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DETERMINANT OF RADISH YIELD: A CASE STUDY OF PUNJAB, PAKISTAN

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In the present study, determinants of radish yield in two districts of Punjab, Pakistan were ascertained using Cobb Douglas type production function. Data were gathered from Sheikhupura and Sahiwal and a total of 97 radish growers were interviewed from these districts using purposive sampling technique during 2003. Results indicated that seed, fertilizer, labour hours used for weeding and education were positively related with radish yield whereas non-availability of quality seed and plant protection were negatively related with radish yield. Educating the vegetable growers to adopt modern technology and use appropriate inputs would increase radish yield to a great extent.

Key words: Determinants, yield, radish, Punjab

INTRODUCTION

A variety of vegetables are cultivated in Pakistan. Mainly vegetables are concentrated in the vicinities of big urban centers like Lahore, Karachi and Peshawar. Area and production of radish is concentrated in Sheikhupura around Lahore. Similarly production of potato is specialized in Okara, Sahiwal, and Kasur around Lahore (Chaudhry and Ahmad, 2000).

Being a highly remunerative vegetable, radish can be grown on all soil types, but grows well in light, rich and moist soils. The major identified districts for radish production are Sheikhupura, Sahiwal, R. Y. Khan, T. T. Singh and Okara. However, the focus of research pertaining to the input use, seasonal pattern of production and other practices is very little. Same is the case with the various factors affecting the radish yield. The above is perhaps being ignored due to the fact that radish is a minor crop and occupies a small proportion of the total cropped area in the country. Radish research is needed to explore the ways and means to put this remunerative industry on scientific lines and to ensure that it can bring prosperity to the growers on the one hand and to the country on the other. Keeping in view the monetary importance of radish, the present study was designed with an aim to investigate the factors that influence the production of this vegetable.

MATERIALS AND METHODS

Two districts were selected on the basis of area of concentration. Sheikhupura and Sahiwal were the most important in terms of area and production of radish in Punjab. Share of Sheikhupura and Sahiwal in total radish area in the Punjab province was found to be 11.54 and 9.17 percent respectively (Ahmad *et al.*, 2004). Two tehsils from each district were chosen for the purpose of data collection. Radish growing villages were selected with the consultation of Department of Agriculture in the respective districts. A total of 97 farmers, 50 from Sheikhupura district and 47 from Sahiwal district were taken using purposive sampling technique. The survey was conducted in July-August 2003. Survey data contained information on socio-economic characteristics of the farmers, land tenurial status, source of irrigation, management practices, input and output quantities etc.

To estimate the impact of various factors on the yield of radish, production function analysis was used to estimate the extent of effects of various factors influencing radish yield. Cobb-Douglas type production function was used to determine the impact of various factors on yield due to its ease in computation and interpretation. Important factors affecting yield were incorporated in the analysis, many were still left out.

Consider the following Cobb-Douglas production function in general form:

$$y_i = \prod_{i=1}^{m} \chi_{ij}^{\ b_i} e^{u_i}$$

where,

i = 1, 2, ...,m are inputs; j = 1, 2, ...,n are farms, y_i is output of the j-th farm; χ_{ij} is the level of i-th input on the j-th farm, b_i are the parameters to be estimated, u_i is error term and e is the natural exponent. We can write the above production function in log linear form as

$$\ln y = A + \sum_{i=1}^{m} b_i \ln \chi_{ij} + \mu$$

where,

A = lna and all other notations are as previously defined.

Land preparation (tractor hours/acre), seed (kg/acre), fertilizer (kg/acre), irrigation (no./acre), plant protection measures (no./acre), and labour used for weeding (labour hours/acre) were included in the function and other variables along with above mentioned variables are in detailed in Table I.

variables is explained below and given in Table II. Out of nine variables, five variables were statistically significant at five percent level of significance and one variable at seven percent probability level. Others variables were not significant. The value of coefficient of quantity of seed (LnSEED) was significant and had a

Table I. Descriptive statistics of various variables

Variables	Mean	Standard deviation	Minimum	Maximum
Yield (kg/ac)	6068	35.73	2400	9440
Land preparation (tractor hours/ac)	5.6	1.20	1.75	8.50
Seed (kg/ac)	1.43	0.46	0.75	2.50
Fertilizer (kg/ac)	51	23.25	9	105
Irrigation (no./ac)	5.76	1.76	3	10
Plant protection measure (no./ac)	1.40	1.38	0	4
Weeding (labour hours/ac)	84.7	57.70	16	256
Educated farmers (no.)	55	-	-	-
Claiming about seed quality (no.)	38	-	-	-
Claiming disease attack (no.)	43	-	-	-

Table II. Estimates of Cobb-Douglas Type Production Function

Variable	Parameter	Standard Error	T-value	Significance
Constant	8.28	0.21	38.74	0.00
LnLP	-0.05	0.08	-0.64	0.53
LnSEED	0.21	0.07	3.27	0.00
LnFERT	0.12	0.04	3.26	0.00
LnIRRI	-0.11	0.08	-1.43	0.16
LnPPM	-0.05	0.05	-1.08	0.28
LnWEED	0.06	0.03	2.16	0.03
DEDUC	0.08	0.04	1.84	0.07
DQLTYSEED	-0.11	0.04	-2.81	0.01
DINSDISATT	-0.15	0.04	-3.41	0.00
R^2				0.53
Adjusted R^2				0.49
F value				11.06

(Dependent variable= Ln of radish yield in kg per acre)

RESULTS AND DISCUSSION

Our main interest was to investigate the direction and the extent of various factors affecting the radish yield. Value of F test indicated that our overall model was significantly different from zero. Similarly, value of R^2 (0.53) was quiet good for our cross sectional data showing that 53 percent variation in the yield was due to factors included in the multiple regression equation. The individual significance of the independent

positive sign as it was expected. The value was found to be 0.21. This indicated that one percent increase in the seed of radish increased yield of radish by 0.21 percent meaning thereby that well populated fields increased per acre yield. The coefficient of fertilizer (LnFERT) was 0.12 and it was highly significant whereas the sign of the coefficient of this variable was according to our expectation. It indicated that on an average one percent increase in fertilizer nutrients (kg) could cause an increase in the yield of radish by 0.12

percent. Studies indicated that seed and fertilizer increased vegetable yields substantially (Ahmad *et al.*, 2005; Bakhsh *et al.*, 2005; Ahmad *et al.*, 2003; Bakhsh *et al.*, 2004) and our findings are in full agreement with these studies. It is a priori that the labour used to control weeds in any field crop increases output. In our case, it was estimated that the direction of the effect of weeding was according to our expectation. The coefficient of weeding (LnWEED) was significantly different from zero according to an asymptotic t-test. The value was 0.06 indicating that one percent increase in labor hours used for weeding could cause an increase in the yield by 0.06 percent. The dummy variable of education (DEDUC) had a positive coefficient as expected and was statistically significant at seven percent probability level. Many studies showed that education had a positive effect on the farm production and adoption of modern inputs and technology (Cotlear, 1990; Raza and Ramachandran, 1990; World Bank, 1991; Lin, 1991; Tilak, 1992; Ali and Hau, 2001). The dummy for inadequate availability of good seed (DQLTYSEED) was negative according to priori and was significant at one percent significance level. Non-availability or inadequate availability of radish seed was a serious problem in the selected districts particularly in Sahiwal district. The coefficient of dummy variable for plant protection problems (DINSDISATT) was also negative and its value was –0.15. This coefficient was statistically significant (Table II). Plant protection problems included disease and insect attacks on the radish crop. This result indicated that the radish yield decreased by 0.15 percent due to these problems. Disease and insect attacks problems were more serious in Sahiwal district.

CONCLUSIONS

Results of production function analysis showed that seed played an important role in increasing the yield of radish. The more use of seed, fertilizer and labour hours used in weeding could increase radish yield substantially. Appropriate use of these inputs should be applied to obtain higher output and in turn maximum income from growing this enterprise.

The radish crop is sensitive to disease and insect attacks. Diagnosis of disease and insect attack at the right time is the foremost element in crop management practices. A delay may cause disaster to the crop and ultimately the producer will suffer from it. After diagnosis, the selection and dose of pesticide required for specific attack is the next important step in crop management. Consulting the extension staff or any other specialist in this field may help in the right selection and application of pesticide. It was concluded from the production function that the non-availability of quality seed was a serious factor causing a decline in the radish production in the study areas. Mixing of poor quality seeds with the healthy ones was the crucial problem for the radish growers.

REFERENCES

Ahmad, B. K. Bakhsh, S. Hassan, and S.B. Khokhar. 2003. Economics of growing muskmelon. Faculty of Agricultural Economics and Rural Sociology, University of Agriculture, Faisalabad.

Ahmad, B., K. Bakhsh, and S. Hassan. 2004. Economics of growing radish. Faculty of Agricultural Economics and Rural Sociology, University of Agriculture, Faisalabad.

Ahmad, B., S. Hassan, and K. Bakhsh. 2005. Factors affecting yield and profitability of carrot in two districts of Punjab. Int.J.Agric.Biol., 5:794-98.

Ali, M. and V.T.H. Hau. 2001. Vegetables in Bangladesh: Economic and Nutritional Impact of New Varieties and Technologies. Asian Vegetable Research and Development Center, Tainan, Taiwan.

Bakhsh, K., M. Ashfaq and M.W.A. Chattha. 2005. Effects of poor quality of ground water on carrot production: A comparative study. J.Agric.Soc.Sci. 1:52-54.

Bakhsh, K., W. Akram, M.A. Raza and I. Hassan. 2004. Determination of factors affecting cauliflower cultivation. Int.J.Agric.Biol., 2:36-38.

Chaudhry, M.G.. and B. Ahmad. 2000. Dynamics of vegetable production, distribution and consumption in Pakistan. Asian Vegetable Research and Development Center, Tainan, Taiwan.

Cotlear, D. 1990. The effects of education on farm productivity. in K. Griffin and J. Knight (eds.). Human Development and the International Development Strategy for the 1990s, Macmillan, London.

Lin, J.Y. 1991. Education and innovation adoption in agriculture: Evidence from Hybrid rice in China. Amer. J. of Agric. Econ, 73.

Raza, M. and H. Ramachandran. 1990. Schooling and rural transformation. Vikas Publishing House Pvt. Ltd., New Delhi.

Tilak, J.B.G.. 1992. Education and its relation to economic growth, poverty and income distribution. Discussion paper No. 46, World Bank Comparative Studies: The political economy of poverty, equity, and growth, Research paper No. 3. The World Bank, Washington, D.C., U. S. A.

World Bank. 1991. World Development Report. Washington, D.C., U.S.A.