DETERMINANTS OF INCOME FROM VEGETABLES PRODUCTION: A COMPARATIVE STUDY OF NORMAL AND OFF-SEASON VEGETABLES IN ABBOTTABAD

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ABSTRACT:- Pakistan is blessed with wide climatic diversity which offers opportunities for growing variety of vegetables throughout the year. The promotion of vegetables in Pakistan is necessary not only for increasing farmer's income and production diversity concerns, but also for increasing the intake of micronutrients in human diet through increased vegetable consumption. The spectrum of year round availability of vegetables could be further extended. The off-season vegetable production offers a promising opportunity in this direction. The study is based on comparison of income obtained from production both in normal and off–season vegetables. Total sample of study was 150 vegetable producers of Abbottabad district. Majority of the sampled farmers were growing tomato and cucumber. There was not much fluctuation in the income among the farmers in normal season but the income from off-season vegetable production was almost double. Most of the farmers were not highly educated but many of them had their own land or land rented or shared in with other farmers so they were growing vegetables both in normal season and in off- season.

Key Words: Tomato; Cucumber; Off-season Cultivation; Determinants of Income; Socio Economics Factors; Pakistan.

INTRODUCTION

Vegetables play an important role in the agrarian economy of Pakistan like other major agricultural crops. They are used both for domestic consumption and export earnings. In Pakistan vegetables are grown over 220,500 ha of which 29,900 ha area is in Khyber Pakhtunkhwa (GoP, 1998). Pakistan having a wide climatic diversity, offers opportunities for growing almost all kinds of vegetable crops in its ecological zones. Khyber Pakhtunkhwa has comparative advantage in producing variety of vegetables. Total cropped area of Khyber Pakhtunkhwa was 2 mha in 1999-2000 and area under vegetables was 20,800 ha, which was 1% of total cropped area (GoP, 2000). Latest statistics shows that total cropped area in NWFP is 1.84 mha in 2005-2006 (GoP, 2007).

Vegetables are grown in many cities of Khyber Pakhtunkhwa, and Abbottabad is one of the major city for vegetable production. In addition to vegetables grown in normal season, the trend of growing off-season vegetables in surroundings and in Abbottabad is very common. The off-season vegetable production offers a promising opportunity in this

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direction. It's a difficult task to grow off-season vegetables such as cucumber and tomato due to unfavorable conditions, but farmers of the area make it possible by using the plastic tunnel technology and earn good prices.

The objective of the study is to investigate the determinants of income from normal and off- season production of vegetables in district Abbottabad. Vegetables are grown both in normal and off-season in Abbottabad. The research will specifically explain the off-season vegetables production because growing off-season gives more income to the farmers and because off-season is about intensive farming which requires more input than normal season production. Majority of the studies show that most of the off-season vegetable growers were using different technologies for vegetable production and earning more profits by enhancing their production. Parasad (1999) explains his findings that the farmers earned remunerative returns; he argued that tomato is the most remunerative crop followed by brinjal, potato, cauliflower and cabbage. However, despite the variability in net returns because of variations in yield rate all the selected vegetables in this study are profitable and highly labour intensive. As such, vegetable crops have vast potential of generating employment and income opportunities.

The introduction of off-season vegetables enhances the cropping intensity by 200–300% (Kendra, 2004).The demand of vegetables is increasing every year. Vegetables, particularly off-season vegetables, are getting popular among mid-hill farmers as a high priority and high value crop mainly to generate employment and to increase the income of a rural people (Manandhar, 2000). Parmar and Chaudhary (2001) explained that the off-season vegetable production under protected conditions is the best alternative to use the resources more efficiently. Thus protected and off-season cultivation can increase production of vegetables. Ishaq et al. (2003) explained that the trend of growing off-season vegetables is very common beside normal season and found the cost incurred and revenue obtained from off-season production by calculating the benefit cost ratio shows that investing off-season is profitable.

It is anticipated that the findings of the study will be helpful in providing information regarding revenues obtained from growing off-season vegetables. The findings might be of great importance to vegetable growers in comparing revenues obtained from off-season's vegetables with those grown in regular season.

However, the overall objectives of the study are to analyze the determinants of income from normal and off season vegetables production and make recommendations for improvement of normal and off season vegetables production.

MATERIALS AND METHOD

The proposed research was conducted and the sample was taken from five union councils of district Abbottabad, namely Bakoth, Boi, Kokmung, Nambal, and Pattan. The systematic random sampling technique was used. A questionnaire was formulated to collect all the required

information. Tomato and cucumber were selected for the research because mostly these two vegetables were growing in the researched area. To collect the required data, it was decided to interview the farmers involved in both normal and off-season vegetables production. Out of 185 questionnaires, 150 were incorporated in this study.

The data is analyzed by using Statistical Package for Social Sciences (SPSS) and E-views. The regression models for normal and off-season vegetables production were estimated by Ordinary Least Square (OLS) regression method. The OLS estimators are Best Linear and Unbiased estimators (BLUE) (Gujrati, 2003).

Simple regression analysis was performed to analyze the relationship between dependent and independent variables. Two cross-sectional models were formulated, one for the income from normal and second for the income from off-season vegetables. Total income from normal and off-season vegetables production was a dependent variable and age, farming experience, size of land owned, lands rented or shares in, total area under cultivation, total cost of fertilizers used, total cost of labors hired and total number of labors and family members working on the farms were independent variables. Model '1' is for normal season while model '2' is for off-season vegetables production. The ordinary least square model can be estimated as:

$$IN_n = \beta_1 + \beta_2 FE_i + \beta_3 Ed_i + \beta_4 TAC_i + \beta_5 LH_i + \beta_6 CF_i + \beta_7 FL_i + \beta_8 D_{1i} + U_i \quad \text{(Equation 1)}$$

$$In_o = \beta_1 + \beta_2 AGE_i + \beta_3 Ed_i + \beta_4 TAC_i + \beta_5 D_{2i} + \beta_6 CF_i + \beta_7 FLH_i + \beta_8 D_{1i} + U_i \quad \text{(Equation 2)}$$

where,

i = Cross section= 1, 2, 3....., 150

IN_n = Total income from normal season per acre

β_i = Regression coefficient for cross section i

FE = Farming experience

Ed = Total years of schooling of respondent

TAC = Total area under cultivation

LH = Total number of labour hired in normal season

CF = Total cost of fertilizer

FL = Total family members working on farm in normal season

D_{1i} = Dummy for caste (1= chaudhry's, all other =0)

IN_o = Total income from off-season per acre

AGE = Age of respondent

D_{2i} = Dummy for irrigation source (1= canal and tube well, springs = 0)

FLH = Total number of hours per day of members working on farm in off-season

Ui = Error term

RESULTS AND DISCUSSION

This section of the study is related to descriptive and inferential analysis of the data. All the personal and household information of the respondents are analyzed in this section. This part explains the demographic profile of the respondents in detail.

Caste of Farmers

The graph shows the frequencies and percentages for all the categories of farmer's castes. The quantitative

values are assigned to different caste categories. In the sample 33.3 % are Awan, 26.7 % are Abbasi, 25.3 % are Kandlal, 10 % are Gujjar and 4.7% are Chaudhry (Figure 1).

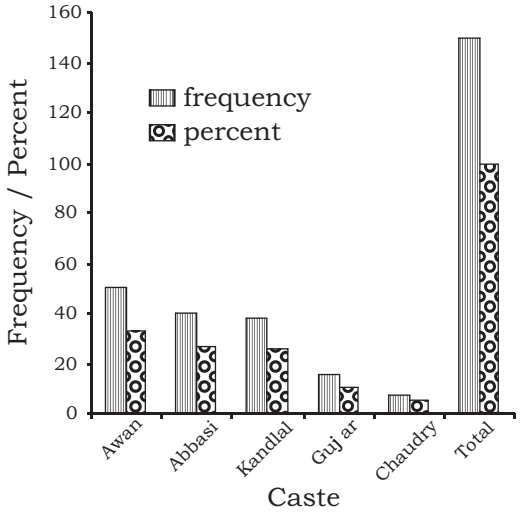

Figure 1. Frequency of various castes of farmars

Irrigation Source

Irrigation source is categorized into canal, tube well and springs. Percentage of irrigation from canal is higher as compared to others. About 50 % of the farmers have irrigation through canals, 2.7 % is through tube wells and 47.3 % is through springs (Figure 2).

The sample statistics mean and standard deviation, of all the numerical variables (Table 1) revealed that the mean age of the respondent was 34 and schooling was at 7 years. Household mean was 7 and the farming experience was 17 years.

Mean number of dependents in the households was 6. Number of acres owned was 1. Approximate mean value of land per acre was Rs. 156,254. The mean number of acres

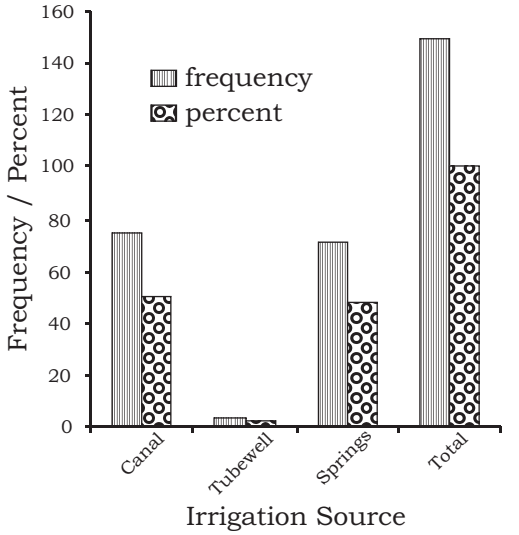

Figure 2. Frequency of various irrigation sources

rented in/shared was 1 acre; mean rent per acre was Rs 2278 ± 1341 showing that rent is not so high in the researched area. Total area under cultivation has a mean of 2 ± 0.5, indicating that mostly two acres of land are used for cultivation. Total cost of fertilizers in normal season has a mean of Rs 7071 ± 2808, suggesting that fertilizers are used in normal quantity in normal season.

Total number of labors hired in normal season had mean of 2, implying that in normal season more labors were not hired. Total cost of labors hired in normal season had a mean of Rs. 324, suggesting that cost of labors hired in season was not so much and the labor was cheap. Total number of family members working on the farm had a mean of 2; indicating mostly family members were working most of the time on farm. Total number of working hours per day in normal season had a mean of 12, indicating that mostly average working hours were 12h. Total cost of

Table 1. Socio-economic profile of sample farmers

Variables	Mean	Standard Deviation
Age (year)	34	6
Total years of schooling (year)	7	2
No of household members	7	2
Farming experience (year)	17	5
No. of dependents	6	2
No of acres owned	1	0.5
Approx value of land (rupees per acre)	156253	50848
No of acres rented in/share in	1	0.5
Rent per acre (rupees)	2278	1341
Total area under cultivation (acres)	2	0.6
Total cost of fertilizers in normal season (Rs)	7071	2808
Total no of labors hired in normal season	2	1
Total cost of labors hired in normal season (Rs)	324	142
Total no of family members working in normal season	2	1
Total hours of family members working per day in normal season (hours)	12	3
Total cost of fertilizers in off season (Rs)	9561	3198
Total no of labors hired in off season	2	1
Total cost of labors hired in off season (Rs)	475	216
Total no of family members working in off season	3	1
Total hours of family members working per day in off season (hours)	17	4
Total income from normal season (Rs)	40766	4891
Total income from off season (Rs)	80193	7416

fertilizers in off-season had mean of Rs. 9,561 as more fertilizer was used in off-season. Total number of labors hired in off-season had a mean of 2, showing that in off-season more labour was hired. Total cost of labors hired in off-season had a mean of Rs. 475, suggesting that more expensive labour was hired in off-season. Total number of family members working on the farm in off-season had a mean of 3, showing that more family members were working on the farm in off-season. Total number of working hours per day in off-season had a mean 16, indicating that more working hours were required for off-season production.

Total income from normal season had a mean of Rs. 40,766, showing that income obtained from normal season was not much high but total

income from off-season had mean of Rs. 80,193 showing that from off-season more income was obtained from the production, respectively.

Inferential Statistics: Regression Estimation

The inferential analysis includes estimation method and results of the regression. The Equation '1' explains that total income from normal season considered as dependent variable. The results indicate that intercept is significant at 1% level and its value is 36.24 when all other independent variables are equal to zero (Table 2). The results explain that the farming experience is negatively related with income, suggesting that the young farmers can also effectively grow vegetables. The education has positive relation with income and the coefficient is significant at 5% level of significance but it is not compulsory that only more educated are involved in farming because the result shows that average education is not very high in the surveyed area. The total family members working on farm in normal season are significant at 5 % level of confidence, indicating that family members can better take care of the farms.

Amongst the castes that is dummy variable, Chaudhry's are contributing more in production and had positive and significant relation with income. The income of Chaudhry's are 3.02% higher than other caste groups. This seems to be caste variable and some factors which implies on this ability are: (i) hard work, (ii) work ethics, (iii) generations of companion with the soil and (iv) the continuation of a family profession. The value of R^2 is 0.11 and the value of F-statistics shows overall significance of the model at 5% level of significance.

The results of regression of equation '2' showed that the coefficient of intercept is positively significant at 1% level of confidence and the value of intercept is 72.85 when all other independent variables are equal to zero.

The coefficients of total cost of the labors hired and the total cost of the fertilizers used had positive relation with income and they are significant at 10% level of confidence. As off-season farming is basically intensive farming, this means more input like labor is hired and more fertilizers are used to get more production and more income. The overall results show that vegetable production will significantly increase the annual income of these farmers.

Some specific conclusions are that the total return from vegetable production depends on vegetable mixes; vegetable production is labor intensive and sensitive to change in labor cost, implying that an increase in minimum wage might affect the return from vegetable production; and development of labor-saving technology in vegetable production could be considered as a long-term solution to increase the returns of vegetable producers (Kebede and Gan, 1999).

The age of the respondent has negative relation with income because young ones can also grow vegetables and the results showed that higher age is not required for farming. The education coefficient is positively related with income. The dummy variable Chaudhry's are contributing more and have positive relation with income and is significant at 10% level of confidence,

Table 2. Results of the Regression

Model – I			Model - II		
Dependent variable = IN_n		Observations =150	Dependent variable = IN_o		Observations =150
Variable	Coefficients	t-statistics	Variable	Coefficients	t-statistics
Constant	36.24***	16.05	Constant	72.85***	10.94
FE_i	- 0.266**	- 2.57	AGE_i	- 0.11	- 0.573
Ed_i	0.340**	2.07	Ed_i	0.094	0.211
TAC_i	0.948	0.30	TAC_i	- 2.51	- 0.858
LH_i	0.876	0.69	CF_i+CL_i	0.0009*	1.706
CF_i	- 0.0001	- 0.21	FLH_i	0.250	1.091
FL_i	1.818**	2.13	D_{1i}	3.39*	1.799
D_{1i}	3.02**	2.25	D_{2i}	1.798	1.253
R^2 =0.11	F-Statistics = 2.57**		R^2 =0.10	F-Statistics= 2.26**	

, ** and * = Significant at 10%, 5% and 1% level, respectively*

showing that the income of the Chaudhry's is 3.39% higher than income of other caste groups. In off-season more family members are working on the farm and hence have positive relation with income because off-season farming is about intensive farming which requires more workers. The value of R^2 is 0.10 and F-statistics shows overall significance of the model at 5% level of significance. Both models are checked for the problem of heteroskedasticity and by applying White heteroskedasticity-Consistent standard errors and covariance test, the problem of heteroskedasticity is removed.

RECOMMENDATIONS

- The cultivation of off-season vegetables is a high source of income. It is apparent that those with higher expenditure and skills are doing better.
- Off-season production is a dynamic production system. One is on learning curve and because of that it is possible to determine progressive farms as these progressive farms can then be further enhanced to higher production functions. It's being presumed that there is no limit of human ingenuity.
- Awareness should be created among the vegetable growers in other areas of similar climate to adopt this technology.

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