Trees under Agroforestry: An Analysis of Farmers' Preferences for Tree Species

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ABSTRACT

Present investigation revealed the farmers preferences for trees in agroforestry and relationship between age, land holding of the farmers with trees preferences. The total numbers of trees available with the respondent farmers are 2950 trees. Out of which 880 trees are planted. On an average every farmer has 46.83 trees. The average numbers of planted and natural trees are 4.67 and 35.08 respectively. Shisham was found to be the first preference of the farmers and then Teak followed by Neem respectively. It was found that the respondent of age group 21-40 years (young), Shisham was the first preference, while Sagon, Neem and Subabul are second, third and fourth choice, respectively. For respondents between 41-60 age group, (middle age) the choice of MPTS was more or less similar to young respondents. The older respondent (61-80 years) preferred Shisham, Sagon, Siris and Butea as their preferences in descending order. The overall preference of MPTS in relation to age was found as Shisham-first, Sagon-second, Neem-third and the Sirisis as fourth choice. The marginal farmers preferred trees in descending order as Shisham, Sagon, Subabul and Eucalyptus. For small farmers the preferences were as Shisham-first, Neem- second, Eucalyptus- third and Teak-fourth. For older farmers the preferences were as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. The overall preference for MPTS reported as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. The study found that there was positive correlation (0.95) between holding size of the farmers and the availability of trees in their field. It indicates that higher holding size promote more number of trees with farmers.

Key Words : Agroforestry, preference for trees, MPTS

INTRODUCTION

Agroforestry encompasses land use systems where woody perennials are intentionally grown on the same piece of land with agricultural crops and/or animals either in the form of special arrangement of temporal sequence. A good deal of work has been done on the subject during last one-and- half decade. Agroforestry is an age-old land use that has been practiced for thousand of years by farmers the world over. Agroforestry is a land use that involves deliberate retention, introduction or mixture of trees or other woody perennials in crop/ animal production fields to benefit from the resultant ecological and economic interactions (Nair,1985). About 50 per cent of the total agriculture land in the country, is estimated to be marginal land and could be more productively used by revegetating with suitable species of tree, fruit and grasses in association with crops. Since independence, the diversion of forest land for non-forest land use has continued unabated. Between 1951 to 1980, about 4.3 million hectares of forest land (agriculture: 2.623 million ha, river valley project: 0.502 m ha, industries and townships: 0.134 m ha, transmission lines and roads; 0.161 m tones, miscellaneous: 1.008 m ha) has been diverted for non-forest uses. This represents an average loss of forest land @ nearly 0.15 m ha/year. This process of diversion of forest land to non-forest land use and their degradation has caused floods, water logging, increase in erosion of fertile land, and the silting or rivers and dam. It is estimated that about 0.7 m ha of forest land have been encroached upon so far, by people living in the vicinity of forests or forest dwellers. India has 69.2 million ha forest cover which is 21.05 per cent of the country's total geographical area (FSI, 2011). Bundelkhand region of India comprises seven district of Uttar Pradesh (Jhansi, Jaloun, Lalitpur, Banda, Hamirpur, Mahoba and Chitrakutdam Karvi) and six districts of Madhya Pradesh (Datia, Tikamgarth, Panna, Sagar and Damoh) including Lahar and Bhander subdivision of Bhind and Gwalior districts respectively. The total geographical area of Bundelkhand is 7.85 million hectares. The region is located between $23^0 8^0$ - $26^0 30^0$ N latitude and 78"11-81" 30" E longitude and at 300 m above sea level (ASL). The region is characterized by extremely harsh and hostile climatic conditions. The mean annual temperature is 26.5^0C characterized with May and June being the hottest months, January being the coldest month. The annual rainfall varies from 800-1300 mm with an average 900 mm of which 90 per cent is received during monsoon season. The distribution of rainfall is erratic and uncertain; with annual potential evaporation of 1400 to 1700 mm. thereby a shortage of soil moisture for growing crops. Bundelkhand is predominantly mono cropped region. The crops are grown in monsoon (*kharif*) season on red soil and *rabi* season on black soil with conserved moisture.

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Land of Bundelkhand region is undulating, poor in fertility status, shallow depth with poor water holding capacity. Irrigation facilities are limited and are primarily through open wells having poor water discharge capacity. On the basis of colour, texture, depth *etc.* The soil of this region can be classified into two major groups *i.e.* Red soil (includes rakkar and parwa) and black soil (includes mar and kabar) it has been reported that 56 per cent areas of Bundelkhand region of U.P. is under red soil group. (The dwindling forest cover in the region resulted in shortage of fodder and fuel wood and therefore, animal dung, the valuable source of well rotten farm yard manure, is diverted for making dung cakes to be used for fuel purpose, in the region, though there is in abundant area under natural grass land with the grasses, trees, bushes, etc, but the practice of 'Anna Pratha' (to keep animals let loose) left these grasses with grasses and trees due to over grazing.) The available trees are heavily lopped in proportion to their age and size resulting in the death of the trees. As a result of prevailing climatic condition, large area of the region is under rainfed agriculture. The socio-economic status of the farming community is very poor in this region.

One of the important areas of research in agroforestry extension is the manner in which farmers participate in management of natural resources. Farmers' choice of trees is an important component in the process of tree plantation. Every agroforestry extension research activity should begin with a study of socio cultural environment to answer basic questions, these are what are the socio cultural perceptions of the products and benefits from trees, shrubs and herbs? What species of trees, shrubs and herbs can satisfy these values to the maximum extent? The rural poor are commonly considered as the primary beneficiaries of agroforestry. Consequently agroforestry technologies are expected to be especially relevant and applicable to small-scale land owners. Therefore social acceptability is much more important measure of success for agroforestry technologies than for commercially oriented, high input agricultural and forestry technologies. In agroforestry, farmers preferences about trees is prerequisite for designing the agroforestry programme for the concerned region. Though a lot of research information has been generated in cultivation of different tree species, little has been done with respect to knowing farmers preferences about tree species under agroforestry. Further, the need for conducting research on these items was emphasized by Shah (1997). Therefore, the present study was undertaken with the objectives *i.e.* (i) To study the preferences of the farmers about trees and (ii) To find out relationship, between the age and land holding size of the farmers with trees preferences.

METHODOLOGY

Study area
Two villages namely Shekhar and Nayakhera in Babina block of Jhansi District of Bundelkhand Region were selected purposively for the present investigation. The distance of the study area is 38 km from district headquarter (Jhansi).

Sample & data collection
The sample for the present study comprised 189 farmers of two villages namely Shekhar and Nayakhera in Babina block of Jhansi district. The total respondents (n=189) were categorized according to holding size into three category *i.e.* marginal farmers (holding up to 2.5acre), small farmers (holding < & = 5acre) and medium and large farmers (holding > 5 acre). In this way there were 63 farmers in every category. The data were collected by individual personal interviews with the farmers with the help of a specially constructed interview schedule.

RESULTS AND DISCUSSION

Background information about the respondents
The average age of respondents is 46.67 years.The majority of the farmers (47.61%) were young 42.86 per cent respondents were in middle age group, while 9.53 per cent sample farmers were old. It revealed that 77.78 per cent respondents were illiterate, 13.23 per cent respondents had only primary education. About 5 per cent farmers had middle level education. Only 3.18 Per cent respondents had high school and intermediate education.

The majority of the farmers (58.79%) had family size of 6-10,members, about one-fourth respondents' family size was 11-15 members, while 23.80 per cent farmers had family size up to five members. On an average, every respondent had family size of 7.30 members. The average land holding of the respondent was 4.25 acre. On an average every farmer had 4.17 acre irrigated land. Only 3.18 per cent farmers have unirrigated land, which was on an average 2.5 acre per farmer.

Available trees at farmers' field
The total numbers of trees available with sample respondents were 2950. Out of which 880 trees were planted. On an average every farmers had 46.83 trees. The average numbers of planted trees were 4.67 and the average numbers of natural trees available were 35.08 trees per farmer.
The study revealed that there was positive correlation (0.95) between holding size of the farmers and the availability of trees at their field.
Daily working hours of respondents

The average working hours of men were 7.95 hrs. For women, it was 7.08 hrs. and for children 6.31 hrs. It is interesting to note that the working hours of men and women were more or less similar. The average daily working hours of men, women and children was 17.71 hrs. It was revealed that normal 8 hrs working is not sufficient in case of agroforestry, and the respondents devote more than 18 hrs.

Farmers' preferences for trees

Table 1: Farmers' preferences for trees

Tree Species	Preference for Trees				
	I	II	III	IV	Rank Total
Shisham (*Dalbergia sissoo*)	39	11	5	2	201
Neem (*Azadirachta indica*)	6	2	8	17	63
Mahua (*Madhuca latifolia*)	1	2	0	1	11
Dhak (*Butea monosperm*)	1	1	0	0	7
Babul (*Acacia nilotica*)	0	3	7	4	27
Subabul (*Leucaena leucocephala*)	2	8	7	3	49
Eucalyptus spp	1	8	6	4	44
Teak (*Tectona grandis*)	10	0	11	5	64

The respondents were asked to list and prioritizs the MPTS which they want to plant? It was revealed from Table 1 that Shisham (*Dalbergia sissoo*) is the first preference the farmers. Teak (*Tectona grandis)*, Neem (*Azadirachta indica*) is the second and third choice respectively. In Bundelkhnad region Mahua (*Madhuca latifolia*), Dhak (*Butea monosperm*) and Babul (*Acacia nilotica)* are the common MPTS available everywhere. But the respondents have not given much emphasis for these MPTS. Therefore, research work on Shisham, Teak and Neem need to be concentrated in the Bundelkhand region.
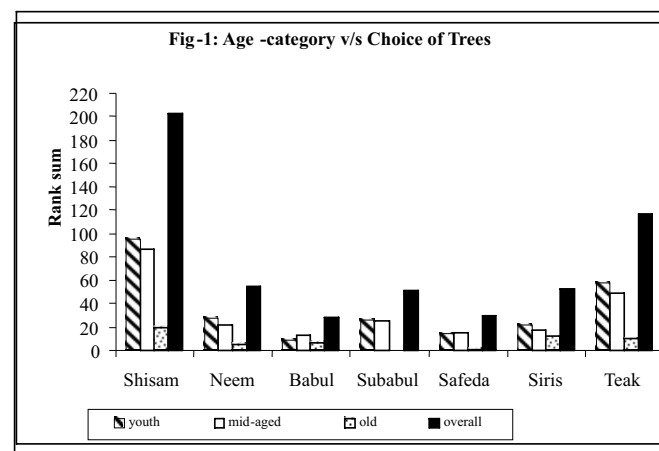
Relationship of Age of the Respondents with Preference of Trees

It was thought worthwhile to see the relationship between age and preference of the treees. The preference was collected on the basis of ranking of weightage score (Sabarathnam, 1988). It was found that for the respondents of age group 21-40, Shisham was the first preference, while Teak, Neem and Subabul where, second, third and fourth choice, respectively. For respondent between 41-60 age group, the Sisham was first, and Teak, Subabul and Neem were second, third and fourth choice respectively. The older respondent 61-80 preferred Shisham, Sagon, Siris and Butea as their preference. The overall preference of MPTS in relation to age compiled and presented in Table 2. It was observed that the first choice as Shisham (weightage score 202), the second choice is Sagon (weightage score 117), the third

choice is neem (weightage score 55) and the fourth choice is Siris (weightage score 52). On the basis of data, this may be suggested that for Bundelkhand region, research work on Shisham, Sagon, Neem and Siris is desired. The various problems related to these species may be taken into consideration to initiate agroforestry programme in the Bundelkhand region. It was revealed from Figure-1 that the overall preferences for MPTS are as Shisham, Teak and Neem in descending order.

Table 2: Age of the respondents and trees preference

MPTs	Age (21-40) (Youth)				Rank Sub Total	Age (41-60) (Middle)				Rank Sub total	Age (61-80) (Old)				Rank Sub total	Overall Rank Sum
	I	II	III	IV		I	II	III	IV		I	II	III	IV		
Shisam	19	4	2	1	95	16	6	2	1	87	4	1	-	1	20	202
Neem	1	2	5	7	27	3	-	1	8	22	1	-	1	-	6	55
Mahua	-	1	-	1	4	-	1	-	-	3	-	-	-	-	-	7
Butea	-	1	-	-	3	1	-	-	-	4	-	-	-	1	1	8
Babul	-	1	2	2	9	-	2	3	1	13	-	1	2	-	7	29
Subab-ul	-	6	3	2	26	-	6	3	1	25	-	-	-	-	-	51
Safeda	1	2	3	2	14	1	2	4	1	15	-	-	-	1	1	30
Siris	-	3	4	5	22	-	3	5	2	18	-	2	3	-	12	52
Teak	7	6	5	2	58	2	10	5	1	49	1	2	-	-	10	117

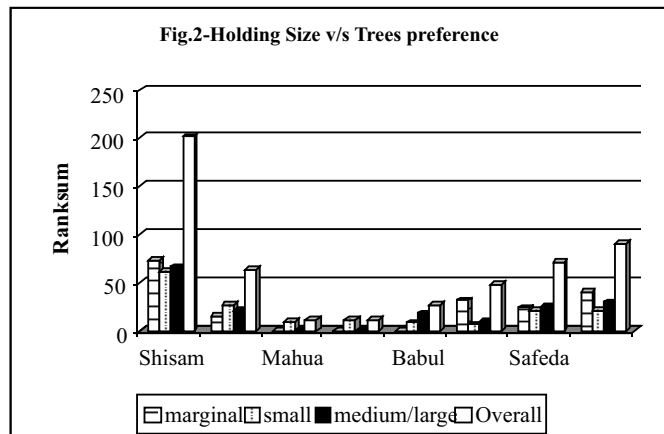**Fig-1: Age -category v/s Choice of Trees**

Relationship of Land Holding Size with Preference of Trees

The holding size of the farmers was developed into three-category up to 2.5 acre, between 2.5-5 acre and above 5 acre. There were 63 (33.33%) respondents in every category. The responses obtained for preference of trees were ranked and score was given. The results are presented in Table 3. Those who have up to 2.5 acre land preferred MPTS in ascending order as Shisham (73), Sagon (40), Subabul (31) and Eucalyptus (24). However, those farmer with a holding size between 2.5-5 acre, expressed their willingness as first for Shisham, second for Neem, third for Eucalyptus, fourth for Teak. The farmers having more than 5 acre land choose Shisham as

first choice, Teak as second choice, Eucalyptus as third choice and Neem as fourth choice. The overall preference for MPTS reported as Shisham score (201), Teak (91), Eucalyptus (71) and Neem (63) as their preference in descending order. Research workers in agroforestry are suggested to consider these preference of farmers while planning the farmers' related development project. The overall preference of farmers are presented in Figure 2.

Table 3: Relationship between holding size of land and trees preference

MPTs	Marginal Farmers				Rank Sub total	Small Farmers				Rank Sub total	Medium & Big Farmers				Rank Sub total	Rank Grand total
	I	II	III	IV		I	II	III	IV		I	II	III	IV		
Shisam	14	5	1	-	73	11	5	1	1	62	14	1	3	1	66	201
Neem	2	-	1	5	15	3	-	4	7	27	1	2	3	5	21	63
Mahua	-	-	-	-	-	1	2	-	-	10	-	-	-	1	1	11
Butea	-	-	-	-	-	2	1	-	-	11	-	-	-	-	-	11
Babul	-	-	-	-	-	-	1	3	-	9	-	2	4	4	18	27
Subab-Ul	1	5	5	2	31	1	1	-	-	7	-	1	3	1	10	48
Safeda	1	4	3	2	24	-	6	1	2	22	-	3	3	-	25	71
Teak	3	6	5	-	40	3	-	4	1	21	4	8	2	2	30	91

Fig.2-Holding Size v/s Trees preference

The researche in extension education have shown that there are several constraints with verifying the degree of seriousness in increasing agricultural production, which are confronted not only by the farmers but also by the scientists and extension agents. On one hand these constraints adversely affect the adoption of recommended agroforestry technologies by the farmers while on the other hand, block the flow of agroforestry technologies from research stations to extension agents (line departments in case of India) and obviously to farmers.

Timely and inadequate supply of inputs like improved seeds, fertilizers, irrigation facilities, insecticides and pesticides play a key role in the transfer of new technologies. Other constraints namely high cost

involved in purchase of inputs, financial problems, adulteration of inputs were also important in this context at the farmers' level. This suggests that all the inputs should be arranged timely and in sufficient quantity nearest to the farmers' approach. Agroforestry loan at cheaper rate of interest should be sanctioned to purchase these inputs at the subsidised rate to the farmers.

Proper training was also a constraints in transfer of agroforestry technology. It was also observed during data collection that some farmers had passive attitude towards technology. They do not take any interest in adopting advance technology. Hence the extension workers of line department should motivate farmers to change their outlook towards scientific training.

Complexity of the technology was the most important constraint in this category followed by risky nature of technology and cost involved in adopting the technology. There are few farmers who adopt the technology immediately after its release. The technology like measures of tree protection requires more knowledge, skill and intensive training. Hence, the scientists should generate simple and cheaper technology so that the farmers can adopt it easily with less financial burden. Some incentives may also be provided to them for popularising the technology. Therefore, it is suggested that the technology should be simple, cheaper, profitable, less risky and easily available.

CONCLUSION

Shisham was the first preference of the farmers. Teak and Neem were the second and third choice respectively. It is found that for the respondents of age group 21-40 years (young), Shisham was the first preference, while Sagon, Neem and Subabul were second, third and fourth choice, respectively. For respondents between 41-60 age group, (middle age) the choice of MPTS was more or less similar to young respondents. The older respondent (61-80 years) preferred Shisham, Sagon, Siris and Butea as their preferences in descending order. The overall preference of MPTS in relation to age was found as Shisham-first, Sagon-second, Neem-third and the Sirisis as fourth choice.

The marginal farmers preferred MPTS in descending order as Shisham, Sagon, Subabul and Eucalyptus. For small farmers the preferences were as Shisham-first, Neem- second, Eucalyptus- third and Teak-fourth. For older farmers the preferences were as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. The overall preference for MPTS reported as Shisham-first, Teak-second, Eucalyptus-third and Neem

as fourth choice. It is found that there was positive correlation (0.95) between holding size of the farmers and the availability of trees at their field. It indicates that higher holding size promote more number of trees with farmers. The various problems reported were as: Difficulties during ploughing due to roots and canopy of the trees. Effect of shade affects the crop production. According to farmers there is reduction in crop yield due to less growth of under storey crops. Due to high wind velocity and typhoon the trees and their branches fall down which create hindrances in intercultural operations. *Anna Pratha (stray animals)* of animals does create obstacles during new plantation. Lack of interest by state government employees towards agroforestry, socio-economic, psychological and personal characteristics of the farmers, to a certain extent are responsible for the dissemination of agroforestry technologies. The manipulation of such factors may, therefore, help to increase the extent of dissemination. These findings suggest that future agroforestry efforts need to focus on managing and developing locally important trees, fully involving local people, both men and women, and incorporating their knowledge in this process.

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