Here is a brief Note on the Action Plan in the real sense of Holistic View--a view that has only been talked about but so far never applied in practice. Points given below are very brief and indicative only. For More details please refer to Author's Booklet "Save Ganga" (English) or "Ganga Bachavo" (Hindi).

Problems & Action plan

1 Climate Change & Receding Glaciers. (Hills)

Declare 150 kms from Glaciers as Eco-Sensitive

Prepare White Paper on Forestation Ban Luxury Tourism, Adopt Eco Tourism

Ban Use of Kerosene, Diesel, Smoke Chulhas

Freely Distribute Smokeless Chulhas, Pressure Cookers in Hills

2 Flow Reduced (High Withdrawals from Rivers)

Water Conservation Measures-Irrigation, Industry, Domestic, (Reduce Consumption & Waste-Involves-Irrigation, Agriculture Yields, Organic Farming, Cropping Pattern, Food Habits etc etc.)

Minimise Pipe Line & Pilferage Wastages (40%) in Cities

Improve Recycling of Water

Improve Sources-Harvest Rain Water, Ground W, Ponds, Lakes

3 Breaking Fragile Hills

Ban Heavy Constructions, Blasting, Restrict Tourism, Heavy Vehicles, Urbanization, Ban Tree Cutting, Deforestation,

Do not Change River Morphology by Diversions, Tunnels, Reservoirs (that immerse forests)

Allow Free Flow of River and Sediment Flow

Survey & Protect Trees and Herbal Plants, Wild Life Habitats etc.

4 Industrial Pollution

Convert PCBs into Active, Energetic, Vigilant (Not Negligent), Result Oriented Units, Responsible & Answerable to All Lapses.

Fight Pollution, Do Not Succumb to Political Pressure or Mafia

Give Time Schedule to Industries to Replace Old Process/ Equipment to Save Energy/Water Consumption/ Pollutant Discharge

5 Domestic Sewage

Quick Survey to Estimate Sewage Flowing into Ganga & Tributaries at all Points; Estimates for 2025-2030.

Finalise Sewage Treatment Technologies (at Different Places) and Estimate Costs.

Clear Choked Storm Drains & Encroachments, Avoid Mix up of Rain Water with Sewage.

Plan for Decadal Population Growth 30% in Urban Centres.

6 Agri Run-off of Fertilisers & Pesticides

Prevent Run-off by Creating 'Green Belt' All Along the Banks of Rivers by Growing Definite Species of Trees.

Avoid Misuse of Banks by Corridors for Highway or Monorail.

Encourage Farmers to Grow Two Rows of Trees Around their Boundaries

Minimise Use of Fertilisers and Pesticides.

Ban Use of Chemical Fertilisers on Farms in Flood Plains.

7 Solid Waste (Non Point Pollutants)

PCB (Pollution Control Boards) To Procure Industry-wise Data of Hazardous Waste and Actions In Each Case (Target and Time Bound Action).

PCB To Procure Data of Hospital wise Waste and actions For Safe Disposal

Each Thermal Plant to Tackle The Problem of Disposing Fly Ash in

Next 3 years-No Dumping into Low Lying Areas.

Adopt 3 Fold Policy for Garbage Disposal-1) Polluter Pays for Industrial Garbage, 2) Polluter Holds till Clearance by Municipality for Service Sector (Shops, Street Vendors, Hotels, Guest Houses/Resorts, Marriage Halls, Clubs, Public Functions) and 3) Polluter Segregates for Domestic Garbage.

Implement Strict Adherence to Ban on Certain use & Throw Items like Polythene Carry Bags, Plastic Cups, Spoons, etc which create Maximum Garbage (Manufacture, Storage, Sale).

8 Save Ecology (Save River System)

Survey on Herbs, Biodiversity, Flora and Fauna, Aquatic Life and Wild Life (Types, Population, Place etc).

Apt Measures to Protect diversity of birds, mammals, amphibians, reptiles, fish.

Save Endangered Species like Dolphins, Turtles, Crocodile, Indian Otter, Asian Small-Clawed Otter, Sunderban Marsh Crocodiles, Bengal Tiger etc.

9 River Front Habits

Involve Local Groups to Curb/Restrict/Monitor Activities Like

a) Use of Soaps, Detergents, Oil etc.

b) Defecating, Cleaning of Animals, Vehicles, Throwing Garbage, Waste, Carcass, Dead Bodies of Animals--Punishable Offence.

c) Use of Chemicals, Immersion of Idols, Puja Materials, Plastics etc.

d) Social, Luxury, Cultural Activities & Water Sports.

e) Build and Run Efficiently--Electric Crematoriums, Dhobi Facilities, Change Rooms, Toilets etc (BUILT for Cleanliness).

f) Propaganda for Forbidding "Performance of 14 Acts Near/On

Ganga".

Finally Convert Ghats into Cultural Centres To Avoid Misuse

10 Misuse of River Banks

- a) Ban Illegal Sand/Stone mining,
- b) Remove Encroachments of all kinds by brick kilns, agri-farms, resorts, buildings etc.
- c) No diversion of river course

Enact Law to Prohibit Constructions for 150 mtrs from Highest Flood Level Marks on Banks, on Both Sides. (Implement Allahabad High Court Order)

Find Better/Efficient Alternative Other Than Embankments for Flood Control

11 Other Measures

Set Up Think Tanks and Gather

Nation-wide Expert Opinion on Subjects like River Linking, Breaking of Dams on Hills, Barrages on Ganga, National Highway Corridor or Monorail Corridor on the banks etc.

Consider Expert Opinions of Academicians working in the Universities and some Reputed Retired Officials of the Ganga Basin area.

Consider Opinions of well known Experts who are familiar with the problem and have sufficient expertise on the above mentioned subjects.

12 Participatory Management

Encourage Formation of Ganga Centres at Local and District levels to work in Unity for All Local

Representations.

Ganga Centres at all important places like (examples only), Haridwar, Bijnore, Kanpur, Allahabad, Varanasi, up to Ganga Sagar.

Channelize individual/group wise grievances Through Ganga Centres. Many local problems can be satisfactorily tackled only with People's Participation.

Ganga Centres will be Watch Dogs/Auditors to check Quality, Expenses, Time Schedules etc During Execution of Projects.

Only Specialist Think Tanks or Committees Do Not Solve Social and Do Not Ensure Participatory Management.

Interior Plantscaping for Co y and Healthy Indoor Environment

Shilpi Singh and R.K. Roy*

Botanic Garden, Floriculture & Landscaping Division,
CSIR-National Botanical Research Institute, Lucknow, India

*roynbri@rediffmail.com

People, as a part of daily life, are exposed to two different kinds of environment viz. indoor and outdoor. The indoor environment is comprised of different components viz. artificial light, furniture, carpets, curtains, cabins, rooms, halls and other enclosed spaces. There is virtually no availability of natural light and fresh air in indoor. In contrast, outdoor environment is having natural light, free air, dust, pollutants and lot of open space. Both the conditions are very contrasting and have their merits and demerits. We are very much aware about the outdoor environmental pollution and accordingly, take precautions also. Indoor environment quality is often ignored and presumed safe.

The urban working population of India spends about 60-70% time of a day indoors and 30-40% time outdoors. Unfortunately, they are not much aware and worried about the interior environmental quality. When we are indoors, we feel satisfied that the environment is clean. However, in fact indoor air quality may be inferior and presence of pollutants is also there. As per report, air inside sealed energy

efficient building is 10 times more polluted than outdoor. Therefore, interior environment have significant effects on our health and well-being.

There are several ways to improve interior air quality. Interior plantscaping is recognized world over as the most efficient mechanism to create healthy environment. Interior plantscaping has various styles which suits to every situation. Moreover, a set of plants is specifically recommended for such purpose.

A list containing top twenty plant species recommended for interior plantscaping is furnished below:

Agave angustifolia 'Marginata' (Caribbean Agave), *Areca lutescens* (Areca Palm), *Aspidistra elatior* 'Variegata' (Cast-iron Plant), *Cycas revoluta* (Sago Palm), *Epipremnum aureum* (Golden Pothos), *Ficus benjamina* 'Nuda' (Weeping Fig), *Ficus elastica* (Rubber Plant), *Ficus lyrata* (Fiddle Leaf Fig), *Neoregelia spectabilis* (Fingernail Plant), *Nephrolepis tuberosa* (Boston Fern), *Peperomia obtusifolia* (Peperomia), *Philodendron bipinnatifidum* (Heart Leaf Philodendron), *Polyscias balfouriana*

'Marginata' (Balfour Aralia), *Portulacaria afra* (Jade Plant), *Raphis excelsa* (Broadleaf Lady Palm), *Ruscus hypoglossum* (Mouse Thorn), *Sansevieria trifasciata* (Snake Plant), *Schefflera actinophylla* (Queensland Umbrella Tree), *Spathiphyllum wallisii* (Peace Lily) and *Syngonium podophyllum* (Goosefoot Plant).

Benefits of healthy environment by interior plantscaping

Various scientific studies have been conducted throughout the world for defining benefits and quantum assessment of cleansing indoor air by interior plantscaping besides its cost effectiveness. The results of these studies suggest that interior plantscaping is one of the most effective tools for creating healthy interior environment. The benefits of green plant therapy are summarized below.

Lowering of stress and negative feelings

- Studies on reducing stress and related feelings by placing green plants in an aesthetic way inside office or any other enclosed environment have recorded significant reduction in tension / anxiety (37%), depression / dejection (55%), anger / hostility (44%) and fatigue (35%).

Improvement of productivity and performance - It has been found that productivity and performance of the work force in a production unit was increased by 10-15% when surrounding environment was made ambient by placing colourful plants. Moreover, increase in concentration and reduction in accidents were also recorded.

Reduction in sick building syndrome - The syndrome refers headache, fatigue, dry skin, throat congestion, eye irritation and lack of concentration. This problem is very prevalent in energy efficient buildings having sealed environment and lack of fresh air and high concentration of toxic chemicals. It is estimated that the pollution inside is 10 times more than the air outside. Such buildings when provided with indoor house plants show reduction in reducing sick building syndrome by reducing level of toxin, increase in supply of oxygen and mood enhancement.

Lower background noise - Enclosed spaces filled with plants displayed systematically helps to reduce background noise by 5 decibels. Plants with their leaves either absorb or reflect noise and make the environment more cozy for the occupants.

Improvement Well-being - Improvement in well-being in the work place / homes / hospitals has been recorded when indoor plants were placed in comparison to no plants. In such situations, reduction in stress, strain, improvement in speed and accuracy were observed. In another experiment conducted in Norway, it was observed that health of the employees in offices and schools and patients in hospitals when they were put into a green environment improved. Studies in

USA and United Kingdom showed that simple visual exposure to plants help to reduce blood pressure and stress within 5 minutes. Human eyes can perceive more shade of green than any other colour. The green colour triggers a response in the nervous system, which relieves tensions in the blood vessels and lowers the blood pressure. Not only that, greens lowered heart rate and anxiety resulting an instant feeling of calmness and recovery.

Ambiance at working place - Offices / work places well decorated with house plants in various pattern (plants in stands / hangers / window sill) creates an overall ambiance to the working people resulting improvement in efficiency and greater job satisfaction.

Improvement of creativity - It has also been observed that people working in an environment duly decorated by various kinds of plants increase creativity by 15%.

Biophilia - This refers to natural affinity of human beings towards nature. Work places / living rooms / buildings displayed with selected plant species aesthetically helps to develop biophilic connection of plants resulting all round wellness, less health problem, less absenteeism and productivity gains.

Improvement of indoor air quality - Selected indoor plants in a proper way in proportionate number to the overall floor area function as sink and improve air quality by reducing concentration of CO₂, temperature and inducing cooling effects. As per recommendation, one well grown potted house plant per 3 employees is required for efficient improvement in indoor air quality.

Reduction in interior pollutants and clean air - The household toxins viz.

formaldehyde, benzene, xylene, toluene, ammonia, trichloroethylene besides dust particles, allergic particles and other indoor pollutants usually come out from the furniture, curtains, carpets, paper wastes, photocopier and computers. These make the interior air polluted.

Various experiments conducted worldwide have suggested placing of indoor plants which can reduce / absorb all these pollutants and make the interior air clean and breathable.

Styles of Interior Landscaping

There are different standardized styles for using plants in interior landscaping. The main purpose is to create a comfortable and clean indoor environment. Accordingly, the style needs to be modified to suit the physical structures of the interiors. The major styles are furnished below along with structural requirement.

Plants in containers - Several types of plant holders are available accommodating single to multiple pots for display purpose. These may be used for various purposes according to the need.

Plants in racks - This is another modification of display in containers having various labels and multiple numbers of pots.

Plants in hanger - If there is no sufficient floor space, the plants may be displayed in the hangers.

Vertical gardening - Vertical gardening is a special kind of indoor gardening suitable to small spaces particularly for decorating the walls and other unused interior spaces in various manners. This system of gardening is so adjustable that it can be molded according to the needs and space to beautify with the help of plants and special structures.

Indiscriminate botanical specimen collection: A serious threat to endangered species of plants

Saikat Kumar Basu

University of Lethbridge, Lethbridge AB Canada

saikat.basu@uleth.ca

The practice of botanical excursions across India by botany departments of different universities has been doing much damage to the local flora rather than teaching the students about the

floral diversity of the eco-regions where such excursions are being conducted. The insensitive and callous collection process, picking and damaging of rare species of bryophytes, pteridophytes,

gymnosperms, orchids etc have been an important factor contributing towards endangerment of many such precious species in their natural habitats. It is now important for Indian universities to look

into the current curricula and rethink about making the field excursions more

should be placed to catch the different species in the form of sketches, images and photographs along with their distribution maps. Instead of collecting rare ferns, horsetails, lycopods etc. for preparing herbarium specimens, the primary focus could be turned towards studying their habits, habitats, ecological successions, floral assemblages to get a more comprehensive and holistic idea of the floral diversity of the target ecozones.

The collection of plants for herbarium specimens should be restricted only to the collection of local weeds for such purpose rather than collecting specimens of rare, threatened and endangered species.

NEWS & VIEWS

Childhood obesity linked to traffic pollution

The global increase in rates of childhood obesity has serious public health implications: overweight children are at increased risk of developing conditions such as cancer, diabetes and heart disease. Of course, diet plays a significant role in this obesity trend, but diet alone cannot explain why the rise is so rapid. Many scientists believe that the environment also has an influence.

Air pollution is considered to be one of many possible environmental influences on weight. It causes inflammation, which may affect metabolism and hence weight gain. Animal research supports this theory: lab mice exposed to air pollution have been found to develop more fat than mice on the same diet but breathing purified air. Previous research has also found that children living in areas of high traffic have higher BMIs (measured as weight in kilograms divided by height in metres). However, it was not clear what it was about traffic that increased their weight.

The researchers of a study in U.S.A monitored the BMI of 4 550 children in California over four years. They used data on traffic and pollution levels near each child's home, as well as information on over 50 other influencing factors on weight. These included physical activity levels, health, diet, poverty rates, and access to parks and food outlets. Using statistical models, the researchers calculated the influence of each of these factors on BMI.

The average BMI at the start of the study, when the children were aged 5-7, was 16.79. After four years, it had risen to 19.35, on average. Fifteen per cent of these children were classified as obese, and a further 14.4% as overweight.

Air pollution was estimated to be responsible for a 0.4 unit difference between the BMIs of children aged 10 in the top 10% of traffic pollution exposure and the BMIs of 10-year olds in the bottom 10% of exposure. This translates into 13.6% increase in the annual

rate of BMI growth for those in the most polluted areas. At the start of the study, there was no difference in pollution's effects on BMI between these two groups. However, it accumulated as the children grew older.

The study concludes that pollution had a significant effect on BMI, and it likely plays a role in obesity epidemics. The findings, which support efforts to reduce traffic emissions, are consistent with the theory that pollution affects metabolism, particularly because the differences in BMI accumulated over time. They are supported by studies that have found higher rates of other metabolic disorders, such as diabetes, in polluted areas.

Source:

www.ehjournal.net/content/13/1/49/abstract

Household air pollution puts more than one in three people worldwide at risk of ill health, early death

Household air pollution, caused by the use of plant-based or coal fuel for cooking, heating, and lighting, is putting nearly three billion people worldwide at risk of ill health and early death, according to a new report, published in *The Lancet Respiratory Medicine* journal. A third of the world's population use plant-based solid fuels such as wood or charcoal, or coal, to cook, heat, and light their homes, primarily in Asia and Africa. These smoky, dirty fuels are often used in an open fire or simple stove, resulting in high levels of household air pollution in poorly ventilated homes. Studies in India have found that in some areas, household air pollution is so high that it actually increases outdoor (ambient) air pollution – leading to pollution levels more than three times higher than a typical London street, and well above WHO-recommended safety levels. The report, which was led by Professor Stephen Gordon, from the Liverpool School of Tropical Medicine, UK, and Professor William Martin, from The Ohio State University, USA, examines evidence for the

effects of household air pollution on health. They conclude that an estimated 600-800 million families worldwide are at increased risk of illnesses such as respiratory tract infections, pneumonia, COPD, asthma, and lung cancer. Estimates suggest that household air pollution killed 3.5 to 4 million people in 2010.

Despite this huge toll of premature death and ill health, coordinated international and country-led efforts to tackle household air pollution have thus far been insufficient and public awareness of the risks of cooking with solid fuels in poorly ventilated homes remains low in the areas most badly affected. The women and children living in poverty who are most affected by household air pollution are also likely to have poor access to healthcare – especially the complex and expensive treatments required for much of the respiratory illness and cancer caused by household air pollution.

Although a number of clean cooking technologies such as advanced cook stoves, LPG or solar power systems exist, providing affected homes with cleaner ways to cook, heat, and light their homes with biomass fuel will not be the long term solution, says Professor Gordon. In communities where solid fuel cooking methods are currently the norm, cleaner fuel and cooking methods need to be at least as affordable, efficient, and long-lasting as the traditional style methods they replace.

According to Professor Martin, "All of the evidence we examined in this Commission points to a serious need for improved commitment to tackling the problem of household air pollution. Scientists and health professionals in countries where household air pollution is still widespread need to work with governments and international health agencies to increase awareness of the huge toll that it is exacting on the population. There are many gaps in our knowledge of how to effectively measure and prevent household air pollution. It is high time that the global community recognizes the scale of this problem and commits to coordinated and concerted action."



CONFERENCES

World Congress on Sustainable Technologies (WCST-2014)

December 8-10, 2014; Bath Road, UB3 5AN, London, United Kingdom

Website: <http://www.wcst.org/>

E-mail: info@wcst.org

International Conference on Plant, Marine and Environmental Sciences (PMES-2015).

1-2 January, 2015; Kuala Lumpur (Malaysia)

Contact person: Conference Secretary-PMES-2015

E-mail: info@iicbe.org

Website: <http://www.iicbe.org/2015/01/02/54>

International Conference on Environment and Bio-Engineering (ICEBE 2015)

10-11 January 2015; Dubai, United Arab Emirates

Contact person: Ms Mickie Gong
Email: icebe@cbees.net

Website: <http://www.icebe.org/>

Eleventh International Conference on Environmental, Cultural, Economic and Social Sustainability

21-23 January 2015; Copenhagen, Denmark

Contact person: Conference Director

Website: <http://onsustainability.com/2015-conference>

International Conference on Environment, Climate change and Renewable Energy (ICECCRE'15)

14-15 April 2015; Zimbabwe, Harare

Pr. Eng. Rujeko Masike (Ms.), Chairperson, Dept of Industrial and Manufacturing Engineering, Harare Institute of Technology, Belvedere, Harare, Zimbabwe

E-mail: rujekom3@gmail.com, rmasike@hit.ac.zw

23rd International Conference on Modeling, Monitoring and Management of Air Pollution

1 - 3 June, 2015; València, Spain

Contact: Rachel Van Loock

Wessex Institute, Ashurst Lodge, Ashurst

Southampton, SO40 7AA

E-mail: rloock@wessex.ac.uk



BOOKS

Horticulture: Plants for People and Places, Volume 1

(Eds.) Dixon, Geoffrey R., Aldous, David E.

Springer 2014

ISBN 978-94-017-8577-8

Price: 139,99

Plant Biotechnology Experience and Future Prospects

(Eds.) Ricoch, Agnes, Chopra, Surinder, Fleischer, Shelby

Springer 2014

ISBN 978-3-319-06892-3

Price: 118,99

Environmental Cost and Face of Agriculture in the Gulf Cooperation Council Countries

Fostering Agriculture in the Context of Climate Change

(Eds.) Shahid, Shabbir A., Ahmed, Mushtaque

Springer 2014

ISBN 978-3-319-05767-5

Price: 139,99

Evolutionary Biology: Genome Evolution, Speciation, Coevolution and Origin of Life

(Ed.) Pontarotti, Pierre

Springer 2014

ISBN 978-3-319-07622-5

Price: 149,99

Climate Change and Himalaya: Natural Hazards and Mountain Resources

By Sundaresan, J.; Gupta, P.; Santosh, K.M.; Boojh, Ram

Scientific Publishers 2014

ISBN: 9788172338817

Price: Rs 2750

Herbaceous Plants as Natural Protective Food

By Rana, M.K

Scientific Publishers 2014

ISBN: 9788172339005

Price: Rs 2750

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

President :

Dr. C.S. Nautiyal

Vice-Presidents :

Dr. S.C. Sharma
Prof. Mohammad Yunus
Prof. Muhammad Iqbal

Secretary :

Dr. K. J. Ahmad

Additional Secretary :

Dr. R.D. Tripathi

Joint Secretaries :

Dr. Mrs. Nandita Singh
Dr. Vivek Pandey

Treasurer :

Dr. D.K. Upreti

Members of the Executive :

Prof. Mrs. Madhoolika Agrawal

Prof. Arun Arya

Prof. A.K. Attri

Prof. S.K. Barik

Dr. H.M. Behl

Dr. Ms. Shashi Dhawan

Dr. Tariq Husain

Dr. Mrs. Kamla Kulshreshtha

Dr. U.N. Rai

Prof. Y.K. Sharma

Prof. Rana Pratap Singh

Advisors :

Prof. J. N. B. Bell

Prof. C.R. Bhatia

Prof. R.F.E. Crang

Prof. R.K. Kohli

Prof. S. V. Krupa

Dr. P. V. Sane

Dr. B. P. Singh

Prof. R.S. Tripathi

Prof. C.K. Varshney

Prof. H.N. Verma

Awareness Programme Committee :

Ms. Kanti Srivastava (Convener)

Editors :

Dr. K.J. Ahmad

Prof. R.S. Tripathi

Prof. Mohammad Yunus

Printed and Published by :

International Society of Environmental Botanists, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow-226001, India

Tel. 0522-2297821: 2205831-35 Extn. 821

Fax: 0522-2205836

Email: isebnbrilko@sify.com

Website: <http://isebindia.com>