



A study of mango production and budget preparation in Karnataka

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Abstract

This study emphasizes mango production and budget preparation in Karnataka state; mango is the king of fruit items, and Karnataka is the third largest state in mango production after Uttar Pradesh and Andhra Pradesh. In this study, we discussed the cost of cultivating mango fruit because mango production has been decreasing year by year in Karnataka. Studies find that initially, in 4 to 5 years, farmers suffer low income because of term crops, so farmers are unable to get their returns instantly. On the cost side, fixed costs are going to increase because input factors have a higher cost compared to variable costs because maintenance charges are very high in fixed costs. Finally, this study concludes that the government needs to facilitate financial assistance, a price assurance market, and cold storage facilities for the mango growers in Karnataka.

Keywords: Cost cultivation, mango production, Karnataka, cold storage

Introduction

Mango is a type of edible stone fruit produced by the tropical tree *Mangifera indica*, which is said to have its origins in the area bounded by Bangladesh, northeastern India, and northwest Myanmar. Indica has been grown in South and Southeast Asia since antiquity, giving rise to the "Indian type" and the "Southeast Asian type" of modern mango cultivars. The majority of the edible fruits known as "mangoes" are produced by other species of the genus *Mangifera*, which is found in the Malesia ecoregion. Bangladesh's national tree is the mango tree, while the mango is the national fruit of India, Pakistan, and the Philippines. India dominated the world in mango production with 55 million tonnes or 45% of the total. Karnataka has an average mango production of 1600000 metric tons from 2009 to 2020. In Karnataka, Kolar district ranks first in mango production, followed by Ramanagara district and Tumkur district. We can see the increase in mango production in the Srinivasapur taluk of Kolar district, where 60 different varieties of mangoes are grown. In Karnataka, the production of 17,62,531 metric tonnes of mangoes in 2010 was a good production level. But we can see that in 2018-19, there has been a declining growth of 17.14%, as in 2018, there was a production of 14,28,435 MT. This decline in production has been observed in Karnataka due to the severe drought experienced in Ramanagara district in 2018.

We can see that Ramanagara Kolar Tumkur districts are the districts with the highest mango production levels. Kodagu district has the first position as the least mango-producing district in Karnataka. This one district has an average mango production of 900 metric tons, followed by Vijayapur, Yadagiri, Gadag, and Bellary districts, which are the lowest mango-producing districts. But Bellary district is the district which has seen good growth in mango production in recent years.

Objectives

1. To analyze the trends and patterns in mango production in Karnataka.
2. Estimation of Cost and returns of mango production in the study area.

Materials and Methodology

The first objective of this study also focused on secondary data sources, and this data was collected from union and state government ministries' various annual reports. This study spans 11 years; that is, from 2009 to 2020, I employed trend and pattern and descriptive statistics and charts and tables. This method might involve calculating year-to-year growth rates to identify significant changes in mango production in the study periods. The second objective is primary data, which was collected by direct interview. The

production in acre data given by farmers. In this study, the production cost per acre was calculated using the total cost, total variable Cost, and total fixed Cost. Average variable cost, average fixed cost, and average total cost have been calculated to know how much they spend to produce one kg of mango.

Data Source

This study has two objectives. The first objective is based on secondary data; this data is collected from mango production data in Karnataka from 2009 to 2020 collected through the Directorate of Economics and Statistics website. The second objective is primary data. This data was collected directly from the mango production farmers of Yeshvathnagara, Jigenahalli, and Thippanamardi villages of Sandur taluk, Bellary district.

Sample Techniques

On the basis of the nature study, I have taken 30 sample sizes of the total population in the Ballari district. In this district, I selected 3 Villages, Yeshvathnagara, Jigenahalli Thippanamardi, because NABARD sponsored a special scheme, NABARD Bengaluru Sankapla Yojana, for SC and ST candidates; therefore, we considered these villages on the basis of simple random sampling techniques.

Result and Discussion

To perform a trend and pattern analysis of mango production (in metric tonnes) in Karnataka over the years 2009-10 to 2019-20, we can use statistical methods. Here's how you can analyze the data.

Table 1: Growth rate of Mango Production in Karnataka from 2009 to 2019

Year	Production (in M. Tonnes)	Percentage Change
2010-11	1762531	4.02%
2011-12	1693462	-3.92%
2012-13	1655990	-2.21%
2013-14	1641167	-0.90%
2014-15	1676210	2.13%
2015-16	1723956	2.84%
2018-19	1428435	-17.14%
2019-20	1659728	16.17%

Sources: Author Calculation

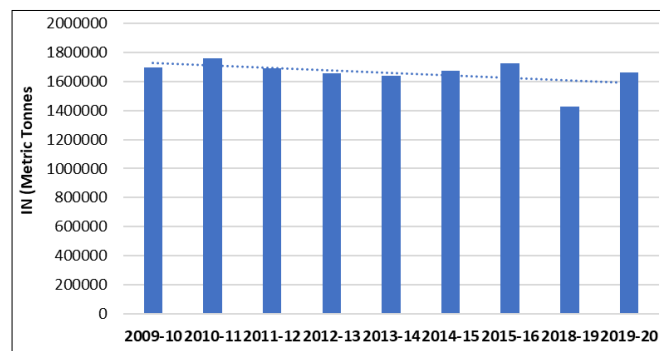


Fig 1: Mango production in Karnataka from 2009 to 2019

The above figure shows the data on mango production in Karnataka from 2009 to 2020. And the Y-axis of this graph

shows the production of mangoes in metric tons. And on the X-axis, you can see the period in those one year. Mango production in the period 2010-11 saw a production of 17,62,531 metric tons, which is the highest production in this period from 2009 to 2020. In 2018, we can see 14,28,435 metric tons less mango production due to the COVID-19 effect. Kolar Tumkur Ramanagar districts are found to be the districts producing an average of 2,00,000 MT in Karnataka. From the high production of these districts, we can see that Karnataka has an average production of 16 lakh metric tonnes of mango from 2009 to 2020.

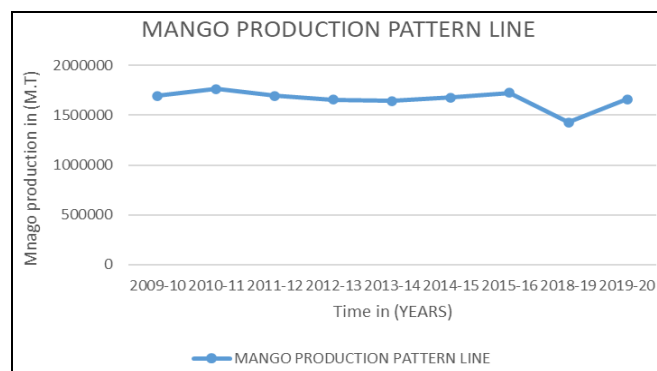


Figure 2: Mango production pattern in Karnataka

In the chart, the x-axis represents the years, and the y-axis represents mango production in metric tonnes. There is a general upward trend in mango production from 2009-10 to 2015-16, with some fluctuations. The year 2015-16 stands out as a peak in production during this period. After 2015-16, there was a drop in production, which is especially significant in the 2018-19 COVID-19 effect reason. The year 2019-20 shows a partial recovery but doesn't reach the peak levels of 2015-16.

Fluctuations and Factors

The data exhibits both short-term fluctuations and a more extended-term trend. Short-term fluctuations may be influenced by factors such as weather conditions, disease outbreaks, or market dynamics. The sharp drop in production in 2018-19 could be due to adverse weather conditions or other agricultural challenges.

Long-Term Trend

From 2009-10 to 2015-16, there is an overall upward trend, suggesting that mango production was generally increasing during this period. This could be attributed to improved agricultural practices, increased cultivation, and potentially favorable weather conditions.

Further Investigation

To understand the causes of these patterns more comprehensively, it would be beneficial to consider external factors like weather data, agricultural practices, disease occurrences, and market conditions during these years. Interviews with local farmers or agricultural experts could provide valuable insights into the specific reasons behind production fluctuations.

Table 2: Total Returns of Mango Production

AREA SIZE/Acre	ACRE	1
Mango Production	KG	1194
MANGO PRICE/Kg	RUPEES	66.55
MANGO REVUNUE /Acre	RUPEES	79460

Estimation of Cost and returns of mango production in the study area

The data was collected from 29 mango production farmers and covered 152.5 acres of production area. And the amount of wages paid to all the workers required for this production and the cost of export to the market. It can be understood that collected and includes income from total mango production.

Table 3: Estimation of Cost and returns of mango production in the study area (rupees/acre)

Variable	Cost/Units	Quantity	Total Cost
Soil Test Cost/Acre	Rupees	1	535.34
Water Charge/Acre	Rupees	3	0
Mango Plant /Acre	Rupees	1	1067
Electric Bills /Acre	Rupees	12	0
Market Trnsport Cost	Rupees	2	2442.17
Fertiliser/Acre	Rupees	3	5361.55
Pesticides/Acre	Rupees	3	3805.72
Plantation Workers Cost	Rupees	2	1425.5
Compost Application	Rupees	2	819.0
Pruning Labour Cost	Rupees	1	103.45
Hand Harvest And Field Packing	Rupees	2	660.34
Mago Packing Boxes Cost	Rupees	1	770.24
Transport Labour Cost	Rupees	2	682.76
Land Prepration Cost	Rupees	1	3438
Total Variable Cost	Rupees		21112.03

Sources: Author Calculation

Table 4: Mano production information

-	Rupees	0
Machinery and Equipment Annual Replacement Cost	Rupees	59877
Machinery And Equipment	Rupees	33629
Total Fixed Costs	Rupees	93506

Sources: Author Calculation

Mango production information

Area Size: 1 acre

Mango Production: 1194 kg

Mango Price per kg: 66.55 Rupees

Mango Revenue per kg: 79460 Rupees

This section provides basic information about the size of the area used for mango production, the quantity of mangoes produced, and the corresponding price and revenue per kilogram of mangoes.

Total variable cost

The next section of the table lists various costs associated with mango production. The Soil Test Cost for 1 acre is 535.34 Rupees. Water Charge/Acre (Rupees): This column indicates water charges three times, but the total cost is listed as 0 Rupees. It's important to note that water might be sourced from a free or non-metered source in this scenario. The cost of mango plants for 1 acre is 1067.96 Rupees. Electric Bills/Acre (Rupees): The electric bills for three

months for 1 acre amount to 0 Rupees. Market Transport Cost (Rupees): This represents the cost of transporting mangoes to the market and is listed as two units with a total cost of 2,442.17 Rupees. The cost of fertilizers three times is 5,361.55 Rupees. The cost of pesticides three times is 3,805.72 Rupees. The labor cost for plantation workers for two units (possibly days) is 1,425.5 Rupees. The cost of applying compost for two units is 819.0 Rupees. Pruning Labor Cost (Rupees) The Labor cost for pruning for 1 unit (possibly a day) is 103.45 Rupees. Hand Harvest and Field Packing (Rupees) The Labor cost for hand harvesting and field packing for two units is 660.34 Rupees. Mango Packing Boxes Cost (Rupees) The Cost of mango packing boxes for 1 acre is 770.24 Rupees. The labor cost for transport for two units is 682.76 Rupees. The cost of preparing the land for 1 acre is 3,438 Rupees. The sum of all the variable costs amounts to 21,112.03 Rupees.

Total fixed cost

Irrigation System Cost 0 Rupees (assuming there is no cost) Machinery and Equipment Annual Replacement Cost: 59877 Rupees. Machinery and Equipment Cost 33629 Rupees Fixed costs are those that do not vary with the level of production. In this case, it includes the cost of machinery and equipment, both the initial purchase cost and the annual replacement cost. The total fixed cost is 93506 Rupees, which is the sum of the annual replacement cost and the machinery and equipment cost.

Total returns

The total returns from mango production can be calculated by multiplying the quantity of mangoes produced (1194 kg) by the price per kg (66.55 Rupees/kg). This yields a total revenue of 79506.57 Rupees.

Total Cost

To calculate the total cost of producing 1 acre of mangoes, you can use the following formula:

Total cost = Total Variable Costs + Total Fixed Costs

Total Variable Costs = 21,112.03 rupees

Total Fixed Costs = 93,506 rupees

Total cost = 21,112.03 + 93,506 = 114,618.03 rupees the total cost of producing 1 acre of mangoes is 114,618.03 rupees.

Profit or loss

To determine whether mango production is profitable or not, you would subtract the total variable and fixed costs from the total revenue.

Profit/Loss = Total Revenue - (Total Variable Cost + Total Fixed Cost)

Profit/Loss = 79506.57 - (21112.03 + 93506)

Profit/loss = -35011.46 Rupees The negative value indicates a loss of 35,011.46 Rupees from mango production in this scenario.

Average variable cost per kgs

The total variable Cost is 21112.03/acre. When it is divided by the 1194 kg of mangoes produced on an acre, the result is the average variable Cost paid by the farmer to produce an acre of mangoes. For the production of one kilogram of mangoes, a farmer must spend Rs 17.68. The price of one

kg of mango is 66.55/kg, and the price charged by the farmer is also less than that price, so the farmer gets more profit.

Average Variable Cost = Total Variable Cost / Total Production

AVC per kg = Total Variable Cost / Total Production

AVC per kg = 21,112.03 rupees / 1,194 kg \approx 17.68 rupees/kg

the average variable Cost per kilogram is approximately 17.68 rupees/kg.

Price 66.55/kg > Average variable cost 17.68/kg

Average fixed cost per kgs

The total fixed cost is 93506/acre, and when we divide this by 1194kg of mango production per acre, the average fixed cost incurred by the farmer is 78.31/kg. As this average fixed cost mango price is higher than 66.55, the farmers suffer loss.

Average Fixed Cost = Total Fixed Costs / Total Production

Average Fixed Cost (AFC) per kg: AFC per kg = Total Fixed Costs / Total Production

AFC per kg = 93,506 rupees / 1,194 kg \approx 78.31 rupees/kg the average fixed cost per kilogram is approximately 78.31 rupees/kg.

Price 66.55/kg < Average fixed cost 78.31/kg

Average total cost per kgs

Total Cost: 1,14,618. When divided by the production of one acre of mangoes, which is 1194 kg, the average total Cost incurred by the farmer is found to be 95.99/kg. But as this average total cost is more than the price, the farmer suffers a loss of -29.44 rupees per kg.

Average Total Cost = Total Cost / Total Production

Average Total Cost per kg = 114618.03 rupees / 1194 kg

Average Total Cost per kg \approx 95.99 rupees/kg the average total cost for producing one kilogram of mangoes is approximately 95.99 rupees per kilogram.

Price 66.55/kg < Average total cost 95.99/kg.

Conclusion

Analysis of mango production trends, patterns, and cost-return calculations for mango cultivation in Karnataka reveals valuable insights into the challenges and opportunities faced by mango farmers in the region. Mango Production Trends and Patterns Trend analysis has shown fluctuations in mango production over the years, influenced by various factors such as weather conditions, disease outbreaks, and changes in farming practices. From 2009-10 to 2015-16, there was an overall upward trend, indicating growth in mango production due to improved farming practices and favorable climate. However, the significant decline in production in 2018-19, the impact of COVID-19, and adverse weather conditions disrupted this trend. The subsequent recovery in 2019-20 demonstrated the resilience of mango farming in Karnataka. Cost-Return Analysis Cost-Return Analysis The average variable Cost of producing mangoes in Karnataka is approximately Rs 17.68 per kg, which is less than the selling price of Rs 66.55 per kg. This indicates that farmers are making a profit at variable Costs. However, when fixed costs are considered, the average fixed cost per kilogram is Rs 78.31, exceeding the selling price. This indicates that farmers are incurring losses when

fixed and variable costs are calculated. The total cost per kilogram of mango is approximately Rs 95.99, which further highlights the loss incurred by the farmers. Causes of loss fixed costs, inefficient production practices, and market price fluctuations have been identified as major factors leading to losses in mango cultivation. Small-scale production and the presence of disease or pest problems played a role in increasing variable costs.

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