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Documentation of different Agroforestry Systems in Dry and Transition Zones of Hassan District

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Abstract

The present study was carried out in Dry and Transition zones of Hassan district in Karnataka state during 2015-2016 and 2016-2017 to document the agro-forestry systems practiced by farmers and also to know the profile of farmers practicing agro-forestry. A total of 180 farmers were interviewed using a pre-tested schedule. A larger proportion of farmers practicing agro-forestry were marginal farmers falling in the age group of 35-50 years and had studied upto secondary education. The results revealed that plantation based agro-forestry system was found to be the dominant agro-forestry system across the different zones of Hassan district. The major purpose of the practicing agro-forestry by the farmers were to get timber & other products and also for getting additional income.

Keywords: Agro-forestry, farming systems, dry and transition zone, aesthetic purpose

Integration of trees and crops on the farm land is an age old traditional practice practiced by the farmers mainly to attain the ecological benefits like shade, protection, soil conservation and also the economic benefits like, fuel wood, fodder, timber, food etc. These traditional agro-forestry systems adopted by the farmers are sustainable and profitable. Retention of trees on the farm land depends on the farmer preference, ecological condition of the region and land use pattern (Nair *et al.,* 2008).

Agro-forestry system includes both traditional and modern land use system, wherein trees are managed together with crops and / or livestock production in both irrigated and rainfed conditions. It produces multiple products and ecosystem services like soil and water conservation, carbon sequestration, decrease in deforestation, creation of microclimate and conservation of biodiversity (Anon., 2014). However, in recent days the trees on the landscape and traditional methods of agro-forestry systems are disappearing rapidly due to the intensification of agricultural production and change in land use pattern. Hassan district of Karnataka comprises of four agro-climatic zones with a total geographical area of 6.63 lakh ha, out of which agricultural area constitutes 4.49 lakh ha, forest area constitutes 59 thousand ha and trees and groves constitutes 7,000 ha (Anon., 2014).

With this background, the present study was undertaken with the following specific objectives:

1. To know the profile of farmers practicing agro-forestry.
2. To document the different agro-forestry systems practiced by farmers.
3. To examine the purpose of practicing agro-forestry as perceived by the farmers.

Material and Methods

A survey was conducted during the years 2015-16 and 2016-17 in seven taluks of Hassan district in Karnataka (Fig. 1). The district has four agro-climatic zones, out of which three zones were selected for the

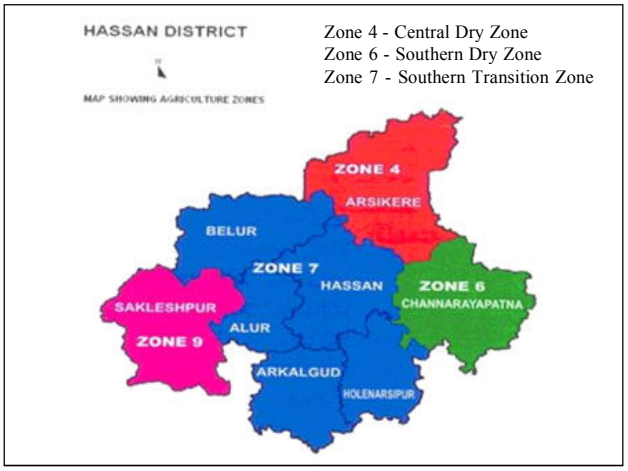

Fig. 1: Hassan district map with agroclimatic zones

study *viz.,* Central Dry Zone (Zone 4), Southern Dry Zone (Zone 6) and Southern Transition Zone (Zone 7). In each zone, ten villages were selected randomly from each village and six farmers practicing agro-forestry were interviewed from each village. The total sample constituted 180 farmers practicing agro-forestry. However, for ease of classification, agro-forestry systems in the district were sub-classified as follows :

a. Timber species + agricultural crops (*e.g.,* Teak based agro-forestry system)

b. Plantation species + agricultural crops (*e.g.,* Coconut based agro-forestry system)

c. Fruit based agro-forestry system (*e.g.,* Mango based agro-forestry system)

d. Short rotation tree based agro-forestry system (*e.g.,* Silver oak based Agro-forestry system)

Primary information was obtained from the farmers through personal interview using a pre-tested schedule. Secondary information was obtained from the government reports / records.

Results and Discussion

Distribution of farmers based on land holdings

It is observed from Table I that a greater proportion of the farmers practicing agro-forestry were marginal farmers (46%), whereas, 28, 14 and 12 per cent of them were small farmers, large farmers and medium farmers, respectively.

Distribution of farmers based on age

A majority of marginal farmers (54.22%) were belonging to 35-50 years age group, while 62.75 per cent of small farmers, 66.67 per cent of marginal farmers and 72.00 per cent of the large farmers were also of 35-50 years age group (Table II). About 60.56 per cent of the pooled sample were also of 35-50 years age group.

Table I

Distribution of farmers based on land holdings

(n=180)

Category	Frequency	Per cent
Marginal farmers	83	46
Small farmers	51	28
Madium farmers	21	12
Large farmers	25	14
Total	180	100

Distribution of farmers based on educational status

A larger number of marginal farmers (43.37%) had studied up to secondary education, whereas a majority of small farmers (52.94%) had also studied up to secondary education (Table III). The results in Table III also reveals that more number of marginal farmers (42.86%) and large farmers (42.31%) had also studied up to secondary education. As high as 46.11 per cent of the all the categories of farmers (pooled sample) have studied up to secondary education.

Different agro-forestry systems practiced by farmers in Hassan district

Agri-silivi, silvihorti and agri-silvpastoral agro-forestry systems were practiced by the farmers of

Table II

Distribution of age group of the farmers

Educational Status	Marginal farmers (n=83)		Small farmers (n=51)		Medium farmers (n=21)		Large farmers (n=25)		Pooled sample (n=180)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Below 35 years	14	16.87	9	17.65	6	28.57	3	12	32	17.78
35-50 years	45	54.22	32	62.75	14	66.67	18	72	109	60.56
Above 50 years	24	28.92	10	19.61	1	4.76	4	16	39	21.67

TABLE III

Distribution of different category of farmers based on their educational status

Educational Status	Marginal farmers (n=83)		Small farmers (n=51)		Medium farmers (n=21)		Large farmers (n=25)		Pooled sample (n=180)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Illiterate	4	4.82	1	1.96	0	0.00	0	0.00	5	2.78
Primary	16	19.28	12	23.53	2	9.52	3	11.54	33	18.33
Secondary	36	43.37	27	52.94	9	42.86	11	42.31	83	46.11
PUC	19	22.89	6	11.76	3	14.29	5	19.23	33	18.33
Degree	7	8.43	3	5.88	6	28.57	7	26.92	23	12.78
Postgraduate	1	1.20	2	3.92	1	4.76	0	0.00	4	2.22

Hassan district (Table IV). The major components of agri-silvi system include timber based (*Tectona grandis*) , short rotation tree based (*Grevillea robusta* and *Melia dubia)* and plantation based *(Cocos nucifera)*. Fruit based system (*Mangifera indica* and *Manilkara zapota)* was the major component of silvi-horti system, where in the case of Agri-silvipastoral system the fodder based (*Melia dubia)* was the major component practiced in Hassan district.

TABLE IV

Different agroforestry systems practiced by the farmers in Hassan district

Nature of the component	Major component	Major tree
Agrisilvi system	Timber based	*Tectona grandis*
	Short rotation tree based	*Grevillearobusta melia dubia*
	Plantation based	*Cocos nucifera*
Silvihorti system	Fruit based	*Mangifera indica*
Agrisilvihorti	Fodder based	Fodder Jowar

Agro-forestry systems followed by different categories of farmers in Hassan district

Plantation species based agro-forestry system was predominant across the agro-climatic zones of Hassan district (Table V). The major tree component of the system was coconut and the major agricultural component observed was maize. This trend was recorded in marginal (54 %), small (47 %) and medium (43 %) category of farmers, however, in the case of large farmers short rotation tree based agro-forestry was predominant (44 %) with silver oak as a major tree component. In the case of marginal farmers, the other major system followed was short rotation tree based system (27 %) followed by timber based agro-forestry system. The least was fruit based system (1%). In small and medium category of farmers, the other major system was short rotation tree based 25 and 33 per cent, respectively. Fruit based system was least in small category of farmers (10 %), whereas, in medium category of farmers the least was timber based agro-forestry (10 %). In large category of farmers, timber based (20%) and fruit based (20 %) systems were the second most followed system and the least was plantation based agro-forestry system (16 %).

Across all the categories of farmers, plantation based agro-forestry system (46 %) was the major system followed by short rotation tree based (29 %) and timber based (17 %); the least was fruit based system (8 %).

The reason for the deviation among the large farmers towards short rotation tree based agro-forestry system can be attributed to the big land holdings, less availability of farmers, absentee land lordism and easy maintenance. On the contrary, smaller and marginal farmers practiced plantation based agro-forestry systems because of the advantage of less extent of land holding, multiple use of the tree component such as coconut and the farming is carried out by the family members.

TABLE V

Agro-forestry systems followed by different categories of farmers in Hassan district

Agro-forestry systems	Categories of farmers									
	Marginal (n=83)		Small (n=51)		Medium (n=21)		Large (n=25)		Total (n=180)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Timber based	15	18	9	18	2	10	5	20	31	17
Plantation based	45	54	24	47	9	43	4	16	82	46
Fruit based	1	1	5	10	3	14	5	20	14	8
Short Rotation tree based	22	27	13	25	7	33	11	44	53	29
SD	18.37	22.14	8.18	15.90	3.30	15.64	3.20	12.81	29.38	16.32

Purpose of practicing agro-forestry system as perceived by the farmers

It is observed from Table VI that a little more than one-fourth of the farmers practiced agro-forestry for getting products other than timber (28%) and for obtaining additional income (26%), whereas 20 per cent of the farmers practiced agro-forestry as a source of timer, 14 per cent of the farmers practiced agro-forestry as a protection from soil erosion, 10 practiced agro-forestry for serving as a live hedge, wind breaks, shelter belts and protection and the remaining 1 per cent of the farmers practiced agro-forestry for aesthetic purpose.

TABLE VI

Purpose of practicing agro-forestry system as perceived by the farmers

Purpose	No.	%
Additional income	47	26
Source of timber	37	21
Protection from soil erosion	26	14
Source of other products other than timber	51	28
Live hedge, wind breaks shelter belts and protection purpose	18	10
Aesthetic purpose	1	0
Total	180	100

The results of the study revealed that plantation based agro-forestry system was found as the dominant system throughout the Hassan district across the zones. Coconut was the major tree component among the plantation based agro-forestry system. Most of the farmers practicing agro-forestry were marginal farmers falling under the age group of 35-50 years and studied up to secondary education. The important reasons for practicing agro-forestry as perceived by the farmers were to get additional income and timber etc.

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