



VEGETABLE GROWERS IN BAREILLY DISTRICT OF UP: DETERMINANTS OF INCOME LEVELS

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Abstract

According to primary data, almost twice the variations exist between marginal and small farmers of total average income. The present paper want to analyse the factors responsible for these variations in Bareilly, where the vegetable crops cultivation in this state. More specifically, in this paper we want to examine the various inputs expenditure like expenditure on seeds, irrigation, fertilisers, pesticides, labour and transport influencing the variations among marginal farmers, small farmers and total average income of these farmers in Bareilly. To achieve the objectives of this paper primary data has collected through multiple random sampling in this district. The results indicate that marginal farmers income highly influenced by one factor significantly, whereas small farmers income influenced by three factors and total average income influenced by two factors significantly.

Introduction

Income from vegetable crops is one of the most important source for these marginal and small farmers. In Uttar Pradesh all the three seasons like Kharif, Rabi and Zaid farmers used to grow vegetables. As per available data more than 90% land holdings are being cultivated by marginal and small farmers in Uttar Pradesh. 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 Bareilly, per farmer total average income shows that Rs.1,18,237 from vegetable crops. Out of which the small farmers average income is very much higher Rs. 1,58,809 as compared to marginal farmers average income per farmer is only Rs. 72,784. Large variations indicate between small and marginal farmers average income from vegetable cultivation.

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 and Joshi, 2007) 1. Tewari et al (1974)² conducted a study on income and investment behaviour 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 (1974)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. Rathore et. 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 total Income levels of vegetable growers in Bareilly; and
- To see the cause and effect relationship between the factors influencing the Income of Marginal, Small and Total farmers in Bareilly.

Data and Methodology: In this paper we have collected primary data. It has collected about the selected district in this ACZ, about determinants' of Income levels between marginal and small farmers. 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 agro-climatic zone 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 per acre, expenditure on irrigation, fertilisers, pesticides, labour and transport. 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 for marginal farmers Rs.8,373, where as small farmers it is Rs.16,503.

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 irrigation for marginal farmers Rs.9,967, where as small farmers it is Rs.18,285.

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 fertilisers for marginal farmers Rs.9,520, where as small farmers it is Rs.15,412.

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 pesticides for marginal farmers Rs.4,036, where as small farmers it is Rs.7,550.

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 for marginal farmers Rs.4,114, where as small farmers it is Rs.9,775.

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 for marginal farmers Rs.11,107, where as small farmers is Rs.24,842.

Net Income: Net income will depend on Total production cost – total value of Production of each farmer has considered. The average total income for marginal farmers Rs.72,784, where as small farmers it is Rs.1,58,807 and the total income is Rs.1,18,327.

Marginal Farmers Income

Equation: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + E$

Equation: Y (Net Income) = $-12432 - 0.69572X_1 + 1.0241X_2 + 2.5741X_3 - 2.5326X_4 + 4.58234X_5 + 3.8049X_6$

Multiple Regression Results:

<u>Mult. R</u>	<u>R²</u>	<u>Adj.R²</u>	<u>Stan. Err.</u>	<u>Df</u>	<u>SS Regre.</u>	<u>SS Resi.</u>	<u>Signi. F</u>
0.91917	0.8449	0.7414	17154	6,9	14423818	2648399	0.003

<u>Variables</u>	<u>Co-efficients</u>	<u>P-value</u>
<u>Expenditure on Seeds</u>	-0.69572	0.7337
<u>Expenditure on Irrigation</u>	1.0241	0.2026
<u>Expenditure on Fertilizers</u>	2.5741	0.1775
<u>Expenditure on Pesticides</u>	-2.5326	0.3623
<u>Expenditure on Labour</u>	4.58234	0.01**
<u>Transportation Cost</u>	3.8049	0.2178

Summary information

The multiple correlation coefficient is 0.91917. 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 84.49%. This means that close to 94% 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 0.7414. 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 17154 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 (14423818) is the variation explained by the regression line, and SS residual (2648399) 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 6 and 9 degrees of freedom (available from f table) to test the null hypothesis: $H_0: B_1=B_2=B_3=B_4=B_5=B_6$ vs H_a : at least one (B_1) 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%, 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 the 95% confidence intervals. The independent variables are statistically significant in explaining the variation in the net income levels are the 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% respectively. The relationship between expenditure on labour and net income levels is positive: The larger the irrigation expenditure, the higher the income levels. The coefficient of 4.58 indicates, on average, an additional labour expenditure increases the income levels by 4.58. The expenditure on Labour is positively related to the Income level at 5% level, this may be due to an interaction with the expenditure on labour variable because larger income levels will come if deploy more labour in vegetable crops. On the other hand they are perishable in nature, demand supply conditions will effects the price levels of vegetables.

Significance Level:

In regression analysis, we see that the factors of net income influencing on it around 84 per cent, the most affected factors are expenditure on labour per acre (0.01). This variables is at 5% level of significance. Which means one unit of labour variable changes (positive), the income levels will also changes (positively) at the same rate or more.

Small Farmers Income

Equation: Y (Net Income) = $-35973 + 6.3335X_1 - 6.8372X_2 - 0.121222X_3 + 18.1025X_4 + 4.51897X_5 - 3.25198X_6$

Multiple Regression Results:

<u>Mult. R</u>	<u>R²</u>	<u>Adj. R²</u>	<u>S. Err.</u>	<u>D.f</u>	<u>SS Reg.</u>	<u>SS Res.</u>	<u>Sig. F</u>
0.8017	0.6428	0.44795	65764	6,11	8560779686	475738417	0.0414

<u>Variables</u>	<u>Co-efficients</u>	<u>P-value</u>
<u>Expenditure on Seeds</u>	6.3335	0.1190
<u>Expenditure on Irrigation</u>	-6.8372	0.0647***
<u>Expenditure on Fertilizers</u>	-0.121222	0.9669
<u>Expenditure on Pesticides</u>	18.1025	0.02379**
<u>Expenditure on Labour</u>	4.51897	0.0127**
<u>Transportation Cost</u>	-3.25198	0.3329

Summary information

The multiple correlation coefficient is 0.8017 this indicates that the correlation among the independent and dependent variables is positive. The coefficient of determination, r^2 is 64.28%. This means that close to 64% 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 0.44795. The standard error of regression is 65764.

Analysis of variance

The SS regression is 8560779686, and SS residual is 475738417. The f statistic can then be compared with the critical f value for 6, and 11 degrees of freedom where the null hypothesis: $H_0: B_1=B_2=B_3=B_4=B_5$ vs H_a : at least one B_1 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%, 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 labour only has indicated the calculated p values that are less than the significance level of 5% and 10% respectively. The relationship between expenditure on irrigation and small farmers' income level is negative: The larger the irrigation expenditure, then lower the small farmers' income levels. The coefficient of -6.84 indicates, on average, an additional irrigation expenditure increases then small farmers' income levels decline by 6.84. The relationship between expenditure on pesticides and expenditure on labour between small farmers income level is positive: The larger the pesticides expenditure and labour tends to increase the small farmers income levels. The coefficients of 18.10 and 4.52 indicates, on average an additional pesticides and labour expenditure increases then small farmers income levels increase by 18.10 and 4.52.

Significance Level

In regression analysis, we see that the factors of small farmer's net income influencing on it around 64 per cent, the most affected factors are expenditure on irrigation, expenditure on pesticides and expenditure on labour per acre (0.0647, 0.0238 and 0.0127). These variables are at 10% and 5% and 5% level of significance.

Total Farmers Income

Equation: $-12653 + 2.8782X_1 - 1.4527X_2 + 0.2373X_3 + 6.8733X_4 + 4.318002X_5 - 1.057X_6$

Multiple Regression results of Total Farmers Income

<u>Mul. R</u>	<u>R²</u>	<u>Ad. R²</u>	<u>S.Error</u>	<u>D.f</u>	<u>SS Reg.</u>	<u>SS Res.</u>	<u>Signi. F</u>
0.8158	0.66559	0.59128	51354	6, 27	14173171	7120730	0.000

<u>Variables</u>	<u>Co-efficients</u>	<u>P-value</u>
<u>Expenditure on Seeds</u>	2.8782	0.2307
<u>Expenditure on Irrigation</u>	-1.4527	0.3659
<u>Expenditure on Fertilizers</u>	0.2373	0.9019
<u>Expenditure on Pesticides</u>	6.8733	0.058***
<u>Expenditure on Labour</u>	4.318002	0.000*
<u>Transportation Cost</u>	-1.057	0.6294

Summary information

The multiple correlation coefficient is 0.8158. It indicates that the correlation among the independent and dependent variables is highly positive. The coefficient of determination, r^2 is 66.56%. This means that close to 67% 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 0.59128. The standard error of regression is 51354 which is an estimate of the variation of the observed income about the regression line.

Analysis of variance

The SS regression 14173171 is the variation explained by the regression line, and SS residual 7120730 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 27 degrees of freedom to test the null hypothesis: $H_0 : B_1=B_2=B_3=B_4=B_5=B_6$ 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 1%, 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 pesticides and expenditure on Labour has indicated that exceed the critical values, and (2) the calculated p values that are less than the significance level of 1% and 10% respectively. The relationship between expenditure on pesticides and expenditure on labour and net income levels are positive: The larger the pesticides expenditure and labour expenditure, then higher the income levels. The coefficient of 6.87 and 4.32 indicates, on average, an additional pesticides and labour

expenditure increases then the income levels increase by 6.87 and 4.32. The expenditure on Labour is positively related to the Income level at 1% level of significance, this may be due to an interaction with the expenditure on irrigation variable because larger income levels tend to have more labour.

Significance Level:

In regression analysis, we see that the factors of net income influencing on it around 67 per cent, the most affected factors are expenditure on pesticides per acre (0.058), expenditure on labour per acre (0.000). These two variables are at 10% and 1% 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 fertilisers and pesticides and everyday labour and good transport facilities only 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 small farmers' average income is more as compared to marginal farmers but the expenditure on Pesticides and Labour is significantly influencing the average income of the farmer. Whereas marginal farmers point of view expenditure on labour is only highly influencing the average income of the farmers significantly. It clearly reveals that expenditure on irrigation, expenditure on pesticides and expenditure on labour are significantly influencing the farmers' income levels.

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