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Note to Authors:

We welcome the readers of Van Sangyan to write to us about their views and issues in forestry. Those who wish to share their knowledge and experiences can send them:

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The articles can be in English, Hindi, Marathi, Chhattisgarhi and Oriya, and should contain the writers name, designation and full postal address, including e-mail id and contact number.

TFRI, Jabalpur houses experts from all fields of forestry who would be happy to answer reader's queries on various scientific issues. Your queries may be sent to The Editor, and the expert's reply to the same will be published in the next issue of Van Sangyan.

Cover Photo: Panoramic view of Achanakmar-Amarkantak Biosphere Reserve
Photo credit: Dr. N. Roychoudhury and Dr. Rajesh Kumar Mishra, TFRI, Jabalpur (M.P.)

From the Editor's desk

Herbs, shrubs and trees (browse) play a significant role both in farming systems, where they are protected as fallow species, and in livestock production. The importance of browse increases with increasing aridity and is generally most essential in the dry seasons, when most other feed resources depreciate in quality and quantity. Generally, trees occupy a significant niche in the farming systems and overall way of life in animal production.

Ligneous plants, which may be trees, small trees , shrubs or undershrubs, are an important component of the fodder resources for livestock and wildlife. The fodder value of their leaves and fruits is often superior to herbaceous plants, particularly in the case of legumes. In arid and semi arid zones, they provide the largest part of the protein supply during the driest months; for example, it is estimated that in the Sahel, up to 80% of the protein ration is provided by plants of the Capparaceae family during the three driest months of the year. In the past, trees were commonly used as browse and the cutting of leaves or branches for animal feed is recorded as long ago as Roman times. Sometimes ligneous plants were used for different purposes but their importance as browse plants was only recognised late. For example, Gliricidia maculata and G. sepium were introduced at the end of the 18th century in Africa as shade trees for coffee, tea and cocoa plantations but it was recognised only a few decades ago that they provide a valuable feed, with 20 to 30% N in the leaves, 14% CF, and digestibility ranging from 50 to 75% according to the type of animal. Their main role now is to serve as a supplement to the natural flora (mixed with 50% grass) for feeding livestock, especially during the driest part of the year.

The data/estimates of fodder production in the country vary widely. Fodder production and its utilization depend on the cropping pattern, climate, socioeconomic conditions and type of livestock. The cattle and buffaloes are normally fed on the fodder available from cultivated areas, supplemented to a small extent by harvested grasses and top feeds. Grazing and harvested grasses are the chief fodder source for equines, while camels usually subsist on top feeds, either browsed or lopped from shrubs and trees. The three major sources of fodder supply are crop residues, cultivated fodder and fodder from common property resources like forests, permanent pastures and grazing lands.

This issue of Van Sangyan contains an article on Tree browse for livestock production among tribal of Jharkhand. There are also useful articles, such as Mulching: An improved agricultural practice, Homegardens and agroforestry, Wood DNA, Casuarina equisetifolia L.: A potential tree, बबूल (एकेशिया निलोटिका लिन.) के असामान्य मूलांकुर (in Hindi), Aboriginal remedial plants for piles, मैदा छाल: एक विलुप्त होती प्रजाति (in Hindi), Potter spray tower and biodiversity of Treron phoenicoptera and Aegle marmelos

I hope that readers would find all information in this issue relevant and valuable. Van Sangyan welcomes articles, views and queries on various issues in the field of forest science.

Looking forward to meet you all through forthcoming issues.

Dr. N. Roychoudhury
Scientist G & Chief Editor

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Tree browse for livestock production among tribal of Jharkhand

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Livestock rearing

The livestock rearing is mainly a supplementary occupation to agriculture and also a fall back mechanism particularly for the tribal poor in Jharkhand (Bedia, 2014). The tribal people rear the livestock for animal products such as milk, ghee, meat, dung, manure *etc.* ploughing, religious sacrifices, entertainment, propitiation of gods and celebrations (Islam *et al*., 2015). Thus, the livestock rearing is the most preferred secondary occupation which supports agriculture and allied activities besides sustaining the nutritional, social, economic, religious and recreational aspirations of the people (Chandramolly and Islam, 2015). Holding good quantum of livestock varies according to the socioeconomic status of the families (Bedia, 2014). In fact, the number of livestock per family has decreased over the last decade especially the cattle (Anon., 2010). The prevailing scenario is the handiwork of acute poverty, migration, substandard life quality, debt, unrest, naxalism, isolation from national mainstream, lack of awareness and exposure, traditional severity *etc*. (Verma and Paul, 2016).

The tribal people are keeping livestock either by providing place in their own house or by constructing separate shed within the homestead land (Sahu, 2008). In earlier years, the selling of cattle was not very common because rearing cattle is like a custom and it is not seen as an occupation. But over the years the thinking has changed. Now-a-days livestock rearing is seen as an asset, which fetches money at the time of emergencies and in some places, also as additional income. It is mostly sold in the local weekly market (*haat*) especially for livestock, to the cattle traders. Other cattle products like milk, eggs are usually sold to the nearby restraints. Small ruminant and birds are the most preferred among the various livestock. Even within small ruminants, goats are the most preferred followed by pig. Chicken is the third priority. The basic reason for selecting goats and pigs is that there is no need of stall feeding for them and also availability of land for grazing (Anon., 2010).

Fig. 1. Grazing/ browsing

Fig. 2. Green fodder collection

Fig. 3. Cattle under tree shade

Fig. 4. Goatry

Feeding practices

Feeding of paddy straw, sun cured dry agricultural field forage, green grasses, weeds, other agricultural residues, tree browse, forest herbage, oilseed cakes, bran *etc*. is the common traditional feeding practices of livestock owners (Islam *et al*., 2015). They also graze their animals down to dusk in the nearby forests, grazing grounds or other common property resources to provide sufficient feeds (Plate 1). A small proportion of progressive farmers offer cultivated fodders, crop residues or horticultural wastes besides concentrates to their livestock. Cattle breeders usually supplement the paddy straw and grasses by green browses lopped from trees during lean periods (Plate 2-3). The goats were mainly maintained on tree browses in addition to paddy hay (Plate 4-6). Though the tree browses are low palatable to cattle it constitutes a highly palatable for goats. Some aquatic plants are also harvested from water bodies for feeding cattle, goats and other ruminants during lean seasons.

Livestock browsing

Feeding on buds, shoots and leaves of woody growth by livestock is the most popular feeding practice among tribal communities of Jharkhand (Chandramolly and Islam, 2015). Forests in vicinity of the villages offer plenty of browsing grounds with enough fodder availability for livestock rearing in the tribal landscapes of Jharkhand (Singh *et al*., 2010). Traditional agroforestry, community forestry and homestead forestry are the other important sources of tree browse accessibility. Trees and shrubs provide fodder which is of great importance during the period of nutritional stress in the dry season when the nutritional value of dormant grasses and forbs is low (Chhetri, 2010). Paddy straw and dry gasses being less milk productive, cattle owners usually supplement them with productive, nutritious green broad leaved tree browses (Bakshi and Wadhwa, 2004). Chief tree species being lopped to meet the household fodder demand includes *Dillenia pentagyna, Shorea robusta, Kydia calycina, Grewia asiatica, Murraya exotica, Azadirachta indica, Melia azedarach, Zizyphus mauritiana, Zizyphus xylopyra, Moringa oleifera, Butea parviflora, Bauhinia retusa, Bauhinia purpurea, Bauhinia variegata, Albizzia lebbek, Albizzia procera, Albizzia odoratissima, Terminalia arjuna, Terminalia belerica, Terminalia chebula, Terminalia tomentosa, Toona ciliata, Syzygium cumini, Lagerstroemia parviflora, Anogeissus latifolia, Anthocephalus cadamba, Artocarpus heterophyllus, Artocarpus lakoocha, Gmelina arborea, Litsea sebifera, Emblica officinalis, Mallotus philippinensis,*

Mangifera indica, Ficus bengalensis, Ficus cunia, Ficus hispida, Ficus religiosa, Gardenia latifolia, Morus alba, Acacia arabica, Aegle marmelos, Anogeissus latifolia, Dalbergia sissoo, Ougeinia oojenensis etc. Low socioeconomic condition, unavailability of pastures or fodder production unit and ignorance towards green fodder production are the main reasons compelling tribal poor for tree browsing (Islam *et al*., 2015).

Fig. 5. Browse collection

Fig. 6. Browse feeding

Fig. 7. Market of browses

Fig. 8. Shop of browses

Income generation through tree browse

The collection and marketing of tree browses is a prevailing household occupation yielding considerable employment and income opportunities for the tribal people since time immemorial (Plate 7-8). Collection of tree browses, packaging in gunny bags, transportation to nearby urban market and marketing through make-shift shops are widespread activities for livelihood sustenance among the tribal people and most of them are working in an informal way to increase their household income. The browses are sold in nearby urban markets at nominal prices yielding the returns which are less remunerative and not commensurable with labour. The earning from this profession is barely enough to survive on and even this income is seasonal. During the low demand period in rainy season when plenty of green grasses are available, life gets even tougher. The browse collectors have no savings, so they look for farm work or other sources of income. Some value addition measures need to be taken not only to reduce their drudgery but also enhance employment and income opportunities for the tribal people. Selling tree browses not at peak time when there is glut in the market, but in times of relative scarcity at a place where a premium price can be obtained may yield good returns to the collectors. The tribal people living in

forest fringes have the rights and concessions to collect tree browses from the forests for self-consumption, occupation and sale under the auspices of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Ministry of Tribal Affairs, Government of India (Kumar and Choudhury, 2016).

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Mulching: An improved agricultural practice

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Introduction

Mulching is a practice used to conserve soil and water, to manage weeds. Mulch is any material placed on the soil surface to maintain moisture, reduce weed growth, mitigate soil erosion and improve soil conditions (Jack *et. al*., 1955). They are applied to the soil surface, around trees, paths, flower beds, to prevent soil erosion on slopes, and in production areas for flower and vegetable crops. It was also well known as Non-chemical Weed Management. About 60 to 70 percent of the rainfall is lost through evaporation. Application of mulches results in additional benefits like conservation of soil moisture, moderation of temperature, reduction in soil salinity and weed control. Mulch can be expensive however and labour intensive to obtain, transport and disperse. Mulch layers are normally two inches or deeper when applied.

Mulching is needed for effective conservation practices for reducing water loss through surface evaporation. A cover can be best provided by mulches or plant residues on the soil surface. Mulches act as barriers to the movement of moisture out of the soil.The effect of mulch upon soil moisture content is complex. Mulch forms a layer between the soil and the atmosphere which prevents sunlight from reaching the soil surface, thus reducing evaporation. However, mulch can also prevent water from reaching the soil by absorbing or blocking water from rains. Towards the beginning of the growing season, mulches serve initially to warm the soil by helping it retains heat which is lost during the night. This allows early seedling and transplanting of certain crops and encourages growth (Menezes *et. al.*, 1974).

Types of mulching

1. Organic mulches
2. In-organic mulches

Organic mulches

Organic mulch is made up of natural substances i.e., bark, straw, leaves, cut grass, wood chips, peat, but it attracts the insects, pest and diseases. They decomposed easily and need frequent replacement (Patil *et. al.*, 2013).

Benefits

1. If the mulch is applied too early, it will keep the ground cool and root development will be delayed
2. With newly planted material, the mulch should be applied after the plants are set in place and watered in well.
3. If planting is done in late summer or early fall, the mulch should be applied immediately after watering the plants so that the soil temperature will be kept warm during the cool nights.

Constraints

1. Drawbacks include costs and labor of application, limited efficacy on perennial weeds, delayed soil

warming, and the potential to carry weed seeds and harbor pests.
2. As beneficial as organic mulch is, too much mulch can be harmful.
3. Deep mulch can lead to excess moisture brings the chances of root rot, mould fungus.
4. Thick blankets of fine mulch may prevent penetration of water and air.
5. Some organisms can proliferate too much in the moist and protected conditions of the mulch layer.
6. Slugs and snails can multiply very quickly under a mulch layer.
7. Damaging organisms such as stem borers may survive in the stalks of crops like cotton, corn or sugar cane.
8. Plant material infected with viral or fungal diseases should not be used as there is a risk that the disease might spread to the next crop.

Inorganic mulches

Inorganic mulches can be made from a range of materials including whole or crushed rocks, recycled glass, or recycled rubber tyers. Like traditional organic mulches, they offer several benefits to gardeners. They help prevent weeds from sprouting, retain moisture in the soil, and keep soil temperatures cooler in summer and warmer in winter. Because inorganic mulches don't break down the way organic mulches do, they don't need to be replenished regularly. But they also won't provide plants with helpful nutrients the way organic mulches do. Inorganic mulch is of following types: Plastic film, Rock, Recycled rubber, Landscape fabric (Patil *et al.*, 2013)

Benefits

1. Don’t decompose over time.
2. Similar moisture savings as organic mulches.
3. Good appearance.
4. Potential cost savings (don’t need to reapply as often).
5. pH neutral.
6. Recycled product.

Constraints

1. Don’t contribute organic matter or nutrients.
2. Appearance – some look ‘fake’.
3. Higher initial cost.
4. Rocks used as mulch may wedge in bark or damage tree trunks.
5. Potential increased heat/light reflectance.
6. Large areas of inorganic mulch may increase soil temperature
7. Black plastic does not allow water, nutrients or air to penetrate the soil
8. Inorganic mulches do not provide nutrients to plants
9. Rubber mulch may be harmful to plants.
10. Does not work well in areas where perennial weeds are a problem.
11. Organic matter (mulch) remains on top of the fabric and does not mix with the soil.

Effect of mulching on soil and plants

Soil conservation through mulching is the important purposes. It improves the micro climatic conditions which widely affected by an optimum degree of soil moisture (Kumar and Lal, 2012). When the soil was covered by mulches it has been seen that soil biological, chemical and physical properties are conserved by mulches (Cooper, 1975). Thus help for the good growth and development of the plant.

Reduced infiltration rate

Mulching of soil has increased the intake of water than the un-mulched soil. The infiltrate in soil can be utilized by crops

there by increased in growth and yield (Koni, 1983).

Reduced soil erosion and weed growth

Mulching has proved to reduce the velocity of runoff and increased the amount of water in the soil profile. (Gardner, 1959).Mulching has also reduced the growth of weed, as mulching the soil surface can prevent weed seed germination and physically suppress the weed emergence (Merwin, 1995).

Increased yield

Mulches help in increased in yield, Chen and Katan (1980) have reported a significant increase in vegetation and yield of different crops using mulch. Rylski and Kempler (1972) reported that the double layer cover induced more vigorous plant development; good fruit set on lower nodes, resulting in higher early yields of large fruit was obtained.

Conclusion

In the present scenario, there was increased in the demand for food crops all over the world. Apart from using high yielding varieties and better technology, there is a need to utilize environmental friendly techniques for higher production. Mulching is one such process that can help us in producing quality food in quantities. Mulching also helps to improve soil health.

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Homegardens and agroforestry

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Agroforestry is a new concept in science but an old art. The concept of agroforestry mainly aims at incorporating woody perennial along with agricultural crops and/ or animal component in a sustainable manner. As time have progressed this concept, now a science has grown to greater extent and has got attention globally which can be reckoned form the establishment and funding provided to World agroforestry Centre at Nairobi, Kenya and its regional headquarters. India had one of its regional headquarters at New Delhi. It's to be also noted that the India is the first country in the world to come out with a National Agroforestry Policy. Such importance has been given in India, only because of certain well known agroforestry that are practiced by farmers who have recognized the economical and ecological benefit of the agroforestry.

Some of the dominant agroforestry system that are practiced in India are popular based agroforestry system, coconut based systems, eucalyptus/ casuarina based system for pulp and paper needs… the list can be very exhaustive with more than hundred different systems that are encompassed in 30 different practices (Atangana*et al*.,2014). Even so the most exemplar example for a typical agroforestry is Home gardens. The homegardens is defined as follows *homegardens represent intimate, multistory combinationsof various trees and crops, sometimes in association with domestic animals, aroundthe homestead*(Kumar and Nair, 2006). This concept developed around the rural areas as subsistence economy but with the increase in land scarcity, home garden can be the solution for providing both food and nutritional security. So here in this article, we may have a glance of various homegarden in India and around world

Homegardens in India

Homegardens of kerala are best example of Homegardens yet there some examples that justify the above said statement. Following the same trend homegardens of Andaman and Nicobar Islands is another best example. In the word of Pandey*et al*., (2007) does explicitly explains the nature and function of homegarden found in Andaman and Nicobar islands. The data shows that more than 5% of the land area are under homegarden with a unique structure and composition that is different from that of kerala homegardens. Similarly, Das and Das (2005) details about the home garden of Assam and every state has its own forms of homegarden structure and compostion catering the needs of the local population which is the unique nature.

Homegardens around the world

Homegardens do exist to a much smallerdegree in temperate zones of China, North America, and Europe (Nair & Kumar, 2006). It was the experiment done by Feldhake and Schumann (2005) concluded that when planting density was substantially higher than the desired final stand may be warranted for better

utilization of the site which goes on par with concept of homegarden.

The homegarden of other regions are known by various local name such as *Talun-Kebun* and *Pekarangan* for homegarden systems of Java (Indonesia), *Shamba* and *Chagga*in East Africa, and *Huertos familiares* in Central America. The homegarden need not be always close to home as the literal meaning suggest it may also like that multistory tree gardenssuch as the *Talun*or *kebun* of Indonesia, that are not in physical proximity to homes butreceive the same level of constant attention from the owners' household and havesimilar structural and functional attributes as other homegarden units located nearhomes are also considered as homegardens.

Conclusion

There are some countries where home garden practice is more similar and equally popular like that of kerala are homegardens of Sri Lanka and Bangladesh. Yet there are many countries where the concept of home garden does prevail in various form as mentioned by Nair and Kumar (2006). One significant outcome for the readers of this article will understand that "All home gardens are not the homegardens".

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Wood DNA

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The DNA or deoxyribonucleic acid of a living organism is a storehouse of biological information. DNA is made from monomers known as nucleotides, and information is conveyed through the order of nucleotides within the DNA. Most DNA molecules consist of two polynucleotide strands coiled around each other to form a double helix. DNA usually occurs as linear chromosomes in eukaryotes, and circular chromosomes in prokaryotes. The set of chromosomes in a cell makes up the genetic material of an organism or its genome. The human genome has approximately 3 billion base pairs (bp) of DNA arranged into 46 chromosomes. In plants, the genome size can vary from 61 mega bp as in the case of *Genlisea tuberose*, which is the smallest recorded flowering plant genome, up to 150 giga bp as in the case of *Paris japonica*, which is the largest known genome of any living organism.

The variation in the genome and the resulting characteristics of different organisms is a result of the variation in the nucleotide sequence of their DNA. The information carried by DNA is held in the sequence of pieces of DNA called genes. The transmission of genetic information in genes is achieved via complementary base pairing. The information in a DNA sequence is copied into a complementary RNA sequence during transcription. This RNA sequence is then used to make a matching protein sequence in a process called translation. In a similar fashion, complementary base pairing allows two identical copies of DNA to be produced from one original DNA molecule for biological inheritance, and this process is called replication.

Deciphering the genetic code, which is based on non-overlapping triplets of bases called codons, represents the birth of molecular biology. Since then, DNA has found a variety of uses in technology. They include (i) genetic engineering: to change the genetic makeup of cells through the transfer of genes within and across species and produce improved or novel organisms, (ii) DNA profiling or genetic fingerprinting: to identify individuals by characteristics of their DNA, (iii) DNA nanotechnology: to create static structures such as two- and three-dimensional crystal lattices, nanotubes, polyhedra and arbitrary shapes, as well as functional devices such as molecular machines and DNA computers, (iv) bioinformatics: to store, data mine, search and manipulate biological data, including DNA sequence data, and (v) phylogenetics: to infer the evolutionary history of organisms by comparing mutations accumulated in DNA over time.

DNA isolation

Molecular investigation on any organism requires that the DNA of the organism under study be extracted first. Extraction of DNA from microorganisms, human and animal tissues is a routine procedure. It involves the use of chemical and/or physical methods for cell lysis i.e.,

disrupting the cell wall/membrane. The other cellular components like proteins, lipids and RNA are then removed using specific chemical reagents along with centrifugation. The DNA obtained is purified from the reagents used and contaminating salts by precipitating it from the aqueous phase and washing thoroughly, before it is suspended in water or storage buffer. The search for more efficient means of extracting high quality DNA with higher yield has led to the development of a variety of DNA isolation protocols; however the fundamentals of DNA extraction remain the same.

DNA extraction from plants is done regularly as part of many research activities, most commonly from agricultural crops. Isolating DNA from plant tissues is challenging compared to animal tissues, as the same tissue type from different species has varied levels of metabolites like polysaccharides & polyphenols, and structural molecules. There are numerous protocols for isolating DNA from plants, of which the CTAB method developed by Doyle and Doyle in 1987, is the widely followed. CTAB (cetyl trimethyl ammonium bromide), a cationic detergent, facilitates cell lysis as well as the separation of polysaccharides. Additives like PVP (polyvinylpyrrolidone) can be used to remove polyphenols.

DNA from wood

Tissues like needles, leaves or buds are the best source of DNA from mature trees. But many a times, extraction of DNA from wood/timber is required. Mature trees are generally tall and leaf sample collection becomes difficult, which limits the number of samples taken and narrows down the scope of investigation, which can be overcome by extracting DNA from wood samples. Wood DNA is required in the use of molecular genetic tools (i) for genetic diversity studies based on wood samples, (ii) to aid in the investigation of timber theft cases, for curbing illegal logging activities, (iii) in determining the geographical origin of wood and wood products, for wood certification and regulating timber trade, (iv) to infer species identity, for conservation of endangered trees, (v) during forensic investigations, to match suspect and focal wood samples, etc.

Wood is the secondary xylem in the stems and roots of trees and woody plants. It is a structural tissue, which is porous and fibrous, and functions in providing support in living trees. Wood is a cellular material composed of cellulose, hemicelluloses and lignin. There are many hindrances for extracting DNA from wood as compared to other plant tissues. The mechanical treatments applied to disrupt wood tissue can cause overheating, leading to irreversible DNA degradation. Decomposition of wood by fungi and microorganisms during storage results in degradation of wood DNA and is a source of contaminating DNA.

Wood samples contain inherent contaminants or molecular substances which potentially inhibit DNA extraction or result in low-quality DNA not suitable for further processing. The contaminants include polysaccharides, tannins, phenols and other wood extractives, whose presence will inhibit subsequent molecular reactions in which the extracted DNA is used. These constituents vary from tree to tree in terms of form and quantity. Hence a single protocol developed for DNA extraction from wood cannot be used for all the tree species as varied cleaning steps are required to separate the DNA from co-extracting contaminants. Even for

individuals of the same species, modifications need to be made each time.

Though DNA yields from wood samples tend to be lower than from leaf tissue, DNA extraction from freshly harvested wood incorporating cambium tissue has been performed and found to yield DNA of high quality which is comparable to that from leaf material. But this is not the case for dried wood tissue, in which DNA extraction can be more problematic. Much work has been done on oak timber of different ages and preserved under different conditions.

DNA has been isolated from the sapwood, transition wood and heartwood of fresh and dried *Cunninghamia lanceolata* wood by Jiao *et al.* (2012). The quantity and purity of the DNA from the sapwood and transition wood (derived from nuclei and plastids in the parenchyma cells) was greater than that from the heartwood (derived mainly from amyloplasts). They have also demonstrated the optimized radial position for DNA extraction in the stem.

DNA extraction from dry wood of *Neobalanocarpus heimii* has shown to be possible by Tnah *et al.* (2012). The efficacy of DNA extraction was higher for the cambium and sapwood than for the heartwood tissues. In order to safeguard the intactness of the DNA, the DNA extraction from dry wood is recommended to be carried out within 6 weeks after felling for logs and 6 months after felling for stumps. However, only the chloroplast region can be perfectly retrieved from heat-treated lumber.

Conclusion

DNA extraction from wood becomes a prerequisite when morphological and anatomical features are not identifiable i.e., absent or inconclusive, and when the wood has been processed. DNA based molecular analysis can then be used by investigators for species identification from wood samples. In forensic investigations, identification based on the presence of DNA molecules in the sample depends on the amplification of DNA molecules using random primers, after which the DNA sequence can be studied to get a picture of the sample. In a similar fashion, small fragments of DNA molecules present in degraded wood samples can also be amplified using random primers and the amplified DNA can then be used for further analyses. Also, the primers can be designed to target plastid DNA which is easier to amplify, due to the presence of high copy numbers of plastid genomes per cell.

Wood DNA represents an epigenetic diary with information on genes and pathways involved in the tree's responses to environmental changes, which may prove valuable to the fundamental understanding of tree biology and to climate research, including mediating the effects of climate change on forests. It is possible to explore epigenetic “diaries” by whole genome DNA methylation profiling of trunk bore cores.

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Casuarina equisetifolia L.: A potential tree

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Introduction

Casuarina equisetifolia L. (family - Casuarinaceae) is predominantly a monoecious species which distributed along the coastal region of Parangipettai, Southeast coast of India (Zoysa, 2008; Mascarenhas and Jayakumar, 2008). It is commonly known as beach she-oak, coast she-oak, beefwood, common ironwood, Australian pine, whistling-pine and its native to the tropical and subtropical coastlines of Australia, Southeast Asia, Malaysia, Melanesia, Polynesia and New Caledonia. India is the largest Casuarina growing country in the world with an estimated 800,000 ha of plantations (Pinyopusarerk and Williams, 2000) and it estimated that about 500,000 ha are planted with Casuarina in the states of Andhra Pradesh, Orissa, Tamil Nadu and the Union Territory of Puducherry (Nicodemus, 2009). This plant has the capability of growing in a wide range of soil conditions particularly on coastal and on limestone soils near the shore (Liu et al., 2014). It is a tall, fast-growing tree that can, in as little as 12 years, reach upto height of 20 m (66 ft). It has the tolerant of salt spray, light to heavy textured soil and it is often one of the trees growing closer to the coastline (Balasubramanian, 2001). Elevated proline levels have been reported in different Casuarina species subject to salt stress while Reddy (2001) reported that the more tolerant species, *C. junghuhniana*, accumulated more proline than *C. cunninghamiana* and *C. equisetifolia* in stressful environment. It is also an important species for the control of erosion, especially on coasts (its natural habitat) and sand dunes, and on poor inland soils, where it does well because of its ability to fix nitrogen. This latter ability makes it ideal for inter plantings with agricultural crops to enrich the soil and provide light-to-moderate shade.

Silvicultural characteristics

Climate

*Casuarina*is a fast growing, drought hardy, care free species for sites and climates as varied as coastal regions, hot humid tropics and even semi-arid regions. The tree remains unaffected even by cyclones in coastal areas. It can be grown upto an altitude of 1500 metres. It tends to be bushy when the water table is low and dies when the water table rises to the surface level. The species does not coppice and is not frost hardy but can withstand low temperature.

Temperature

It is mainly planted in areas with tropical and hot subtropical climate with the mean annual temperature being 28^0C. It is light demander requiring bright sunshine for best growth and development. The monthly mean maximum temperature in its native area is 15^0 C - 33^0 C, but it is adapted to a wide range of temperatures. On the coasts of the Indian Peninsula, where it thrives well, the absolute maximum shade temperature varies from 35.56 to 41.11^0 C and the absolute minimum ranging from 7.22 to 17.22^0 C.

Rainfall

In its natural habitat, annual rainfall varies from 700 to 2,500 mm, often with a dry season of 6-8 months. However, it has been planted successfully in areas with annual rainfall as little as 200-300 mm or as much as 5,000 mm.

Soil

The tree thrives best on loose sandy soils, laterite, rich loamy soils and some marshy places in open areas, where pH varies from 4.8 to 8.4. It prefers sandy soil with high water table during the summer. The species can also grow in saline and alkaline soils. Heavy, clayey soils and soils with poor drainage are detrimental to its growth. Good plantations can be seen on laterite soils and well drained sandy loams. The tree is able to survive on poor soils because of its capability to trap atmospheric Nitrogen. The soil includes coastal sand, shifting sterile sand, river alluvium, sandy loam with high water table, red loam, red gravelly loam and hard laterite etc. Topography ranges from coastal flats, to very gently undulating terrain.

Nursery propagation: Rooting of phylloclad cuttings is the widely practiced method of vegetative propagation in *C. equisetifolia* (Kumar, 2017).

Nitrogen fixing ability

Casuarina equisetifolia engage in the process of biological nitrogen fixation by the formation of root nodules with the help of actinomycetes microoganism called Frankia (Hardman et al., 2012). Three actinomycetes were isolated from the surface sterilized root nodules of *C. equisetifolia* and morphologically identified as Frankia sp., Streptomyces sp. and Micromonospora sp. The species is moderately tolerant to calcareous and slightly saline soils and is a very poor performer on heavy soils such as clays. It can withstand partial water logging for a very short period.

Uses

There is a great demand for *Casuarina* poles for scaffolding, centering, roofing etc. Poles are extensively used throughout India as props in agricultural crops like banana, tomato, betel vine etc. The wood is used for manufacture of beams, boat building, electric poles, fences, furniture, gates, house posts, piling, rafters, tool handles, wagon wheels and yokes. It is one of the best firewoods in the world with high calorific value of 4950 kcal/kg. Extensively used as a fuel and also used for the manufacture of charcoal. It also burns when green. In fact when the tree is felled, it is converted and marketed in atleast 4 forms: Stumps, thicker branches, finer branches with needles and billets of 1m length. These products meet the various needs of both the rich and the poor. The stumps are exceptionally good for making charcoal.

The wood is suitable for paper pulp and is a promising raw material for the manufacture of paper for writing, printing and wrapping. It can also be used to prepare hard boards and chip boards. The bark is reddish maroon and blue black in colour and is a tonic and astringent. It is useful in treating diarrhoea and dysentery. Its powder is used for the treatment of acne. A lotion of it is reported to be efficacious as gargle for soar throat, in beri-beri, in coughs, ulcers, constipation and stomach ache. The bark contains catechol type tannins (6-18%). The fresh bark is commonly rubbed on the fishing lines to toughen and preserve the fishing nets.

The needles are made into compost and are used as manure. They are powdered and

boiled in oil and applied as a remedy in diseases of the ear. Their extract exhibited anti-cancer activity. Phytosterol from the leaves of the plant has been reported on hypoglycemic, molluscicidal, cytotoxic and used to treat nervous disorders, diarrhea and gonorrhea. The tree is important culturally since its bark is widely used in traditional medicines for treating digestive tract problems and other ailments.

Use in environmental conservation

Casuarina forms good shelter belt plantation and also helps in stabilizing sand dunes. *C. equisetifolia* plantation has the potential to sequestrate atmospheric CO_2 and contributes to the regional C cycling.Extensive shelter belt plantations are raised in coastal areas of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala and Karnataka. It protects soil erosion by reducing wind speed. The fine network of sub-surface roots also protects the soil against rain and wind. Because of its capability to fix atmospheric nitrogen, it improves the environmentally degraded soils.

It also reported that negative environmental impacts of Casuarina invasion include displacement of native flora and fauna (Abe et al. 2011), blockage of sea turtle and crocodile nesting habitats by downed trees (Davis and Whiting 1977) and respiratory irritation caused via pollen load (Fly 1952).

Soil conservation and reclamation

The plant is extensively cultivated in coastal region for soil reclamation and for control of soil erosion. By planting this species, numerous stretches of land on the sea coast have been reclaimed, where other species can be subsequently introduced. This is suitable for grassy banks, estuaries, river banks and water ways also. It is grown as evergreen hedges, shelter belts, wind breaks, avenue trees and as sand binder. It is also recommended for Agroforestry and Social Forestry (Zoysa, 2008).

Allelopathic effect

Jian et al (2013) reported that quercetin-3-α-araboside and quercetin-3-β- glucoside were recognized as biologically activeallelochmicals in *C. equisetifolia* that are responsible for the autotoxicity in Casuarina plantations. Deng et al. (1996) also mentioned that Kaempferol-3-α-rhamnoside and luteolin-3, 4-dimethoxy-7-β-rhamnoside were also isolated and identified as autotoxins in *C. equisetifolia.*

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बबूल (*एकेशिया निलोटिका* लिन.) के असामान्य मूलांकुर

डॉ. ममता पुरोहित एवं डॉ. राजेश कुमार मिश्रा
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बीज परीक्षण के दौरान सामान्य बीजांकुरों की पहचान एक आवश्यक प्रक्रिया है क्योंकि कायिक व कार्यिक रूप से विकसित पौधे ही वृक्ष बनते हैं । सर्वप्रथम विरिंगा एवं लीनडरटज (1928) तथा सबलीन (1929) के प्रयोग परिणामों ने बीज विशेषज्ञों का ध्यान कृत्रिक माध्यम पर अंकुरण सम्बंधी अध्ययनों के दौरान बीजांकुरों के आकारकीय विकास की तरफ आकर्षित किया जिससे सामान्य एवं असामान्य बीजांकुरों की पहचान हो सके ।

बबूल या कीकर (*एकेशिया निलोटिका*) माइमेसेसी कुल का सदाबहार बहुउपयोगी लघु वृक्ष है जिसका विस्तृत भौगोलिक वितरण है । शुष्क दशाओं में अच्छी तरह वृद्धी करने के कारण बबूल का गोंद, टेनिन, ईंधन, इमारती लकड़ी, औषधीय उपयोग व लाख कीटपालन के लिए भारत के शुष्क व अर्ध शुष्क क्षेत्रों में वृहद पैमाने पर वृक्षारोपण किया जा रहा है । वृक्षारोपण के अलावा कृषि वानिकी पद्धति में भी बबूल को सफलतापूर्वक लगाया जा रहा है । प्रस्तुत लेख में बबूल के असामान्य मूलांकुरों का उल्लेख किया गया है जो प्रयोगशाला में अंकुरण सम्बंधी अध्ययन के दौरान देखे गये हैं ।

प्रयोग विधी

बबूल की परिपक्व फल्लियाँ मार्च्च 2014 में उष्णकटिबंधीय वन अनुसंधान संस्थान परिसर में एकत्रित की गई । धूप में सुखाई गई फल्लियों को लकड़ी के हथौड़े से कूटकर बीज निकाले गये । अंकुरण प्रतिशत ज्ञात करने के लिए बबूल के 400 बीजों को 100- 100 बीजों के चार समुच्चयों में 5 मिनिट के लिए 70° सेल्सियस वाले गर्म पानी में (आग से हटाकर) डाला गया एवं 24 घंटे के लिए उसी पानी में डुबाकर रखा गया । इस तरह उपचारित 400 बीजों को 100- 100 बीजों के चार समुच्चयों में विभक्त कर (आई. एस. टी. ए. 1996) 30° सेल्सियस पर नम जर्मीनेशन पेपर पर गर्मीनेशन के लिए रखा गया । बीजों को नम बनाये रखने कि लिए आसुत जल का आवश्यकतानुसार छिड़काव किया गया एवं परीक्षण काल (28 दिन) के अंत तक प्रतिदिन नियत समय पर अंकुरित बीजों की सँख्या दर्ज की गई । अकारकीय अध्ययन के आधार पर सामान्य एवं असामान्य बीजांकुरों को वर्गीकृत किया गया।

अवलोकन

बबूल के एकत्रित किये गये ताजा बीजों में गर्म पानी के उपचार के पश्चात 65 प्रतिशत अंकुरण

पाया गया। कुल अम्कुरित बीजों में 62.5

छायाचित्र - अ

प्रतिशत बीजांकुर सामान्य प्रकार के थे अर्थात प्रांकुर एवं मूलांकुर (मूसला जड़) का आकारकीय दृष्टि से विकास सामान्य (छायाचित्र अ - 1) था जबकि 2.5 प्रतिशत बीजांकुरों में एक मूलांकुर का विकास न होकरउसके स्थान दो (छायचित्र अ- 4), तीन (छायचित्र अ- 3) या अधिक (छायचित्र अ- 2) रेशेदार मूलांकुर/जड़ें विकसित हुईं। यह भी देखा गया कि एक प्रांकुर व एक मूलांकुर वाले सामान्य बीजांकुर तो वृद्धि करते है परन्तु एक से दअधिक मूलांकुरों /जड़ों वाले बीजांकुर आगे वृद्धि नहीं कर सके।

स्पष्टीकरण

आनुवांशिक अनियमितताओं के कारण बीजांकुरों में आकारकीय असामान्यता आती है तथा विकास के लिए आवश्यक रचनाओं जैसे प्रांकुर, मूलांकुर, बीजपत्र आदि में आकारकीय असामानता होने से बीजांकुर पूर्ण वृद्धि प्राप्त पाधे/वृक्ष नहीं बन पाते हैं।

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Aboriginal remedial plants for piles

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Abstract

The existing report is rigorous on the ethnic knowledge of aboriginal remedial medicinal plants curing in piles by pastoral people of Telangana, India. A total of 17 species were recorded as natural therapeutic plants treating in piles. Of individual's species, representing 16 families. The extreme, herbs were in the information are measured. In the present results the importances of the aboriginal remedial plants wisdom have been observed. apart from efforts are ruined to educate the further generations about their importance, it may be missing in future. This diversity of information might contribute comprehensively in modern drug conniving or in government policies to advancement contemporary innovative drug design systems in rural, folkloric areas, and in the enhancement of advance formulas with reference to aboriginal remedial medicinal pants.

Introduction

The importance of aboriginal remedial medicinal plants in treating piles has not been documented perfectly from rural, folkloric background of Indian society. India has been considered a rich in biodiversity of medicinal plants and their aboriginal cleverness (Piermattei D L. *et al.,* 2006). Piles are very common in around the Mahabubnagar. Due to high temperature water conditions different than other areas of the same district.

Piles are inflammation of the blood vessel that generally nearby in anal canal. The piles are produce when the anal cushions are disrupted by the power of defecation. The stool uniformity and defecator routine for countless wounded are almost positively to clam. The smash up is increases due to hard stools which is vigor of shearing. There are two types of piles, internal piles and external piles. Interior piles expand inside, along the anal. The common symptoms of internal piles are the painless blood loss. The internal piles are the totally prolapsed. Exterior piles extend close to the anus. The color of external piles is same as the skin. The outside piles form a thrombus. The outside piles are painful. When the external pile ruptures it bleed. The blood loss is more disturbing and blood loss the typical cause for considering a doctor. Prolapsed is, on the other hand, anal dysfunctional special effects and the other undeniable warning sign soreness, impatient, are fewer dependable problem-solving criterion (Thomson, W.H., 2001).

The maximum people that living in villages have been using the home-grown plants for medicinal purpose. In view of the fact that ages because the information on the subject of local plants is transfers from generation to generation and it is based on the experiences lifelong. That people living in villages mostly have less suitable physical condition services because villages have long distance far away from the central cities. The

neighboring people use the several plants or parts of plants in the earliest therapeutic prose in curing the diseases such as piles (Rani, S et al., 2013). The extract has the super enzymes which originate from the plants, that is used to treat the trouble of piles (Chauhan, R et al ., 2012).

Piles are haemorrhoids which are enlarged veins located in lower part of anus and rectum. These veins become inflamed because of increased pressure within them. Piles can be of two types, one is the internal piles and the other is the external piles and can be of different sizes. Internal piles generally effects within 2 to 4 cm above the opening of rectum. Internal piles are more common which are painless but makes presence known due to bleeding with movement of bowel which is the only sign of this. They may cause prolapse through the rectum. The other type of piles is the external piles, medically termed as perianal hematoma which affects the outer side of the rectum. One can see and feel it and is very uncomfortable. Sometimes blood clots are formed within the external haemorrhoids which causes extreme pain. When external piles become thrombosed, it looks more frightening accompanied by significant pain. Anal pain and bleeding is an alarm against piles and one should think about piles treatment at home in bleeding.

As no appropriate medical rehabilitation is accessible for such piles, it is imperative to search for some new or less known medicinal plants, which are potential source for new bioactive compounds of theraptic significance.

The current work is an effort to document and analyze the ethnic facts concerning the custom and exploit of aboriginal remedial medicinal plants in healing in treating piles. So that the present work carried out around the villages of Mahabubnagar district head quarter of Telangana.

Methodology

A digit of countryside trips were undertaken in south districts of study area (Fig. 1). At each one time of trip, diverse folkloric and forest or rural people's information was collected in different seasons. The information was accrued after discussions with several users like village head, elder women and other local informants. Repeated interviews through questionnaires were made in diverse villages to substantiate the information. Plant specimens were collected and identified with regional floras (Gamble J S. 1928, Pullaiah T and Chennaiah. 1997, Pullaiah T and Moulali D A. 1997, Pullaiah T. 2015).

The study area Telangana is one of the southern states of India. This region is situated in the central stretch of the eastern seaboard of the Indian Peninsula. Telangana has an area of 114,840 square kilometres (44,300 sq mi). The area is divided into two main regions, the Eastern Ghats and the plains. Telangana lies between 15 50' – 19 55' North latitudes and 77 14' – 78 50' East longitudes. Telangana is bordered by the states of Maharashtra to the north and north-west, Karnataka to the west, Chattisgarh to the north-east and Odisha to the east and Andhra Pradesh to the south. The state is drained by two major rivers, with about 79% of the Godavari river catchment area and about 69% of the Krishna catchment area, but most of the land is arid. It is an extensive plateau with an average elevation of about 400 m above sea level. This plateau consists mainly of the ranges of erosion surface: (i) above 600 mt, (ii) from 300 – 450 mt and (iii) from 150 – 300 mt. The State Telangana has the

monsoon type of tropical climate. On the whole State enjoys warm climate. In northern Telangana tropical rainy type of climate prevails. Hot Steppe type of climate is noticed in the southern parts of the State. In Tropical Rainy type, the mean daily 0 temperature is above 20C with an annual rainfall of 150 to 200 cms, mostly in summer and South-West monsoon. In the Hot Steppe type, the mean daily temperature is 18C and less. In the state of Telangana Maximum temperature in the summer season varies between 37C and 44C and minimum temperature in the winter season ranging between 14C and 19C. The State has a wide variety of soils and they form into three broad categories - red, black and laterite. The type of forests met within Telangana, as per the classification of Champion and Seth are Tropical moist deciduous forests, Southern dry deciduous forests, Northern mixed dry deciduous forests, Dry savannah forests and Tropical dry evergreen scrub. In the Telangana there is about more than 20 tribes were recorded. Commonly they are located hilly and interior forest areas (Singh and Singh 2016). The research report focussing on a number of the important wild medicinal plants, which need to be documented for diverse usages in future.

Results

In the present report sum numerical of 17 species were recorded as natural therapeutic plants treating in piles. Of individual's species, representing 16 families. The extreme, herbs were in the information are measured. In the present results the importances of the aboriginal remedial plants wisdom have been observed. apart from efforts are ruined to educate the further generations about their importance, it may be missing in future. This diversity of information might contribute comprehensively in modern drug conniving or in government policies to advancement contemporary innovative drug design systems in rural, folkloric areas, and in the enhancement of advance formulas with reference to aboriginal remedial medicinal plants.

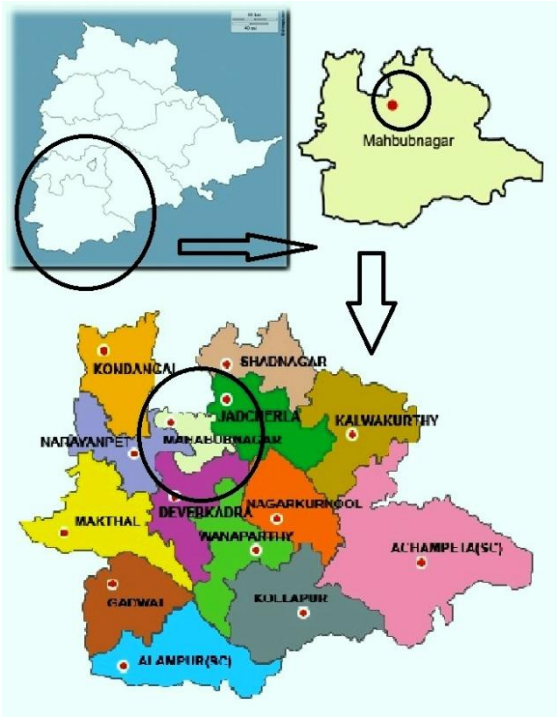

Figure 1: The study area: Villages of around the Mahabubnagar head quarter.

Abelmoschus manihot

Abutilon indicum

Achyranthes aspera

Adhatoda vasica

Aegle marmelos **L. Corr**

Aloe barbadensis

Aristolochia bracteata

Butea monosperma

Cocus nucifera

Gynandropsis pentaphylla

Gymnosporia Montana

Plumbago zeylanica

Mimosa pudica

Termina chubula

Ocimum basilicum

Tinospora cordifolia

Phyllanthus emblica

Conclusion

In the instant the people are escalating profusely, at the same time people are forgetting their aboriginal remedial medicinal plants information. The work outcome will be possessions on future health care. Subsequently, work into initiations are needed to undertake widespread education about their importance as a medicinally importance and as a direct and indirect source of safeguarding in health care system for the

Table-1: The important aboriginal remedial medicinal plants used in treating piles.

Botanical name	Family	Habitat	Local name	Part Used
Abelmoschus manihot	Malvaceae	Climber	Budda benda (Telugu), Athibala (Hindi).	Leaves juice
Abutilon indicum (Linn.) Sweet.	Malvaceae	Climber	Thuthura benda (Telugu), Athibala (Hindi).	latex
Achyranthes aspera	Amaranthaceae	shrub	Uttareni (Telugu), Aapang (Hindi).	Greeny Bark
Adhatoda vasica	Acanthaceae	Herb	Addasaramu (Telugu), Adoosa (Hindi).	Ripened leaves
Aegle marmelos	Rutaceae	Tree	Maaredu (Telugu), Bilva (Hindi).	Fruit pulp
Aloe barbadensis	Liliaceae	Herb	Kalabanda (Telugu), Gheekanvar (Hindi).	Bark peel
Aristolochia bracteata	Aristolochiaceae	Climber	Gaadaparaku (Telugu), Kitamar (Hindi).	Leaves
Butea monosperma	Papilionoideae	Tree	Mooduga (Telugu), palaas (Hindi).	Leaf base
Cocus nucifera	Arecaceae	Tree	Kobbari (Telugu), Nariyal (Hindi).	Roots
Gynandropsis pentaphylla	Capparidiaceae	Herb	Nya malle (Telugu), Zasmin (Hindi).	Young leaves
Gymnosporia montana	Celestraceae	Srub	Dantha (Telugu), Chota Dudhila (Hindi).	Bark
Mimosa pudica	Mimosaideae	Climber	Attipathi (Telugu), Lajjalu (Hindi).	Leaves
Ocimum basilicum	Lamiaceae	Herb	Advi tulsi (Telugu), Sabja (Hindi).	Leaves
Phyllanthus emblica	Euphorbiaceae	Tree	Usiri (Telugu), Amla (Hindi).	Fruit
Plumbago zeylanica	Plumbaginaceae	Herb	Agni maata (Telugu), chatawar (Hindi).	Leaves
Termina chubula	Combretaceae	Tree	Karka (Telugu), balahar (Hindi).	Fruit
Tinospora cordifolia (Willd.L).	Menispermeaceae	Climber	Thippa theega (Telugu), Guloye (Hindi).	Olden leaves, Seeds

future generations. A very few of the aboriginal remedial medicinal plants are available in the treating of piles. So, efforts must be affianced to safeguard aboriginal remedial medicinal plants and also the rustic brainpower for prospect health care systems.

Acknowledgement

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मैदा छालः एक विलुप्त होती प्रजाति

योगेश पारधी एवं डॉ. नसीर मोहम्मद
आनुवांशिकी एवं पादप प्रजनन प्रभाग
उष्णकटिबंधीय अनुसंधान संस्थान, जबलपुर

भारत विश्व के सबसे बडे जैवविविधता पूर्ण देशो में से एक है। भारत की जैवविविधता की दृष्टि से सम्पन्नता इसे विश्व में अलग पहचान दिलाती है। आदि काल से ही मानव प्रकृति से जुडा रहा है तथा अपने जीवन यापन की समस्त आवश्यकताओं की पूर्ति के लिए प्रकृति पर निर्भर रहता है। वर्तमान

मैदा छाल के बीज

परिदृष्य में मानव ने प्रकृति का अंधाधुंध दोहन किया है । इसके पीछे मुख्य वजह औद्योगिकीकरण की क्रांति से उपजी मानव की यह सोच है की प्रकृति के विदोहन से ही पूर्ण विकास सम्भव है। प्रकृति का ख्याल रखे बिना मानव ने प्राकृतिक संसाधनों का अतिशय दोहन किया जिसके परिणामस्वरूप बहुत सारे जीव जन्तु एवं प्राकृतिक वनस्पति या तो विलुप्त हो गए या विलुप्ति की कगार पर आ खडे हुए हैं।

उन्ही में से एक प्राकृतिक वनस्पति मैदा छाल का वृक्ष है जो अत्यंत ही गुणकारी व लाभप्रद

मैदा छाल के पौधे

प्राकृतिक वनस्पति है जिसका उपयोग हम विभिन्न बीमारियों एवं व्याधियों के उपचार में करते हैं। मैदा छाल का वृक्ष भारत, श्रीलंका, चीन, भूटान, म्यान्मार, नेपाल, थाइलैंड वियतनाम में पाया जाता है । मैदा वृक्ष के विभिन्न भाग जैसे छाल, जड़, पत्तियाँ एवं बीज

इत्यादि उपयोग में लाये जाते हैं। मैदा छाल का पाउडर Bacterial & Fungal Infection की

मैदा छाल के अत्यधिक विदोहन का दृष्य

दवाईयां बनाने में उपयोगी होता है। मैदा की छाल में बहुत सारे रासायनिक तत्व उपस्थित रहते हैं जैसे - एल्केलाइडस, प्लेवेनाइ, ग्लायकोसाइड, फिनाल, टेनिन और सेपोनीन आदि। इन रासायनिक तत्व की मौजूदगी इस पेड़ की उपयोगिता सिद्ध करती है। आमतौर पर ग्रामीण जनता इसकी छाल का उपयोग डायरिया, दस्त, घाव, सूजन, कमर दर्द व हडडी के टूटने पर करती है। इसकी गीली छाल को पीसने पर एक लसलसा तरल द्रव निकलता है जिसे ग्रामीण लोग हडडी के टूटे हिस्से पर लगाकर मजबूती से बांध देते है जिससे हडडी जुड जाती है। धारदार हथियार से घाव होने पर ग्रामीण जन इसकी छाल के रस को प्रतिजेविक की तरह इस्तेमाल करते हैं। इसकी छाल पेट सम्बन्धी व्याधि के उपचार में उपयोग की जाती है। इसका बीज भी बहुत लाभकारी व उपयोगी होता है। इसके बीज में एरोमेटिक आईल होता है जिसका उपयोग अगरवत्ती बनाने में किया जाता है। मेदा छाल का स्वाद कसैला होता है। ऐसी मान्यता है कि इसकी छाल के रस को पेय की तरह से इस्तेमाल करने से शरीर की शक्ति में वृद्धि होती है। मेदा छाल का उपयोग प्राकृतिक शैम्पू के तौर पर भी किया जाता है।

मैदा के छाल व बीज के बिना अगरबत्ती उद्योग अधूरा है। अगरबत्ती उद्योग में इसकी छाल का उपयोग बहुतायत में होता है। यही वजह है कि इसकी छाल का अंधाधुंध दोहन किया जा रहा है। जिसकी वजह से इसके विलुप्त प्रजाति की श्रेणी में आने में देर न लगेगी। अगरबत्ती उद्योग व प्राकृतिक दवाई बनाने व रोगो के उपचार करने में बडी मात्रा में जरूरत होने की वजह से इसका तेजी से दोहन किया जा रहा है। औषधीय गुणों

से परिपूर्ण होने की वजह से इसकी राष्ट्रीय व अन्तर्राष्ट्रीय स्तर पर अच्छी मांग है। यद्यपि बहुत सारे व्यापारी इसके औषधीय गुणों से पूर्णतः परिचित नही है परन्तु इसकी बाजार में बढती मांग के प्रति सजग अवश्य ही है । शायद यही वजह है कि ये ग्रामीण जनता पर इसके अनैतिक तरीके से अत्यधिक दोहन का दबाव बनाते हैं। ताकि ग्रामीण जनता के माध्यम से छाल एकत्र कर बाजार में विक्रय की जा सके। मांग की पूर्ति करने के लिए ग्रामीण जन गलत तरीके से पेड़ से छाल निकालते है । व्यावसायिक दृष्टि से उनका उददेश्य ज्यादा से ज्यादा छाल प्राप्त करना होता है इस बजह से पेड मर जाता है। यही वजह है कि इसकी संख्या दिन व दिन कम होती जा रही है। इस दिशा में बचाव के तौर पर वन विभाग को इसके छाल निष्कर्षण पर प्रतिबंध लगाना चाहिए तथा वन अधिकार समिति के माध्यम से इन पर कडी निगरानी रखनी चाहिए तथा जो इस गैर कानूनी व अनैतिक व्यापार में लिप्त है उनके लिए सख्त सजा का प्रावधान करना चाहिए।

वर्तमान स्थिति को देखते हुए इस बात का सहज ही आंकलन किया जा सकता है कि वह दिन दूर नही जब मैदा छाल का पेड विलुप्त श्रेणी के पौधों में शामिल हो चुका होगा । हमने छत्तीसगढ, मध्यप्रदेश के करीब 15 जिलों में वन दौरा किया तथा वहां पर मेदा पेड की वर्तमान स्थिति का आंकलन किया तो जाना कि मैदा के पेड से निरन्तर व बिना समयांतराल छाल निकालने से पेड़ सूख जाता है। शायद यही कारण है कि यह पेड़ विलुप्ति की कगार पर आ खड़ा हुआ है।

अत्यधिक विदोहन से मृत मैदा छाल का वृक्ष

इस प्रजाति में नर एवं मादा वृक्ष अलग-अलग होते है। माह जून-जुलाई में फूल आना शुरू हो जाते है एवं अक्टूबर के अंत में फल तोड़ने लायक हो जाते है। इस प्रजाति का प्रसार बीजों द्वारा आसानी से किया जा सकता है। बीजो को मई माह में "sand : soil : FYM" के मिश्रण में बोना चाहिए। 20 से 30 दिनों के बाद अंकुरण होना शुरू हो जाता है। अंकुरण का प्रतिशत 28 से 30 प्रतिशत के लगभग रहता है। स्थानीय लोगों ने हमे बताया कि यदि मैदा छाल को एक निश्चित समयांतराल के बाद निकाले तो इसे नष्ट

होने से बचाया जा सकता है । यह एक बेहतर विकल्प है जिसके द्वारा हम इसे बिना नुकसान पहुंचाए इससे छाल प्राप्त कर सकते हैं ।

वर्तमान समय में मध्यभारत में इसके अनैतिक व्यापार की वजह से मैदा छाल के वृक्षों की संख्या में आई कमी ने मुझे इस लेख को लिखने के लिए प्रेरित किया । मुझे व्यक्तिगत रूप से यह महसूस हुआ कि इसकी संख्या में आ रही कमी को रोकने के लिए वन विभाग को इस प्रजाति के प्लान्टेशन को बढावा देना चाहिए । इस प्रजाति का समावेश ग्रीन इंडिया मिशन, नेशनल एफारेस्टेशन प्रोग्राम जैसी बड़ी परियोजनाओं में कर इस उदेश्य की प्राप्ति की जा सकती है । अन्यथा वह दिन दूर नही जब मैदा पेड इस वन से गायब हो जाएगा ।

Potter spray tower

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The Potter Spray Tower has been named after C. Potter, who has developed this spray apparatus at Rothamsted Experimental Station, Harpenden, Herts, England (Potter, 1952).

The Potter Tower is internationally recognised as the standard of reference for chemical spraying techniques in the laboratory. This type of apparatus is required for studying the biological effects of contact poisons on organisms.

The tower is manufactured from an attractively finished high grade of stainless steel. Height of potter spray tower is 120 cm. Its standard sample reservoir capacity is 20 cc. Its operating pressure is 151b/sq.in. The Tower contains quickly detachable atomizers and a pneumatically operated spray table, with all controls mounted conveniently at the front. This air operated spraying apparatus applies an even deposit of spray over a circular area of 9cm diameter. Throughout industry and research there are increased tighter controls on the handling and use of pesticides both in the field and the laboratory. Potters spray tower is developed to prevent the operator exposure and contamination to the toxins/ pesticides. The load-unload pneumatic option for the Potter Tower eliminates the need for operators to manually place petri dishes on the spray table immediately beneath the spray tube and therefore avoids the risk of contamination. With an automatic operating cycle and the

Potter Precision Laboratory Spray Tower (Manual load) (make-Burkard Scientific, England)

pneumatic on/off switch mounted outside of the fume cupboard loading and unloading of petri dishes can now be made well clear of harmful pesticides. This design offers a smoother elevation of the table and prevents the air from passing to the atomizer until the table is finally positioned.

Principle

It works on the principle of constant atmospheric pressure i.e 151b/sq.in. Constant supply of 151b/sq.in through the input connection controlled by an on/off switch and exhaust valve. Fine adjustment is made by a sensitive needle valve on the left hand side of the instrument giving direct reading on the pressure gauge, or manometer (which is supplied as an extra). This pressure operates the air jack and nozzle head simultaneously.

Uses

It is suitable for studying the biological effects of chemicals both when applied as a direct spray on the organisms or as a residual film. The automatic safety load-unload system allows operators to place petri dishes on the spray table away from the spray tube and therefore avoids the risk of contamination with hazardous materials. This design offers a smoother elevation of the table and prevents the air from passing to the atomiser until the table is finally positioned. The automatic operating cycle enables increases in processing speeds.

References

Potter, C. (1952). An improved laboratory apparatus for applying direct sprays and surface films, with data on the electrostatic charge on atomized spray fluids. Annals of Applied Biology 39 (1): 1-28.

Potter Spray Tower (make: Burkard Scientific, England) along with air compressor at Forest Entomology Division, Tropical Forest Research Institute, Jabalpur

Know Your Biodiversity

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Himalayan Forest Research Institute, Shimla (H.P.)

Treron phoenicoptera

Treron phoenicoptera commonly known as **Yellow footed green pigeon and** Harial. It belongs to order Columbiformes and family Columbidae. They are commonly found in India, Sri Lanka, Burma, Pakistan, Nepal, Bangladesh, China, Thailand, Cambodia, and Indochina. These birds commonly found in semi evergreen forests, deciduous forest, scrubland at altitude up to 800 m from mean sea level. It is state bird of Maharashtra.

It is a beautiful bird with yellowish olive-green body and blue grey crown. Neck usually dark golden olive-yellow tinged greenish and mauve shoulder. Abdomen dull green with greyer flanks and bright sulphur-yellow lower belly and bright yellow legs. Female is slightly duller than male.

They are social birds and usually found in pairs or in small groups on the tops of emergent trees. They are gregarious and arboreal. Flight of the bird is noisy, swift and strong. Yellow footed green pigeons are herbivores and feed on various buds, shoots, fruits, berries and grains. They forage in flocks.

The breeding season of birds is in between March to June. During the courtship the male puffs out his throat and breast, lowers his wings, ruffles out his feathers, then prances solemnly up and down the branch, continually bowing his head and whistling softly. Sometimes the female responds with a similar but less intense version of this display. Nest is a relatively slight platform of twigs in a tree or shrub. Female lays eggs are 1 to 2 in number which are white and glossy in color. Incubation period is between 13 - 15 days and both the sexes share caring towards their young ones.

This species has an extremely large range and population size which has not been quantified and the population of these birds appears to be stable. According IUCN and Schedule – IV, Wildlife Protection Act, 1972 it is classified as Least Concern (LC). Yet it may be noted that the present population status of *Treron phoenicoptera* in the wild is unknown and some evidences suggest that the species might be facing serious threat from habitat loss and hunting. Long-term population monitoring and ecological studies are required immediately to know its population trends and for the conservation of abundantly available *Treron phoenicoptera* which might become rare and threatened in the near future if left unchecked.

Aegle marmelos

Aegle marmelos is a sacred tree commonly known as Quince, Golden Apple, Indian Quince, Stone Apple, Bael, Bengal

Adhararuha, Bilva, Haridyagandha and

Pitphala. Bael is the only member of the monotypic genus *Aegle* which belongs to order Sapindales and family Rutaceae. It is widely distributed in Southeast Asia. It is present in the states of Himachal Pradesh, Uttar Pradesh, West Bengal, Tripura, Maharashtra, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. In India, the natural presence of this species is restricted to the tropical areas receiving a mean annual rainfall of 500-2000 mm. Bael tree has its origin from Eastern Ghat and Central India. The tree is considered to be sacred and the fruits are used in traditional medicine and as a food in its range.

It is slow growing, medium sized, aromatic, deciduous tree. Bark is bluish-grey, irregularly broken on older stems. Leaves alternate, pinnately trifoliolate, occasionally 5-foliolate, dimorphic. Petioles are slender, glabrous when young. Leaflets are elliptic-lanceolate, articulated, often on an extension of rachis. Inflorescences are axillary or terminal, racemose or cymose, few flowered and peduncles densely puberulent. Flowers are subglobose in bud and fragrant. Calyx is cupular with 5 small sub orbicular teeth, lobes obtuse. Petals are 4 or 5 in number, ovate-oblong, glandular, gland-dotted, glabrous and greenish white. Stamens are numerous. Anthers are linear-oblong and apiculate. Disc is cylindrical, greenish and glabrous. Ovary is ovoid-oblong, faintly ridged, glabrous and greenish. Fruits (Berries) are sub-globose, woody, grey to yellowish. Seeds many, oblong, flattened, large, embedded in a sweet thick flesh coloured mucilaginous pulp. Flowering and fruiting season is between March-December.

Marmelosin is the active constituent in Bael. The roots are one of the ingredients of 'Dasamool' of Ayurveda. Leaves consist of essential oils a and b-phellandrene and the powder of bael leaves has an anti-diabetic effect. Juice of bael leaves with black pepper taken three times a day is used to cure jaundice. When there is pain and redness in eyes, poultice of bael leaves applied on eyes gives good result. Oil prepared by boiling bael's soft leaves with cow urine, sesame oil and goat milk in the ratio of 1: 4:8 is useful in ear diseases. Bael leaves soaked overnight in water and the water is drunk in the morning which gives relief in pain and discomfort in peptic ulcers. Bark of bael contains coumarin and umbelliferone and used to cure intermittent fever. In stress, insomnia and feeling of nervousness milk boiled with bark of bael tree give good result.

Ripe fruits are edible. Jam is also prepared from the fruit and eaten as health tonic. They act as a laxative, diuretic and in strong doses as a cardiac depressant. Unripe or half-ripe fruits are astringent, digestive and stomachic. The pulp is aromatic, cooling and is used in the form of sharbets. Syrup made of pulp of bael fruit, with tamarind is useful in burning sensation on skin, diarrhea, yellow coloration of skin, nausea etc. Muarraba of bael is highly useful in diarrhea, especially when there is bleeding. Gummy substance around the seeds serves as an adhesive. It

is more abundant in young fruits and used as a varnish for pictures, and adds brilliancy to water colour paints. Besides medicinal use, different parts of the plant especially leave are used in religious rituals especially in Shivratri festival. Leaves are offered in prayers to deities Lord Shiva and Parvati and thus the tree is also known as Shivaduma (the tree of Shiva).

Bael has been used for the number of ethno-botanical purposes throughout its range since ancient times and it is highly important source of medicine to cure different human and animal diseases due to its various phytochemicals. Apart from this people are also dependent on this plant for their different rituals viz. festivals, marriages and death ceremonies. Hence conservation of this plant is very important for the exploring possibilities to prepare standardized drugs and for the livelihood of local people.

Refernce

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