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ECONOMICS ANALYSIS OF STATICE CUT-FLOWER PRODUCTION IN PUNJAB, PAKISTAN

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Flowers are crowning beauty of God's creation. They are inseparable part of human joy and sorrows. It is said that man is born with flowers, lives with flowers and finally dies with flowers. This paper estimates the costs, returns and different socioeconomic and agronomic factors affecting the yield of statice cut-flower farmers. Random sampling technique was used to collect primary data and total 70 farmers were interviewed in 2011. The results of our study revealed that small farmers not only attained highest production but achieved highest total revenue. Net income was also greatest of the small farmers followed by medium and large farmers. Benefit cost ratio of small, medium and large farmers were 2.64, 2.51and 2.36, respectively. The results of Cobb-Douglass production function shows that the variables of education of the farmers, land preparation cost, FYM cost, fertilizer cost, chemical cost and irrigation number have positive and significant effect on the dependent variable (yield), while age of the farmers and labor hours used has negative and insignificant effect on the yield. Cut flower growing experience of the sampled farmers has positive but insignificant effect on the dependent variable (yield). The value of R^2 0.88 and F-ratio 49.55 indicates the overall significance of model. Young and experienced farmers should be encouraged to involve in growing statice. Sound policies are needed to promote formal education among rural households. Policy makers should also focus to investin production technologies, improving agricultural labor productivity and need to promote the use of FYM. Cheap and effective pesticides would be introduced.
Keyword: Statice, economics analysis, net income, BCR, Cobb-douglass production function, Pakistan

INTRODUCTION

Diversification of agricultural production is seen as a priority for developing countries to reduce dependence on primary commodities. The main reason is, despite high dependence on these commodities for their livelihood, declining trend of real prices for primary agricultural commodities (Humphrey, 2006). Accordingly, floriculture sector is chosen for enhancing farm incomes and reducing poverty in developing countries like Pakistan. Fewer economies of scale and labour-intensive nature of production in cut flower industries are major sources of comparative advantage (Labaste, 2005).

According to the estimations of Rabobank, the income of the ornamental plants sector is over US $ 50 billion. Cut flowers take first place, amounting to US $ 24.7 billion, followed by indoor ornamental plants (pot plants) – US $ 14.3 billion, outdoor ornamental plants (trees, shrubs, etc.) – US $ 7.6 billion, naturalflower bulbs – US $ 0.9 billion and US $ 1.6 billion other production materials (seed, cutting material etc.) (Yazgan *et al.,* 2005).The biggest centers of commercial cut flowers production are Holland, USA, Columbia, Kenya, Zimbabwe, Japan and Israel. 145 countries in the world have been commercially producing ornamental plants, and the area of production in these countries has been estimated at 223 105 hectare (Gursan and Erkal, 1998).

The cut flowers world market is a $5.7 billion market dominated by Netherlands which accounts for about 54% of exports in 2005. The other top exporters are Colombia (16%), Ecuador (6%) and Kenya (6%). The main import destinations for cut flower exports are to EU countries. The largest country destination is Germany (18%) followed by UK (17%) and the USA (16%) (Hornberger *et al*., 2007).

Flowers are an integral part of human life due to their diversity in beauty, form, texture, color and fragrance (Ikram *et al.,* 2012). Statice flowers are popularly used in dried flower arrangements, bouquets and ornamental purpose. Cut-flowers are useful in many ways. Their cultivation in Pakistan is increasing day-by-day, due to the growing demand of fresh flowers for garlands, bouquets and wreaths. These are not only cultivated for domestic purposes but also for export. The dried flowers are exported to the US and other countries. The flower-farming is labor-intensive business. It requires abundant quantity of labor from production till sale in the market and Pakistan has abundant labor located in both urban and rural areas. Investment in this sector is evident from the increased number of nurseries, green houses, flower markets and flower auction centers and the production of cut-flowers.

The diverse agro-climatic conditions in Pakistan suit all kinds of floriculture crops, including cut flowers, and pot plants throughout the seasons. In Pakistan growing cut flowers is a very profitable business if done properly on commercial basis. As farm holdings are small, therefore a farmer hardly makes his both ends meet from this enterprise. It is high time that innovative approaches were employed by the farmers to increase their income. Pattoki, a small town is situated about 80km south of Lahore is emerging as a leading and pioneering home for cut flower in Pakistan (Alam and Manzoor, 2005). In Pakistan cut-flowers and other ornamental flowers and plant are mainly grown in Karachi, Hyderabad, Pattoki, Chunian, Lahore, Rawalpindi, Islamabad, Mansehra, Harripur, Multan, Faisalabad, Rawlakot and Quetta. Rose, statice, marigold, tuberose, gladiolus, chrysanthemum and jasmine are the main exportable cut flowers in Pakistan.

Pakistan exported cut flowers in 2007 of worth 191 thousand US $, 2008 (681 thousand US $), 2009 (225 thousand US $), 2010 (518 thousand US $) and 2011 (761 thousand US $), respectively (ITC Comtrade, http://www. intracen.org.). The commercial cultivation of gladiolus is limited by rare production of corms and cormels and thereby does not fulfill local demand of the countries (Memon *et al.,* 2009).

Cut-flower can become Pakistan's second largest export sector after textile if government of Pakistan encourages the cut flower growers by facilitating them to provide better technology in production, refrigerated transportation, easy loan, extension services and exploring more foreign markets (Shafique *et al.,* 2010).

The main objective of this paper was to estimate gross margins, net income, benefit cost ratio and Cobb Douglass production function to check coefficient of regression model for statice cut-flower productivity. This study will be helpful in eliminating the gap regarding production and constraints faced by different stakeholders in this sector.

MATERIALS AND METHODS

Data Collection: The data were collected from tehsils Pattoki and Chunian of district Qasoor through farmer's interviews using a well-structured and pre-tested questionnaire in 2011. From cut flowers, statice cut flower was targeted. From each tehsil 35 statice growers were selected as respondents using simple random sampling technique. Thus, total 70 respondents were taken for the study.

Data Analysis: The data were analyzed by using SPSS Version 17. The respondents were classified into small, medium and large farms according to the size of their area under cut flower acreage. The farmers having cut flowers acreage of less than 2.5 acres were termed as small farmers; those with cut flowers acreage between 2.5 acres to 5 acres were placed under medium farmers, whereas farmers having more than 5 acres of cut flowers were classified as large farmers.

Estimation of Costs and Incomes: Net value of the produce and cost involved were estimated. Cost of variables inputs such as labor, ploughing, planking, seed, fertilizer, irrigation, hoeing, pesticide, weedicide and picking were calculated.

Gross Margin

$$GM = TR - VC$$

Where GM=Gross Margin
TR=Total Revenue
VC= Variable Cost

Net Income

$$NI = TR - TC$$

Where NI=Net Income
TR=Total Revenue
TC= Total Cost

For estimating net income total cost was subtracted from total revenue. Total cost includes variable cost plus land rent and abyana.

Benefit Cost Ratio (BCR): It is defined as the amount received in the shape of profit on the costs of one rupee. The BCR was computed by this method.

BCR = TR/TC

Econometric Model Specification: The Cobb-Douglas production function is the most commonly used functional form for analyzing agricultural production data. The major reasons for using this functional form were due to its mathematical properties, simplicity of computation, and interpretation (Heady and Dillon, 1961). In addition, the Cobb- Douglas production function is relatively simpler to estimate because of logarithmic transformation into linear form (Beattie and Taylor, 1985). The Cobb- Douglas production function was linearized in a double logarithmic function with a view to a form amenable to practical purposes was used as expressed below.

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln x_7 + b_8 \ln X_8 + b_9 \ln X_9 + \ln U_i$$

Where; Y = Average statice cut flowers yield measured in number of flowerbushels per acre.
X_1 = Age measured in years
X_2 = Education measured in years
X_3 = Flower growing experience measured in years
X_4 = Land preparation cost measured in Rs.
X_5 = Total labor man days No.
X_6 = FYM cost measured in Rs.
X_7 = Fertilization cost measured in Rs.
X_8 = Chemical cost measured in Rs.
X_9 = Irrigation No.
U_i = Error term which included unknown factors affecting the yield.
ln = Natural logarithm
a = constant

Table1. Socioeconomics characteristics of the sampled farms in the study area

Indicator/Unit	Frequency	Percent	Indicator/Unit	Frequency	Percent
Age (Years)			**Flower Growing Experience**		
21-40	49	70	16-20	7	10
41-60	18	25.7	21-25	4	5.7
61 to above	3	4.3	26-30	2	2.9
Total	70	100	Total	70	100
Education (Years)			**Tenancy Status**		
Illiterate	10	14.3	Owner	40	57.1
Primary	8	11.4	Owner cumtenant	24	34.3
Middle	9	12.9	Tenant	6	8.6
Inter	15	21.4	Total	70	100
Graduation and Above	5	7.1	**Irrigation Source**		
Total	70	100	Canal	36	51.4
Flower Growing Experience (Years)			Canal + Tubewell	34	48.6
1-10	43	61.4		70	100
11-15	14	20.0	Total		

RESULTS AND DISCUSSION

Socioeconomic characteristics of the sampled respondents are presented in Table 1. The results of our finding revealed that average operational land holding of the sampled farmers were about 10.84 acres and average statice cut flower acreage in the study area was about 0.68 acres. Average production cost per acre of the sampled farms of statice cut-flower in the study is presented in Table 2. The results of our study revealed that the land preparation cost of the sampled farms were highest of the small farmers (Rs.6628.55) followed by large farmers (Rs.6585.63) and medium farmers (Rs.5878.98), respectively. The seed cost of the sampled small, medium and large farms were Rs. 11830.96, Rs.12466.7 and Rs.11412.5, respectively. The results of our study shows that seed transplantation cost was highest of the small farmers (Rs.3100) followed by medium farmers (Rs.2933.33) and larger farmers (Rs.2850). It was found that sampled small farmers (Rs.17778.16) use more quantity of fertilizer as compared to medium (Rs.17591.4) and large farmers (Rs.15180.2). The earthling up cost of the sampled small farmers was Rs.3707.14, medium farmers Rs.3633.33 and of the large farmers Rs.3450, respectively. Hoeing expenditure was highest of the large farmers (Rs.5381.25) followed by medium farmers (Rs.4959.26) and small farmers (Rs.4699.63). The results of our study revealed that pesticide and weedicide cost were highest of the medium farmers followed by small and large farmers. The sampled large farmers have much higher cost of irrigation (Rs.5000) as compared to small farmers (Rs.2444.44) and medium farmers (Rs.1800). The picking cost of the small, medium and large farmers in the study area of the sampled respondents were Rs.11505.26, Rs.11666.7 and Rs.10275, respectively. Seeds, fertilization and picking charges were the main area of cost.

Table-2. Average production cost per acre of the sampled farms of statice cut-flower in the study (Rs.)

Production practices	Farm size categories		
	Small	Medium	Large
Land Preparation	6628.5	5878.9	6585.6
Seed	11830.9	12466.7	11412.5
Seed Transplantation	3100.0	2933.3	2850.0
Fertilization	17778.1	17591.4	15180.2
Earthling up	3707.1	3633.3	3450.0
Hoeing	4699.6	4959.2	5381.2
Pesticide and Weedicide	2038.8	2166.6	1800.0
Tube well Irrigation	2444.4	1800.0	5000.0
Picking	11505.2	11666.7	10275.0
Land Rent (four month)	8333.3	8333.3	8333.3
Abiana (four month)	60.0	60.0	60.0
Variable Cost	63733.0	63096.0	61935.0
Total Cost	72126.0	71490.0	70328.0

Economic analysis of the sampled statice cut-flower farms are presented in Table-3. The results of our study revealed that total cost of production per acre of the sampled farms were highest of the small farmers' i.e (Rs.72126) followed by medium farmers (Rs.71490) and larger farmers (Rs.70328). Productions per acre of small, medium and large farmers were 22587 bushels, 20882 bushels and 19005 bushels, respectively. The results of our finding reveal that the small farmers earn highest total revenue (Rs.190405) as compared to medium farmers (Rs.179171) and large farmers (Rs.166297). The gross margin of the small, medium and large farmers was Rs.126672, Rs.116075 and Rs.104362, respectively. The net income per acre of the sampled farms of statice cut-flower was higher of the small farmers Rs.118279, followed by medium farmers Rs.107681 and large farmers Rs.95969, respectively.Cultivation of flowers return 3-5 times and 1.5-2 times more returns than obtained

from rice and vegetables (Dadlani, 2003).The finding of our study shows that BCR of small, medium and large farmers were 2.64, 2.51 and 2.36, respectively. The sampled small farmers earn higher return as compared to medium and large farmers as they have small holdings of acreage and focuses on very much on their production and produce good quality statice cut flowers, which fetch higher prices in the cut flower market.

The results of Cobb-Douglass production function are presented in Table 4. The value of R^2 was 0.88 which indicated that 88% variation in statice cut-flower yield is being explained by the explanatory variables included in the model. The coefficient of the age was -0.02. It was negative

Table 3. Economic analysis of the sampled statice cut-flower farms in the study area

Item/Unit	Farm size categories		
	Small	**Medium**	**Large**
Variable cost (Rs.)	63733	63096	61935
Total cost (Rs.)	72126	71490	70328
Production (Bushal)	22587	20882	19005
Average Price/ bushel (Rs.)	8.43	8.58	8.75
Total Revenue (Rs.)	190405	179171	166297
Gross Margin (Rs.)	126672	116075	104362
Net Income (Rs.)	118279	107681	95969
BCR	2.64	2.51	2.36

Table 4. Regression results of cobb-douglass production function

Variable	B	t-value	Prob.
Constant	6.63	6.80	0.00
ln-age (years)	-0.02	-0.43	0.67
ln-education (years)	0.25	3.83	0.00
ln-flower growing experience (years)	0.08	1.56	0.12
ln-land preparation cost (Rs.)	0.23	2.77	0.01
ln-total labor man-days (No)	-0.70	-1.25	0.22
ln-FYM cost (Rs.)	0.31	3.69	0.00
ln-total fertilization cost (Rs.)	0.20	2.87	0.01
ln-chemical cost (Rs.)	0.10	1.85	0.07
ln-irrigation No.	0.10	1.73	0.09
R^2		0.88	
Adjusted R^2		0.86	
F-ratio		49.55	

but insignificant. It indicates that with increase in age of the farmers the statice cut-flower yield decreases but not significantly. Young farmers should be encouraged to involve in statice cut-flower production. The education of the farmers is very important because cut flower is a very sensitive business. The coefficient of education was 0.25 which was positive and significant at one percent level. It revealed that with one percent increase in education yield increased by 0.25 percent. The coefficient of flower growing experience was 0.08. It was positive but insignificant. Land preparation is very important variable the coefficient for this variable was 0.23 which was highly significant at one percent level. It revealed that with one percent increase in the expenditure on the land preparation cost yield increases by 0.23 percent. The coefficient for total man-days was -0.7, it was insignificant. The results our study revealed that there was the use of the untrained labor by the sample respondents at the study area.Well skilled and efficient persons should be employed for the care and management of the flowers (Younis *et al.,* 2002).

The coefficient for FYM was 0.31. It revealed that with one percent increase in the expenditure on the FYM cost boost the statice cut-flower yield by 0.31 percent.Farm manure application reduced the deleterious effects of brackish water and enhanced the fertility level of the soil (Munir *et al*., 2012). Straw mulch encourages flower production both qualitatively and quantitatively (Younis *et al.,* 2012).

Fertilizer is very important input in the production of statice cut flower. There is always need to add fertilizers in soil to fulfill nutrients deficiency to get maximum production. A balanced used of fertilizer with desire level of nutrients is very necessary if one wants to get maximum production. Fertilizer is very essential for statice production as its pickings have done daily during it season; the coefficient of fertilizer cost was 0.20 which is positive and highly significant at one percent level. It demonstrated that with one percent increase in the expenditure on fertilizer cost enhanced yield by 0.20 percent.

The results of our finding demonstrated that the coefficient for chemical cost variable was 0.10. It was positive and highly significant at seven percent level. It indicated that with one percent increase in the expenditure on the chemical cost dependent variable (Yield) increased by 0.10 percent. The coefficient for irrigation number was 0.10. It was positive and significant at nine percent level. It indicated that with one percent increase in irrigation no. yield increased by 0.10 percent. The F-ratio was 49.55 which indicate the overall significance of our model.

Conclusion and Recommendations: Growing statice cut-flower is profitable business as returns are double than cost. The results of our study revealed that total cost of production per acre of the sampled farms were highest of the small farmers' i.e (Rs.72126) followed by medium farmers (Rs.71490) and larger farmers (Rs.70328). Productions per acre of small, medium and large farmers were 22587 bushels, 20882 bushels and 19005 bushels, respectively. The results of our finding show that the small farmers earn highest total revenue (Rs.190405) as compared to medium farmers (Rs.179171) and large farmers (Rs.166297). The

gross margin of the small, medium and large farmers was Rs.126672, Rs.116075 and Rs.104362, respectively. The net income per acre of the sampled farms of statice cut-flower was highest of the small farmers Rs.118279, followed by medium farmers Rs.107681 and large farmers Rs.95969, respectively. The finding of our study shows that BCR of small, medium and large farmers were 2.64, 2.51 and 2.36, respectively. The sampled small farmers earn higher return as compared to medium and large farmers as they have small holdings of acreage and focuses on very much on their production and produce good quality statice cut flowers, which fetch higher prices in the cut flower market.

The results of our Cobb-Douglass production function shows that the variable of education of the farmers, land preparation cost, FYM cost, fertilizer cost, chemical cost and irrigation number has positive and significant effect on the dependent variable (yield), while age of the farmers and labor hours use has negative but insignificant impact on the yield. Cut flower growing experience of the sampled farmers has positive but insignificant effect on the dependent variable (yield). The value of R^2 0.88 and R-ratio 49.55 indicates the overall significance of our model. Young and experienced farmers should be encouraged to involve in growing statice. Sound policies are needed to promote formal education among rural households. Policy makers should also focus to investment in land preparation technology, investments in improving agricultural labor productivity; need to promote the use of FYM. Cheap and effective pesticides would be introduced.

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