



RESEARCH ARTICLE

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Role of farmers knowledge, experience and decision making at farm level agroforestry: why do farmers adopt agroforestry or not?

HIMSHIKHA AND CHARAN SINGH

ABSTRACT : A farmer's decision to engage with agroforestry practices further depends upon personal vision about knowledge and experience about land use options and especially on the agricultural practices. Several studies have been carried out to gain insight into the adoption of agroforestry in Indian sub continent. But very less have shown light on knowledge, experience and decision making of farmers to adopt or not to adopt agroforestry. To evaluate this, a survey was conducted on the present conditions of farmlands and farmers households in Haridwar, India. Objectives of the study were to access farmers' knowledge, experience, their decision making, and role of women in the process and activities at farm level. Responses from 426 farm households containing both agroforestry and non-agroforestry farmers were recorded and then analyzed to compare above said objectives. Results shown that level of farming experience were more in agroforestry farmers than the non agroforestry farmers. Non-agroforestry farmers were having lesser medium (32.79%) and sufficient (52.46%) level of farming experience than the agroforestry adopters (36.44% for medium and 60.27% for sufficient level, respectively). Average and sufficient level of knowledge was also reported higher in adopters. The study concludes that farming experience, decision making process and agroforestry experience are at higher level in agroforestry farmers than that of non-agroforestry farmers. However, the inferior status of women in family as they don't have much chances or right to take decisions at farm level which is important aspect in agroforestry hence need to be improved.

KEY WORDS : Adoption, Agroforestry, Farmers, Practices, Women

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INTRODUCTION

Farming activities like agroforestry are influenced

MEMBERS OF RESEARCH FORUM

Address of the Correspondence : HIMSHIKHA, Extension Division, Forest Research Institute, DEHRADUN (UTTARAKHAND) INDIA

Email: bhshikha654@gmail.com

Address of the Coopted Authors : CHARAN SINGH, Extension Division, Forest Research Institute, DEHRADUN (UTTARAKHAND) INDIA

by several factors including socio-economic, environmental, and mental processes that are governed by a set of intervening variables (Thangata and Alavalpati, 2003). Agroforestry projects are also known to suffer from inadequate rate of adoption and abandonment soon after adoption (Pattanayak *et al.*, 2003). A farmer's decision to engage with agroforestry practices further depends upon personal vision about knowledge and

experience about land use options and especially on the agricultural practices (Grado and Husak, 2004). A recent global review of the adoption of agroforestry show that the level of agroforestry has generally lagged behind scientific and technological advances attained in such technology there by reducing its potential impacts (Mercer, 2004). This situation explains the concern to see more research on how farmers make decisions regarding agroforestry (Nkamleu and Manyong, 2005). As Nair (2011) argues, agroforestry is characterized by the following four words: intentional, intensive, integrated and interactive. This description shows the complexity in their adoption mainly by the farmers. Adoption and management of agroforestry is a long term goal. Although agroforestry entitles practicing farmers with lots of benefits, evaluation of an innovation (such as agroforestry) is, to a large extent based on the experience of similar individuals (Parwada *et al.*, 2012). Knowledge related to farm management practices like agroforestry, related experience, and level of decision making regarding important household and farm activities/ issues plays important role in adoption and dissemination of any farm related management practices and technologies, especially when it comes as adoption of agroforestry practices. In terms of knowledge, experience and decision to adopt or not to adopt agroforestry, the experience concerning Indian context has not been too different from the global trends. Agroforestry and conservation agriculture have emerged as a sustainable land management practices (Mwase *et al.*, 2015). Trees are useful in livelihood strategy especially among rural communities (Islam *et al.*, 2015). Agroforestry as a science has the potential to contribute to the improvement of rural livelihoods due to the capacity of its various forms to offer multiple alternative sand opportunities to enhance farm production (Basamba *et al.*, 2016). Given the high demand for a wide range of agroforestry products, both locally and regionally (Gockowski *et al.*, 2013) enhancement of agroforestry technologies has a potential to alleviate poverty among rural farming communities.

Agroforestry is a topic which increasingly recognized as a possible land use management option among rural communities in developing countries like in India. Several empirical studies have been carried out to gain insight into the adoption of agroforestry especially in Punjab, Haryana and Uttar Pradesh and other states of India. But very less have shown light on knowledge,

experience and decision making of farmers to adopt or not to adopt agroforestry. With this objective, this study intends to analyze the knowledge level, experience and decision making by farmers in Uttarakhand state, India. It is hypothesized that attributes like farming and agroforestry experience, farm level decision making in family and ability in female family members to take decisions, their participation in farming activities together with other attributes play important role in farm level agroforestry. This study also shows a comparison between above said determinants for two categories *i.e.* agroforestry and non-agroforestry farmers/adopters.

EXPERIMENTAL METHODS

Sampling, survey and data collection:

Uttarakhand state consists of thirteen districts majority of which lie in hilly portion. Only two districts, namely; Haridwar and Udham Singh Nagar have large scale farm fields and agroforestry plantations. It was intended to cover whole district Haridwar to carry out the study. Using random sampling (Safa, 2005), 426 respondents containing 365 agroforestry farmers and 61 non-agroforestry farmers were finally selected from three tehsils and 36 villages, 12 from each tehsils of district Haridwar. The choice of farmer to administer the questionnaire to was randomly done and not more than one member of the family were allowed to fill/or answer the questions. However, they were included in focused group discussions at last of the interview. The information was collected through a field survey using pre-tested semi structured questionnaire and interview schedules with adult members or head of the family. The questionnaires were administered to 432 random households in the selected villages surveyed. Questionnaires contained questions on farming, agroforestry experience, decision making, female participation in farming activities, participation in decision making process, and determinants affecting decision making.

Data analysis:

Data was coded 0 and 1. Data were then cleaned, sorted and converted into tables. Data were analyzed and compared using statistical procedures like average, frequency, percentage etc. Results were represented in to tables and figures and exploratory analysis technique. Descriptive answers and responses were later included

in data interpretation.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads :

Farming experience:

In study area, level of farming experience was more in agroforestry farmers than the non agro-forestry farmers.

It shows that farming experience is related to adoption of agroforestry (Fig. 1). From results it is also clear that non-adopters having medium and sufficient level of farming experience are lesser than the agroforestry adopters. It may be another reason why these farmers are not practicing agroforestry.

Level of knowledge:

Knowledge as a factor becomes more important because farmers know the reason why and how they should retain different tree species (Philip *et al.*, 2005). As far as their level of knowledge related to agroforestry practices, average and sufficient level of knowledge was also reported higher in adopters than non-adopters of agroforestry (Fig. 2).

This study supports the suggestions of Raghav and Sen (2014) as government assistance to promote participations of farmers especially female farmers in related training and workshops. It may be helpful in improving their knowledge and skills related to farming practices and agroforestry.

Fig. 3 relates knowledge level of farmers to their farming experience. From interviewed agroforestry farmers, numbers of adopters having sufficient farming experience were reported more as agroforestry adopters than non-agroforestry adopters. Although more than half

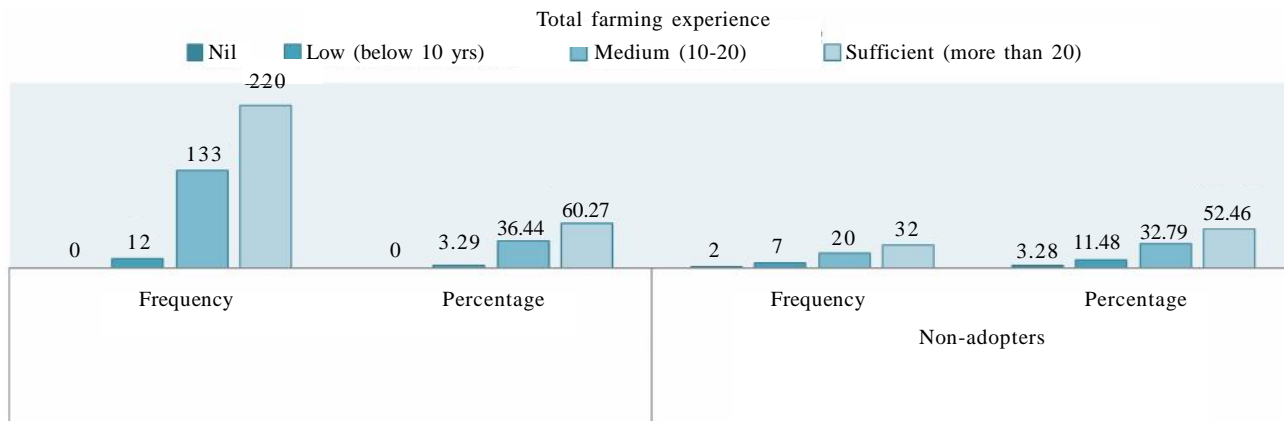


Fig. 1 : Total farming experience of sampled farmers

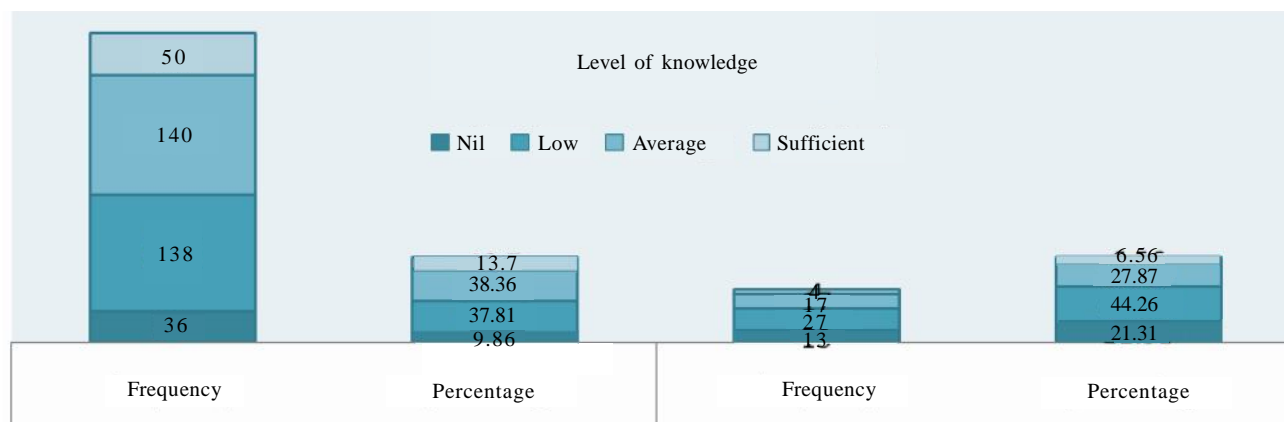


Fig. 2 : Level of knowledge of sampled farmers

of adopters having medium and sufficient knowledge who constitute one fourth of total agroforestry respondents considered themselves under average and low level of knowledge. In spite of having sufficient farming experience, these farmers did not found themselves having enough knowledge of agroforestry. It shows that such training farming experience hardly links itself with level of knowledge of total agroforestry farmers who were enough experienced considered themselves nil in knowledge level regarding agroforestry. Few more than one third of total responding farmers considered themselves as medium (10-20 years) farming experienced followed by low farming experienced. However, contradictory to this, 1 per cent of low as well as average knowledge level of agroforestry category farmers also reported that they did not have any farming experience it shows that there are other things also which contribute to farmers' knowledge level of agroforestry. Despite of larger number of farmers having sufficient farming experience, very less people were sufficient in agroforestry knowledge. They accepted themselves enough to understand new agroforestry. Hardly any difference was reported between the numbers of farmers having average level of knowledge to farmers having low level of knowledge regarding agroforestry practices. Farmers falling under these categories wanted to improve their level of knowledge. About one in every ten of total farmers counted himself having almost no knowledge of agroforestry but still they are engaged in agroforestry.

Agroforestry experience:

Among non-adopters of agroforestry, nil and low level of farming experience was reported more than adopters. Average agroforestry experience was 20 years for agroforestry farmers, while for non-agroforestry farmers, it was 18 years. A comparison between of total agroforestry experience shows that percentage of farmers having no experience of agroforestry was higher in non-agroforestry farmers, and only very less of total agroforestry farmers were without any agroforestry experience.

Similar to farming experience, experience of agroforestry was also found higher in agroforestry farmers as compare to non agroforestry farmers. It goes with findings of Basamba *et al.* (2016). Hence, it shows that total experience of the farmers in terms of agroforestry matters in its adoption. No experience acts like a barrier in agroforestry and farmers with almost no agroforestry experience do not prefer to adopt agroforestry as they find it more risky to invest or adopt such practice in which they are not experienced.

Farm level decision making:

Decision making has been divided into four categories in both farmers' groups. The table given below shows the percentage of farm level decisions in farming families. In studied agroforestry families, decision making by men was found quite at similar level and four out of five respondents from both farmers' categories admitted

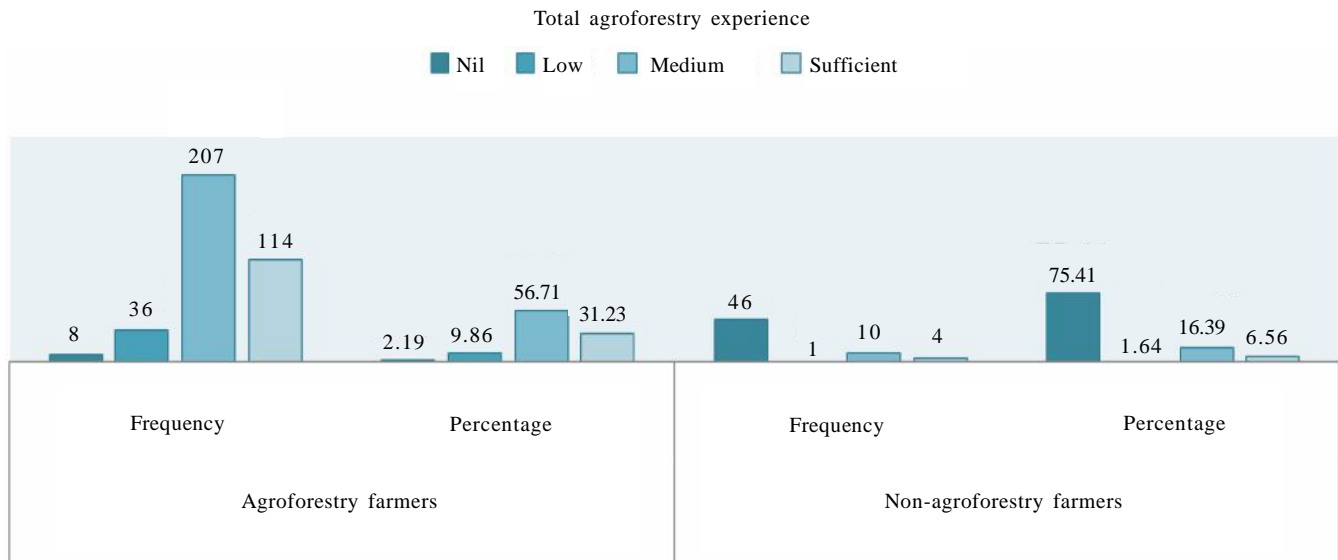


Fig. 3 : Total agroforestry experience of agroforestry and non-agroforestry farmers

that farm level decisions in their families were taken by men or male persons only (Fig. 4). These decisions included decision to hire labor, marketing, choice of tree-crop species, sowing and harvesting methods etc. similar results were recorded by Mugure *et al.* (2013) according to which, most of the farm decisions especially on land use, were taken by men.

Women plays an important role in households and farm management practices and when it comes to adoption of any new practice to family or farm, their role as key person becomes more important. In the study area, male farmers make most of the decisions on their farm management which are necessary in case of continuous management of farm plantation and production. Considering the suggestion and opinion of women they were included in decisions in around 19 per cent agroforestry adopting families while 16 per cent in non agroforestry families. In very less households, any adult person whether male or female was having freedom to take any decision regarding agroforestry/agriculture. This factor has relevant importance in agroforestry as in research findings; it was observed that about 3 per cent families in agroforestry were headed by females compared to 0 per cent in non-agroforestry households. But, in current section it was observed that in agroforestry households, very less 1 per cent decisions particularly at farm level were taken by women (even lesser then the 2% women decisions in non agroforestry households). It show that the adoption of agroforestry is although widespread in study area, but role of women in farming decisions are very less as compare to that and is required to be improved by taking steps accordingly. However, in surveys, around most of the respondents admitted that family members actively support them in farm activities,

while only around one in five respondents admitted female participation in farm level activities. It means females do not have liberty to take decisions but they are utilized as work force in farm level activities. It only depicts their role as labour at farm.

Female participation in farm level decision making:

Data were further analyzed for knowing the decision making ability of women in the region. Fig. 5 illustrates the decision making ability of women in farming families. In agroforestry households, almost one in four families admitted that female never get chance to show their decision making ability. While one-tenth of total respondents counted it as a rare incident, very less farmers confirmed that female in their households always get chance and show decision making ability when required so.

Decision making ability of women was found bit more in non-agroforestry farm households. It was reported higher in non-agroforestry farmers’ households showing that women in about one-fifth of house hold rarely got chance to take decisions, but very less did it always. However, the situation is not very favorable, but is better than the agroforestry adopting households where it requires improvements. It also affects decision of resource acquisition and allocation by females in family and at farms. The study understands that lack of control over resources such as land and income probably lowers their involvement in decision making process.

Female participation in farming activities:

The result shows that in 20 per cent families, female participate in farming activities like sowing, seeding and harvesting. Merely difference was reported between both

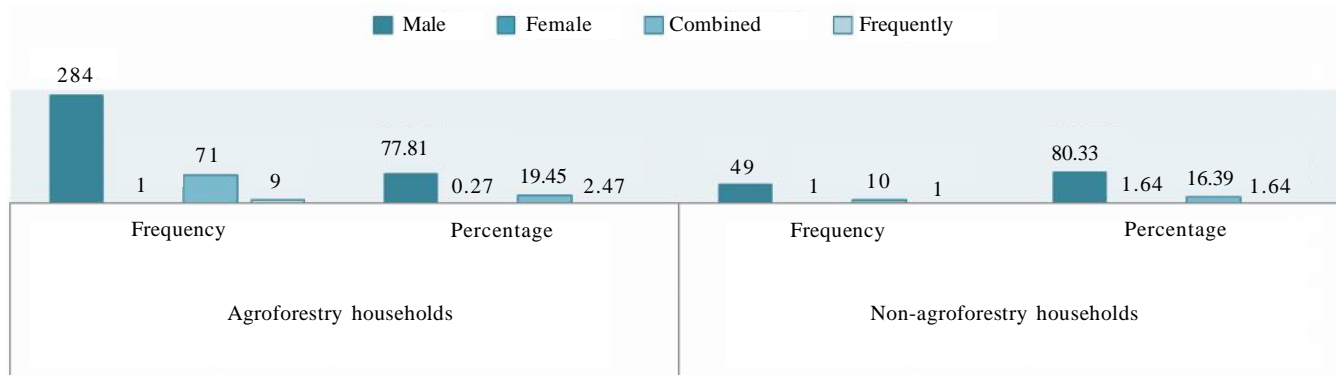


Fig. 4 : Farm level decision making

adopters and non-adopter categories. This data reveals that though their level of participation in farming activities is less but their role in decision making is even lesser than that and female are considered only as workforce to carry on the farm level work/activities. This hinders their role in agroforestry practices (Fig. 6).

farmers' decision making regarding adopt or not to adopt agroforestry, comparison between agroforestry and non agroforestry farmers in study area shows that agroforestry farmers equally get affected by family, villagers and others like acquired information, market channels, farm production etc. (Fig. 7) while in non agroforestry farmers, they get affected primarily by villagers. Here we see that family and villagers impacts almost same upon agroforestry and non agroforestry

Other affecting farmers' decision making process:
Given that a number of determinants affecting

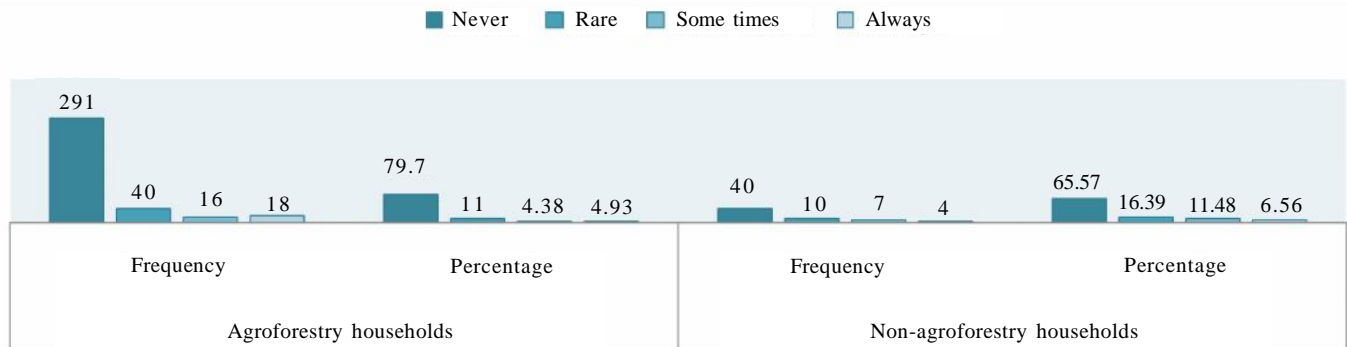


Fig. 5 : Female participation in decision making activities

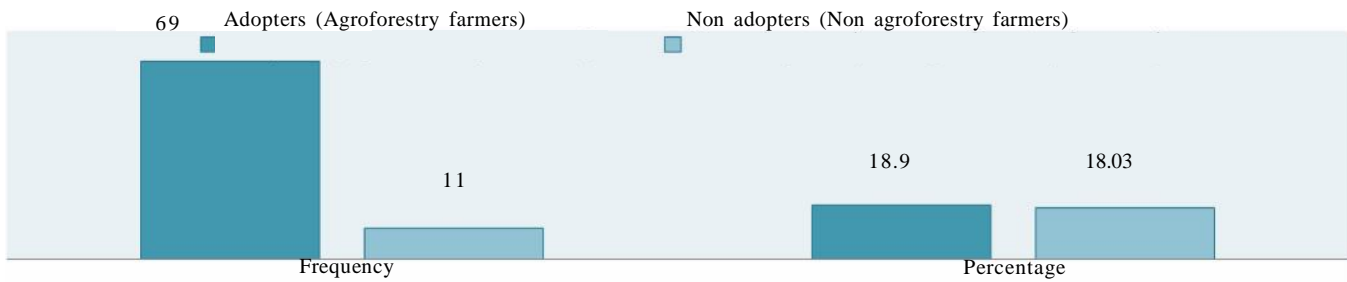


Fig. 6 : Female participation in farming activities

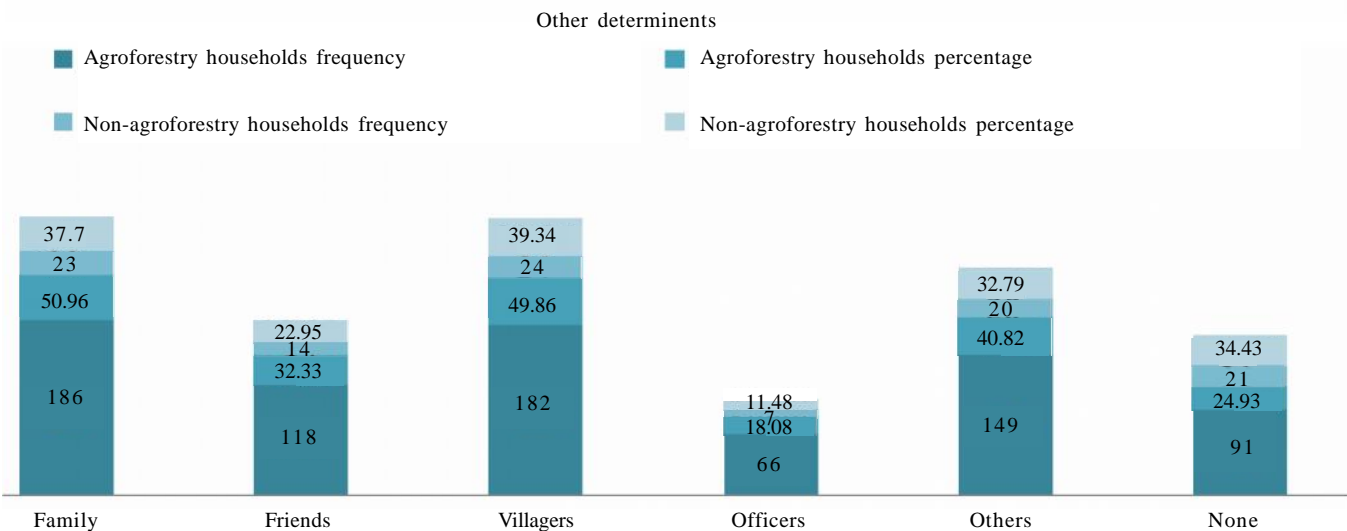


Fig. 7 : Others affecting farmers' decision making

farmers. Almost one-fourth agroforestry farmers and one-third of total non agroforestry farmers did not get influenced by any of these.

This study tried to insight three major factor *i.e.* Knowledge, experience and decision making in context to agroforestry. In study area, both general farming and experience were found to be related with adoption of agroforestry. Non agroforestry farmers need to have access and gain of more knowledge and experience. This study is an answer to the question, “do experience, knowledge and decision making really affect agroforestry adoption?” However the encouragement of agroforestry by the farmers in the region needs mutual involvement of male and female for both studied categories in decision making while gaining more knowledge and experience at the same time. Community, villagers, family, friends etc. all affect individual farmer’s decision to adopt or not to agroforestry. Results have indicated the inferior status of women in family as they don’t have much chances or right to take decisions at farm level; like should they adopt agroforestry or no? Or what kind of new species should be introduced in farm agroforestry. Their role remains lesser than man in decision making process and men are more likely to take decisions at farm level. On gender perspective, female participation in farming activities and decision making process is important and required to be improved by means of induction of combined training programmes etc. because in absence of male person of household head, they have to make all important decisions to carry out related activities required to adopt, continue or manage agroforestry practices and to other female farmers, less participation could hinder adoption of agroforestry in their farm fields.

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