ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

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IN THIS ISSUE

President ISEB's Message

It is a matter of great pride and satisfaction that International Society of Environmental Botanist (ISEB) at CSIR-NBRI has completed 25 years of its existence on 3rd December. The contributions to Science and Society made by ISEB during the past 25 years are significant. During this period, the membership of ISEB has grown to over 530, covering several countries of the world.

ISEB has so far organised six international conferences on Plants and Environmental Pollution (ICPEP) in close collaboration with CSIR-NBRI. Delegates from nearly 50 countries participated in these highly successful conferences. ISEB has been regularly publishing a quarterly newsletter ***Environews*** since January, 1995 with an aim to bring latest and complex scientific information on plants and environment to the reach of specialists and non-specialists. I am happy to share with you that today it is highly popular among the scientists globally. ISEB has also launched a scientific journal ***International Journal of Plant and Environment*** (IJPE) since 2015 and it currently publishes 4 issues a year. In a short span of 5 years it has gained international acclaim and recognition.

From 2018, ISEB has introduced ISEB Fellowship to recognize the scientists who have made significant research contributions to the field of Environmental Science. I congratulate all the ISEB Fellows selected during 2018 and 2019.

I wish to record my deep appreciation for the colleagues at CSIR-NBRI and ISEB for maintaining the symbiotic relationship between the two to achieve the objectives of ISEB.

I extend my warmest greetings and best wishes to all the members of ISEB, and readers of ***Environews*** and ***IJPE*** for the New Year 2020.

Prof. S.K. Barik
President, ISEB & Director, CSIR-NBRI
Lucknow, India

HAPPY NEW YEAR 2020

President and Members of the Executive of International Society of Environmental Botanists (ISEB) Wish a Very Happy, Fruitful and Prosperous New Year to all Members of ISEB and readers of EnviroNews and IJPE. With this issue, EnviroNews enters the 26th year of its publication

LETTERS

Greetings on the successful completion of 25 years of existence of the ISEB. We sincerely wish the Society much more rate of growth and success in achieving the objectives it was made for. Please convey my best wishes to all the members of the Executive and the General Body.

Prof. RK Kohli, Vice-Chancellor, Central University of Punjab, Bathinda (rkkohli45@gmail.com).

Hearty Congratulations, Greetings and Best wishes for the continued progress for the society.

Prof. Umesh Lavania, Lucknow (lavaniauc@yahoo.co.in)

Silver Jubilee is an important milestone for any organization. Heartiest Congratulations and best wishes for the continued growth of the ISEB. Perhaps some year long activities be planned.

Prof. PK Seth, Lucknow (pkseth@hotmail.com)

Heartiest Congratulations to all the Founder Members of the Society for your untiring efforts. The Society has a glorious past of 25 years, with 6 ICPEP as its major achievement. Congratulations and Best Wishes to all its Members.

Dr. PA Shirke, Chief Scientist, Plant Physiology Division, CSIR-NBRI, Lucknow (pashirke@nbri.res.in)

Hearty congratulations. We are visiting Lucknow and NBRI during 21/2/20 to 25/2/20. Hope to meet you soon.thanks.

Dr. Tilak Basu, Ex-Scientist, CGCRI, Kolkata (tilakdola@gmail.com).

Congratulations and Best wishes for future progress and programs.

Dr. Daizy R. Batish, Professor, Department of Botany, Panjab University, Chandigarh (daizybatish@yahoo.com).

I would like to thank you for sending me the the Events of ISEB Silver Jubilee. Wish you a great success.

Prof. AKM Nazrul Islam, Department of Botany, Dhaka University, BANGLADESH (nazrul.islam.akm@gmail.com)

My heartfelt greetings to International Society of Environmental Botanists for completing 25 years.

Dr. Seemaa Ghate, Women Scientist in Know How Foundation, Pune (shamu995@rediffmail.com)

Congratulations for completing the 25 years of of the activities of the society. I am happy for it and send my greetings.

Dr. RC Chaudhary, PRDF, Gorakhpur (ram.chaudhary@gmail.com)

Congratulations on ISEB Silver Jubilee. It is a milestone to be proud of. Best wishes.

Prof. Viney P. Aneja, Co-Director of Graduate Programs and Professor, Department of Marine, Earth, and Atmospheric Sciences | North Carolina State University (VINEY_ANEJA@NCSU.edu)

Congratulations to all who keep working hard and consistently for the progress of the objectives of ISEB.

Prof. SB Chaphekar, Ex-Professor, IISc, Mumbai (sharadchaphekar@gmail.com)

Its a great moment that ISEB is going to celebrate its silver jubilee in 2020. I congratulate all the members and thank all those who helped the society to reach to a greater height with many laurels during the course of this journey. I wish a very best to the Society for the future events

Prof. Madhoolika Agrawal, Department of Botany, Banaras Hindu University, Varanasi (madhoo.agrawal@gmail.com)

Congratulations Sir

It is a matter of great satisfaction and pride that the International Society of Environmental Botanists (ISEB), with its humble beginning in the year 1994, has completed 25 years of active and impact-full existence and has carved out a niche for itself, as reflected from the steady growth of its membership and well wishers both nationally and internationally. My heartiest congratulations to the founding members, past and present office bearers for their commitment and dedicated services to ISEB. I wish that the future of ISEB will be even more eventful and glorious.

Prof. CK Varshney, Ex-Dean, School of Environmental Sciences, JNU, New Delhi (Advisors ISEB) (ckvarshney@hotmail.com, ckvarshney@gmail.com)

First, let me express my gratefulness to you and the ISEB Fellowship Committee for recommending and selection as a Fellow of the ISEB. I am deeply honoured by the selection and happy to be part of the galaxy of eminent scientists like you. I shall do the needful at the earliest possible, and attend the silver jubilee meeting on March 6th.

Dr. P Suprasanna, Head, Nuclear Agriculture and Biotechnology Division & Professor, Homi Bhabha National Institute, Bhabha Atomic Research Centre (BARC), Trombay, Mumbai (prasanna@barc.gov.in; penna888@yahoo.com)

NEWS FLASH

Dr. Amit Pal, Assistant Professor and former Head of Institute of Environment & Development Studies, Bundelkhand University, Jhansi and Life Member of ISEB has been bestowed with on prestigious ABRF Excellence Award for Environmental Research-2019 for significant scientific contribution in the field of Environmental Pollution research by The Asian Biological Research Foundation (ABRF), Prayagraj on the occasion of First International Conference on *Environment & Society* (ICES–2019), Socioeconomic Challenges of Agriculture, Biodiversity and Environment during December 22-23, 2019 at Harcourt Butler Technical University, Kanpur.

WELCOME NEW LIFE MEMBERS

Dr. Mukunda Dev Behera, Associate Professor, Oceans, Rivers, Atmosphere and Land Sciences, Indian Institute of Technology, Kharagpur (mdbehera@ coral.iitkgp.ernet.in, mukundbehera@gmail.com)

Dr. Krishna Kumar Choudhary, Assistant Professor, Department of Botany, School of Basic and Applied Sciences, Central University of Punjab, Bathinda. (choudhary.krishna2@gmail.com).

ISEB FELLOWS 2019

The Executive Committee of ISEB which met on 20th November 2019 considered the recommendations of ISEB Fellowship Committee and unanimously approved the same. Prof. S.K. Barik accorded his approval to the recommendations. The award certificates will be duly presented to the awardees by the President ISEB at the 25th Silver Jubilee function of ISEB on 06th March 2020 at CSIR-National Botanical Research Institute, Lucknow.

SN	Name of Fellow	Address	E-mail
1.	Dr. Naser Aziz Anjum	Scientist-D, Department of Botany, Faculty of Life Sciences, AMU, Aligarh.	g0216@myamu.ac.in dnaanjum@gmail.com
2.	Professor Naveen Kumar Arora	Professor, Department Environmental Science, BBA University, Lucknow.	nkarora.bbau@gmail.com
3.	Dr. Rajeev Pratap Singh	Assistant Professor, Institute of Environment & Sustainable Development, Banaras Hindu University, Varanasi.	rajeevprataps@gmail.com
4.	Dr. Sanjeeva Nayaka	Sr. Principal Scientist CSIR-National Botanical Research Institute, Lucknow.	nayaka.sanjeeva@gmail.com
5.	Dr. Ashwani Kumar	Assistant Professor, Department of Botany, Dr. H.S. Gour Central University, Sagar.	ashwaniiitd@hotmail.com
6.	Dr. Penna Suprasanna	Head & Professor, Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, Trombay, Mumbai.	penna888@yahoo.com
7.	Professor Daizy Rani Batish	Professor, Department of Botany, Panjab University, Chandigarh.	daizybatish@yahoo.com
8.	Professor S.P.S. Kushwaha	Former Group Director & Dean (A), IIRS, ISRO, Dehradun.	spskushwaha@gmail.com
9.	Dr. Prabhat Kumar Rai	Assistant Professor, Department of Environmental Science, Mizoram University, Aizwal.	prabhatrai24@gmail.com
	ISEB Young Scientist Award		
10.	Dr. Gaurav Kumar Mishra	Lichenology Laboratory, CSIR-National Botanical Research Institute, Lucknow.	gmishrak@gmail.com

Sustainability Bottlenecks in Technology-Led Solutions for Arsenic Mitigation Programs in Indian Subcontinent

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A major cause of global water crisis is geogenic and anthropogenic contaminations of water resources, which lead to millions of people suffering from water poverty due to inadequate access to safe water. Arsenic (As) is a metallic element, naturally found in earth's crust. Exposure of arsenic is a serious health hazard to mankind across the globe with varying concentrations of this element being reported to cause cardiovascular disorders, skin lesions, respiratory diseases, and cancers (Chikkanna et al., 2019). According to recent studies, approx 296 million people are living under the threat of arsenic toxicity in nearly 107 countries. India stands among the worst affected countries across the globe with millions of individuals potentially exposed to arsenic contaminated ground water which is being used for drinking, cooking and irrigation purposes (Ghosh et al., 2018). Toxic effects of arsenic not only culminate into deleterious health issues but also create social stigma. Majority of the population effected by exposure to arsenic, lives below poverty line and affected individuals are usually illiterate with no social education concerning causes and treatment of toxicity. Many a times, symptoms of toxicity are confused with other contagious diseases and consequently these sufferers are abandoned from all public appearances. The women and children face worst wrath of society with social occlusion from work as well as home (Navasumrit et al., 2016).

Historically, ground water has been utilized as the most affordable source of drinking water supply, especially by the underprivileged population. Groundwater has also been extensively used for irrigation purposes in recent past, as it offers a convenient option towards shortfalls in water availability, thereby stabilizing crop productivity and food security. It has been estimated that approx. 80% of rural domestic needs, 50% of urban and industrial needs, and about 65% of irrigation water requirements are met solely by ground water. Extensive research over the past few decades elucidates that the sediments from Himalayan rocks which collected in the fluvial plains of Ganga-Brahmaputra-Meghna, form the holocene shallow aquifers. These holocene aquifers are the major source of arsenic contamination in ground water and are confined upto the depth of 120 m below ground level (Mehrotra et al., 2018).

There has been execution of various mitigation programs for arsenic contamination in ground water by various national and inter-national agencies however arsenic is still a global public health concern, especially in the Indian subcontinent. With a broad objective of generating policy suggestions towards extenuating arsenic led health concerns, we started this study by identifying critical bottlenecks of existing mitigation programs.

The acceptable limit of arsenic in drinking water was 50 ppb in India till the year 2009, however after 2009 the BIS revised desired limit of arsenic in drinking water to be 10 ppb and maximum permissible limits in absence of other drinking water source to be 50 ppb (Ali et al., 2019). In areas where arsenic is present above permissible limits (10 ppb) in the drinking water supply, there are two possible ways of keeping off from its exposure i.e. i) use of alternative uncontaminated water source, or ii) bringing down the levels of arsenic in contaminated water below permissible limits before consumption. It is estimated that at an average, drinking water requirement for a person is 5 Lit/Day and for cooking and other kitchen purposes it is 10 Lit/Day. Therefore minimum requirement of safe drinking water is 15 Liters/Day for a person. To this end, various arrangements like piped water supply, dug wells, deep tubewells, rainwater harvesting and surface water sources have been suggested which provide alternative sources of arsenic free water in or near the arsenic affected areas. We found that efforts made in the last two decades towards development of arsenic mitigation options in endemic areas, have largely focused on technological advancements. However, the literature is full of reports where national and international technology ventures have seen major abandonment by the effected population (Amrose et al., 2014).

Extensive literature-review and field-visits during this study revealed that large numbers of public- and private-funded organizations have used various technologies to produce point-of-use arsenic removal units (ARUs), however these systems have not been acclimatized with socio-economic and cultural variability of the surrounding field conditions. Rather the technology-developers do not seem to address the technological problems and perspectives being faced in villages of endemic areas. Exhaustive discussion with some of the leading technology-developers showed that fewer efforts have been made towards flexibility and resilience of product, in different socio-economic and cultural conditions of end-users, which are needed for technology acceptability.

Further, through questionnaire based survey of people living in seven different villages of Lakhimpur Kheri (a district in Uttar Pradesh, India, well known for presence of arsenic above permissible limits in the ground water), it was identified that most ARUs were either not operative or were facing technical breakdown. Survey results indicated multi-faceted reasons behind sustainability failures of these ARUs, which include social, economical, technological, and environmental aspects. Using survey results as well as personal observations, we found that low-alertness and lack of ownership of consumers along with unavailability of maintenance funds for these ARUs appeared as major determinant for the operative success of these units. We noticed that houses residing near ARUs were using filtered water whereas families residing at distant places are still using water from their own hand pumps which are major source of arsenic contaminated ground water. It was also observed that the reject water from filters was discharged near the filters without any mechanism of management, thereby raising the risk of accumulation of contaminants in near-by soil. During our survey we also noticed that those villiges where people were more vigile and took care of the filters, they were able to keep filter in a working condition. Some of the critical reasons behind technology failures, which we assessed on the basis of field-survey and personal observations were i) absence of regular maintenance and monitoring system for ARUs, ii) lack of awareness and ownership, and iii) unchecked disposal of generated waste/sludge.

The observation and data generated through survey of technology developers as well as end-users has provided vital information for development of policy interventions in this area. Currently we are performing comprehensive survey of varied arsenic-affected field conditions so as to summarize evidence based reasons behind technology failures. These findings will form the basis for assessment of available/forthcoming arsenic-mitigation-technology solutions for their sustainability and success in the field conditions. Further, as part of our study, we are conducting qualitative and quantitative assessment of presence of arsenic in installed arsenic removal units (ARUs) filtered water, soil bearing ARU-reject contaminates, and crop samples of affected areas and places around the ARUs. The data generated will be modelled so as to project the suggested mitigation programs/policies at the national or global level. This piece of work will create a larger view point for policy-makers towards framing effective STI-lead policies which, in turn, will foster outreach of governmental efforts towards reducing water poverty in the country, through better utilization of public-funds.

Moss – Efficient Monitors of Air Pollution with Heavy Metals

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Air is the invisible mixture of extremely important gases including oxygen, carbon dioxide, and nitrogen. These gases provide O_2 for respiration to occur, and also CO_2 for photosynthesis to happen in plants. Thus being an important part of several essential cycles on Earth, most species including human beings need air to survive. However, rapid establishment of industries aimed at making our daily life confartable, on the other hand, is adding highly toxic substances to air and making it very hard to breath. Air sampled in the major world cities has been confirmed having increasing levels of small size components or particulate matter (PM) (PM10, PM2.5, UFP -ultrafine particles-), 20 times smaller than the width of a human hair. Contributed mostly as by-products of combustion from coal-fired power stations, wood and charcoal-burning stoves, vehicle engines and factories, these PM can carry on their surface different organic and inorganic elements including heavy metals, metals with a specific density of more than 5 g cm^{-3}. Notably, atmospheric heavy metals including Cd, Cr, Cu, Hg, Pb and Zn are considered an important group of air pollutants. Additionally, owing to its link with higher rates of cancer, heart disease, stroke, and respiratory diseases such as asthma, pollution of air with toxic metals has become a global health hazard and has also been considered as the world's top killer.A continuous monitoring of the concentartion of the said atmospheric heavy metals in the environment can help us in assessing their influence and effects on ecosystems, and also in taking preventive measures and minimizing the death tolls on time.

Owing to their unique characteristics, plants have long been used as indicators of chemial pollutants in varied environmental compartments. To this end, known as the amphibians of the plant kingdom, the plants of phyllum bryophyta were the first green plants to colonize the terrestrial environment. Notably, within phyllum bryophyta, the most member of the class bryopsida (commonly known as moss) exhibit widespread distribution, a high surface/mass ratio, lack a root system,numerous small leaves and thick waxy cuticles. Mosses have propensity to colonize and thrive in all manner of ecosystems worldwide. Additionally, mosses are ectohydric species and lack internal conducting systems. Hence, mosses absorb water, nutrients and ions avaialable in atmosphere through the whole surface. In addition, these plant types grow slowly (often for years) and also exhibit their unique tolerance to long periods of desiccation. Additionaly, these plants exhibit special morphological structures independent of the cahnges in seasons, metal accumulation mechanisms, and ecophysiology. Given above, compared to endohydric species and air pollution monitoring system based solely on chemicals, mosses have been used all across the world as active or passive low-cost biological monitoring system (bioindicators or biomonitors) for determining the degree of accumulation of pollutants including the highlighted above atmospheric heavy metals (Wilkins and Aherne 2015; Cowden and Aherne 2019; Olmstead and Aherne 2019; Stankoviæ et al. 2018).

Assessment of the long-term accumulation of deposited airborne metals has been successfully biomonitored employing the pleurocarpous feather moss species (including *Haplocladium angustifolium*, *Hylocomium splendens*,*Hypnum cupressiforme*, *Pseudosclerpodium purum*, *Barbula indica*and *Pleurozium schreberi*) (ICP Vegetation 2014).In pleurocarpous feather moss species, accumulation of pollutants is favored by their high cationic exchange capacity, and high surface-to-volume or -weight ratio. In a recent study, the pleurocarpous feather moss species, *Haplocladium angustifolium* was considered better than leaves of vascular plants such as evergreen tree species, *Cinnamomum bodinieri*and *Osmanthus fragrans* in monitoring atmospheric heavy metal pollution in urban areas (Jiang et al. 2018).Notably, *Grimmia pulvinata* (Hedwig) Smith is a species abundantly found in all studied cemeteries and very com- mon in Europe. Therefore, the use of *G. pulvinata* has been argued as a good candidate for the survey of urbanized areas (Natali et al. 2016).In addition, the use of mosses in large-scale monitoring of Hg as a major tool has also been suggested in order to evaluate the impact of global processes in remote ecosystems (Bargagli 2016).

It is also important to highlight the major mechanisms underlying the accumulation of different heavy metals in mosses. Materials transported by air and eventually deposited on the surface of mosses can be accumulated as a result of the absence of cuticle and thick cell walls, and the permeability of moss cells to water, minerals and contaminants including metals (Szollosi-Moþa et al. 2020). In fact, mosses possess unique cell wall composition, where uronic acid is a characteristic component of their cell wall. The organic functional groups (of polygalacturonic acid, phosphodiester, carboxyl, phosphoryl and amine groups, as well as polyphenols) available in the cell walls form complexes with metals and thereby help mosses in significantly binding most heavy metals. Additionally, sulfhydryl and amine are also important in this context. Specific membrane transport proteins or the channels present in the cell membrane are involved in bringing the heavy metals in the moss cells once these metals are adsorbed on the moss surface (Basile et al. 2012). Hence, compared to flowering plants, the mosses have the ability of accumulating varied heavy metals to a greater extent.

In areas lacking indigenous cryptogams, the transplants of mosses (and also lichen) have been reported to contribute in the spatial and temporal monitoring of the sources and deposition patterns of atmospheric contaminants (Giordano et al. 2013). Installation of the moss bags in these areas has helped in active biomonitoring of air quality for the past several decades (Ares et al. 2012). The standard moss bag methods are being used in Finland for monitoring the atmospheric deposition of metals including Hg (Lodenius 2013). The development of biotechnological tool based on a devitalised moss clone (EU-FP7 MOSS clone project; www.mossclone.eu), comprizing the peat moss *Sphagnum palustre* has also contributed in biomonitoring of atmospheric Hg (Beike et al. 2014; Bargagli 2016; González et al. 2016).

Despite the discussed above aspects, the use of mosses for biomonitoring the atmosphereic heavy metals is still under development. In future studies on the subject, it would very interesting to enlighten the behaviour modelling of mosses, and more insights into underlying physiological/biochemical processes therein for accumulation, retention and release, and and tolerance.Compared to a plethora of data available on the use of moss in biomonitoring of the spatial and temporal trends of atmospheric deposition in Europe,exhaustive studies on this aspect in India require proper attention.

The Role of Giloy as an Indian Medicinal Herb

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Figure 1: The morphological parts of Giloy

Far Decades, The Giloy (Tinospora Cordifolia), a medicinal herb that has been used as Indian medicine for ages. Giloy is also known as 'Amrita', which literally translates to 'the root of immortality', because of its abundant medicinal properties. “The stem of Giloy is of maximum utility, but the root can also be used. “Giloy can be consumed in the form of juice, powder or capsules”.Tinospora cordifolia, which is known by the common names heart-leaved moonseed, gaduchi, and giloy, is an herbaceous vine of the family Menispermaceae indigenous to the tropical areas of Bangladesh, India, Manipur called Ningthou khongli, Myanmar, and Sri Lanka.

Giloy helps to remove toxins, purifies blood, fights bacteria that causes diseases and also combats liver diseases and urinary tract infections. “Giloy is used by experts in treating heart related conditions, and is also found useful in treating infertility”

Morphology of Plant

The plant of Giloy is green Paan like structure. It is a large climbing shrub with several elongated twining branches. Lamina is broadly ovate or ovate cordate, 20-30 cm, long and 10–15 cm broad with a prominent reticulum beneath. The Leaves are simple, alternate with long petioles up to 10 cm long both at the base and apex with the basal one longer and twisted partially and half way around. Flowers are unisexual, small on separate plants and appearing when plant is leafless. The Male flowers are clustered, but female flowers are usually solitary. It has six sepals in two series of three each. The flower six petals which are smaller than sepals, obovate, and membranous. Fruits aggregate in clusters of one to three and red. They are ovoid smooth drupelets on thick and scarlet or orange colored (Figure 1).

Phytochemicals

Tinospora contains diverse phytochemicals, including alkaloids, phytosterols, glycosides, and mixed other chemical compounds. Columbin, tinosporaside, jatrorhizine, palmatine, berberine, tembeterine, tinocordifolioside, phenylpropene disaccharides, choline, tinosporic acid, tinosporal, and tinosporon have been isolated from Tinospora cordifolia.

The Chemical properties and pharmacology of Guduchi is highly rich in anti oxidants. It has wound healing property, antipyretic (fever-reducing) and anti-viral properties. It has many Anti oxidants like Ascorbic acid, Lycopene, Carotene, Phenol,Iron and Anthocyanin. Some minerals like Calcium, Phosphorus, Iron, Copper, Zinc and Manganese are also found. It act as Immuno-modulatory activity, Anti- bacterial activity, Anti- psychotic acitvity

Besides many other chemical propersties of Giloy is given below:

Alkaloids: Berberine, Choline, Tembetarine, Magnoflorine, Tinosporin, Palmetine, Isocolumbin, Aporphine alkaloids, Jatrorrhizine, Tetrahydropalmatine

Glycosides:18- norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside, Syringin, Syringin- apiosylglycoside, Pregnane glycoside, Palmatosides, Cordifolioside A, B, C, D and E

Steroids: Beta–sitosterol, Delta-sitosterol, 20 Beta- hydroxyecdysone, Ecdysterone, Makisterone A, Giloinsterol Aliphaticcompound: Octacosanol, Heptacosanol Nonacosan-15- one dichloromethane

Others: 3- (4- Dihydroxy- 3- methoxy-benzyl)- 4- (4- compounds hydroxy- 3-methoxybenzyl)- tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifelone, Giloinin, Giloin, N- trans-feruloyltyramineas diacetate, Tinosporic acid

The Side effects and precautions of Giloy

It is a very good herb for diabetes, may further lower the blood glucose levels. Hence people with diabetes should take this herb only under medical supervision. It's usage in pregnancy should be monitored under strict medical supervision. It is used in post-natal care and in Children.

It is also used as home remedy. The role of giloy in Home remedies is pointed below:

Home remedy for gout

- Giloy Home remedy for rheumatoid arthritis
- Giloy home remedy for fever
- Giloy remedy for gout
- Giloy help to revive pancreas in type 1 diabetic patient
- Giloy helps to revive pancreas in type 1 diabetes.
- Giloy help in reducing Eosinophilia
- Giloy help to improve immunity and also to fight the virus.
- Giloy is useful in controlling the blood sugar level, to fight insulin resistance and also to prevent weight gain. These symptoms are associated with PCOS. Thus, in this way, giloy is useful in PCOS.
- It has strong antioxidant properties, which protects against free radical damage and boosts immunity.
- It helps in reducing fever, also effective for chronic fevers such as dengue or chikungunia and also helps in increasing blood platelet count.
- It aids in digestion, highly alkaline and has anti-inflammatory effect, which aids in treatment of arthritis and asthma.
- It can help reduce blood glucose levels for type-2 diabetics.

NEWS & VIEWS

PAH levels in Arctic air remain steady despite decreasing global emissions

Polycyclic aromatic hydrocarbons (PAHs) enter the environment in large quantities via the combustion of fossil fuels and organic matter. They are a cause for concern given their known toxicity, potential to cause cancer and ability to move large distances in the atmosphere — meaning that they are found in remote or protected areas, such as the Arctic, even if not emitted there. This study explores how PAH levels in the Arctic atmosphere have changed over the past 20 years at three sites in Canada, Norway and Finland. The results show that, despite a global decrease in PAH emissions in the same timeframe, the air concentrations in the Arctic are not significantly declining — possibly partly as a result of local warming causing more volatile PAHs to move from the surface to the air.

PAHs move great distances to the Arctic from other locations, conveyed on ocean and atmospheric currents, and are trapped in the Arctic environment by the cold climate. They originate from continuous regional emissions (e.g. heating and industry) and temporary local activities (such as maritime traffic and coal mining). They also fluctuate seasonally, with space heating in colder months causing winter air concentrations to be far higher than summer levels, and may not degrade as readily in the extended darkness of the Arctic winter than elsewhere, where they degrade and alter in the presence of light.

Levels of regulated persistent organic pollutants (POPs) are declining in Arctic air and water due to international initiatives to control emissions — such as the Convention on LongRange Transboundary Air Pollution (CLRTAP) and the Stockholm Convention on POPs. This is not true of PAHs, however, even though global emissions declined by 16% from 1995 to 2008. As human activity increases in the Arctic, PAH levels may also increase. These pollutants have been identified as emerging contaminants in the Arctic environment.

To understand more about pollutants in this region, the Arctic Monitoring and Assessment Programme (AMAP) has investigated the occurrence of POPs in the Arctic atmosphere for nearly three decades. This study uses three long-term AMAP datasets, covering 20 years each, gathered at different observatories – Alert, Canada; Pallas, Finland; and Zeppelin, Norway – to assess the sources, transport, and cycling of PAHs in Arctic air, and to evaluate if, and how, a global reduction in PAH emissions has affected concentrations and trends over time.

Regular air samples were collected at each AMAP site between 1992 and 2015 (Canada); 1994 and 2015 (Norway); and between 1996 and 2015 (Finland) with high-volume air samplers. The measured PAH air concentrations in these samples were checked for data quality. Time trends of PAHs were developed from observed air concentrations. The PAHs traced were phenanthrene (PHE), anthracene (ANT), fluoranthene (FLA), pyrene (PYR), benzo[a]anthracene (BaA), benzo[a]pyrene (BaP), indeno[1,2,3-c,d]pyrene (IcdP) and benzo[g,h,i]perylene (BghiP).

The Pallas observatory had greater air concentrations of PAHs than Zeppelin and Alert, which the researchers attribute to the Finnish observatory's closer proximity to human settlements. Annual mean concentrations of all eight aforementioned PAHs combined were between 49 and 363 (Alert); 91.7 and 523 (Zeppelin); and 346 to 817 (Pallas) picograms per cubic metre. Levels were higher in the winter months, particularly from December to February

The researchers then used a simulated

global 3D transport model (to elucidate the atmospheric transport, deposition and degradation of PAHs) and compared the modelled time trends with those observed in the Arctic atmosphere. They focused on two representative PAHs that were detected frequently and at high concentrations — phenanthrene (PHE) and pyrene (PYR); and, in addition, on benzo[a]pyrene (BaP) — a PAH of toxicological importance and, significantly, different physical-chemical properties to the former two. At Alert, levels were highly variable, increasing and declining multiple times — probably due to the occurrence of frequent, active forest fires in nearby regions. At Zeppelin and Pallas, levels initially declined before reaching a steady state. Overall, PAH levels fluctuated but remained largely steady at all sites.

The researchers also explored whether PAH sources had changed at each site over the study period. They found these not to have differed much at Pallas and Zeppelin (probably due to continued use of coal-fired power plants in Europe), but suggest that Alert has seen a slow shift from coal/wood combustion to petroleum (i.e. vehicle emissions). Additionally, the most prominent Arctic warming due to climate change occurred in Greenland and northeastern Canada and this is reflected in the sites' modelled long-term trends. From 1998 to 2000, Alert and Zeppelin showed higher levels of PHE, a PAH that becomes more volatile with increasing temperature and moves from the Arctic surface to the air, whereas PHE had a less marked effect at Pallas.

PAH emissions declining globally over the past 25 years, Arctic levels of atmospheric PAHs did not reflect this decrease. The researchers suggest that the decline in emissions may be offset by an increase in PAH 'volatilization' caused by warming, as seen in the case of PHE. Recently, new activity — such as resource exploration, research, tourism and maritime traffic — has entered the Arctic region, and melting ice has opened up new shipping routes, potentially introducing new threats and PAH sources to this environment. The researchers suggest that their study helps to model the impact of climate change on contamination in Arctic environments; that efforts should continue to reduce PAH emissions globally; and that both direct and indirect impacts of climate change, particularly forest fire, should be included in assessing the environmental and health risks of PAHs.

Y. Yu et al.
(Source- Science for Environment Policy 28 November 2019, Issue 536)

Even 50-year-old climate models correctly predicted global warming

Climate change doubters have a favorite target: climate models. They claim that computer simulations conducted decades ago didn't accurately predict current warming, so the public should be wary of the predictive power of newer models. Now, the most sweeping evaluation of these older models—some half a century old—shows most of them were indeed accurate.

"How much warming we are having today is pretty much right on where models have predicted," says the study's lead author, Zeke Hausfather, a graduate student at the University of California, Berkeley.

Climate scientists first began to use computers to predict future global temperatures in the early 1970s. That's when newfound computing power coincided with a growing realization that rising carbon dioxide levels could boost global temperatures. As the issue gained public attention, critics questioned the reliability of rudimentary model predictions. Even a 1989 news article in *Science* radiated skepticism, stating that "climatologists may have a gut feeling that the greenhouse effect is heating up the Earth, but they have not been close to proving it."

Today, the models are much more sophisticated. Mainframe computers driven by paper punch cards have given way to supercomputers running trillions of calculations in 1 second. Modern models account for myriad interactions, including ice and snow, changes in forest coverage, and cloud formation—things that early modelers could only dream of doing. But Hausfather and his colleagues still wanted to see how accurate those bygone models really were.

The researchers compared annual average surface temperatures across the globe to the surface temperatures predicted in 17 forecasts. Those predictions were drawn from 14 separate computer models released between 1970 and 2001. In some cases, the studies and their computer codes were so old that the team had to extract data published in papers, using special software to gauge the exact numbers represented by points on a printed graph.

Most of the models accurately predicted recent global surface temperatures, which have risen approximately 0.9°C since 1970. For 10 forecasts, there was no statistically significant difference between their output and historic observations, the team reports today in *Geophysical Research Letters*.

Seven older models missed the mark by as much as 0.1°C per decade. But the accuracy of five of those forecasts improved enough to match observations when the scientists adjusted a key input to the models: how much climate-changing pollution humans have emitted over the years. That includes greenhouse gases and aerosols, tiny particles that reflect sunlight. Pollution levels hinge on a host of unpredictable factors. Emissions might rise or fall because of regulations, technological advances, or economic booms and busts.

To take one example, Hausfather points to a famous 1988 model overseen by then–NASA scientist James Hansen. The model predicted that if climate pollution kept rising at an even pace, average global temperatures today would be approximately 0.3°C warmer than they actually are. That has helped make Hansen's work a popular target for critics of climate science.

Hausfather found that most of this overshoot was caused not by a flaw in the model's basic physics, however. Instead, it arose because pollution levels changed in ways Hansen didn't predict. For example, the model overestimated the amount of methane—a potent greenhouse gas—that would go into the atmosphere in future years. It also didn't foresee a precipitous drop in planet-warming refrigerants like some Freon compounds after international regulations from the Montreal Protocol became effective in 1989.

When Hausfather's team set pollution inputs in Hansen's model to correspond to actual historical levels, its projected temperature increases lined up with observed temperatures.

The new findings echo what many in the climate science world already know, says Piers Forster, an expert in climate modeling at the United Kingdom's University of Leeds. Still, he says, “It's nice to see it confirmed.”

Forster notes that even today's computer programs have some uncertainties. But, “We know enough to trust our climate models” and their message that urgent action is needed, he says.

The new research is a useful exercise that “should provide some confidence that models can be used to help provide guidance regarding energy policies,” adds Hansen, now director of the Climate Science, Awareness and Solutions Program at Columbia University.

He communicated with *Science* from Madrid, where world leaders are gathering this week for the 25th annual United Nations climate conference. Delegates from around the world are negotiating how to implement emissions cuts agreed to at the 2016 meeting in Paris. Meanwhile, a U.N. report issued last month showed greenhouse gas emissions have continued to climb since then, and that many of the biggest polluting countries aren't on track to meet their promises.

Warren Cornwall
(Source-Climate, Dec. 4, 2019)

Climate crisis: Marine life under threat from falling oxygen levels

The loss of oxygen from the ocean due to climate change risks "dire effects" on sea life, fisheries and coastal communities, a global conservation body said Saturday (Dec 7). The International Union for the Conservation of Nature (IUCN) said that around 700 sites had been identified globally with low oxygen levels -- up from only 45 in the 1960s.

In the same period, the group warned, the volume of anoxic waters -- areas totally devoid of oxygen -- have quadrupled. The ocean absorbs around a quarter of all fossil fuel emissions, but as global energy demand continues to grow there are fears that the world's seas will eventually reach saturation point. Oceans are expected on current trends to lose 3.0-4.0% of their oxygen globally by 2100.

However, most of that loss is predicted to be in the upper 1,000m, that is the richest part of the ocean for biodiversity. "As the warming ocean loses oxygen, the delicate balance of marine life is thrown into disarray," said the IUCN Acting Director Grethel Aguilar. The largest peer-reviewed study to date on ocean oxygen loss concluded that deoxygenation is already altering the balance of marine life to the detriment of species that need more of the life-giving gas.

Species such as tuna, marlin and sharks -- many of which are already endangered -- are particularly sensitive to low oxygen levels due to their large size and energy demands. But loss of oxygen is affecting species across the food chain. The biomes that support around a fifth of the world's current fish catch are formed by ocean currents that bring oxygen-poor water in to coastlines.

"Impacts here will ultimately ripple out and affect hundreds of millions of people," the IUCN said. The group this year issued a landmark assessment of the world's natural habitats, concluding starkly that human activity was threatening up to one million species with extinction. Ocean life is already battling warmer temperatures, rampant overfishing and plastic pollution. The World Meterological Organization this week said that due to man-made emissions growth, the ocean is now 26 percent more acidic than before the Industrial Revolution.

Olivia Rosane
(Source-Eco Watch, Dec. 09, 2019)

Microplastics alter soil properties and plant performance, Germany

Microplastics, polymer-based particles of less than five millimetres in size, have become an archetypal sign of anthropogenic waste and environmental pollution. This German study explores how microplastics in soil affect plants, screening the potential effects of six different microplastics on the soil environment, plant traits and function using a terrestrial plant-soil model based on the spring onion (*Allium fistulosum*). The researchers find that plants react strongly to microplastic exposure, with significant changes observed in the physical parameters of soil, plant root and leaf traits and plant biomass.

Discarded microplastics interact with and accumulate in their environments; most of the plastic ever produced —an immense 12 000 megatonnes by 2050 —will find its way into environmental systems, with agricultural soils potentially storing more microplastic than oceanic basins. Soils can store over 40 000 microplastic particles per kilogram, with the vast majority of these being secondary particles —fibres (92%) or fragments (4.1%) resulting from the degradation of larger plastics.

This study explored how six different microplastics affected a plant-soil model of the spring onion. The test soil comprised a loamy, sandy soil collected from the centre of Berlin, Germany on 4 April 2017, sieved to remove roots and gravel larger than five millimetres in size. This soil was then exposed to six types of microplastic—polyester fibres, polyamide beads, and fragments of polyethylene, polyester terephthalate, polypropylene and polystyrene —over roughly two months at levels relevant to highly polluted environmental soils, before being planted with spring onion seedlings and left for an additional 1.5 months.

Various properties were used as proxies for soil health—these were measured and then subjected to statistical analysis.

The results show that microplastics change a) the physical parameters of the soil environment; b) plant root traits; and c) plant leaf traits and total biomass. Specifically, plant biomass (total organic matter), tissue composition, root traits and microbial activity within the soil changed significantly, reflecting that both plant and soil responded strongly to microplastic exposure. The magnitude of this response depended on the type of microplastic —particles that differed most in size, shape or composition to natural soil particles elicited the most noticeable effects.

The researchers suggest, via a proposed causal model (a diagram of the relationships between independent, control and dependent variables), that microplastics affect plant-soil systems in a way that triggers a cascade of events that alter the soil's biophysical environment. For instance, changes in soil structure and composition affect pore space and connectivity, which also affect water holding capacity and permeability. Increased water evaporation decreases the amount of water available in the soil (impacting biological processes such as root growth and microbial activity), thereby affecting the frequency and intensity of wet-dry cycles within the soils. These cycles regulate the expansion and contraction of soil particles —something linked to soil structure. The plants, in turn, adjust their traits to the soil's new biophysical condition, changing in both form and function.

This demonstrates that pervasive microplastic contamination in soil can have significant consequences for plant performance, say the researchers, and may thus trigger environmental change that threatens agro-ecosystems and terrestrial biodiversity. They suggest that further study is needed to improve understanding of how various microplastics affect different soils, plant 19 November 2019 s and environments.

de Souza Machado et al.
(Source-Science for Environment Policy, Nov. 19, 2019)

Scientists unearth world's oldest forest in a New York quarry

The fossil forest in Cairo would have spread from New York all the way into Pennsylvania and beyond. representative image/AP New York : Scientists have discovered remnants of the world's oldest fossil forest - an extensive network of trees around 386 million years old - in a sandstone quarry in the United States. The fossil forest in Cairo would have spread from New York all the way into Pennsylvania and beyond, according to the researchers from Binghamton University, and New York State Museum, US.

The forest is around 2 or 3 million years older than what was thought to be the world's oldest forest at Gilboa, also in New York State and around 40km away from the Cairo site. The finding, published in the journal Current Biology, throws new light on the evolution of trees and the transformative role they played in shaping the world we live in today. The team, including researchers from Cardiff University in the UK, mapped over 3,000 square metres of the forest at the abandoned quarry in the foothills of the Catskill Mountains in the Hudson Valley. "This would have looked like a fairly open forest with small to moderate sized coniferous-looking trees with individual and clumped tree-fern like plants of possibly smaller size growing between them," said co-author of the study Chris Berry from Cardiff University. The research shows that the forest was home to at least two types of trees: Cladoxylopsids and Archaeopteris . A single example of a third type of tree was also uncovered, which remained unidentified but could possibly have been a lycopod, the researchers said.

Collin Barrao
(Source-Science, Dec. 19, 2019)

CONFERENCES

2nd International Conference on Green Energy
May 07-08, 2020; Zagreb, Croatia
Contact: Conference Series LLC Ltd
47 Church field Road, W3 6AY, London.
E-mail: greenenergy@europemeet.com

3rd World Congress on Environmental Toxicology and Health Safety
May 25-26, 2020; Barcelona, Spain
Contact: Environmental Toxicology and Health Safety Event
Conference Series LLC LTD
47 Churchfield Road, W3 6AY, London
E-mail: environmentaltoxicology@meetingsnexpo.com

10th World Convention on Recycling and Waste Management
July 20-21, 2020; Osaka, Japan
Contact: Recycling and Waste Management Conference Series LLC Ltd
47 Churchfield Road, W3 6AY, London.
E-mail: wastemanagement@asia-meetings.com
Website: https://wastemanagement.conferenceseries.com/conference-brochure.php

9th International Summit on Global Warming and Environmental Science
August 10-11, 2020; Stockholm, Sweden
Contact: Global Warming and Environmental Science
Conference Series LLC Ltd
47 Churchfield Road, W3 6AY, London.
E-mail: globalwarming@europemeet.com
Website: https://globalwarming.conferenceseries.com/

9th World Conference on Climate Change
October 12-13, 2020; Zurich, Switzerland
Contact: Climate Change Event
Conference Series LLC Ltd.
47 Churchfield Road, W3 6AY, London.
E-mail: climatechange@brainstormingmeetings.com

10th International Conference on Biodiversity and Conservation
October 12-13, 2020; Sydney, Australia
Contact: Biodiversity and Conservation Event
Conference Series LLC Ltd
47 Church field Road, W3 6AY, London.
E-mail: tobaccoconference@expert-meetings.com
Website: https://biodiversity-ecosystem.conferenceseries.com/

15th Crop Science and Agriculture Summit
October 19-20; 2020 Beijing, China
Contact: 15th Crop Science and Agriculture Summit
Conference Series LLC Ltd
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E-mail: agricrop@memeetings.com

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ISBN: 978-981-10-1199-3
Price: €145,59

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CRC Press 2019
ISBN: 9781138336896
Price: GBP £ 130.00

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ISBN: 978-3-030-21637-5
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Elsevier 2020
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Price: US $ 262.50

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Apple Academy Press 2020
ISBN: 9781771888110
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