

## **LAC HOSTS AND GUM-YIELDING TREES FOR AGRO-FORESTRY IN JHARKHAND**

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### **INTRODUCTION**

Agriculture production strategies normally tend to focus on maximizing cultivation or productivity of a single crop; temporal and spatial crop combinations/sequences are also addressed. Indian agricultural scenario stands in contrast, in several respects, compared to other leading countries in agricultural production, such as : engagement of a large proportion of work force (about two-thirds, manpower intensive) of the country, low productivity, fragmented agricultural holdings, large area under rain-fed farming and source of livelihood to over 700 million people. Taking these into consideration and the psycho-socio-economic conditions of a large section of Indian farmers, especially in States like Jharkhand, there is need for development of appropriate agricultural technologies.

In the past, productivity was the basic tenet around which Indian agricultural development revolved. With greater emphasis on sustainability, livelihood, etc. systems approach is being promoted for agricultural production especially in resource-constrained regions. Father of green revolution in India, Dr MS Swaminathan, in his prescription for the agricultural development of the country included agro-forestry and other sustainable land use systems, especially in the fields of resource-poor farmers.

Though a number of definitions are available in the literature, the following one by World Agroforestry Centre appears quite appropriate and comprehensive: “Agroforestry is a dynamic, ecologically based, natural resource management practice that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits.”

Agroforestry has greater relevance to states like Jharkhand, in view of the nature of land and the people. We attempt here to examine here the agricultural scenario of Jharkhand, the benefits of agro-forestry systems and also the potential lac host and gum-yielding plants for agroforestry.

### **AGRICULTURE SCENARIO OF JHARKHAND**

The agriculture in Jharkhand is mainly for subsistence, basically rain-fed and the farmers follow a rice-based cropping system. Some factors affecting agriculture productivity of this region is summarized below:

- A large untapped land area and water resources
- Very low productivity
- Poorly developed irrigation facilities

- High runoff leading to soil erosion and fertility degradation
- Moisture stress, drought and soil acidity
- Non-availability of electricity
- Poor infrastructural facilities

## **AGROFORESTRY SYSTEMS**

It is said that growing trees with food crops had been practiced in during Vedic period in India. Basic elements of agroforestry are seen in several traditional farming systems in different regions of our country. For example, in Gujarat farmers retain trees species like *Acacia nilotica*, *A. catechu*, *Dalbergia sissoo*, *Mangifera indica*, *Ziziphus mauritiana* and *Gmelina arborea*, along with the crops. Similarly in Jharkhand, we find the farmers do not disturb the lac hosts like *Z. mauritiana* and *B. monosperma* in their fields and exploit them for lac production.

In the National Agriculture Policy (2000), the role of agroforestry was stressed for soil enrichment and for integrated and holistic development of rainfed areas through community involvement to augment biomass production. Introduction of agroforestry was also recommended for about 140 lakh ha of irrigated areas undergoing degradation due to soil erosion, salanization and water logging.

Realizing the importance of agroforestry research, the ICAR, the apex body for agricultural research in the country, established the National Research Centre for Agroforestry, Jhansi in 1988; All India Co-ordinated Research Project on Agroforestry is also located here with 36 cooperating centres.

The rationale behind development of agroforestry systems is summarized below:

- Enhanced returns through synergistic interactions
- Livelihood and nutritional support the people esp. in areas of rain-fed agriculture
- Improved resource management
- Ecosystem development
- Reduction of pressure on forests

Agroforestry is a system approach to farming and has several advantages. The benefits of integrating tree species with agricultural crops can be viewed from various angles.

### **To the farmer**

- Enhanced economic returns
- Food and nutritional security
- Reduction of total crop failure common in mono cropping
- Continuous income due to diversification of activities

### **To the system (by the tree component)**

- As shelter-belts and wind-breaks

- Source of fuel-wood, poles or pulp-wood in industry
- Improving soil health, organic matter enrichment
- Provides economic products
- Act as hosts for beneficial insects like lac, silk and honey
- Reduction of surface run offs, nutrient leaching,
- Act as live hedges
- Protection of intercrops and animals in the system
- Stimulation of soil microfauna and microflora
- Recycling of nutrients by trees from deeper layers
- Fodder availability for extended period in silvi-pastoral plots

#### **To the forestry and environment**

- Enhanced tree cover (TOFs)
- As a source of quality wood
- Effective system for carbon sequestration
- Protection of soil and water
- Improvement of biodiversity
- Improvement of microclimate

When we consider tree components to be included in the integrated models, it is desirable to choose species which would be able to provide income to the farmer on a sustainable basis. Multipurpose trees (MPTs) may be given greater importance for multiple benefit to the farmer

#### **TREES THAT SUPPORT BENEFICIAL INSECTS**

Beneficial insects are one of the important economic components of forest ecosystem. Their, exploitation had been historically linked with tribal economy especially in the Eastern Plateau and Hills Region, in which the whole of Jharkhand forms a part. Therefore, exploiting insects producing lac, silk and honey are important in terms reality and/or potentiality of their products. Besides, culturing of these insects is attractive in terms economic returns as well as suitable for the land and culture of people of region. They also form excellent components for agroforestry.

#### **Lac**

India is the largest producer of lac in the world. The mean lac production in the country had been estimated at 20,640 tons (2003-04 -- 2007-08). Chhattisgarh and are the top two lac producing States of the country. A recent survey of lac growers in Jharkhand showed that on an average income from lac cultivation was found to contribute 26.4 per cent of the farm income. The average annual income from lac was around Rs. 7,000 per family. Lac was a subsidiary crop for the growers who depend on it for meeting cash expenses towards family needs and cash purchase for their house hold requirements.

Conventional tree hosts of lac like *ber* (*Zizyphus mauritiana*) and *palas* (*Butea monosperma*) can easily be integrated in bunds of cropped fields. The former species can be included in strips at the periphery of uplands. *Ber* can be established in about 3 years for lac cultivation. The IINRG is currently working on such models suitable for farmers in Jharkhand. Other quick-growing bushy hosts like *Flemingia semialata* hold potential for integration in farming system models. *F. semialata* is quite promising for production winter *kusmi* lac under rainfed condition. It can be raised in the bunds easily for lac production. *Albizia procera*, which has been recently identified as lac host is also a good multipurpose tree for introduction in farmers and fields.

Since returns through lac is higher than agricultural crops introduction of lac hosts in the farmers' field leads to overall improvement in returns. Thus lac cultivation can contribute towards income security while crops like paddy, vegetables, etc. can provide for nutritional security.

### **Silk and Honey**

All the four known varieties of silk, viz., Mulberry, Tasar, Eri and Muga are cultivated in India and India ranks second in world's silk production. Jharkhand holds potential for production of especially, Tasar and Mulberry silk. The plants used in the silk production, such as *Terminalia tomentosa* (*asan*), *T. arjuna* (*arjun*) and *Shorea robusta* (*sal*) for tasar insect; the commonly used *Morus alba*, *M. indica*, *M. serrata* and *M latifolia* for mulberry insect; can be included in the agroforestry models. Central Tasar Research and Training Institute is already working tasar host plant-based models.

India produces about 70,000 t of honey, out of which 25-27,000 t is exported to various countries. India has four of the six reported honey bee species; *Apis dorsata*, *A. cerana indica*, and *A. mellifera* (introduced) are mainly used in India for honey production. Honey bees are not only important for their honey but are also of paramount importance to agriculture production and plant diversity, as pollinators. There had been a world-wide decline in the population of honey bees and in India the decline had been estimated at >40% during the past quarter century. This promotion of apiculture results in other benefits to the agricultural production due to their role as pollinators. The region has potential for both forest and cultured honey. The region already has a vast reservoir of bee plants and there is scope for inclusion such plants in the forestry component of the integrated models. A number of bee plants have been identified by CBRI, Pune for different climatic conditions and purposes, which can be included in the agroforestry systems.

### **GUM YIELDING TREES**

The gross value of goods and services provided by the forestry sector is estimated at an average of Rs. 26,330 crores *i.e.*, about 2.37 % of GDP. Of this recorded forest revenue about 60% comes from minor forest products including gums and resins. This sector supports about 50 million population inhabiting forests and sub-forest areas providing 70% of employment (about 1.6 million man-days) of forest sector.

Gums and resins form an important group of non-wood forest products. The industrial applications of gum and resin have expanded tremendously in recent years. They are used in many unrelated industries such as paper, textile, petroleum, pharmaceutical, cosmetics, food, varnishes, lacquers and soaps. Even though gum and resins is produced by a large number of

plants, their commercial exploitation is restricted to members of the Leguminosae, Sterculiaceae, Combretaceae, Pinaceae, Dipterocarpaceae, Burseraceae and Umbelliferae. Indonesia, India, China and Sudan are among the World's major producers of gums and resins. India annually produces about 2, 81,000 t which includes about 2, 24,000 t of gums, 55,500 t of resins and 1,500 t of gum-resins. India is traditionally largest producer of lac, guar gum and karaya gum.

It is an admitted fact that both the forests and their tribal and poor inhabitants should be viewed as integral components of environmental protection. The only way to ensure involvement of forest dwellers in forest protection is through promotion of minor forest products like natural resin and gum- based economic activities in these areas, to provide sustained income to these poor population.

Jharkhand endowed with a number of MPTs; very little is known about these and particularly the role of especially gums and resin yielding plants. Some of the gum and resin yielding plants act as excellent MPTs, particularly in challenged areas where raising other field crops is difficult. The latest forest survey of India report (2009) says that only 23% of the country's land is covered by trees. Government of India approved a scheme to plant forests in 2.42 lakh village panchayats to achieve the target to cover 33% of India's geographical area with trees by 2012.

Tree outside forests (TOFs) is gaining grounds among the planners of forestry sector in our country. Gum yielding trees species such as *Acacia senegal* ( yielding gum Arabic) and *Boswellia serrata* (yielding *salai guggul*) are potential species for agroforestry models in Jharkhand. Their planting in sufficient numbers can complement the efforts to increase the tree cover in the State. *A. senegal* yields gum Arabic which is used as food additive and in cosmetics. It also finds application in traditional medicine, rope making and for making small tools and parts. This species is native of Africa and introduced in India for gum production. *B. serrata* produces salai gum which is used for flavouring and in medicines.

## CONCLUSIONS

Jharkhand has great potential for agricultural production, which is largely underutilized. It is also a challenging region for the research and development workers in view of the psycho-socio-economic characteristics of the farming population. It is felt that farming systems including agroforestry are highly relevant to this region and there is need to develop models based on the existing cropping practices of the region. It would provide enhanced and sustained returns besides a number of other advantages. Rice-centric agroforestry models need to be developed integrating appropriate tree components. Some of the tree species which have potential for inclusion in agroforestry are lac hosts, bee plants and silk worm trees and gum producing plants. Choice of multipurpose trees would ensure enhanced benefits to the farmers. Integration of tree species in the agricultural practices has several advantages including enhanced returns to farmer, reduced risk, benefits to the system and the crops and environmental benefits.