

# **Agricultural Commercialization and Diversification in Jammu and Kashmir: Causes and Impacts**

Kardan Journal of Economics and  
Management Sciences  
1(4) 59–84  
©2018 Kardan University  
Kardan Publications  
Kabul, Afghanistan  
<https://kardan.edu.af/Research/CurrentIssue.aspx?j=KJEMS>

**Mohammad Asif Shah**

## **Abstract**

*The paper has examined trends and patterns in crop diversification in Kulgam district of Jammu and Kashmir for the period 2007-08 to 2013-14 using Simpson Index of Diversification (SID) and estimated the determinants of crop diversification by using multiple regression analysis. The cropping pattern for whole of the State, and Kulgam district in particular has been discussed and it has been found that traditional system of the subsistence farming without any surplus is being practiced in the region. The study has revealed that the farmers are steadily shifting towards the cultivation of cash crops, by replacing the food crops, either via specialization or diversification for reaping the higher benefits from the horticulture sector. The use of regression analysis has brought out the importance of gender, family type, and education as the important determinants of crop diversification towards the high-value crops in the region. The study will help in converting the opportunities into benefits and to prevent the economy from the bad consequences of the move which can be a future threat to the State economy.*

**Key words:** Crop Diversification; Jammu and Kashmir; Cropping Pattern; Specialization; Regression; Food Crops; Cash Crops; Specialization; Horticulture; Agriculture.

---

**Dr. Mohammad Asif Shah**, Assistant Professor of Economics at FBS Business School, Bangalore, Karnataka, India., Mobile: +91-7889462018, e-mail: [asif@fbsbschool.com](mailto:asif@fbsbschool.com)

## Introduction

The sluggish growth in agricultural sector of the State of Jammu and Kashmir is a concern for policymakers as nearly two-thirds of people still depend on rural employment for a living (Economic Survey). The current agricultural practices in the region are found neither economically nor environmentally sustainable, and yields for many agricultural commodities are low. A significant decline has been observed in the total reported area in the State (Wani, 2009). Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Bhatia (1999) has also emphasized the role infrastructural development in agriculture, and termed it as a pre-requisite for the accelerated economic development. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation. It will be essential for the State to build a healthy and diversified agricultural sector and facilitate rural, non-farm entrepreneurship and employment. Encouraging policies that promote cultivation of cash crops in-lieu of food crops will ensure the farmers receive better prices. Rao (2006) has highlighted importance of access to markets, agricultural planning, public and private sector investment strategies as the critical factors for the growth of agricultural sector.

Keeping an eye on the increasing population of India as a whole and the State of Jammu and Kashmir in particular, instead of focusing on just being a self-reliant, as could be seen in the policies of last five decades, rather the focus should be on the major earners of the foreign exchange for the country. And for achieving this feat, the commercialization of agriculture is a necessary step (Somini Sengupta, 2008 and Hazra, 2001). Agriculture in the State is characterized by small farm land holdings. The highest share of land holdings (94.43 per cent) are marginal, with 5.01 per cent small, 0.53 per cent semi-medium, 0.03 per cent medium and large holdings come for zero per cent. And still, the more important thing is that the marginal farmers being the highest group share just 81.30 per cent of the total land area, with small farmers sharing 14.87 per cent, semi-

medium farmers sharing 3.46 per cent and the medium farmers sharing 0.37 per cent of the total (Agriculture Production Department, Jammu and Kashmir).

Hence, the small farmers do have the option for the production of such crops which can uplift them from the severe poorness. Thus, they choose to cultivate the commercial crops in preference of food crops. The area under food crops has not been increasing in proportion to the area under fruits has been increased over the past few decades. Paddy is a highly labor-intensive crop, and rice cultivation is a major source of employment in the state. On the other hand, the labor requirements of cash crops (Apple) are marginal. The shift in cropping pattern away from rice towards cash crops does have important implications for employment and also for the income distribution between the owner-cultivators and agricultural laborers. Hence crop diversification can be a better initiative in the development of agriculture, which can bring all the features for agricultural development in the State.

India, which was once a subsistence economy, and was not even able to generate enough food production to meet the requirements, later on, became self-sufficient and export promoting nation. The eras of food shortages and famines were replaced with the eras of bliss. As stated by Farmer (1986), the advantage of the implementation of new technology in the form of High Yielding Varieties (HYV's) of cereals, especially wheat and rice, in association with controlled irrigation, use of chemical fertilizers and mechanization all led to supersede the traditional way of cultivating agriculture. Slowly and surely, the agriculture in India became profitable and started to commercialize and to leave its traditional production structure laid the emphasis towards more remunerative crop varieties.

Crop diversification is a strategy to stabilize and raise the farm income by switching off to remunerative crops. It helps in increasing the employment opportunities for small and marginal farmers by shifting their excess labor to off-farm sectors. It works well in

boosting the exports by producing the cash crops instead of depending only on the production of food crops. It enhances the natural resource base by changing the old fashioned cropping patterns to new ones. The most important feature of crop diversification is that it saves the soil from losing its quality and fertility and decreasing water table so as to enrich the production and productivity and a strategy to get rid of food insecurity (Vyas, 1996; Joshi et al., 2004; Sharma, 2005).

Kumar and Mittal (2003) have emphasized the role of agricultural diversification to achieve the heights in economic growth. According to them, the factors responsible for agricultural diversification and cropping pattern changes are technological breakthroughs, consumer approach in the form of high demand, government policies to enhance the process of diversification, and infrastructural development in the form of roads, markets, and irrigational development. In the last few decades, India is experiencing an enormous degree of crop diversification towards the commercial crops and specifically towards the horticultural crops. There has been a great shift of land area under such crops in the cost of the area under cereals and pulses (Kumar and Mittal, 2003; Radhakrishna and Ravi 1990; Mittal 2006; Mittal, 2007). The diversification towards the cash crops can change the agricultural set-up using income augmentation, employment generation, and export promotion (Von Braun, 1995; Pingali and Rosergrant, 1995; Chand, 1996; Ryan and Spencer, 2001).

Crop diversification is a strategy to achieve important development goals, which has received increased attention of policy makers in the country during the recent years. The strategy envisages changes in production activities of the farm sector, to adjust to changes in economic environment and to face the challenges of persistent unemployment and natural resources degradation (Joshi et al., 2004). The broad objectives of this strategy are to raise per capita income through the opening of avenues for productive

employment in farm and non-farm sectors and to make the economic growth broad-based and sustainable in the long run.

The success of the policy for crop diversification requires crop identification of suitable region-specific diversification alternatives, the creation of physical and institutional infrastructure facilities, and implementation of appropriate intervention strategies (Kurosaki, 2003). Conservation of natural resources, to provide for employment, more income to the marginal farmers, to reduce dependence on outside supply and to promote export possibilities are some basic reasons for the adoption of diversification. The main objective of this program has been to prepare farmers to cultivate quality and marketable produce based on demand supply chain (Joossens, 1996). Crop diversification refers to the competition among the growing crops in a region. The keener the competition, the higher the magnitude of crop diversification, and the lesser the competition, the greater will be the trend towards crop specialization or monoculture farming, where the emphasis is on one or two crops. Thus crop diversification is a concept which is opposite to crop specialization (Bhatia, 1965).

### **Status and pattern of cropping pattern**

The cropping pattern means the identification of the most efficient crops of a region which fit the intensity of cropping. The changing cropping pattern simply infers a transformation in the area of the varied set of crops. Cropping pattern is the extent to which the arable land under different agricultural activities can be put to use (Singh and Dhillon, 2005). Increasing the area under high-value crop is expected to increase total return from the farm. The cropping pattern change is of great interest to the agricultural economists for its notable impact on agricultural output (Ranade, 1980). Everywhere, the major influencing factor behind the changes in the cropping pattern is found to be the size of the land owned by the farmer. Small farms dominate the agricultural economy of India, and so is the case of Jammu and Kashmir. Small farmers are largely poor and depend upon their farms for their sustenance (Kadapatti and Bagalkoti, 2014).

In general, the farmers have a tendency to stick to a stable cropping pattern under any given agro-climatic region unless the price factors dictate them in adjusting acreage allocation (Mruthyunjaya and Kumar, 1989). The climate is also found to be the most significant environmental variable affecting the production of crops (Aggarwal, 2008).

**Table 1: Land Utilization Pattern of Kulgam District (Area in Hectares)**

District	Type of Crops	Kulgam																				
		Fruits	Non Food Crops	Food Crops	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016									
		5770	2726	30769	5693	2723	30747	3106	30485	3200	29187	3617	30832	3833	30824	3833	30825	3750	30800	9025	3730	30775

Source: DSEO, Kulgam.

After seeing the details from the table 1, it is ample clear that over the years, the area under food crop cultivation in the region has decreased, while as the area under the cultivation of non-food crops has somewhat increased. But the area under the cultivation of fruits has dramatically changed. The area under fruit cultivation can be seen to be doubled over the past eight to nine years.

**Table 2: Distribution of the Land Holdings According To the Size/ Class**

Size- Class	Land Holding Size (2010-11)			
	Number	Percentage Share	Area (Hectares)	Percentage Share
Marginal	63,007	94.43	2,1327	81.30
Small	3,340	5.01	3,901.25	14.87

<b>Semi-Medium</b>	356	0.53	908.95	3.46
<b>Medium</b>	21	0.03	97.09	0.37
<b>Large</b>	0.00	0.00	0.00	0.00
<b>All Classes</b>	66,724	100.00	26,234.29	10.00

Source: Computed.

It can be seen from the table 2, that the highest share of land holdings (94.43 per cent) are marginal, with 5.01 per cent small, 0.53 per cent semi-medium, 0.03 per cent medium and large holdings come for zero per cent. And still, the more important thing is that the marginal farmers being the highest group share just 81.30 per cent of the total land area, with small farmers sharing 14.87 per cent, semi-medium farmers sharing 3.46 per cent and the medium farmers sharing 0.37 per cent of the total.

Hence, the small farmers do have the option for the production of such crops which can uplift them from the severe poorness. Thus, they choose to cultivate the commercial crops in preference of food crops. The area under food crops has not been increasing in proportion to the area under fruits has been increased over the past few decades. Paddy is a highly labor-intensive crop, and rice cultivation is a major source of employment in the state. On the other hand, the labor requirements of producing the apple are marginal. The shift in cropping pattern away from rice towards cash crops does have important implications for employment and also for the income distribution between the owner-cultivators and agricultural laborers.

**Table 3: Change of Area of Cultivation under Different Crops Present in the District (Area in Hectares)**

	2013-14	2012-13	2011-12	2010-11	2009-10	2008-09	2007-08
<b>Year</b>							
<b>Paddy</b>	16,748	16,812	16,729	18,121	19,537	18,291	17,961
<b>CAGR</b>	-6.75	-6.40	-6.86	.89	8.77	1.84	00
<b>Maize</b>	3,061	3,827	3,275	3,761	3,034	4,507	4,928
<b>CAGR</b>	-37.43	-22.34	-33.54	-23.68	-38.43	-8.54	00
<b>Pulses</b>	1,125	1,167	1,166	829	1,133	1,170	1,047
<b>CAGR</b>	7.45	11.46	11.37	-20.82	8.21	11.48	00
<b>Fruits</b>	8,747	8,900	8,532	5,347	5,645	5,693	5,770
<b>CAGR</b>	51.59	54.25	47.87	-7.31	-2.17	-1.33	00
<b>Veg</b>	1,021	1,097	1,097	1,092	1,109	1,059	1,009
<b>CAGR</b>	1.19	8.72	8.72	8.23	9.91	4.50	00

Source: Computed.

Change of area of cultivation under different crops in the district have been presented in the table 3. The concept of Compound Annual Growth Rate (CAGR), which is a useful measure of growth over multiple time periods has been used. It can be thought of as the growth rate that we get from the initial value to the ending value, when the growth has been compounding over the time period. From the table, it is apparent that the area under paddy cultivation has decreased with 6.75 per cent over the years. The area under maize has also been decreased by 37.43 per cent. While as the area under fruits has increased by 51.59 per cent and the area under vegetables has



also increased by 1.19 per cent. The pulses have grown by a meagre percentage, but not showing a promising trend.

**Table 4: Changing Land Utilization Pattern in the District over the Years (Area in Hectares)**

Year	Area Under Forests	Reporting Area	Area not Available for Cultivation	Other Uncultivated Land	Fallow Land	Net Area Sown
2007-08	190	47,642	8,894	7,667	184	30,707
2008-09	190	47,642	8,894	7,667	208	30,683
2009-10	190	47,642	7,491	7,040	2,149	30,772
2010-11	190	47,642	7,112	6,418	4,903	29,019
2011-12	190	47,642	5,491	6,040	5,242	30,679
2012-13	190	47,642	5,475	6,372	4,926	30,679
2013-14	190	47,642	5,475	6,372	4,925	30,680

Source: Computed.

The table 4 shows the changing land utilization pattern in the district over the years. The region has different lands based on altitude (highlands, midlands, lowlands), but the cultivation of apple has become a fashion, instead of suiting the land quality. The area under fruits has gone up, and it appears that the apple orchardists are increasing at the expense of paddy land. Horticultural crops, that tolerate low moisture conditions, especially in time summer months, such as apple, cherry, pear, almond, walnut, and apricot are grown in the high altitude lands, where there is the shortage of irrigation water. While as the food crops like maize and rice are the most important crops easily grown in mid-altitude lands, because of the abundant water in the soil throughout the year. Regarding the lowlands, the feature of sandy loam soil makes it possible to cultivate root crops like radishes, beets, carrots, turnips, onion, potatoes and leafy vegetables, like lettuce, cabbage, spinach, cauliflower, broccoli, etc.

Horticulture sector plays a significant role in enhancing the economic profile of the people of the State and can be a promising sector if the government adopts the principle of the scientific program of horticulture development. It implicates gratification that the State is enriched with rich green assets (horticultural crops) and henceforth offers an enormous outline for exploiting these assets at a broad and business scale. The J&K State in general and the Kulgam district, in particular, is witnessing a tremendous growth of horticultural crops, especially the growth of area and production of apple.

**Table 5: Compound Annual Growth Rate of Area and Production of Fruit Crops at the District Level over the Last Seven Years**

Area under Fruit-Crops. (Hectares)						
Year	Fresh Fruit	CAGR	Dry Fruit	CAGR	Total	CAGR
2007-08	6,560	00	157	00	6,717	00
2008-09	14,364	118.96	6,085	3,775.80	20,449	204.44
2009-10	16,236	147.50	6,099	3,784.71	22,335	232.51
2010-11	17,178	161.86	6,132	3,805.73	23,310	247.03
2011-12	17,446	165.95	6,132	3,805.72	23,578	251.02
2012-13	18,405	180.56	6,147	3,815.29	24,552	265.52
2013-14	19,092	191.04	6,162	3,824.84	25,254	275.97
Production under Fruit Crops. (Metric Tons)						
Year	Fresh Fruit	CAGR	Dry Fruit	CAGR	Total	CAGR
2007-08	6,5895	00	2,812	00	68,707	00
2008-09	124,510	88.95	8,466	201.07	132,976	93.54
2009-10	120,156	82.34	20,619	633.25	140,775	104.89
2010-11	129,408	96.39	21,404	661.17	150,812	119.50
2011-12	122,122	85.33	21,340	658.89	143,462	108.80
2012-13	131,090	98.94	19,034	576.88	150,124	118.50
2013-14	156,689	137.79	24,424	768.56	181,113	163.60

Source: Computed.

Table 5 depicts the area and production of fresh and dry fruits. It can be easily comprehended by the above table, both the area and

production of the crops has increased over the years, especially in the year 2008-09. The area under the fresh fruits has been increasing steadily over the years, but in case of the dry fruits, the area has increased with a stumpy speed. Similarly, for the case of production, fresh fruit production has been rising over the years, but the production of dry fruits has risen up to 2009-10, later on decreased up to 2012-13, and then again increased in the year 2013-14. Now the keen interest is on the trend of productivity of both types of crops, which will depict the actual situation among both the crops, occurred over the years. The below table (Table 6) portrays the productivity of dry fruits and fresh fruits in the district, over the years:

**Table 6: Productivity of the Fruit Crops in Kulgam District over the Last Seven Years (Metric Tons/ Hectare)**

Year	Fresh Fruit	Dry Fruit	Total
2007-08	10.04	17.91	10.23
2008-09	8.67	1.39	6.50
2009-10	7.40	3.38	6.30
2010-11	7.53	3.49	6.47
2011-12	7.00	3.48	6.08
2012-13	7.12	3.10	6.11
2013-14	8.21	3.96	7.17

Source: Computed.

The table 6 shows that the productivity of both types of crops is not showing a promising trend. The productivity of fresh fruits, as well as of dry fruits has declined over the years. However, the cultivation of cash crops (fruits) is considered as a better option than cultivating the food crops like paddy. Paddy land is getting changed into the horticultural land, as the farmers find it to be more remunerative as compared to the cultivation of paddy.

### Data methods

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. 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, and was also once to be known as the rice bowl of the Kashmir. 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.

The collected data is supplemented with the secondary data, collected from various publications and records from government departments, namely, Agriculture, Horticulture and Directorates of Economics and Statistics and Land Records.

### **Determinants of crop diversification in the study area**

The magnitude and the determinants of diversification at the district level have been carried out using farm-level information collected through the interview schedule. The researcher has tested the variables that are considered important for diversification towards the high-value crops (HVC's). The magnitude of crop diversification is measured by Modified Herfindahl Index or commonly known as Simpson Index for measuring the extent of crop diversification. It is obtained by subtracting the HI from one and has

a direct relationship with diversification, such that its zero value indicates specialization and a movement towards one shows an increase in the extent of crop diversification (Malik and Singh, 2002). Joshi (2004) debated the strong influence of price policy, infrastructure development (especially markets and roads), urbanisation and technological improvements as the main determinants of crop diversification. Using four years of household data from three agro ecological zones in Burkina Faso, Reardon (1992) examined the determinants like age and gender in the process of crop diversification. Kasem (2011) discussed farmers' attendance in training and interaction with farmer groups as the influencing factors of crop diversification. An index was constructed that measures changes in the area allocated to different crops between two time periods as suggested by Chand and Chauhan (2002).

**Simpson Index (SI)** The following formula gives the Simpson Index:

$$SI = 1 - \sum_{i=1}^N Pi^2 \quad (1)$$

Where  $N$  is the total number of crops and  $Pi = Ai / \sum 1Ai$  represents acreage proportion of  $i$ -th crop in the total cropped area. Its value also lies between 0 and 1. This index increases with an increase of diversification. It approaches zero when the farm is specialized and takes a maximum value when there is perfect diversification.

$$SI = 1 - \sum_{i=1}^N Pi^2 \quad (2)$$

Where  $N$  is the total number of crops and  $Pi = Ai / \sum 1Ai$  represents acreage proportion of  $i$ -th crop in the total cropped area. Its value also lies between 0 and 1. This index increases with an increase of diversification. It approaches zero when the farm is specialized and takes a maximum value when there is perfect diversification.

### **Multiple Linear Regression Model**

The Multiple Linear Regression Model (MLRM) has been used to quantify the determinants of crop diversification. The area of production under paddy and apple crops was regressed on following

explanatory variables to identify the determinants of crop diversification in the region. The MLRM of the following type has been used:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + U \quad (3)$$

Where the dependent variable, Y = area under the apple cultivation,

$a$  = constant,

$b_1$  = regression coefficients

$X_i$  = several attributes of the household head

$X_1$  = gender

$X_2$  = family type

$X_3$  = education

## Results and Discussions

The results of the Linear Regression Model are presented in the table 7. In the table, the regressed variable is the area under the apple cultivation in the year 2014 respectively.

**Table 7: Determinants of Crop Diversification in the Study Area**

Explanatory Variables	Dependent Variable : Area under Apple Cultivation in 2014	
	Coefficient	Standard Error
Gender	1.529***	0.348
Family Type (Nuclear-1, Joint-2)	0.363*	0.302
Education {Years of Schooling}	0.434**	0.212
Constant	-3.102**	0.800

Source: Computed.

The table 7 represents the key role of various explanatory variables in determining the area of cultivation under apple crop in 2014. From the table, it is noticeable that all of the three variables as discussed already, are found to be positively influencing the farmer's decision to diversify in favour of apple cultivation.

Gender is found to have a significant influence on the farmer's decision to diversify their lands for apple cultivation. The sign of the coefficient is positive and highly significant. The female-headed

respondents are seen to have a higher propensity towards diversification. It was also observed from the results that all the female household heads (28) have specialized their lands towards apple cultivation, and only a share of 18.9 per cent (46) of the male household heads was seen to have specialized their lands towards apple cultivation.

The nature of the family (Joint or Nuclear) can influence the farmer's decision to grow specific crops. Mostly nuclear families are strong decision makers, while in the case of a joint family; the role of decision is highly influenced by the presence of a large number of family members. Here also the sign of the coefficient is positive and significant, meaning the influence of family type on the diversification. Nuclear families are seen to have a higher propensity to diversify towards apple cultivation, while as the joint family households are less diversifying towards apple cultivation. 72 out of 194 nuclear family respondents (37.1 per cent) have specialized their lands for apple cultivation, while two sample respondents out of 78 (2.6 per cent) of the joint family households have specialized their lands for apple cultivation. So it can be concluded that nuclear family households diversify more than the joint family households.

If a household head is more educated (here more years of schooling), it is found that his decision for sowing a particular crop would be governed by the sound economic estimates of the costs and benefits of that crop. Also, an educated farmer is more enlightened about the existing options of demand and supply and is more attuned towards the advanced techniques than an illiterate farmer. Here likewise education yielded a positive and significant influence on the farmer's decision to diversify their lands towards the apple cultivation. So if the farmers are more educated or having more years of schooling, it will help them in taking the conscientious decisions and enable them in accessing several facilities, needed for crop diversification. Hence, it could be concluded that more the years of schooling more the chances of diversification and less the schooling years, less will be the chances of diversification.

## Integrated Discussion and Testing of Hypotheses

Gender, Family Type, and Education are having a positive but significant association with the rate of crop diversification. Sharma (2005), Vyas (1996) have also discussed and regressed the variables like gender, family size and educational qualification. The diversification of agriculture towards high value cash crops including fruits and vegetables is a viable solution to stabilise and raise farm income, increase employment opportunities, and conserve and enhance the natural resources, principally land and water (Vyas, 1996).

**Table 8: Distribution of the Sample Respondents Based On the Crop Diversification Level**

Variables		Diversification Level					Total
		Complete Diversification	Low Diversified	Moderately Diversified	Highly Diversified	Complete Specialization	
Gender	Male	0 (0)	74 (30.3)	120 (49.2)	4 (1.6)	46 (18.9)	244 (100)
	Female	0 (0)	0 (0)	0 (0)	0 (0)	28 (100)	28 (100)
	Total	0 (0)	74 (27.2)	120 (44.1)	4 (1.5)	74 (27.2)	272 (100)
Chi Square		df			P-Value		
83.516		3			0.001		
Family Type	Nuclear Family	0 (0)	40 (20.6)	80 (41.2)	2 (1.0)	72 (37.1)	194 (100)
	Joint Family	0 (0)	34 (43.6)	40 (51.3)	2 (2.6)	2 (2.6)	78 (100)
	Total	0 (0)	74 (27.2)	120 (44.1)	4 (1.5)	74 (27.2)	272 (100)
Chi Square		df			P-Value		



		37.360			3			0.001					
<b>Education</b>	<b>Illiterate</b>	0	(0)	22	(27.5)	34	(42.5)	0	(0)	24	(30.0)	80	(100)
	<b>Middle</b>	0	(0)	32	(31.4)	48	(47.1)	4	(3.9)	18	(17.6)	102	(100)
	<b>HSC</b>	0	(0)	12	(33.3)	22	(61.1)	0	(0)	2	(5.6)	36	(100)
	<b>Graduation</b>	0	(0)	6	(27.3)	8	(36.4)	0	(0)	8	(36.4)	22	(100)
	<b>PG/Other</b>	0	(0)	2	(6.3)	8	(25.0)	0	(0)	22	(68.8)	32	(100)
	<b>Total</b>	0	(0)	74	(27.2)	120	(44.1)	4	(1.5)	74	(27.2)	272	(100)
<b>Chi Square</b>					<b>df</b>			<b>P-Value</b>					
		49.373			12			0.001					

Source: Computed

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

The table 8 examines the association between the dependent variable, i.e. the level of diversification (whether the respondents have completely diversified, or low diversified, or moderately diversified, or highly diversified, or completely specialized towards apple cultivation) and the various independent variables (characteristics of the household head) such as gender, family type and education of the household head. Out of the total sample size, N=272 respondents, 120 respondents (44.1 per cent) have moderately diversified, 74 respondents (27.2 per cent) have specialized, 74 respondents (27.2 per cent) have low diversified and the rest of 4 respondents (1.5 per cent) have highly diversified. Interestingly there is not a single sample respondent with complete diversification.

Taking the case of gender, among the males, the highest share of 120 sample respondents (49.2 per cent of the row total) show moderate diversification, a share of 74 sample respondents (30 per cent of the row total) show low diversification, a share of 46 sample

respondents (18.9 per cent of the row total) show complete specialization towards apple cultivation and the rest of four sample respondents (1.6 per cent of the row total) show high diversification. Among the females, all of the 28 sample respondents (100 per cent of the row total) show complete specialization towards apple cultivation.

The Chi-Square test is used for finding out the association between the attribute (gender) and the level of crop diversification. The result reveals that the calculated Chi-Square value (83.516) at 3 degrees of freedom is significant at 0.01 levels. Hence the null hypothesis is rejected, and the alternative hypothesis is accepted. Therefore, it can be concluded that there is an association between the attribute (gender) and the level of crop diversification.

Taking the case of family type, among the type of nuclear family respondents, the highest share of 80 sample respondents (41.2 per cent of the row total) show moderate diversification, a share of 72 sample respondents (37.1 per cent of the row total) show complete specialization towards the apple cultivation, a share of 40 sample respondents (20.6 per cent of the row total) show low diversification and the rest of two sample respondents (1.0 per cent of the row total) show high diversification. Among the joint family respondents, the highest share of 40 sample respondents (51.3 per cent of the row total) show moderate diversification, a share of 34 sample respondents (43.6 per cent of the row total) show low diversification, a share of two sample respondents (2.6 per cent of the row total) show high diversification and the rest of two sample respondents (2.6 per cent of the row total) show complete specialization towards apple cultivation.

The Chi-Square test is used for finding out the association between the attribute (family type) and the level of crop diversification. The result reveals that the calculated Chi-Square value (37.36) at 3 degrees of freedom is significant at 0.01 levels. Hence the null hypothesis is rejected, and the alternative hypothesis is accepted.

Therefore, it can be concluded that there is an association between the attribute (family type) and the level of crop diversification.

In the case of educational qualification, considering illiterates, the highest share of 34 sample respondents (42.5 per cent of the row total) show moderate diversification, a share of 24 sample respondents (30 per cent of the row total) show complete specialization towards apple cultivation, and the rest of 22 sample respondents (27.5 per cent of the row total) show low diversification. Among the respondents who have studied up to middle, the highest share of 48 sample respondents (47.1 per cent of the row total) show moderate diversification, a share of 32 sample respondents (31.4 per cent of the row total) show low diversification, a share of 18 sample respondents (17.6 per cent of the row total) show complete specialization towards apple cultivation and the rest of four sample respondents (3.9 per cent of the row total) show high diversification. Among the respondents, who have studied HSC, the highest share of 22 sample respondents (61.1 per cent of the row total) show moderate diversification, a share of 12 sample respondents (30 per cent of the row total) show low diversification, and the rest of 2 sample respondents (5.6 per cent of the row total) show complete specialization towards apple cultivation. Among the respondents who have studied up to graduation, the highest share of eight sample respondents (36.4 per cent of the row total) show moderate diversification, a share of 8 sample respondents (36.4 per cent of the row total) show complete specialization towards apple cultivation and the rest of 6 sample respondents (27.3 per cent of the row total) show low diversification. And among the sample respondents who have studied PG or above, the highest share of 22 sample respondents (68.7 per cent of the row total) show complete specialization towards apple cultivation, a share of eight sample respondents (25.0 per cent of the row total) show moderate diversification, and the rest of two sample respondents (6.3 per cent of the row total) show low diversification.

The Chi-Square test is used for finding out the association between the attribute (education) and the level of crop

diversification. The result reveals that the calculated Chi-Square value (49.373) at 12 degrees of freedom is significant at 0.01 levels. Hence the null hypothesis is rejected, and the alternative hypothesis is accepted. Therefore, it can be concluded that there is an association between the attribute (education) and the level of crop diversification.

Hence from the above discussion, we come to the conclusion that all the three independent variables (gender, family type, and education) are significantly associated with the level of crop diversification, which can be seen by the high values of Chi-Square. Mostly, the sample respondents have gone for specializing their lands towards the apple cultivation, and the rest are also seen in the same mode to move towards apple cultivation. Now taking the view back on the regression table, the positive value of the regression coefficients for the three variables (1.529\*\*\*for gender, 0.363\* for family type, and 0.434\*\* for education) shows the positive direction of their association with the rate of crop diversification.

### **Factual Highlights**

As per the classification of the farmers done by the government, marginal farmers form the highest share of 94.43 per cent (63,007) of the total 66,724 land size holdings in the district. The medium farmers form a share of 0.03 per cent (21), and interestingly there is not even a single large farmer in the district.

The area under maize cultivation has shown a decrease of 37.43 per cent over the last seven years, followed by the area under paddy cultivation, which decreased by 6.75 per cent over the same period. The area under fruits in the district has shown a considerable increase of 51.59 per cent over the last seven years, followed by the pulses, whose area of cultivation has also increased by 7.45 per cent, and the area under vegetable cultivation has increased by a meagre percentage of 1.19. The area under fresh fruits has shown an increase of 191.04 per cent over the last seven years, and the area under dry fruits has increased by 3,824.84 per cent. The production of fresh fruits has increased by 137.79 per cent over the last seven years, while

as the production of dry fruits has increased by 768.56 per cent. The productivity of fresh fruits has decreased from 10.04 metric tons/quintal in the year 2007-08 to 8.21 metric tons/quintal in the year 2013-14. Similarly, the productivity of dry fruits has also decreased from 17.91 metric tons/quintal in the year 2007-08 to 3.96 metric tons/quintal in the year 2013-14.

Age was found to have a negative influence (sign of the coefficient being negative and highly influencing) on the farmer's decision to allocate their land for the cultivation of apple. 66.7 per cent of the sample respondents from the age group of 21-40 have specialized their lands for apple cultivation, while as none of the respondents from the age group of above 60 have opted for specialization. The family size established a negative influence on the farmer's decision to diversify their lands towards apple cultivation. 43.6 per cent of the group of households having a family size below five have specialized their lands for apple cultivation, however, none of the respondents; having a family size above ten opted for specialization. The land size was found to have a negative influence (sign of the coefficient being negative and highly significant) on the decision of farmer to diversify their lands towards apple cultivation. As from the obtained results, 94.6 per cent out of the total households who have opted for specialization are having a land size below 9 Kanals. And interestingly, none of the households who are having land size more than 16 Kanals have opted for specialization.

## **Conclusion**

The major conclusions, which are being drafted here, are drawn from the above analysis done and the hypothesis tested. The study has revealed that the crop sector in the study area has been diversifying towards the apple cultivation at a very fast rate. Even the trend of complete specialization has been observed in the region. Younger generation is found to be following the trend by taking risks and preferring the cultivation of cash crops over the traditional food crops. The nuclear family system has also facilitated the respondents in the move. The small holdings did not seem to be a restraint in crop

diversification; they appeared to have an even higher inclination for the cultivation of apple crop. The regression results have also retained the same explanations.

The data obtained from the official sources have also shown the high rate of diversification of the land under food crops towards the horticultural crops. The whole district has been witnessing the trend of specialization rather than the diversification towards the apple cultivation. The paddy is seen to lose its market as the costs of cultivation are increasing tremendously, and the net returns have not increased in such manner. The snags present in the paddy market have also contributed a lot for the conversion of the paddy lands towards apple orchards. The lack of proper market for the paddy sale and the lack of governmental support has assisted the move of specialization to a greater extent. The climate also has been in favor of apple cultivation as the paddy can be cultivated only once in a year. The results have exhibited the income augmentation and employment generation through the cultivation of apple crop instead of paddy. The increasing demand of Kashmiri Apple on both the national as well as the international level has also influenced the minds of the people to a greater aspect. The government is also playing its role in the process by not showing any intrusion in the process of diversification.

Concerns have been expressed whether this practice would endure in the long-run, given the facts of little scope for the cultivation of food crops, as the landholdings are day by day getting smaller under population pressure. However, the conditions on the ground have made the farmers to replace their paddy land with apple as the average yield of rice in Kashmir is way below the optimum levels.

## References

Aggarwal, P. K. (2008). "Global Climate Change and Indian Agriculture: Impacts, Adaptation and Mitigation." *Indian Journal of Agricultural Sciences*, 78(11): 911.

- Bhatia, S. (1965). "Patterns of Crop Concentration and Diversification in India." *Economic Geography*, 41(1): 39-56.
- Bhatia, M. S. (1999). "Rural Infrastructure and Growth in Agriculture." *Economic and Political Weekly*, A43-A48.
- Chand, R. (1996). "Diversification through High Value Crops in Western Himalayan Region: Evidence from Himachal Pradesh." *Indian Journal of Agricultural Economics*, 51(4): 652.
- Chand, R. (2005). "Exploring Possibilities of Achieving Four Percent Growth Rate in Indian Agriculture." *National Centre for Agricultural Economics and Policy Research, (Indian Council of Agricultural Research), Pusa, New Delhi: Working Paper (NCAP-WP- 01/2005)*.
- De Ploey, J., Imeson, A., and Oldeman, L. R. (1991). "Soil Erosion, Soil Degradation and Climatic Change." In *Land Use Changes in Europe*, ed. F. M. Brouwer, A. J. Thomas, and M. J. Chadwick, Stockholm Environment Institute at York, 275-292. Springer Netherlands.
- Directorate of Economics and Statistics. (2014-15). "Economic Survey." Government of Jammu and Kashmir, Bemina Srinagar, Vol. I and II.
- Farmer, B. (1986). "Perspectives on the Green Revolution in South Asia." *Modern Asian Studies*, 20(1), 175-199.
- Hazra, C. R. (2001). "Crop Diversification in India." In *Crop Diversification in the Asia-Pacific Region*, ed. MK Papademetriou and FJ Dent, Food and Agricultural Organization Regional Office, 32-50. Bangkok, Thailand
- Joossens, L. (1996). "Diversification is the Future for Many Tobacco Farmers." *Tobacco Control*, 5(3): 177.
- Kadapatti, R. G., and Bagalkoti, S. T. (2014). "Small Farms and Agricultural Productivity-A Macro Analysis." *International Journal of Social Science Studies*, 2(3): 123-135.

- Kasem, S., & Thapa, G. B. (2011). "Crop Diversification in Thailand: Status, Determinants, and Effects on Income and Use of Inputs." *Land Use Policy*, 28(3), 618-628.
- Kumar, P., and Mittal, S. (2003). "Crop Diversification in India: Analysis by State and Farm Size Group." *Agricultural Situation in India*, 60: 273-280.
- Kumar, Piyush (2016). "Green Revolution: A War between Hunger and Self Sustainability." *Biotech Express*, 3(30): 22-24
- Kurosaki, T. (2003). "Specialization and Diversification in Agricultural Transformation: The Case of West Punjab, 1903-92." *American Journal of Agricultural Economics*, 85(2): 372-386.
- Mittal, S. (2006). "Structural Shift in Demand for Food: Projections for 2020." Indian Council for Research on International Economic Relations, New Delhi: Working Paper (184).
- Mittal, S. (2007). "Can Horticulture Be A Success Story For India?" *Indian Council for Research on International Economic Relations, New Delhi: Working Paper (197)*.
- Mruthyunjaya, and Kumar, P. (1989). "Crop Economics and Cropping Pattern Changes." *Economic and Political Weekly*, A159-A166.
- P. K. Joshi, Gulati, A., Pratap S. BIRTHAL, and Tewari, L. (2004). "Agriculture Diversification in South Asia: Patterns, Determinants and Policy Implications." *Economic and Political Weekly*, 39(24), 2457-2467.
- P. K. Joshi, Gulati, A., Pratap S. BIRTHAL, and Tewari, L. (2004). "Agriculture Diversification in South Asia: Patterns, Determinants and Policy Implications." *Economic and Political Weekly*, 39(24), 2457-2467.
- Pingali, P. L., and Rosegrant, M. W. (1995). "Agricultural Commercialization and Diversification: Processes and Policies." *Food Policy*, 20(3): 171-185.



- Pingali, P. L., Hossain, M., and Gerpacio, R. V. (1997). "Asian Rice Bowls: The Returning crisis." *International Rice Research Institute*, 52(4): 809.
- Postel, S. (1989). "Water for Agriculture: Facing the Limits." *Worldwatch Institute, Washington DC: Working Paper (93)*.
- Radhakrishna, R., and Ravi, C. (1990). "Food Demand Projections for India." *Centre for Economic and Social Studies, Hyderabad, mimeo*. (Background Monograph for World Bank's Country Report on India, 1990)
- Ranade, C. G. (1980). "Impact of Cropping Pattern on Agricultural Production." *Indian Journal of Agricultural Economics*, 35(2): 85.
- Rao, P. P., Birthal, P. S., & Joshi, P. K. (2006). "Diversification towards High Value Agriculture: Role of Urbanisation and Infrastructure." *Economic and Political Weekly*, 2747-2753.
- Reardon, T., Delgado, C., & Matlon, P. (1992). "Determinants and Effects of Income Diversification amongst Farm Households in Burkina Faso." *The Journal of Development Studies*, 28(2), 264-296.
- Reddy, D. N. (2009). "Agriculture in the Reforms Regime." In *Agrarian Crisis in India*, ed. Reddy, D. N., and Mishra, S, Oxford University Press, 81-94. New Delhi, India.
- Ryan, J. G., and Spencer, D. C. (2001). "Future Challenges and Opportunities for Agricultural RandD in the Semi-Arid Tropics." *International Crops Research Institute for the Semi-Arid Tropics, Patancheru*.
- Sengupta, Somini. (2008). "The Food Chain in Fertile India, Growth Outstrips Agriculture." *New York Times*.
- Sharma, H. R. (2005). "Agricultural Development and Crop Diversification in Himachal Pradesh: Understanding the Patterns, Processes, Determinants and Lessons." *Indian Journal of Agricultural Economics*, 60(1): 71-93.

- Singh, J., and Dhillon, S. S. (2005). "Agricultural Geography." Tata McGraw Hill Publishing Co. Ltd. New Delhi, pp.100-126.
- Von Braun, J. (1995). "Agricultural Commercialization: Impacts on Income and Nutrition and Implications for Policy." *Food policy*, 20(3): 187-202.
- Vyas, V. S. (1996). "Diversification in Agriculture: Concept, Rationale and Approaches." *Indian Journal of Agricultural Economics*, 51(4): 636.
- Wani, M. H., Baba, S. H., & Yousuf, S. (2009). "Land-use Dynamics in Jammu and Kashmir." *Agricultural Economics Research Review*, 22(347-2016-16733), 145.