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# Impact of Farmforestry on Socio-Economic Condition of Farming Communities in District Mardan, Pakistan

**Kamran Khan[1], Sami Ullah[2], Asad Ullah[3], Salman Khan[4], M. Yoserizal Saragih[5]**
[1]*Ph.D. Scholar, Department of Botany, University of Peshawar, Khyber Pakhtunkhwa, Pakistan*
[2]*Ph.D. Scholar, Department of Economics, University of Peshawar, Khyber Pakhtunkhwa, Pakistan*
[3,4]*MPhil Scholar, University of Peshawar, Khyber Pakhtunkhwa, Pakistan*
[5]*Universitas Islam Negeri Sumatera Utara*
*sami00212@yahoo.com, yosesaragih77@gmail.com*

## Abstract

*The present study was carried out to find out the socio-economic impacts of farm forestry on tree farmers in district Mardan. Survey was conducted in four villages and the farmers were asked directly at their farms through a well structure questionnaire. Most of the respondents were literate with large family size. Average farm size was found to be 9.43 acres. 15% of the respondents were self-cultivator while 85% were tenant. In the study area 13700 trees of different species have been planted on an average of 249 trees per farm. 66% farmers were interested to plant more trees on their farm in future, while 34% were found uninterested. It was noted that 7015 tress were sold at an average of 127 trees per farm during last five years and Rs 1903000 were earned from sale of trees. Fifty eight percent of the respondents were found agree and 23% disagree when they were asked whether they were socio-economically uplifted or not. 76% of respondents grow trees for sale and remaining 24% grow trees for domestic purpose. 11% of respondents purchased fuel wood during the last 10 years and the remaining 89% did not. 14% of the respondents purchased timber during last ten years while 86% did not. Those respondents who were found agree earned two types more income.*

Keywords
farmforestry; socio-economic condition; tree farmer; Mardan; Pakistan

## I. Introduction

Mardan District lies between $71^0$ 48/ to $72^0$ 25/ E longitudes and $34^o$ 5/ to $34^0$ 32/ N latitudes. It is an ancient city of great historical importance, which constituted part of Peshawar valley and appeared in history as part of Ghandhara Kingdom. Until 1937, Mardan was set up as an independent district after the name of its headquarters Town. It is bounded on the north by Buner district and Malakand protected area. On the east by Swabi and Buner districts, on the south by Nowshehra district and on the west by Charsadda district.

Total area of the district is 1632 $Km^2$ having population density of 894.7 people per $Km^2$. The average household size of district is 8.4 persons (1998 census).

The summer season is extremely hot. The hottest month is June with maximum temperature of 41 $^0$C, whereas coldest months are December and January, with minimum temperature of 2 $^0$C. R.F occurs mostly in the month of July, August, December and January with maximum R.F 125.85 mm recorded in August. The relative humidity is high throughout the year while maximum humidity has been recorded in December i.e. 73.33 percent.

The rate of afforestation by provincial forest departments has been very low. Only 8900 hectare has been planted annually during the last 25 years. One of the possibilities to bridge the gap between supply and demand of wood is to put more area under state forests. For time being it seems rather difficult because of paramount claim of agriculture on land and also due to financial constraints. Even if view in promised self-sufficiency in wood, more land is made available to expand the almost static forest base and twenty thousand hectare are planted annually, it would take about 100 years to increase the forest area by another 2.5 percent (Sheikh, 1986)

Another possibility could be to intensify the forest management practices for the better yield per unit of area, but that would also require high inputs. It is quite apparent that it would never be possible for the government to spare requisite funds and lands for a Programme which has always been given a low priority (Aripin Marpaung, 2020).

The only feasible alternative appears to be raising trees on private and marginal lands by involving local people with a view to produce the required volume of wood to meet the ever increasing demand and for improving their socioeconomic condition (Zulkifli, Nurdiana, & Muchsin. (2020). With an appropriate programme that encourages and provides opportunities to private land owners in raising trees in conjunction with agricultural crops for their personal use and also for commercial supplies, it is expected that the current price will be considerable reduced if not completely averted in the long run. There is sufficient privately owned cultivated and uncultivated land for the production of both wood and food. Self-sufficiency in wood can be achieved easily by raising shelterbelts, wind breaks, hedgerow inter-cropping with other crops, compact plantation and line or strip planting along farm roads, ridges and water courses, provided the land owner are motivated to do so.

The farmers of Mardan are practicing farm forestry by raising Poplar, Eucalyptus and Mulberry on their farms. They grow trees usually in linear pattern along the field boundaries or around field boundaries and scattered in the farm. Trees provide shade to livestock and laborers from scorching heat, trees also act as wind break and protect their farm from wind erosion, reduce evapo-transpiration losses from the soil, improve soil fertility. Trees also provide wood for domestic requirement and are also a source of additional income at the time when agriculture is very low due to any natural menace.

## II. Materials and Methods

To assess the impact of farm forestry on socio-economic condition of tree farmer's survey was carried out in adjacent areas of city and rural areas of District Mardan. Proportionate sampling was under taken. Mardan district have been divided into various units or union council and out of these four union councils were randomly selected i.e. Roria, Gojar garhi, Bicketganj, Baghdada. Total 55 farmers from four villages were interviewed and data were collected through a questionnaire. The secondary data was collected from census and other published report.

The questionnaire covered many questions related to the tree growing farmers such as education of farmer, landholding size, cultivation pattern, no. of trees on farm, trees sold during last five years, earning from tree selling, effect of trees on productivity of agriculture crop etc.

Data was analyzed through simple statistical methods. The data was analyzed in to various classes. Results were obtained from this data through these statistical methods.

## III. Results and Discussions

### 4.1 Education Level of Respondents

The education of a person influences the development of character and also broadens his level of acceptance or receptivity to new idea on improves farming and agro forestry techniques. Literate farmers can make best use of their resource than illiterate farmers.

**Table 1.** Education level Respondents

| Education Level of Respondents | No. of Respondents | Percentage |
|---|---|---|
| Illiterate | 16 | 29 |
| Primary | 11 | 20 |
| Middle | 11 | 20 |
| Metric | 10 | 18 |
| Intermediate | 5 | 10 |
| Degree | 1 | 1 |
| Master | 1 | 1 |
| **Total** | **55** | **100** |

Source: Author, 2019

According the survey about 29% of the respondents was illiterate. 58% of the farmers were educated up to metric level and remaining had education more than matriculation (table 1).

### 4.2 Education Level of Sample Family

In sample area 80% males were found educated out of total literate and 20% female were educated. Overall the literacy rate was 34% while the literacy rate for rural areas of Pakistan is 28.3%. The higher literacy rate in the study area than literacy rate for rural indicate that people are well aware of important of education and are trying their best to educate their children.

### 4.3 Family Size

Family comprises of household members pooling their income together and eating from the same kitchen. While the family members living outside the household or outside the village contributes to the family income in some form or the other (Cheeme, 1997). The average family size of the sample population was 11 persons out of them 60% were males and 40% were females.

### 4.4 Farm Size

Land is one of the major determinants of the farm income and control over land has strong association with adoption of new farming and agro forestry technique. Farm productivity is related to size of farm. Several economics studies provide ample evidence that certain types of land holding size are economically more efficient. Large landowners are much willing to make capital investment in land. Average farm size of the sample population was found to be 9.43 acres. Minimum farm size was 1.41 acre while maximum farm size was 47.165 acre.

**Table 2.** Farm size class distribution of respondents

| Farm size (acres) | No. of respondents | Percentage |
|---|---|---|
| Up to 10 | 36 | 65 |
| 10-20 | 12 | 22 |
| Above 20 | 7 | 13 |
| **Total** | **55** | **100** |

Source: Author, 2019

According to the survey data 65% of the total respondents have farm size up to 10 acres, 22% have farm size of 10-20 acres and the rest of 13% have farm area greater than 20 acres 100% area is under irrigation (Table-2).

### 4.5 Farm Ownership

Farm owners were classified in to three categories as shown in the table-3 they are; 1) self-cultivators, 2) tenant users and 3) leased operated.

**Table 3.** Farm Ownership Categories.

| Farm operation | No. of respondents | Percentage |
|---|---|---|
| Self-cultivator | 8 | 15 |
| Tenant user | 47 | 85 |
| Leased | 0 | 0 |
| **Total** | **55** | **100** |

Source: Author, 2019

The leased operated were not found in the study area. Self-cultivators were about 15%of the total respondents and rest of 85% farmers were tenant operated (Table-3). Tenant is either given share in production or they are engaged on wage basis, in cash. There is tendency for self-cultivation because of mechanization of agriculture, greater profit margin in farming, on availability of tenants and legal problems in the ejection of tenants.

### 4.6 Trees Planted Under Farm-Forestry

In the study area, 13700 trees of different species have been planted on an average of 249 trees per farm. Poplar, Eucalyptus, Shisham, Mulberry, Kikar and Bakain etc were the main species planted by the respondents.

**Table 4.** Distribution of farmers according to numbers of tress

| No. of tress | No. of respondents | Percentage |
|---|---|---|
| Up to 100 | 18 | 33 |
| 100-500 | 32 | 58 |
| Above 500 | 5 | 9 |
| **Total** | **55** | **100** |

Source: Author, 2019

In the study area there were 33%respondents who have less than 100 trees on their farms (Table-4) while the percentage of respondents having 100-500 and above 500 trees were 58 and 9 respectively. During the study it was found that greater number of trees was

found on large farms and educated respondents showed positive attitude towards tree planting.

### 4.7 Desire for Growing Trees

According to the survey data 66% farmers were interested to plant more trees on their farm in future while 34% farmers have shown no interest in growing more trees. Interested farmers have shown willingness to plant on average of 230 trees per farm.

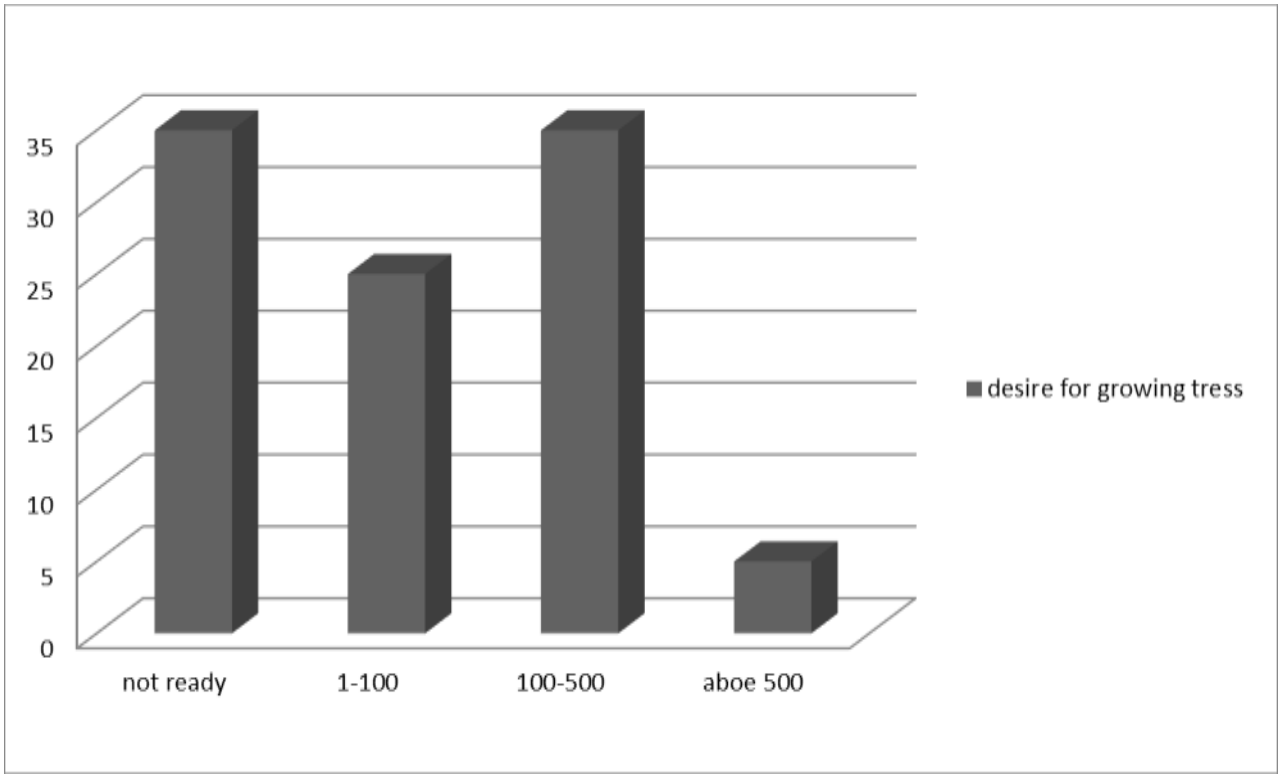


***Figure 1.*** *Desire for growing trees*
Source: Author, 2019

**Table 5.** Respondents' desire for growing trees on their farmlands.

| Number of tress | No. Of respondents | Percentage |
|---|---|---|
| Not ready | 19 | 35 |
| 1-100 | 14 | 25 |
| 100-500 | 19 | 35 |
| Above 500 | 3 | 5 |
| **Total** | **55** | **100** |

Source: Author, 2019

Out of total sample 35%have shown no interest in growing more trees (Table-5). 25% have shown no interest for growing 1-100 trees, 35%of the respondents like to plant 100-500 trees and rest have shown desire to plant more than 500 trees on their farms.Most of the farmers showing no interest in planting trees were owner of small landholding and were of the opinion that due to delay in return from forest trees they cannot afford loss incurred by trees on meager agriculture production, which is due to small farm size.

The farmers who have shown interest in growing more trees on their farm either have large landholding or high income. Other reasons for their willingness may be fair returns from selling of trees. Most of the farmers like to plant trees in linear pattern khalas

and field boundaries. Majority of the farmers have clear preference for Poplar, over other species because of its short rotation, less care needed, easy availability of planting stock and fair return from it.

### 4.8 Effects of Trees on Agriculture Production

Majority of the respondents were of the view that productivity of the agricultural crop is affected by trees, in respect of shade of trees on agricultural crops and extraction of soil moisture. About 82.5respondents were of the view that productivity of agricultural crop is affected by trees due to shade on agricultural crop and extraction of soil moisture.

About 40% respondents informed that loss incurred by trees on agricultural crop can be compensated by the revenue earned from trees. While rest of the respondents was of the view that loss cannot be compensated by value of trees.

The respondents who answered positively about the loss compensation have large landholding size and have grown large number of trees on their farmlands. The respondents who answered negatively, either have small landholding or less number of trees on their farm. Farmers with small landholding are reluctant to grow more trees, according to their views it will negatively affect their agricultural benefits, without any compensation.

### 4.9 Family Income and Expenditure

According to the survey data the average annual family income of the sample population was found to be Rs. 1, 70,000 which constitute the respondent income + income of other family members. This mean annual family income was supporting on average of 11 persons while the per capita annual income was found to be Rs. 15454 which is less than our national per capita income than that of National level is indicating low living standard and poor economy of the area (Table-6).

**Table 6.** Distribution of families by income

| Income groups | No. of respondents | Percentage |
|---|---|---|
| Up to 100000 | 26 | 47 |
| 100000-200000 | 15 | 27 |
| Above 200000 | 14 | 26 |
| **Total** | **55** | **100** |

Source: Author, 2019

As shown in Table-6 out of the total respondents 26% have annual family income more than Rs. 200000, 27% have annual family income of Rs. 100000-200000 and rest were earning up to 100000 annually.

**Table 7.** Family expenditure and saving

| Income status of family size | Income in Rs. | Percentage |
|---|---|---|
| Family income | 170,000 | 100 |
| Expenditure | 81418 | 48 |
| **Saving** | **88582** | **52** |

Source: Author, 2019

The statistical result of the survey data has shown an average family expenditure of Rs. 81418 per annum (Table-7). Against an average family income of Rs. 170,000 which indicates 52% saving of total income i.e., Rs. 88582 per family per annum. This high

percentage of saving also indicates the ability of farmers to take risk of in long term forestry investment.

### 4.10 Earning from Tree during Last Five Years

According to survey 7015 trees were sold at an average of 127 tree per farm during last five years and Rs. 1903000 were earned from the sale of trees given in Table-8.

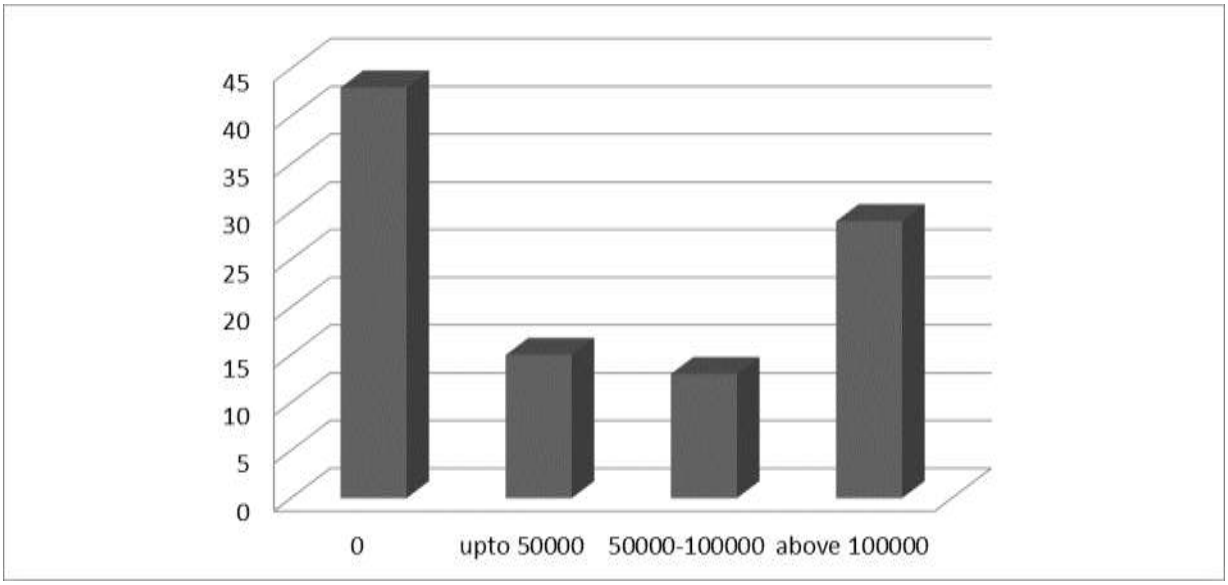


***Figure 2.*** *Earning from tree during last five years*
Source: Author, 2019

**Table 8.** Income from trees during last five years.

| Income from tress | No. of respondents | Percentage |
|---|---|---|
| 0 | 24 | 43 |
| Up to 50,000 | 8 | 15 |
| 50,000-100,000 | 7 | 13 |
| Above 100,000 | 16 | 29 |
| **Total** | **55** | **100** |

Source: Author, 2019

Out of the total respondents, 56% farmers earned revenue from farm trees at an average of Rs.61387 per farm, while rest of the respondents did not fetch any revenue (Table-8). According to income from trees, 15% of the respondents earned up to 50,000, 13% of total respondents earned Rs. 50,000-100000 and rest of 29 earned more than 100000 during the last five years. This was an additional income other than agricultural production to them and certainly it has uplifted their socio-economic condition.

### 4.11 Annual Income from Trees/Acre

**Table 9.** Distribution of respondents by annual income from trees

| Earning in rupees per year/acre | No. of respondents | Percentage |
|---|---|---|
| No income | 24 | 44 |
| Up to 3000 | 19 | 34 |
| Above 3000 | 12 | 22 |
| **Total** | **55** | **100** |

Source: Author, 2019

According to the survey there were 24 farmers (44%) who did not sell any tree. While 19 respondents (34%) got up to Rs.3000 per year per acre by selling trees and 12 respondents (22%) got more than Rs 3000 per year per acre amount of money by selling tree (Table-9). These monetary benefits are in addition to agricultural produce and availability of timber and fuel wood for domestic consumption. So the amount of money which would have been spent on purchasing fuel wood or timber is saved in addition to revenue fetch by selling trees.

### 4.12 Socio-economic Impact of Farm Trees

**Table 10.** Socio-economic impacts on tree farmers.

| Socio-economics impacts of tress | Opinion | No. of respondents |
|---|---|---|
| Socially up lifted | Yes | 32(58%) |
| | No | 23(42%) |
| Purpose of growing tress | Sale | 42(76%) |
| | Domestic | 13(24%) |
| | None | 0(0%) |
| Purchased fuel wood during last 10 years | Yes | 6(11%) |
| | No | 49(89%) |
| Purchased timber during last 10 years | Yes | 8(14%) |
| | No | 47(86%) |

Source: Author, 2019

### 4.13 Farm Size and Number of Trees

**Table 11.** Number of trees vs landholding size:

| No. of trees | Landholding size in acre | | | Total |
|---|---|---|---|---|
| | Up to 15 | 16-40 | Above 40 | |
| Up to 100 | 18 | - | - | 18 |
| 100-500 | 23 | 8 | 1 | 32 |
| Above 500 | 3 | 1 | 1 | 5 |
| **Total** | **44** | **9** | **2** | **55** |

Source: Author, 2019

It is evident from the Table-11 that, 18 respondents have upto100 trees on their farms. All have farm area up to 15 acre. So the number of respondents having 100 trees on their farm decreases with increase in area. The existing total number of trees of all size farm lands of the individual respondents was above 50 on each farm. However, there was some owner who had growing stock more than 100 trees at their farm lands. The majority land holding have less number of trees had limiting factor of land to grow more trees.

There are 32 respondents having 101-500 trees on their farm and 23 respondents out of them have up to 15 acre, 8 respondents have up to 16-40 acre land and rest have landholding more than 40 acre. There are 5 respondents in the study area having more than 500 trees on their farm. Out of these 3 respondents have land size up to 15 acre, 1 respondent up to 16-40 acre and 1 more than 40 acre. Analysis shows that there exist a proportion between farm size and number of trees. Farmers with large land holding are inclined towards planting more trees than their counterpart's i.e., farmers with small landholding. It is due to the fact that farmers with large landholding. It is due to the fact that farmers with large landholdings have more income from agricultural crop and can afford risk of planting trees. They can also spare more space for tree growing.

### 4.14 Education of the Respondents and Number of Trees

**Table 12.** Education of the respondents Vs number of trees present on the farm.

| No. of trees | Education of the respondents | | | Total |
|---|---|---|---|---|
| | Illiterate | School level | College level | |
| Up to 100 | 3 | 13 | 2 | 18 |
| 100-500 | 12 | 11 | 9 | 32 |
| Above 500 | 1 | 2 | 2 | 5 |
| **Total** | **16** | **26** | **13** | **55** |

Source: Author, 2019

It is general perception that education changes the attitude of and thinking of people. More literate person perceptively uses their resource for maximum benefit. The education level of the respondents was classified in to three groups' i.e., illiterate, school level and college level. The Table-12 revealed that majority 26% of the respondents prefer to plant trees on farm lands. In the other word the choice of species is also influenced by the education level of respondents. So increase in education means the increase in growing stock. As depicted from the table number of trees on farm increases with increase in education of the respondents. Because educated farmers in the study area are well aware of the socio-economic benefits of trees than illiterate one.

### 4.15 Farm Size and Income from Trees

**Table 13.** Income from trees per year per annum Vs farm size.

| Landholding size in acre | Rupees earned from sale /yr/acre | | | Total |
|---|---|---|---|---|
| | Up to 0 | Up to 1000 | Above | |
| Up to 10 | 23(96%) | 8(80%) | 15(71%) | 46 |
| 10-20 | 1(4%) | 2(20%) | 5(24%) | 8 |
| Above | 0(0%) | 0(0%) | 1(5%) | 1 |
| **Total** | **24** | **10** | **21** | **55** |

Source: Author, 2019

The above Table 13 shows that there were 24 respondents having no income from sale of trees. Most of them were having less landholding size. There were 10 respondents having income from sale of trees up to Rs.1000 per year per acre. Out of them 80% were the owner of the landholding up to 10 acre, about 20% belong to the landholding class i.e,10-20 acre and no body was found in the landholding class 10-20 acre who has up to Rs.1000 income. The respondents having more than Rs.1000 income per year per acre from sale of tree were only 21. The comparable percentage of them was 71, 24 and 5 respectively. The statistics presented in Table-13 shows that income from sale of tree and farm size is closely related, with increase in landholding annual income from the sale of tree also increases. Due to this reason the respondents with large landholding were found showing willingness to plant more trees and are getting revenue.

### 4.16 Total Number of Trees on the Farm and Trees per Acre

**Table 14.** Total number of trees Vs trees per acre.

| Total no. of trees | Trees per acre | | Total |
|---|---|---|---|
| | Up to 10 | Above 10 | |
| Up to 100 | 8 | 10 | 18 |
| 100-500 | 6 | 26 | 32 |
| Above 500 | 1 | 4 | 5 |
| **Total** | **15** | **40** | **55** |

Source: Author, 2018

Table-14 depicts that there were 18 respondents out of 55 who have upto 100 trees on their farm. Out of them 8 respondents have 10 trees per acre and 10 respondents have above 10 trees per acre. Whereas there are 32 respondents out of 55 having 101-500 trees on their farm. Out of them 6 respondents have 10 trees per acre and 26 respondents have more than 10 trees per acre on their farm. While 5 respondents in the study area have more than 500 trees on their farm. Out of them 1 respondent having up to 10 tree per acre and the remaining 4 were having more than 10 trees per acre.

This relationship shows that with the increase in total number of trees, trees per acre also increase. As previously it has been concluded that increase in the total number of trees is due to increase in the farm size and with increase in total number of trees, farmers are also planting more trees per acre. They are allocating more land for tree and are well aware of role of trees in uplifting socio-economic status.

### 4.17 Earning from Sale of Trees and Income Groups

**Table 15.** Earning from sale of trees per year/acre Vs income groups

| Earning/yr/acre in Rs. | Income groups in Rupees | | | Total |
|---|---|---|---|---|
| | Up to 100,000 | 100,000-200,000 | Above 200,000 | |
| Up to 1000 | 26 | 15 | 5 | 46 |
| Above 1000 | 0 | 0 | 9 | 9 |
| **Total** | **26** | **15** | **14** | **55** |

Source: Author, 2019

In Table-15 data shows that there are 46 respondents out of 55 who are earning from tree selling per year per acre up to Rs. 1000. Out of them 26 respondents have annual income up to 100000, 15 respondents have income from Rs.100000-200000 and rest of 5 respondents has more than Rs. 200000 annual income. The number of respondents in income group more than Rs. 200000 should be more but, respondents having more than Rs. 200000 income have other sources of income too. It means the annual income fetch from trees selling has more effect on the economic conditions of the respondents falling in income groups Rs. 100000-200000.

Also there are 9 respondents who have got more than Rs. 1000 per year/acre from selling of trees and all of them are in income groups more than Rs. 200000. It means that when annual income from tree selling is greater than Rs.1000 per year/acre, it is contributing much in income of respondents having more than Rs. 200000 annual income and income Rs. 1000 per year/acre by tree selling affecting more, income groups of Rs. 100000-200000. So it is concluded that total annual income and income from tree selling per year/acre have interdependency.

### 4.18 Ownership Pattern and Earning From Trees

**Table 16.** Ownership pattern Vs earning from tree selling per year/acre.

| Ownership pattern | Earning from tree sale in Rs. | | | Total |
|---|---|---|---|---|
| | Up to 0 | Up to 1000 | Above 1000 | |
| Tenant | 23 | 8 | 16 | 47 |
| Self-cultivator | 0 | 6 | 2 | 8 |
| **Total** | **23** | **14** | **18** | **55** |

Source: Author, 2019

It is evident from the Table-16 that there are 47 respondents who are tenant operators and out of them 23 respondents were having no income from sale of trees, 8 respondents have earning from tree selling up to Rs.1000 per year/acre. Remaining 16 respondents have more than Rs.1000 per year/acre income from tree selling, while 8 respondents out of 55 are self-cultivator. Out of them 6 respondents have earning from tree selling up to Rs.1000 per year/acre. Remaining 2 respondents have more than Rs.1000 per year/acre income from tree selling.

Farmers getting more than Rs.1000 per year/acre from sale of trees are 18 in number but majority of them i.e., 16 belong to tenants because the tenants are operating large farms while the self-cultivator have small farm area. The survey shows that the tenant operators have maximum earning from tree selling and have large farm size. The respondents have tree potential and due to great challenge for farmers who have adopted large farm forestry. The need of farm forestry has become a trend in the tree growing stock the large land holding farmers have positive impact over farm forestry.

## IV. Conclusion

This study concluded with the findings that farm forestry in district Mardan has raised the socio-economic conditions of farming communities. Income level of the farmers increased with selling of firewood and timber etc. Most of farmers grow tree for domestic purpose. 86% farmers did not purchased wood for burning purposes after farm forestry.

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