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ROLE OF AGRICULTURAL TECHNOLOGY TO INCREASE CROP PRODUCTION IN ALIGARH DISTRICT-A CASE STUDY OF TAPPAL BLOCK

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Abstract: *The main objective of this paper is to assess the use of agricultural technology to increase crop production in Tappal block of Aligarh district. A structured schedule was designed based on existing literature and used as an instrument for data collection. A total number of 146 respondents were selected adhering to the principle of purposive random sampling for the collection of data. Collected data had been analyzed using standard statistical methods and final conclusion was drawn based on it. The study reveals that the uses of modern machineries have been increased in the study area. As a result the production of crops has also increased.*

Key words: Agricultural Technology, Crop Production.

Introduction

Agriculture needs technology infusion to accelerate the production so that food is accessible to the common man. During the green revolution up to now, farm technology has changed at a very rapid rate and has given fruitful results and these changes are not hidden in our country. Agricultural development in India, as in other developing countries, can serve as catalyst for rapid growth of the whole economy. Intensification of agriculture in India is necessary, to feed large and fast growing population of the country. A rapid growth in agricultural sector is essential not only to achieve self-reliance at national level, but also to maintain the house hold food security and most important is that to bring about equity in distribution of income and wealth. It requires raising both productivity in agricultural sector which are economically viable, socially and environmentally sustainable.

Technology has a great impact on all aspects of economic life. It is inevitable and essential for accelerating development of under-developed countries. In fact, suitable technology provides an important weapon in the war against poverty by making better use of available resources. This ultimately brings about prosperity for the entire population. In a nut-shell, technology promotes efficiency and satisfies human wants from scarce resources. Technology is the body of knowledge, or the know-how, since the emergence of Green Revolution the change that took place in utilizing technical knowledge is known as technological change. It is concerned with a shift in production function which indicates the technical relations between output and inputs. In other words, it is the application of scientific discovery of production and distribution which creates new products, new processes of manufacture and changes in the methods of distribution. Technological change provides greater output from resources of land, labour and capital. In this way technology increases the production with lower cost or better quality product for the same cost. Technology can be defined in two senses. In its narrow sense, it deals with equipment and machines which are

deployed in production. In other words, it involves reproducible tangible wealth which can be used a number of times. In a broader sense, technology includes not only reproducible tangible wealth but also body of the knowledge, skills, ideas that help the developmental use of such machines and equipment. In the context of under-developed agriculture, this broad definition is of great significance.

In short, technological change is expressed by capital, entrepreneurial skill, marginal land technical skill, a trained labour force and better utilization of labour, equipment and materials, improvement in the quality of resources, products and methods of production and nationalization of production process. Technological change in agriculture comprises of introduction of high yielding variety of seeds, fertilizers, plant protection measures and irrigation. These changes in agricultural sector enhance the productivity per unit of land and bring about rapid increase in production. Technological change in agriculture can be classified into two (i) Land-augmenting technical change, (ii) Labour-augmenting technical change. Land-augmenting technical change involves change in biological techniques in crop production. It includes mainly HYV of seeds fertilizers, irrigation and plant protection measures. Indian agriculture has witnessed significant changes in production technology through the introduction of high yielding varieties of crops, especially wheat and intensive application of complementary modern inputs in farming. The new momentum created by modern seeds and fertilizers was considered the initiation of Green Revolution. Consequently, the consumption of several agro-inputs like pesticides, growths regulating compounds and weedicides have increased, besides the fertilizers all over the country. It is accepted that consequent to the adoption of modern technology the farm production has increased considerably.

Technology is assumed to mean a new, scientifically derived, often complex input supplied to farmers by organizations with deep technical expertise. Neill and Lee point out that the majority of existing literature on agricultural technology adoption is focused on Green Revolution (GR) technologies such as irrigation, fertilizer use, and the adoption patterns of high-yield variety (HYV) seeds. Due to the development process of HYV and the inputs required to make them productive, studies examining HYV adoption look at very advanced forms of technology; HYV seeds are often the product of intensive laboratory research, and when they are targeted to farmers they are bundled with other technology inputs such as chemical fertilizers, pesticides and extensive irrigation because these are necessary for the HYV seeds to perform as designed. Because so many studies of agricultural technology adoption and diffusion focus on HYV and other Green Revolution inputs, their findings are concentrated on a “high-tech” definition of agricultural technology.

Objectives

The present study has the following objective:

1. To assess socio-economical background of the farmers
2. To show the use of various agricultural machineries in the study area
3. To show the various sources of irrigation.

Database and Methodology

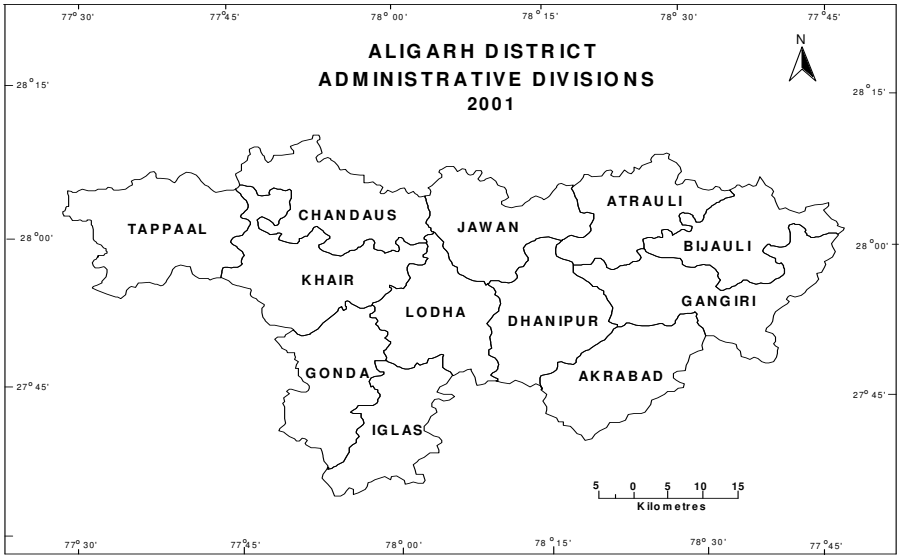
The present study is entirely based on primary sources of data. The primary data has been obtained by conducting the fieldwork in Takipur and Hetalpur village of Tappal block based on questions and personal interview. For conducting primary survey, the sample derived for the study is based on purposive random sampling technique. A total number of 146

respondents were interviewed. Simple percentage method has been used for processing the data. Microsoft excel also used for making charts and diagram.

Study Area

Aligarh district is located in the western part of Uttar Pradesh. It lies between latitudes 27˚34' N and 28˚11' N and between longitudes 77˚29' E and 78˚38' E. The total geographical area of the district is 3648.31 square kilometres. From the administrative point of view, the Aligarh district has been divided into twelve blocks namely, Tappal, Khair, Chandaus, Jawan, Lodha, Dhanipur, Akrabad, Gonda, Iglas, Atrouli, Bijouli and Gangiri which include 1170 inhabited villages. Tappal is a Block placed in Aligarh district in Uttar Pradesh. The block has 91 villages and there are total 32370 houses in this block. The population of this block is 194252 (2011 census). Out of this, 103570 are males and 90682 are females. The number of working people of Tappal block is 61846 whereas 132406 are non-working. Out of 61846 working persons 23529 peoples are totally dependent on agriculture.

Fig.1



RESULT AND ANALYSIS

Age Composition of the Respondents

In the process of overall development in general and agricultural development in population, the age compositions of respondents play a significant role in adoption of new ideas and practices in the field of agriculture. It has been observed that the younger generation is not interested in occupation of agriculture. The reason is that hard work is required in agriculture and today's young do not want to work hard.

Table 1: Age Composition of the Respondents

Age Group	No of Respondents	Percentage
18-25	20	13.70
25-35	28	19.18
35-50	56	38.36
Above 50	42	28.77
Total	146	100.00

Source: Field Survey

With this view, all the respondents have been divided into four categories on the basis of their ages. The data reveals that only 13.70 percent of the total respondents are young age group. However the above analysis gives interesting fact that the middle age and old age respondents actively participate in agriculture rather than younger. The age group consisting 35-50 years accounts 38.36 percent respondents whereas above 50 years age group constitutes 28.77 percent respondents. Most of the farmers complain that their children do not work in field. It is crucial that the younger people are not interested to take agriculture as a main occupation; therefore they are not actively participated in agricultural practices.

Educational Status of the Respondents:

Table 2 indicates that 9.59 percent are illiterate respondents while rest 90.41 percent are literates. Out of total 146 respondents, 12 respondents (8.22 percent) and 16 respondents (10.96 percent) have primary and upper primary level education respectively. About 59 percent respondents have secondary level of education and only 1.37 percent respondents have education up to graduates and postgraduates level. It has been observed that educational institutions have played great impact on literacy.

Table 2: Educational Status of the Respondents

Educational Status	No. of Respondents	Percentage
Illiterate	14	9.59
Primary	12	8.22
Upper Primary	16	10.96
Secondary	38	26.03
Senior Secondary	48	32.88
Graduate	16	10.95
Post Graduate	2	1.37
Total	146	100.00

Source: Field Survey

Operational Size of Landholdings

The operational land holding is defined as all land either owned or self-operated and leased out from others for cultivation. Due to increasing pressure of population on land, the land is fragmented into small pieces of land. Pal (1992) analyzed that use of fertilizers and agricultural implements is highly depend upon size of land holding. The large farmers have capacity to take risk in adopting any new technology and they have sufficient money to invest in agricultural fields.

Table 3: Land Holdings of the Respondents

Land Holdings	No. of Respondents	Percentage
Marginal (<1 Ha.)	38	26.03
Small (1-2 Ha.)	40	27.40
Semi-Medium (2-4 Ha.)	42	28.77
Medium (4-10 Ha.)	24	16.44
Large (>10 Ha.)	2	1.37
Total	146	100.00

Source: Field Survey

This table shows that out of 146 respondents, only 2 respondents (1.37 percent) have operational land holdings more than 10 hectares. About 16.44 percent respondents belonged to medium size of land holdings of total land holdings and about 28.77 percent of

respondents fall in the category of semi-medium. The small size of land holdings covered 27.40 percent to the respondents and 26.03 percent have marginal size of land holdings. The small and marginal farmers are unable to adopt effective utilization of agricultural practices and have little agricultural implements. The small and marginal farmers get no benefits from agricultural policies.

Area under Major Crops

There are two main agricultural season; Kharif and Rabi. The Kharif season usually begins in mid-June with the outbreak of the monsoon, while the Rabi season starts in the end of October or early November when the monsoon has receded. The crops of Kharif season are those which need a high temperature and a plentiful supply of water while the Rabi crops require cool weather and moderate supply of water. The major Kharif crops of the study region are Rice, Millet, Maize, Cotton, Pulses (Moong, Urad and Arhar) and Sugarcane. The Rabi crops of study area are Wheat, Barley, Mustard, Potato, Pulses (Masur and Pea) and Vegetables.

Table 4: Percentage of area under Major Crops to GCA

Crops	Percentage of Area to GCA
Wheat	77.73
Rice	59.60
Millet	15.72
Mustard	8.96
Cotton	1.40
Moong	4.08
Arhar	1.88
Sugarcane	2.80
Vegetables	0.79
Others	3.36

Source: Field Survey

Wheat and Rice is the two most important staple crop of Tappal block. Wheat occupied highest area i.e. 77.73 percent to total gross cropped area. Now a day, the farmer is crazy for paddy cultivation in all villages of district because the govt. provided good price for rice. After getting good price of rice, the farmers are promoted to cultivate rice, whether the soil is suitable or not, irrigation facilities are good or not for its cultivation. Rice occupies 59.60 percent area to gross cropped area in selected villages as a whole. The total area under millet is 15.72 percent to Gross Cropped area. Mustard is also an important crop grown in Rabi season occupied an area of 8.97 percent to total gross cropped area. Sugarcane is an annual crop but it is sowing in Kharif season so it comes under Kharif crops. It covers only 0.79 percent area in selected villages. Now the farmers do not want to cultivate the sugarcane. The first reason behind it, the farmers do not get timely payment for their crops. They are awaited sometimes for one year or more. Secondly, the govt. does not give good price for sugarcane. Therefore the farmers get low return for their crops. Every farmer cultivates fodder in one or two bigha of land for feeding the animals.

Table 5: Yield of Major Crops

Crops	Yield (quintal/ha.)
Wheat	38.85
Rice	45.78
Millet	30.00
Maize	24.56
Mustard	24.25
Potato	280
Pulses	12.50

Use of Agricultural Implements and Machineries

In the field of agriculture, the farmers are moving gradually towards the adoption of innovation of agriculture. Efforts have been made to increase the productivity through application of technology and new innovation. Black (1945) has stated that "the process of innovation is particularly interesting to observe in agriculture because of its gradualness." Table 6 shows that about 71.92 percent farming is done by tractors. It is evident from table that with 55.48 percent of respondents use harrows, 71.92 percent cultivators, 33.56 percent threshers, 8.22 rotavators, 71.92 percent tillers, 78.08 sprayers, and 32.19 percent sowing machines. Farm implements and machinery increase resource use efficiency and productivity.

Table 6: Use of Agricultural Implements and Machineries

Implements	No. of Farmers	Percentage
Tractor	105	71.92
Harrow	81	55.48
Cultivator	105	71.92
Thresher	49	33.56
Rotavator	12	8.22
Tillers	105	71.92
Sprayers	114	78.08
Sowing Machine	47	32.19
Wooden Plough	6	4.11

Source: Field Survey

Sources of Irrigation

Irrigation is the most crucial component of agricultural development. The use of modern agricultural technology (High Yielding Varieties of seeds, fertilizers) for agricultural growth to increase in crop yield and cropping intensity depends critically on irrigation. Irrigation facilities are necessary for adoption of double and multiple cropping by the farmers. Phukan (1972) and Deshpande (1986) provided statistical evidence confirming positive contribution of irrigation towards increasing cropping intensity. The rainfall is uneven distributed in a year and is usually concentrated in the summer month of July to September. Therefore, development of irrigation facilities is required. Rice and wheat require proper irrigation during whole period. Each crop also requires proper irrigation for higher yield except millet. If rainfall occurs then there is no requirement of irrigation in millet.

Table 7: Different Sources of Irrigation used by the Respondents

Sources	Type	No. of Farmers	Percentage
Pumpset	Own	117	80.14
	Hired	29	19.86
Tube Wells	Own	103	70.55
	Hired	20	13.70
	Govt.	25	17.12

Source: Field Survey

Table 7 and 8 shows distribution of agricultural sources and area under different sources of irrigation in selected villages. It reveals that private tube wells are main source of irrigation in region. It shares 70.55 percent own tube wells and 30.82 percent have hired and govt. tube wells together. During the field survey, it has been found that marginal and small farmers have not their own source of irrigation and they use hiring water for irrigation from

private tube-wells and pump-sets. Large, medium and some semi medium farmers have their own tube-wells and pump-sets.

Table 8: Area under Different Sources of Irrigation

Sources	Type	Area in Percent
Pumpset	Own	88.03
	Hired	11.97
Tube Wells	Own	87.18
	Hired	5.42
	Govt.	7.4

Source: Field Survey

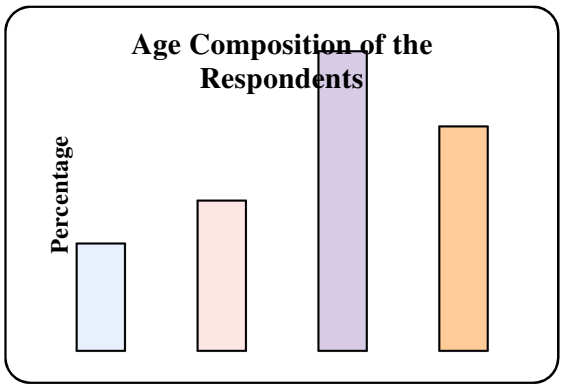
Use of Cooperative Societies & Kisan Credit Card

Capital is essential for improving agriculture conditions. This facility is provided by credit institutions. Cooperative societies and Kisan Credit Card are two essential ways of financial support to farmers. Cooperative societies supply various services to their members with inputs for agricultural production including seeds, fertilizers and agricultural machineries. According to Omotesho (2008), "Cooperative society is one of the most effective vehicles for efficient mobilization of production resources and accelerated agricultural development." Kisan Credit Card (KCC) is a scheme which provides affordable credit to farmers. This scheme is initiated in India during the year 1998-99 with the help of Reserve Bank of India (RBI) and National Bank for Agriculture and Rural Development (NABARD) for helping the farmers by providing timely and adequate credit. It is observed during field survey that cooperative societies are not working properly. Seeds, fertilizers and other services are not supplied by cooperative societies at time. It is evident from the Table 9 that only 38.36 percent of the total respondents using services from cooperative societies whereas 52.74 percent respondents have Kisan Credit Card. It is found that the farmers, who have more than 2 acre land, they have only Kisan Credit Card. It is also observed that most of the farmers do not pay crop loans at stipulated time; therefore, Kisan Credit Card of the farmers has been cancelled.

Table 9: Use of Cooperative Societies & Kisan Credit Card

	Type	No. of Farmers	Percentage
Cooperative Societies	Yes	56	38.36
	No	90	61.64
Kisan Credit Card	Yes	77	52.74
	No	69	47.26

Source: Field Survey



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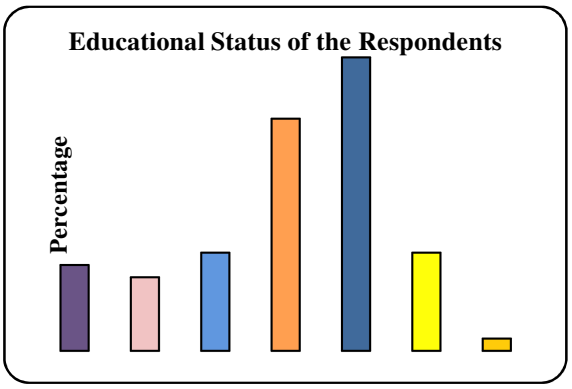

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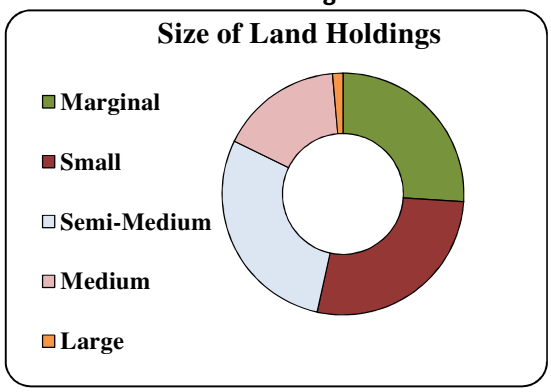

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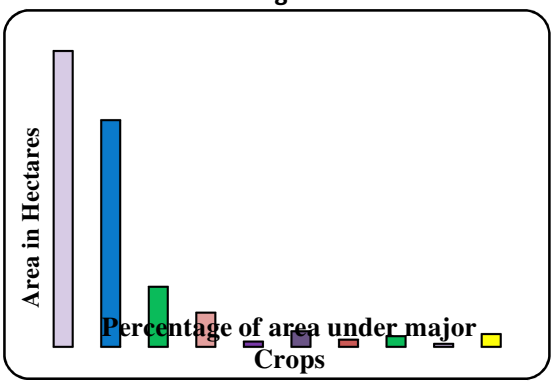

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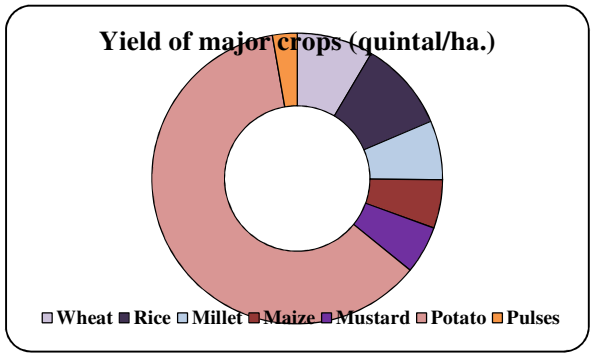

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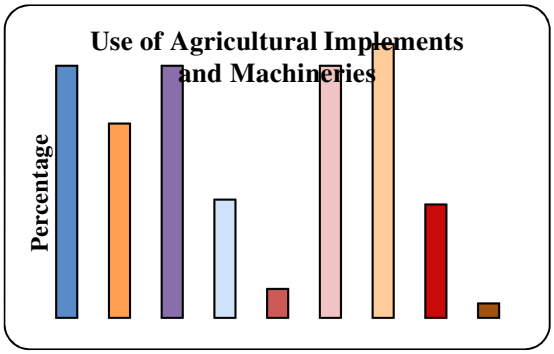

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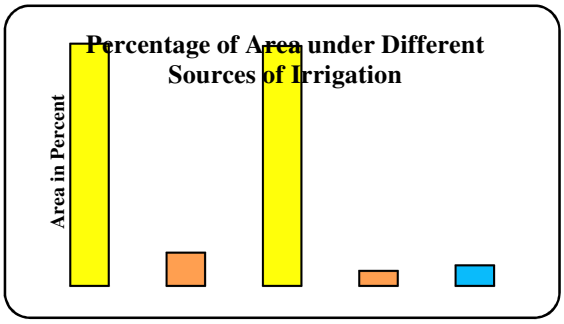

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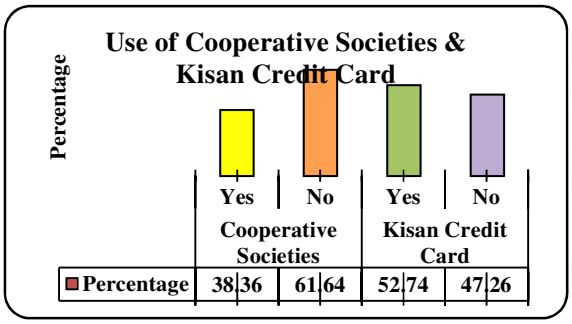

Fig.8

Conclusions and Suggestions

The above analysis revealed that young and highly educated people are not interested in agriculture occupation. It is also clear from the field survey that size of land holdings is small and fragmented. Only 1.3 percent size of land holdings are more than 10 hectares. On the contrary to this, 27.40 percent respondents have small size of land holdings which are high in all size of land holdings. It is seen that small and marginal farmers are unable to adopt effective utilization of agricultural practices as comparison to large farmers.

The study point out that cropping pattern is influenced by a number of factors like size of land holdings, irrigation facilities, market distance, soil quality and price. Wheat shares 77.75 percent area and it is cultivated by all size of farmers. In Rabi season, only large farmers grow other crops with wheat whereas small and marginal farmers cultivate only wheat crop for their survival. It is analyzed that rice is main crop because of availability of canal water for irrigation. It is seen that only large, medium and semi-medium farmers cultivate rice with the help of tube-well irrigation in those areas where canals irrigation is inaccessible because they can afford the charges for tube-well irrigation. Potato cultivation is influenced by price and soil quality. It is increasing because of good price. Vegetable farming is determined by market distance, accessibility and connectivity from the village. Vegetable farming occupies in those villages which are located near to city or town and vegetable mandies are located near to villages with good accessibility. Maize and Pulses share low area due to damage of crops by wild animals.

Traditional method of ploughing by wooden plough is almost finished. It is observed that large, medium and semi-medium farmers have their own agricultural implements and sources of irrigation whereas small and marginal farmers hired from owners on rent. Only large farmers have modern agricultural inputs like, tractor, thresher, rotavator etc. It is seen that farmers have adopted mechanized farming at great level but they are not aware of some scientific use of these machineries. The farmers have no idea of soil testing, seed treatment before sowing and line sowing of seeds.

Special attention should be paid for canal irrigation because canals are dried in all seasons except rainy season. For managing water at all time, rain water harvesting procedure should be adopted. At least, a local body village information system should be established at village level which provides update, accurate, timely data and information to the farmers after every cropping season. Therefore, it will be helpful for the farmers to cultivate crops in different cropping season. Agricultural scientist should be appointed at village level for giving the proper guidance to farmers. It has been observed that instead of using Hybrid seeds, farmers prefer local varieties of seeds because hybrid seeds cannot be again sown in field and it will be useless for next crop. Therefore, agricultural scientist should develop such type of hybrid seeds that can be used for next two or three crops. Foundation seeds should provide to farmers instead of certified seeds. It is also suggested that fertilizers and seeds should be given to farmers at proper time. Modern technology requires adequate knowledge. It is remarked that famers are not aware of agricultural techniques and they have poor skill to handle these machineries. Therefore, training should be provided to the farmers for using these machineries. Crop rotation is also an essential requirement for improving crop yield, which improves soil fertility also. It is clear after the field survey that about 54 percent farmers belong to small and marginal farmers. Therefore, they are the backbone of

economy. These farmers do not possess adequate means to improve their method of cultivation. Therefore, policies should be made for small and marginal farmers.

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