Cultural Knowledge of On-farm Tree PlantationinRuralCommunitiesof Gurez Himalaya

ABSTRACT

People's perceptions on cultural knowledge of on-farm tree plantation have become fundamental elements of sustainable forest resource management. The study examined the people's knowledge on cultural practices of on-farm tree plantationand their socioeconomic determinants in rural communities of Gurez Himalaya. Multistage random sampling technique was used to select 337 households from 18 sample villages for field survey. Data were collected through personal interviews administering structured interview schedule and non-participant observations. Data were analyzed using simple descriptive statistics. Results indicated that majority of the people were belonged to low socioeconomic status class as reflected by their household characteristics. Among the ten selected major cultural practices about on-farm tree plantation the 'spot weeding' (WMS, 2.87; priority percentage, 12.83%) was ranked 1st while 'thinning' (WMS= 1.31; priority percentage, 5.85%) was ranked 10th. Majority of the respondents (54.88%) had medium knowledge on cultural practices for on-farm tree plantation followed by high (23.78%) and low (21.34%) classes.Adoption of tree plantation, problem faced in tree cultivation, experience in tree cultivation, training exposure on tree cultivation and level of education had significant contribution on people's knowledge on cultural practices about on-farm tree plantation.The findings suggested that the trainings on cultural practices about on-farm tree plantationis the crucial intervention for livelihood diversification, socioeconomic development and forest conservation; hence, need-based trainings must be planned and imparted to the individuals for improving the tree resource production, harvesting and marketing.

Key-words: Cultural knowledge, tree management, agroforestry, socioeconomic,Gurez, Himalaya**,** India.

1. INTRODUCTION

On-farm tree plantation has been invariably identified as an ideal, ecologically and economically suitable land-use system which aims to increase the total production per unit area besides maintaining or enhancing microclimatic amelioration[1]. On-farm tree plantation is an integrated and complex phenomenon because the productivity, adaptability and sustainability of the system mainly depends on the positive or negative effect of the social, economic and biophysical criteria[2].To increase the forest resource production in terms of fuelwood, fodder, fruits, timber and other non-timber forest resources (NTFR), reduce land degradation and improve nutrient recycling in the on-farm plantation the efficient management of trees through better cultural practices is imperative[3].Essentially, the on-farm tree plantation hasfinite amount of light, water and nutrients, hence, optimum utilization of these resources by

various management interventions can be applied to find tune to the limited resources[4].In on-farm tree plantation, mismanagement of light, water and nutrients, is the prominent reason of lower productivity[5]. The spot weeding, cleaning, application of fertilizers and manures, crown pruning, insect/ pest/ disease management, enrichment planting (tree wildings and seed collection), mulching, climber cutting, root pruning and thinning are the potential cultural practices for on-farm tree management[6].

The knowledge and experience on the cultural practices about on-farm tree plantation forms a basis for culture or tradition that guides decisions in familiar and newsituations[7].Generally, the cultural knowledge about on-farm tree plantationis considered as primitive andinefficient approach to solve the natural and social problemsby the poor and the marginalized populations[8]. Yet cultural knowledge about on-farm tree plantationis an important intellectual property for cost-effective, participatory and sustainabledevelopmentof naturalresources[9]. Knowledge on cultural practices about on-farm tree plantation also preserve valuablelocal practices, encourage community self-analysis,increase awareness and involve the stakeholders infeedback systems[10]. By studying cultural knowledge systems towardson-farm tree plantation, scientists/ extensionists have enhanced their knowledge on biodiversity conservation, ecosystem functions and forest resource production[11]. In order to meet thecurrent global challenges of climate change and foodinsecurity and to mitigate environmental challenges of deforestationand land degradation, revisiting the cultural knowledgeabout on-farm tree plantation is necessary because the scientificknowledge has independentlyfailed to solve these problems[12].The tree management cultural practices are carried out by the local people to get desirable product, properly manage the tree canopy and roots to facilitate maximum resource utilization, management of organic residues for nutrient cycling, proper method of harvesting tree resources and protection from biotic and abiotic stresses in Gurez Himalaya.The main objective of tree management cultural practices is to minimize the negative interactions and maximize the positive. The cultural knowledge about on-farm tree management is embedded in community experience and isoften linked to spirituality in Gurez valley.Cultural knowledge about on-farm tree management has gained substantial recognition in recent decades but scaling up of the cultural practices in natural resource management is limited by absence of clear documentation or sufficient data to establish baselines.Keeping these facts in view, the present study was undertaken to identify the cultural practices adopted by the people for on-farm tree management, assess the extent of knowledge about cultural practices of on-farm tree management and determine their distinguishing household socioeconomic characteristics.

Comment [A1]: Very long Introduction! Give an essential information!

2. MATERIALS AND METHODS

2.1 Study site

Gurez Valley (Fig. 1) is situated at 34^0 23’ to $34^0$41’N latitude and $74^0$37’ to 74^0 46’E longitude at an altitude of 2370 meters above MSL in Bandipora district of Jammu and Kashmir UT. The valley is

surrounded on north by Ladakh, south by Bandipura, east by Ganderbal and west by Kupwara. Razdan pass- the coldest and dangerous peak located at 3557 m amsl connects the region with the rest of Kashmir and differentiates it on geographical, socio-cultural and linguistic lines. The valley is drained by mighty Kishenganga River between Kaobal Gali in east and Kanzalwan in west with other aquamarine and crystal streams. The valley has an area of above 57842 hectares mostly mountainous with ranges of the Himalayas and lush forest cover inhabited by 31912 people [13]. Main occupations of the people are agriculture, livestock production and NTFR collection [14]. The valley has fascinating scenic beauty, abundant biodiversity and inimitable culture. It houses a unique Shina speaking tribe of Dards inhabitants of Shina Communities who are ethnically and culturally quite distinct from Kashmiris. The mountainous terrain having lofty hills and peaks scattered by long flat grasslands are used by the migratory people to graze their livestock during the snow free summer months. The climate is temperate with four usual seasons; the heavy snow precipitation during winters keeps the valley snow bound and inaccessible for almost six months. It has dense coniferous and broad-leaved forests mostly dominated by *Acer caesium, Abies pindrow, Pinus wallichiana, Picea smithiana, Juniperus macropoda, Taxus wallichiana* and *Betula utilis*. The vegetations at higher elevations is rather sparse and dotted mostly with moraines, boulders and slopes of varying steepness with few important shrubs like *Rhododendron anthopogon* and colorful flowering herbs such as *Bergenia ciliata, Dactylorrhiza hatagirea, Eremurushima lacius, Saussurea* spp. The vegetation starts growing from late April with the melting of snow and comes to its full bloom during June to September and starts dying out by the end of October.

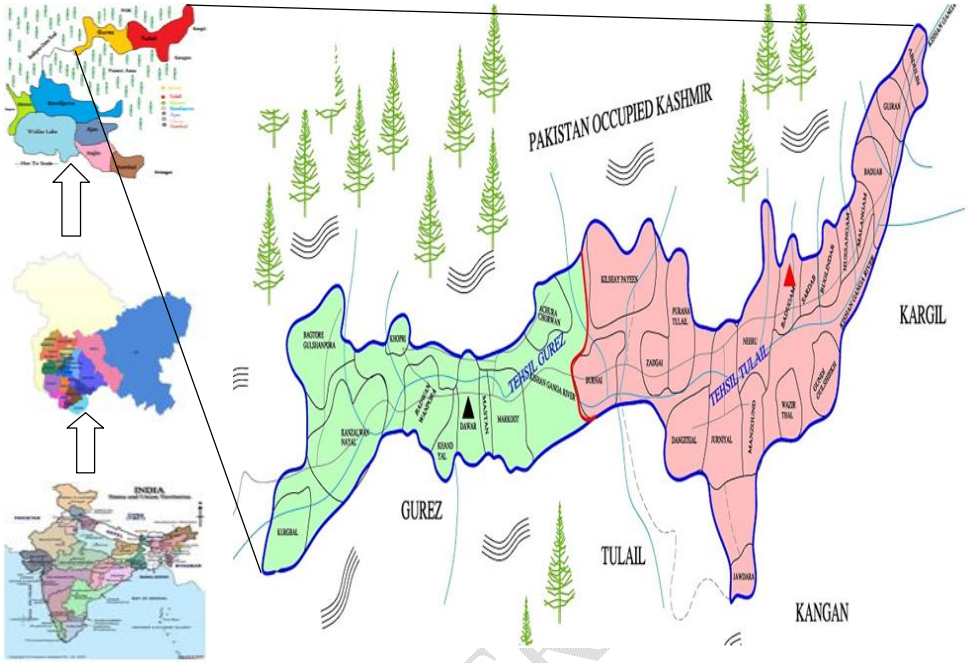

Fig. 1. Location map of the study area

2.2 Sampling Procedure

Multi-stage random sampling technique [15] was employed to select the blocks, villages and the households. In the first stage, three blocks including Gulshanpora, Dawar and Tilail were selected. In the second stage, eighteen (18) villages were sampled including two villages from Glushanpora block, four villages from Dawar block and twelve villages from Tilail block. In the third stage, a total of 337 households were withdrawn from the selected villages having 10% sampling intensity for field survey. The households identified for assessing the cultural knowledge of on-farm tree plantation in rural communitiesof Gurez Himalaya were different in farming activities, land holding size and other different socioeconomic attributes.

2.3 Data Collection

Data were collected from the randomly selected households using pre-tested structured schedule through personal interviewsand participant observations[16]. The interviews were conducted at the respondent's residence/work place by the investigators and the responses were recorded in the schedule. Utmost care was taken to make the respondents to understand about the objectives of the study and clarified their doubts in the interview schedule. For this purpose, an interview schedule was constructed for data collection from respondents in the light of the objectives of the study. For the present study, a list of 10

major cultural practices about on-farm tree plantation was prepared. The specific and relevant cultural practices about on-farm tree plantation were itemized through different review of literature, discussion with state extension functionaries, KVK staffs as well as investigators own field experiences and were systematically incorporated in the interview schedule. The schedule was administered to the indented respondents for data collection. In this regard, the respondents were requested to give a tick (“) in one of the four response categories namely, excellent, somewhat, very littleand not at all provided against the identified cultural practices about on-farm tree plantationwith their respective scores of 3, 2, 1 and 0. The socioeconomic variables were measured on the basis of “Socio-economic status scale” developed by Venkataramaiah (1990) after updating for 2022 [17]. The household socioeconomic variables included in the interview schedule were age, education, social membership, family composition, size of land holding, main occupation, housing status, farm power, farm implements, livestock possession, wealth status and gross annual income.

2.4 Data analysis

In order to achieve the objectives and to get meaningful results the data were analyzed by simple descriptive statistics viz., frequency, percentage, average,range, confidence interval and rank order [18] after coding with numerals using scoring techniques [17]. In this study, the respondent’s responses were collected in a 4– point continuum scale as excellent, somewhat, very little and not at all by assigning scores 3, 2, 1 and 0 respectively. The results were calculated as weighted mean score (WMS) for each of the cultural practice identified for the on-farm tree plantation using simple ranking technique.

$$\text{Weighted mean score (WMS)} = \frac{(\text{Excellent}\times 3) + (\text{Somewaht}\times 2) + (\text{Very little}\times 1) + (\text{Not at all}\times 0)}{\text{Total no. of Excellent + Somewhat + Very little + Not at all}}$$

The WMS of the cultural practices for the on-farm tree plantation ranged from 0 to 3. Data were processed and analyzed with MS Excel and Statistical Package for Social Sciences (SPSS) software and displayed through table and graph.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic characteristics of rural people

The socioeconomic variables averaged for the rural households (Table 1) specified the prevalence of middle aged people (41.75 years) having low literacy (2.89), membership of only one organization (1.14), nuclear and large sized families (2.90), marginal sized land holding (1.15), engaged mainly in agriculture (2.80), owning one mixed or *pucca* house (3.57), one pair of bullocks (1.04), low farm implements possession (9.64), 6 to 10 livestock (1.91), low wealth status (8.09) and gross annual income of ₹92811.24/year.

Table 1. Descriptive statistics for socioeconomic characteristics of sample households(N=337)

Characteristic	Mean ± SD	95% CI for mean	Range

		(Lower-Upper)	(Minimum-Maximum)
Age	41.75 ± 9.53	40.17-43.33	25-56
Education	2.89 ± 0.93	2.73-3.04	2-6
Social participation	1.14 ± 1.20	0.94-1.34	0-4
Family composition	2.90 ± 0.88	2.76-3.05	2-4
Size of land holding	1.15 ± 0.53	1.06-1.24	1-4
Main occupation	2.80± 1.20	2.61-3.00	1-6
Housing status	3.57 ± 1.01	3.40-3.74	2-6
Farm power	1.04 ± 0.64	0.94-1.15	0-3
Farm implements	9.64 ± 3.78	9.01-10.27	4-17
Livestock possession	1.91± 0.56	1.82-2.00	0-3
Wealth status	8.09± 3.36	7.53-8.65	2-15
Gross annual income	92811.24 ± 32134.19	47381.15-74393.49	18000-105000

Socioeconomic conditions of the people are far away from desired level as reflected by the current analysis and hence, there is much scope to improve their quality of life by livelihood diversification through alternative sources. The socioeconomic attributes of the rural people are usually assumed to have a significant influence on determining the on-farmtree ownership and associated cultural practices for its management[19]. They are the key determinants of household tree resources production, consumption and degree of dependence on tree resources [20].They are directly or indirectly associated to household tree diversity, diverse use pattern, tree-based livelihood strategies and poverty-tree use linkages [21]. The households' socioeconomic characteristics demonstrated in the study can be a framework for tree holding planning, tree resources management and improving economic conditions.The present analysis of the socioeconomic conditions of the peoplecan be a base in planning and implementation of tree ownership based developmental projects for livelihood security and diversifying tree-based economy.

3.2 People's knowledge about cultural practices of on-farm tree plantation

People's knowledge about the ten major cultural practices of on-farm tree plantation (Table 2) indicated that the weighted mean score (WMS) ranged from 1.31 (rank 1st) to 2.87 (Rank 10th). Apparently, it is seen that the respondents had the highest knowledge regarding spot weeding (WMS, 2.87; rank 1st) followed by cleaning (WMS, 2.85; rank 2nd), application of fertilizers and manures (WMS, 2.76; rank 3rd), crown pruning (WMS, 2.67; rank 4th), insect/ pest/ disease management (WMS, 2.38; rank 5th), enrichment planting (tree wildings and seed collection) (WMS, 2.21; rank 6th), mulching (WMS, 1.98; rank 7th), climber cutting (WMS, 1.82; rank 8th), root pruning(WMS, 1.51; rank 9th) and thinning (WMS, 1.31; rank 10th).The people viewed the 'spot weeding' as the very prominent cultural practice accounting for 12.83% of the total perceptions while the cultural practice 'thinning' received lowest priority comprising 5.85% of the total perceptions (Fig. 2).

Table 2. Cultural tree management practices, explanation and people's knowledge ranking (N=337)

Cultural practice	Explanation	Level of knowledge				Weighted mean score	Rank order
		Excellent	Somewhat	Very Little	Not at all		

Spot weeding	Uprooting or cutting back weeds are around the planted seedlings within about 1-m radius.	294 (87.24)	43 (12.76)	0 (0.00)	0 (0.00)	2.87	1st
Cleaning	Removal or topping of inferior growth including individuals of favoured species, climbers etc.	288 (85.46)	49 (14.54)	0 (0.00)	0 (0.00)	2.85	2nd
Climber cutting	Regular cutting or uprooting of climbers to control them.	93 (27.60)	136 (40.36)	63 (18.69)	45 (13.35)	1.82	8th
Root pruning	Cutting roots with a sharp object or trenching within 3 m of already established trees to separate root systems of trees and crops.	76 (22.55)	96 (28.49)	90 (26.70)	75 (22.26)	1.51	9th
Crown pruning	Removal of live or dead branches or multiple leaders from standing trees for the improvement of the tree or its timber.	251 (74.48)	63 (18.69)	23 (6.83)	0 (0.00)	2.67	4th
Thinning	Selective removal or killing of some trees to allow the remaining trees to maintain a steady growth rate or form.	52 (15.43)	86 (25.52)	114 (33.83)	85 (25.22)	1.31	10th
Enrichment planting (tree wildings and seed collection)	Tree wildlings are collected from natural forests and good mother trees scattered over the landscape and planted on farms or degraded forests. Sometimes seeds are gathered and germinated at home or in communal nurseries to supply seedlings.	149	128	43	17	2.21	6th
Insect/ pest/ disease management	Application of organic insecticide/ pesticides to control insect/ pest/ disease attack.	191 (44.21)	95 (37.98)	41 (12.76)	10 (5.05)	2.38	5th
Application of fertilizers and manures	Application of organic manures, cattle dung and various plant materials to improve the soil fertility.	265 (78.64)	64 (18.99)	8 (2.37)	0 (0.00)	2.76	3rd
Mulching	Weeds and grass are cut and used to cover the soil.	122 (36.20)	124 (36.80)	54 (16.02)	37 (10.98)	1.98	7th

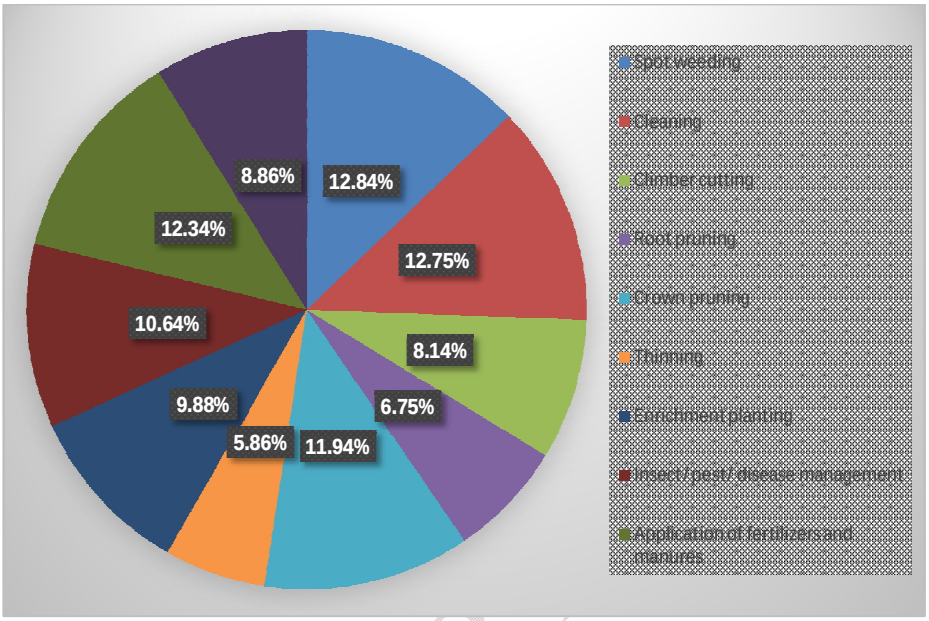

Fig. 2. Percentage knowledge towards cultural practices for tree management (N=337)

The people were found highly dependent on forest resources in their homesteads, agricultural fields and nearby reserved forests for meeting their basic needs and earning livelihoods. Higher adoption of appropriate cultural practices of on-farm tree plantation helps to increase knowledge on the cultural practices as well as minimize the tree-based losses[22]. People with higher knowledge regarding the cultural practices of on-farm tree plantation face low problems in tree cultivation and encourage them to go for more tree resource production which ultimately helps to improve livelihood security[23]. People having long tree farming experience have more knowledge because the tree farming experience is helpful to increase knowledge, improve skill and change attitude of the farmers[24].It also builds confidence of the people for making appropriate decisions timely. Training provides the structures, techniques, skill and awareness to manage time and workload efficiently, which might increase productivity and motivate farmers to increase knowledge on cultural practices for tree management. Such consideration indicates that there is necessity to provide enough training to the people for gaining the knowledge on cultural practices for tree management.

Table 3. Extent of knowledge about cultural practices for tree management among the respondents(N=337)

Category	Scores	Respondents		Mean	SD
		Frequency	Percentage		

Low	<16.08	35	21.34	20.32	4.24
Medium	16.09 to 24.56	90	54.88		
High	>24.56	39	23.78		

Knowledge on cultural practices for tree management score of the people ranged from 6 to 26 against the possible range of 0–30 having an average of 20.32 and standard deviation of 4.46 (Table 3).Among the sample households most of the respondents (54.88%) had medium level of knowledge about cultural practices for tree management followed by high (23.78%) and low (21.34%) levels.The mean score (20.32) of knowledge about cultural practices for tree management confirms that the overall knowledge level was moderate. Forestry is an important source of livelihood and way of life for a large number of households in the surveyed area; hence, people are aware with the cultural practices for tree management. Knowledge is considered as vision of an explanation in any aspect of the situation regarding tree cultivation. It is act or state of understanding; clear perception of fact or truth, that helps an individual to foresee the consequence he may have to face in future. It makes individuals to become rational and conscious about related field.The studies [7,25,26]support the findings of the present research.

4. CONCLUSIONS

The findings led to conclude that the fringe people had medium knowledge on cultural practices for tree management. Thus, there is necessity to increase the knowledge of the people on cultural practices for tree management. The study also revealed that people's adoption of cultural practices for tree management had the highest contribution to their knowledge strengthening and confidence. Therefore, it may be concluded that individuals having more adoption of cultural practices for tree management had more knowledge compared to the non-adopters. People having more knowledge faced fewer problems in tree cultivation. People having long farming experience on tree cultivation have more knowledge. Tree farming experience is helpful to increase knowledge, improve skill and change attitude of the farmers. Training develops the farmer's knowledge, skill, and attitude in positive manner. People having more training exposure had more knowledge on cultural practices for tree management. Level of education of the people had the important contribution to their knowledge on cultural practices for tree management. Thus, it may be concluded that more educated tree growers had more knowledge on cultural practices for tree management.

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