



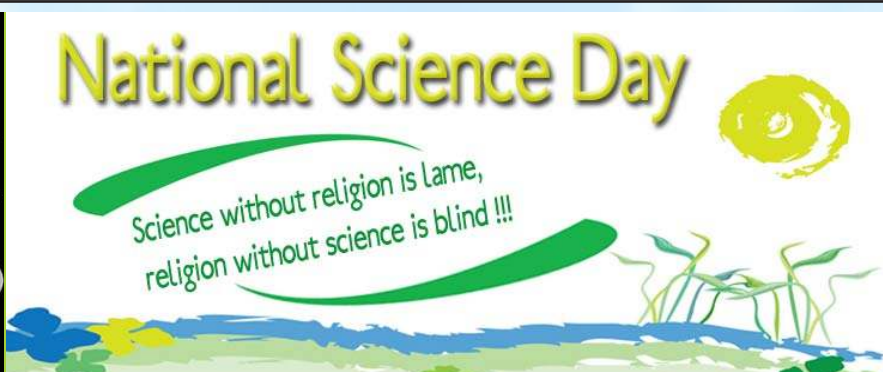
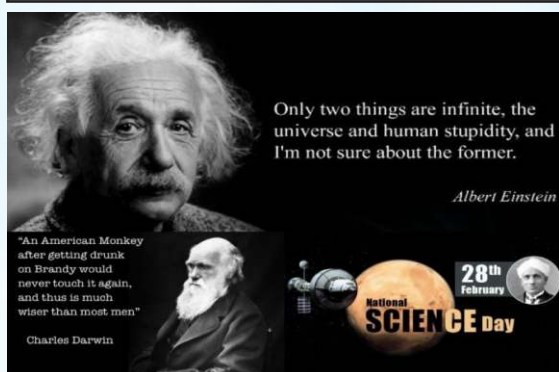
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NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

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31st May 2020

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MEDICINAL PLANTS: A BOON OF NATURE FROM BASTAR

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Chhattisgarh is identified as an 'Herbal State' due to its rich repository of medicinal and aromatic plants in many tribal districts including Bastar. Bastar on the southern part of Chhattisgarh is a tribal district known for its unique blend of traditional knowledge and medicinal plants all over the world. The medicinal plants are distributed worldwide although they are most abundant in tropical regions^[1]. The tribal healers of this region are traditionally dependant on good number of medicinal plants for curing their ailments since long back. Despite of its rich abundance in medicinal flora the region is relatively less explored

with special reference to the healing potency of these herbs. A medicinal plant is any plant which contains substances useful for the therapeutic purposes in one or more of its organ and is the precursors for the synthesis of useful drugs^[2]. Medicinal plants possess a vast variety of organic compounds possessing therapeutic efficacy^[3]. These compounds contain several diverse groups of phytochemicals which are the valuable sources of new and biologically active molecules. Medicinal plants have been used in many forms over the years to treat, manage or control man's ailments viz., antimalaria, antisickling, anti-helminthic, anti-microbial, anti-convulant, anti-hypertensive and anti-schistosomal^[4]. The medicinal properties of plants are due to their antioxidant, antimicrobial and antipyretic effects of the phytochemicals present in them^[5]. Many reports have documented the effective activity of traditional herbs, so plants are one of the bedrocks for the modern medicines^[6]. The plant kingdom has served as an inexhaustible source of useful drugs, foods, additives, flavouring agents, lubricants, colouring agents and gums from time immemorial and the medicinal actions of



1. *Amorphophallus campanulatus* 2. *Curcuma caesia* 3. *Dioscorea alata* 4. *Urginea indica* R – Root; S – Stem; L - Leaf

plants are unique to particular plant species or groups, consistent with the concept that the combination of secondary metabolites in a particular plant is taxonomically discrete^[7]. These compounds are found in different part of the plants viz., stems, roots, leaves, bark, flowers, fruits and seeds such as alliacins, isothiocyanates, plant pigments, hydrolytic enzymes, proteins, essential oils and phenolic compounds^[8-9]. The development and advances in the field of modern medicine in late last century temporarily subdued the traditional herbal medicine but it has now stayed a comeback and an herbal renaissance is blooming across the world. The common view in the society and the medical community is that green medicines are healthier, safer, harmless and more reliable than synthetic ones^[10-14]. Therefore, systematic studies on the bioactive compounds of medicinal plants should be investigated and explored to understand their properties, safety and efficacy. Thus, microbiologists, botanist, natural product chemists and ethno botanists are in search of novel bioactive compounds from medicinal plants for curing several infectious ailments^[15].

Medicinal plants are endowed with a rich wealth of bioactive compounds that are the valuable source of drugs. The curative potentiality of these plant based phytochemicals is yet to be completely explored. The therapeutic power of herbs had been recognized since creation of the universe and botanic medicine is one of the oldest practiced professions by humanity^[16]. Medicinal plants are the best source of obtaining a variety of newer drugs as phytochemicals are more specific, biodegradable and supposed to have fewer side effects^[17]. They also offer unique platform for biological functionality and structural diversity that is indispensable for novel drug discovery^[18]. Herbs are widely explored in the traditional system of medicine and their curative potentials are well documented^[19]. The documentation of the plant materials to treat and prevent infectious diseases has attracted the attention of scientist's worldwide^[20]. The traditional system of medicines continues to play a vital and significant role in health care system with about 80% of the world's inhabitants mainly depending on the traditional medicines^[21]. It has been estimated that 74% of pharmacologically active plant derived components were discovered after following up on ethno medicinal value of plants and 14-28% of higher plant species are used medicinally^[22]. Some important biological and pharmacological activities from various parts of plants species were reported as antimicrobial, anti-tumour, antiviral, anti-inflammatory, cardiotoxic, contraceptive, anti-platelet, wound healing and prostaglandin inhibitory properties^[23-25]. Therefore, in light of present context an effort to further explore the medicinal or natural products from man's botanical flora towards improving health care delivery deserves attention.

Herbal medicines are in great demand in the developed as well as developing countries due to their wide medicinal and biological applications. The emerging interest in the products of natural origin in the developed economics led to the extraction and development of several drugs and chemotherapeutic agents from plants and from traditionally used rural herbal remedies^[26]. Plants have provided western pharmacopoeia about 7000 different pharmacologically active compounds and several top selling drugs of modern times, like quinine, taxol and camptothecin^[27]. 80% of the populations in developing countries use medicinal plants as a result of the importance of herbs in the lives of people^[28].

So in light of vast potentiality of medicinal plants as therapeutics there is an urgent need of extensive research in the area of medicinal plants with the aim of exploring their ethno-medicinal use and subsequently the isolation, purification and characterization of the bioactive compounds by various analytical methods viz., HPLC, UV Visible Spectroscopy, FT-IR, NMR and ESI-MS is greatly significant which will contribute for the better, safer and cost effective novel drug development for a better tomorrow.

Conclusion

Medicinal plant as therapeutics is one of the key source for obtaining a variety of newer drugs as phytochemicals are more specific, natural, healthier, biodegradable and are supposed to have fewer side effects, clinically effective and safer alternatives to the synthetic ones. Naturally occurring secondary metabolites from medicinal plants have been well reported to exhibit broad spectrum efficacy against several dreadful ailments. They also offer a vital and unique platform for biological functionality and structural diversity which is indispensable for novel drug discovery. In future multi-dimension research aimed at correlating phytochemicals and botanical properties to specific pharmacological activity is also expected. Further, the plant based secondary metabolites have enormous potentials and would open an avenue for the formulation of new herbal therapy. However, not only testing these bioactive plant extracts on clinical culture but also their toxicological evaluation in-vivo with the view to formulate novel chemotherapeutic agents will lay the foundation of medicinal therapy in years to come for better human health. Thus, in light of vast potentiality of medicinal plants as therapeutics there is an urgent need of extensive research in the area of herbal drugs and secondary metabolites with the aim of exploring their ethno- medicinal efficacy. However, purification and characterization of the bioactive compound can pave the path and shed light for the development of better, cost effective and novel drug development in future ahead.

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“If you believe in science, like I do, you believe that there are certain laws that are always obeyed.”

Stephen Hawking

“Only two things are infinite, the universe and human stupidity, and I'm not sure a bout the former.”

Albert Einstein

Nothing has such power to broaden the mind as the ability to investigate systematically and truly all that comes under thy observation in life.

Marcus Aurelius



Save Water and Do Rainwater Harvesting



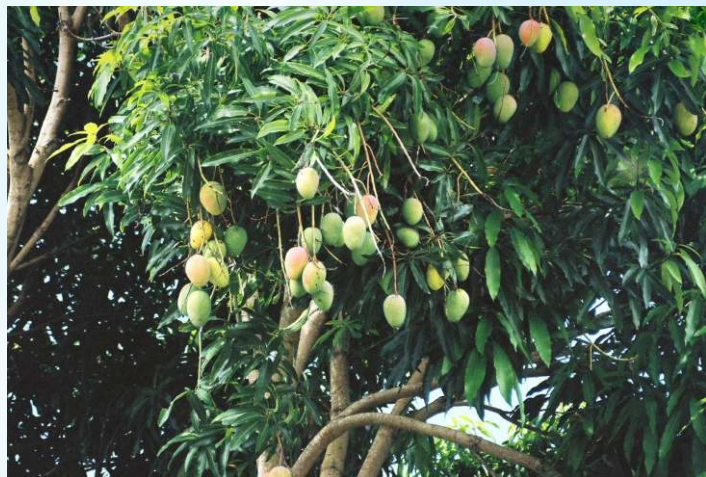
Each One Plant One

GENOMICS FOR INCREASED SHELF-LIFE IN MANGO

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Mango (*Mangifera indica* L.) is one of the most important commercial fruit crops, being the second largest tropical next to banana in terms of production, acreage and popularity. However, its relative share in the world production has been gradually declining. The decline in production is attributed not only due to the incidence of pests and diseases, but also because of others factors like poor germination percentage, lack of efficient rootstocks, irregular bearing habit, short shelf-life etc. The market of mango has been, however, somewhat limited by significant postharvest losses due to perishable nature of fruit. Detailed study of post-harvest changes indicated that this mechanism cannot be completely stopped but can be regulated up to certain limits. Ripening in climacteric fruit is closely linked to its softening which in turn is associated with structural changes in the cell wall including reduction in size of hemicellulose, loss of galactose side chains and solubilisation and depolymerisation of pectin. The enzymes that are involved during fruit softening are polygalacturonase, pectin methyl esterases, pectate lyase, cellulase etc. In mango, water is the main principal component. When harvested, the fruit can no longer replace the water that is lost through respiration. Besides, mangoes are susceptible to damage during post harvest-handling and at damaged stage, respiration and ethylene production proceed at a rapid pace leading to their rapid deterioration. Moreover, damage may not be visible externally but can show up later in the handling chain typified by the failure of the damaged portion to change colour and the presence of a starchy layer just beneath the peel of the ripe fruit. Extent of softening directly affects palatability, shelf-life, resistance to post-harvest pathogen infection, transportation, storage, consumer acceptability, and ultimately cost of fruit is decreased. Therefore, there is an urgent need to improve the shelf-life of mango but due to highly heterozygous perennial nature owing to long juvenile phase; it is not easy for the breeders to directly determine the genes controlling different target traits in mango. Moreover, research on tree crops is expensive, slow, and has often been limited to few horticultural species. To increase the

shelf life of mango, it requires through understanding of ripening phenomenon at biochemical and molecular level, cloning of genes related to softening and studying its features and tailoring of gene to make it available for genetic control of ripening process itself. Polygalacturonase is one such candidate genes that have been successful in delaying softening in tomato, papaya and banana and it remains a potent candidate for controlling softening. Similarly, α -expansin gene, MiExpA1 is found to be correlated with the ripening. Ripening related genes such as ACC synthase and ACC oxidase are already employed in tomato for increasing shelf life. Genetic transformation could be utilized to transfer these genes. Genetic transformation of the plants with any of the genes that control ethylene production so that mRNA in the antisense configuration is produced has been demonstrated to be an effective strategy for blocking fruit ripening. Further, transformation of mango with constitutively expressed chitinase, glucanase, defensin, and other pathogen-resistant genes could be a very useful strategy for disease control in mango. Recently, the development of genomic and transcriptomic tools have contributed significantly to better understanding of the metabolic and molecular processes involved in ripening and shelf-life processes. In conclusion, conventional methods of shelf life enhancement are cumbersome and uneconomic and moreover could not delay ripening for long period of time. Antisense technology using genetic transformation has been applied in tomato, papaya and banana and this could be extended in mango as well. Transgenic mango with delayed ripening can increase availability of fruits in Indian market for long time. This will significantly reduce the post harvest losses.

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BERGENIA CILIATA : A HIMALAYAN HERB OF MEDICINAL VALUE

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The continuous exploitation of several medicinal plant species from the wild and substantial loss of their habitats during past 15 years have resulted in population decline of many high value medicinal plant species over the years. There are many other potential causes of rarity in medicinal plant species, such as habitat specificity, narrow range of distribution, land use disturbances, introduction of nonnative, habitat alteration, climatic changes, and heavy livestock

grazing, explosion of human population, fragmentation and degradation of population, population bottleneck, and genetic drift. Additionally, natural enemies (i.e., pathogens, herbivores, and seed predators) could substantially limit the abundance of rare medicinal plant species in any given area.

Bergenia ciliata (How. Stc. n. b. Belongs to family Saxifragaceae. This family comprises of 30 genera and 580 species, mostly distributed in the cold and temperate regions. The genus *Bergenia* comprises of 6 species distributed in the temperate Himalayas and Central and East Asia, represented in Uttarakhand by 2 species namely *Bergenia ciliata* and *Bergenia stracheyi*. It is perennial

herb upto 50 cm tall. They are clump-forming, rhizomatous, evergreen perennials with a spirally arranged rosette of leaves 6–35 cm long and 4–15 cm broad, and pink flowers produced in a cyme the leaves are large, leathery, ovate or cordate and often have wavy or saw-toothed edges. For most of the year, the leaves have a glossy green color, but in cooler climates, they turn red or bronze in the fall. The flowers grow on a stem similar in color to a rhubarb stalk and most varieties have cone-shaped flowers in varying shades of pink. These can range from almost white to ruby red and purple.

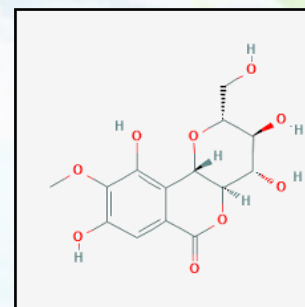


Figure 2: Berginin

Biologically active constituents:

The root contains 14 - 16% tannin forming a slowly spreading clum principle, berginin (0.6%). Bergenin and its glycosides along with β sitosterol, gallic acid, catechin-3- gallate and afzelechin is the major constituent reported from the rhizome.

Medicinal uses:

Bergenia ciliata is used in the traditional medicine of Asian countries. A juice or powder of the whole plant is used to treat urinary troubles in Nepal the juice of the leaves is used as a tonic in the fevers, diarrhea and pulmonary affections. The root juice is used to treat coughs and colds asthma and urinary problems externally the root is bruised and applied as a poultice to boils. Methanolic and aqueous *B. ciliata* rhizome extracts were found to possess antioxidant activity, including reducing power, free radical scavenging activity and lipid peroxidation inhibition potential (Rajkumar et al., 2010). Uddin et al., (2012) reported that *Bergenia calciata* contained interesting biological active phytoconstitants which may be exhibited significance potential in folk medicine and can also bring potential natural products. In another study, researcher reports that the hydro-alcoholic extract of rhizomes of *B. ciliata* administered to rats with ethylene glycol induced lithiasis, reduced and prevented the growth of urinary stones more effectively as compared to cystone treatment.

Taxonomy Hierarchy

Kingdom	Plantae
Order	saxifragales
Family	saxifragaceae
Genus	<i>Bergenia</i>
Species	<i>Bergenia ciliata</i>



Figure 1: *Bergenia ciliata*

EXTRACTION AND SALE OF WILDLIFE IN THE YUCATAN PENINSULA, MEXICO

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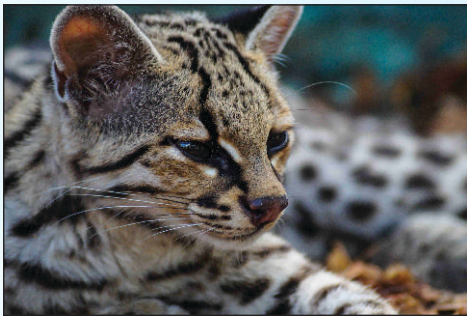
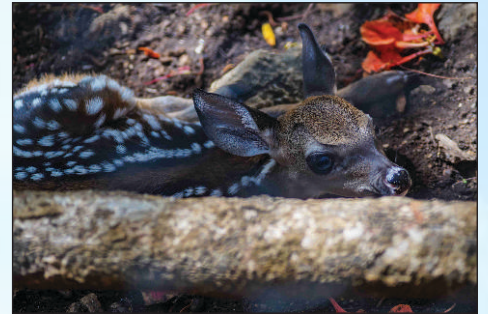
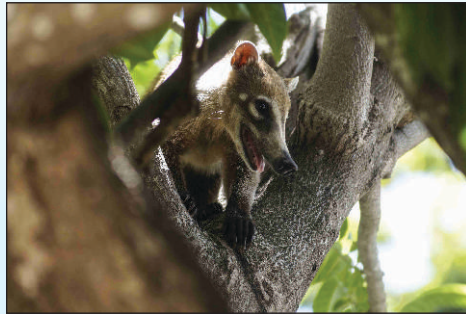
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Mexico is characterized by its great diversity of flora and fauna worldwide, where there are approximately 1150 species of birds, representing 11% worldwide. On the other hand, the country has 525 species of mammals and ranks fourth with 13% worldwide. However, 48% of mammals in Mexico fall into conservation risk categories. Due to factors such as immoderated logging, extraction of charcoal, change of land use, expansion of urban areas, illegal and immoderate hunting, among others. In addition, to which various wildlife species are used as pets in homes, for example, in the Yucatan Peninsula (YP) Mexico, owning wild animals is part of



the culture in rural communities. This promotes the extraction of newborn pups for the sale of pets illegally and in some cases adult females are killed for the capture of young. In addition, they are used for the sale of meat or fur collection. There are not enough studies on the illegal sale of wildlife, which allow to determine how natural populations are in the region and which could help to know their current state of conservation. Although there is a Mexican law that regulates the protection and conservation of wildlife (NOM-059-SEMARNAT-2010), there is a lack of supervision by federal, state and local government agencies.

For example, the psittacids (parrots, macaws, parrots) that are a group of vulnerable birds worldwide; in Mexico they are under pressure for illegal traffic estimates indicate that your catch rate is



from 65,000 to 78.500 units per year. These birds are extracted from their nests from their first days of chicks, sometimes they cut the primary wings to not allow the flight; Its value ranges illegally from 8 to 51 US dollars (150 to 1,000 Mexican pesos) according to the species and according to its size. In the YP, these birds are commonly used as pets in the homes of rural communities. Another example in the region is the illegal sale of offspring of Nasuanarica, the cost of a offspring has a value of 5 to 10 dollars (100-200 Mexican pesos).

In most cases, wildlife is placed in medium-sized cages and fed with household fruits such as bananas, watermelon, melon and/or seeds, etc. In addition, they tend to be semi-domesticated or have them freely within their land or homes, they even



become adapted to live with other animals such as dogs and cats. In Mexico, the Secretariat of Environment and Natural Resources (SEMARNAT - Secretaría de Medio Ambiente y Recursos Naturales) and the Federal Attorney for Environmental Protection (PROFEPA - Procuraduría Federal de Protección al Ambiente) have implemented awareness campaigns in communities and cities on the effect of illegal traffic on wildlife conservation. Globally there are organizations such as TRAFFIC and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which are dedicated to listing the threatened flora and fauna worldwide.

In the YP, it is required to prioritize studies on illegal sale and the effects on their natural populations in mammals such as *N. narica* Linnaeus, *Odocoileus virginianus* Zimmermann and *Leopardus wiedii* Schinz in Psittacid birds such as *Amazona albifrons* Sparrman, *A. oratrix* Ridgway, *A.xantholora* Gray and *Eupsittula nana* Vigors, as well as the bird of prey *Caracara cheriway* Jacquin.

Photo credit: **Authors**

RELIGIOUS ETHICS AND CULTURAL FESTIVALS: ROLES IN AGRO-BIODIVERSITY CONSERVATION IN INDIA

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India is very rich in terms of agrobiodiversity which encompasses a wide spectrum of habitats starting from tropical rainforests to alpine vegetation and from temperate forests to coastal wetlands. But these huge agrobiodiversity is presently being depleted by habitat destruction, fragmentation, over exploitation, climate change and many more. Agrobiodiversity conservation is of prime importance to maintain sustainability in agriculture. India is known as a famous land of celebrations, crowded ceremonies, fairs and festivals and other social activities. These religious ethics and festivals have a great role in agro biodiversity conservation directly or indirectly. Ingredients that make part of a festival or celebration are naturally protected because they serve a purpose and have ritual significance. Our ancestors had left various religious beliefs for us towards nature and it was a very constructive device for conservation of agro biodiversity not only during their time but at present also. Social taboos and cultural festivals represent good examples of informal institutions in biodiversity conservation. Hence this is the need of the hour to promote such traditional festivals along with other conservative incentives through local commitment, supportive policies and official legislation for long-term sustainable conservation of traditional agrobiodiversity.

Keywords: Agrobiodiversity, Conservation, Religious ethics, Festival

Introduction:

India is a god gifted country because it is very rich in agrobiodiversity. It is one of the most agrobiodiversity rich countries of the world with over 160 crop species with hundreds of varieties, 325 wild relatives of crop species and around 1500 wild but edible plant species and diverse domesticated diversity of animals and birds. Agrobiodiversity is the collective result of natural selection processes and the careful as well inventive selection by farmers and researchers over a longer period of time. Agrobiodiversity is a vital sub-set of biodiversity. India is agriculture dependant country and here many peoples' food and livelihood security totally depends on the sustained management of various agrobiodiversity. Thus, agrobiodiversity encompasses the total variety and variability of animals, plants and microorganisms that are must for sustaining the key functions of any agroecosystem, including its structure and functions. Religious believe, local knowledge, ethics and cultures can therefore be considered as integral part of agrobiodiversity conservation.

Definition of Agrobiodiversity:

Agrobiodiversity can be defined as the variety and variability of animals, plants and microorganisms that are used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries. It comprises the diversity of genetic resources (varieties, breeds) and species used for food, fodder, fiber, fuel and pharmaceuticals. It also includes the diversity of non-harvested species that support production (soil microorganisms, predators, pollinators) and those in the wider

environment that support agroecosystems (agricultural, pastoral, forest and aquatic) as well as the diversity of the agro-ecosystems.

Agrobiodiversity: Few distinct features

- i. Agrobiodiversity is managed by farmers (both male and female farmers).
- ii. Many components of agrobiodiversity would not survive without this human interference; local knowledge and culture are integral parts of agrobiodiversity management.
- iii. As human management is an integral part of agrobiodiversity conservation, thus preservation through establishing protected areas is very less relevant.

Threats to agrobiodiversity:

1. Habitat destruction:

Habitat loss or destruction is the primary cause of loss of agro biodiversity. Habitat loss resulted from large scale industrial activities, commercial activities associated with agriculture, irrigation, construction of dams, mining, fishing and many others.

2. Habitat fragmentation:

Habitat fragmentation is different from habitat destruction. Habitats are being fragmented into parts by roads, fields, canals, power lines, towns etc because of heavy demographic pressure. The dispersal and colonization of many species get restricted in isolated fragment of habitats. Apart from this, the habitat fragmentation also cause change in microclimatic conditions in terms of light, temperature, wind etc.

3. Pollution:

The most dangerous factor inducing loss of biodiversity is environmental pollution which includes air pollution, water pollution, industrial pollution, pollution due to chemical pesticides, radioactive materials etc.

4. Over-exploitation:

The natural resources are over exploited to meet growing demand by the ever increasing population, rural poverty, intensive technological growth and globalization of economy. All these factors together may be responsible for the extinction of a number of species.

5. Introduction of exotic and invasive species:

Many a time we introduce new exotic species in a particular area which sometimes overpower on the indigenous species and suppress their natural population.

Role of religious ethics and cultural festivals in agrobiodiversity conservation

1. Conservation of agrobiodiversity in Uttarakhand through religious believes

Central Himalayan region is very rich in biodiversity. Role of religious believes in agrobiodiversity conservation is an integral part of the people living in Uttarakhand, Central Himalaya, India. Central Himalayan people celebrate different socio cultural activities which have been directly or indirectly contributing towards conservation of traditional germplasm of the region. Such socio-cultural activity of the Central Himalayan people helps in conserving the traditional crops/landraces/genetic resources which seems to become obsolete in near future because of variety of factors. Every year Central Himalayan region faces hail storming and unprecedented rain in the months of October-November and March-April. The people from this region are always afraid for the safe-harvesting of their agricultural produce, which is the main source of earning of Himalayan people. The believes from one generation is passed to next generation. To a

certain extent the same philosophy is passed into present generation and this generation is following the ideas set up by their ancestors for conservation and management of the resources that would lead to a healthy environment. But unfortunately due to a variety of reasons the area under traditional crops is declining very fast in the region but undoubtedly there are many such

examples which explains that many local crop varieties are still conserved in the region because of their socio-cultural and religious values (Nautiyal *et al.*, 2010). Many local land races of paddy for are being still conserved for different applications and believe and they are presented in Table. 1.

Table 1: Traditional paddy races and their uses.

Vernacular names of the traditional land races of paddy	Ethno-medicinal uses
Bhabri	Stomachache and shivering
Ghyasu	Loose motion
Jolya	Constipation
Kalon Kala	Leucorrhoea
Kalon Safed	Dysentery
Khullu Safed	Wounds and internal injury
Kimoli	As tonic
Khagola	Delivery
Khullu Kala	Pimples
Lal Sati	Small pox
Lalmati	Earache, urinary infection
Mukhmar	Internal body heat, anti- allergic, auspicious religiously
Nagyon	Retain placenta in ovine and bovine
Nandini	Cold
Rajbhog	Indigestion
Rajmati	Tonic for expectant mother
Ramjawan	Preventing hair loss
Thapachini	Piles
Ukhari	Tonic

2. Mobile agrobiodiversity festival in Andhra Pradesh

People from semi-arid and backward Zaheerabad region in Medak district of Andhra Pradesh every year celebrates one festival in a unique manner. This celebration is of fifteen days long and they celebrate it every year in the month of January and this comes into the limelight. The celebration is unique in the sense that, they promote biodiversity conservation for which the marginal farmers are proud of. Those marginal farmers perhaps may not know about different heavy weight words like 'global warming', 'climate change' 'Biodiversity' etc. But they are well aware that they are contributing their bit to conserve biodiversity in their own style but in a simple way, i.e. through conserving ecological farming, preserving local variety of seeds and age old agricultural practices. Not only this, they have been prescribing these practices through this fortnight long festival namely 'Mobile Biodiversity Festival' every year in January since 1999. These marginal farmers in Zaheerabad region still are in practice to grow traditional crops like millets and traditional varieties of red gram, black gram, and chickpeas among others in a way they were grown by their ancestors. These practices are cost effective and can be practiced on poor soil without additional irrigation, fertilizers or

pesticides and other inputs. They cultivate multiple varieties of these traditional crops which in turn help to preserve the biodiversity of the region. They depend on only local variety of seeds that were handed down to them by their forefathers and preserve them in 'seed banks' in their villages for posterity.

The festival targets at cheering up farmers of that region to exchange seeds among themselves and cultivate by using ecological farming practices to protect their lands from degradation. The festival spreads awareness among farmers regarding the need to reverse back to traditional crops to protect and conserve the biodiversity of their lands and also to acquire food sovereignty. The festival also aims to remind people elsewhere that presently we need to diversify our food habits by incorporating this traditional food grains part of the regular diet for their high nutritional values.

The festival is basically a procession of colorful and brilliantly decorated bullock carts travelling along with singers and dancers carrying the message of the importance of retaining, reviving and rejuvenating traditional agricultural practices and cultivation with traditional crops, land races for conserving them. The

procession of bullock carts is nicely decorated with flower garlands and colorful fabrics give an impression of an overpowering image of bountiful crops and food sovereign villages. Small baskets containing millet seeds are kept inside the beautifully decorated carts and as well there are colorful shop window on the wheels which seems like moving biodiversity on wheels. The farmers also move along with the cart and visit 70 villages in the region and in every village they exchange their seeds with the seeds grown in those villages. They advocate for ecological farming and women moving along with the cart prepare traditional dishes to bring out the culinary significance of their crops. Apart from this, the millet growers take an oath pledging to carry forward the thought of preserving the old farming practices, varieties and indigenous knowledge of biodiversity. As an integral part of the festival, the elder generation of women, who have so far preserved, protected and nourished the heritage of agrobiodiversity for a generation, hand over in the form of a seed pot (a copper pot in which a variety of seeds were mixed, collected and exchanged throughout visit at different villages) to the daughters/daughters-in-law of their communities for safe keeping, preserving and nourishing in their generation. This "mobile biodiversity festival" generates huge energy and make aware on the issue of biodiversity in all the villages in the region.



(Photo credit: Smitha et al., 2014 and Shobha Warriar)

3. Seed festivals (The Nel Thiruvizha) in Tamil Nadu: Promotes paddy seed conservation

In 2006, the idea of a seed festival originated in Tamilnadu in 2006 and thus the first 'Nel Thiruvizha' menas 'Paddy festival' in Tamil was born. The first paddy festival was organized during the month of May and the first festival experienced a gathering of 425 farmers who chose from sixteen traditional paddy varieties. Each farmer was distributed with two kilograms of paddy seeds. Since the inception and celebration of first Paddy festival, the festival is growing bigger each year. The late Dr. Nammalvar, the legendary organic farmer in Tamil Nadu began talking about it at every meeting and slowly the message spread. Multiplying and then conserving the seeds is actually needs tremendous efforts and this seed festival provides an opportunity for farmers to share and multiply traditional varieties among themselves. Initially only few farmers used to cultivate the seeds taken from the festival but now, most farmers collect the seeds and plant them. Every year, more number of farmers joins the festival and return double the amount of seeds they have taken from the seed festival. Among the 61 varieties which were collected from Tamil Nadu, Kerala and Karnataka being distributed, some are more popular than others. According to an analysis, it was observed that 19 varieties are most popular, which include Mappilai Sambha, Jeeraka Sambha, kattuyanam, Kattu ponni, Aruvadam Kuruvai and others. Farmers have reported good yields by the traditional varieties they have grown and also reported for high resilience during adverse climatic conditions.

4. Mulaipari festival in Tamilnadu: Role in agrobiodiversity conservation

Mulaipari festival is celebrated every year on the 18th day of the Tamil Month of Adi (July). This festival is celebrated to request to

goddess for good rain in the monsoon month ahead for better cultivation practices and good yield. The women devotees in the procession carry earthen pots filled with the growing plants of nine different types of grains on their heads. The festival is celebrated to request the village goddess for rain for the fertility of the land in order to secure a good harvest. The nine different grains used for festivals are traditional one. This is how the traditional varieties are conserved. The grains which are used are as follows:

1. Suriyan (Sun) – Wheat
2. Chandiran (Moon) - Paddy
3. Chevvai (Mars) - Thuvarai (Toor)
4. Bhudhan (Mercury) -Greengram (Moong)
5. Guru (Jupiter) - Chana (Kadalai)
6. Sukiran (Venus) - White Rajma or Avari kai
7. Sani (Saturn) - Black Sesame (Til)
8. Rahu – Black gram (Ulundu or Urad)



5. Agrobiodiversity conservation by 'Bathukamma festival' in Telangana

Bathukamma festival is a festival of flowers. This flower festival is celebrated in Telangana and it helps for conserving the indigenous flowers of that region. 19 flowers are used viz. *Mirabilis jalapa*, *Jasminum*, *Cassia auriculata*, *Crysanthemum*, *Cucurbita pepo*, *Crossandra*, *Rosa*, *Portulaca grandiflora* etc.



6. Role of Chhath puja in conserving the agrobiodiversity

In northern India and Nepal, *Chhath Puja* is celebrated by Hindu. It's a festival to worship Sun. Rituals during the festival are believed to help cure skin ailments such as leprosy, and bring health benefits to family members. Like many other festivals, the performance of Chhath Puja involves ritual made complete by prayers and specific dishes made with specific ingredients. In the state of Bihar, the ritual is largely observed by women. The puja includes offerings of a variety of fruits, flowers, spices and root vegetables. Women arrange these offerings carefully and recite traditional songs to reiterate the

importance of conserving water and the environment. Of all the ingredients used, pomelo, is the essential fruit that makes this ritual complete. A large citrus fruit native to South Asia, the festival is a strong motivation for families in Bihar to plant a pomelo tree in their homegarden. In fact, many of the fruits, herbs and spices used in the festival such as guava, banana, sugarcane, turmeric and ginger are all sourced from homegardens. In Bihar, the average homegarden has an average of 6-8 fruit trees, up to 16 in some cases. Thus, indicates that religious believe helps in conserving many fruits, vegetable and spice crops.

7. Role of Harela festival in agrobiodiversity conservation

Harela festival is celebrated in the Himalayan region two times in a year. One in Ashwin (seventh lunar month of the Hindi calendar-October-November) and the other in Chaitra, the first lunar of the Hindi calendar (mid-March to mid-April) are also celebrated in Himalayan region. In the month of Ashwin the harvesting of summer crops is done while the winter crops are being sown, which are harvested in the month of Chaitra (mid March-mid April, time for harvesting of winter crops). This festival signifies that, the people worshiped their Gods and Goddesses for greenery and prosperity and for safe harvesting and safe storage of their crop produce. It is believed that the people are blessed by the God/Goddesses for safekeeping their harvest while protecting their food crops from any type of natural calamities (i.e. hail storming, unprecedented rain, drought, etc.). Actually, the months of October-November and March-April are likely to have hail storming and unprecedented rain in Central Himalayan region. In this festival, the seeds of five to seven traditional crops/landraces is sown in a small basket 10 days before Viz. Maize (*Zea maize*), Sarson (*Brassica spp.*), Gahat (*Macrotyloma uniflorum*) (legume), Jau (*Hordeum vulgare*), Wheat (*Triticum aestivum*), traditional land race(s) of Paddy (*Oryza sativa*), Mass (*Vigna sp.*) and Bhatt (*Glycine sp*) needed for Harela festival, should have stored by every household. This is one such socio-cultural activity of the Central Himalayan people through they make efforts to keep conserving the traditional crops/landraces/genetic resources which seems to be in jeopardy due to variety of factors. In this endeavor empirical evidences showed that conservation of traditional crops/ landraces as described here with the introduction of Harela becomes important in view of rapid socio-economic and cultural changes. Emphasizing the social and cultural set up and other socio-cultural activities of the Himalayan people along with other conservative incentives would be helpful for long-term conservation of traditional agrobiodiversity, which is in danger of extinction due to the so-called 'modernization' taking place in society.



Conclusion

The agrobiodiversity feeds us and are the nature's treasure which should be conserved for future generation. Local believes, ethics, different cultural and religious festivals play vital role in conservation of traditional crops/ landraces. Hence this is the need of the hour to promote such traditional festivals along with other conservative incentives through local commitment, supportive policies and official legislation for long-term

sustainable conservation of traditional agrobiodiversity.

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From the Editor's

Dear Readers,

I wish my warm wishes on auspicious occasion of Maha Shivratri.

In February, we recount the various projects and five popular articles. This issue also includes seven Annual awards by Academy for its members actively involved in their field or events and activities organised by the Academy. NESA is well known for its environmental awareness activities.

I humbly request to all the members of the Academy to please plant a single tree on his/her birthday or any member of the family, friends and relatives and share the memorable pictures with us. We would like to include in our Newsletter and it will serve as an inspiration and motivation to many for making our Planet with the motto "Green and Clean Environment".

Once again, I express sincere and huge thank to all the persons who contributed writing the wonderful and inspiring 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.

Dr. R. S. Tomar
Editor-in-Chief

Dr. Sushma Tiwari
Associate Editor

Save our planet Earth! Save the Environment and you will Save the Life and Future. Save the Environment, Save the World. Taking care of environment is not an obligation - Our environment is our life.

APPEAL TO LIFE MEMBERS

NESA Life Members are requested to submit short articles for the NESA e-Newsletter that are consistent with NESA's objectives to improve environment. The articles should focus on topics related to environment and facilitate communication and discussion among researchers, academicians and students. The articles for March edition can be submitted before **25th March 2020** to NESA Publications.

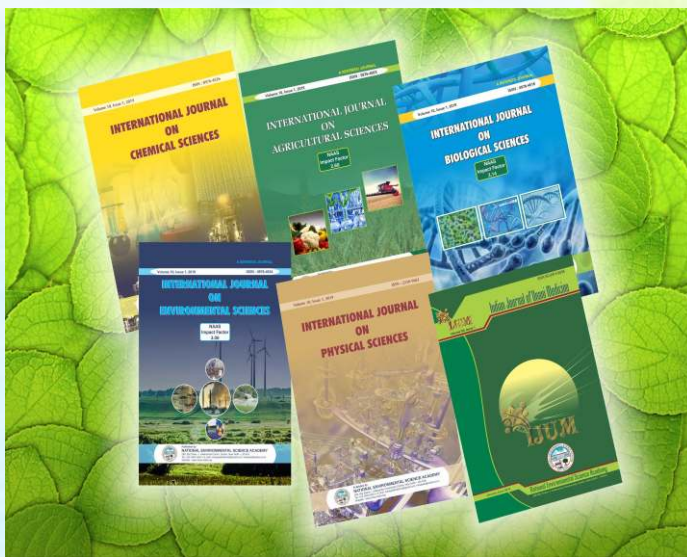
Dr. R.S. Tomar
Editor-in-chief, NESA E-newsletter

To,

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