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From the Editor's

Dear Readers,

Greetings!!

In December issue, we recount the various projects and popular articles. Once again, I express sincere thank to all the persons who shared articles, without which there wouldn't have been this Newsletter issue. Please continue sharing such articles and share with your friends also.

I would like to thank President and General Secretary, NESA, New Delhi, and the Editorial team including Print, Designer and Publication committee for their nonstop support and efforts throughout this edition.

Hope this edition makes an interesting read. Please feel free to offer any suggestions for improvement.

NEED FOR SCIENCE COMMUNICATORS FOR ENVIRONMENTAL EDUCATION AND AWARENESS

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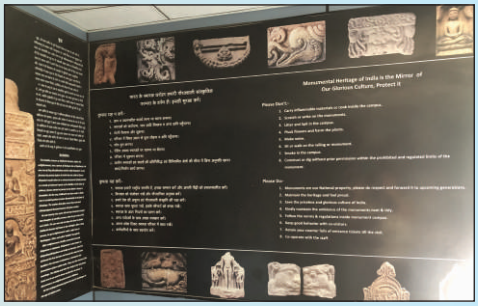
Science Communication is a powerful tool in both communicating with the mass as well as disseminating science and technology to them in a simple non-technical language. The discipline is a relatively new branch of Journalism and was conceptually developed in and around the second World War while following the developments of the Manhattan Project that finally lead to dropping atomic bombs on the Japanese cities Hiroshima and Nagasaki. Post World War II, the discipline of science communication slowly emerged into a regular news form in the western countries. It has also slowly emerged as a coverage area in developing countries from the latter half of the 1990s. India is also part of this development.

Around the planet now there are several journals, magazines, periodicals, newspapers, newsletters and bulletins associated with science communication. Thanks to the tireless efforts of numerous journalists, academics and researchers around the globe; science communication has slowly made its mark felt first in print media and then slowly into electronic and finally into the social media. It is also important to note that the average education and awareness of the common people has also been raised over the past 3 to 4 decades. As a consequence, science communication has been able to penetrate the fall walls of the newspaper agency offices and been able to percolate down to the dinner or lunch table of the readers.

However there are several significant challenges to work as a science communicator as well as a science reporter. Being a relatively new field with comparatively low demand in contrast to high voltage political news, sports coverage, international news and local and/or regional developments. In many cases good reports are severely curtailed by Editors or Assistant Assistant to






accommodate a story on science in an obscure inner page that many readers miss or ignore. This science reporting still has to go a long way before being recognized as a mainstream news material.

None the less, Like any other reporters; science communicators and science reporters need to follow the ethics of modern journalism; be sincere and dedicated to their work and be respectful to their profession. It's science communicator should never rely on verbal communication for preparing a report; but must wind considerable time investigating the truth behind the report multiple times two checks and cross checks before making it to publication. Do you like any other profession, science communication needs an individual to be diligent and meticulous in his/her work to be successful as an established journalist. It is important to read and conceptualizer the works of award winning journalists, reporters, editors, field agents and science communicators to understand the basics of the trade and become successful professional in the not so distant future.

A true and honest science communicator needs to be honest in his/her profession; avoid yellow journalism and be truthful to their reports, interviews conducted and data collected. It is not advisable for science communicators to take anything on face value but only on the basis of hard satisfying evidence. Last but not the least, gaining real term field experience is an asset fir the career in science communication and hence it is important for aspirants to learn from the pro as much as possible and gain valuable experience to transform from a cocoon into a vibrant adult butterfly.

As a developing country with a huge population India has numerous environmental problems and issues. Unfortunately, a significant section of the population particularly those living close to the environment such as forests, deserts, mountains and other inaccessible and remote locations are not aware of the immediate environmental problems and to look for sustainable solutions for them. Science communicators could play a significant role in spreading education and awareness among the mass by using both traditional and nontraditional media sources as applicable. Where is traditional forms of media communication such as use of drawing boards, pictures, images, small drama group, puppetry, comedy, rural fairs and even panchayat meetings are essential means and opportunity to make people aware of their immediate environmental challenges and their possible mitigation. Science communication in vernacular languages and regional dialects and customs could be highly effective in providing our rural mass with effective means of environmental communication.

Hence, we need to look forward to train and empower our dedicated science communication teams to work at the ground level and help building awareness about our ecology, environment, health and hygiene, importance of proper diets, against child marriages, importance of vaccination, establishing home toilets, against open air defecation, against superstitions and unwanted rumours to slowly build public awareness. Science Communication could this serve as an important source of public education and awareness campaigns for our society and the local governments. We should not under estimate the value of such traditional education and awareness and provide necessary support to strengthen the ground network of Science Communicators to develop a better, educated Society with openness.

Photo credit: **Saikat Kumar Basu**

COP26

A REPORT OF AMITY GLOBAL WARMING CLIMATE CHANGE CLUSTER

Date & Time: 16th December 2021, 2 to 5:30 PM

Prof. Tanu Jindal, Group Additional Pro Vice Chancellor (R & D), Director, Amity Institute of Environmental Toxicology, Safety and Management, welcomed the dignitaries and introduced the session.

The entire event was jointly hosted by **Miss. Jayati Arore, Miss Pragyarath Research scholars Amity Institute of Environmental Sciences**.

Address by Prof. D. K. Bandyopadhyay

He addressed the gathering, with highlighting the purpose of the COP 26.He focused India have been changing their goal posts when it comes to problems regarding. In cop 26 India did take commit to, The five major commitments or 'Panchamrit' to fight climate change**.** India will achieve net zero emission by 2070. India will bring its non-fossil capacity to 500 GW by 2030**,** its economy carbon intensity down to 45 percent by 2030**,** Fulfill of the 50 percent of its energy requirement through renewable energy by 2030**,** India will reduce 1 billion tonnes og carbon emissions from the total projected emissions by2030.

Presentations were given by –

1. **Dr. Nisha Mendirat**
2. **Asst. Prof. Stellina jolly**
3. **Ashish Chaturvedi**
4. **Mr. Sabyasachi Bharti**
5. **Dr. Rajeev Kumar Mehajan**
6. **Miss Varsha Rajkhowa**

With Miss. Jayati Arora hosting the program, the first speaker of the day **Dr. Nisha Mendirat** Concern of Climate change government took initiative like national efforts, international, and NGOS. Discuss the effect of green house gases, incresing and decreasing of GHG is thinkable, anthropogenic activities directly effected this. Consequences of climate change, Plight of polar bears due to shrinking of ice cover in artic circle. Paris submerge by flooding of river sein in 2016, as well as presented MOEF REPORT (2020) which was related to global mean temperature India targets to achieve 40 percent non-fossil-based power capacity by 2030 i.e. 175 GW of new renewable power capacity by 2030.

She discussed Adaptation and COP 26 Lessons for developing countries. Although climate change is very vulnerable world wide. Glasgow climate pact : Kept alive the goal of 1.5 degree celcius temperature and requests that countries “revisit and strength” their climate pledges by the end of 2022, Language supporting a “Phase down ” of unbated coal power which is the single biggest source of global temperature rise, A first for a UN climate agreement. The duty to fulfill the pledge of providing 100 billion dollars annually

from developed to developing countries was reaffirmed. Forest management and legal framework, forest legislation precedes climate change. Success of green mission.

Ashish Chaturvedi

Deliberated to Key agenda items at Glasgow: mitigation, net zero, climate finance, adaptation and loss and damage, finalisation of the Paris rule book. Action research play a major role to accelerate climate action in priority sectors such as energy, agriculture, forests.

Mr. Sabyasachi Bharti

Talked about Understanding the power of storytelling in the modern era and the role of films and film-festivals in **Climate Change and Mitigation.** The storytelling is best way to people make understand to climate change and wildlife conservation. Prominent Green film makers of India: Rita Banerji, Sandesh Kadur, Krupakar and Senani etc. The aim of CMS Vatavaran to conserve and awaerness the environment by film and storytelling.

Dr. Rajeev Kumar Mehajan

Deliberated to Climate services, 5 sector play a important role in our life like energy etc.

Miss Varsha Rajkhowa

She was deliberate different wonderful ideas like Kamdhenu milk revolution, Global warming pollution, consequences of climate disaster like rainfall, water crisis and drought, it causes major threat food crises for human as well as animal, so we should act fast to conserve and protect to our environment. Reuse and reduce the plastic, Cutting down carbon cycle, use alternative, reduce uses of plastic, spray, deodorant, Avoid to fast fashion at the last the message was **'Green start', Sapling a plant your special day.**

Finally, at 5:40 p.m. **Dr. Abhishek Chauhan** ended the session with a vote of thanks.

GOOD AGRICULTURAL PRACTICES FOR CULTIVATION OF BERGENIA CILIATA (HOW.) : A POTENTIAL MEDICINAL PLANT

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Bergenia ciliata

Ayurvedic name	Shailagarbhaja, Pashanbheda
Unani name	Zakhmehayat, Pakhanbed
Hindi name	Pakhanabhed, Pashanbheda
English name	Hairy bergenia
Trade name	Pashanabhed
Parts used	Rhizomatous Rootstock or Rhizome

Morphological Characteristics

This is a rhizomatic herb with fleshy leaves, growing upto 30 cm tall, having a stout creeping rhizomatous rootstock with scars and intermittent axillary buds. Plant is quite hardy and able to survive frost during winter turning reddish in colour. It is evergreen and flowers in April to June. Its flowers are white pink and purple in colour. Stem is short. The rhizome comes out from the cervices of rocks and hangs in the air in sloppy areas. Leaves are 5-30 cm long, glabrous, sparsely hairy in margins, broadly obovate or elliptic, finely or sparsely denticulate or shallowly sinuate-denate.

Floral Characteristics

The flowers are bisexual, white, pink or purple with long cymose panicles 4-10 cm long. The fruit is a capsule and rounded in shape. Seeds are greyish in colour, minute and numerous in one capsule.

Distribution

The plant is endemic to Northern and Eastern temperate Himalayan region in Himachal Pradesh, J&K, Uttaranchal, Nepal and North Eastern hilly states between altitudes of 2100-3000 meter in the cold or glacial mountain rocky slopes in stone crevices. It is also found in adjoining countries like Pakistan, Afghanistan upto Tibet and China in higher altitudes.

Climate and Soil

Plant grows well under humid, temperate climatic conditions, where temperature generally remains below 20°C. Plant grows well over sandy, slightly acidic soils with high porosity and rich in organic matter or forest humus. However due to its hardy nature, this species can be grown well over medium loamy to clay soils, supplemented with manure. It tolerates light shade and grows well under open sunny conditions. But the vegetative growth has been found better in shad.

Propagation Material

Rhizome Segments: 8-14 cm long and 23-26 gm in weight are used for direct planting; annular segments of 2 cm thickness are preferred for nursery raising.

Seeds: Seed germination is low and seed viability is very poor.

Agro-technique

Nursery Technique

- **Raising Propagules:** It takes about one month to develop a mother nursery which can supply planting material for raising cultivation.

  i) **By Rhizome Segments:** The crop can be raised by direct planting of 7.5-12.5 cm long rhizome segments (average weight: 23-26 gm) with 2-3 nodes as propagation material for quick and faster regeneration in the field in late summer or onset of monsoon. It is treated with 100 ppm IBA solution for two minutes. Raising crop through rhizome segments can reduce crop cycle by one year in comparison to propagation through seed sown. However, it requires large quantity of rhizome sections for planting. It is noted that the smaller rhizome segments of about 2 cm thickness can be planted at spacing of 10X10 cm in nursery. The rate of growth is slow and as it takes about 18 months time for raising plants in nursery for field planting.

  ii) **By Seed Method**: The seeds are very minute in shape and exhibit poor viability and germination potential. They exhibit slightly recalcitrant nature and need to be used immediately after maturity in spring season (March-April). The seed is stratified for 15 days at 4°C to improve germination. Storing will lose viability. Seeds are sown over top surface of raised beds or poly bags over the moist layer of forest litter or farmyard manure preferably under green house conditions. The seeds take 60-90 days for germination. After germination, the seedlings are picked out at two-three leaved stage and planted in fresh nursery beds at spacing of 10X10 cm and takes a season to grow large before planting

in the field in next summer.

iii) **Propagule Rate and Pretreatment:** About 88,000-90,000 plants are needed to plant one hectare land for which approxmately 18-20 quintals fresh biomass of rhizome is required. Before planting, the rhizome segments should be treated with 100 ppm IBA solution for two minutes or soaked in plain water for two hours.

Planting in the Field

- **Land Preparation and Fertilizer Application:** It is a hardy plant hence it can be planted in spring as well as summer in the hills; although the best time for planting is monsoon time (July). Land preparation is as usual for growing crops in hills. Add 35 t/ha of FYM and plough the deep in the soil. After planting, make 9-12 cm raised beds or shallow ridges for intercultural operations. For proper water retention and enhancing the porosity of soil, add sufficient quantity of locally available peat moss or the forest litter. It enriches soil with useful microfauna and micorrhiza, which help growth.
- **Transplanting and Optimum Spacing:** The rooted plants should be transplanted in the field in 12-15 cm raised bed at a spacing of 30X30 cm. While planting in the raised beds, keep at least 5 cm space on each side of bed along the length so that three rows of plants can be adjusted.
- **Intercropping System**: The maximum height of plants which can be achieved under optimum growing conditions may be 30 cm with heavy leaf biomass. Intercropping is possible when the two crops growing to gether do not compete for same nutrients. Under this study some experimental study was conducted by planting annual crop of *Swertia angustifolia* (Chirayita) plants in a spacing of 15 cm in straight line between the gaps of two rows which showed very encouraging results and it was concluded that because these two crops have different maturity period and crop cycle, hence they can be grown together successfully.
- **Interculture and Maintenance Practices**: The leaves of plants are prone to decay during rainy season. Such leaves must be removed immediately from the plants to avoid any fungal infection. The slope of water drainage can be put toward inner side of field to protect the fertile soil from washing away.
- **Irrigation Practices**: The crop should be given irrigation an interval of 15 days in summer season. Sprinkler irrigation can be tried to keep the humidity level high at canopy level.
- **Weed Control**: Broad leaved weeds and some perennial grasses are common during rainy season which should be uprooted immediately. Six weeding operation are needed per year.
- **Disease and Pest Control**: Leaf hopper and snails generally attack the foliar part of crop. No bacterial and fungal diseases were reported. To check the disease, the extra foliar growth should be removed. Sometimes extreme frost conditions are observed in high hills which lead to leaf and flower decay.

Harvest Management

- **Crop Maturity and Harvesting**: The crops mature in autumn from the second year and onwards. However, it is recommended to harvest roots during third year.
- **Post-harvest Management**: The underground rhizomes are taken out and after removing the leaf and soil debris, they are washed thoroughly under running water and cut it into small pieces of 5 cm long and allowed to dry in partial shade for 8-10 days or till complete drying (4-6% moisture stage). The dry rhizomes are packed in gunny bags and stored in cool and dry conditions.
- **Chemical Constituents**: The rhizome of *Bergenia ciliata* contains Bergenin (0.6%), Gallic acid and Tannic acid (14.2%), Glucose (5.6%, mucilage and wax).
- **Yield and Cost of Cultivation**: The plant yields 7.0-7.2 tonnes rhizomes per hectare (dry biomass) after second year when the crop is raised through rhizome cuttings. The cost of cultivation for one hectare may come to Rs.74,455/- .

Therapeutic Uses

The drug is used as litholytic agent for urinary calculi. It is widely used in the treatment of dysuria, cystisis, crystalluria and renal failure, vertigo and headache. The rhizomes and roots of the plant act as astringent, tonic and have anti-inflammatory effect and are applied as poultice for stiff joints, boils, abscesses and skin infections. The root powder is considered to be a mild diuretic, but in higher doses, it exhibited anti-diuretic action. Various Ayurvedic classical drugs such as *Pashanabhedadi kwath, Pashanabhedadi ghrit, Pashanabhedadi Churan* etc. are prepared from Pashanbhed rhizome.

NATURE MUSEUM AT SANTINEKATAN: AN ENVIRONMENTAL GALLERY PER EXCELLENCE

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Our live revolves around our immediate environment and ecosystem. Nature is the core source of our lives and livelihood as well as the unique platform for our basic survival and sustainability. We often fail to appreciate and understand the natural beauty available in organic form in front of us. We may visit major art galleries or art auctions and shops, modern museums or even malls to search for beautiful art pieces. But we fail to appreciate the unimaginable beauty that nature has created for us to enjoy in the most simple organic forms in and around the environment or ecosystem to which we belong.

The other important aspect is our lack of education, awareness and sensitivity to our own history and heritage, sociology-cultural norms and practices. As a consequence we fail to appreciate the urgent need for the protection, restoration and conservation of our priceless heritage art. Recently on a visit to the remote corner of the Purulia district of the West Bengal state I found an ancient Jain temple that is being only cared for by the poor local rural communities. Unfortunately it should have been protected and taken over by the Archaeological Survey of India (ASI). But there is no such state or central government initiatives noticed on the ground. The priceless archaeological site is in urgent need for restoration, protection and conservation. It could develop into a prominent tourist spot earning revenues if developed and restored properly. While we visit several internationally reputed museums and World Heritage Sites; many of our natural art galleries surviving amidst nature are ignored.

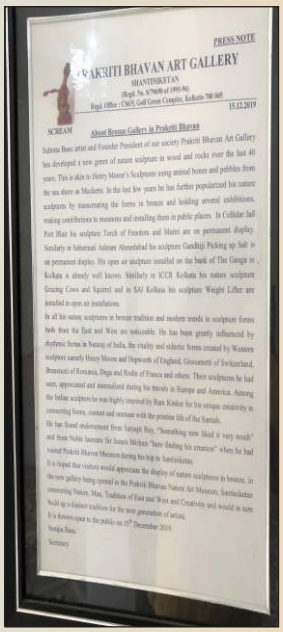
However, a remarkable difference is noticed in the world class Nature Museum (the one of its only kind in the country) located at Santinekatan near the Khowai region in the Birbhum district of West Bengal. This outstanding museum has been single-handedly developed and created from scratch by the eminent nature artist Subrata Basu. His collection over a period of five decades has accumulated in nature art objects giving rise to a monumental collection of wood and stone art forms procured from the nature around us. The hallmark environmental philosophy and outstanding ecological art themes promoted by World Poet and Noble laureate Rabindranath Tagore and his nephew Abanindranath Tagore, one of the pioneers of establishing the Bengal school of art has been beautifully captured in these natural art pieces. Off course there is a gallery of bronze replicas of these natural

Photo credit: S. K. Basu


Gandhi Lifting Salt


Gandhi Ashram
Ahmedabad
Gandhiji Lifting Salt
Gandhiji Lifting Salt at the Sundows of Dandi


Torch of Freedom

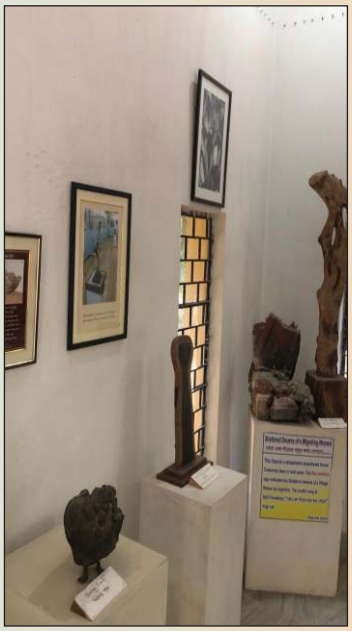

PRESS NOTE
PRAKRITI BHAVAN ART GALLERY
SHANTINIKETAN
15.12.2019
SCREAM
About Bronze Gallery in Prakriti Bhavan

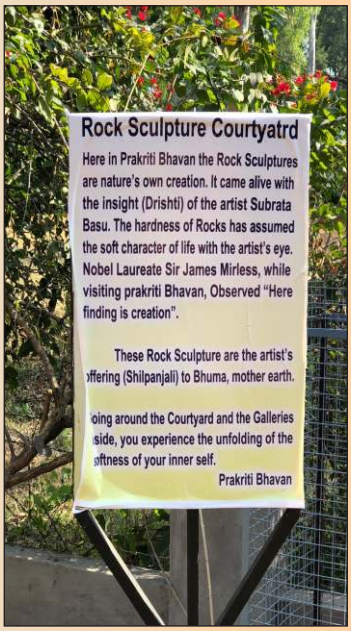

ET


Tagore's Portrait on river Padma
This Nature sculpture in Bronze captures the sail of a boat with Tagore's portrait imprinted on that. A King Fisher is having a free ride on that sail increasing the field of his survey. This is reminiscent of Tagore writing poetry during his journey on the river Padma.
The unity of Nature, Man and the Universal Creator realized within himself, found expression in Tagore's creations - poetry music, literature and Santiniketan itself.
I hope visitors wil experience the spirit of Santiniketan within himself, seeking expression. Thereby, he would participate in the creation of the Visual Poetry (Drishya Kabya) Prakriti Bhavan, Santiniketan, as often expressed in their scribbled thoughts by the visitors, coming for all over India and abroad, in the visitor's book over the last 10 years. In today's fragmented world we have to reverse the mind from moving away from that unity, the Truth.
Subrata Basu
Prakriti Bhavan
Santiniketan


Royal Bengal Tiger
Crocodile
Sundari Tree
SUNDARBAN TOUR
You are standing in front of Royal Bengal Tiger. On the right is a Sundari Tree holding the soil against erosion. Behind you is a Sun bathing crocodile with a little crane sitting on its back. You will experience the journey of "Sundarban" a unique topography of Bengal that is both awe inspiring and thrilling. This composition is to sensitize people about our great natural heritage that binds both Bangladesh and West Bengal.
Subrata Basu
Prakriti Bhavan


আদি শক্তি প্রকৃতি ও মানুষ




Rock Sculpture Courtyatrd
Here in Prakriti Bhavan the Rock Sculptures are nature's own creation. It came alive with the insight (Drishti) of the artist Subrata Basu. The hardness of Rocks has assumed the soft character of life with the artist's eye. Nobel Laureate Sir James Mirless, while visiting prakriti Bhavan, Observed "Here finding is creation".
These Rock Sculpture are the artist's offering (Shilpanjali) to Bhuma, mother earth.
oing around the Courtyard and the Galleries side, you experience the unfolding of the oftness of your inner self.
Prakriti Bhavan

UNDERSTANDING BEARING HABIT IN FRUIT CROPS

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Introduction

India is still by far the major producer of various fruit crops, but its relative share in the world production has been gradually declining. Fruit growers also facing problem of irregular bearing in some fruit species, which severely affects the fruit yield and profitability from year to year. Therefore, flowering is an important event in the plant life cycle, as blooming is the key factor to fruit production. Under favorable growth conditions the timing and intensity of flowering greatly determine where and how much fruits are produced. However, in several times there are very contrasting phenomena where prolific flowering take place without appreciable fruit set. Complete understanding of flowering gene and genomic regions at physiological and molecular level could solve this complex phenomenon. The ability to control the timing of flowering is a key strategy for planning production in perennial fruit crops, which is very important in the present scenario of climate change. A thorough understanding of floral transition with complex genetic network, regulated by multiple environmental and endogenous cues is primary requirement. With the availability of the draft genome sequence of some fruit crops will greatly assist future molecular genetic studies. Greater and in depth understanding of the mechanisms involved in floriferous condition of fruit trees is essential to strategize appropriate orchard protocols to maximize the production. Reproductive success and crop productivity in fruit trees mainly regulated by flowering. It depends on the number and quality of flower buds formed. Numerous external and internal signals control the development of flower buds (Tan and Swain 2006). The conditions controlling floral transition determined by certain complex growth correlations (Nocker and Gardiner 2014). Major pathways to flowering in fruit trees include environmental induction through photoperiod, vernalization, autonomous floral initiation, gibberellins, and aging by sequentially operating miRNAs (typically miR156 and miR172) responding to endogenous signals. Flowering time is determined by a common set of genes like *FLC*, *FT*, *LFY,* and *CO*1. Recent molecular studies hypothesized that epigenetic modification, alternative splicing, antisense RNA and chromatin silencing regulatory mechanisms play an important role in this process by regulating related expression of flowering genes (Khan et al. 2014). The ability to control the timing of flowering is a key strategy for planning production in perennial fruit crops. A thorough understanding of floral transition achieved through a complex genetic network and regulated by multiple environmental and endogenous cues is primary requirement. This paper highlights the current understanding of the genetic control of flowering by searching key genes and regulatory regions in fruit crops that regulate the flowering.

Genes for flowering

Flowering is an important event in the plant life cycle, as blooming is the key factor to fruit production. Under favorable growth conditions the timing and intensity of flowering greatly determine where and how much fruits are produced. However, in several times there are very contrasting phenomena where prolific flowering take place without appreciable fruit set. A series of morphological and physiological events under the control of external and internal factors involved in flowering. Genes mainly from photoperiod and hormone pathways have been identified that genetically governing floriferous identity of meristems and fruit development (Sharma et al. 2019). Many important details about flowering are now becoming clearer, especially in annual/herbaceous plants at the physiological, biochemical and molecular levels, but this complex biological phenomenon continued to remain less understood in perennial tree fruit crops. Recently, the development of next-generation sequencing (NGS) tool, genomic and transcriptome has contributed to a thorough understanding of the metabolic and molecular processes involved in floral biology. Genome sequencing of some fruit crops will greatly assist future molecular genetic studies, like linking genes to biological processes and traits along with their function. Understanding the key interactions between environmental factors and genetic mechanisms controlling the induction and development of inflorescences, flowers, and fruits is also an important area that requires increased emphasis, especially given the large seasonal fluctuations in yield experienced by the crop and the increasing concern about the effect of climate change on existing fruit producing regions.

Gene synteny

Most of our knowledge about flower induction has come from studying flowering regulatory genes in *Arabidopsis thaliana* (Komeda 2004). The knowledge from *Arabidopsis* and other model species represents a great resource to study flowering in fruit crops to uncover similarities and differences. Flowering involves the sequential action of two groups of genes: those that switch the fate of the meristem from vegetative to floral (floral meristem identity genes), and those that direct the formation of the various flower parts (organ identity genes). In general, perennial flowering gene orthologues have been shown to function akin to their *Arabidopsis* namesakes. Mouhu et al. 2009 observed homologs for 118 *Arabidopsis* flowering time genes from

Fragaria by EST sequencing and bioinformatics analysis and identified 66 gene homologs that by sequence similarity, putatively correspond to genes of all known genetic flowering pathways. Some of the first homeotic genes designated *MdMADS1-MdMADS4* of floral development in apple has been isolated from the 'Fuji' apple (*Malus domestica* Borkh.). These genes are expressed in the inflorescence and floral meristem. Recently, two different types of cDNA for *LFY* homologues were isolated from six maloid species, namely *AFL1*-Fuji and *AFL2*-Fuji for apple, *PpLFY-1* and *PpLFY-2* for Japanese pear, *PcLFY-1* and *PcLFY-2* for European pear, *CoLFY-1* and *CoLFY-2* for quince, *CsLFY-1* and *CsLFY-2* for Chinese quince, and *EjLFY-1* and *EjLFY-2* for loquat (Esumi et al. 2005).

Floral signal pathway

In several species, flowering ability has been demonstrated to be influenced by the integration of environmental signals from the photoperiod and vernalization pathways (Onouchi et al. 2000).

Environment

Horticultural trees generally initiate flowers in response to either an environmental stimulus or autonomously. There is some evidence that the mechanisms through which environmental stimuli act are similar between annual plants and horticultural trees. Vernalization acts on the meristem and leaves in *Arabidopsis* to suppress floral repressors, but in mango cool temperatures are sensed in the mature leaves that generate a signal that is exported to the meristem to promote flowering. Mango appears to be more analogous to photoperiodic induction in *Arabidopsis*, or to the effects of ambient temperature on genes of the autonomous flowering pathway (Blazquez et al. 2003). Satsuma mandarin *FT* orthologue mRNA levels increased with the seasonal onset of cool temperatures during the time of floral induction (Nishikawa et al. 2007). Expression of these genes appears to follow a bimodal pattern related to the two seasons that are needed to flower. Molecular genetic analysis of seasonal patterns of flowering in diverse annual and perennial species has demonstrated some shared features. In particular vernalization-response pathways have evolved independently in different species as repressors of photoperiodic pathways until plants have been exposed to winter temperatures. Also, the activation of transcription of *FT* like genes by day length is a feature of photoperiodic response with different regulatory mechanisms Indeed, CETS proteins, particularly *FT* like but also *TFL*1 like proteins, have important roles in all species examined, and in perennials the importance of the repressive function of *TFL*1 like genes appears to be increased. In addition, although *FT* like genes is characteristically involved in floral promotion, they can control other seasonal responses, such as repressors of vernalization response or induction of tuberization and growth (Andrés and Coupland 2012). The environmentally responsive transcription factors converge on a small number of floral integrator genes that initiate the early stages of flowering, and this convergence creates a coordinated response to seasonal cues.

Several studies have demonstrated that modification of the genes involved in floral induction by a transformation approach successfully shortens the juvenile period. For example, overexpression of *AtFT*-homologous genes accelerates flowering time in apple, plum, poplar, citrus and pear (Zhang et al. 2010), while repression of *TFL*1-like genes has a similar effect in apple and pear (Flachowsky et al. 2007).

Hormone

A remarkable increase in the expression of genes encoding proteins associated with calcium-dependent auxin polar transport, a reduction in bud endogenous auxin levels (Smith and Samach 2013), and an increase in ABA-metabolizing genes, accompanied by a decrease in ABA levels and those of its catabolises in buds following de-fruiting were identified. Fruit removal resulted in relatively rapid changes in global gene expression, including induction of photosynthetic genes and proteins (Shalom et al. 2012). There is now some understanding of how the expression of flowering genes integrates with the environment and flowering time in horticultural trees.

ON and OFF regulatory mechanism

Genomic analysis resulted in numerous differentially expressed genes (DEGs), allowing the partial identification of mechanisms that convert ON into OFF buds (Sharma et al. 2020). In citrus there are four highly *CAX* homologous genes and the expression of a *CAX3* homologue was highly induced following de-fruiting. The citrus *NPH*3-like gene induced in OFF and DEF buds compared with ON buds. Higher levels of IAA in ON buds reflect their inability to distribute IAA efficiently *via* the Ca2+-dependent PIN-based polar auxin transport mechanism. In addition, efficient auxin removal from the bud appears to be a key component in transforming the ON bud into an OFF bud. The application of auxin polar transport inhibitors resulted in flowering induction in a number of fruit trees (Bangerth 2006).

The study of the expression pattern of flowering-genes of on (fully loaded) and off (without fruits) trees revealed that homologues of *FT, SOC1, AP1* and *LFY* were negatively affected by fruit load. Thus, *CiFT* expression showed a progressive increase in leaves from off trees (Mun˜oz-Fambuena et al. 2011). The expression of flowering control genes, *FT, LFY, AP1, TF*L, and *miR156*-regulated *SPL5* in leaves and buds of citrus, mango and apple is affected by fruit load (Muñoz-Fambuena et al. 2011, 2012; Shalom et al. 2012; Nakagawa et al. 2012). The expression pattern of *SPL-like, miR156* and other flowering control genes suggested that fruit load affects bud fate, and therefore development and metabolism, a relatively long time before the flowering induction period (Shalom et al. 2012).

Conclusion

There is an urgent need to meet challenges in fruit production as population is increasing day by day and with the limited land, pressure is too high to fulfil the requirement of the people. Further work is needed to uncover key regulators and/or regulatory mechanisms that determine the widespread translation enhancement in response to light treatment, juvenility, and hormonal effect.

Future thrust

Research in trees is expensive, slow, and has often been focused on limits to production in horticultural species. Therefore, there are still experimental bottlenecks. So despite the rapid progress in flowering transcriptomic and genetic studies a number of mechanisms are still not clear and need more efforts with combining molecular tools as well as possible horticultural interventions.

Acknowledgments

We are thankful to DST-SERB and ICAR-IARI, New Delhi for providing the research facilities.

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ACTIVITIES AND SPECIAL DAYS AT A GLANCE IN THE MONTH OF DECEMBER 2021

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2 December- National Pollution Control Day
This is another significant date in December 2021. This day is commemorated to raise awareness about pollution and its negative consequences. It is commemorated to honour the victims of the Bhopal Gas Disaster.

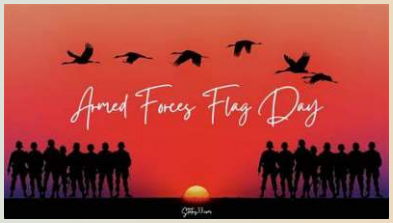
2 December- International Day for the abolition of slavery
This event is being held to raise awareness about human rights violations such as slavery.

3 December- World day of the handicapped
This day raises awareness about the importance of welcoming people with disabilities. "Leadership and involvement of persons with disabilities toward an inclusive, accessible, and sustainable post-COVID-19 future," is the theme for IDPD 2021.

4 December- Indian Navy Day
This is commemorated in order to highlight the achievements and contributions of the Indian Navy.

5 December- International Volunteer Day
This day is commemorated to honour the contributions and efforts of volunteers and organizations.

5 December-World soil day
This day is celebrated for raising awareness about the importance of soil and healthy ecosystems.



7 December- Armed Forces Flag Day
This is another notable day in December when contributions are collected from the general public and martyrs at the border are honoured.

7 December- International civil aviation day
This is commemorated around the world to promote awareness about the socio-economic growth of countries and the role of the International Civil Aviation Organization (ICAO) in international air transport.

10 December-Human rights day
This day is marked to safeguard all people's human rights and freedoms around the world.

This day is observed to protect the human rights and freedom of all individuals globally.

11 December-International mountain day
This day is commemorated to teach young children about the importance of mountains in human lives.

11 December-UNICEF Day
Every year on December 11, UNICEF Day is commemorated. On December 11, 1946, the United Nations General Assembly established UNICEF as the United Nations International Children's Emergency Fund in order to enhance the health, nutrition, education, and general welfare of children who had been impacted by World War II.

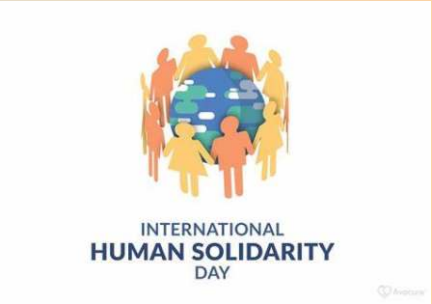
14 December-National energy conservation day
This day raises awareness about the need of energy conservation and the necessity for energy.

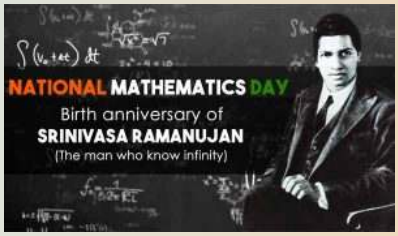
16 December-Vijay Diwas
This day is commemorated to honour martyrs and their sacrifices, as well as to increase the military's role.

18 December- International Migrants day
This day is commemorated in order to promote awareness of migrants and refugees, as well as strategies to safeguard them.

19 December-Goa's Liberation Day
On this day, Goa was freed from the grips of Portuguese domination. This is commemorated to honour the role of the Indian military forces in assisting Goa's independence.

20 December-International human solidarity day
This is observed to show the importance of unity in diversity.





22 National mathematics day
The mathematician Srinivasa Ramanujan's birth anniversary is commemorated on this day.

23 December-Kisan Diwas
Former Prime Minister Chaudhary Charan Singh's birthday is celebrated on this day.

24 December-National consumer rights day
This day is marked to raise consumer awareness of their rights and obligations.

25 December- Christmas
This is celebrated to commemorate the birth of Jesus Christ.

NESA NEW DELHI IS ORGANIZING

International Conference on

Agriculture Science and Technology: Challenges and Prospects (AST-2022)

28-30 April, 2022

Rani Lakshmi Bai Central Agricultural University, Jhansi, (Uttar Pradesh)

jointly by

Rani Lakshmi Bai Central Agricultural University Jhansi, U.P.

National Environmental Science Academy (NESA) New Delhi

ICAR-Indian Grassland and Fodder Research Institute, Jhansi, U.P.

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- Role of advanced tools and techniques like Information technology, Big Data Analysis and Artificial Intelligence in agriculture
- Plant Molecular Biology
- Genomics and Gene editing
- Application of Remote sensing and Geo Informatics in Agroforestry.

IMPORTANT DATES

Conference Dates	**28-30 January, 2022**
Registration and Abstract Submission Starts:	**15.12.2021**
Last Date of Registration without late payment:	**10.01.2022**
Abstract submission Deadline:	**10.01.2022**
Full length paper submission Deadline:	**15.01.2022**

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Category	Regular Registration (Till 10.01.2022)	Late & On-Spot Registration* (After 10.01.2022)
Members of NESA / Indian Society of Agroforestry/ Range Management Society of India	Rs. 3000.00	Rs. 4000.00
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ELEPHANT CONSERVATION

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Human-animal conflicts are reported from around the world; but the epic battle between man and elephants is particularly a very sad story. The rapid loss of habitat and increasing loss of suitable foraging sites within the degraded forests has been pushing the pachyderms for mass migration from one region to another. The consequences have been unfortunate deaths of the gentle giants by coming in contact with live electric wires, unfortunate road and railway accidents, poaching, drowning in big reservoirs or direct clashes with farming communities as they destroy crop fields in their migration routes across elephant habitats in Asia and Africa. The conflicts have also costed lives of unfortunate human victims who got entangled in thus epic man-animal conflict. It is therefore necessary to improve the quality of habitats of wild Asiatic and African elephants, restrict them from moving into human settlements, secure elephant migration corridors and protect them from poachers.

But this simple story depicted above is not so simple as it all a part of highly complex and critical issue that needs our immediate attention. Elephants in both continents were once targeted due to the global ivory trade. However, the global banning of all kinds of ivory products; and the increased awareness among mass about mass slaughters of elephants for ivory has reduced or suppressed this trade successfully. Although the global ivory trade is not completely under control; but the demand of ivory has certainly become lower due to stringent legislation as change in people's attitude towards procuring ivory from poached elephants. With decreasing demand for ivory in the international illegal wildlife markets operating in parts of China and South East Asia; a paradigm shift is now being observed with respect to exploitation of wild elephant herds across Africa and Asia.

Elephant-human conflicts across the Indian subcontinent has been one of the most serious wildlife conservation challenges faced during the past five decades.

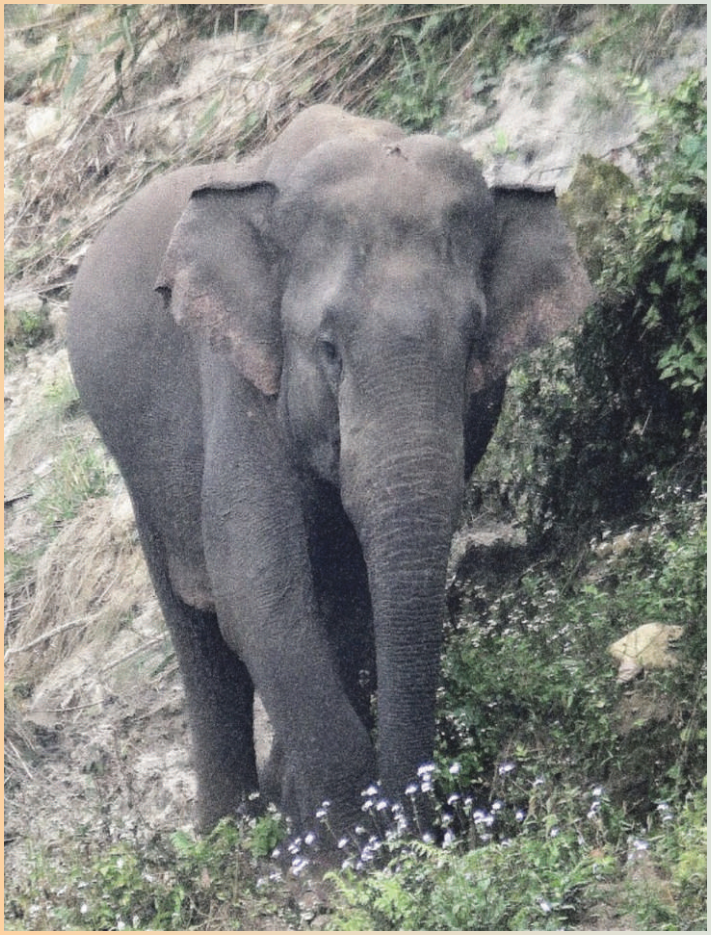
Poachers and illegal wildlife trade traffickers are now targeting elephants for collecting their skin for making jewellery; and different body parts due to high demands in the traditional naturopathic and traditional medicines. Now helpless wild elephants are being shot with high powered rifles and even advanced machine guns to make a bigger harvest. Often the poor animals are poisoned intentionally so that they do not runaway from the boys herd fir collecting the skin. The elephant body parts are being sold in illegal trophy markets as well as the traditional medicine industry at very high prices making profits for all. The leftover elephant meat ate then being sold at local bush meat markets or illegal wildlife markets specializing in wild bush meat for rich customers and high end restaurants serving wild meat. Such evil practices has completely jeopardized conservation efforts of the elephants drastically.

Elephants are big mammals and they are used to migration in search of food, water and mates. They travel in large groups or herds and move from one country to another or from one region to the other in search of better foraging grounds. They are extremely intelligent and remember their routes and always follow the same path. However anthropogenic pressures around the world has been pushing the migration corridors further and further farther away from their original position; and making the life of elephants very difficult. This shifted migration routes due to anthropogenic pressures have force them to pass through crop fields, orchards, human settlements, villages and towns bringing them in direct confrontation with people. All the elephants are being held responsible for the massive death and destruction on their path to their favourite migration corridors very few experts acknowledge the pressure on their lives and lifecycle created by humans.

These challenges with the mighty pachyderms have food some people to use gruesome techniques and unacceptable lethal methods to eradicate them from their resident areas. This Could include using poison baits, toxic pesticides, live high voltage electric cables in their oaths to kill of shock them. Furthermore, recently reports from southern India of an incident where food laced with fire crackers were given to a female elephant that exploded inside her mouth and killed her painfully. The incident raised great hue and cry across India, but little has changed till date. Railway and highway accidents killing pachyderms are a common affair. Animal corridors has been established; but little has been done to educate and aware the drivers or book them under Indian Criminal Code for their callous attitude and lack of responsibility.

It is important to better understand the plight of our pachyderm neighbours and then develop suitable strategies for their conservation efforts. As humans we need to treat them as our friends and not just wild enemies. A gross change in attitude is therefore necessary.

Thus the common onslaught of innumerable anthropogenic factors has been decimating the global elephant populations. It is quite unfortunate that even



corrupt governments in some countries are involved in the illegal trade of elephant tusks, bones, horns, skin, trunk, feet and other body parts. It has therefore become quite challenging to protect these helpless giants. Recently, in China forest officials tracked the unprecedented migration of local elephants in the Yunan province using drones to record migration patterns. We are failing to realize and appreciate the great ecological roles played by the elephants in our ecosystems. We as humans have been only focusing on the negative aspect of human-animal conflict without paying attention to the factors why elephants are elephants are moving out of the forests. Habitat destruction, lack of food in the forest, human pressure beyond carrying capacity on the elephant habitats are forcing them out of their habitats. It is us as humans who is responsible for the crises, not the elephants.

Elephants are migratory mammals and they need undisturbed land and forest corridors to move from one region to another depending on season and food availability. It is important to respect their biological needs and provide them the space to maintain the privacy of their natural biological cycles. Severe human encroachments into premier elephant habitat and migration corridors are important factors contributing towards elephant-human conflicts resulting in tragic incidents on both sides.

Under these circumstances elephant conservation both in Asia and Africa has hit a wall to high to climb. The investors in illegal wildlife trade and transportation are investing heavily to arm local tribesmen to track and hunt elephants at an industrial scale wiping out vulnerable herds. The rapid and unprecedented decline in wild elephant populations across sensitive elephant habitats in Asia and Africa now needs international attention and support. The time is short and the danger of extinction for wild elephant herds are becoming increasingly higher by the day. It is fine to at immediately on this to save the pachyderms from devastating loss of various sub populations. Exploitation of the gentle giants are causing a great concern for their future.

Photo credit: **Rahul Ray/Saikat Kumar Basu**

EACH ONE PLANT ONE

STAY SAFE WEAR MASK