

# A Statistical Analysis of Finance-Production Relationship in Mango Farming in Palani Taluk

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## Article History:

Received:04/12/2024

Revised:03/01/2025

Accepted:05/02/2025

## Abstract:

The present study aims to analyze the impact of financial problems on production efficiency among the mango cultivators. The primary data were collected from 360 mango farmers who were further classified into three groups based on the level of financial problems faced by them, such as Low, Moderate and High. Using ANOVA, the study examines the variation in production efficiency among these groups. The findings reveal a statistically significant difference in production efficiency levels, with the F-value of 42.574 ( $p < 0.001$ ), indicating that the severity of financial problems substantially affects production performance. The results emphasize the need for improved financial access and credit support to enhance productivity in mango cultivation.

**Keywords:** Mango cultivation, financial constraints, production efficiency, ANOVA, agricultural finance.

## INTRODUCTION

Agriculture is the backbone and perennial source of Indian economy; horticulture, in particular, contributes significantly to the farmers' income and export earnings. Among the fruit crops, mango occupies a predominant position due to its high market demand and nutritional value. Tamil Nadu State is one among the major mango-producing States in India. In particular, Palani Taluk in Dindigul District is well-known for its large-scale mango orchards and favorable climatic conditions.

Despite the potentiality of mango cultivation, mango farmers in Palani Taluk face numerous financial challenges such as limited access to institutional credit, fluctuating market prices, and high input costs. These financial constraints influence both the productivity and economic efficiency of the mango cultivators. A proper comprehension of the existing relationship between these factors is vital for designing effective agricultural finance policies. Hence, the present study attempts to assess the impact of financial problems on production efficiency among mango cultivators in Palani Taluk.

## PRODUCTION PROBLEMS

Production problems refer to the challenges that hinder the effective cultivation and productivity of mango orchards. Key problems include:

1. **Climatic Challenges:** Irregular rainfall, extreme temperatures, and wind damage.
2. **Soil & Irrigation:** Poor soil fertility, water scarcity, and inadequate drainage.
3. **Pests & Diseases:** Fruit flies, powdery mildew, and stem borers.
4. **Technical Issues:** Traditional farming methods, lack of modern techniques, poor pruning practices.
5. **Labour Constraints:** Shortage of skilled labour and high wages.
6. **Financial Stress:** Limited credit, high input costs and dependence on moneylenders.
7. **Post-Harvest & Marketing:** Price fluctuations, transportation issues, and lack of storage facilities.

These factors collectively impact the efficiency and profitability of mango production. Production problems refer to the difficulties, constraints or challenges that affect the process of production and yield in the cultivation of mangoes. Particularly in agriculture, these problems limit the yield, reduce quality, increase cost and on the whole make farming less profitable. The production problems encountered by the mango farmers in Palani Taluk were identified through 20 structured statements incorporated in the questionnaire and measured using a five-point Likert scale. To examine the production-related problems faced by the mango farmers in Palani Taluk, a structured questionnaire was developed, comprising 20 statements focused on common cultivation challenges. These statements were measured using a five-point Likert scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), to capture the intensity of the farmers' perceptions towards such problems.

The variables are Non availability or shortage of labourers, High cost for labour, Long juvenile period of mango plants, Non availability of modern equipments, Lack of support from Horticulture Department or Government, Lack of modern technical know-how Pilferage, Disturbances by animals or birds, Perishable nature of Mango, High cost of fertilizers, Fruit drops due to excess wind, High initial cost for orchard investment, High cultivation cost, Inadequate rainfall, Menace by pests and diseases in Mango, Lack of Water resources, High cost of soil testing, Irregular bearing by the mango plants and Unexpected hazards and losses.

## **FINANCIAL PROBLEMS**

Agriculture, particularly fruit cultivation, requires substantial investment in land preparation, planting materials, irrigation systems, fertilizers, pesticides, and labour. Among the various constraints faced by the farmers, financial problems are often considered to be the most critical, as they directly influence the scale and efficiency of production. In the context of mango cultivation, financial constraints can limit the ability of farmers to adopt modern techniques, purchase quality inputs, or manage orchards effectively throughout the year.

In Palani Taluk, mango farming serves as a major source of livelihood for many rural households. However, most mango cultivators belong to small and marginal farm categories and depend heavily on external financial support. Limited access to institutional credit, high interest rates from private moneylenders, and delayed loan disbursements often create severe liquidity shortages. These problems restrict timely investment in essential operations such as pruning, fertilization, and pest control, ultimately reducing yield and profitability.

Furthermore, fluctuations in cost of mangoes and the long gestation period between planting and harvesting increase the risk and uncertainty of returns. Farmers facing continuous financial stress tend to reduce expenditure on inputs; this condition leads to lower productivity and poorer quality of produce. Thus, financial problems not only affect the current income of mango farmers but also hinder long-term sustainability and competitiveness in the agricultural sector.

The present study, therefore, focuses on assessing the impact of financial problems on production performance of the mango cultivators in Palani Taluk. By analyzing the variations in production efficiency across different levels of financial constraints, the research aims to identify how financial stress influences farm-level decision-making and output performance.

This research article discusses the financial problems encountered by mango cultivators in the study area. The issues were identified with the help of 10 structured statements included in the questionnaire and measured by using a five-point Likert scale. To ensure the statistical validity and reliability of the statements taken for consideration of finance problems, a factor analysis was conducted. The list of variables to measure the financing constraints are Delay in getting finance, Domination of middlemen, Insufficient finance, High interest rate, Early Financial Assistance to the Middlemen, Rise of any bad debts, Delay in payment while selling (credit), Lack of Government assistance, High processing charge, Difficult Procedure.

## OBJECTIVES OF THE STUDY

1. To analyze the relationship between financial problems and production performance among the mango cultivators in Palani Taluk.
2. To test whether the severity of financial problems significantly affect production efficiency

## METHODOLOGY

- **Study Area:** The study was conducted in **Palani Taluk, Dindigul District, Tamil Nadu**, which is known for its favourable climate, fertile soil, and extensive mango orchards. The area represents diverse farm sizes, cultivation practices, and socio-economic backgrounds, making it ideal for analyzing the impact of financial problems on production efficiency.
- **Data Source:** Primary data were collected through **structured interviews** with **360 mango farmers**. The questionnaire included sections on socio-economic profile, farm characteristics, input usage, production practices, financial constraints, and perceived production problems.
- **Sampling Technique:** A **stratified random sampling method** was used. Farmers were categorized based on the **level of financial problems** they face: Low, Moderate, and High. Stratification ensured that all financial categories were adequately represented, improving the reliability of comparisons.
- **Sample Size Justification:** A total of 360 respondents were selected to provide sufficient statistical power for ANOVA testing, ensuring that variations between groups could be detected with confidence.
- **Variables Studied:**
  1. **Independent Variable:** Level of financial problems (Low, Moderate, High).
  2. **Dependent Variable:** Production efficiency (measured as a score based on yield, quality, and farm management practices).
  3. **Control Variables:** Farm size, age of the orchard, years of experience, and input usage.
- **Data Collection Period:** Data were collected during **the mango production season of 2025**, ensuring that responses reflect current financial and production conditions.
- **Statistical Tools:** Descriptive statistics (mean, standard deviation, range) were used to summarize the data. **Analysis of Variance (ANOVA)** was applied to determine whether differences in production efficiency across financial problem categories were statistically significant.
- **Reliability and Validity:** The questionnaire was pre-tested on a small group of farmers to ensure clarity and relevance. Cronbach's alpha was calculated for multi-item scales to confirm internal consistency, and experts from the Department of Commerce validated the content of the survey instrument.
- **Ethical Considerations:** Farmers were informed about the purpose of the study, and their participation was voluntary. Data confidentiality was strictly maintained.

## TABLE AND ANALYSIS

The table shows the mean production scores, standard deviation, and range of mango farmers grouped by financial problems (Low, Moderate, High). ANOVA results indicate a highlighting the impact of financial constraints on productivity.

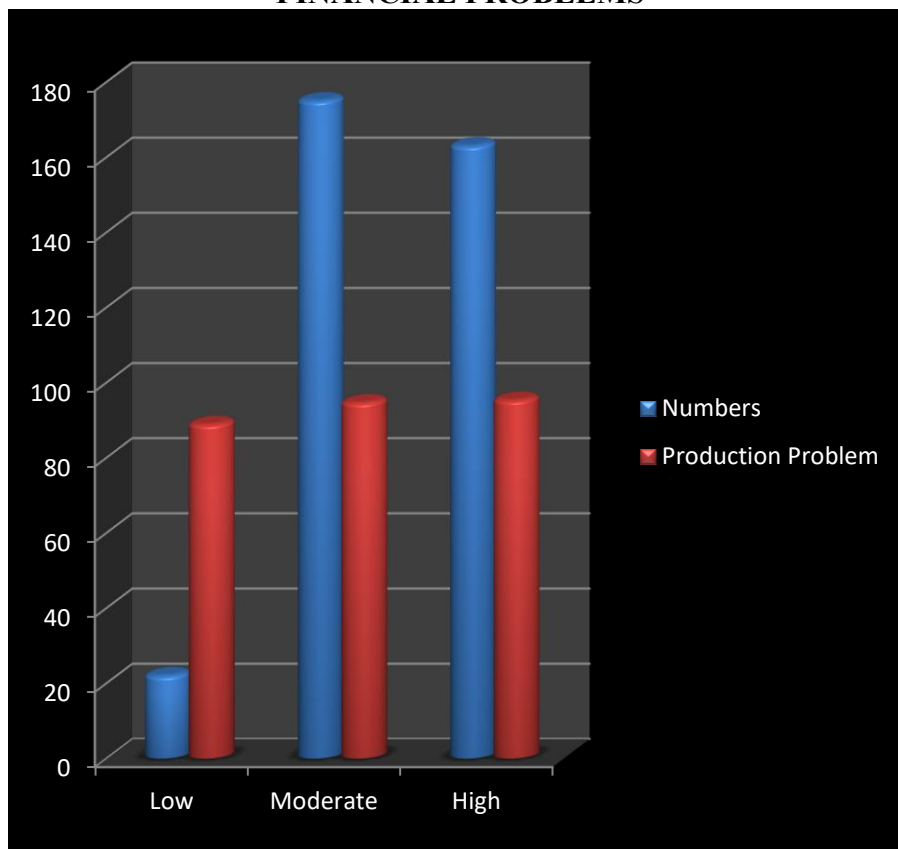
## PRODUCTION PROBLEM OF MANGO FARMERS BY LEVEL OF FINANCIAL PROBLEMS

Finance Problem	Numbers	Production Problem	Standard Deviation	Minimum	Maximum
Low	22	88.82	2.63	85.00	92.00
Moderate	175	94.60	2.08	89.00	98.00
High	163	95.26	3.91	80.00	100.00

<b>Total</b>	<b>360</b>	<b>94.54</b>	<b>3.41</b>	<b>80.00</b>	<b>100.00</b>
<b>Df: <math>v_1</math> 2, <math>v_2</math> 357</b>	<b>F Value: 42.574</b>		<b>P Value: .000</b>		<b>Significant</b>

Source: Primary data

**CHART PRODUCTION PROBLEM OF MANGO FARMERS BY LEVEL OF FINANCIAL PROBLEMS**



### Results and Discussion (Expanded)

- **Financial Problem Distribution:** Among 360 farmers, 22 face low financial problems, 175 moderate, and 163 high financial problems. This shows that **most mango farmers in Palani Taluk experience moderate to high financial stress**, highlighting the importance of credit access and management.
- **Production Efficiency:** Mean production scores are 88.82 (low), 94.60 (moderate), and 95.26 (high financial problem groups). The **higher mean in high financial problem group** suggests that some farmers manage financial stress through efficient resource use, careful planning or reliance on experience and traditional practices.
- **Variability:** Standard deviation is prominent in the high financial problem group (3.91), indicating **greater variation in productivity among financially stressed farmers**. This may reflect differences in resource management skills, orchard size, or risk-taking capacity.
- **ANOVA Interpretation:** The F-value of 42.574 ( $p < 0.001$ ) confirms **statistical significance**, meaning financial problems significantly influence production efficiency. Post-hoc tests can pinpoint the differences, e.g., moderate vs. high financial stress farmers.
- **Implications for Palani Taluk:**
  1. Financial interventions could **stabilize production variability**.
  2. Farmers with high financial stress may benefit from **technical guidance and subsidized inputs**.

3. Policies supporting **small and marginal mango growers** can enhance yield, quality, and market competitiveness.

### POLICY IMPLICATIONS AND RECOMMENDATIONS

1. **Credit Accessibility:** Introduce **low-interest loans** specifically for mango cultivation, with simplified approval procedures.
2. **Insurance and Risk Management:** Encourage **crop insurance schemes** to protect against natural disasters, pests, and market fluctuations.
3. **Training and Capacity Building:** Conduct **financial literacy programs**, modern horticulture techniques, pest management, and post-harvest handling workshops.
4. **Formation of Farmer Cooperatives:** Farmer Producer Organizations (FPOs) can **collectively market produce**, negotiate better prices, and reduce dependency on middlemen.
5. **Infrastructure Support:** Improve **cold storage, processing units, and transport facilities** to minimize post-harvest losses.
6. **Subsidy and Incentive Programs:** Government can provide **fertilizer, irrigation, and pest control subsidies**, particularly targeting high-risk and small-scale farmers.

### LIMITATIONS OF THE STUDY

- The present study focuses only on **Palani Taluk**; so findings may not be generalized to other mango-growing regions.
- The **production efficiency score** is based on multiple indicators; while comprehensive, it may not capture all quality or market-related nuances.
- Financial stress and production efficiency are dynamic and **may vary yearly**, depending on rainfall, market prices and input costs.

### SCOPE FOR FUTURE RESEARCH

- Comparative studies across **different taluks or states** to understand regional variations.
- Longitudinal studies to track **financial problem impact over multiple mango production seasons**.
- Incorporating **market price volatility** and export potential into production efficiency analysis.
- Assessing the impact of **technology adoption** (drip irrigation, bio-fertilizers) on production under financial constraint

### Conclusion (Expanded Version)

The present study demonstrates that **financial problems significantly affect the production efficiency** of mango cultivators in Palani Taluk. The ANOVA results ( $F = 42.574$ ,  $p < 0.001$ ) confirm that farmers facing different levels of financial stress show significant differences in productivity. Interestingly, farmers with high financial problems recorded slightly higher mean production scores, suggesting that some cultivators may adopt efficient practices, rely on experience, or prioritize resource utilization to overcome financial constraints.

The study highlights that financial stress is not only a barrier to investment in inputs such as fertilizers, irrigation, and pest control, but also influences labor management, orchard maintenance, and overall farm decision-making. Variability in production among farmers with high financial stress points to the need for targeted interventions, as some farmers are able to maintain high efficiency despite constraints, while others lag due to lack of access to credit or technical knowledge.

From a policy perspective, the findings underscore the importance of **enhancing institutional credit access, providing timely government subsidies, and conducting financial literacy and farm management training programs**. Strengthening **Farmer Producer Organizations (FPOs)** and improving post-harvest infrastructure such as storage and transport can further reduce losses and stabilize income.

In conclusion, addressing financial problems among mango cultivators in Palani Taluk is crucial for **improving productivity, ensuring sustainable livelihoods, and promoting the economic development of the horticulture sector**. Future studies can expand this research by examining the impact of credit facilities, market fluctuations, and technology adoption on production efficiency across different regions.

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