

Review Article**Agroforestry Models of South Gujarat****Manmohan J. Dobriyal, *Mohit Husain, V.M. Prajapati and Jilariya Devanand**Department of Silviculture & Agroforestry,
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Received : 08.08.2019; **Accepted :** 12.09.2019**ABSTRACT**

This paper based on survey shows that most of the farmers of the region are growing mainly Horti-silvi (HS), Agri-silvi-horticulture (ASH), Agri-silviculture (AS), Agri-horticulture (AH), Homegardens (HG) and Horti-pasture (HP) systems at their fields. Farmers of this region are mainly adopting Horti-silviculture system as teak main tree components on boundary with sapota or mango as main crops. Some farmers are also adopting teak based paddy agroforestry systems (Agri-Silviculture system). These exiting agroforestry systems provide more return per unit area as compared to other existing agroforestry practices in these regions and also require less amount of irrigation water. These two systems are mainly based on rain water.

Figure : 00

References : 08

Table : 01

KEY WORDS : Agroforestry systems, Farmers, Production, South Gujarat.

Introduction

Agroforestry practices come in many forms but fall into two groups viz., first, is those that are sequential- such as fallows and second, those are simultaneous- such as alley-cropping¹. Among all, some 18 different agroforestry practices have some infinite number of variations to each other⁵. Agroforestry is generally practiced with the intention of developing a more efficient and sustainable form of land use that can improve farm productivity and the welfare of the rural community. The total area under Agroforestry in the world is 1023 mha (FAO, 2000). Maximum areas of Agroforestry in the world are found in South America (3.2 million square kilometre) followed by sub Saharan Africa that is 1.9 million square kilometre⁴. However the area under Agroforestry is increasing continuously. In India, in 2007 it was reported 7.4 million hectare⁸ but in 2013 it reached upto 25.32 million hectare². Gujarat has 6.86% of total geographical area under the forest cover and supply only 13% of all timber, 5% of all small timber (pole), and 18% of all fuelwood consumption in the state⁷. The rest is either imported from the adjoining states or gathered from wastelands, common grazing land and private holdings. The most wood based industrialised and thickly populated

belt of South Gujarat region need more raw materials and wood to fulfil the demand of growing population and industries for this region, so there is an imperative need to increase production of food, energy, fodder and building materials to satisfy the rapidly growing population. However, forest resources are under such an enormous pressure to meet requirements for fuel and fodder that the current rate of removal of trees exceeds the annual increment of the forest and is causing a rapid depletion in forest cover. Taking all these factors into account, it is simply not possible to ensure the survival of remaining forests by taking action solely within the boundaries of these forests. The ultimate answer lies outside the forests and especially by the introduction onto peasant farms of agroforestry practices in which trees can be grown for food, fodder and fuelwood, e.g. along field boundaries and on unutilized and underutilized corners of farms, home gardens etc. The tree component of agroforestry systems can greatly contribute to the restoration of shattered domestic rural economies, becoming a prized capital asset for resource-poor farmers, compensating for seasonal shortages, providing recurrent flows of food, fuel, fodder and other useful materials for rural industries, and conserving soil, water and human energy.

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Methodology

The present study was conducted in the selected districts of south Gujarat. Information related to existing agroforestry models were collected through the farmers during the farmers field visit at their farms. Total four district viz., Navsari, Valsad, Surat and Dang were selected to record the practised agroforestry systems by the farmers of this region. Total forty villages were selected, ten villages from each district, to conduct this survey to fulfil the objectives of the present study.

Result and Discussion

The present study revealed that farmers of different district of south Gujarat having different economic status have adopted peripheral and mixed planting almost to the same extent, with the number of marginal farmers being the same as the number of large farmers. Most of the farmers have prominently adopted six types of agroforestry systems viz., Horti-silviculture (HS), Agri-silvi-horticulture (ASH) Agri-silviculture (AS) Agri-horticulture (AH), Homegardens (HG) and Horti-pasture (HP) systems according to household requirements and livelihood security of this region (Table). Similar results were conducted by others⁶ and reported that the farmers of Navsari prominently adopted five types of agroforestry systems viz., Agri-silvi-horticulture, Agri-silviculture, Agri-horticulture, Homegardens and Horti-pasture according to their needs to achieve livelihood security. Both types of agroforestry are popular all over the villages of the selected district. Nine out of ten farmers raise teak and eucalyptus either in pure stands or in combination with agriculture crops mainly paddy crop. Similar results were

recorded in a study in which nine out of ten farmers raise eucalyptus either in pure or in combination with other tree species⁷. Other trees have not found very much favour due to climatic conditions and their socio-economic importance. The farmers of Valsad district are mainly growing mango orchard having teak as a boundary plantation component (Horti-silvicultural) along with sapota orchard for their livelihood security.

Meanwhile in the Dang district, Farmers are growing teak as a boundary plantation with paddy crop as a main crop in their farms. The reason behind this is that Dang received high rainfall during the rainy season and after that remains too dry. So the farmers of this reason grow only paddy during the monsoon. Due to scarcity of irrigated water during the dry months, farmers could not grow any other crop for their livelihood and domestic needs. Navsari district farmers are growing all the six types of recorded agroforestry systems along with observed nine species - Neem (*Azadirachta indica*), Deshi babool (*Acacia nilotica*), Nilgiri (*Eucalyptus spp.*), Sharu (*Casuarina spp.*), Ardusa (*Ailanthus spp.*), Teak (*Tectona grandis*), Subabool (*Leucanea leucocephala*), Bengali babool (*Acacia auriculiformis*) and Bamboo. These are dominant and economic species in agro-forestry plantations of south Gujarat region. Among the fruit species, Mango (*Mangifera indica*), Drum stick or Sargavo (*Moringa oleifera*), Sitafal or Custard apple (*Annona squamosa*), Aonla or Indian goose berry (*Embilca officinalis*), Bordi (*Zizyphus spp.*), Jamun (*Syzygium cumini*), Nariyal (*Cocos nucifera*), Chikoo (*Acrus sapota*), and Guava (*Psidium guajava*) are important tree species raised by the farmers for their basic needs and livelihood.

TABLE-1 : Recorded agroforestry systems of selected districts of south Gujarat

Sr. No.	Agroforestry system	Tree component	Agri./Horti. Crop
1.	Horti-silvi (HS)	Teak, Babool, Neem	Mango, sapota
2.	Agri-silvi-horticulture (ASH)	Teak, Sharu, Eucalyptus	Mango, sapota, Guava
3.	Agri-silviculture (AS)	Teak	Paddy, Mustard, Maize
4.	Agri-horticulture (AH)	-	Horti.- Mango, guava, sapota, jamun, coconut Agri.- Paddy, Mug, sugarcane, gram, pea, wheat
5.	Homegardens (HG)	Teak	Curcuma, cocus, banana, chilli, tomato, okra
6.	Horti-pasture (HP)	-	Horti.- Mango, sapota Pasture- Maize, Sorghum and lemon grass, vetiver, Napier grass Legume – Lucerne

Conclusion

Present study shows that the farmers prominently adopted six types of agroforestry systems viz., Horti-silviculture (HS), Agri-silvi-horticulture (ASH), Agri-silviculture (AS), Agri-horticulture (AH), Homegardens (HG) and Horti-pasture (HP) systems according to household requirements and livelihood security of this region. The

common practised systems recorded in these regions are mango+rice (AH), sugarcane+teak (AS), vegetables crop+mango+teak (HG) and sapota+grass+teak (ASH). These Agroforestry practices also provide indirect benefits to the farmers as work soil improver and addition more organic matters to release more nutrients for main crops. Teak based (boundary plantation) agroforestry practices are more common in the major districts of south Gujarat.

References

1. Cooper PJM, Leakey RR, Rao MR, Reynolds L. Agroforestry and the mitigation of land degradation in the humid and sub-humid tropics of Africa. *Experimental agriculture*. 1996; **32** (3): 235-290.
2. Dhyani SK, Handa A, Uma. Area under Agroforestry in India: An Assessment for Present Status and Future Perspective. *Indian Journal of Agroforestry*. 2013; **15** (1) : 1-11.
3. FAO. Forest resources assessment report. 2000.
4. Kumar P, Singh RP, Singh, AK, Kumar V. Quantification and distribution of agro forestry systems and practices at global level. *Hort. Flora Res. Spectrum*. 2014; **3** (1): 1-6.
5. Nair PKR. Agroforestry systems inventory. *Agroforestry Systems*. 1987; **5** (3): 301-317.
6. Singh NR, Arunachalam A, Bhusara JB, Dobryal MJ, Gunaga RP. Diversification of Agroforestry Systems in Navsari District of South Gujarat. *Indian Journal of Hill Farming*. 2017; **30** (1): 70-72.
7. Verma DPS. Agroforestry Practices of Gujarat State. *International Tree Crops Journal*. 1990; **6** (1): 17-30.
8. Zomer RJ, Bossio DA, Trabucco A, Yuanjie L, Gupta DC, Singh VP. Trees and Water: Small holder Agroforestry on Irrigated Lands in Northern India. International Water Management Institute, Colombo, Sri Lanka (Series: IWMI Research Reports, no. 122). 2007.