

ASSESSMENT OF TREE GROWTH ON FARMLANDS FROM FARMERS' PERCEPTIONS IN DISTRICT CHARSADDA, KHYBER PAKHTUNKHWA

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ABSTRACT

A study on “assessment of tree growth on farmlands as farmers’ perception in District Charsadda” was conducted to estimate the growth of trees on farmlands and determine the status of farm forestry in District Charsadda. In order to achieve the objectives of the study, a social survey was conducted in the area and information was collected through a semi structured questionnaires. Fifty respondents were interviewed in selected sample villages using multi-stage random sampling techniques. The sampling intensity was 0.1%. The results revealed that all farmers have planted trees on their farmlands. Poplar is the main species, followed by Eucalyptus, Bakain, Ailanthus and Kikar. Though farm forestry is practiced in the area since ancient times, the modern commercial farm forestry has been started in the last three decades. Driving forces for adoption of farm forestry include inspiration from other farmers, self-initiatives and quick economic return. Majority of the respondents (72%) have planted trees for commercial purpose. The average number of trees per acre is 100. There has been a considerable increase in the number of trees on farmlands since 1990. The normal spacing between plants on the boundaries of field is 2-3 feet whereas in case of compact plantations it is 3x3 or 4x4 feet. About 48% of the respondents procured saplings from private nurseries whereas 42% of the farmers produce planting stock in their own nurseries. Majority (82%) of the respondents reported that trees have negative effects on agricultural crops which results in loss of agricultural crop in the range of 20-50%. On the average the loss is 30%. However, the loss in agricultural crop is much below than the income from sale of trees on farmlands. Thus, farm forestry is a very profitable activity that has multiple benefits including source of cash income. The study recommends to diversify tree species and include more species particularly nitrogen fixing native species such as Kikar, Shisham and Siris in the farmland plantations. There is also need to educate farmers on optimum spacing for plantations of different species in the area.

Keywords: Agroforestry, Tree growth, Plantation, Poplar, Farmland

INTRODUCTION

Agroforestry is defined as land-use systems and practices where woody perennials are deliberately integrated with crops and/or animals on the same land management unit. Actually, agroforestry is a new name for a set of practices and approaches that have been developed by farmers over thousands of years (Anwar *et al.*, 2017). Agroforestry is a collective name for land-use systems and practices where woody perennials are deliberately integrated with crops and/or animals on the same land management unit (ICRAF, 1992). The integration can

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be either in spatial mixture or temporal sequence. There are normally both ecological and economic interactions between the woody and non-woody components in agroforestry.

Agroforestry is practiced in Khyber Pakhtunkhwa in different patterns and forms which range from mere protection of naturally growing trees to artificial planting of trees on farmlands. The more traditional form of agroforestry in the province is a complex agro-silvo-pastoral system that combines native trees, shrubs, grasses, agricultural crops and animals on the farmland. It is generally practiced at a subsistence level (FFSP, 2008). However, this system has been more recently converted into a more commercial agroforestry by donor-funded social forestry projects which have encouraged fast-growing exotic timber species to be incorporated into the system (Ali *et al.*, 2011).

District Charsadda, located in the central irrigated zone of Khyber Pakhtunkhwa has made enormous progress in terms of plantations on farmlands. It can be considered as the best model of farm forestry in Pakistan. Almost every farmer has planted trees on his farmlands. Due to fast growth and quick economic return, exotic poplars have become so popular that one can hardly find any piece of land in Charsadda which is devoid of poplar trees.

There is a need to give proper attention to the development of farm forestry in Pakistan. In this regard, research on the attitude of farmers towards tree plantation on their farmlands needs special attention (Afzal *et al.*, 1999). The current study was undertaken to find out the reasons behind high adoption of farm forestry in District Charsadda. The study was also aimed at investigating the current status of tree growth on farmlands of District Charsadda and knowing the farmers' views about the management and future prospects of farm forestry in the area. The findings of the study can also be used to frame guidelines for replication and promotion of farm forestry in other similar areas of Pakistan.

The main purpose of this study was to assess the growth of trees on farmlands, determine the status of farm forestry in District Charsadda.

MATERIAL AND METHODS

For assessment of tree growth on farmlands through farmers' perceptions in District Charsadda, a semi-structured questionnaire was designed and a social survey was conducted by the researcher in the selected villages of District Charsadda. During the survey, 50 respondents were interviewed and the information was recorded through a semi-structured questionnaire. The questionnaire was first prepared using existing questionnaires about farm forestry in Pakistan. The questionnaire was pre-tested in the field and necessary modifications were made in the questionnaire. The questionnaire has three parts. First part contains questions about the socio-economic attributes of the farmers,

second part has questions about role of farm forestry in meeting domestic requirements of wood. In part 3 of the questionnaire, farmers were asked about the status of farm forestry in the area, problems faced by them in growing trees and suggestions for improvement of farm forestry.

The respondents were interviewed in their environment, mostly at their farms or in their homes. Though the interview schedule was in English, the questions were asked in local languages i.e. Pashto or Urdu for the convenience to obtain reliable and required information with maximum accuracy. The respondents were interviewed individually in their own environments. During interview every effort was made to remain unbiased, informal and friendly with the respondents.

Sampling procedure and sampling intensity

Data on farmers' perception about farm forestry was collected using multi-stage random sampling in all three Tehsils of District Charsadda. In the first stage, 4 sample villages were randomly selected in Tehsil Charsadda, and 3 villages each in Tehsil Tangi and Shab Qadar. Thus, in total 10 villages were randomly selected. As there are 200 villages in district Charsadda, sampling intensity was 5% in the first stage. In the second stage, 5 farming households were randomly selected from each village. Thus, in total, 50 farmers were interviewed for collecting relevant information about various aspects of farm forestry. According to NWFP Agricultural Statistics (2000), there are 45,243 farms in District Charsadda, the sampling intensity was determined as one per thousand (0.1%) in the second stage and 45 farmers were required to be interviewed. However, 50 farmers interviewed in the field. Same methodology was adopted by Amjad (1989) for assessment of tree growth on farmlands in Khyber Pakhtunkhwa. The detail of sampled villages and respondents is given in Table 3.7.

Table 1. List of sample villages and respondents

S.No.	Tehsil	Name of village	No. of Respondents
1	Charsadda	Turang zai	5
		Bhaloola	5
		Nissata	5
		Agra	5
2	Tangi	Sherpao	5
		Tangi	5
		Amir abad	5
3	Shab Qadar	Shab Qadar	5
		Kangra	5
		Katozai	5

Selection of individual respondents

A list of household heads was prepared using the voter lists of general election. The serial numbers of the so prepared list were considered as respective codes. These codes were written on chits and using a pot it was shuffled thoroughly. Every time before picking another chit, the pot was shaken. The coding and shuffling was done separately for each sample village.

It was realized that it may not be possible to find all those persons (household heads or member) selected as primary samples for interview, so 50 percent additional samples were selected by the same procedure as alternate candidates to be interviewed. In this way we had 50 candidates as original sample and 25 as reserve sample. It was tried at best to locate the original samples for interview and in cases they were not available alternate samples were interviewed. This arrangement proved useful when the survey was started practically in the field.

RESULTS AND DISCUSSION

Purpose of raising plantation on farmlands

Trees are grown on farmlands for different purposes. It was found that majority of the respondents (72%) planted trees for commercial purpose, whereas 16% plant trees for domestic fuelwood and 6% plant trees for domestic timber and 2% raise trees for fodder purposes. 4% of the respondents reported that they are growing trees on their farmlands to control soil erosion.

Table 2. Purpose of plantation on farmlands

Purpose	Frequency	Percentage
Commercial	36	72
Domestic fuelwood	8	16
Domestic timber	3	6
Fodder	1	2
Soil erosion	2	4
Total	50	100

Number and spacing of trees

Questions were asked to know the average number of trees per acre in the area. It was found that the average number of trees per acre is 100. Usually the farmers plant trees on all boundaries of their farms and sometime block plantations are also raised. The usual spacing between plants on the boundaries of field is 2-3 feet. This closer spacing is practiced to grow more and more trees

on the farmlands and fully utilize the site resources. However, it results in competition and slow growth of trees.

Source of Planting material

The survey revealed that Forest Department and other organizations are playing no role in providing planting material to the local farmers. 48% of the respondents get plants from private nurseries. This is also a good indicator for nursery business in the area. On the other hand 42% of the farmers produce planting stock in their own nurseries. This indicates high level of adoption of farm forestry in the area. The farm forestry is totally dependent on local support instead of any external support.

Table 3. Source of planting material

Type of fuel	Frequency	Percentage
Private nursery	24	48
Own nursery	21	42
Forest Dept.	2	4
Other organization	3	6
Total	50	100

No of trees planted

The respondent reported that all of them have planted trees on their farmlands. Majority (40%) of the respondents have planted more than 300 plants last year or last time on their farmlands. 26% have planted in the range of 100-200 plants whereas 22% have planted less than 100 plants on their farmlands.

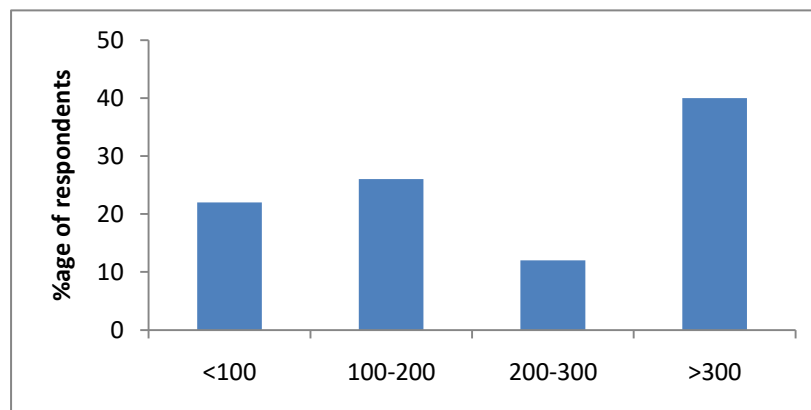


Fig. 1. Number of trees planted per year

Species planted

Poplar is the most common species planted on the farmlands. A predominant majority of farmers (84%) have planted poplar, 8% have planted eucalyptus, 4% have planted bakain and 4% have planted other species including robinia and ailanthus etc. The detail is given in the following table.

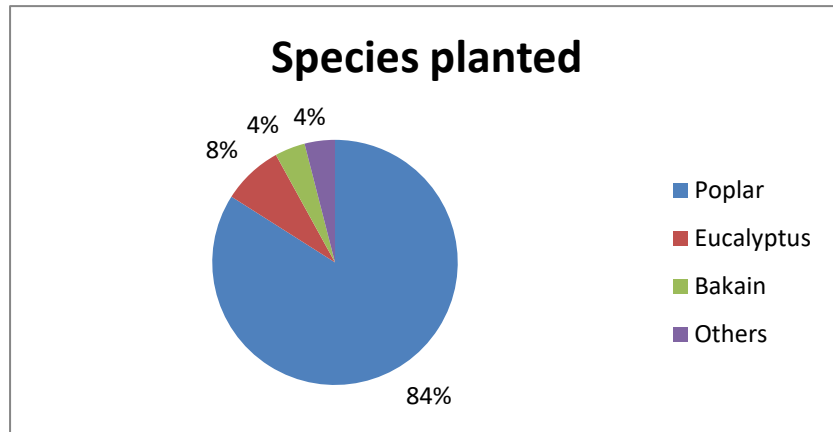


Fig. 2. Species planted

Effect on crop

Trees have impacts on agricultural crops. These impacts are both positive and negative. However, the negative impacts are more visible and noticed easily by the farmers. These include tree shade and roots which badly affect field crop yield. Majority (82%) of the respondents reported that trees have negative effects on agricultural crops whereas only 4% termed it positive. 14% of the respondents observed that there is effect of trees on crops.

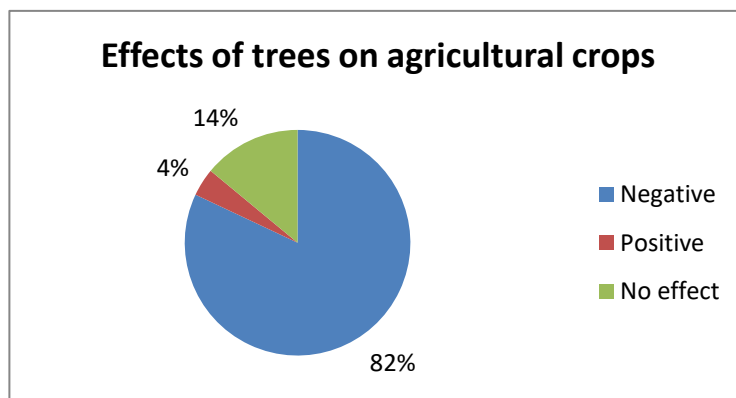


Fig. 3. Effect of trees on agricultural crops

Income from sale of farm trees

Commercial agroforestry is practiced in the study area. Farmers get substantial income from the sale of trees growing on the farmlands. Poplar is particularly grown for commercial purposes and as a source of additional income for the farmers. Huge returns from fast growing poplar have motivated the farmers to grow more and more trees on their agricultural fields. Out of the total respondents, 60% reported that they had earned income from the sale of trees on their farmlands during last five years. About 16% of the respondents were getting income less than 25,000. On the other hand, there were 20% big farmers/landlords who were earning more than Rs 300,000 during last five years from the sale of trees from their farmlands.

Table 4. Average Annual Income during last five years from farmland trees

Income (Rs.)	Frequency	Percentage
>25000	8	18
25000-50000	5	10
50000-75000	5	10
75-100000	3	6
100000-150000	5	10
150000-200000	5	10
200000-250000	5	10
250000-300000	3	6
>300000	10	20
Total	50	100

Age/size of tree harvesting

Farmers need quick returns from farmland plantations and therefore, they prefer fast growing tree species. It was found that most of the farmers fell poplar trees at the age of 7-8 years. At this age, poplar usually attain a size of 15 cm diameter at breast height. As most of the poplar wood is used in match factories, this size is preferred by the industries and fetch quicker and higher returns for the farmers. However, some of the farmers grow poplar trees on their farmlands upto 10 years. In case of eucalyptus, the common age for harvesting is 10 years. Other species are not harvested at regular intervals but felled when they reach maturity or when needed by the farmers.

Table 5. Age/size of tree harvesting

Species	Common age at harvesting
Poplar	7-8 years
Eucalyptus	10 years
Other species	When mature or needed

Satisfaction of farmers with farm forestry

Farm forestry has become a very popular farm enterprise in district Charsadda. As farmers fetch higher income from the sale of trees, most of the growers are satisfied with farm forestry. About 76% respondents reported that they are satisfied with the plantation of trees on their farmlands. However, 24% respondents showed their dissatisfaction with farmland plantation. This is mainly felt by the tenants who rent others' land for cultivation and the income from the sale of trees are exclusively taken by the owners. The loss in the form of reduction in agricultural crop is borne by the tenants and thus they are not happy with plantation of trees on farmlands.

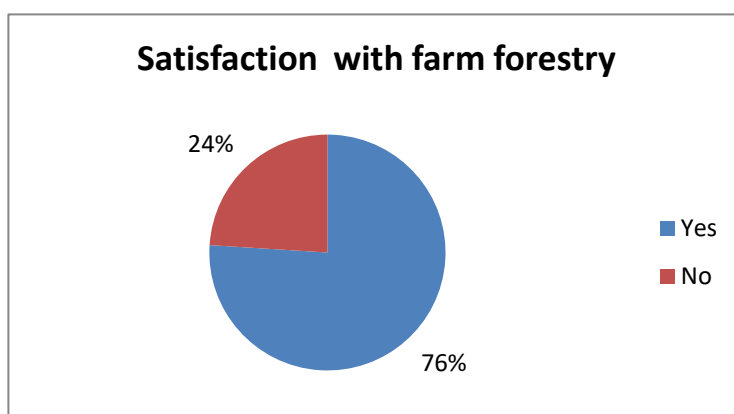


Fig. 4. Satisfaction of farmers with farm forestry

Problems in farm forestry

The respondents were asked to highlight the problems faced by them in management of plantation on their farmlands. Majority (80%) of the respondents reported borer attack on poplar as the main problem in farmland plantation. Second important problem is the lack of quality planting material, lack of proper marketing and factories and are also problem for tree growers. Some respondents also reported ban on wood export to neighbouring Afghanistan as a barrier in further promotion of farm forestry in the area.

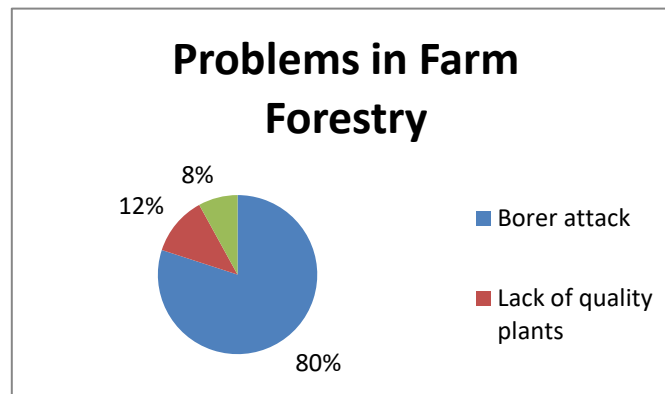


Fig. 5. Problems in Farm Forestry

DISCUSSION

Agroforestry has become a promising landuse practice in District Charsadda and almost all farmers whether big or small landholdings are raising trees on their farmlands. The reason behind this success of agroforestry are availability of fertile land, irrigation water, adoption of a fast growing tree species and high demand for the timber by the wood-based industry. Small farmers are mostly raising plantation on the boundaries of agricultural fields whereas big farmers raise trees on farm boundaries as well as inside the farm in the form of compact plantation. The average number of trees per acre was recorded as 100 which is much more as compared to the past. Mir (2003) reported that the average number of trees on farmlands is 25 per acre, whereas Amjad *et al.* (1990) has reported 29 trees per acre. This means, that there has been a considerable increase in the number of trees on farmlands since 1990. Though it is perceived that trees negatively affect the crop yield on farmlands but the revenue from the sale of the trees is more than the loss in crop yield (Khan, *et al.*, 2020).

Marketing is a major challenge for agroforestry and it must be addressed for success of the practice (Baig *et al.*, 2020). Poplar cultivation has overcome the marketing challenge as it has become a species of choice for farmers due to its fast growth and early economic return. The poplar saplings are easily available in the area in private nurseries and the farmers also well trained in raising poplar nursery in the farms. The species reach harvestable size in 5-6 months and fetch good price due to its demand by match and sports industries. Agroforestry has also become a good adaptation measure for farmers in the face of climate change as annual crops and livestock are severely affected by the harsh climatic event like floods whereas trees help in resisting floods and reducing the damages (Mahood, M. I., 2018). Charsadda has been severely

affected by the floods in 2010 and 2022 and the farmers who had grown trees on their farmlands were in a better position to cope with the financial shocks of the flood.

CONCLUSION AND RECOMMENDATIONS

District Charsadda is the best model of farm forestry in Pakistan. Almost every farmer has planted trees on his farmlands. Due to fast growth and quick economic return, poplars have become so popular that one can hardly find any piece of land in Charsadda which is devoid of poplar trees. All farmers have planted trees on their farmlands. Poplar is the main species, followed by eucalyptus, bakain, ailanthus and kikar. Though farm forestry is practiced in the area since ancient times, the modern commercial farm forestry has been started in the last three decades.

It was found that the average number of trees per acre is 100. Usually farmers plant trees on all boundaries of their farms and sometime block plantations are also raised. There has been a considerable increase in the number of trees on farmlands since 1990. Farm forestry has become a very popular farm enterprise in district Charsadda. As farmers fetch higher income from the sale of trees, most of the growers are satisfied with farm forestry. About 76% respondents reported that they are satisfied with the plantation of trees on their farmlands. However, 24% respondents showed their dissatisfaction with farmland plantation. This is mainly felt by the tenants who rent others' land for cultivation and the income from the sale of trees are exclusively taken by the owners. The loss in the form of reduction in agricultural crop is borne by the tenants and thus they are not happy with plantation of trees on farmlands.

The study recommends to conduct research on the problem and recommend proper control measures for borer attack on poplar trees. There is also a need to diversify tree species and include more species particularly nitrogen fixing native species such as Kikar and Shisham in the farmland plantations. Fodder trees should also be promoted to increase fodder availability in the area. It is also recommended that forest extension services should be strengthened in the area to provide awareness and build the skills of farmers in plantation management. It is also recommended that tenants should be given proper share in income from the sale of trees on farmlands. This will motivate them to protect farmland plantations. There is a need to establish wood-based industry in the area so that farmers get full returns from their farmland plantations. Research should be conducted to determine optimum spacing and management interventions for farmland plantations and find out best combinations of different tree species and agricultural crops on farmlands.

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