Seasonal Income Determinants of Vegetable Crops Grown by Farmers in Baharaich District of Up

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Abstract

The present paper want to analyse the factors responsible for determination of seasonal like Kharif, Rabi, and Zaid and total income levels of sample farmers in Bahraich, where the low level of vegetable crops area under cultivation in this state. More specifically, in this paper we want to examine the various inputs like expenditure on seeds, irrigation, fertilisers, pesticides, labour and transport cost influencing the determinants of Kharif, Rabi and Zaid seasons and total income of sample farmers in Bahraich. To achieve the objectives of this paper primary data has collected through multiple random sampling in this district. The results indicate that during Kharif seasonfarmers income highly influenced by two factors significantly, whereas duringRabi season farmers income influenced by only one factor and during zaid season farmers income influenced by three factors and total income influenced by two factors significantly.

Introduction

Income from vegetable crops is one of the most important source for farmers. In Uttar Pradesh all the three seasons like Kharif, Rabi and Zaid farmers used to grow vegetables. In this context, how much they are earning incomes from the agriculture is one of the debatable issue in this state. Apart from this how much income earned through vegetable cultivation is also an important issue. As we all know income is the most important source for livelihood. Every year, to attain the good level of living the agriculture farmers used to grow various cereal crops and vegetable crops etc. In general, we study the income levels of the farmers to relate the poverty and employment conditions. Though, the income variations are very high from one season to another season, from one crop to another crop and one place to another place. However, in Bahraich, per farmer total average income shows that Rs.79,901 from vegetable crops. Out of which the kharif season average income is high Rs. 38,850 as compared to Rabi season average income per farmer is Rs. 33,624 and zaid season average income is very low Rs. 12,732 as compared to kharif and rabi. In general during rabi season vegetable crops income is more as compared to kharif and zaid seasons, but in Bahraich district kharif season average income is higher than both rabi and zaid seasons vegetable crop incomes of the farmers.

The literature reveals that, smallholders dominate both Indian agriculture and vegetable production. Across all production sectors, more than 80% of farms are < 2 ha, and on average, 0.6 ha. Income from staple crops is inadequate, so farmers supplement with off-farm and non-

farm income, and increasingly grow high-value crops such as vegetables. The growth in horticulture is driven by consumer demand and the need for farmers to enhance incomes through high-value crops. In India between 1983 and 1999/00, per capita availability of vegetables has doubled, while cereal consumption has declined by 10% (Birthal andJoshi, 2007) 1.Tewari et al (1974)2" conducted a study on income and investment behavior of vegetable and cereal growing farms in mid-hills of Himachal Pradesh. They observed that the gross income of cereal growing farms were less than half of the vegetable growing farms, but the expenditure on various inputs was found to be higher on vegetable growing farms and the expenditure on fertilizers contributed more than 40 per cent of the total variable cost. The analysis suggests that vegetable growing farms could increase their income by improving the quality of land by adopting land development measures and increase the irrigation resources. Garg and Prasad (I974)3" observed higher net returns per hectare from vegetable farming than food-grains in a study on comparative profitability of various vegetable crops around Kanpur city. The per hectare investment on tomato was found to be 3.64 per cent lower than wheat, but the net income from tomato was 1.5 times more than wheat. Rathoreet. al. (1974)4" analyzed the profitability and resource allocation in the cultivation of vegetable crops in temperate region of Himachal Pradesh. They estimated the total cost of cultivation for tomatoes to be Rs. 7,736 per hectare. Of this, family labour and manures and fertilizers accounted for 48.21 and 7.99 per cent of the total cost of cultivation respectively. The naturally flowing streams were used by the vegetable growers for irrigation and, therefore, do not pay any irrigation charges. Singh (1990)5 by the application of linear production function observed that amongst the important input variables like seed, manure and fertilizers, human labour, plant protection and marketing costs, only plant protection and marketing cost were found as significant input variables in tomato crop. The coefficient of human labour was also a significant factor having a positive effect on the returns of pea crop on small farms.

Major **Objectives** of this Paper are:

- To measure the seasonal and total Income levels of vegetable growers in Bahraich; and
- To see the cause and effect relationship between the factors influencing the Incomes of kharif, rabi and zaid seasons vegetable growers income in Bahraich.

Data and Methodology: In this paper we have collected primary data. It has collected about the selected district in this North Eastern Plain ACZ, about determinants' of Income levels of Kharif, Rabi and Zaid and Total seasons. A multi-stage stratified random sample design adopted in this study. The area under vegetable cultivation will be taken as the first stage of sample. Secondly, proportionately, one district has been chosen in this ACZ of the state. And finally, from this district three blocks were selected on the basis of high, medium and low area under vegetable cultivation. From each block one village was selected and totally in this district 36 households were randomly selected to collect the data. For the Primary Data a detailed

questionnaire is being canvassed while covering all the aspects as mentioned above. Attempt is being made to collect information about the net income earned after all the expenditure. On the basis of primary data we have calculated average expenditure on seeds, irrigation, fertilisers, pesticides, labour and transportper acre. There are following components in production cost: For example, Expenses on seeds, Preparation of field, Irrigation, Manure and Fertilizers, Pesticides, Expenses on hired labourers including family labour, other expenses (Breakfast, Pan Masala, Bidi, etc) and also including transportation cost from sowing of seed to completion of crop. We have computed percentages, growth rates wherever it is necessary. After that we have computed, average total value of production - total average production cost, then we have got total average net income per farmer.

Regression on Income :

Income is the most important factor to measure the outcome of the vegetable farmers.   Net income will depend on Total production cost – total value of Production. Total production cost consists of input costs (seeds, irrigation, fertiliser, pesticides, transportation, storage, packing and losses in packing, expenditure on labour). The main Independent factors in this study are Expenditure on seeds, expenditure on irrigation, expenditure on fertiliser, expenditure on pesticides, expenditure on transportation, expenditure on labour, storage expenses are negligible because maximum farmers are marginal and small, they may not store that much of surplus goods; and Dependent variable is Net Income.

Expenditure on seeds: There are two types of seeds available in the market. The first one is traditional seed and the second one is Hybrid or High yielding seeds. Overall each farmer how much he has spent on seeds taken into consideration. The average expenditure on seeds during kharif season each farmer spendsRs. 4630, rabi season Rs.6424,zaid season only Rs.1226 and on an average the total expenditure on seeds is Rs.11769 for all seasons average per farmer in this district. It clearly shows that during rabi season each farmer used to spend more money on seeds as compared to kharif and zaid seasons.

Expenditure on irrigation: Second most important factor for determination of yield is expenditure on irrigation per acre. Irrigation is a must for vegetable crops. Borewell, ponds, and other sources are the major sources of irrigation in Uttar Pradesh. To run the borewell, electricity is a must. The charges on electricity are considered as irrigation charges. The irrigation charge varies from crop to crop. The total expenditure on irrigation has considered in this analysis during that time.The average expenditure on irrigationduring kharif season each farmer spends Rs. 8883, rabi season Rs.3777, zaid season only Rs.2780 and on an average the total expenditure on irrigation is Rs.14282 for all seasons average per farmer in this district. It clearly shows that during kharif season each farmer used to spend more money on irrigation as compared to rabi and zaid seasons.

Expenditure on fertiliser: The third most important factor is expenditure on fertilizer which is also most important to achieve good yield. There are different types of fertilizers available for

growth of vegetables and they can be used in different quantities at different prices. The total expenditure on fertilizer has considered in this analysis during that time.The average expenditure on fertilisersduring kharif season each farmer spends Rs. 7691, rabi season Rs.4641, zaid season only Rs.2516 and on an average the total expenditure on fertilisers is Rs.13800 for all seasons average per farmer in this district. It clearly shows that during kharif season each farmer used to spend more money on fertilisers as compared to rabi and zaid seasons.

Expenditure on pesticides: Fourthly, expenditure on pesticides is also most important to reduce the plant diseases throughout the crop period. There are different types of pesticides available for removal of plant diseases and they can be used in different quantities at different prices. The total expenditure on pesticides has considered in this analysis during that time. The average expenditure on seeds during kharif season each farmer spends Rs. 4955, rabi season Rs.3761, zaid season only Rs.2167 and on an average the total expenditure on pesticides is Rs.9980 for all seasons average per farmer in this district. It clearly shows that during kharif season each farmer used to spend more money on pesticides as compared to rabi and zaid seasons..

Expenditure on transportation: Fifthly, expenditure on transportation is also one of the major part of the expenditure. The expenditure differ between mode of transport i.e. bullock cart, auto, four wheeler and others. The total expenditure on Transportation has considered in this analysis during that time. The average expenditure on transportation during kharif season each farmer spends Rs. 2891, rabi season Rs.2038, zaid season only Rs.1170 and on an average the total expenditure on transportation is Rs.5611 for all seasons average per farmer in this district. It clearly shows that during kharif season each farmer used to spend more money on transportation as compared to rabi and zaid seasons.

Expenditure on labour: Every farmer has to spend reasonable amount on labour charges. All types of operations, how much each farmer has spent on labour have taken into consideration. This study is exclusively meant for marginal and small farmers. In view of this expenditure on labour is most important during that time. This is one of the major parts of expenditure to each and every farmer. The average expenditure on labour during kharif season each farmer spends Rs. 10020, rabi season Rs.6486, zaid season only Rs.2329 and on an average the total expenditure on labour is Rs.17865 for all seasons average per farmer in this district. It clearly shows that during kharif season each farmer used to spend more money on labour as compared to rabi and zaid seasons.

Net Income: Net income will depend on Total production cost – total value of Production of each farmer has considered. The average total income during kharif season is higher than rabi and zaid seasons as mentioned above.

Kharif Season Farmers Income

Equation: $Y = \beta_0 + \beta_1 X1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X6 + E$

Equation: Y (Net Income) = - 3158 – 5.7316X_1–3.1745X_2 + 12.2949X_3–1.8148X_4+0.137536X5 +3.39006X6

Multiple Regression Results:

Mult. R	R^2	Adj.R^2	Stan. Err.	Df	SS Regre.	SS Resi.	Signi. F
0.677683	0.4592	0.3474	30682	6,29	231870341	273013443	0.004

Variables	Co-efficients	P-value
Expenditure on Seeds	-5.7316	0.1962
Expenditure on Irrigation	-3.1745	0.06986***
Expenditure on Fertilizers	12.2949	0.019495**
Expenditure on Pesticides	-1.8148	0.6842
Expenditure on Labour	0.137536	0.7010
Transportation Cost	3.39006	0.6029

Summary information

The multiple correlation coefficient is 0.677683. It indicates that the correlation among the independent and dependent variables is highly positive. This statistic, which ranges from -1 to +1, only shows the relationship between dependent and independent variables but not indicate statistical significance. The coefficient of determination, r^2 is 45.92% only. This means that close to 46% of the variation in the depended variable (net Income) is explained by the independent variables. The adjusted r^2, a measure of explanatory power, is 0.3474. This statistic is not generally interpreted because it is neither percentage (like r^2) nor the test of significance (Such as the f statistic). The standard error of regression is 30682 which is an estimate of the variation of the observed income about the regression line.

Analysis of variance

The analysis of variance information provides the breakdown of the total variation of the dependent variable (net income of marginal farmers) into the explained and unexplained portions. The SS regression (231870341) is the variation explained by the regression line, and SS residual (273013443) is the variation of the dependent variable that is not explained. The f statistic is calculated using the ratio of the mean square regression (MS regression) to the mean square residual (MS residual). This statistic can then be compared with the critical f value for 6and 29 degrees of freedom (available from f table) to test the null hypothesis: H_o: B1=B2=B3=B4=B5=B6 vs H_a: at least one (B1) not equal to zero. Hence the significance value associated with the calculated f statistic is probability beyond the calculated value. Comparing this value with 5% and 10%, for example, indicates rejection of the null hypothesis.

The estimated regression line

The results of the estimated regression line include the estimated coefficients, the standard error of the coefficients, the calculated t-statistic, the corresponding p-value, and the bounds of both the 95% and the 90% confidence intervals. The independent variables are statistically significant in explaining the variation in the kharif season net income levels are the expenditure on irrigation, expenditure on fertilizers and expenditure on Labour has indicated by (calculated t statistic) that exceed the critical values, and (2) the calculated p values that are less than the significance level of 5% and 10% respectively. The relationship between expenditure on irrigation and net income levels is negative: The coefficient of -3.1745 indicates, on average, an additional unit of irrigation expenditure increases the income levels decline by3.17459. The coefficient of fertiliser is positive and it effects the income levels significantly at 5% level. The coefficient of 12.2949 indicates, on average, an additional unit of fertiliser expenditure increases the income levels also increase by 12.2949.

Significance Level:

In regression analysis, we see that the factors of net income influencing on it around 46 per cent, the most affected factors are expenditure on irrigation per acre (0.069) andexpenditure on fertilisers per acre (0.01945). These two variables are at 10%and 5% level of significance. Which means one unit of any of these two variables changes (positive or negative), the income levels will also changes (positively or negatively) at the same rate or more.

Rabi season Farmers Income

Equation: Y (Net Income) $= - 6182 + 1.6956X_1 - 0.36513X_2 + 2.9857X_3 - 1.0861X_4 + 1.3018X_5 + 5.923797X_6$

Multiple Regression Results:

Mult. R	R^2	Adj. R^2	S. Err.	D.f	SS Reg.	SS Res.	Sig. F
0.8342	0.6960	0.6331	21784	6,29	315102729	137618671	0.00

Variables	Co-efficients	P-value
Expenditure on Seeds	1.6956	0.0379**
Expenditure on Irrigation	-0.36513	0.8662
Expenditure on Fertilizers	2.9857	0.3460
Expenditure on Pesticides	- 1.0861	0.3319
Expenditure on Labour	1.3018	0.5214
Transportation Cost	5.92380	0.1466

Summary information

The multiple correlation coefficient is 0.8342 this indicates that the correlation among the independent and dependent variables is positive. The coefficient of determination, r^2 is 69.60%. This means that close to 70% of the variation in the dependent variable (small farmers income) is explained by the independent variables. The adjusted r^2, a measure of explanatory power, is 0.6331. The standard error of regression is 21784.

Analysis of variance

The SS regression is 315102729, and SS residual is 137618671. The f statistic can then be compared with the critical f value for 6, and29 degrees of freedom where the null hypothesis: H_o: B1=B2=B3=B4=B5 vs H_a: at least one B1 not equal to zero. The significance of calculated f statistic is probability beyond the calculated value in case of seeds expenditure. Comparing this value 5%, for example, indicates rejection of the null hypothesis.

The estimated regression line

The independent variable statistically significant in explaining the variation in the Rabi farmers' income is the expenditure on seeds only has indicated the calculated p values that are less than the significance level of 5% respectively. The relationship between expenditure on seeds and rabi season farmers' income level is positive: The larger theseeds expenditure, the higher the rabi season farmers' income levels. The coefficient of 1.6956 indicates, on average, an additional seeds expenditure increases the rabi farmers' income levels by 1.69561.

Significance Level

In regression analysis, we see that the factors of Rabi farmers net income influencing on it around 70 per cent, the most affected factor is expenditure on seeds per acre (0.0379). This variable is at 5% level of significance. Which means one unit of expenditure on seeds variable changes, the income levels will also changes at the same rate or more.

Zaid season Farmers Income

Equation: Y (Net Income) = 1763 + 1.7233X_1+ 1.9358X_2– 1.05294X_3+ 0.47576X_4- 2.2543X_5 + 8.8398X_6

Multiple Regression Results:

Mult. R	R^2	Adj. R^2	S. Err.	D.f	SS Reg.	SS Res.	Sig. F
0.9439	0.8909	0.8441	2089	6,14	49888208	61103122	0.00

Variables	Co-efficients	P-value
Expenditure on Seeds	1.7233	0.05906***
Expenditure on Irrigation	1.9358	0.06092***
Expenditure on Fertilizers	-1.05294	0.3052
Expenditure on Pesticides	0.47576	0.7110
Expenditure on Labour	-2.2543	0.1667
Transportation Cost	8.8398	0.00175**

Summary information

The multiple correlation coefficient is 0.9439 this indicates that the correlation among the independent and dependent variables is positive. The coefficient of determination, r^2 is 89.09%. This means that close to 89% of the variation in the dependent variable (small farmers income) is explained by the independent variables. The adjusted r^2, a measure of explanatory power, is 0.8441. The standard error of regression is 2089.

Analysis of variance

The SS regression is 49888208, and SS residual is 61103122. The f statistic can then be compared with the critical f value for 6, and14 degrees of freedom where the null hypothesis: H_o: B1=B2=B3=B4=B5 vs H_a: at least one B1 not equal to zero. The significance of calculated f statistic is probability beyond the calculated value in case of seeds expenditure. Comparing this value 10%, and 5% for example, indicates rejection of the null hypothesis.

The estimated regression line

The independent variable statistically significant in explaining the variation in the small farmers' income is the expenditure on seeds, expenditure on irrigation and transportation cost has indicated the calculated p values that are less than the significance level of 10% and 5% respectively. The relationship between expenditure on seeds, expenditure on irrigation and transportation cost and zaid farmers' income level is positive: The larger theseeds expenditure, irrigation expenditure and transportation cost then the higher the zaid season farmers' income levels. The coefficient of 1.7233, 1.9358 and8.8398 indicates, on average, an additional seeds, irrigation and transportation cost expenditure increases the zaid farmers' income levels by 1.72, 1.94 and 8.84.

Significance Level

In regression analysis, we see that the factors of small farmers net income influencing on it around 89 per cent, the most affected factors are expenditure on seeds, irrigation and transportation cost per acre (0.059, 0.060 and 0.001). These variablesare at 10% and 5% level of significance. Which means one unit of expenditure on seeds, irrigation and transportation cost variables changes, the income levels will also changes at the same rate or more.

Total Farmers Income

Equation: -7186+ 3.0250X_1- 0.1968X_2 + 0.6909X_3-1.64934X_4+ 0.3730X_5 +9.7224X_6

Multiple Regression results of Total Farmers Income

Mul. R	R^2	Ad. R^2	S.Error	D.f	SS Reg.	SS Res.	Signi. F
0.8058	0.6493	0.5768	36743	6, 29	7249961	39151744	0.00

Variables	Co-efficients	P-value
Expenditure on Seeds	3.0250	0.01088**
Expenditure on Irrigation	-0.1968	0.840318
Expenditure on Fertilizers	0.6909	0.8228
Expenditure on Pesticides	-1.64934	0.25187
Expenditure on Labour	0.3730	0.3853
Transportation Cost	9.7224	0.06804***

Summary information

The multiple correlation coefficient is 0.8058. It indicates that the correlation among the independent and dependent variables is highly positive. The coefficient of determination, r^2 is 64.93%. This means that close to 65% of the variation in the depended variable (net Income) is explained by the independent variables. The adjusted r^2, a measure of explanatory power, is 0.5768. The standard error of regression is 36743 which is an estimate of the variation of the observed income about the regression line.

Analysis of variance

The SS regression 7249961 is the variation explained by the regression line, and SS residual 39151744 is the variation of the depended variable that is not explained. The f statistic is calculated and can then be compared with the critical f value for 6 and 29 degrees of freedom to test the null hypothesis: H_o : B1=B2=B3=B4=B5=B6 vs H_a: at least one (B1) not equal to zero. Hence the significance value associated with the calculated f statistic is probability beyond the calculated value. Comparing this value with 5%, and 10% for example, indicates rejection of the null hypothesis.

The estimated regression line

The independent variables are statistically significant in explaining the variation in the net income levels are the expenditure on seeds andtransportation cost has indicated that exceed the critical values, and (2) the calculated p values that are less than the significance level of 5% and 10%respectively. The relationship between expenditure on seeds and net income levels is

positive: The larger the seeds expenditure, the higher the income levels. The coefficient of 3.0250 indicates, on average, an additional seeds expenditure increases the income levels by 3.02. The expenditure on seeds is positively related to the Income level at 5% level of significance. And finally transportation cost is also positively influencing the income levels and significant at 10% level. The coefficient of 9.7224 indicates, on average, an additional transportation cost increases the income levels by 9.7224.

Significance Level:

In regression analysis, we see that the factors of net income influencing on it around 65 per cent, the most affected factors are expenditure on seeds per acre (0.01), and transportation cost (0.06804). These two variables are at 5% and 10% level of significance. Which means one unit of any of these two variables changes (positive or negative), the income levels will also changes (positively or negatively) at the same rate or more.

Conclusions

Though there are large variations in expenditure on inputs which tends to impact on net income directly. Generally we assume that if the expenditure of inputs are lower, then the net income of the farmer will be more. But now a days while sowing high yielding varieties of seeds, the cost of inputs also growing at a rapid rate. If they put more expenditure on quality seeds, sufficient irrigation, adequate fertilisersandgood transport facilities gives good incomes to the farmers. Of course good marketing facilities are also important to get good incomes. In this paper, we have found that during kharifseason farmers' average income is more as compared to Rabi and Zaid season farmers on the basis of the expenditure on irrigation and fertilisers in kharif season, expenditure on seeds during rabi season and expenditure on seeds and transportation cost during zaid season, is significantly influencing the average income of the farmer. Whereas Total farmers point of view expenditure on seeds and transportation cost are highly influencing the average income of the farmers significantly. It clearly reveals that expenditure on irrigation, expenditure on fertilisers and expenditure on seedsand transport cost are significantly influencing the farmers' income levels in this district.

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