

# Problems and Prospects of Diversification towards Vegetables in Haryana

Akshu

Research Scholar, Department of Economics, M.D. University Rohtak

## ABSTRACT

*Agriculture sector plays a very important role in the economy of the Haryana and predominantly it is an agriculture economy. The area under wheat and rice is continuously increasing in the state. The mono cropping of wheat and rice has led to serious problems such as exploitation of ground water, decline in the fertility of soil, due to excessive irrigation there is problem of water-logging and salinity; and the excessive use of subsidized fertilizers has degraded the food grains quality. So that there is a need to diversify the cropping pattern towards the alternative crops. The main objectives of this paper are to examine the status of vegetable production in the state and the problems faced by the farmers while growing vegetables. Both time series and cross-sectional data have been used in this research work. The study revealed that among majority of marginal size farmers transportation and unavailability of inputs were the important problems. Timely payment and crop risk were considered as important problems by small size farmers. Timely payment and marketing problems were reported as the important problems by majority of medium size farmers while crop risk and marketing problems were reported as the important problems by majority of large size farmers. Diversification from paddy to vegetable crops in the kharif season in Haryana requires a favorable price regime, technology for increasing the existing levels of productivity, financial support and infrastructure facilities.*

**Key words:** Agriculture, Diversification, Vegetables, Productivity, Infrastructure Facilities.

## INTRODUCTION

Indian agriculture has made remarkable progress in the last few decades especially after the introduction of Green Revolution and HYVS of rice and wheat, fertilizers, pesticides and expansion of irrigation facilities are responsible for the higher production and productivity of these crops in the country. The area under rice has increased from 35.28 million hectare in 1966-67 to 43.86 million hectare in 2014-15, i.e. showing 24.32 per cent increase over the time period. Similarly the area under wheat has increased from 12.84 million hectare in 1966-67 to 30.97 million hectare in 2014-15, showing 141.20 per cent increase over the period in the country (Roy 2016, Handbook of RBI).

Agriculture sector plays a very important role in the economy of the Haryana and predominantly it is an agriculture economy. The area under wheat and rice is continuously increasing in the state. The increase in area under wheat in the state is on the cost of decrease in area of other rabi crops such as barley, gram etc. while the increase in area under rice is on the cost of decrease in area of Jowar, bajra, maize etc. These clearly indicate that the cropping pattern in the state is skewed towards the wheat rice rotation. The mono cropping of wheat and rice has led to serious problems such as exploitation of ground water, decline in the fertility of soil, due to excessive irrigation there is problem of water-logging and salinity; and the excessive use of subsidized fertilizers has degraded the food grains quality. The production, productivity, and net profit of both the crops are almost stagnant since the last few years (Singh 2016).

Another important fact is that the taste preference and food habits of the people in the country are changing and the demand of vegetables, fruits, pulses, and milk etc. are increasing now days.

<b>Item Wise Share of Expenditure to Total Food Expenditure</b>				
	Rural		Urban	
	1987-88	2009-10	1987-88	2009-10
<b>Cereals</b>	41.1	29.1	26.6	22.4
<b>Pulses and products</b>	6.3	6.9	6.0	6.6
<b>Milk and products</b>	13.4	16.0	16.8	19.2
<b>Egg, fish and meat</b>	5.2	6.5	6.4	6.6
<b>Vegetables</b>	8.1	11.6	9.4	10.6
<b>Sugar</b>	4.5	4.5	4.3	3.7
<b>Food total</b>	100	100	100	100

Source: key indicators of household consumer expenditure in India 2009-10, National Sample Survey (NSS) 66<sup>th</sup> Round

The above table shows that the expenditure on cereals both in rural and urban area has decreased whereas, expenditure on vegetables, pulses, egg, and milk etc. has increased over the time period. From here, it is clear that the share of cereals in the consumption basket has gone down and the consumption basket is skewed towards fruits, vegetables, pulses, and milk etc. (Uma Kapila 2015-16).

In such circumstances, crop diversification is being required due to many reasons. First, to tackle the problems arising due to the mono cropping pattern of wheat and rice as explained earlier. Second, to achieve the socio economic goals, i.e. to generate more employment opportunities and to raise the income level of the farmers. Third, to adjust the domestic demand and supply of food items that is changing now days (Ramesh Chand

1999). Hence an attempt has been made in this research work to examine the status of vegetable production in the state and the problems faced by the farmers while growing vegetables.

## OBJECTIVES

Following objectives of the study have been framed to get fruitful results.

1. To examine the trends and growth pattern of vegetables over time across in the states and district Sonipat.
2. To identify major constraints faced by vegetable growers and suggest policy options to increase vegetable production and productivity in the state.

## REVIEW OF LITERATURE

**Mishra et al. (2014)** have examined the major vegetables in varanshi district of Uttar Pradesh. The study was based on micro level data. The researchers revealed that spot payment, correct weight, and proximity etc. were the important factors that influenced the farmers to sell their vegetables in a particular market. Due to these factors the farmers sell their produce in the un-organized market. The major constraint faced by the retail market was the competition given by the un-organized sector.

**Kumar and Gupta (2015)** highlighted the trends and patterns in crop diversification in their study “Crop Diversification towards High-value crops in India: A State level empirical Analysis”. The researchers observed that the area under high-value crops was increased during the study period. The study also revealed that the agricultural economy in India was diversifying from traditional food grains to high value crops but the diversification was not evenly distributed among the states.

**Rao, et al. (2006)** highlighted high value crops in their study Diversification towards High Value Agriculture. The researchers found that the high value agriculture was around 40 per cent of the total agricultural output during 1980-1998. Intensive high-value agriculture was practiced in the coastal and hilly areas, extensive agriculture was mostly in central and north western regions and moderate incidence of high value agriculture was in the north and eastern regions during the study period.

**Sharma and Jain (2011)** highlighted the high value crops in their study “High-Value Agriculture in India: Past Trends and Future Prospects”. The study revealed that there was a structural shift in the production and consumption pattern of peoples both in rural and urban areas from cereals to high-value agricultural commodities such as fruits and vegetables, milk and milk products, meat, eggs, fish and processed food products. The researchers suggested that the government should focus on investment in technological development, basic infrastructure, improve the technical capacity of producers etc. for high-value agricultural development

## RESEARCH METHODOLOGY

This study is based on time series and cross-sectional data. Time series data has been collected from **Department of horticulture, Haryana**. For cross-sectional data a multistage simple random sampling has been used. The sampling has been done at four stages i.e. District, Blocks, Villages and Farmers. At the first stage, Sonipat district has been selected by using purposive sampling as the district is the largest producer of vegetables in Haryana. At the second stage, two blocks Ganaur and Murthal has been selected again by using purposive sampling. As both the blocks are approached by NH-1, which is helpful for the farmers for their easy communication to Azadpur Mandi, New Delhi. At the third stage, four villages have been selected out of the selected blocks, two from each by using random sampling and at the last stage; farmers have been conferred for interview. A sample of 30 farmers has been selected randomly from a village and interviewed. In this way a total of 120 farmers have been interviewed for the study.

For the purpose of collection of data, a scheduled questionnaire was structured for the farmers. The questions cover the information about the cost and returns of paddy and vegetable crops and the constraints faced by the vegetable growers. All the questionnaires were filled by direct interview and personal visits to farmers.

In this study in order to examine the trend and pattern of growth of vegetable crops in Haryana and sampled district Sonipat simple statistical tool like ACGR, CV (coefficient of variation) and percentage has been used for the analysis of data.

### Analysis of growth rates:

The study examines the growth rates of area, production and productivity of vegetable crops in Haryana as well as in sampled district Sonipat because it helps to examine the tendency of vegetables to increase, decrease or remain stagnant over a period of time. The estimation of growth rate has been done with the help of common method of growth rate i.e., Annual Compound Growth Rate (ACGR). It also specifies the magnitude of the rate of change per unit of time in the variables under consideration. The Annual compound growth rate (ACGR) is estimated by employing the following formula: -

$$Y = ab^t$$

By using logarithm, it may be written as:

$$\text{Log } y = \text{log } a + t \text{ log } b$$

$$Y^* = a^* + t.b^* \text{ (where } \text{log } y = y^*, \text{ log } a = a^* \text{ and } \text{log } b = b^*)$$

The value of  $b^*$  is computed by using OLS Method. Further, the value of ACGR can be calculated by followed method:

$$\text{ACGR} = (\text{Antilog } b^* - 1) \times 100$$

**Instability Analysis:**

Instability is simply the deviation from mean and the researchers in their studies have used the coefficient of variation (CV %) as a tool for estimating the instability. In present study instability of area, production and productivity have been estimated by using coefficient of variation (CV). The CV for these parameters has been calculated by using the following formula:

$$CV (\%) = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

**RESULT AND DISCUSSION**

Firstly, trend and growth pattern of area, production and productivity of vegetables in Haryana and sampled district Sonipat has been analyzed. Further, profitability of vegetable crops as compare to competing crop paddy and major constraints faced by the vegetable growers in Sonipat district of Haryana has been examined.

**Area, Production and Productivity of Vegetables in Haryana:**

Table 2 shows that the area, production and productivity of vegetable crops in Haryana for the period 2004-05 to 2014-15 which indicates that the area and production of vegetable has increased significantly, area from 207750 hectares in 2004-05 to 359395 hectares in 2014-15 with 5.63 per cent annual growth rate while the production has increased from 2980400 tonnes in 2004-05 to 5285590 tonnes in 2014-15 as the growth rate was recorded 5.90 per cent per annum.

**Table 2****Trends in Area, Production and Productivity of Vegetables in Haryana**

Year	Area*	Production**	Productivity***
2004-05	207750	2980400	14346
2005-06	232660	2984800	12829
2006-07	280870	3366860	11987
2007-08	274580	3277100	11935
2008-09	298430	3893430	13046
2009-10	300860	4020720	13364
2010-11	346400	4428900	12786
2011-12	356769	5068426	14206
2012-13	360339	5011311	13907

<b>2013-14</b>	373170	5565900	14915
<b>2014-15</b>	359395	5285590	14707
<b>ACGR</b>	5.63	5.90	0.25
<b>SD</b>	55858.4	955823.79	1036.42
<b>Mean</b>	308293	4171221.55	13457.09
<b>CV (%)</b>	18.12	22.91	7.70

*Calculations based on Horticulture Department, Haryana  
\*in hectares, \*\* in tonnes and \*\*\* in kgs. /hectare*

The area under vegetables has increased continuously but has shown a decreasing trend from 2013-14 to 2014-15 same as in case of production of vegetables. The productivity of vegetables in Haryana has increased marginally from 14346 to 14707 kgs. per hectare during the time period with 0.25 per cent growth rate annually. The average area under vegetables for the period 2004-05 to 2014-15 is 308293 hectares and the average production has been estimated 4171221.55 for the same time period.

The coefficient of variation was found 22.91 per cent in the production of vegetables.

#### **Area, Production and Productivity of Vegetable crops in Sonipat:**

Table 3 explained the area, production and productivity of vegetable crops in Sonipat district of Haryana for the period 2004-05 to 2014-15 which shows that the area and production of vegetable has increased significantly from 22754 hectares and 346106 tonnes in 2004-05 to 38901 hectares and 582222 tonnes in 2014-15 with 5.51 and 5.34 per cent annual growth rate respectively.

**Table 3**

#### **Trends in Area, Production and Productivity of Vegetables in Sonipat**

<b>Year</b>	<b>Area*</b>	<b>Production**</b>	<b>Productivity***</b>
<b>2004-05</b>	22754	346106	15211
<b>2005-06</b>	24770	277360	11197
<b>2006-07</b>	26543	359202	13533
<b>2007-08</b>	26691	313512	11746
<b>2008-09</b>	26800	369949	13804
<b>2009-10</b>	28295	369344	13053
<b>2010-11</b>	33132	441044	13312
<b>2011-12</b>	33426	528946	15824
<b>2012-13</b>	34910	507941	14550
<b>2013-14</b>	35865	550515	15350
<b>2014-15</b>	38901	582222	14967

<b>ACGR</b>	5.51	5.34	-0.16
<b>SD</b>	5242.04	104521.50	1490.83
<b>Mean</b>	30189.7	422376.45	13867.90
<b>CV (%)</b>	17.36	24.75	10.75

*Calculations based on Horticulture Department, Haryana  
\*in hectares, \*\* in tonnes and \*\*\* in kgs. /hectare*

The productivity of vegetables in Sonipat has decreased marginally from 15211 to 14967 kgs. per hectare during the time period with -0.16 per cent growth rate annually as it was highest during 2011-12 i.e. 15824 kgs. /hectare.

The coefficient of variation was found 24.75 per cent in the production of vegetables which is highest as compared to that of Haryana.

### **Profitability of vegetable crops with competing crop paddy:**

The results of the collected data about the costs and returns of vegetables and competing crop paddy during the kharif season have been presented in table 4. The major competing vegetable crops of paddy in the study area were ladyfinger, bottle gourd, carrot, cucumber and tomato. The cropping pattern followed by the sampled farmers under different size group of holdings was more or less same. There was a little bit deviation among the sampled farmers.

The average yield of paddy was 20.09 qtls per acre at the aggregate level and the farmers reaped an average price of Rs. 1817.3 per qtl for the year 2015-16. The sampled farmers earned a total of Rs. 15191.56 per acre over cost from the cultivation of paddy during the year.

**Table 4**  
**Comparative Profitability of Paddy and Vegetables, Sampled Households in 2015-16**

Name of the Crop	Average Yield(qtl/acre)	Average Price(Rs./qtl)	Gross Returns	Total Cost	Returns over cost
Paddy	20.09	1817.3	36509.56	21318	15191.56
Ladyfinger	248.25	1018.5	252842.63	111515	141327.63
Bottle gourd	244	715	174460	58960	115500
Carrot	117	847	99099	39697.5	59401.5
Cucumber	175	615	107866.38	46342.5	61523.88
Tomato	344.25	806	277465.5	72952.5	204513

*Source: Calculations based on primary survey*

It has been seen clearly from the above table that per acre cost of vegetable cultivation for all sampled farmers was much higher in comparison to that of paddy but the returns over cost from the vegetables was also higher

than that of paddy. Despite being the higher profitability of vegetable crops in comparison to paddy, the farmers are not diversifying their cropping pattern as the vegetables are perishable in nature and more risky than paddy.

### Constraints faced by vegetable growers:

The problems faced by the growers of vegetables in the kharif season competing with paddy crop are financial problems, production problems, crop risk, marketing problems, transportation problems, unavailability of inputs, proper knowledge, family requirement, timely payments and others have been analyzed and presented in tables 5 to table 8.

**Table 5**  
**Main Problems faced by Marginal Farmers during Production of Vegetables in 2015-16**  
**(Per cent multiple response)**

Sr. no	Particulars	Rank 10	Rank 9	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Financial problems	16	12	0	0	72	0	0	0	0	0
2	Production problems	0	0	0	84	16	0	0	0	0	0
3	Crop risk	0	4	68	16	12	0	0	0	0	0
4	Marketing problems	0	0	0	0	0	0	0	0	4	96
5	Transportation problems	64	12	24	0	0	0	0	0	0	0
6	Unavailability of inputs	20	72	8	0	0	0	0	0	0	0
7	Proper knowledge	0	0	0	0	0	4	0	12	84	0
8	Family requirements	0	0	0	0	0	0	0	84	12	4
9	Timely payments	0	0	0	0	0	88	12	0	0	0
10	Other problems	0	0	0	0	0	12	88	0	0	0

*Note: Ranks are in order of importance from 10 (most important) to 1 (least important)*

*Source: Calculations based on primary survey*

Table 5 explains the different problems faced by the marginal category farmers. During the survey it has been observed that there are many problems expressed by farmers regarding vegetable production. A rank method has been used to explain the farmers' response according to their experience with the above said problems. Ranks 10 to 1 stand for higher to lower among different problems. The percentage of sampled farmers is here as:

The table shows that 72 per cent of sampled marginal farmers gave rank 6 to the financial problem as it is normal among majority of farmers but ranks 10 and 9 have been given by 16 per cent and 12 per cent of sampled farmers respectively as the problem for them is most important. On the other hand, productivity problem is on the higher side as compared to the financial problem as 84 per cent farmers gave it rank 7 and the remaining 16 per cent ranked it 6.

Further, crop risk is the another important problem as 68 per cent of sampled farmers gave it rank 8 while 16 per cent gave it rank 7, 12 per cent gave rank 6 and the remaining 4 per cent rank 9 as the second most important problem. Marketing problem is the least important problem among marginal farmers as 96 per cent farmers gave it rank 1 while transportation and unavailability of resources are the important problems as rank 10 and 9 has been given to these problems by 64 and 72 per cent farmers respectively.

Furthermore, proper knowledge and family requirement are considered as less significant problems by majority of farmers as 84 per cent farmers gave rank 2 and rank 3 to these problems respectively. Timely payment and other problems are also not very significant as 88 per cent of farmers ranked them 5 and 4 respectively.

It may be concluded from the above analysis that transportation and unavailability of resources are the most important problems while marketing problems, proper knowledge and family requirements are considered as less significant problems by the sampled farmers.

**Table 6**  
**Main Problems faced by Small Farmers during Production of Vegetables in 2015-16**  
**(Per cent multiple response)**

Sr. no	Particulars	Rank 10	Rank 9	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Financial problems	8	8	4	0	4	68	8	0	0	0
2	Production problems	0	0	4	80	12	4	0	0	0	0
3	Crop risk	8	80	12	0	0	0	0	0	0	0
4	Marketing problems	0	0	68	20	12	0	0	0	0	0
5	Transportation problems	0	0	0	0	68	32	0	0	0	0
6	Unavailability of resources	0	4	4	0	4	0	88	0	0	0
7	Lack of information and knowledge	0	0	0	0	0	0	0	8	92	0
8	Family requirements	0	0	0	0	0	0	0	88	4	8
9	Timely payments	84	8	8	0	0	0	0	0	0	0

10	Other problems	0	0	0	0	0	0	0	4	4	92
----	----------------	---	---	---	---	---	---	---	---	---	----

*Note: Ranks are in order of importance from 10 (most important) to 1 (least important)*

*Source: Calculations based on primary survey*

Table 6 explained the problems faced by small category farmers in the production of vegetables. Financial problems have been found moderate among small size farmers as rank 5 has been given to this problem by 68 per cent farmers. On the other hand, rank 7 has been given to the productivity problems by 80 per cent small size farmers. Crop risk is considered as one of the most significant problem as rank 9 has been given by 80 per cent farmers, rank 8 by 12 per cent farmers and the remaining 8 per cent farmers gave rank 8 to the problem.

Further, the table shows that 68 per cent farmers gave rank 8 to the marketing problems. Transportation problem has been found normal among small farmers as 68 per cent farmers gave rank 6 and the remaining 32 per cent rank 5 to the problem i.e. almost in mid of ranks. Unavailability of resources, proper knowledge and family requirement are the less significant problems among small farmers as majority of farmers gave rank 4, 2 and 3 to these problems respectively. Timely payment is considered as the most significant problem as 84 per cent of small farmers gave rank 10, 8 per cent gave rank 9 and the remaining 8 per cent gave rank 8 to the problem while other problems are considered as least important by majority of small size farmers as 92 per cent farmers gave rank 10 to this problems.

**Table 7**  
**Main Problems faced by Medium Farmers during Production of Vegetables in 2015-16**  
**(Per cent multiple response)**

Sr. no	Particulars	Rank 10	Rank 9	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Financial problems	0	0	8	4	8	76	4	0	0	0
2	Production problems	0	0	4	0	84	12	0	0	0	0
3	Crop risk	0	0	72	12	8	0	4	0	0	4
4	Marketing problems	12	84	4	0	0	0	0	0	0	0
5	Transportation problems	0	0	0	0	0	0	88	12	0	0
6	Unavailability of resources	0	0	0	0	0	0	0	84	12	4
7	Proper knowledge	0	0	4	4	0	4	4	0	84	0
8	Family requirements	0	4	8	80	0	8	0	0	0	0
9	Timely payments	88	12	0	0	0	0	0	0	0	0

10	Other problems	0	0	0	0	0	0	0	4	0	96
----	----------------	---	---	---	---	---	---	---	---	---	----

*Note: Ranks are in order of importance from 10 (most important) to 1 (least important)*

*Source: Calculations based on primary survey*

Table 7 highlighted the problems faced by medium size farmers. The table explained that the financial problems remains natural among maximum sampled farmers as 76 per cent farmers ranked this problem as 5 i.e., almost in mid of ranks whereas productivity problem is marginally higher as majority of farmers (84 per cent) ranked it 6. Crop risk is another major problem among medium sized farmers as 72 per cent farmers ranked it 8. Marketing problem is the second most important problem for the farmers as 84 per cent of the farmers ranked it 9 while 12 per cent ranked it as the most important problem and the remaining 4 per cent farmers gave this problem rank 8.

Further, the table indicates that transportation problems, unavailability of resources and proper knowledge are on the lower side of the rating scale as majority of medium size farmers gave rank 4 (88 per cent), 3 (84 per cent) and 2 (84 per cent) for transportation problems, unavailability of resources and proper knowledge respectively. Problem regarding family requirement has been ranked 7 by 80 per cent of medium category farmers. Finally, in case of timely payment the table shows that 88 per cent farmers gave rank 10 to this problem, as it shows that this is the most important problem among medium size farmers as compared to others.

**Table 8**  
**Main Problems faced by Large Farmers during Production of Vegetables in 2015-16**  
**(Per cent multiple response)**

Sr. no	Particulars	Rank 10	Rank 9	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Financial problems	0	0	0	0	0	0	88	12	0	0
2	Productivity problems	4	0	76	0	12	8	0	0	0	0
3	Crop risk	12	76	0	0	0	0	0	12	0	0
4	Marketing problems	84	12	4	0	0	0	0	0	0	0
5	Transportation problems	0	0	0	0	0	0	0	0	84	16
6	Unavailability of resources	0	0	0	0	0	0	0	0	16	84
7	Proper knowledge	0	12	8	4	76	0	0	0	0	0
8	Family requirements	0	0	0	88	12	0	0	0	0	0
9	Timely payments	0	0	0	0	0	92	8	0	0	0

10	Other problems	0	0	12	8	0	0	4	76	0	0
----	----------------	---	---	----	---	---	---	---	----	---	---

*Note: Ranks are in order of importance from 10 (most important) to 1 (least important)*

*Source: Calculations based on primary survey*

Table 8 highlighted the problems faced by large size farmers in the production of vegetables. The table explained that the financial problems are not very significant among maximum of large size farmers as 88 per cent farmers ranked this problem 4 i.e. on the lower side of the ranking scale and remaining 12 per cent ranked it 3 which is further lower. Productivity problems, crop risk and marketing problems are found significant among maximum sampled farmers as 76 per cent farmers ranked 8 to productivity problems, 76 per cent ranked 9 to crop risk and 84 per cent farmers ranked 10 to marketing problems.

Further, transportation problems and unavailability of resources are the least important problems among large category farmers as 84 per cent farmers ranked these problems 2 and 1 respectively. Proper knowledge, family requirement and timely payments are the moderate problems faced by majority of farmers as 76 per cent farmers gave rank 6 to proper knowledge, 88 per cent farmers gave rank 7 to family requirements and 92 per cent farmers ranked 5 to timely payments.

Furthermore, it has been observed during the survey that other problems are not very significant among majority of large category farmers as 76 per cent farmers ranked 3 to other problems.

## CONCLUSION

Result of this study has shown that the area and production of vegetable crops has increased in the state and in the sampled district as well while the productivity of the crops has decreased marginally in Sonipat. Further, there are several problems faced by the vegetable growers in the sampled district. Among majority of marginal size farmers transportation and unavailability of inputs were the important problems. Timely payment and crop risk were considered as important problems by small size farmers. Timely payment and marketing problems were reported as the important problems by majority of medium size farmers while crop risk and marketing problems were reported as the important problems by majority of large size farmers.

Diversification from paddy to vegetable crops in the kharif season in Haryana requires a favorable price regime, technology for increasing the existing levels of productivity, financial support, infrastructure facilities in rural area and above all, a multi-pronged government support. Without firm policy reforms in favour of vegetable crops, diversification will remain an elusive goal in Haryana and will continue as an issue which will be debated in different form without any concrete outcome.

## REFERENCES

- **Reserve Bank of India (2015-16)**, *Handbook of Statistics on Indian Economy*, Mumbai.
- **Roy, R. (2016)**, “Possibilities and Constraints in Adoption of Alternative Crops to Paddy in Green Revolution belt of North India (Western U.P)”, *Agricultural Situation in India*, Vol. LXXIII, No. 2, PP. 35-40.
- **Singh, N. (2016)**, “Agricultural Diversification and Contract farming in Punjab”, *Agricultural Situation in India*, Vol. LXXII, No. 10, PP. 19-31.
- **Akshu et al. (2017)**, “Benefit cost ratios of organic and inorganic wheat production in Haryana: A case study of Rohtak district”, *International Journal of Multidisciplinary Research and Development*, Vol. 4, Issue 5, PP.316-318.
- **Kapila, U. (2015-16)**, “*Indian Economy: Performance and Policies*”, Academic Foundation, New Delhi-110002.
- **Chand, R. (1999)**, “*Agricultural Diversification in India*”, Mittal Publications, New Delhi-110059.
- **Government of Haryana**, Department of Horticulture, Various Issues
- **Akshu and Sharma, L. (2017)**, “Production of foodgrains in Haryana: A District wise analysis”, *International Journal of Academic Research and Development*, Vol.2, Issue 3, PP. 182-187.
- **Kumar, S. and Gupta, S. (2015)**, “Crop Diversification towards High-value crops in India: A State level empirical Analysis”, *Agricultural Economics Research Review*, Vol. 28, No. 2, PP. 339-350.
- **Rao, P.P. and Birthal, P.S., P.K. Joshi (2006)**, “Diversification towards High Value Agriculture: Role of Urbanisation and Infrastructure”, *Economic and Political Weekly*, Vol. 41, No. 26, PP. 2747-2753.
- **Sharma, V.P. and Jain, D. (2011)**, “High-Value Agriculture in India: Past Trends and Future Prospects”, W. P. No. 2011-07-02, Indian Institute of Management, Ahmedabad. PP. 1-52.
- **Mishra, S., Singh, R. and O. P. Singh (2014)**, “Economic analysis of marketing of major vegetables in varanasi district of Uttar Pradesh, India”, *Economic Affairs*, Vol. 59, No. 4, PP. 649-652.
- **Kumar, S. and Akshu (2017)**, “Growth and Pattern of Fertilizer Consumption in Haryana”, *International Journal of Research in Economics and Social Sciences*, Vol. 7, Issue 4, PP.138-148.