Impact of the Socio-Economic Variables on the Use of Fertilizer Type in the Case of Apple Cultivation: A Case Study of District Kulgam, Jammu and Kashmir

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Abstract: *In the present study, the researcher estimates the association between the different socioeconomic variables and the type of fertilizer (Organic/Inorganic) used for producing apple at the household level in Kulgam, one of the districts of Jammu and Kashmir. In the past few decades, agricultural sector in the whole state and particularly in the district of Kulgam has witnessed a heavy shift in the cropping pattern from food crops to non-food crops (cash-crops). The horticultural sector has been playing an important role in the State, largely by contributing to the State Economy and turns to be the source of livelihood for nearly thirty-three lakh people, but the paddy production on the other hand has shown an opposite trend. Paddy land is getting changed into the horticultural land, as the farmers find it to be more remunerative. Kulgam, which was once the major producer of rice in the State, and was known to be the "Rice Bowl of Kashmir", is now among the least producers of rice. Farmers witnessed that sticking only to the water-intensive crops proved to be non-beneficial and they willingly shifted to the cash crops, like: apple, almond, and walnut. Chi Square test has been used to find out the association between the different socioeconomic variables and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.*

Key Words: *Kashmir; Crop Diversification; Paddy; Apple; Crop*

1. INTRODUCTION:

Crop diversification is a best strategy to achieve the goals of development. It took the attention of policy makers in the country during the recent years. The approach envisages changes in production activities of farm sector, to adjust to changes in economic environment and to face the problems like unemployment and depletion of natural resources (Ramesh Chand, 1999). The main objective of this approach is to raise per capita income by means of opening of avenues for prolific employment opportunities in farm and non-farm sectors and to make the economic growth broad and stable in the long-run (Amitabh Kundu, 2012). The success of the policy lies in the identification of the particular crop for the appropriate region-specific, diversification choices, establishment of physical and institutional infrastructure services and execution of suitable strategies.

Another feature of this approach is to prepare the farmers to grow excellent and profitable produce based on both demand and supply in the long run (Anjani Kumar et al., 2012). Diversification in cropping pattern is likely to save the disintegration of agriculture economy and environment of the study area. Crop diversification acquires extraordinary implication in this region because of the ecological and environmental problems and depletion of the natural resources. Crop diversification refers to the competition between the crops growing in a region. If there is eagerness in the competition, the higher will be the extent of crop diversification; and less important the competition, the better will be the trend in the direction of crop specialization (where emphasis is on one or two crops). Therefore crop diversification is an idea which is contradictory to crop specialization. The extent of crop diversification mainly depends on the geo climatic/socio-economic conditions and technological development in the area (Husain, 2000).

India is blessed with a varied set of regional, agronomic, ecological, climatic, social and economic attributes. As far the state of Jammu and Kashmir is concerned, it is totally different regarding all these features with the rest of the country. The economy of Jammu & Kashmir principally depends on agriculture, having about one-third of its population engaged with this agriculture and allied sectors. The geography setup of the area is restricting the growth of paddy cultivation. The production of paddy is not increasing in proportion to the cost involved in the farming, so in this background of stagnation in paddy production, which is not able to raise the level of employment in the region, horticulture is a possible option for exploration**.** The area is blessed with the appropriate climatic zones for rising temperate, sub-tropical and tropical fruits throughout the whole year. These fruits are not only the supplement diet of the local people, but also appear to be the main item of export to other parts of India and rest of world (SP Sharma et al., 2011). Kulgam which famous for the rice productivity once used to be called as *rice bowl* of the Kashmir is now amongst the least producers of rice (A. N. Raina, 2012). Paddy land is getting converted into horticultural land as farmers seek to earn more revenue against horticultural products (Mohmad Iqbal Reshi et al., 2010). Farmers feel that

sticking only to the water-intensive crops like paddy in times of water-scarcity might prove non-beneficial and they readily switch over to cash crops like apple, almond and walnuts (J&K Govt. Report, 2012).

2. THEORETICAL PERSPECTIVE:

There are two ways by which the farmers go for crop diversification; one is to go for substitution and second way is to go for expansion. In the former one the farmers go directly for substituting the crop by new one, and in latter the farmers can go by increasing the land area by bringing unwanted lands or by clearing the forests under cultivation. But mostly the farmers have adopted substitution method rather than the expansion method in the study area. There are lots of theories (Theory of Production and Costs, Prof. Schultz Theory of Transforming Traditional Agriculture) which discuss about the crop diversification in detail, but the present study has used the Theory of Profit Maximisation to understand the issue very well.

3. METHODOLOGY:

The researcher has made an attempt to examine the ground realities in the study area to devise a methodology and research design of the present study by going through the existing literature meticulously in the area of research. The present study is exploratory in nature, mainly based on the primary data collected from thorough field survey with structured interview schedule and the units of analyses being the household heads.

3.1 Sampling Design:

Among the three divisions (Jammu, Kashmir, and Ladakh) of Jammu and Kashmir State, Kashmir division chosen for the present study which is dominated by the cultivation of apple. Kashmir division if further divided into South, North and Central parts, comprises of ten districts. Anantnag, Kulgam, Shopian, and Pulwama form the Southern part; while as Bandipora, Baramulla, and Kupwara forms the Northern part and Budgam, Ganderbal and Srinagar as the Central part of the region.

In all the ten districts of Kashmir region, both apple and rice are extensively cultivated. Out of which, the five districts which come under high productivity group in case of both apple and rice production are: Kulgam, Budgam, Anantnag, Pulwama, and Baramulla. Kulgam district, which was once known as the "*Rice Bowl of Kashmir*" has been chosen for observing the rapid trend in the shifting of paddy cultivation towards the apple cultivation over the last few decades.

Primary data were obtained from the survey samples by adopting stratified random sampling method to choose the respondents from the selected villages, with the help of an interview schedule by implementing three-stage sampling procedure as follows:

Stage I: Selection of all ten horticultural blocks of district Kulgam. (*Manzgam, Waripora, D.K. Marg, Kulgam, Arreh, Kadder, Qazigund, Devsar, Qaimoh, and Yaripora*)

Stage II: Selection of thirty-four highly apple populated orchardist villages from all ten blocks by the number of villages in the respective blocks.

Stage III: Selection of total of 272 sample respondents of the total thirty-four villages, eight sample respondents from each village.

3.2 Objectives:

The following objectives were set for the present research:

To find out the association between the different socioeconomic variables and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.

3.3 Hypotheses:

- There is an association between the attribute (age) and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.
- There is no association between the attribute (gender) and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.
- There is an association between the attribute (educational qualification) and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.
- There is no association between the attribute (occupation) and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.
- There is no association between the attribute (family type) the use of fertilizer type (organic/inorganic) in the case of apple cultivation.
- There is an association between the attribute (family size) and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.
- There is no association between the attribute (land owned) and the use of fertilizer type (organic/inorganic) in the case of apple cultivation.

3.4 Data Processing and Statistical Tools Used for Analysis

After completing the data collection, the collected primary data were processed. The collected data were properly coded and tabulated and were analyzed by using Microsoft Excel 2010 and SPSS Package 20.0. Further, descriptive table and indexes of the surveyed respondents were generated from the gathered data for the purpose of classification analysis and interpretation. The percentage analysis and table presentation are used to interpret the socio-economic characteristics of the selected sample respondents of the study area. ANOVA Model has been applied to identify the variation in the responses of the sample respondents regarding the issues about the cultivation of paddy and apple. Further, to find out the association between the use of fertilizer type and the responses to the particular questions (regarding the various socioeconomic variables), Chi-Square test has been used.

4. RESULTS AND DISCUSSION:

The table 1 examines the association between the dependent variable i.e. the use of fertilizer in the case of apple cultivation (whether organic or inorganic or both) and the various independent variables (characteristics of the household head) such as age, gender, educational qualification, occupation, family type, family size and land owned. Out of the total sample size, N=272 respondents, 220 respondents (80.9 per cent) make use of both types of fertilizers, 40 respondents (14.7 per cent) make use of only inorganic fertilizers and the rest of 12 respondents (4.4 per cent) make use of only organic fertilizers, while the cultivation of apple.

In the age group of 21 to 40, the highest share of 42 sample respondents (87.5 per cent of the row total) show the use of both types of fertilizers and the least share of 2 sample respondents (4.2 per cent of the row total) show the use of inorganic fertilizers. In the age group of 41 to 60, the highest share of 142 sample respondents (82.6 per cent of the row total) show the use of both types of fertilizers and the least share of 6 sample respondents (3.5 per cent of the row total) show the use of organic fertilizers. Likewise, in the age group with respondents having age above 60 years, 36 sample respondents (69.2 per cent of the row total) show the use of both types of fertilizers while the cultivation of apple and the least share of 2 sample respondents (3.8 per cent of the row total) show the use of inorganic fertilizers.

The Chi Square test is used for finding out the association between the attribute (age) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (12.21) at 4 degrees of freedom is significant at 0.01 levels. Therefore, it can be concluded that there is an association between the attribute (age) and the type of fertilizers used by the sample respondents to cultivate the apple.

In the case of gender, among the males, the highest share of 198 sample respondents (81.1 per cent of the row total) show the use of both types of fertilizers and the least share of 10 sample respondents (4.1 per cent of the row total) show the use of organic fertilizers. And among the females the highest share of 22 sample respondents (80.9 per cent of the row total) the use of both types of fertilizers while the cultivation of apple and the least share of 2 sample respondents (7.1 per cent of the row total) show the use of organic fertilizers.

The Chi Square test is used for finding out the association between the attribute (gender) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (0.55) at 6 degrees of freedom is > 0.05. Therefore, it can be concluded that there is no association between the attribute (gender) and the type of fertilizers used by the sample respondents to cultivate the apple.

In the case of educational qualification, considering illiterates, the highest share of 66 sample respondents (82.5 per cent of the row total) show the use of both types of fertilizers and the least share of 4 sample respondents (5.0 per cent of the row total) show the use of organic fertilizers. Similarly, among the respondents who have studied up to middle, the highest share of 80 sample respondents (78.4 per cent of the row total) show the use of both types of fertilizers and the least share of 4 sample respondents (3.9 per cent of the row total) show the use of organic fertilizers. Likewise, among the respondents, who have studied HSC, the highest share of 30 sample respondents (83.3 per cent of the row total) show the use of both types of fertilizers and the least share of 2 sample respondents (5.6 per cent of the row total) show the use of organic fertilizers. And among the respondents who have studied up to graduation, the highest share of 16 sample respondents (72.7per cent of the row total) show the use of both types of fertilizers, a share of 6 sample respondents (27.3 per cent of the row total) show the use of inorganic fertilizers and no any sample respondent who show the use of organic fertilizers. And finally among the sample respondents who have studied PG or above, the highest share of 28 sample respondents (87.5 per cent of the row total) show the use of both types of fertilizers while the cultivation of apple, a share of 2 sample respondents (6.3 per cent of the row total) show the use of inorganic fertilizers and a share of 2 sample respondents (6.3 per cent of the row total) show the use of organic fertilizers.

The Chi Square test is used for finding out the association between the attribute (educational qualification) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (7.02) at 8 degrees of freedom is significant at 0.01 levels. Therefore, it can be concluded that there is an association between the attribute (educational qualification) and the type of fertilizers used by the sample respondents to cultivate the apple.

In the case of occupational structure, among the respondents practicing agriculture, the highest share of 92 sample respondents (78.0 per cent of the row total) show the use of both types of fertilizers and the least share of 6 sample respondents (5.1 per cent of the row total) show the use of organic fertilizers. Likewise, among the respondents having business as their main income generating source, the highest share of 74 sample respondents (90.2 per cent of the row total) show the use of both types of fertilizers and the least share of 2 sample respondents (2.4 per cent of the row total) show the use of organic fertilizers. Similarly, among the respondents who are in government service, the highest share of 54 sample respondents (75.0 per cent of the row total) show the use of both types of fertilizers while the cultivation of apple and the least share of 4 sample respondents (5.6 per cent of the row total) show the use of organic fertilizers.

The Chi Square test is used for finding out the association between the attribute (occupation) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (6.926) at 4 degrees of freedom is > 0.05. Therefore, it can be concluded that there is no association between the attribute (occupation) and the type of fertilizers used by the sample respondents to cultivate the apple.

In the case of family type, among the nuclear type household families, the highest share of 162 sample respondents (83.5 per cent of the row total) show the use of both types of fertilizers and the least share of 8 sample respondents (4.1 per cent of the row total) show the use of organic fertilizers. Likewise, among the joint family type households, the highest share of 58 sample respondents (74.4per cent of the row total) show the use of both types of fertilizers while the cultivation of apple and the least share of 4 sample respondents (5.1 per cent of the row total) show the use of organic fertilizers

The Chi Square test is used for finding out the association between the attribute (family type) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (3.21) at 2 degrees of freedom is > 0.05. Therefore, it can be concluded that there is no association between the attribute (family type) and the type of fertilizers used by the sample respondents to cultivate the apple.

In the case of family size, in the group of households having family size below 5, the highest share of 130 sample respondents (83.3 per cent of the row total) show the use of both types of fertilizers and the least share of 8 sample respondents (5.1 per cent of the row total) show the use of organic fertilizers. Similarly, among the households in the group of 6-10 the highest share of 64 sample respondents (84.2 per cent of the row total) show the use of both types of fertilizers and the least share of 2 sample respondents (2.6 per cent of the row total) show the use of organic fertilizers. Likewise, among the households having the family size of above 10, the highest share of 26 sample respondents (65.0 per cent of the row total) show the use of both types of fertilizers, while the cultivation of apple and the least share of 2 sample respondents (5.0 per cent of the row total) show the use of organic fertilizers.

The Chi Square test is used for finding out the association between the attribute (family size) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (9.777) at 4 degrees of freedom is significant at 0.01 levels. Therefore, it can be concluded that there is an association between the attribute (family size) and the type of fertilizers used by the sample respondents to cultivate the apple.

In case of land owned, considering the group of households having land size below 2 Kanals, the highest share of 8 sample respondents (80.0 per cent of the row total) show he use of both types of fertilizers, a share of 2 sample respondents (20.0 per cent of the row total) show the use of inorganic fertilizers and no any sample respondent who show the use of organic fertilizers. Also, among the respondents who have been having the land size of 3 to 4 Kanals, the highest share of 44 sample respondents (88.0 per cent of the row total) show he use of both types of fertilizers and the least share of 2 sample respondents (4.0 per cent of the row total) show the use of inorganic fertilizers. Similarly, among the respondents, who have land size of 5 to 8 Kanals, the highest share of 84 sample respondents (77.8 per cent of the row total) show he use of both types of fertilizers and the least share of 20 sample respondents (18.5 per cent of the row total) show the use of inorganic fertilizers. Likewise, among the respondents who have land size of 9 to 16 Kanals, the highest share of 76 sample respondents (82.6 per cent of the row total) show he use of both types of fertilizers and the least share of 4 sample respondents (4.3 per cent of the row total) show the use of organic fertilizers. And among the sample respondents who have land size of above 16 Kanals, the highest share of 8 sample respondents (66.7 per cent of the row total) show he use of both types of fertilizers while the cultivation of apple a share of 4 sample respondents (33.3 per cent of the row total) show the use of inorganic fertilizers and no any sample respondent who show the use of organic fertilizers.

The Chi Square test is used for finding out the association between the attribute (land owned) and the type of fertilizers used by the sample respondents to cultivate the apple. The result reveals that the calculated chi-square value (11.489) at 8 degrees of freedom is > 0.05. Therefore, it can be concluded that there is no association between the attribute (land owned) and the type of fertilizers used by the sample respondents to cultivate the apple.

5. CONCLUSION:

From the above analysis, discussion, interpretation, and results, it can be concluded that some of the socioeconomic variables are having impact on the use of fertilizer type (organic/inorganic) in the case of apple

cultivation by the farmers; while as some of them are found to have no any association with the use of fertilizer type. The variables which were found to be associated were: age, educational qualification, and family size; and variables like gender, occupation, family type, and land owned were found to be having no any association. Farmers of young age group were found to be using organic fertilizers most as compared to the old age group, and in case of use of inorganic fertilizers old age farmers were found to be using most as compared to the young age farmers. Considering the gender, female household heads were found to be using the organic fertilizers most than the male household heads, while in case of inorganic fertilizers male household heads were found to be using most as compared to the female household heads. And taking educational qualifications into consideration, highly educated farmers were found to be using organic fertilizers most as compared to the less educated farmers, and in case of use of inorganic fertilizers less educated farmers were found to be using most as compared to the highly educated farmers. Considering the occupational structure, household heads which were getting maximum income from government jobs were found to be using the organic fertilizers as well as the inorganic fertilizers most than the household heads who were having agriculture and business as the main income source. In the family type of distribution of the households, the joint family households were found to be using organic fertilizers as well as the inorganic fertilizers most than the nuclear type of households. Small sized families exhibit higher use of organic fertilizers than the large sized families, while as large sized families were found to be making use of inorganic fertilizers as related the small sized families. And finally taking the land size into concern, small land size holders were found to be making the use of organic fertilizers maximum than the households having large sized holdings, however in case of use of inorganic type of fertilizers, medium sized farmers overturn the small sized farmers.

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Table 1
Impact of the Socio-Economic Variables on the Use of Fertilizer Type in the Case of Apple Cultivation

Variables		Type of Fertilizer Used in Apple Cultivation			Total
		Organic	Inorganic	Both	
Age	21 to 40	4 (8.3)	2 (4.2)	42 (87.5)	48 (100.0)
	41 to 60	6 (3.5)	24 (14.0)	142 (82.6)	172 (100.0)
	Above 60	2 (3.8)	14 (26.9)	36 (69.2)	52 (100.0)
	Total	12 (4.4)	40 (14.7)	220 (80.9)	272 (100.0)
Chi-Square		df			P-Value
12.205		4			0.016 S
Gender	Male	10 (4.1)	36 (14.8)	198 (81.1)	244 (100.0)
	Female	2 (7.1)	4 (14.3)	22 (78.6)	28 (100.0)
	Total	12 (4.4)	40 (14.7)	220 (80.9)	272 (100.0)
Chi-Square		df			P-Value
0.55		6			0.75 NS
Educational Qualification	Illiterate	4 (5.0)	10 (12.5)	66 (82.5)	80 (100.0)
	Middle	4 (3.9)	18 (17.6)	80 (78.4)	102 (100.0)
	HSC	2 (5.6)	4 (11.1)	30 (83.3)	36 (100.0)
	Graduation	0	6 (27.3)	16 (72.7)	22 (100.0)
	PG/Other	2 (6.3)	2 (6.3)	28 (87.5)	32 (100.0)
	Total	12 (4.4)	40 (14.7)	220 (80.9)	272 (100.0)
Chi-Square		df			P-Value
7.02		8			0.53 NS
Occupational Structure	Agriculture	6 (5.1)	20 (16.9)	92 (78.0)	118 (100.0)
	Business	2 (2.4)	6 (7.3)	74 (90.2)	82 (100.0)
	Government Service	4 (5.6)	14 (19.4)	54 (75.0)	72 (100.0)
	Total	12 (4.4)	40 (14.7)	220 (80.9)	272 (100.0)
Chi-Square		df			P-Value
6.926		4			0.140 NS

Table 1 Contd...

Variables		Type of Fertilizer Used in Paddy Cultivation			Total
		Organic	Inorganic	Both	
Type of Family	Nuclear	8 (4.1)	24 (12.4)	162 (83.5)	194 (100.0)
	Joint	4 (5.1)	16 (20.5)	58 (74.4)	78 (100.0)
	Total	12 (4.4)	40 (14.7)	220 (80.9)	272 (100.0)
Chi-Square		df			P-Value
3.21		2			0.20 NS
Size of the Family	Below 5	8 (5.1)	18 (11.5)	130 (83.3)	156 (100.0)
	6-10	2 (2.6)	10 (13.2)	64 (84.2)	76 (100.0)
	Above 10	2 (5.0)	12 (30.0)	26 (65.0)	40 (100.0)
	Total	36 (13.2)	20 (7.4)	216 (79.4)	272 (100.0)
Chi-Square		df			P-Value
9.777		4			0.044 S
Size of Land Owned	Below 2	4 (8.0)	2 (4.0)	44 (88.0)	50 (100.0)
	3 to 4	4 (3.7)	20 (18.5)	84 (77.8)	108 (100.0)
	5 to 8	4 (4.3)	12 (13.0)	76 (82.6)	92 (100.0)
	9 to 16	0	4 (33.3)	8 (66.7)	12 (100.0)
	Above 16	12 (4.4)	40 (14.7)	220 (80.9)	272 (100.0)
	Total	4 (8.0)	2 (4.0)	44 (88.0)	50 (100.0)
Chi-Square		df			P-Value
11.489		8			0.175 NS

Source:Computed

Note: Figures in parentheses indicate percentage to the row total.