Tree growing practices on farmland: an option for sustaining rural livelihoods

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With a view to know the tree growing practices in rural areas of Eastern, Central and Far-western Nepal, field survey was carried out during June-July, 2000 in the three districts of the Terai region of the country, namely Kanchanpur, Chitwan and Sunsari. This study aims to provide information on preferences of farmers towards tree species suitable for farmland and to explore the constraints perceived by the farmers in growing tree species in and around their homesteads. In order to attain above objectives, formal and informal discussions were held with tree growing households, knowledgeable persons and government and non-government officials of three districts. Focus group discussions were also made in all the sites in order to verify the information obtained from the household survey.

Tree growing on farmland has been an alternate in fulfilling demand of forest products of rural population. Farmers have planted tree species to attain more return from their land together with agricultural crops. The study found that farmer's preferences for planting trees on farmland varies with the study sites. The study also found close association between farm size and tree growing in all the three study sites. Despite the popularity of growing trees on farmland, some factors have hindered in promoting such practices on large scale. The energy use pattern in all the three sites was mostly traditional. Government-managed forests together with community forests and trees on farmland were found to be the main source of forest products in the study sites.

Key words: Trees, Farmland, Forest, Farmers

Forestry is an extensive land use system in Nepal. The forest and trees provide a vast array of goods and services to human beings. The major sources of forest products in Nepal are the government-managed forests, community forests and trees grown on farm and marginal lands. Tree resources provide the basic commodities such as fuelwood, timber and fodder to the people and serve as an important ecological function such as biodiversity conservation, erosion control, and carbondioxide consumption. Fuelwood is the main source of energy, providing 68% of all energy used (WECS 1997).

Agriculture is the mainstay of economy in the country as agriculture and forestry together has 60% contribution in total gross domestic product of the country. Dwindling of forest resources at an annual rate of 1.7% over fifteen years period from 1978/79 to 1994 (DFRS 1999) and growing demand for forest products has motivated the local people to grow trees on their farmland. Tree growing on farmland in and around the villages is gaining ground in the country as it provides immediate benefits and utilities to the rural people in sustaining their livelihoods. The income from sale of matured trees has become one of the important livelihood strategies for tree growing households. The growing markets for tree products have encouraged farmers to grow trees on their private farmland (Malla 1993; Kanel 1995).

Realising the growing interest of farmers towards tree growing on their farmland, this study was carried out in order to explore such practices on farmland in the Terai region of the country. Specifically, it aims to:

- know the preferences of farmers towards tree species,
- identify the species richness on farmland,
- identify the constraints perceived by the farmers in tree growing and
- know the energy use pattern in the study sites.

Methodology

Chitwan, Kanchanpur and Sunsari district were selected for this study. Multistage sampling was applied for selecting households. Officials at the respective District Forest Offices (DFOs) were consulted for selecting the Village Development Committees (VDCs). VDCs having large number of tree growing farmers were selected for this survey. Based on the information obtained from the VDC officials and some key informants, one ward was selected from each VDCs of the three districts. The list of households was taken from the respective VDC offices and wealth ranking was done in order to know the economic status of the households. Tree grower and non-grower households were identified at the same time.

Secondary data were gathered through information obtained from DFOs, and literature review. Primary data were gathered through:

Household survey: With the help of at least five different key informants including women in each VDCs, wealth ranking of all the households from the selected ward was done. A total of 30 tree growing households from Kanchanpur, 33 from Chitwan and 29 from Sunsari were selected for survey, representing all the economic strata and ethnic groups. Semi-structured questionnaires were used to obtain required information.

Focus group discussion: Discussions were held with male and female groups of the same ward and the adjoining wards in order to cross-check the information obtained from household survey.

Key informants interview: Some influential persons including teachers, social workers, local leaders including VDC chairman, user group officials and officials at district forest offices were interviewed to generate necessary information.

Findings and discussion

Household information

A census was carried out in the study villages to determine the number of tree growers which is also an indicator of level of interest towards tree growing in the study villages in the past and present (Table 1). It was found that on the percentage basis, there are more tree growers in the study village of Sunsari district than the villages of other two districts. The percentage of tree growers decreases westwards. All the economic strata in Sunsari have carried out tree planting on their private land. No tree grower households were found in the lower economic strata in Kanchanpur district.

Tree species preferences of farmers

In the study area, it was found that sissoo was one of the most widely distributed species, mainly grown on the homestead farmland and bunds at the edges of farmland. Preferences of farmers towards tree species are presented in Table 2. Although farmers in the past preferred *Dalbergia sissoo* mostly for private planting in all the three sites, the present tree growing trends shows that farmers have increasingly adopted other tree species as a replacement of sissoo in recent years after the spread of sissoo dieback disease

In Chitwan, Bakaino (*Melia azederach*) is a popular alternate of sissoo, whereas in Sunsari, Kadam (*Anthocephalus cadamba*) has gained a similar status. Poplar spp has become an alternate species in the study village of Kanchanpur district.

Bamboo planting is also considerable in all the sites as suitable species for growing on farmland. The interest towards fruit tree growing is also equally evident in the study villages of all the three districts. Similar study carried out in India indicated that Poplar is the most preferred tree species for planting on farmland followed by *Eucalyptus spp* and *Dalbergia sissoo* (Pant et al., 1999). The preferences of farmers towards tree growing were in order of: (i) Commercially important tree species such as Sissoo, Bakaino (ii) Fruit trees such as Mango, Jackfruit, Litchi and (iii) Fodder trees such as Badahar, Khanyu, Dabdabe.

Table 1: Household information and tree growing in the three study villages

S N	Location	Total Household	Total Population	Sampled Household	Total No of Tree Growing HH
1	Krishnapur VDC- 4, Kanchanpur	505	3495	30	51 (10.1%)
2	Birendranagar VDC- 1, Chitwan	374	2710	33	69 (18.5%)
3	Bhasi VDC- 1, Sunsari	125	811	29	50 (40%)

Source: Krishnapur VDC, Birendranagar VDC, Bhasi VDC and Field Survey 2000

Table 2: Most preferred tree species by farmers in the study sites

Trees for utility as timber and fuelwood	Preference Ranking		
	Kanchanpur	Chitwan	Sunsari
Dalbergia sissoo	I	I	I
Melia Azederach	IV	II	IV
Anthocephalus cadamba	V	III	II
Poplar spp	II	V	V
Babbusa/Dendrocalamus spp	III	IV	III

Source: Field Survey, 2000

Species richness on farmland

The study found that species richness varied with study sites. The species richness was observed higher in Chitwan than other two districts. There were more than 25 different tree species were found on private farmland in the study village of Chitwan district, 20 in Sunsari and 12 in Kanchanpur district. The tree grower households in all the study villages have planted at least five different tree species on their farmland. It was found that average landholding per household of tree grower is 2.04, 0.84 and 1.63 ha respectively in the study villages of Kanchanpur, Chitwan and Sunsari districts (Table 3). Despite the low landholding per household in Chitwan, it was noteworthy that average number tree species on farmland per household was found higher.

The average number of trees per household on farmland in Sunsari was found minimum among the three districts (Table 3). However, the species richness was more than that of Kanchanpur. There is a positive correlationship between landholding and tree growing in all the three studied districts (r=0.283 in Kanchanpur, 0.103 in Chitwan and 0.04 in Sunsari). This means that there are more trees on the farmlands of big landholders than the small landholders.

Constraints in tree growing on farmland

Respondents were asked whether they have been facing problems in growing trees on their farmland. The results of multiple responses obtained from the tree growers are given in Table 4. Lack of technical knowledge and skill in growing trees remained dominant problems in all the three sites. Disadvantaged and low income group households expressed lack of land and smaller size of land holding as one of the constraints for not growing trees even if they have interest in it. Many of the respondents were of the view that they were not able to obtain good quality planting stock at the time of plantations. Some of the household expressed uncertainty in getting end product of tree species that has been grown on farmland. The information obtained was also verified during the group discussion. Lack of marketing opportunity for the tree products of farmland was also one of the major concern of farmers during the field survey.

Table 3: Average landholding and tree growing on farmland

S N	Location	Average Landholding per Household (in ha)	Average No. of Tree Species per Household
1	Krishnapur VDC-4, Kanchanpur	2.04	106
2	Birendranagar VDC-1, Chitwan	0.84	194
3	Bhasi VDC-1, Sunsari	1.63	61

Source: Field Survey, 2000

On the other hand, positive correlationship was seen between income level of the household and tree growing in Kanchanpur only (r=0.221). This does not imply that the high-income groups have carried out more planting than the low-income groups in other two sites of Chitwan and Sunsari districts. It is argued that larger and wealthier farmer in Bangladesh tended to plant more trees on their farmland than poorer farmers (Hocking et al. 1996). It is revealed that farmers always try to incorporate as many tree species as possible in their homesteads to establish a sustainable productive system (Mohiuddin et al. 1997). The inclusion of large variety of tree species on farmland was considered one of the means of diversifying sources of household income and hence the livelihoods.

The study found that tree growers lack marketing information on tree products. Similar study carried out in India showed that unavailability of irrigation facility remained as the major constraint for tree planting on farmland followed by unavailability of desired plant species and smaller size of land holding (Kumar et al. 1999).

Table 4 Problems associated with tree growing in the study area

S N	Problems faced by tree growers	Percentage of HH Respondent		
		Kanchanpur	Chitwan	Sunsari
1	Lack of technical knowledge and skill about selection and management of appropriate species	18 (30%)	22 (30.5%)	20 (33.3%)
2	Lack of land/smaller size of land holding	17 (28.3%)	15 (20.8%)	7 (11.7%)
3	Lack of quality seedlings/cuttings	11 (18.3%)	10 (13.9%)	17 (28.3%)
4	Loss in soil nutrients	5 (8.3%)	11(15.3%)	3 (5%)
5	Uncertainty about the produce from the trees	3 (5%)	7 (9.7%)	5 (8.3)
6	Problems in protection of trees from grazing	4 (6.7%)	2 (2.8%)	4 (6.7%)
7	Marketing problems	2 (3.3%)	5 (6.9%)	4 (6.7%)

Source: Field Survey, 2000

Help cited by the tree growers

Tree growers were asked what kind of help they needed to grow trees on their farmland. The results obtained from the tree growers through multiple responses are presented in Table 5. The most frequently cited help by the tree growers from all the three districts was the provision of technical knowledge and skill on selection and management of appropriate tree species on farmland, followed by availability of quality seedling/cutting. Site visits during the field survey provided sufficient room to verify the limited knowledge of farmers in growing trees.

Insufficient spacing, monoculture and planting of trees on available sites irrespective of site suitability were some of the key technical points tree growers have raised. Most of the farmers of all the three districts have expressed that they have planted trees for both household and income purposes. However, a strong concern was that they were unable to obtain money what they have expected from the tree species due to lack of marketing opportunity and enterprise development facility. Most of the respondents have recommended to provide training to tree growers on enterprise development, which would be a good option for skill development of farmers.

Source of forest products and energy use pattern

The field survey revealed that the main sources of forest products for the respondent households were government-managed forests, community forests and trees grown on farmland. The traditional concept of taking forest products from the government-managed forests as virtually free commodity has been gradually changing in all the study sites. The local people have increasingly been introduced tree species in and around the homesteads to meet their household needs. The consciousness of local people and the people-centred approach of the government in managing the forests has resulted into reduction of pressure on government-managed forests. However, government-managed forests were still the main source of timber in the study villages of Kanchanpur and Chitwan mainly due to the proximity of forests to these villages.

In all the three villages studied, fuelwood constitutes the major energy source (Table 6). It is apparent from the table that traditional energy sources were dominant in all the three villages. It is also indicated that about 89% of energy source in the country is traditional (MoPE, 2000). Cowdung was an alternate of fuelwood in Sunsari whereas no such energy use pattern was seen in other two sites.

Table 5: Steps Suggested by tree grower households

S N	Help expected by sissoo growers	Percentage of HH respondents		
		Kanchanpur	Chitwan	Sunsari
1	Technical advise on selection and management of appropriate tree species	24 (43.6%)	20 (34.5%)	22 (34.4%)
2	Market facility	4 (7.3%)	8 (13.8%)	5 (7.8%)
3	Availability of quality seedlings/cuttings	12 (21.8%)	11(19%)	14 (21.9%)
4	Provision of insurance	1 (1.8%)	4 (6.9%)	6 (9.4%)
5	Loan facility	3 (5.4%)	5 (8.6%)	5 (7.8%)
6	Training to tree growers on enterprise development	11 (20%)	10 (17.2%)	12 (18.7%)

Source: Field Survey, 2000

Table 6: Energy use pattern in three study sites

Energy Source	Kanchanpur	Sunsari	Chitwan
Fuelwood	29 (96.7%)	26 (43.3%)	32 (80%)
Cowdung	0	25 (41.7%)	0
Straw	0	4 (6.7%)	0
Kerosene	0	2 (3.3%)	6 (15%)
LP Gas	0	0	1 (2.5%)
Electricity	0	0	1 (2.5%)
Biogas	1 (3.3%)	3 (5%)	0

Source. Field Survey, 2000

Conclusion

Tree growing on farmland has been increasingly popular among farmers in these days. Farmers have planted tree species to attain more return from their land together with agricultural crops. The species richness was found higher in the study village of Chitwan than other two districts. It was found that the percentage of tree growers decreases westwards.

It was found that sissoo tree has dominated other tree species on farmland. Bakaino (*Melia azederach*) in Chitwan, Kadam (*Anthocephalus cadamba*) in Sunsari and *Poplar spp* in Kanchanpur were found to be an alternate to sissoo. According to farmers, these trees also have good market values at their respective places. However, the spreading of die-back disease in sissoo tree has changed the preferrences of local people to other species. It was revealed that bigger the size of land holding higher the number of trees on farmland in all the three sites. A positive correlation was seen between income level of household and tree growing only in Kanchanpur.

Lack of timely technical advice on selection and management of appropriate tree species was found the most serious constraint expressed by the farmers. They were seeking timely guidance on technical matters of tree growing from the concerned institutions. The energy use pattern in all the three sites was mostly traditional. Government-managed forests together with community forests and trees of farmland were found to be the main source of forest products in the study sites.

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