ECONOMICS ANALYSIS OF TUBEROSE PRODUCTION IN PUNJAB, PAKISTAN

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ABSTRACT

Tuberose is a popular cut flower, not only for use in arrangements, but also for the individual florets that provide fragrance to bouquets and boutonnieres. This paper is an attempt to examine the cost and return of tuberose cut-flower along with factors affecting revenue. Purposive sampling technique was to collect primary data in 2011 and 80 respondents were selected from district Kasur. Average tuberose acreage in the study area was about one acre. Total variable cost of the small farmers was Rs.152371, medium Rs.146574 and large Rs.147587. The production of tuberose was highest of the medium farmers 290480 pieces, followed by small 289202 pieces and large 268700 pieces. Gross margin per year was the greatest of the small farmers Rs.0.253 million followed by medium Rs.0.246 million and large Rs.0.237 respectively. The results of econometrics Cobb-Douglass production revealed that the variable of age, education; land preparation, fertilization and irrigation were positive and significant. Farmers flowering experience and FYM variable were positive and they have non-significant impact on dependent variable revenue. The coefficient of labor and chemical were negative and have significant impact on revenue, coefficient of seed was negative and significant. The benefit cost ratio of small, medium and large farmers were 2.66, 2.68 and 2.60 respectively. Large farmers have highest return because they have abundant amount of money, infrastructure and marketing information. Tuberose is very profitable crop as returns are double than cost. In this paper some problems has been identified and recommendations are given to enhance gladiolus production, productivity.

Keyword: **Economic Analysis, Tuberose, Cobb-Douglass Production Function, Pakistan**

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INTRODUCTION

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

Tuberose (*Poliasnthes tuberosa* L.), native to Mexico and a relative of the century plant (Agave), has long been cherished for the aromatic oils extracted from its fragrant white flowers. It is also a popular cut flower, not only for use in arrangements, but also for the individual florets that can provide fragrance to bouquets and boutonnieres. Because of this popularity, a number of countries including Kenya, India, and Mexico are growing tuberose commercially for export markets in the USA, Europe and Japan (Michael, 1996).

The tuberose is one of the earliest cultivated plants, and may be extinct in its natural habitat. The Aztecs were growing it nearly 600 years ago. The Spanish found the Aztecs growing it in 1519 and took it back with them to the old World. A French missionary, returning from the Indies in the 1500's did so as swell. Once introduced to Europe, it became part of the moon garden, a collection of white or pastel flowers, which release an intense fragrance after dusk. These gardens were popular among the sun-shunning Victorian ladies, who valued a milky pale complexion. The plant did fall out of favor when it became much overused at funerals. It has an intense fragrance, and one or two open blossoms will fill the air of an entire garden (www.jeannerose.net/articles/tuberose.html *12/12/2011*).

Netherlands is the largest cut flower producer in the EU, accounting for nearly half the production value of the EU (€ 2 billion). The Netherlands is also the most important player in the EU trade of cut flowers, accounting for 68% of total flower supplies to the EU. The flower auctions are the centre of the EU flower business, handling approximately 60-70% of foreign supplies to the Netherlands. There are also approximately 130 importers and 900 wholesalers. Among the wholesalers are 45 Cash and Carry outlets and around 40 wholesalers supplying directly from their trucks (so-called Flying Dutchmen). The Netherlands accounts for only 17% of total EU imports (€598

million). However, it accounts for 60% of total EU imports from developing countries (€503 million) (http://www.cbi.eu/marketinfo, 2009).

Conventionally flowers were grown for the aesthetic benefits, social function and export of essential oils and fragrance production (Byczynski, 1997). Now floriculture has been recognized as a potential business because of the divergence of farmers towards high value crops and use floral flower in social and industrial level in Pakistan. Therefore, commercial floriculture has emerged within the country. The most important floricultural crops to trade of cut flowers in Pakistan are roses, gladiolus, tuberoses, marigold, carnation, lilies, gerberas and statice, etc. The production and consumption of cut flowers has also increased over the last decade and growth is expected to continue given the number of indefinite factors in Pakistan.

The industry of growing flowers and other ornamental crops in Pakistan is mainly concentrated around the big cities: Karachi, Hyderabad, Lahore, Rawalpindi, Islamabad, Multan, Faisalabad, and Quetta. Places such as Pattoki near Lahore, Sahiwal in Sargodha district and location in the vicinity in Hyderabad have assumed important because of growing sizable area under these crops. Pattoki serve as the centre for floriculture activity in Pakistan. Pattoki, market is emerging as a leading and pioneering home for cut flower floriculture technology (Alam and Manzoor, 2005). It is the major market for buying and selling of fresh cut flowers in Pakistan. About one million pieces of cut flowers are daily exported from Pattoki to different market in Pakistan, more important of which, are Karachi, Peshawar, Lahore and Islamabad.

By observing this rapid growth in cut flower export, this business 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 year-round production, refrigerated transportation and exploring more foreign markets (Shafique *et al.*, 2010). The major objectives of this paper were to estimate production cost, returns and factors affecting farmer's revenue.

MATERIALS AND METHODS

Study Area and Data Collection Technique

The data was collected from tehsils Pattoki and Chunian of district Kasur in 2011. From cut flowers tuberose cut-flower was selected. These are the main growing areas of tuberose in Punjab, Pakistan. Purposive sampling technique was used and total 80 respondents were taken for the study.

Data Analysis

The data were collected through farmers' interviews using a well-structured questionnaire. The data were analyzed by using SPSS and Microsoft excel. The respondents were classified into small, medium and large farms according to size of their operational land holdings. The farmers operating a farm of less than 12.5 acres were termed as small farmers; those with an operational land holding between 12.5 acres to 25 acres were placed under medium farmers, whereas farmers having more than 25 acres were classified as large farmers.

Estimation of Costs and Incomes

Net value of the produced and cost involved were estimated. Cost of variables inputs such as labor, ploughing, planking, seed, fertilizer, irrigation, hoeing, pesticide, weedicide and picking were computed. For the estimation of gross income, the value of product (cut flower piece) during the year was taken in to the account. To compute the net income the following formula was used:

Gross Margin

GM = TR - TVC

Whereas

GM = Gross Margin
TR = Total Revenue
TVC = Total Variable Costs

Benefit Cost Ratio

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/TVC
Whereas
BCR = Benefit Cost Ratio
TR = Total Revenue
TVC = Total Variable Cost

Econometric Model Specification

The Cobb- Douglas production function was chosen as the lead equation. The Cobb-Douglas production function was linearized into a double logarithmic function with a view to getting a form amenable to practical purposes as expressed below.

$$\mathbf{lnY = lna + b_1lnX_1 + b_2lnX_2 + b_3lnX_3 + b_4lnX_4 + b_5lnX_5 + b_6lnX_6 + b_7lnx_7 + b_8lnX_8 + b_9lnX_9 + b_{10}lnX_{10} + lnU_i \ldots.(1)}$$

Whereas;

Y = Revenue measured in Rs.
X_1 = Age measured in years
X_2 = Education measured in years
X_3 = Gardening experience measured in years
X_4 = Land preparation cost measured in Rs.
X_5 = Total labor man days
X_6 =Seed quantity (Kg.)
X_7=FYM cost measured in Rs.
X_8=Fertilization cost measured in Rs.
X_9=Chemical cost measured in Rs.
X_{10}=Irrigation No.
U_i = Error term which included unknown factors affecting the Revenue of farmers
ln = Natural logarithm
a = constant

RESULTS AND DISCUSSION

Table 1 represents the socio economic characteristics of the farmers at the study area. Average age of the farmers was 38 years. The average schooling years of all the farmers were 8 years. Flower growing experience at the study area was about 12 years. Average operational land holding and the tuberose acreage at study area was 10.54 and 1.01 acres respectively.

Table 1. ***Socio economic characteristics of the farmers in the study area.***

Indicator/Unit	Average
Age (years)	38.00
Education of the farmers (years)	8.65
Flower Growing Experience (years)	11.66
Operation Land Holding (acre)	10.54
Tuberose Area (acre)	1.01

Table 2 demonstrated that the average seasonal prices of per 100 pieces of tuberose in the cut flowers market of Pattoki was the highest in the winter season. Small farmers sold 100 pieces of tuberose at Rs.226.27, medium Rs.230.56 and large farmers Rs.306.25 respectively. In the summer season small, medium and large farmers sold 100 pieces of tuberose at Rs.136.09, Rs.122.78 and Rs.151.25, respectively. The autumn season prices that the farmers received in the study area was Rs.177.24, Rs.158.89 and Rs.172.50 of the small, medium and large farmers respectively. Prices were minimum in summer season because the production of tuberose is less in summer season and high in winter season due to valentine's day, marriages, month of Muharram and Eids. Fig. 1 represents the gross margin and Fig. 2 the benefit cost ratio of the farmers in the study area.

Table 2. ***Average seasonal prices (Rs.) received of per 100 pieces of tuberose in the study area.***

Seasons	Farm Size Categories		
	Small	**Medium**	**Large**
Winter	226.27	230.56	306.25
Summer	136.09	122.78	151.25
Autumn	177.24	158.89	172.50

Table 4 revealed that the average production per acre per year of small, medium and large farmers was 289202 pieces, 290480 pieces and 268700 pieces respectively. Average price per piece was highest of the large farmers Rs.1.43 followed by small Rs.1.40 and medium 1.35, respectively. Total revenue was largest of the small farmers Rs.0.405 million followed by medium i.e. Rs.0.392 and large Rs. 0.384 million. Gross margin per year was also greatest of the small farmers Rs.0.253 million followed by medium Rs.0.246 million and large Rs.0.237 million. The benefit cost ratio of small, medium and large is 2.66:1, 2.68:1 and 2.60:1.

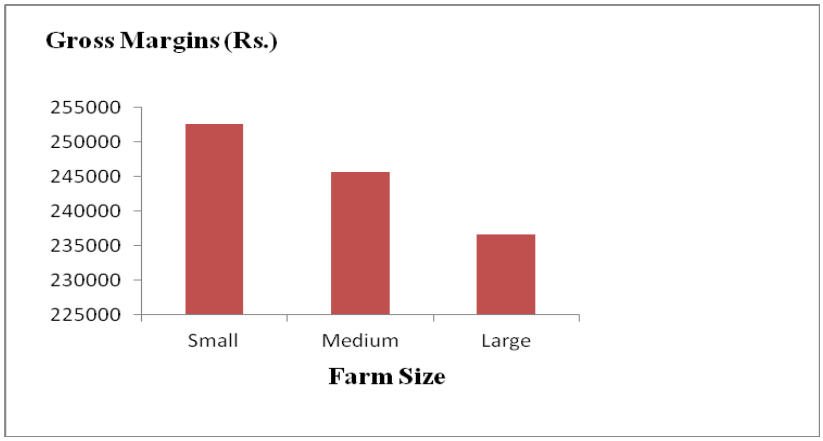

Fig. 1. Gross margins

Table 3. ***Average input costs/acre (Rs.) for production of cut flower of Tuberose.***

Production Practices	Farm Size Categories		
	Small	**Medium**	**Large**
Land preparation	7058.00	6663.21	6580.31
Seed	17441.89	18296.3	16335
Seedlings Transplantation	3608.96	3400	3525
Fertilization	23856.66	24305.26	25955.21
Earthling up	3931.34	4000	4050
Hoeing	22845.04	19451.85	18281.25
Weedicide	593.96	633.33	500
Tube well irrigation	9050.58	6325	8611.11
Pickings cost	63985.07	63500	63750
Total variable Cost	**152371.5 (0.152)***	**146574.94 (0.147)***	**147587.88 (0.148)***

*Amount in Million Rupees.

The estimated form of unrestricted Cobb-Douglass production function is given below in Table 5. The value of R^2 was 0.69 which indicated that 69% variation in total revenue of the tuberose is being explained by the explanatory variables included in the model. The coefficient of the age was 0.22. It was significant at one percent level and has positive impact on revenue. It indicated that with the one percent increase in age revenue increased by 0.22%. The education of the farmers is very important because cut flower is a very sensitive business. The coefficient for education is 0.34 which was positive and significant. Education has positive impact on the revenue. The coefficient for gardening experience is 0.00. Production of tuberose increases as the farmers gains more experience. Each stage of its production till sale in the market requires expertise. The tuberose farmers in the study area were expert and

have well knowledge about its production. It was non-significant and positive. Land preparation is very important variable the coefficient for this variable is 0.30 which is significant at one percent level. Land preparation has positive impact on the revenue. It indicated that with one percent increase in land preparation revenue increased by 0.30%. The coefficient for total labor man days is -0.12, it is negative and non-significant. The farmers were using mostly woman and child labor; it has no valid impact on revenue. The coefficient for seed quantity is -0.56; it is negative and significant at one percent level. It indicated that with one percent increase in seed quantity revenue decreased by 0.56%. The farmers used more seed than standard amount. FYM is very important variable as it increases the soil fertility. The coefficient for FYM is 0.00. It is positive and insignificant. It has positive impact on revenue. Fertilization is very essential for; the coefficient for this variable is 0.07 which is positive and significant at one percent level. It demonstrated that one percent increase in the uses of fertilization enhanced revenue by 0.07%. The coefficient for chemical cost variable is -0.02. It was negative and non significant. The coefficient for irrigation number is 0.68. It was positive and highly significant at one percent level. It indicated that with one percent increase in irrigation no. revenue increased by 0.68%. The F-ratio was 15.15.

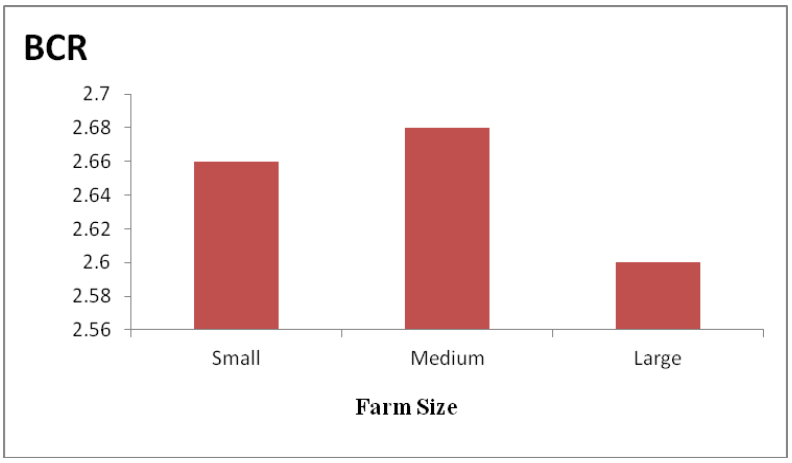

Fig 2. Benefit cost ratio

Table 4. ***Economic Analysis***

Indicator/unit	Farm Size Categories		
	Small	**Medium**	**Large**
Total variable cost (Rs.)	152371.50 (0.152)*	146574.94 (0.147)*	147587.88 (0.148)*
Production/acre (Piece)	289202.96	290480.00	268700.00
Average Price/piece (Rs.)	1.40	1.35	1.43
Total Revenue (Rs.)	404884.14 (0.405)*	392148.00 (0.392)	384241.00 (0.384)*
Gross Margin (Rs.)	252512.64 (0.253)*	245573.06 (0.246)*	236653.12 (0.237)*
BCR	**2.66**	**2.68**	**2.60**

*Amount in Million Rupees.

Table 5. ***Estimated regression results of Cobb-Douglass production function***

Variable	B	t-value	Sig. Level
Constant	8.75	5.33	0.00
ln-age (years)	0.22	2.29	0.03
ln-education (years)	0.34	4.02	0.00
ln-flower growing experience(years)	0.00	0.01	0.99
ln-land preparation cost (Rs.)	0.30	2.43	0.02
ln-total labor (man days)	-0.12	-0.81	0.42
ln-seed quantity (Kg.)	-0.56	-1.92	0.06
ln-FYM cost (Rs.)	0.00	0.44	0.66
ln-total fertilization cost (Rs.)	0.07	2.10	0.04
ln-chemical cost (Rs.)	-0.02	-1.25	0.21
ln-irrigation No.	0.68	4.34	0.00
R^2		0.69	
Adjusted R^2		0.64	
F-Value		15.15	

CONCLUSIONS AND RECOMMENDATIONS

Growing tuberose is profitable business as returns are double than cost. There were some problems and constrained faced by the tuberose grower like; high fertilization cost, shortage of water, fluctuation in daily prices, no proper flower market, no training institute. Following recommendations are given to eliminate them:

Farmers should be trained in such a way that they adopt the changing scientific technology. Marketing information should be available to the farmers. The effective and disease resistance varieties should be introduced. Pure pesticides should be introduced and explore the markets for cut flowers. A well-established cut flower market and research institute should be established Government and private sector should take effective measures to enhance production, productivity and export of tuberose cut flower.

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