Current Research Journal of Social Sciences 4(1): 29-35, 2012
ISSN: 2041-3246

Submitted: October 03, 2011 Accepted: November 25 , 2011 Published: January 25, 2012

Farmers' Agro forestry in Pakistan, Farmers' Role-Trends and Attitudes

[1]Tanveer Hussain, [2]Ghulam Sarwar Khan, [3]Shahid Ali Khan, [4]Nasir Masood,
[5]Muhammad Ashfaq and [1]Naila Sarwer
[1]Cholistan Institute of Deserts Studies, Islamia University of Bahawalpur, Pakistan
[2]Department of Forestry, Range and Wildlife Management, University of Agriculture, Faisalabad
[3]Research and Planning, PMAS Arid Agriculture University, Rawalpindi, Pakistan
[4]University College of Agriculture and Environmental Sciences,
The Islamia University of Bahawalpur, Pakistan
[5]Department of Chemistry, The Islamia University of Bahawalpur, Pakistan

Abstract: The purpose of the study was to identify the beliefs that underlie farmers' decisions to engage in agro-forestry, defined as intension to plant trees in the farms. The less proportion of forest land and perpetual degradation of existing forest plantation are confronting serious threats to the sustainability of forest plantation in Pakistan. Agro forestry has been identified the most feasible solution; especially in irrigated areas of Punjab. The application of theory of planned behavior during the survey of 64 farmers in three different ecological zones showed/depicted that farmers' willingness to plant trees on their fields is a result of their attitudes towards the advantages and disadvantages of trees, their perception of the opinions of salient referents and factors those encourage and discourage farm level tree planting. Farmers' viewed farm forestry as economically beneficial and environment friendly. Tree planting was being perceived as increasing income, providing wood for fuel and furniture, controlling pollution and providing shade for human and animals. Farmers viewed the hindrance in agriculture operations and the harboring of insects pests and diseases as negative impacts of tree planting; however, they were outweighed by their perceptions of positive impacts. Tree growing decisions of the farmers were influenced by the opinions of the family, owners/tenants, fellow-farmers. Farm forestry programs are more likely to be successful, if they acknowledge and address the factors, which underlie farmers' reasons for planting or not planting trees.

Key words: Agro-forestry, attitudes, planned behavior theory, trends

INTRODUCTION

Pakistan has poor forestry resources and one of the lowest proportions of forest area in the world (Mcketta, 1990). The existing forest cover is unable to meet the growing demands for food and food-based products in Pakistan, the 7th most populous country in the world and 4th in Asia bearing population growth rate 2.1% (GOP, 2003). The current forest area is only 4.7% of the total area of Pakistan and is depleting due to numerous threats including continuous cutting / felling of forest trees and commercial over exploitation (GOP, 2004).

The output from the state forest is insufficient to fulfill the demand for timber and fuel wood, raw materials for industries, energy requirements of agriculture sector and fodder for livestock. The dependence on conventional fuel i.e. fire wood alone accounts for 50% of the rural fuel needs, cow dung and agricultural residue highlights the importance of trees in solving energy needs of rural communities (Siddiqui, 1997). Trees also contribute to economic development having their role in the protection of watersheds, maintenance of bio-diversity and environment quality (Bukhari, 1997). The plants and soils of forest hold 460-575 billion metric tons of carbon world-wide with each acre of forests storing about 180 metric tons of carbon. Tree planting on farmlands is the most feasible and viable solution under the present circumstances in Pakistan, in order to re-claim the degraded forest lands, ensure sustainable use of marginal lands, protect good quality land fulfill the rural needs for the economic and non-economic benefits from trees to sustain their rural livelihood (Khan *et al*., 2001).People participation in farm forestry activities is low because most social forestry projects were mainly focused on biological and technical concerns and very low or no emphasis has been placed on understanding the perceptions of local people or beneficiaries of the projects. Concept of social forestry envisages the practice of forest trees on lands outside the conventional forest area to achieve social objectives for the benefits of rural and urban communities. The social forestry program is being implemented through the establishment of

Corresponding Author: Tanveer Hussain, Cholistan Institute of Deserts Studies, Islamia University of Bahawalpur, Pakistan

plantations under various schemes ranging from road-side, canal bank plantations. Trees have an important role in the life of the entire living organism on the earth. It is basic to fundamental necessities of life i.e. food, fiber, and shelter. Forest can also play an important role in Pakistan's economy. These are the important sources for protection of lands, water resources, particularly in prolonging the lives of dams, reservoirs and irrigation network of canals. The world's forest cover amounts to 3.9 billion ha, which is about 33% of land area and it is estimated that an insignificant percentage of Pakistan's forest cover consists of "Primary forest" which is relatively intact. An insignificant %age of Pakistan's forest is classified as "protected" while about 11.4% is " Conserved" and about 32% is classified as " Production forest" (FAO, 2000).

Rapid decline in forest cover also lead to increased environmental degradation, pollution, land-degradation, loss of bio-diversity and low agriculture yield. Pakistan has lost about 0.21 million hectare of forest with deforestation rate of 2.1%, meaning it has lost an average of 0.043 hectares of forest annually.

Pakistan is a forest deficient country with only 0.3 hectare per capita as compared to an average of 1 hectare per capita. This forest area per capita is declining with growing population of 2.1% annually. The area under public forest cannot be further expanded to keep pace with population growth rate and increasing demands for forest products. The only available option is to increase wood production on private or farmlands so as to meet pulp and paper demands locally to reduce import bill and save foreign exchange. It is estimated that sate forests contribute 14% of timber and 10% of fuel wood whereas 46% of timber and 90% of fuel wood requirements are being met from farmlands (FAO, 2001) .Thus farm forestry is playing a vital role in fulfilling our wood requirements. The farmlands of central Punjab have about 200 million trees of which 95% are in irrigated areas. The significance of wood produced on farmlands has increased sharply during the last two decades. According to the Forestry Sector Master Plan (FSMP), the annual growth of forestry was 14.4 million cubic meters of which 7.7 million cubic meters (53%) were put on by the farmlands trees. Now the farmers have recognized the importance of planting trees on the fields for sheltering crops, generating wood for self-consumption and commercial scale. Scattered trees have less competition with the agricultural crops and it yield tangible benefits against very little cost and efforts. Some efforts have been made to assess the farmers' participation in agro-forestry but previously no formal effort was made to assess the perception of farmers to value trees planted as new intervention in the districts of the Punjab. The main objective of the study was to identify the beliefs that underlie farmers' decisions to engage in agro-forestry, defined as intension to plant trees in the farms.

MATERIALS AND METHODS

Empirical research was carried out in three randomly selected divisional headquarters, representing three distinct zones in the Punjab Province of the Pakistan in 2006 and 2007 viz: Lahore, Faisalabad and Bahawalpur, (Lahore is divisional headquarters of district Lahore,Faisalabad is divisional headquarters of district Faisalabad, Bahawalpur is divisional headquarters of district Bahawalpur. For this purpose, a comprehensive questionnaire was prepared to interview a number of farmers of varying land holdings in each zone. The questionnaire included 7 salient outcomes and believes/statements. Metrological data of Lahore, Faisalabad and Bahawalpur regions is given in Table 1-3 during study period. Three salient referents and 7 salient controls believe. Control Believers included those related to land tenure, inability to protect trees from damage, availability of barren lands, market factors and confirming the constraints of others.

Farmers were classified into various categories based upon land holdings, their occupation and association with farm forestry, (called FF) and those not engaged in farm forestry (called NFF) as female householders play a very small role in the contest of this study, key decision maker in respect of tree planting on the farm are dominantly the men, who were recognized as holding lands with the following criteria:

- Farmers having land holdings 25 acres and above
- Farmers with land holding 10 to 24 acres
- Farmers having land holdings less than 10 acres

Assessment of "Believes": The two components of attitude; belief strength and outcome evaluation were each measured by suing a five point Likert Scale ranging from: "strongly agree (5 points) to strongly dis-agree (1 Points) for belief strength; for outcome, it was, "very good" (5) to very bad (1). The two components of Subjective Norms (SN) were also measured on five points scale ranging from strongly agree to strongly dis-agree for normative belief and motivation as, "very much" (5) to not at all (1). Similarly two components of Perceived Behavioral Controls (PBC) were measured on 5-1 scale, "strongly agree" that the factor would be hindrance to planting trees and "strongly disagree" for control believes, as well as for power of control believes.

Evaluation of results: The data was analyzed using SPSS. As the variables were measured on ordinal scale; median and IQR, instead of mean and standard deviation were used as measures of central tendency and dispersion. Significance of differences between FF & NFF was observed by MANN-Whitney U Test. In the first phase, open interviews were taken with 7 FF farmers and 6 NFF farmers from each zone. Statement of believes in relation

Table 1: Comparison of the belief strength (si), outcome evaluation (ei) and attitudes (si, x ei) of FF and NFF towards farm forestry

Attitude statements	Belief strength (si)			Outcome evaluation (ei)			Attitude (si x ei)		
"Planting trees on my farm will…"	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W)	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W)	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W)
Increase income	5(5-5)	5(4-5)	**	5(5-5)	5(4-5)	***	25(25-25)	25(18-25)	***
Provide fuel wood and furniture wood	5(5-5)	5(5-5)	ns	5(5-5)	5(4-5)	***	25(25-25)	25(20-25)	***
Provide shade for human beings and animals	5(5-5)	5(4-5)	*	5(4-5)	4(4-5)	**	25(20-25)	20(20-25)	**
Control pollution	5(4-5)	5(4-5)	ns	5(4-5)	4(4-5)	ns	20(20-25)	20(18-25)	Ns
Cause hindrance in agricultural operations	4(3-4)	2(1-3)	***	4(3-4)	2(1-3)	***	16(9-16)	4(1-9)	***
Cause shade that will reduce the yield of crops	4(4-5)	4(3-5)	ns	5(4-5)	4(3-5)	**	16(16-25)	16(9-25)	*
Provide harbor to insects, pests and diseases	2(1-3)	1(1-2)	**	2(1-3)	1(1-2)	**	4(1-9)1	1(-4)	**
Si	30(27-32)	27(22-30)	***						
ei				31(26-32)	25(21-30)	***			
si x ei							131(116-150)	111(86-138)	***

Significance of the difference in the distribution of scores of FF and NFF on the basis of Mann-Whitney U test (M-W); *: significance at 0.05; **: significance at 0.01; ***: significance at 0.001; ns: showing no significance differences

to outcomes of planting trees on their farm in the next five years, along with their behaviors limitations, freedom etc were recorded. Statements recorded from multiple interviews were regarded as salient to be used for the interview in the second phase. In the second phase: 34 FF farmers and 30 NFF farmers were interviewed. The samples were selected in three stages depending upon land holding. The list of the farmers in each category was drawn up from different union councils and district officer of agriculture; 8 farmers in each of the two categories were selected at random.

RESULTS AND DISCUSSION

Farmer engaged in FF were significantly younger then NFF. The farmers having land holdings less then 10 acres 10-24 acres and above 25 acres showed their response to grow farm trees as 22, 42 and 75%, respectively. They were also more likely to have occupation in addition to farming, with 64% of FF and 40% of NFF reported to have non-farm employment. Analysis of salient beliefs showed a strong belief in the positive outcomes of tree planting for both FF & NFF (Table 1). A majority of respondents of both FF & NFF expressed either, "Strong" or "very strong" intentions to plant trees on their farms in near future. The proportions of FF were significantly greater than NFF giving 94% and 66%, respectively. Intention to plant trees during the next five years was slightly less strong. 92 and 55% of FF and NFF expressed "strong" or "very strong" impulses for plantation of trees. The tree planting was economically beneficial and environment friendly. Most of the farmers reported that planting trees on their farmlands has resulted in an increase in income, provided wood for fuel and making furniture, controlled pollution, and provided shades for human being and animals especially during summer. However, negative impact of growing trees was also observed as causing hindrance in performing agriculture operations. In some cases, the shade of tree proved to be inimical to crops and vegetables absorbing sunlight to reach the plants resulting into reduction in photosynthesis which cause curtailment of yield (Fig. 1, 2 and 3). It is clear from the comparison of median score (Table 1) that significant variations were recorded between FF and NFF regarding belief strength, outcome evaluation and their summated products. Out of seven modally salient beliefs regarding their strength of beliefs, both the groups disagreed in three beliefs. FF were of the view that trees increased income (median { IQR }= 5{5-5}), controlled pollution (median { IQR)=5{5-5}), and provided shade for animals and human beings (median {IQR}=5{5-5}), more strongly than NFF. On the other hand, NFF considered the trees as hindrance in agricultural operations (median {IQR} = 2{1-3}), and harboring insects, pests, and diseases of crops (median {IQR} = 1{1-2}), more significantly as compared to FF (Table 1). Regarding the outcome evaluation, significant differences were found between the two groups. About five evaluative beliefs out of the total studied beliefs, FF showed higher scores than NFF in the evaluation of positive impacts of farm-level tree planting viz: increase in income (median {IQR} = 5{5-5}), provision of fuel wood and furniture wood (median {IQR} = {5-5}), and provision of shade for animals and human beings (median {IQR} = 5{4-5}) as shown in Table 1.

On the contrary, three beliefs of farm forestry, i.e. hindrance in agricultural operations (median {IQR} = 2{1-3}), shading crops to reduce their yield (median {IQR} = 4{3-5}) and harboring insects, pests, and diseases of crops (median {IQR} = 1{1-2}) were significantly negatively evaluated by NFF more than FF. Regarding motivation to comply, both FF and NFF were motivated to comply with the opinion of all salient referents (median {IQR} = 20{16-22}), pertaining to farm forestry (Table 2).

Table 2: Comparison of the belief strength (bi), motivation to comply (mi) and subjective norms (bi, x mi) of FF and NFF

Salient referents	Normative beliefs			Motivation to compaly			Subjective norms		
	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W)	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W)	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W)
Tenant/owner	4(3-5)	4(2-5)	*	4(2-5)	3(2-5)	***	15(8-20)	11(4-20)	**
Fellow former	4(3-5)	4(3-5)	ns	4(2-4)	3(2-5)	**	12(8-20)	10(8-16)	**
Forest department	3(3-3)	4(3-3)	*	04(3-5)	3(3-5)	***	12(9-15)	9(9-14)	**
bi	11(9-13)	12(8-13)	**						
mi				12(7-14)	9(6-15)	***			
bi x mi							39(25-55)	30(21-50)	***

Significance of the difference in the distribution of scores of FF and NFF on the basis of Mann-Whitney U test (M-W); *: significance at 0.05; **: significance at 0.01; ***: significance at 0.001; ns: showing no significance differences

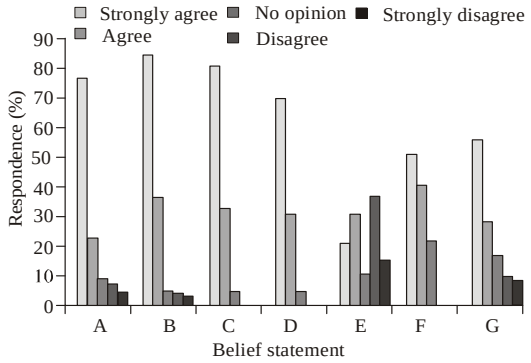

Fig. 1: Belief strength scores of the farmers (n = 64) regarding farm forestry. A: income increase; B: Provide fuel wood and furniture Wood; C: Provide shade for animals; D: Control pollution, E = Cause hindrance in farm operations; F: Cause shade that reduce the yield of crops; G: Provide Harbor to insect, pest and diseases of crops

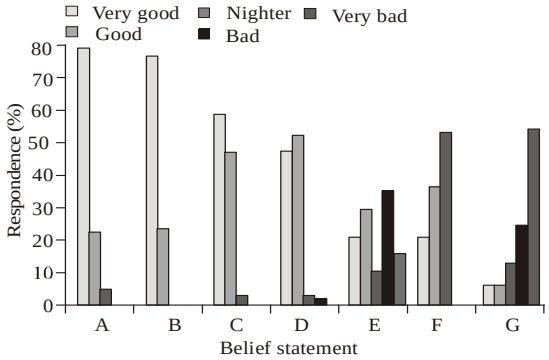

Fig. 2: Outcome evaluation scores of the farmers (n = 64) regarding farm forestry. A: income increase; B: Provide fuel wood and furniture Wood; C: Provide shade for animals; D: Control pollution; E: Cause hindrance in farm operations; F: Cause shade that reduce the yield of crops; G: Provide Harbor to insect, pest and diseases of crops

From, this it can be seen that FF are significantly different from NFF regarding their motivation to comply with the opinions of tenants/owners (median {IQR} = 4{2-5}):

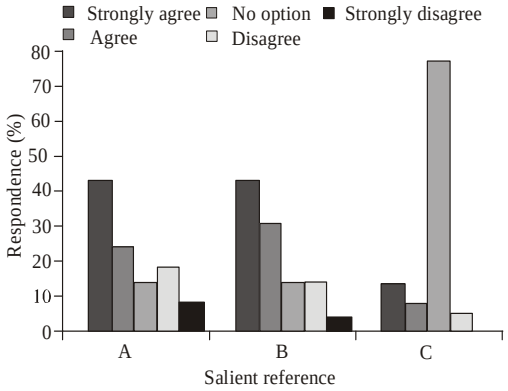

Fig. 3: Normative belief scores of the farmers (n = 64) regarding farm forestry
A: Tenant/Owner; B: Fellow Farmer; C: Forest Department

fellow farmers (median {IQR} = 4{2-4}): Forest Department (median {IQR} = 4{3-5}), concerning growing trees on their farms. It is interesting to note that FF was more compliant to the opinion of others as compared to NFF. This finding is not in agreement with who suggested that "early majority" was less constrained by the opinion from others and make their own decisions. The above difference attributed to the fact that growing of trees on farmlands involves a certain degree of uncertainty, due to which farmers seek more opinions from others in order to reduce the uncertainty before deciding to go ahead and plant trees. This view is consistent with other findings reported by Rogers (1995). Farmers largely believe in the existence of factors that prevent or facilitate the planting of trees and which (they consider) make tree planting either easy or difficult (Fig. 4 and 5). There are significant differences between FF and NFF regarding control beliefs and power of control beliefs Fig. 6. The two groups disagreed significantly in four salient control beliefs of the total seven beliefs questioned upon. FF were significantly more vivid than NFF in perceiving the availability of barren land as a facilitating factor (median [IQR] = 4[45]), and

Table 3: Comparison of the control beliefs (ci), Power of control beliefs (pi) and perceived behavioral control (ci, x pi) of FF

	Control belief			Power of control beliefs			Perceived behavioral control		
Salient control beliefs	FF Median	NFF Median	Sig. (M-W) (IQR)	FF Median (IQR)	NFF Median (IQR)	Sig. (M-W) (IQR)	FF Median (IQR)	NFF Median(M-W) (IQR)	Sig.
Provision of barren Lands	4(4-5)	4(3-4)	***	4(4-5)	4(3-4)	***	16(16-25)	16(9-16)	***
Unavailability of markets	2(1-3)	1(1-2)	***	2(1-3)	1(1-2)	***	4(1-9)	1(1-4)	***
Long term business	2(1-3)	3(2-4)	**	3(2-4)	3(1-3)	ns	5(3-8)	8(3-12)	ns
Long-term land utilization	3(2-4)	3(2-4)	**	3(2-4)	2(1-3)	**	9(4-16)	4(1-9)	**
Damage by humans/animals	2(1-2)	2(1-3)	***	2(1-3)	1(1-2)	***	3(2-4)	3(1-6)	ns
Lack of nurseries	4(2-4)	4(3-4)	***	2(1-3)	2(1-3)	ns	8(4-10)	4(2-6)	***
Acquisition of less income	3(3-4)	1(1-2)	Ns	3(3-4)	4(3-4)	**	12(6-16)	12(9-16)	ns
Ci	20(14-25)	18(12-24)	*						
pi				19(15-26)	17(11-21)	**			
ci x pi							57(36-88)	48(26-69)	**

Significance of the difference in the distribution of scores of FF and NFF on the basis of Mann-Whitney U test (M-W); *: significance at 0.05; **: significance at 0.01; ***: significance at 0.001; ns: showing no significance differences

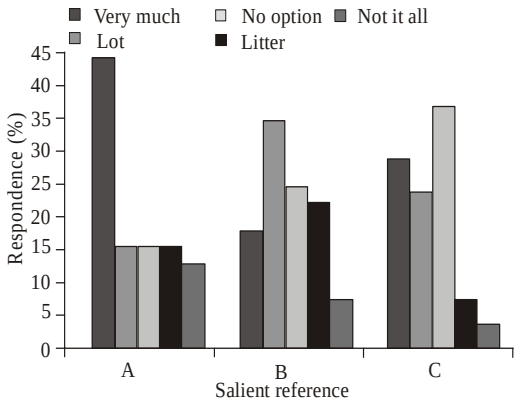

Fig. 4: Motivation to comply scores of the farmers (n = 64) regarding farm forestry

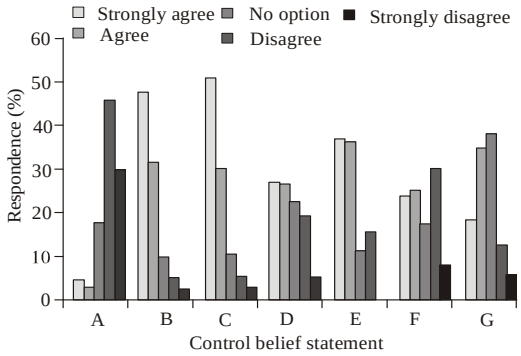

Fig. 5: Control belief scores of the farmers (n = 64) regarding farm forestry. A: Availability of barren Land; B: Unavailability of market; C: Long-term business (return); D: Long-term land Utilization; E: Damage by animal and humans; F: Lack of nurseries; G: Acquisition of less income

the damage to the seedlings by the animals and human beings (median [IQR] = 2[1-2]) as a limiting factor (Table 3).

NFF apprehended significantly more than FF that unavailability of markets is a limiting factor (median

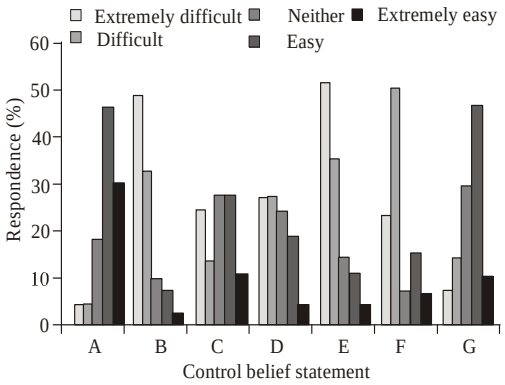

Fig. 6: Power of control belief scores of the farmers (n = 64) regarding farm forestry. A: Availability of barren land; B: Unavailability of market; C: Long-term business (return); D: Long-term and utilization; E: Damage by animals and humans; F: Lack of nurseries; G: Acquisition of less income

[IQR] = 1[1-2]), tree growing as a long term business, (median [IQR] = 2[1-3]), long term utilization of land (median[IQR] = 2[1-3]) and lack of nurseries (median [IQR] = 2[1-3]), than FF (Table 3).

The two groups also differed significantly in four out of seven powers of control factors. FF were more encouraged by the availability of excess land (median [IQR] = 4[4-5]), than NFF. Contrary to this NFF were more likely to express the view than FF that preventive factors such as unavailability of market (median [IQR] = 1[1-2]), long time land utilization by trees (median[IQR] = 2[1-3]) and damage by animals and humans (median[IQR] = 1[1-2]) would make it difficult or very difficult for them to plant trees on their farm lands next year (Table 3).

The study mentioned above was carried out to explore the belief of farmer's attitude and perceptions, the role of salient referents and the factors that encourage or discourage the successful performance of farm forestry. The significant differences in scores of FF and NFF for

beliefs supporting attitudes suggested that the decision whether to grow trees on the farmland was influenced by farmers' perceptions of the benefits and losses engaging in farm forestry. The farmers who have planted trees have assessed the economic and environmental benefits to outweigh the perceived adverse effects of trees. Favorable attitudes towards farm forestry system from their beliefs suggested that planting tree will increase income, and meet household requirements for fuel wood and timber and provide them with a healthy environment to work.

CONCLUSION

Therefore the cobclusion was that , policies and Programme for promoting farm forestry should be sought to intensify or encourage these beliefs especially among those who have not already been engaging in farm forestry. However, the finding that NFF as well as FF have a generally favorable attitude toward the planting of trees suggested that the other two main constraints in the TPB framework are implicated in farmers over all beliefs about farm forestry. Our data showed that the decision to grow trees on farmlands is associated with farmers' perceptions of the opinions and suggestions of salient referents and the motivation to comply with their approval and disapproval. Coupled with attitudes and perceptions farmers also feel social pressure while making the decision to grow trees on their farms. A pressure is, therefore, an important factor influencing farmers towards growing trees on farm. As a result, endeavors and policies aiming at social pressure from fellow farmers, tenants and owners may have an impact on the prevailing system of beliefs. These impacts may change the thinking of farmers and lead them to make new decision that is more responsive to change and may add to the efficiency of farm forestry. The importance of fellow farmers as a salient reference indicates the role of opinion leaders, who can be instrumental in information, dissemination and influencing farmers' attitudes and perceptions. The role of religious leaders in the dissemination of useful information cannot be denied and they should be exploited for this purpose. The availability of land is reported as a major encouraging factor contributing towards the performance of farm forestry. This indicates that farmers consider trees as crops of marginal or barren land due to a number of discouraging factors (market unavailability, lack of nurseries and the long-term nature of farm forestry as an enterprise) in the performance of farm forestry. The competition between farm forestry and agriculture assumes importance if both compete for the same land. If good agricultural land was put under farm forestry, then obviously crop production would be adversely affected. This suggests a need to concentrate more on short-rotation multipurpose tree species rather than long-rotation tree species especially when availability of productive land was a constraint and farming was more directed towards subsistence level.

Similarly reported that "devising more systematic tree designs and careful species selection may therefore reduce the perception of tree growing as long term business by taking farmland for tree planting as utilized for the agricultural purpose". The market for tree products is an important factor to consider. Unavailability of markets and lack of information regarding available markets is a serious constraint that boost up farmers' profit and leads to a high share of the profit being diverted towards intermediaries. There is a dire need to communicate market information clearly to farmers so that they can plan and implement tree-growing strategies. A platform is needed at distinct level for tree growers and also for wood contractors, industrialists and consumers to streamline the affairs of production and marketing of fuel wood and timber. Moreover supporting wood price as implemented for agricultural commodities may also help to encourage tree growing on farmlands. There is no network of nurseries and Forest Department nurseries are not easily accessible to most of the areas situated away from the city or where nurseries are not established. Nurseries run by private owners have a limited choice of planting stock. Farmers do not have their own nurseries to generate planting stock and hence they have to rely on nurseries operated by the Forest Department and private owners. The accepted wisdom in social forestry circles is that seedlings are never in such a short supply as to pose a constraint to tree cultivation, the issue of lack of nurseries and poor access has threatened the performance of farm forestry. A union council-level network of nurseries maintained and run by the farmers under Forest Department supervision may generate confidence among farmers and infuse encouragement for tree planting on farmlands. This may give a fillip to allow more and more nurseries to flourish in the future and ultimately lead to an increase in the number of trees on farmlands that will contribute towards improved rural livelihood through the sustainable supply of fuel wood, timber, and other tree products. Another important factor that discourages tree planting on farmlands is the damage to seedling by animals and human. This perception points to the need to sort out ways and measures to prevent damage from animals, as well as to combat the human factor in damaging trees. This requires rigorous efforts in awareness raising, training, and demonstration campaigns showing the importance of trees and highlighting ways to protect young trees from hazards.

ACKNOWLEDGMENT

Author would like to thanks, University of Agriculture Faisalabad, Pakistan for providing the financial support in carrying out this research study.

REFERENCES

Bukhari, A.S., 1997. The role of NGOs in promoting fuel wood production in Pakistan. In: National workshop on wood fuel production and marketing in Pakistan. RWEDP Report no. 49. Faisalabad, Pakistan: FAO Regional wood Energy Development Programme in Asia (GCP/RAS/154/NET).

FAO, 2000. Global Forest Resources Assessment 2000 and UNEP Global Biodiversity outlook 2001, Retrieved from: (http://www.safnet.org/about forestry/world.cfm).

FAO, 2001. Global Forest Resources Assessment 2001 and UNEP Global Biodiversity outlook 2001, Retrieved from: (http://www.safnet.org/about forestry/world.cfm).

GOP, 2003. Economic survey of Pakistan, 2002-2003. Islamabad: Government of Pakistan (GOP).

GOP, 2004. Economic survey of Pakistan, 2003-2004. Islamabad: Government of Pakistan (GOP).

Khan, A., G. Morgan and A.J. Sofranko, 2001. Farmers" utilization of information sources: A study of the farmers in N.W.F.P. Journal of Rural Development and Administration, 22:38-58.

Mcketta, C.W., 1990. The wood shortage in Pakistan: hypothetical contradictions. Pak. J. For., 40: 266-273.

Rogers, E., 1995.Diffusion of Innovations. 4th Ed., The Free Press, New York.

Siddiqui, K.M., 1997. Wood fuel in the national energy balance. In: National workshop on wood fuel production and marketing in Pakistan: FAO Regional Wood Energy Development Programme in Asia (RWEPD). Report no 49, Faisalabad, Pakistan.