

AGROFORESTRY IN INDIA: CURRENT STATUS AND CHALLENGES

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Agro forestry can be defined a science of designing and utilizing land management systems which involve integration of woody components such as trees, palms, bamboos, shrubs and agricultural crops including pasture/ animals, simultaneously on the same piece of land and at the same time, such that it satisfies the socio-economic as well as the ecological needs of the people. The development of agriculture over time and the desire of humans to bring more and more land under cultivation of crops has led to increased interaction with natural resources. Also, the increased demographic pressure due to rapid rise in population has forced man to derive maximum productivity out of the limited land resources. Important agro forestry practices include: silvopasture, alley cropping, Agri-horticulture, Agri-silviculture etc.



AGRO FORESTRY RESEARCH IN INDIA

Agro forestry research is over 100 years old in India, but organized research came to the forefront during the last century in some ICAR Institutes namely Central Soil and Water Conservation Research and Training Institute, Dehradun, Central Arid Zone Research Institute, Jodhpur, Indian Grassland and Fodder Research Institute, Jhansi. The research in this field has made us understand importance of agro forestry

in managing local ecosystems and satisfying the needs of the rural population. The research has also demonstrated that different agroforestry practices are prevalent in different parts of the country.

IMPORTANCE OF AGRO FORESTRY

Agro forestry systems, due to their ecological and economic importance, can significantly help to address major challenges to present day agriculture i.e. environmental health degradation, climate change and deteriorating economic conditions of farmers. In view of the present scenarios of degrading environmental health and climate change, they can play significant role by carbon sequestration and moderating climatic conditions. In addition to this, they can help in improving economic conditions of the farmers by enhancing total yield and input use efficiency.

ECOLOGICAL IMPORTANCE

- Limiting soil degradation and amelioration of problematic soils.
- Reduction in the groundwater pollution arising from high levels of fertilizer use.
- Reducing the impact of deforestation at a location.
- Controlling desertification in semi-arid regions.
- Increasing biodiversity within the farming system.
- Ensuring food availability and thereby reducing pressure on natural resources.

ECONOMIC IMPORTANCE

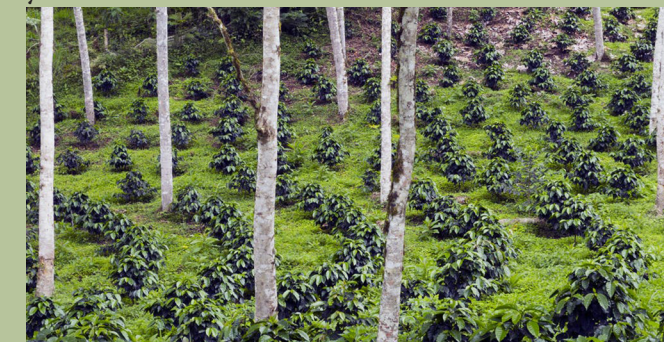
- Agro forestry systems cater to the needs of the population and also improve the land-use efficiency.
- Trees add leaf matter and other residues which eventually decompose to form humus. This improves soil fertility and reduces the fertilizer requirements.
- Higher yields can be obtained in fields managed under agroforestry systems. Around 20% increase in yields of grains and wood have been observed in Uttar Pradesh and Haryana under agroforestry models.

MAJOR TREES IN AGROFORESTRY SYSTEMS

- Arid and semi arid regions- *Dalbergia sissoo*, *Azadirachta indica*, *Ailanthus excelsa*, *Leucaena leucocephala*, *Acacia tortilis* and *Prosopis cineraria*
- Indo-Gangetic region- Eucalyptus, Poplars, *Acacia* and *Dalbergia sissoo*
- Coastal and island regions- *Casuarina equisetifolia*, *Pongamia*, *Artocarpus*, *Grevillea robusta* and *bamboos*
- Southern region- *Tamarindus indica*, Para rubber (*Hevea brasiliensis*), *Tectona grandis* and cashew nuts (*Anacardium occidentale*)
- Western Himalayan region- *Morus alba*, *Grewia optiva*, *Robina pseudoacaci* and *Ulmus wallichiana*
- North-eastern Himalayan region- *Acacia auriculaeformis*, *Parasarianthes falcataria*, *Alnus nepalensis*, Bamboos and *Gmelina arborea*

Examples of successful implementation of agroforestry systems

Popular cultivation in a system of poplar-wheat, developed at PAU, Ludhiana has led to tremendous opportunities in Punjab. The plywood industry has grown by 50% from 1993 to 2008 because farmers have started to adopt this model at their private lands. Due to its short duration and fast growing habit, poplar has become an important tree species in the area. Farmers grow poplar rows in wheat fields at a row distance such that it is enough to move agricultural machinery between them. Sapota-Teak based agroforestry system, developed by Dharwad centre, Karnataka has sapota as the base crop, teak grown in the sapota line and an agricultural crop in the interspaces. This agroforestry system improved the microclimatic conditions within the plantation. Also, it provided income for up to 180 man days per year.



CHALLENGES TO AGROFORESTRY IN INDIA

- There is lack of superior quality planting material and seed availability, only 10% of the planting material being of high quality.
- Insufficient research on agro forestry models also poses a challenge, providing limited information on their suitability in different regions.
- Infrastructure for marketing of produce from agro forestry is available only in few states. As a result, most of the profit is absorbed by middlemen, making agro forestry an economically unviable venture for farmers.
- Legislation regarding tree felling and wood transportation is complex and costly, which may prove to be a barrier in convincing a farmer to adopt an agro forestry model.

It is concluded that Agro forestry systems are sustainable land use systems which can maintain or enhance total yield by combining annual food crops with perennial tree crops on same unit of land by using the management practices most suitable to the social and cultural characteristics of the local people as well as economic and ecological conditions of that area. Thus, before implementing any plantation programme in an area, objectives should be clearly defined, keeping in view the problems related to soil, water or climate as well socio-economic status of the people. Thus, if implemented and managed properly based on systematic research, agro forestry systems can prove highly beneficial by improving environmental health, enhancing productivity and input use efficiency along with improving economic conditions of the farmers, which is need of the hour.

