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Economic Analysis of Mango Production and Identify the Issues Faced by Mango Farmers in Sindh Pakistan

Ali Mustafa[1], Lakhano Rajar[2], Imam Uddin[3], Asim Aziz Koondhar[4], Zameer Ahmed Chachar[5], Noshad Ahmed Koondhar[6]

[1,2,3,4,5,6] Department of Agricultural Economics, Sindh Agriculture University, Tandojam, Pakistan, Corresponding Author's Email: aleeymustafa84@gmail.com

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Abstract

This study aims to examine the production costs and profitability per acre per acre associated with mango. A deliberate sample of 120 mango producers was selected from district Mirpur Khas Sindh, Pakistan. The aim was to calculate the benefit-cost ratio and net present value of establishing a mango orchard. The mango farmer typically incurred an average production cost per acre of Rs. 246588.00 and Rs. 63000.00, Rs. 65000.00, Rs. 48000.00 and Rs. 79588.00 on fixed cost, labor costs marketing costs respectively on capital inputs. The result is that each mango grower obtained 182 mound per acre on average. That each selected mango per maund Rs.3720.00 and total revenue per acre earned Rs. 677040.00 that was acquired by mango grower. During the study, the average earnings of mango growers per acre were Rs. 430,452.00 in net income, Rs. 677,040.00 in gross income, and Rs. 246,588.00 in total expenditure within the area of study. The selected mango farmers in the research area have an average gross revenue of Rs. 677,040.00 per acre and total expenses amounting to Rs. 246,588.00. Consequently, their input-output ratio from mango cultivation in this area is 1:2.75. The chosen mango respondent achieved a net income of Rs. 430,452.00 and a total expenditure of Rs. 246,588.00 per acre in area of study, resulting in an input-output ratio of 1:1.75 from mango cultivation in study.

Introduction

Mango (Mangifera Indica L.) occupies a significant role due to its strong production foundation, considerable domestic demand (95%), and export potential, all of which aid in the country's socio-economic advancement. Mango is widely referred to as the 'King of Fruits'. It is Pakistan's national fruit and ranks second after citrus in terms of area cultivated and production among fruit crops. According to FAO (2024), Pakistan ranks as the sixth-largest mango-producing country globally, with a production of 1717 thousand tons on an area of 171 thousand hectares. Mangoes are primarily produced in Pakistan's two provinces, Punjab and Sindh, which together account for 99.7% of the nation's total mango output; 63% originates from Punjab, while 37% comes from Sindh. Punjab constitutes 63% and Sindh 37% of Pakistan's total mango cultivation area. Mango yield in Pakistan is approximately 10 tons per hectare. Mangoes from Pakistan are renowned worldwide for their unique flavor, nutrition, juiciness, and sweetness. In summer, the demand for mangoes is very high domestically. They are widely enjoyed in both fresh and processed forms, including jams, pickles, juices, nectars, squashes, milkshakes and jellies. Mango from Pakistan is recognized as one of the best of its kind in the world market (GoP, 2022). After citrus, in Pakistan mango is the second most significant crop in terms of cultivation, spans an area of 93.42 thousand hectares and yields a production of 915.7 thousand tons. The area allocated for mango production has increased, but production increases at a slower rate. In the Sindh province, mango cultivation is primarily concentrated in the districts of Mirpurkhas, Hyderabad, Tando Muhammad Khan, Mattiari, and Thatta. Pakistan's mango season starts in Sindh in late May and end in Punjab in late August. Sindhri and Chounsa are primary mango varities grown in Pakistan. Dosehri, Malda,

Swarnarika, Langra, Siroli, Alphonso, Gulab Khas, Fajri, Golden, Anwar Ratol, and Began Phali, are other varieties, also present in specific regions of Sindh and Punjab provinces. Sindhri mangoes are primarily grown in Sindh, while Chounsa mangoes are commonly grown in Punjab. According to PHDEB (2020), industry experts believe Chounsa and Sindhri to be outstanding varieties, because of their flavor and demanded for in both local and foreign markets. Pakistan ranks fifth globally in mango production, but despite this, it only accounts for 3.2% of the world's total mango exports and ranks ninth among the major exporters of mangoes. In the agri-food sector, various commercial chains operate, and products move from producers to consumers. Mangoes, recognized for years as the "king of fruits," serve as the staple fruit crop in countries such as Philippines, Mexico, India, Brazil, Pakistan, China, and Thailand are included in this discussion. Mangoes hold a central position among the various fruits produced and exported by Pakistan due to their taste, color, size, yield, and export potential (Shafaqat, 2021). International demand for mangoes is growing at an extremely fast rate, with the United States and Europe being the largest importers of mangoes, accounting for about one-fifth of total global mango imports. Pakistan is one of the largest mango producers in the world, with an annual output of about 1.73 million tons, of which Sindh province produces 390,486 tons of mangoes and exports 61,632 tons of mangoes. Pakistan, a major producer of mangoes, has realized only a fraction of its true potential in this sector (SBI¸ 2022). Although mangoes exported from Pakistan has great potential, the export volume is only nominal. Pakistan's mango export system is inefficient and systematic and cannot fully tap the economic potential of mangoes. Most of the efforts to export mangoes are on a central and individual basis, with little use of centrally organized platforms. High-end exporters with substantial sources of finance, personal links with importers, better means of supply, better information knowledge and better export management methods, to take advantage of opportunities in the international mango market, but most exporters suffer from poor mango organization and export systems. Most of the exporters of Karachi get from Punjab and Sindh provinces and then produce products in their processing centers. They use their brand names and packaging materials. In the absence of a full universal platform, some weather traders have also jumped into it. Dreaming of higher profits in the short term, the export business often uses unethical means, giving the enterprise bad reputation and credibility. MirpurKhas region is fertile and produces wheat, onions, sugar cane, cotton, maize, mangoes and other crops. However, this region is known for mango products. The city is happy to announce that it has 250 different varieties of "mangoes", the most famous of which is "Sindhri Amb", which literally means mango of Sindh province. The Sindhri mango originated in the Mirpurkhas district of Pakistan. This mango has an oval shape, and its skin is a bright yellow color. This highly fragrant mango represents the ideal flavor that is typically sweet but has a slight tang in the early harvesting season (Wikipedia, 2021). Mirpur Khas is the main producer of mangoes in Sindh and is famous as Mango City of Pakistan. The quality of mango produced is often highly appreciated by virtue of its taste, color and size. Mirpur Khas produces export quality mango and large number of quantities are being exported all over the world every year. Therefore, it is necessary to explore effective marketing channels and provide suggestions to producers to obtain the best price of agricultural products. To date, little research has been done on mangoes, especially on mango marketing in the country. This study will analyze mango marketing patterns, profits and efficiencies in the Mirpur Khas region.

Methodology

This study aimed to explore the mango producers that exist in the Mirpur Khas district of Sindh. The area, type, and number of respondents were studied using a planned strategy; without it, the effort would have been ineffective. To render the research more scientific and objective, it is crucial to define the variables it includes.

Study Area

This study was perfomed on primary data collected from the mango producers in Mirpur Khas Sindh district. The district Mirpur Khas district administratively subdivided into seven talukas

Digri, Kot Ghulam Muhammad, Mirpur Khas, Jhuddo, Sindhri, Hussain Bux Mari and Shujabad. At the time of the 2023 census, Mirpur Khas district had a population of approximately 1,809,513 (assuming a growth rate), however authentic data of district Mirpur Khas specifically isn't available in public domain for 2023, of which around 933,919 were males and 875,594 females (using the national male-female ratio). The rural population was around 1,102,806 (61.18% of total population, using national rural population percentage) and urban 706,707 (38.82% of total population, using national urban population percentage)

Analysis of Data

The Data collected from the interviews were transferred to tally sheets and then input into a computer for analysis using percentages and frequencies. The desired statistical analysis was obtained using Microsoft Excel used for data analysis.

Descriptive Statistics

Descriptive statistics were employed to determine the percentages and frequencies of various traits among mango farmers to analyze the present study's findings.

Mean Estimations

The following formula was used to determine the means

$$\text{Average} = \sum Xi / n$$

Were.

$\sum Xi$ = sum of the variables

n = Total observations

Overall production cost

Cost of production was calculated by the given formula:

$$TC=TFC+TVC$$

Net Returns

The following formula was used to calculate net returns

$$NR= TI- TC$$

Input-output ratio

The following formula was used to get the input-output ratio:

$$IOR = \frac{T1}{TC}$$

Were

IOR = Input-Output Ratio

Cost-benefit ratio

The following formula was used to estimate the cost-benefit ratio:

$$CBR = \frac{NR}{TC}$$

Were

CBR = Cost Benefit Ratio

Problems with mango farmers

Views voiced by the farmers regarding the problems of mango farming.

Results

The research conclusions presented in this chapter explain the current production techniques for mangoes. In the Mirpur Khas district of Sindh province, Pakistan, it thus examined the independent and intervening factors that affected the adoption of these practices. This chapter presents the results of the research, highlighting the prevailing practices in mango production. It also analyzes the independent and intervening variables influencing the adoption of these practices in the Mirpur Khas district of Sindh Province, Pakistan.

Table 1: Displays Pakistan's mango status.

Year	Area (000, ha)	Production (000, tonnes)	Yield (tonnes/ha)
2011-12	171.9	1888.5	7.80
2012-13	172.4	1700.1	7.33
2013-14	170.4	1680.4	6.64
2014-15	171.3	1716.90	7.12
2015-16	170.2	1636.47	7.01
2016-17	176.3	1784.09	7.63
2017-18	173.1	1733.94	7.41
2018-19	171.8	1722.68	7.09
2019-20	172.5	1742.23	7.52
2020-21	174.4	1751.21	7.61
2021-22	172.5	1723	10.0
2022-23	158.8	1790	11.3

Source: Agricultural Statistics of Pakistan, Government of Pakistan, Islamabad (2022-23)

The table 1 presents the trends in mango cultivation in Pakistan from 2011-12 to 2022-23. Over the period, the cultivated area fluctuated between 158.8 and 176.3 thousand hectares, while production ranged from about 1.63 to 1.89 million tons. Yields generally remained between 6.6 and 7.8 tons per hectare up to 2020-21, but a sharp increase is observed in 2021-22 and 2022-23, reaching 10.0 and 11.3 tons per hectare respectively. This indicates relatively stable area and production levels over the years, with a notable recent rise in productivity.

Table 2: Shows the Socio-economic characteristics of mango growers

Particulars	Unit	Mean
Age	Years	27.88
Education	Years	7.7
Farming experience	Years	14.46
Farm size	Acres	16.41

Table 2 provides a summary of the respondents' demographic and farm characteristics. On average, the farmers are 27.88 years old with about 7.7 years of formal education. They have an average of 14.46 years of farming experience, while their farms cover an average size of 16.41 acres. This indicates that the sample consists of relatively young but experienced farmers managing medium-sized landholdings with modest educational backgrounds.

Table 3: Distribution of respondents based on mango trees and their yield per acre

Components	Unit	Mean
Mango trees	Trees per acre	163
Yield/ acre	Mounds per acre	180

Table 3 highlights the key production components of mango farming. On average, there are 163 mango trees per acre, and the farms produce an average yield of 180 mounds per acre. This reflects a relatively dense plantation structure with a substantial output per unit area.

Table 4: Varieties grown by the selected farmers in area of study

Mango varieties	Respondents	Percentage
Sindhri	41	34.17
Chaunsa	37	30.83
Dusehri	22	18.33
Langra	11	9.19
Bangan Pali	09	7.50
Total	**120**	**100**

Table 4 presents the distribution of respondents based on their preferred mango varieties. Among the 120 respondents, Sindhri was the most popular, preferred by 34.17%, followed by Chaunsa at 30.83%. Dusehri accounted for 18.33%, while Langra and Bangan Pali were fewer common choices, representing 9.19% and 7.50% respectively. This shows that Sindhri and Chaunsa together dominate preferences, making up nearly two-thirds of the total responses.

Table 5: Per acre, the overall cost incurred to produce mango

Components	Mean
Fixed Cost	63000.00
Labor Cost	65000.00
Marketing Cost	48000.00
Capital Inputs	79588.00
Total	**246588.00**

Table 5 summarizes the average cost structure for mango production. On average, fixed costs amount to 63,000, labor costs are 65,000, marketing costs reach 48,000, and capital inputs total 79,588. The overall average cost per unit is 246,588. This indicates that capital input and labor constitute the largest components of production expenses.

Table 6: Per acre revenue productivity of mango

Particulars	Rate per maund	Mean
Mango	3720.00	677040.00

Table 6 Displays the income per acre earned by each chosen mango producer in the research area, which was Rs. 677040.00.

Table 7: Input-Output and Cost Benefit Ratio of Mango

Input-output ratio		
Particulars	**Unit**	**Mean**
Area	Acre	1
Total Return	Rs.	677040.00
Total Expenses	Rs.	246588.00
Input-output ratio		**1:2.75**
Cost Benefit Ratio		
Area	Acre	1
Net Return	Rs.	430452.00
Total Expenses	Rs.	246588.00
Cost-benefit ratio		**1:1.75**

The table presents an average gross income of Rs. 677,040.00 and total expenditure amounting to Rs. 246,588.00, with an input-output ratio of 1:2.75 derived from mango cultivation in the study area. Table demonstrates that the chosen mango respondent had a net income of Rs. 430,452.00 and total expenses of Rs. 246,588.00 per acre in area of study, resulting in an input-output ratio of 1:1.75 from mango cultivation in this area.

Table 8: Issues faced by frames and suggested appropriate solutions for sustainable mango

Nature of Problems	Frequency
Variations of climate conditions	91
Poor market prices	87
Lack of cold storage and processing facilities	84
Increases in input prices	57
Labor shortage/high wage rate	61
Pest and disease outbreak	39
Increase in irrigation costs	38

Respondents reported several major constraints in the production and sales of mango in area of study. These constraints are listed in Table 4.20. In the research village, 57% of the respondents pointed that the increase of input prices, while 39% of farmers pointed out pest and disease outbreak. 61% of the interviewees pointed out that the labor shortage / high wage rate, 38% of farmers pointed out increase of irrigation costs,87%,91 of farmers had poor marketing price and vibration of climate conditions. Lack of cold storage and processing facilities in the study area is 84%.

Conclusions and Recommendations

The study finally concludes that mango is an important fruit for growers because its rate is increasing regularly. The cost required for mango production is low as compared to its return on acre; however, profit on one acre is exceptional and beneficial for country's economy and individual betterment. The respondents' age association with the percentage of mango producer age group of 10-20 years, 25.83 percentage, 21-30 years, 37.50 percentage, 31-40 years, 221.67 percentage of mango farmers. The respondents having planting practice of as long as 10 years; they had 32.50 percentage 11-20 years of mango cultivating experience had 42.50 percentage or more 20 years of mango cultivating experience had 25.00 percentage of mango farmer. Most of the respondents the 34.17 percent of the Sindhri verity, 30.83 percent of Chaunsa vareity, 18.33 percentages of Dusehri verities, 9.19 percent and 7.50 percentage mango of the respondents had langra and bangan pali verity of the mango grow in area of study. The labor cost of mango is Rs. 677040.00 respectively in area of study. On average, the selected mango growers incurred a total transportation cost of Rs. 48,000 per acre of mango cultivation, comprising Rs. 7,000 for loading, Rs. 37,000 for transportation, and Rs. 4,000 for unloading. Overall, the mango producers in the study area spent an average of Rs. 63,000 per acre on mango production. This comprised Rs. 8000.00 for land tax and Rs. 55000.00 for land rent. The average cost of production for each mango producer was Rs. 246588.00 and Rs. 63000.00 Rs. 65000.00 and Rs. 48000.00 and Rs. 79588.00 for capital inputs, labor expenses, and marketing expenditure, respectively. It is evident from the results, where each mango producer averaged 182 mounds per acre. The research area's chosen mango producers were chosen based on their revenue per acre of Rs. 677040.00. On average, throughout the research period, mango producers in area of study made Rs. 430452.00 on net earnings, Rs. 677040.00 total earnings and Rs. 246588.00 regarding overall spending in the study area. The selected mango growers, on average, per acre, have total earnings of Rs.677040.00 and total expenses are Rs. 246588.00 in the study area therefore they provided input output ratio of 1:2.75 from mango growing in the study area. It is recommended that Farmers want to increase their profit from mango, and they know better packing and marketing mechanism can help to achieve this goal. They also require storage facilities and think that producing a good variety of mangoes can increase profit. The other factors conducive to mango farming are the lack of cold storage facilities. There are several steps that the mango farmers think the government can take to help them with their marketing. These are providing training in cold storage and market building infrastructure and managing the water problem.

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