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Short Communication

Determination of Factors Contributing Towards the Yield of Carrot in Faisalabad (Pakistan)

ISHTIAQ HASSAN, KHUDA BAKHSH†, MUZAFFAR HUSSAIN SALIK‡, MUHAMMAD KHALIL¶ AND NASEEM AHMAD∏
Adaptive Research, Extension Wing, Govt. of the Punjab, Vehari–Pakistan
†Department of Environmental and Resource Economics, ‡Agri. Information Centre, ¶Institute of Horticultural Science, and ∏Department of Plant Pathology, University of Agriculture Faisalabad–38040, Pakistan

ABSTRACT

Main objective of this paper was to assess the effect of various factors on carrot yield per acre in the Faisalabad. Cross sectional data were collected from carrot growing farmers during 2004 from Faisalabad. Cobb-Douglas production model was applied. It explained 35% of carrot yield variation in the study area. Labor, land preparation and seed was found highly significant.

Key Words: *Daucus carota* L; Carrot; Production; Vegetable; Yield; Faisalabad

INTRODUCTION

Vegetable production in Pakistan is well diversified in terms of the range of vegetable species grown. More than 36 species are grown and consumed as summer or winter vegetables. The major vegetable species grown are potatoes, onions, chillies, melons, tomatoes, and cucurbits (Chaudhry & Ahmad, 2000). Only two percent of the total cropped area in Punjab province was under vegetables (Government of Punjab, 2000), compared to 15% in Taiwan (Ali, 2000). This means that a small quantity of vegetables per person per year is available from farm sources.

Carrot (*Daucus carota* L.) belongs to the family Umbelliferae. The carrot is believed to have originated in Asia and now under cultivation in many countries. The carrot is an important vegetable because of its large yield per unit area throughout the world and its increasing importance as human food. It is orange-yellow in colour, which adds attractiveness to foods on a plate, and makes it rich in carotene, a precursor of vitamin A. it contains appreciable quantities of thiamine and riboflavin, and is also high in sugar. Its use increases resistance against the blood and eye diseases. It is eaten raw as well as cooked in curries and is used for pickles and sweetmeats. Black carrots are used for the preparation of a beverage called kanji, a good appetizer in the early summer (Baloch, 1994). Khan *et al.* (2001) estimated yield 8.12 t/ha in Punjab. It is higher than Indonesia (8 t/ha), and Korea (2.72 t/h) but lower than Sir Lanka (13.8 t/ha), India (14.26 t/g), Vietnam (16.50 t/ha), Taiwan (50.99 t/ha). Low yield are due to inadequate and unbalanced application of inputs. These in turn stem from lack of information about the optimum doses of different production inputs on the one hand and interaction effect when used in combination, on the other hand. In order to maximize producer's profit, information must be provided to the decision maker regarding optimum use of these inputs in proper ratio as a package deal. Use of an input below its optimum level means that farmer can increase his profit by increasing the use of that input as added income is greater than added cost. Seen in this context, knowledge of optimum doses of various inputs, together with their marginal productivity is vital for making efficient management decisions.

The present study was conducted to identify factors through which yield gap can be abridged. The results, it is hoped would help policy makers, planners and extension workers to devise policies to raise present yield to economically feasible levels.

METHODOLOGY

Sample frame, method of collection and data structure. The study was confined to Faisalabad district. Faisalabad is situated in central Punjab. During 1999-2000, the vegetable area in Faisalabad was estimated at 46210 acres. Carrot contributes about 10 percent of the total vegetable area in Faisalabad (Khan *et al*., 2001). Carrot growing farmers were purposively selected with the consultation of Department of Agriculture. The survey was conducted in April 2004. A total of 45 farmers were taken. A well structured, comprehensive interviewing schedule was used for the collection of detailed information on quantities of output and various inputs used by the farmers.

Analytical framework. Various factors affecting the yield of carrot were identified during the survey. To estimate the impact of these factors on the yield, Cobb-Douglas type model was used of the following form.

$$Y \quad = \quad Ao\ Xi\ i\ e\ i$$

This equation is linearized as.

$$Ln\ Y = o + i\ \ Ln\ Xi + i$$

Where,

Y : Dependent Variable,

Xi : Independent variables,

i : Elasticity of Production,

i : Disturbance Term.

Variable definitions. Variable definitions and their descriptive statistics are given in Table I.

Limitations. Despite incorporation of these factors affecting yield, many were still left out. Positive correlation existence between incorporated inputs and missing variables are likely to result in an upward bias to co-efficient estimation of the inputs included in the model. Moreover, data are based on farmer's willingness and memory. Inputs are usually over-estimated and output is often underestimated. The results thus reported in this study may be viewed under these limitations.

RESULTS AND DISCUSSION

This section embodies results of model specified in the preceding paragraphs. Carrot production function with corresponding co-efficient, t-test, and R2 are presented in the Table II. The function containing seven variables explained 35% of yield variation.

Land preparation. Regression analysis shows that elasticity coefficient of land preparation was significant and had positive sign. The value of elasticity coefficient was 0.08 which means that one percent increase in tractor hours for land preparation caused an increase in the yield of carrot by 0.08%.

Quantity of seed. The value of elasticity coefficient was significant and had a positive sign. This indicates that by one percent increase in the seed rate of carrot caused an increase in the yield by 0.45%. This also implies that the well populated fields of carrot had a greater chance for obtaining the higher yield per acre.

Farmyard manure. The value of coefficient of farm yard manure (FYM) was –0.01 and it was non-significant. It shows that one percent increase in FYM cost caused a decrease in the yield by 0.01%.

Fertilizer use. The coefficient fertilizer was 0.12 and it was statistically significant. It indicates that on an average one percent increase in fertilizer nutrients (kg) caused an increase in the yield of the by 0.12%.

Irrigation. The coefficient of irrigation was 0.10 and non-significant. It indicates that additional irrigation hour caused an increase in the yield of carrot by 0.10%.

Plant protection measures. The coefficient of plant protection measures had a positive sign and was statistically non-significant. The value of coefficient was 0.02 this implied that each additional rupee spent on pesticide could increase the yield of carrot by 0.02%.

Labour use. The coefficient of labour use was 0.08 and it was statistically significant. An additional labour hour could increase the yield by 0.47% as cultivation of carrot is labour intensive farming practice, especially harvesting of carrot.

Table I. Variable Definitions and Descriptive Statistics

Variable	Description
Lp	Number of tractor hours for land preparation
Seed	Seed Rate (Kg/ Acre)
FYM	Cost of FYM (Rs)
Fert	Fertilizer nutrients (Kg)
Irr	Number of irrigation
PPM	Cost of plant protection measure (Rs)
Lab	Labor used for various activities (Hours)

Table II. The Cobb-Douglas model estimates of carrot production function

Number of Observations = 45, Number of independent variables =7

Dependent variable = logarithm of carrot yield in kg

Variable	Constant	LP	Seed	FYM	Fert	Irr	PPM	Lab
Coefficient	3.54	0.08	0.45	0.10	0.12	0.10	0.02	0.47
T-value	9.35	1.87	2.97	-1.28	2.15	0.78	0.60	7.15

$R^2 = 0.352$; F-test value = 16.87

CONCLUSION AND SUGGESTIONS

The model used in the present study comes up with a number of important conclusions. Most importantly, labour used for different practices in cultivation of carrot, land preparation, seed and to some extent fertilizer were found significantly related with productivity level.

The above conclusion reveals that quantity of seed, land preparation, fertilizer and labor used for controlling weeds and harvesting etc. played a significant role on the farms experienced higher yield.

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