



# ENVIRONNEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

## Newsletter

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### CLIMATE CHANGE FORCING NEW MIGRATION RESPONSE

Migration of people to escape natural disasters will be a major global issue in the coming years according to a report published by the UN University, CARE International and Columbia University.

Environmentally induced migration and displacement has the potential to become an unprecedented phenomenon – both in terms of scale and scope, the study said. In coming decades, climate change will motivate or force millions of people to leave their homes in search of viable livelihoods and safety. The report said that the science of climate change was too new to forecast exact projected numbers of migrants, but it cited an International Organization for Migration estimate of 200 million environmentally induced migrants by 2050.

The study highlighted especially vulnerable regions of the world, including: island states such as Tuvalu and the Maldives, dry areas such as Africa's Sahel and in Mexico, and delta regions in Bangladesh, Vietnam, and Egypt. In the densely populated Ganges, Mekong, and Nile River deltas, a sea level rise of 1 metre could affect 23.5 million people and reduce the land currently under intensive agriculture by at least 1.5 million hectares. Climate scientists say sea levels could rise by at least a metre this century. The world needed to invest to make poor communities and countries more resilient to climate change.

Migrants from climate disasters may need new rights, the report said. Those displaced by the chronic impacts of climate change will require permanent resettlement.

Source: <http://www.dailytimes.com.pk> June 15, 2009

### ICPEP-4 Rescheduled

Fourth International Conference on Plants & Environmental Pollution (ICPEP-4), which was to be organized during 7-10 February 2010 at the National Botanical Research Institute, Lucknow, India has been rescheduled. It will now be held during **8-11 December 2010**. The venue will remain the same.

Detailed and updated information is available on our website: <http://isebindia.com>

Organizing Secretaries, ICPEP-4  
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## LETTERS

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I hope you are well and I very much hope that we will meet again at the ICPEP meeting next year. I wanted to suggest a couple of things to you. I note that bioindication is a major section for the meeting. We are some way into a massive project on measurement of environmental change which is aimed at community participation and is led by Imperial College and the Natural History Museum. It has £11,000,000 funding from the UK National Lottery and involves universities and community groups throughout England. There are 5 major national programmes: Soil Quality, based on earthworms and various soil parameters; Air Quality, based on lichens and tarspot disease of sycamore; Water Quality; Biodiversity; Climate Change.

The soil project is currently in progress while the air quality one will commence later this year. The others will follow in order. This is work which will yield vast quantities of high quality scientific data, but also develop community awareness in ecology, environmental change and taxonomy. I am the chair of its Biomonitoring Committee and as such am deeply involved. Sally Power is running the Air Programme at Silwood Park which is concerned with vehicle effects on vegetation as well. I believe that this is a unique programme which has much to offer other countries, not the least in the developing world. Would you be interested in me giving a presentation on this at ICPEP. I would love to write an article for *Environews* but it will not be possible for the next issue. Not sure of everything I have done for *Environews* in the past. I know that I have done one on Chernobyl and on environmental education. Possibly also on air pollution effects on pests and pathogens. How about an article on the history of our understanding of air pollution impacts on vegetation.

**Prof. JNB Bell**

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**M**y name is Alice Cook. I've just visited your website [isebindia.com](http://isebindia.com) and I was wondering if you'd be interested in exchanging links with my website. I can offer you a HOME PAGE link back from my Recycling Guide

website which is <http://www.recycling4live.com>. If you are interested, please add the following information to your website and kindly let me know when it's ready. I'll do the same for you in less than 24 hours.

Title: environmental management URL:<http://www.thegreenhouse.co.uk>

Description: the green house provides businesses with tailored waste management programs to minimize their waste output and costs.

**Alice Cook**

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**W**e are pleased to announce the Third United Nations International UN-SPIDER Bonn Workshop: "Disaster Management and Space Technology – From Concepts to Application", which is being jointly organized by the United Nations Office for Outer Space Affairs (UNOOSA), the German Aerospace Center (DLR) and the United Nations Convention to Combat Desertification (UNCCD). The workshop will be held in Bonn, Germany, from 21 – 23 October 2009 in the UN premises in Bonn.

We would be grateful if you could forward the announcement to the readers of *Environews*. The application form, FULLY COMPLETED AND SIGNED, should be submitted by email to Mr. Joerg Szarzynski, UN-SPIDER Bonn Office, Germany or faxed to: (+ +49) 228 815 0399, no later than Monday 31 August 2009. In case a participant wants funding support, he should make sure that his application is signed by the Head of the Institution, otherwise it will not be considered.

Further information regarding the agenda and general arrangements, and other logistical details, will soon be available on the UN-SPIDER Knowledge Portal under <http://www.unspider.org/>.

We would highly welcome the participation of ISEB members in the workshop and we want to see them in Bonn!

**Joerg Szarzynski**

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## WELCOME NEW LIFE MEMBERS

**Mr. Qazi S. Masood Hasan** is a well known ornamental horticulturist, who has made immense contributions in introduction, cultivation, propagation and conservation of Chrysanthemum in Shahjahanpur. In view of this knowledge and expertise in Chrysanthemum he has been regularly invited as a judge at the flower shows organized at NBRI, Aligarh Muslim University and Raj Bhawan, Lucknow. He has written several articles in magazines and chapters in books. He is a Life and Regional member of Chrysanthemum Society of India, New Delhi.

**Dr. Sanjeeva Nayaka** is a scientist at the National Botanical Research Institute, Lucknow. His research interest includes taxonomy, ecophysiology and biogeography of lichens. He has published several research papers on various aspects of lichenology in national and international journals. Dr. Nayaka visited Antarctica twice (in the year 2002-03 and 2008-09) and studied the lichens of Schirmacher Oasis. Currently he is engaged in studying the physiology of Antarctic lichens.

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**Dr. D.K. Upreti** Scientist 'F' is the Head of Lichenology Laboratory of the National Botanical Research Institute Lucknow (CSIR). He has done his Ph.D. thesis under Dr. D.D. Awasthi at Botany Department, Lucknow University, Lucknow. Apart from taxonomy of Lichens, Dr. Upreti has carried out extensive research work on lichens, especially, their use in pollution monitoring, medicinal activity, *in vitro* culture of lichens and biomonitoring studies. Dr. Upreti visited Antarctica to study the lichens of Schirmacher Oasis, East Antarctica during 1991-92 in the 11<sup>th</sup> Indian Antarctic expedition. Lichenology Laboratory of NBRI is the pioneering laboratory in the country conducting researches on Antarctica. This laboratory is well known for its excellent lichen herbarium in Southeast Asia.

Dr. Upreti has published more than 200 research papers and five books on lichens. Dr. Upreti is the member of prestigious lichenological societies. He is the corresponding member of India for British Lichen Society and also acts as Editor Phytotaxonomy. He is also the member of steering committee of CSIR on Antarctic Researches, New Delhi.

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**Dr S.K. Tewari** is working as Scientist EII at the National Botanical Research Institute (NBRI), Lucknow. He has done graduation in Agriculture and post-graduation and doctorate in Agronomy from G.B. Pant Univ. of Ag. & Tech., Pantnagar. He was awarded Vice Chancellor's Gold Medal and Gold Medal & Citation by Directorate of Higher Education, U.P., and Merit Scholarship of the University, Junior Research Fellowship by WAFM Farmers Welfare Trust Society, New Delhi and Senior Research Fellowship by KRIBHCO Ltd., New Delhi during the studies. Presently, he looks after the field unit of NBRI, located at Aurawan where the R&D work is focused on development and utilization of sodic soils and conservation and cultivation of medicinal, aromatic, dye yielding and other non-traditional economic plants. He has over 19 years R&D experience in the areas of eco-restoration of sodic wastelands (biological reclamation) and their economic utilization, conservation and cultivation of medicinal and aromatic plants, agro-forestry systems, organic farming, cultivation of non-traditional crops/plants, bamboos and poplars. He has authored 07 books, 09 chapters in books, 46 research papers, 11 extension bulletins and >50 popular articles.

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**Mr. Sanjay Kumar Gupta** is a Technical Superintendent at the Environmental Engineering Laboratory in the Department of Civil Engineering, Indian Institute of Technology, Delhi.

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**Ms. Babita Kumari Mishra** is carrying out her Ph.D. research at Guru Gobind Singh Intraprastha University, Delhi where she is working as a Women Scientist under a DST scheme.

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**Dr. Uma Shankar** is Professor of Botany at the North-Eastern Hill University (NEHU), Shillong. He specializes in Plant Ecology with a focus on plant biodiversity, and structure, function and conservation of terrestrial ecosystems. Prof. Shankar has over 50 research publications and one edited book to his credit. Currently, Prof. Shankar is coordinating a multi-institutional research project funded by the DBT on "Mapping and quantitative assessment of geographical distribution and population status of plant resources of eastern Himalayan region" with collaborators from several important institutions of northeast India.

He obtained his Ph.D. degree from NEHU, Shillong. He did postdoctoral research at Tata Energy Research Institute (1992-97) and George Perkins Marsh Institute at Clark University, USA (2003). He served as a Scientist at G. B. Pant Institute of Himalayan Environment & Development (1997-2002) before joining NEHU as a Reader. His research contributions are widely recognized. The Indian National Science Academy awarded him the INSA Young Scientist Medal in 1999 for his study of nutrient cycling and productivity of humid grassland ecosystems and their

management. The Council of Science and Technology of Uttar Pradesh recognized his contributions with the CSTUP Young Scientist Award in 2002. Prof. Shankar is a recipient of the BOYSCAST Fellowship of the DST (2003). He is an Honorary Fellow of the Ashoka Trust for Researches in Ecology and the Environment (ATREE), Bangalore and a Fellow of the National Institute of Ecology, New Delhi. The University of Massachusetts, Boston invited him as a short-term scholar in 1996.

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## NEWS FLASH

**Dr. S.C. Sharma**, Vice-President, International Society of Environmental Botanists has been nominated as a member of Institutional Ethics Committee (Human Research) Central Drug Research Institute, Lucknow

**Dr. Jagdish Gandhi**, Founder of City Montessori School, Lucknow and a Life Member of International Society of Environmental Botanists has been awarded Ph.D. degree by the world famous Bakshir State Pedagogical University, Ufa, Russia. This international honour has been given to Dr. Gandhi for his untiring efforts for the rights of children and world unity for the last 50 years.

**Prof. R.S. Tripathi**, FNA, INSA Senior Scientist & Advisor ISEB delivered the key-note address at the Brainstorming Meeting on "Invasive Alien Plants in India: Concerns and Solutions"

organized by the Department of Botany, Panjab University, Chandigarh during 22-23 May, 2009. The Brainstorming meeting was especially organized to commemorate the International Day for Biological Diversity on May 22, 2009. The Convention on Biological Diversity (CBD) had identified "Biodiversity and Invasive Alien Species" as the focal theme for the celebration of this year's (2009) "International Day for Biological Diversity".

He also chaired the Technical Session on "Invasive Alien Plants in India" and was one of the Panellists for Discussion on "Invasive Alien Plants: Road-map for the Future".

The programme was organized on the initiative and sponsorship of the Ministry of Environment & Forests, Govt. of India.

### WORLD ENVIRONMENT DAY

To celebrate World Environment Day, National Botanical Research Institute, International Society of Environmental Botanists and Indian National Science Academy (Lucknow Chapter) jointly organised the programme on June 5, 2009.

Dr. S.C. Sharma Vice President, ISEB presented a CD on "Global Warming and Warning". Based on this theme a Quiz Competition for school children was organised. Dr. Nitya Anand, former Director, Central Drug Research Institute, Lucknow was the Chief Guest on this occasion. This well attended and highly successful function was presided over by Dr. Rakesh Tuli, Director NBRI, President ISEB and Convener of INSA Lucknow Chapter. While all participants were given certificates, the winners of the competition were given prizes.

The programme was followed by tree plantation of the indigenous plant species in the NBRI main building garden.

## OBITUARY

ISEB deeply mourns the sad demise of Mr. Abdul Majeed Khan, a member of long standing. He passed away in Lucknow on 9 June 2009 due to Cardiac arrest. Mr. Khan took keen interest in ISEB and regularly took part in its various activities. A post-graduate in Botany from Lucknow University, he joined NBRI in early sixties and was associated with the Seed Biology Division of the Institute. After serving NBRI for about two decades he took voluntary retirement to take up an assignment in Saudi Arabia.

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## URBAN POLLUTION AND SOLUTION

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In modern times pollution has become the biggest menace for the survival of the biological species. There are various types of pollution e.g. air, water, soil, sound and mental pollution. Earth was a beautiful landscape but man has ruthlessly exploited for his greed specially, in the last century. With rapid industrialization and random urbanization environmental pollution has become a serious problem. Over exploitation of open spaces, ever-increasing number of automobiles and demographic pressure have further aggravated the problem. There are various ways and means to mitigate the urban environmental pollution. Planting of trees and shrubs for abatement of pollution and improvement of environment is an effective way and well recognized throughout the world. Earlier, the purpose of planting trees in urban areas was purely aesthetic. The incessant increase of urban environmental pollution has necessitated to reconsider the whole approach of urban landscaping and its orientation in order to achieve dual effect i.e. bioaesthetics and mitigation of pollution. Proper planning and planting scheme depending upon the magnitude and type of pollution, selection of pollution-tolerant and dust scavenging trees and shrubs should be done for bioremediation of urban environmental pollution. Pollution, the major problem in cities, is compounded by the fact that there is no exhaust for the polluted air to escape. Landscape architects can solve the pollution problems related to urban landscape by creating a micro-climate.

### **Planting along the road**

Roads are the important sites of the urban areas which contribute significantly in generating pollution. By planting trees on both sides pollution can be mitigated. Unfortunately, in most of the old Indian cities and towns, there

is hardly any provision of sufficient space for the same. However, it is necessary to study the type of road, overhead electrical cables, space available on both sides, central verge, traffic triangles, roundabouts, squares and other open space available before taking up any plantation. It has been observed that trees and shrubs which are drought/frost resistant are generally tolerated to pollution.

Selection of trees is another important task. Before selecting any plant species, it is necessary to consider following characters: agro-climatic suitability; height and spread; canopy architecture; growth rate and habit (straight undivided trunk); aesthetic effect (foliage, conspicuous and attractive flower colour); pollution tolerance and dust scavenging capacity. Some of the ornamental trees which have aesthetic effect and are tolerant to pollution have been screened and recommended for planting along the roads: *Acacia auriculiformis*, *Ailanthus excelsa*, *Albizia lebbek*, *Bauhinia acuminata*, *B. purpurea*, *Butea monosperma*, *Cassia fistula*, *C. marginata*, *C. siamea*, *Casuarina equisetifolia*, *Crataeva religiosa*, *Drypetes roxburghii*, *Ficus benamina*, *Lagerstroemia duperreana*, *L. flosreginae*, *L. rosea*, *Mimusops elengi*, *Polyalthia longifolia*, *P. longifolia 'Angustifolia'*, *P. longifolia 'Pendula'*, *Peltophorum ferrugineum*, *Tectona grandis*, *Terminalia arjuna*, *T. muelleri*, *Thespesia populnea* etc. Emphasis should be given to the native plant species which are comparatively well acclimatized, and stress and pollution tolerant.

### **Central Verge**

Central verge of the two way roads in the cities and towns are often found neglected and devoid of any planting. It

is recommended that this area should be well utilized by planting dwarf trees and shrubs. This will not only serve aesthetic purpose but also functional being physical barrier for the glare of head lights of the vehicles which is essential for effective and safe operation of the roads during dark hours. Planting may be done either in single or double row depending upon the space available. Since these plants are more close to the automobile exhaust, their capacity for pollution tolerance should be considered before selection. Following plant species have been reported as pollution tolerant and recommended for plantation: *Acalypha wilkesiana*, *Bougainvillea 'Chitra'*, 'H.C. Buck', 'Lady Mary Baring', 'Mary Palmer Special', 'Partha', 'Shubhra', 'Zulu Queen'; *Caesalpinia pulcherrima*, *Callistemon lanceolatus*, *C. polandii*, *Cassia surattensis*, *Duranta plumeri*, *Euphorbia milli*, *Hamelia patens*, *Hibiscus rosa-sinensis*, *Ixora coccinea*, *Jatropha panduraefolia*, *Lantana camara*, *L. depressa*, *Malpighia coccigera*, *M. glabra*, *Murraya paniculata*, *Nerium oleander*, *Phyllanthus niruri*, *Rosa 'Gruss an Teplitz'*, *Tabernaemontana coronaria*, *Thevetia neriifolia*, *Vinca rosea*, *Wadelia lacinata* etc.

### **Traffic Island**

Traffic islands at the main road intersections vary in shape and size from square, triangle to round. Whatever may be the shape, these islands should be properly planted with the dwarf trees, shrubs and ground covers recommended for planting along the road and central verge which will contribute effectively in mitigating the air pollution.

### **Greenbelt**

Greenbelt is defined as the mass plantation of pollution tolerant trees and

shrubs in an area for the purpose of minimizing air pollution by filtering, intercepting and absorbing pollutants in an effective manner for improvement of the environment. Every town and city must have certain area earmarked for the development of greenbelts. The effectiveness of the greenbelt depends on several factors viz. climatic conditions, design, selection of plant species and its characters and type of pollutants. The importance of greenbelt can be ascertained from the estimate of cleansing capacity of 3.7 tonnes of CO<sub>2</sub> from atmosphere and supply of 2.5 tonnes of oxygen from one hectare of woodland. Following trees and shrubs are recommended for planting in the greenbelt which have aesthetic effect as well as pollution tolerant capacity: *Acacia auriculiformis*, *Albizia lebbek*, *Azadirachta indica*, *Bougainvillea* cultivars, *Bauhinia purpurea*, *Butea monosperma*, *Cassia siamea*, *C.*

*surattensis*, *Dalbergia sissoo*, *Ficus infectoria*, *Diospyros embryopteris*, *Lagerstroemia duperreana*, *Melia azedarach*, *Millingtonia hortensis*, *Murraya paniculata*, *Nerium oleander*, *Nyctanthes arbortristis*, *Parkinsonia aculeata*, *Polyalthia longifolia*, *Putranjiva roxburghii*, *Terminalia arjuna*, *T. muelleri*, *Thevetia neriifolia* etc.

Considering the present scenario of urban environmental pollution, there is a growing need for changing the approach of planting trees and other plant species. Inclusion of the ornamental plants having pollution mitigating ability in the landscape plan will serve the dual purpose of making the cities green and pollution free in the long run. Proper planting scheme will bring healthy life and colour in the cement concrete jungle of large congested cities. There is an urgent need

for saving Lucknow, the beautiful city of Gardens which is being converted into a dead city of stone by ill planning and short sightedness. Solution lies in having a strong and selfless political will. There should be a nodal agency for coordination of the arboricultural activities of the Forest Department, Horticulture Department, Municipal Corporation, Lucknow Development Authority, NGOs, Landscape Architects, Environmentalist and strong media. Sincere efforts will transform Lucknow into a 'Model Green Capital' having 30% forest cover within the next five years. Governments may go and come but the momentum should be maintained, so the citizens may feel healthy and happy. Our city, Lucknow is well known all over the world for its culture and friendliness.

## CHANGE YOUR HOME ENVIRONMENT BY CHRYSANTHEMUM BLOOMS

**B.K. Banerji and A.K. Dwivedi**

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*Chrysanthemum* (*C. morifolium* Ramat.) is an ornamental plant which belongs to family Asteraceae. *Chrysanthemum* finds its origin in China. Confucius (Chinese Philosopher) wrote about *Chrysanthemum* in 550 BC. The name *Chrysanthemum* denotes golden coloured flower, originating from Greek words chrysos, gold and anthos, flower. From China *Chrysanthemum* has spread throughout the world. National Botanical Research Institute is one of the pioneer organizations, maintaining chrysanthemum germplasm from last four decades.

It has collections of all types of chrysanthemum which includes large flower (standard), pot mums, small flowered and mini chrysanthemum. Wide range of biodiversity in chrysanthemum colour, form and type can be seen in the month of December. The size of bloom ranges from 1.0cm to 22cm across. Wide spectrums of

colours are available except blue and black. Leaf size ranges from 1cm to 15cm in length and its colour varies from green, dark green and variegated. The plant height varies from 10cm to 120cm. Beauty of the flower head is decided by the colour, number and arrangements of ray and disc florets on inflorescence (Capitulum). Diversity of flower shape and size blended with broad spectrum of colour make this plant ideal for home and garden decoration and it has the power to change the home environment into heaven.

Floriculture section of NBRI is very keen to develop new cultivars of chrysanthemum to germplasm enrichment to make it more attractive and interesting for the public. In addition NBRI also organizes chrysanthemum and coleus flower show in the month of December to generate interest and awareness about

chrysanthemum plant. This flower show a special section is meant for flower arrangement dedicated to ladies where they translate their artistic skill through chrysanthemum and make eye catching thematic arrangements, garlands, buttons, etc.

On the basis of flower size chrysanthemum is classified into three main types viz mini, small and large. Large-flowered chrysanthemum are used as a pot plant and has eight types of flowers which include Incurved, incurving, reflexed, intermediate, quilled, ball, irregular and spider; Small flower cultivars are used as cut sprays and also used in beds for monochromatic and polychromatic landscape. Small flowered chrysanthemum are classified into ten categories which includes Anemone, button, Korean, Korean Double, Decorative, Pompon, Semi-Quilled, Quilled, Cineraria and Stellate. The third category of chrysanthemum is

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Mini chrysanthemum which is developed by NBRI and is also known as 'no pinch and no stake' type. These cultivars need not require pinching or staking during their life cycle. They can be grown in beds or small pots. It can be grown in 10cm pot and at full bloom stage looks like a flower bouquet.

For converting your home into heaven decoration of home with potted plants and cut sprays and loose flowers of chrysanthemum is required. It begins with the making of Rangoli in front door by colourful ray florets of chrysanthemum, decoration of door with garlands, arrangements of chrysanthemum pots in courtyard and verandas. Interior decoration with flower arrangements is most important part of it due to long vase life of the flower.

Mini chrysanthemum in different shape, colour and forms are available which can be intelligently used for interior decoration. It can be placed even on dining table to spread positive energy as it creates its own beautiful aura to the surrounding. Mini landscapes are very attractive as they have a look of village with hut, well, lake, landscapes made from the different cultivars of mini chrysanthemum. This type of model can be placed near the entrance for creating beautiful surrounding to the home.

Chrysanthemum flowers attract small birds, bees and multicoloured butterflies which add beauty to the home and one can feel that home is now like a heaven.

For decoration of home we

recommend following chrysanthemum cultivars:

- **Large Flower** : Snow Ball, Pink Cloud, Alfred Wilson, Undaunted, Miss Universe, Belur Math, Mahatma Gandhi, Kasturba, Bolo-de-ore Allahabad Reflex, Bhima
- **Small Flower** : Jayanti, Kundan, Shymal, Lilith, Flirt, Otome-Zakura, Purnima, Lalima, Khumaini, Kalyani Mauve
- **Mini Chrysanthemum** : Mother teresa, Diana, NBRI Little Darling, Kargil-99, Y 2K, Mini Queen, Rangoli, NBRI Mini Jessie, NBRI Little Orange, NBRI Hemant, NBRI Pink.

Cultivars of chrysanthemum can be obtained from Floriculture Section of NBRI in the month of August.

## ALIEN PLANT INVASION: A HOT ECOLOGICAL ISSUE

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Migration of species from one geographical region to another across the natural barriers such as high mountains, seas and oceans has been taking place since time immemorial. The movement of species through natural dispersal agents has been rather slow. However, with globalization there has been a phenomenal increase in trade, tourism, travel and other human activities, and this has caused both intentional and unintentional introduction of species from one country to another at a pace that was never witnessed before. If a plant species arrives in a territory where the habitat conditions are similar to its native place, it germinates, survives, grows, reproduces and produces self-sustaining populations in areas of natural and semi-natural vegetation in course of time. Many exotic species may grow luxuriantly in the new environment and can expand their range of distribution at a fast rate, and may even pose a serious threat to the native species. Such introduced or exotic

species are referred to as invasive alien species. Invasive plant species are characterized by rapid growth, high reproductive capacity, efficient dispersal mechanism, high competitive ability and wide ecological amplitude. They have unique ability to adapt physiologically to new environmental conditions. Most of the invasive plant species possess high phenotypic plasticity coupled with hybridization capacity and highly efficient reproductive strategies. These attributes of invasive species contribute to their ecological success and capability to invade new areas. It may be noted that all the alien/exotic species that enter a new territory may not be invasive.

The problem of biological invasion has been recognized by SCOPE (Scientific Committee on the Problems of Environment) as a central problem in the conservation of biological communities. The invasive alien plants have serious ecological implications for the conservation of native biodiversity,

maintenance of plant community structure, plant succession and ecosystem processes in the areas invaded by them. Keeping in view the crucial role played by invasive alien species in the conservation of biological diversity and its sustainable use, the Convention on Biological Diversity (CBD) proclaimed invasive alien species as the theme of this year's International Day for Biological Diversity. The United Nations have declared 22 May the International Day for Biological Diversity and the year 2010 the International Year of Biodiversity. The problem of plant invasion, has engaged the attention of ecologists, conservationists and environmentalists all over the world during the past 3-4 decades especially after the launch of the Global Invasive Species Programme (GISP) by the SCOPE during eighties. As of now, the problem of plant invasion has become a matter of grave concern all over the world. However, in India, so far, the problem of plant invasion has not been addressed as adequately as it

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should have been done, although several exotic plants have invaded the high-value biodiversity areas and have adversely affected the natural and semi-natural vegetation/ecosystems.

Biological invasion and climate change are the two hottest topics of ecology these days. The extent of distribution, rate of spread, and persistence of invasive alien species directly influence the native biodiversity of the invaded region and therefore, the trends in invasion by alien species has been identified as an important indicator of the loss of biodiversity. The 'Convention on Biological Diversity's framework for monitoring progress towards its "2010 Target" which commits CBD to achieve by 2010, a significant reduction in the current rate of biodiversity loss, regards biological invasion as one of the two major threats to biodiversity. It has been reported by a number of researchers that the invasion of plant species in the new environments is triggered by man-induced habitat fragmentation, land degradation, forest degradation, land use and land cover changes, fire regime and other kinds of anthropogenic stresses that impact natural ecosystems. The facilitative effect of these drivers on plant invasion may presumably be mediated through the reduction in biotic and physical resistance of various kinds that would have been offered by the undisturbed host plant community. The quantification of the extent of influence exercised by different kinds of environmental resistances to the invading plant species in the host community could be a very challenging area of ecological study. Apart from causing depletion of native biodiversity, invasive alien species also alter species composition, affect soil physical, chemical and biological properties, and affect community development and ecosystem processes adversely, but no reliable quantitative data is available on any of these aspects. The effects of invasive alien species on the distribution, abundance and population dynamics of native plant species in natural ecosystems, hydrology, soil

biology, and ecosystem processes need to be studied in detail. In India, a good number of high-value biodiversity sites have been invaded by several invasive alien plants, but unfortunately, the studies on the biology of plant invasion have been only scanty. The biology and population dynamics of a number of exotic weeds have been studied by the author and his collaborators at the department of Botany, North-Eastern Hill University, Shillong during 1980-2000. Besides, researches on weed biology have also been conducted at some other universities and research organizations in India, but the plant invasion perspective has been missing in most of these studies.

Although the problem related to the invasion of alien plant species has engaged the attention of ecologists, foresters, agricultural scientists and government agencies over the past few decades, nothing tangible has been done to eradicate and manage the ever-increasing populations of invading plant species that have already established in the invaded areas and are extending their range of distribution due to man-induced habitat fragmentation and other kinds of anthropogenic stresses. The economic and ecological costs associated with the invasion of these alien plant species are indeed staggering. Some of the interesting aspects, and the exciting points that emerge as a result of analysis and synthesis of the scientific information gathered on relevant aspects of plant invasion, are presented below.

- The genetic changes are likely to occur in alien species subsequent to invasion in a new region, and these changes may hold key to their success in the invaded land. An invading species that has colonized a novel environment has to face a genetic challenge, because it has not experienced the selective pressures presented by the new environment. Despite this, alien species become successful invaders although they have to face challenges from the already well adapted native species.

The biologists need to find out the underlying mechanisms and processes that make the invading species so successful in their new environment.

- Some invasive alien species being intrinsically better competitors, offer strong competition to native species in the invaded region. The native species show a decline in resource use and invaders can increase their distribution and abundance at the expense of the resident species of the area. This may cause a drastic reduction in population size of several native species and some of them may even be eliminated from their natural habitats.
- Many invasive plant species release chemical compounds into the environment, which are not generally harmful to them, but those chemicals suppress the growth of other plant species growing in close proximity of such invasive species. This negative effect (often referred to as allelopathic effect) of invaders on the native species confers a tremendous competitive advantage on the former. The 'chemical release hypothesis' offers a plausible explanation for the spectacular success of invasive plant species in the new areas that they invade.
- The herbivores and parasites or pathogens, the natural enemies of the invasive species, that were regulating their population growth in their native place are absent in the invaded region. Invading species generally arrive in their new environments without their co-evolved natural enemies from their natural habitats that they had occupied in their native place. This may provide invaders opportunities for luxuriant growth and more prolific reproduction, which allows them to out-compete native species, and expand their range of distribution. This is the basis of the so-called 'enemy release' or 'escape' hypothesis which is employed to



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explain the spectacular success of invasive alien plants in their new environments.

The above hypotheses or approaches explain why and how alien species become more successful in the invaded land compared to their native place. It may be mentioned that the majority of studies on invasive alien species have been conducted in the invaded territory, and surprisingly, we do not have any quantification regarding their abundance, competitive success, aggressiveness and response to the natural enemies in their native land. The soundness of these "invasion hypotheses" can be tested only when we have comparative bio-geographical approach towards the problem of biological invasion and have sufficient relevant data from the native as well as invaded regions.

For any species to become successful, it is essential that it genetically adapts itself to its new environments. It may also be mentioned here that preserving genetic diversity is absolutely necessary for species to continually adapt genetically in a changing environment. Therefore, investigating the genetic adaptability of invasive alien plant species in the new environments should also be an issue of focus among population ecologists and conservation biologists.

Besides impacting native biodiversity through direct competitive suppression, the invasive alien species having strong allelopathic potential may also influence plant diversity by converting a complex plant community into a much simpler one, which is characterized by the dominance of only a few species. In extreme situations where the impact is severe, the single species-dominance may also result. This kind of effect of invasive species has serious implications for food chain length and complexity of food web, which are prerequisites for ecosystem stability and smooth functioning of ecosystems. Unfortunately, the researches related to impact of invasive plant species on

ecosystem processes are scarce. Ecological impact of plant invasion is a serious cause of concern to all of us. The ecological consequences of plant invasion are many-fold and we need to have zero-tolerance towards invasive alien species. The issue of alien plant invasion needs to be addressed very seriously like the problem of climate change.

Indeed, the problem has engaged the attention of ecologists during the past few decades, but the coordinated rigorous effort involving multinational research teams has been missing. In India where the problem of alien plant invasion is quite severe, the Union Government has recently taken some initiative to address the issue in a befitting manner. The state governments should also follow suit. Some of the aspects/points related to alien plant invasion in India on which we need to focus our attention without any further delay, are as follows.

- The status of alien plant invasion in India.
- Identification of the worst alien species that have invaded the natural ecosystems in different bio-geographic regions of India, their distribution, rates of invasion, and their population dynamics.
- Invasive alien species and their impact on native biodiversity, plant community composition and ecosystem processes.
- Attributes and ecological strategies of the worst invasive alien species and their pathways of invasion.
- Identification of the habitats and ecosystems that are most vulnerable to plant invasion.
- Exploring the causes of spectacular success of the invasive plants in the natural ecosystems of India.
- Plant invasion as related to various kinds of anthropogenic disturbances, fire regimes, species richness and species composition and habitat characteristics of the

host plant communities.

- Plant invasion in relation to elevated concentration of carbon dioxide, climate change and other global changes.
- Genetic adaptability of exotic species in contrasting ecological habitats.
- Impact of invasive alien plants on physical, chemical and biological properties of soil of the areas which they invade.
- Effects of invasive alien plants on ecosystem processes.
- Strategies and action plans for effective management of some of the worst invasive plant species at the local, eco-region and national levels.

There is a need to launch a coordinated / network research program at the national level in India encompassing the points outlined above. We need to develop a policy framework for tackling the problem of plant invasion in India. Special emphasis has to be laid on some of the worst invasive alien weeds that have been spreading very fast and have become established and naturalized in several parts of India. Notable among such alien species are *Ageratum conyzoides* L., *Eichhornia crassipes* Solms., *Eupatorium odoratum* L. (syn. *Chromolaena odorata* (L.) King & Robinson), *E. adenophorum* Spreng. (syn. *Ageritina adenophora* (Spreng.) King & Robinson), *E. riparium* Regel. (*Ageritina riparia* (Regel.) King & Robinson), *Galinsoga ciliata* Blake, *Lantana camara* L., *Mikania micrantha* H.B.&K., *Parthenium hysterophorus* L. and *Prosopis juliflora* DC.

There is a need to launch a national website and create a National Authority that should cover the entire gamut of the problems associated with biological invasion. The proposed Authority could monitor the invasion and spread of alien species, educate people about the adverse impact of invasive alien species on native flora and integrity of natural

ecosystems, and on human and animal health. The Authority could also formulate strategy and action plan for

preventing alien invasion, and for the control and eradication of invasive exotic species, and suggest suitable

mitigation measures where the preventive and control measures fail to yield the desired results.



## NEWS AND VIEWS

### COWS AND WARMING

Now the cows are being fed a diet that will help them belch less methane, one of the more potent heat-trapping gases linked with climate change. Several farms in Vermont, USA, participated in an experiment that altered traditional diets of cows to include more alfalfa and flaxseed that will produce far less methane than a diet of corn and other current feedstock would. In fact, researchers say the new diet in a way mimics the cows' traditional grass diet. Since the experiment began in January, the cows reportedly emit 18 per cent less methane than they did before.

This problem might not have arisen nor corrective action required if cows were left to eat grass at their pace. It is the compulsions of large-scale industrialized farming and ambitious production targets that have led to altering bovine diets in the first place, leading to the huge increase in livestock populations as well as methane-packed belches.

As a greenhouse gas, methane is 20 times more potent than carbon dioxide. It is reported that methane emissions generated on account of human activity far exceed those from natural sources. Total methane emissions amount to 320 million tonnes annually. The main source of human activity induced methane gas emissions are mining – extraction of coal, oil and gas – waste treatment and landfills, rice cultivation, biomass burning and ruminant livestock. Permafrost exposure due to ice sheets melting in the Polar region is releasing huge amounts of methane that lay trapped beneath for thousands of

years. Another big natural source is wetlands.

While concern about greenhouse gases centres on carbon dioxide emissions from automobiles or industrial activity, a good deal of warming may be due to methane emissions as well, with dairy farming and livestock breeding playing an important role. That means attention needs to be paid not only to cars, factories and power plants, but also to daily farming practices and livestock rearing for meat and wool, to improve the quality and safety of landfills, and to trapping and diverting coal methane in mines to supplement our energy requirements to reduce human impact on climate change.

*Times of India*  
Editorial

### GLOBAL WARMING TWICE AS BAD AS ESTIMATED EARLIER

Global warming effects could be twice as extreme as estimated a few years ago. According to M.I.T. scientists, Earth's surface temperature could rise 5.2 degree Celsius by 2100, compared to an earlier study that projected a median temperature increase of 2.4 degrees C. The new projections include improved economic modeling and newer economic data. Other factors in the new model include costing effect induced by 20<sup>th</sup> Century volcanoes, emissions of soot and measurement of deep ocean temperature. These projections indicate that without rapid and massive action, this dramatic warming will take place in this Century only.

**Source: Reuters/Acidnews, Sweden**

### BIRDS FEELING THE HEAT

Climate change is having an observable impact on birds across Europe, according to scientific team that has created the world's first indicator of impacts of climate change on wild life at a continental scale. Of the 122 common species included in the analysis, 75 per cent are predicted to experience declines, while the remaining 25 per cent of species are projected to increase.

### ALLERGEN ATTACKS

Some sources of indoor allergens are well known: mattresses and bed pillows infected with dust mites, for example. Others are not so obvious. People suffering from allergies or asthma can help themselves by recognizing the other allergen sources and where they are located and can take steps to reduce indoor triggers. Dog beds can become infested with dust mites and their allergens. Its fur is then exposed to the allergens and a person is also exposed when he cuddles the dog or he allows the dog to sleep on his bed. Instead of thick dog bed, a blanket or thin quilt should be used which should be washed once a month.

Dust mites can colonize a fish-tank cover, where there is warm, moist air and plenty of food in the form of protein-rich fish flakes. Fish tank should not be put in the bedroom of a child suffering from allergy.

Feathers produce fragments that may contain microscopic granules of bird allergens. People suffering from allergy

or asthma should avoid feather filled bedding or furniture. Feathers are also a problem when attached to a living bird. Several types of respiratory diseases including hypersensitivity pneumonitis are associated with frequent contact with birds.

Jar candles produce a lot of produce a lot of soot that can stain walls and ceilings. Soot particles are small enough to remain permanently suspended in air and to be breathed deep into the lungs. And a soot particle can also carry the allergens on its surface. If the candle burning is unavoidable, then tapered candle should be used, which typically produce less soot.

Real vigilance against household allergens may result in increased energy use, but keeping a home's indoor air clean, is essential for keeping good health.

**Source: Jeffrey C. May**  
(E/The Environmental Magazine)

### CHEWING ON ERASERS, DANGEROUS FOR CHILDREN

Phthalates are a group of chemicals used in the production of plastics to make them softer and more flexible. Because of their potential effects on human health, the European Union has banned the use of six of these phthalates in toys and children articles, especially those that children could put in their mouths. In a recent study the Danish Environmental Protection Agency found a variety of phthalates in school supplies such as bags, pencil cases and erasers and warned of health risks when children regularly suck and chew on them.

The European Commission Scientific Committee on Health and Environmental Risks (SCHER) agreed with the

Danish EPA that among all school supplies erasers may be of special concern as children could repeatedly suck or chew on them.

### NOT SO SWEET

A recent study has shown that wastewater carries some unnatural additives—pollutants that may also be present in drinking water. Researchers at the Water Technology Center in Karlsruhe, Germany, found artificial sweeteners in water even after it had gone through sewage treatment. And these artificial sweeteners could be finding their way into drinking water.

Artificial sweeteners are abundant in food and drinks, and often added to drugs and sanitary products as well. Whether or not these additives have any negative health effects has been the subject of debate for some time, and only one sweetener has ever been detected in the natural environment until now. Sucralose, a common sugar substitute, has turned up in water systems.

This most recent study showed that the sweeteners are present in rivers and streams that receive water from sewage treatment plants. Additionally, water was tested after going through two different kinds of treatment: conventional wastewater treatment and advanced wastewater treatment by soil aquifer. The artificial sweeteners were found in the water after both treatment methods, suggesting that even the more advanced method is not sufficient in removing these pollutants.

**Source: Julie Karceski in Science Daily**

### ORGANIC FARMING

Agricultural pesticides and chemical fertilizers play a great role in polluting

the environment. These chemical additives are harmful for our body and mind. It has been proved that produce from inorganic farming tactics can interfere with the normal functioning of our internal organs adversely and can even cause brain cancer. Organic farming is the only solution to escape from this crisis.

Growing organic foods without resorting to use of chemical pesticides and fertilizers has many advantages. Apostles for chemical fertilizers and pesticides argue that mass production of food cannot be done without these because of the influx of pests and diseases. But environmentalists point out to the fact that loss of revenue to diseases caused by chemicals is getting out of hand and human race would cease to exist if things go on like this. Mass production of organic foods is also possible if everyone pitch in with their efforts.

The merits of organic farming are multifarious. Food produced through organic farming is healthier and tastier. Organic foods can be stored for longer periods. Organic pesticides are easy and cheaper to make and use. They are bio degradable too.

In a nutshell, organic farming is the only solution to our food security and health problems. It does not harm the soil, air and water. Organic farms support diverse ecosystems and most importantly, the overall cost of farming per unit area is much lesser.

**Source: Sheeba Benjamin Benju**

[http://EzineArticles.com/?expert=Sheeba\\_Benjamin\\_Benju](http://EzineArticles.com/?expert=Sheeba_Benjamin_Benju)  
<http://www.leenos.org>

### 2010 GLOBAL ENVIRONMENTAL PRIZE

**2010 ST ANDREWS PRIZE FOR THE ENVIRONMENT \$125,000 US DOLLARS IN CASH PRIZES**

Applications are invited from individuals, multi-disciplinary teams or community groups for the 2010 annual prize, consisting of an award of **\$75,000 USD** for the winner and **\$25,000 USD** for each of the two runners-up. Aimed at helping ordinary people find solutions to environmental problems, the Prize was launched 11 years ago and is recognized as a prestigious international initiative, attracting entries from around the world. The focus is on environmental initiatives, but of course the most innovative and important usually come with gains to people in their locality. The 2010 St Andrews Prize for the Environment is open to entrants from anywhere in the world. More information can be found on: [www.thestandrewsprize.com](http://www.thestandrewsprize.com) <<http://www.thestandrewsprize.com>

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Contact: Marie La Rosa <alarosa@fs.fed.us>

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21 - 23 October 2009 - Bonn - Germany  
Contact: Joerg Szarzynski  
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**Second International Conference on Application of Radiotracers in Chemical, Environmental and Biological Sciences (ARCEBS-10)**  
7-13 February 2010; Saha Institute of Nuclear Physics, Kolkata, India  
Contact: Prof. Suresh Lahiri <arcebs.2010@saha.ac.in>

### Economics 2010

**Third International Conference on Environmental Economics and Investment Assessment**  
3 - 5 May 2010, Cyprus  
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**Tenth International Conference on Modeling, Monitoring and Management of Water Pollution**  
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Contact: Claire Shiell, Conference Secretariat, Air Pollution 2010  
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