



Potentials of agroforestry and constraints faced by the farmers in its adoption in District Nankana Sahib, Pakistan

Taimoor Hassan Farooq ^{1,2}, Muhammad Farrakh Nawaz ², Muhammad Waqqas Khan ¹, Mator Mohsin Gilani^{1,2}, Supaporn Buajan¹, Junaid Iftikhar ³, Norela Tunon ⁴, Pengfei Wu ^{*1}

¹ College of Forestry, Fujian Agriculture and Forestry University, Fuzhou, 350002, Fujian, China

² Department of Forestry and Range Management, University of Agriculture Faisalabad, 38000, Pakistan

³ Institute of Horticulture, University of Agriculture Faisalabad, 38000, Pakistan

⁴ College of Economics, Fujian Agriculture and Forestry University, Fuzhou, 350002, Fujian, China

Abstract

Agroforestry (AF) is a multidisciplinary effort that brings forest into contact with agriculture and livestock. It can help by increasing the overall production through a combination of trees and crops. The objective of the current study was to examine the potentials of AF and constraints faced by the farmers in its adoption. The study was carried out in District Nankana Sahib by conducting a detailed survey in the 3 Tehsiles and 150 randomly selected farmers were interviewed by using a well-structured questionnaire. Our results showed that 91.3% of farmers were practicing AF for economic benefits while Most of the farmers were growing *Eucalyptus camaldulensis* (Sufaida) and *Dalbergia sissoo* (Shisham) on their farmlands. For quick economic returns, the majority of the farmers showed their interest in replacing *Dalbergia sissoo* with the fast growing species like *Eucalyptus camaldulensis* and *Populus deltoides* (Poplar). Lack of technical assistance and water shortage are the major constraints that farmers were facing in the adoption of AF. The system of AF should be effectively designed by the Government to make it socially and economically acceptable for the farmers. Moreover, marketing facilities, financial and technical incentives should be revived.

Keywords: Agroforestry; Economic benefits; Farmlands; Constraints; Farmer

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Cite this article as: Farooq, T.H., Nawaz, M.F., Khan, M.W., Gilani, M.M., Buajan, S., Iftikhar, J., Tunon, N. and Wu, P. (2017), "Potentials of agroforestry and constraints faced by the farmers in its adoption in District Nankana Sahib, Pakistan", *International Journal of Development and Sustainability*, Vol. 6 No. 8, pp. 586-593.

1. Introduction

Forests are very important to maintain the climate and agriculture of any country. It plays a key role in maintaining the ecosystem and offers countless services for living creature on the earth. Along maintaining the balance of nature, forests are also vital for the industrial sector by providing them the raw material (Susilawati and Weir, 1990).

Forests are significant in many ways; providing habitat for animals, reducing soil erosion, improving soil fertility, regulation of precipitation, maintaining ecosystem and other many non-forest products. The majority of the people are directly or indirectly dependent on the forests for their livelihood, especially in less developed areas. Forest products are sold to get cash for daily requirements or used directly by people (Beer and Schlonvoigt, 2000). Nowadays, eco-tourism industry is one of the world's largest business sectors (Kuvan and Perran, 2005)

Modern agriculture has deprived local communities in the tropics of their natural life-support system (Asaah et al., 2011). Although, the Forest crops didn't improve too much the lifestyle of people reliant on the forests it helped them to meet their daily expenses (Boffa, 1999). Pakistan has very meager forestry resources, only 4.8% (4.2 M ha) out of 79.61 million hectares is under forest cover, which is very less as compared to the world which possesses around 30% under forest cover (PFI, 2005). In Pakistan, Khyber Pakhtun-khuwa province has a maximum area (1.21 million hectares) under forest cover while, Sindh, Pujnab, Northern Areas & Azad Kashmir and Balochistan have 0.92, 0.66, 0.42 and 0.33 million hacters respectively (GOP, 2005).

According to World Bank 2011, Pakistan contributes only 2.11% of the total land area out of which only 32.8 % is under commercial forest and remaining 67.2 % under protected forest. Pakistan was ranked at the 110th position by UN General Assembly (Chaudhry, 2011). In Pakistan, per capita, forestry resources are dedicated as 0.001 ha which is very less as compared to the world which is 1.00 ha per capita (FAO, 2011). Due to a rapid increase in population, urbanization and industrialization deforestation has become a major issue in developing countries (Rizwan, 2011). Low agricultural yield also affects the forest cover (Chaudhry, 1997).

Forests can be enhanced by planting trees on private farm lands with field crops. The area under cultivation is 22.15 million hectares in Pakistan and 10% of this can be brought under trees without harming agricultural crops. The possible alternative to overcome deforestation is to advertise agroforestry by creating awareness among farmers. The role of trees in controlling erosion and pollution is significant (Zubair and Chris, 2006) meanwhile provide essential products (human food, medicines, animal food, wood/energy/fiber) followed by environmental services (soil fertility improvement, soil/water conservation, shade) and sale to generate revenue for the farmers (Rahman et al., 2008; Faye et al., 2011). Traditionally farmers in Pakistan consider the tree as a crop of barren land. The objective of the current study is to investigate the current scenario of agroforestry and constraints faced by farmers in it adoption at gross root level.

2. Materials and methods

2.1. Study Area

District Nankana Sahib was selected as the universe of study. Nankana Sahib comprises of 3 Tehsiles: Nankana Sahib, Shahkot, and Sangal Hill. It is a separate district under Lahore division. The land in Nankana is very fertile and productive because of a well-managed irrigation system. The climate of the area is hot summer and short severe winter. Average annual temperature is 24.1°C and average annual precipitation is 476 mm.

2.2. Data collection and analysis

A data of 50 farmers from each Tehsil were collected by making a total of 150 farmers. From all sampling units (three Tehsiles) fifteen villages (10 farmers from each village) were selected randomly. According to the objectives of the study, a well-structured questioner was developed through the consultative process. And interview schedule was organized for this purpose. Statistical Package for Social Sciences (SPSS) software was used for quantitative data analysis and to made conclusions

3. Results and discussions

The actual status of agroforestry helps in understanding the attitude of farmers and determining whether they will adopt or reject new ideas. In scientific research, the analysis of data and its interpretation are the important steps. The majority of the farmers was illiterate and follows the trends; Figure 1 showed that the neighbor farmers were the source of information for the majority (77.3%) of the farmers. Almost half (49.3%) of the farmers mentioned electronic media as their source of information and only 6.0 % of the farmers reported that they got information from print media.

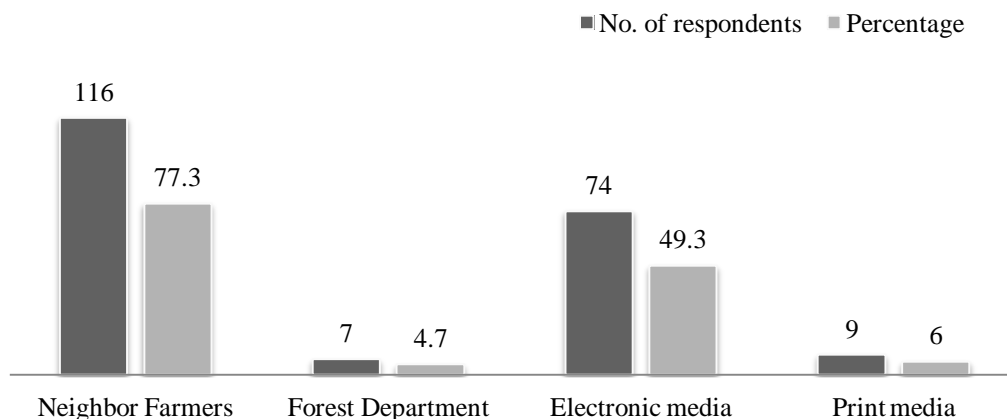


Figure1. Source of information for the farmers about agroforestry

Table 1 shows the distribution of the respondents according to the abundance of trees on their farmlands where 13.3 % of the farmers had cultivated more than 30 *Eucalyptus camaldulensis* trees on their farms and about one fourth (25.3%) of the respondents had up to 30 trees. 60.6 % of farmers had grown up to 30 *Dalbergia sissoo* plants and only 8.0 % had more than 30. Only 4 % of the respondents had grown more than 10 *Acacia nilotica* trees and 19.3% of the farmers had up to 10 trees on their farms. More than half (56.7%) of farmers had cultivated up to 10 *Meleia azederach* trees on their farms while 23% had grown more than 10. The majority of farmers planted *Dalbergia sissoo* due to the economic benefits in terms of sale of timber.

Table 1. Distribution of respondents according to the abundance of trees on their farmlands

Tree Species	No. of Trees	No. of respondents	%
<i>Eucalyptus camaldulensis</i> (Sufaida)	Up to 30	38	25.3
	30+	102	68.0
	Total	140	93.3
<i>Dalbergiasissoo</i> (Shisham)	Up to 30	91	60.6
	30+	12	8
	Total	103	68.6
<i>Acacia nilotica</i> (Kikar)	Up to 10	29	19.3
	10+	6	4.0
	Total	35	23.3
<i>Populus deltoids</i> (Popular)	Up to 10	16	10.6
	10+	4	2.71
	Total	20	13.3
<i>Meleiaazederach</i> (Bakain)	Up to 10	85	56.7
	10+	34	22.6
	Total	119	79.3
<i>Bombaxceiba</i> (Sumbal)	Up to 10	16	10.6
	10+	5	3.3
	Total	21	13.9

Farmers practiced agroforestry for different environmental benefits and financial purposes. A large majority (91.3%) of respondents mentioned that financial benefits were the main purpose of practicing agroforestry. Moreover, 74.6 % of respondents reported main reason for practicing agroforestry was fodder. Other purposes for practicing agroforestry on their farmlands were fuelwood (40.0%), agricultural implements (18.7%), soil fertility (10.8%) and windbreaker (4.7%). More or less the similar results also reported by (Saxena, 1990) who stated among the large farmers income generation and financial benefits while 54% of small farmers were practicing for fodder and fuelwood to meet the daily needs of their family and animals (Figure 2).

Data in the Table 2 revealed 55.3 % of the farmers were in the favor of expansion of *Eucalyptus camaldulensis* on their farms because of its fast growth the farmers want quick economic return while 19 % were considering of reduction. After *Eucalyptus camaldulensis* farmers were in the favor of expanding *Populus deltoides*. Half of the farmers (54.7%) were against planting *Dalbergia sissoo*. Our results are supported by (Nawaz *et al.*, 2016) in his study in district Chiniot, he reported that *Eucalyptus camaldulensis* is most planted

species by farmers in last five years. As a future prospect both these species are likely to replace *Dalbergia sissoo* and *Acacia nilotica*.

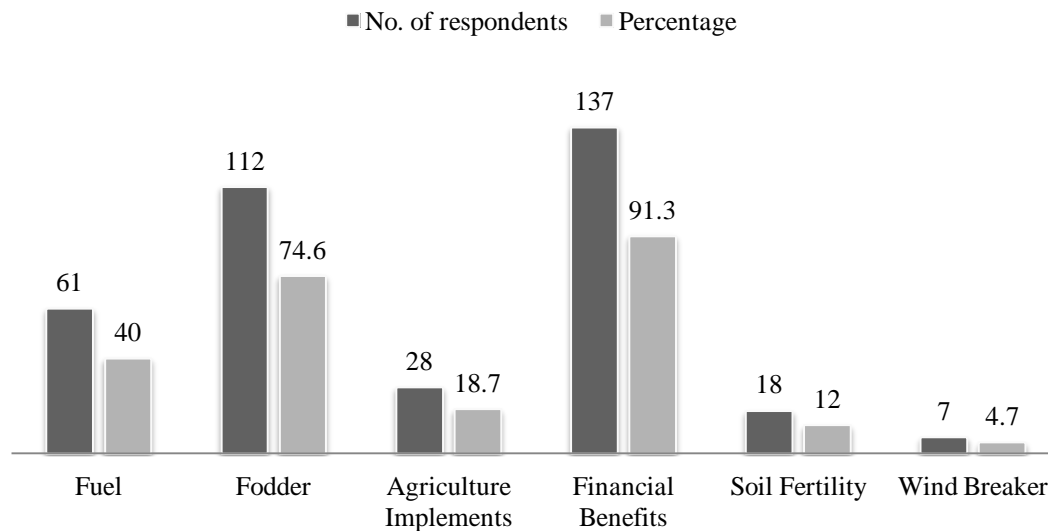


Figure 2. Distribution of the respondent farmers about their purposes of agroforestry

Table 2. Distribution of respondents according to their future plan about Agroforestry

Tree Name	Expansion		Reduction		No change	
	No. of respondents	%	No. of respondents	%	No. of respondents	%
Sufaida	83	55.3	28	18.7	29	19.3
Shisham	4	2.7	82	54.7	17	11.3
Kikar	2	1.3	14	9.3	13	8.7
Popular	13	8.7	3	2.0	7	4.6
Bakain	18	12.0	47	31.3	54	36.0
Sumbal	-	-	10	6.7	8	5.3

Almost three-quarter of the respondents (74.0%) were agreed that in financial terms agroforestry has positive effects on their economic condition. Only 14 % of respondents have opposite views; according to them, agroforestry affects the crop yield as the trees create direct competition for nutrients. More or less similar results reported by (Rahman et al., 2008) in his findings. 52 % of the respondents agreed about the

positive effects of agroforestry while due to lack of awareness 28 % were uncertain and 20 % disagreed. 83 % of the farmers due to a rapid increase in population demand of wood will increase in future. Only 5 % thought that demand for wood will decrease due to excessive use of steel and plastic utilities while 12 % thought it will remain same (Fig 3).

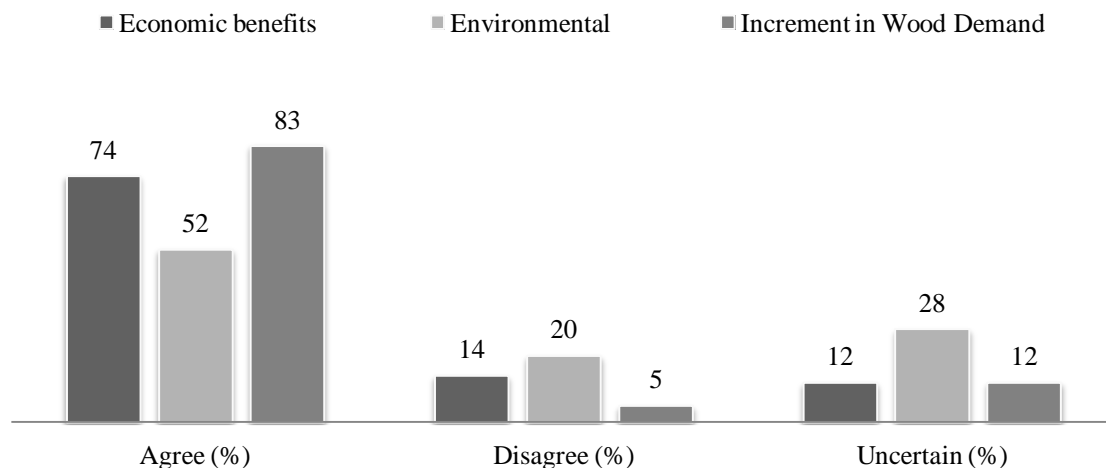


Figure 3. Views of the farmers about agroforestry Benefits and future need

Our results in Table 3 show the problems faced by the farmers in adopting agroforestry where lack of technical assistance and water shortage were the major cause.

Table 3. Barriers faced by farmers in adoption of agroforestry

Sr. No	Barriers	No. of Respondents	%
1	Lack of Capital	58	38.7
2	Small land holding	97	64.7
3	Lack of awareness	86	57.3
4	Lack of Education	92	61.3
5	Lack of Technical Assistance	123	82.0
6	Less Availability of seedlings	12	8.0
7	Water Shortage	119	79.3
8	Lack of Wood-based Market	108	72.0
9	Transportation	31	26.7

4. Conclusions

Farmers are practicing agroforestry for economic benefits so they are replacing the previously grown hardwood trees with the fast growing and straight bole species like *Eucalyptus camaldulensis* to get early economic returns. Lack of technical assistance, proper awareness and water shortage were the major constraints faced by the farmers for planting trees on their farmlands. People have to be careful about the misuse of water and recycling of the used water has to be practiced at small scale level. Drip and sprinkler irrigation should be encouraged. To harvest rainfall water, reservoirs like small dams and embankments should be established with the cooperation of Government and local communities. Productivity and crop yield can be improved by motivating the small scale farmers to invest their labor and limited financial resources. Economic incentives should be reinforced and private sector should be engaged. There is a need of policy reforms and property rights should be strengthen. Government need to establish wood based markets to encourage farmers to grow more trees on their farmlands. Moreover, farmers have to be educate about the other benefits of agroforestry (soil conservation, food security and in climate change mitigating) and landscape management. Through advertisement, Forest department need to arrange seminars, proper training and awareness programs at village level regularly.

Acknowledgement

Authors are grateful to all the people who helped during survey and data collection by arranging meetings and providing residence. Especially thank to Mr. Muhammad Farooq for his continues support in this research project.

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