

Profitability and Cost in Growing Mango Orchards

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ABSTRACT

Cost of production and returns in growing mango orchard are estimated in different ways compared to annual crops. The present study has been designed to investigate cost of production, and returns per acre over the life time of mango trees. A sample of 20 mango growing farmers was taken purposively from various villages of Multan district. The objective was to work out benefit cost ratio and net present worth of growing mango orchard. Net present worth of Rs. 155607.16 per acre was estimated for the sampled respondents which indicate that mango cultivation fetches higher returns whereas benefit cost ratio is reasonably high and it came to be 2.61 implying that investing one rupee in mango cultivation would return Rs. 2.61. These results indicate that investing in mango orchard would bring huge returns to the farmers on one hand and for the country in the form of foreign earnings on the other hand.

Key Words: Mango; Cost of production; Returns; BCR; NPW; Multan

INTRODUCTION

An orchard is a long term including establishment and maturity period investment and careful planning is essential to ensure economic success (Marini, 1997). Mango orchard is no exception in this regard. Mango is the second major fruit crop in Pakistan. At present it is grown on an area of 627.71 thousand acres with production 1089 thousand tonnes (Anonymous, 2005). The main mango growing districts in the Punjab province are Multan, Bahawalpur, Muzzaffar Garh and Rahim Yar Khan. In the province of Sindh, it is mainly grown in Mirpur Khas, Hyderabad and Thatta and in the province of NWFP it is grown in Peshawar and Mardan. It occupies 16 percent of total fruit area in Pakistan. Moreover, Multan and Bahawalpur share around 54 percent of total area under mango (Khan, 2005). The statistics indicate that area under mango cultivation has increased with the passage of time; however, the rise in production is comparatively slow.

Mango fruit is rich in nutrients such as protein, vitamin A, fiber, thiamine, ascorbic acid, etc. (Mangoes of Pakistan) and on the other hand Pakistan earns huge amounts of foreign exchange reserves from exporting mango each year. However, in spite of all this, mango yield in Pakistan is 8-9 tonnes per hectare as compared to the world yield of 25 tonnes per hectare (Sauco, 1993). This gap in yield is due to poor management practices and post harvest losses as the farmers lack technical know how about the mango production in Pakistan (Khushk & Smith, 1996). Perishable nature and marketing practices are other factors which affect quality of mango and hence result in low price and

ultimately the growers suffer from losses (Sabir, 2003).

Production of fruit orchards like citrus, mango, etc. is distinguished from annual crops by the long gestation period, an extended period of output flow, and varying stages of productivity over the lifetime (Chand, 1994). Therefore, it is more difficult to determine economics of growing mango as compared to annual crops. A large variety of forces influences the economics of growing mango. These include yields, prices and cost of production. These factors are influenced by other variables like soil, climate, market conditions, etc.

Having sufficient awareness regarding profitability of any enterprise is needed to make rational decisions at the farm level during various production stages. Economics of various crop enterprises has been estimated at different point of time by various organizations (APCom) and individuals (Ahmad *et al.*, 1992, 1994, 2003). Unfortunately, little research work has been conducted on finding out economics of growing mango in Pakistan. Efforts have been made by various individuals to determine economics of orchards (Ahmad *et al.*, 1993; Shakoor, 2001 (unpublished data); Hanif, 2003). Ahmad, *et al.* (1993) determined various financial techniques to find out profitability of mango cultivation after having discussions with experts. Shakoor (2001, (unpublished data) conducted study on kinnow growing whereas field conditions relating to mango production have not been studied in detail.

The producers would like to know the results of his economic activity by working out a detailed cost benefit analysis of the investment in the project (Akcaý & Uzunoç, 2005). Unfortunately, the farmers and other

concerned individuals know very little about economics of growing mango. The farmers need information regarding investment and returns from fruit gardening business. Keeping in view the importance of mango in terms of area, production and foreign earnings from exporting mango, the present study investigates in determining cost of production and profitability of growing mango orchard.

METHODOLOGY

Source of Data. The present study was confined to Multan district and Multan district is famous for mango cultivation throughout Pakistan. A total of 48 mango growers were selected from two villages of Multan district. Selection of the mango growers was made by using random sampling. The mango growers were randomly stratified into small, medium and large orchard owners. For each category, a total of eight growers were interviewed from each village making a total of 48. A well designed questionnaire was prepared for gathering information regarding the use of various inputs and output of mango trees and personal interview method was employed for collecting above mentioned information.

Analytical Framework. As regards fruit or orchard enterprises, the situation are rather different, growing fruit trees represent long term investment. The first few years of such enterprises only involve costs and low returns. To handle such difficulty, following analytical techniques were adopted to determine profitability of mango cultivation.

Generally mango trees do not start bearing fruit till the sixth year of their life and the annual fruit harvest is divided into two distinct yield cycles: first, from the seventh to the end of the twelfth year; and the second from thirteenth year to fortieth year. The main difference between the two cycles is the average number of mangoes per tree that can be harvested annually. The yield in the second cycle is more than twice as compared to the first one. It was also assumed that selling price of mango produce and input prices remain constant throughout the duration of the enterprise. This is a fairly common approach to avoid the complications arising from attempts to include inflation in input and output prices. As regards the costs, they were organized under three separate sections: the first establishment year, years 2 to 6, years 7 to 12 and years 13 to 40. Cost of various inputs used in growing mango was calculated on the basis of methodology adopted by Ahmad *et al.* (1993 and 2004).

Returns from growing fruit trees vary with the age of trees. The first few years only involve costs and low returns. Therefore, costs and returns are estimated by discounting future benefits and future costs and these are called respectively discounted benefits and

discounted costs. Financial analysis was used to determine profitability of mango trees. For this purpose, two techniques i.e. Net Present Worth (NPW) and Benefit Cost Ratio (BCR) were used as discussed by Gupta and George (1974), Vaidya *et al.* (1991) and Ahmad *et al.* (1993).

Net Present Worth (NPW) of an investment is the discounted value of all cash inflows and cash outflows of the project during its life time. The consensus in the investment literature is that if the objective of a firm is the maximization of profit or wealth of a business, then the NPW is the appropriate procedure to evaluate investment decisions (Tauer, 2002). The NPW is the total present value of future revenue and cost of an activity (Castle *et al.*, 1987). Moreover, the NPW offers the better measure of project worth among the measures of investment returns over time (Swinton *et al.*, 1997). It can be computed as

$$Net\ Present\ Worth = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

where notations are explained below

B_t = benefits in each year

C_t = costs in each year

n = number of years

i = interest rate

The benefit cost ratio (BCR) of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all cash outflows during the life of the project. It can be estimates as follows

$$Benefit\ Cost\ Ratio = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}}$$

Where,

B_t = benefits in each year

C_t = costs in each year

n = number of years

i = interest rate

If $BCR > 1$, then the total revenue is greater than the total cost, if $BCR = 1$ then the total revenue is equal to the total cost and if $BCR < 1$ then the revenue is less than the total cost.

The discount rate or interest rate should be equal to the opportunity cost of capital, that is, the rate of interest which could be obtained in the best alternative investment or the rate of interest on borrowed capital. It was assumed as 10 percent i for the analysis of the present study.

RESULTS AND DISCUSSION

Average cost by items pertaining to the establishment year and for other sections is given in Table I. establishment cost is an investment that takes time to pay off (Sharp & Cooley, 2004). The average annual total cost for the establishment year of mango plantation came to be Rs. 19820 per acre. Total cost was divided into five items and they included planting material and transplanting cost, fertilizer and manure, plant protection measures, fencing, irrigation, labour and miscellaneous expenditures. Cost incurred on planting material and transplanting was Rs. 2020. Fertilizer and manure cost was estimated to be Rs. 700, those of fencing, irrigation and miscellaneous were Rs. 5600, 4800 and 1000 respectively. Labour input included family labour, permanent labour and casual hired labour used for various activities like layout, digging, care of plants, application of fertilizer and irrigation, etc. A total of Rs. 5700 was estimated as labour cost for the first year. Plant protection measure cost was not recorded during the first year because there was no problem of plant protection.

Similarly, for the second section, capital cost (comprising all above mentioned categories) was determined and it came to be Rs. 69270 and the main

component of total cost was fertilizer and manure application whereas the second most important one was labour. For the third section (7-12 years) total cost or capital cost was Rs. 47190 and irrigation, labour and fertilizer and manure were the major constituents of total cost in descending order during this period. A total of Rs. 234920 was estimated as capital cost for the period from 13-40 years. During this period, the crucial constituents of capital cost were irrigation, labour, miscellaneous and fertilizer and manure respectively (Table I).

Output and Returns of Mango Cultivation. As discussed earlier, mango trees do not start bearing in the early years, therefore, output and returns were assumed zero from first to six year. Output and returns were considered from the start of 7th year and onward because during that period, output was produced in such amount that could be marketed. Output depends on number of trees planted per acre and in the case of present study; average number of trees per acre were estimated to be 46. From these 46 mango trees, output produced was 20424 kg per acre during years 7 to 12 and undiscounted amount was Rs. 178301.52 per acre. During second cycle that started from year 13 and ends on year 40, output increased substantially and it was 224112 kg per acre and total amount was Rs.

Table I. Estimated Cost of Mango (Rs/acre)

Particulars	Years				Total
	1	2-6	7-12	13-40	
Planting material and transplanting cost	2020	-	-	-	2020
Fertilizer and manure	700	20070	8550	49000	78320
Plant protection measures	-	1500	1998	4144	7642
Fencing	5600	-	-	-	5600
Irrigation	4800	16800	14400	67200	103200
Labour	5700	18300	13242	58576	95818
Miscellaneous	1000	12600	9000	56000	78600
Total	19820	69270	47190	234920	371200

Table II. Projected Output and Gross Income

Particulars	Unit	Quantity	Output (kg/ac)	Amount (Rs/ac)
Year 7-12 74 kg/tree/year	Tree	46	20424	178301.52
Year 13 to 40 174 kg/tree/year	Tree	46	224112	1956497.76

Table III. Financial Analysis of Mango

Particulars/years	1-6	7-12	13-40
Capital cost (Rs/ac)	67030	-	-
Maintenance cost (Rs/ac)	-	50340	234920
Total cost (Rs/ac)	67030	50340	234920
Gross income (Rs/ac)	0	178301.52	1956497.76
Net benefit (Rs/ac)	-67030	127961.52	1721577.76
PWC at 10 % df	51210.77	20629.04	24879.36
PWB at 10% df	0	71273.41	181052.90
NPW at 10 % df	155607.16		
BCR	2.61		

1956497.76 per acre (Table II). This amount shows that mango cultivation gives huge returns by investing less amount of capital i.e. Rs. 371200 as shown in Table I.

Financial Viability of Mango Cultivation. Costs and returns do not serve as true yardsticks for making a decision to go for investing in mango production. This is due to the fact that costs incurred in and returns from mango cultivation are not comparable without discounting such costs and returns. The present worth of costs and benefits was estimated by using 10 percent interest rate or discounting rate. Present worth of benefits for the period of one to six years was assumed zero because during this period, mango trees generally do not bear fruits (if fruiting occurs in some years then it is in negligible amount). Net present worth was estimated to be Rs. 155607.16 per acre over the life time of mango trees. Our findings are in full agreement with those of Shakoor (2001, unpublished data). The BCR came to be 2.61 (Table III) showing that investment in mango cultivation can be considered substantial and economically justifiable. Results of a similar study conducted in India showed BCR as 2.34 (NABARD) and this finding coincides with our BCR.

CONCLUSIONS

On the basis of results of the study, following conclusions are made as under:

- Discounted gross income per acre came to be Rs. 71273.41 during 7 to 12 years and Rs. 181052.90 during 13 to 40 years whereas discounted cost for the respective cycles was Rs. 20629.04 and 24879.36. These results point out that returns from mango growing are substantial and Pakistani farmers could earn huge profit if mango orchards are planned on commercial basis. In this way, the mango growers could earn a large amount of profit on one hand and can contribute towards earning foreign exchange reserves for Pakistan on the other hand.
- Net Present worth per acre over the life of mango plantation is highly profitable from economic point of view and it is Rs. 155607.16 which indicates that mango cultivation gives higher returns.
- Benefit cost ratio (2.61) is greater than unity and it is profitable to invest more in mango cultivation.

SUGGESTIONS

Results of the study highlight that net returns are positive. It is expected that under the prevailing technology, prices of inputs and outputs, use of various inputs, and the acreage under mango farming will increase. On the basis of the findings of the study, the following suggestions are made to abridge the yield potential of mango.

- Mango cultivation could increase if recommended package of practices of mango based on scientific data are readily available to the farmers. Role of agricultural extension department should be strengthened to boost up mango cultivation and production in the Punjab province.
- Fruits of mango are perishable in nature and they need proper packaging, storing and transporting facilities. However, such facilities are not available to the farmers. If these facilities are made available to the farmers at their door steps, the mango cultivation would rise to a great extent.
- There is a lack of research in mango industry. Prospects of mango cultivation require increased research facilities, research personnel, training to researchers and improved communication between researchers and mango growers. Especially small growers need more attention of the researchers.
- The present is the value addition. Mangoes should be processed into juices, nectars and other value added products. In this way, demand for mangoes would increase and this increased demand would result in higher income of mango growers. For this purpose, setting up processing industries in mango growing areas will be a good decision in the right direction.
- The present study was conducted on a small sample. It is suggested that detailed studies based on larger sample size should be conducted to see the profitability of various farm enterprises. This will help in making more appropriate decisions by the planners, policy makers, administrators and the farmers for achieving optimal allocation of scarce farm resources to alternative enterprises.

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