

THE ECONOMICS OF PRODUCTION AND PROSPECTIVE MARKETS OF TEZPUR LITCHI

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ABSTRACT

India is the 2nd largest producer of litchi in the world, and 8.88% of the total produce comes from Assam. The Tezpur litchi, organically cultivated in Sonitpur district received GI tag in 2013. In 2022, 99.1 acre land was added to the existing 66.1 acre land in Poruwa for litchi farming ensuring a 150% increase of land for litchi supply in local and foreign markets, by 2028. Manufacturing industries allow optimal use of litchi (with shelf life of 3-4 days), for secondary market in form of juice and squash. However, at present day no such industry exists in Assam.

With the background of achieving Sustainable Consumption and Production, Goal 12 of Sustainable Development Goals, this paper attempts to study the economics of production and prospective markets for Tezpur litchi. It studies the investment on factors of production, expected returns and risk of production from 2022 to 2028. This paper aims to study the consumer market for litchi products, with emphasis on juice industry. It also attempts to understand the scope of the litchi juice market, in terms of size, turnover and risk perception for the producers through this period.

Keywords: Tezpur Litchi, Secondary Market, Sustainable Development Goals, Consumer Market, Risk Perception.

INTRODUCTION

Litchi, native to South China, likely originated in the Kwantung and Fukien provinces and has been cultivated for over 4,000 years. Introduced to India in the 18th century, it spread from Tripura to other regions, particularly Eastern and Northern India. India is now the second-largest litchi producer globally, with an annual output of around 568,200 metric tons across 93,300 hectares. Despite this scale, productivity is low at about 7.5 tons per hectare due to poor fruit retention in humid conditions and inadequate nutrient management. Tezpur, Assam, known for unique varieties like Bombay and Bilati, has received a Geographical Indication (GI) tag for its distinct characteristics, yet commercialization remains limited, with 66% of farmers relying on intermediaries. Improved supply chain models could reduce post-harvest losses and enhance profits. International demand for litchi is rising, especially in the USA, Europe, and Arab nations. Litchi juice, with high sugar content, shows potential for wine production, similar to grape wine. Further processing, such as juice and dry fruit production, offers opportunities for enterprise development, providing substantial returns with minimal investment.

LITERATURE REVIEW

Litchi, native to South China and the Philippine Islands, has been cultivated for 4,000 years in provinces like Kwantung and Fukien^[1]. Alphonse De Candolle noted its introduction in the 3rd century, though unofficial records suggest its importance in China dates back to 2000 B.C^[11]. Litchi still grows in the wilderness of Southern China and Hainan Island^[5]. It reached India in the 18th century, spreading from the northeastern states^[6]. Globally, India ranks second in litchi cultivation after China, producing an average of 7.5 tons per hectare in 2018-2019, limited by nutrient mismanagement and poor climate conditions^[1]. Tezpur, known for its GI-tagged litchi, grows nine major varieties like Bombayi, Bilati, and Shahi, though large-scale plantations remain underdeveloped^[9]. Farmers primarily sell to intermediaries (66%), leading to losses from supply chain inefficiencies^[3]. A streamlined supply chain is essential to reduce wastage and boost stakeholder returns. Despite rising demand in Arab countries, the USA, and Europe, India lags in capturing the Chinese market^[7]. Litchi is ideal for value-added products like juice, canned pulp, and dried fruit. Though grape wine dominates, litchi's sugar-acid balance makes it suitable for wine production, which remains underexplored^[10]. Litchi processing accounts for 10% of horticultural crop processing in India, with potential for enterprise development. Setting up small-scale litchi beverage units requires minimal investment, making it a viable business model^[4].

OBJECTIVES OF THE STUDY

This study aims to fulfil the following objectives:

- To conduct a cost-benefit analysis of the litchi production from 2022 to 2028.
- To delineate challenges associated with litchi cultivation to generate an annual risk percentage in production process.
- To study the scope of litchi beverage market for determining the optimum supply of litchi to processing industries and reduce the post-harvest losses.

RESEARCH METHODOLOGY

Study Area: The survey focuses on Poruwa in Sonitpur district, covering 165.4 acres of litchi farming with 52 farmers since 2022.

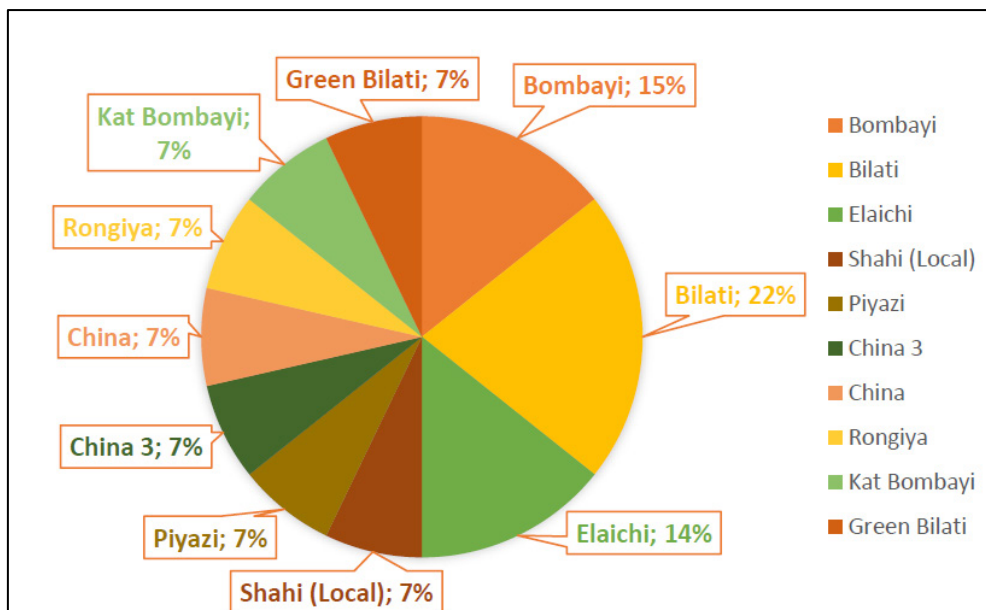
Data Collected: Primary data has been collected for the purpose of this study, from Farmers' Producers' Company, The Megha Quality Foods, The Mahatma Brijmohan Technical and The Shiva Engineers for Food Processing Machinery. Secondary data has been collected from the paper of Ministry of Food Processing Industries, Government of India.

Analyzing Tool: Microsoft Excel was used to organize and analyze the data, employing its pictorial tools for effective data representation.

DISCUSSION/ANALYSIS

Demographics of Litchi Cultivation

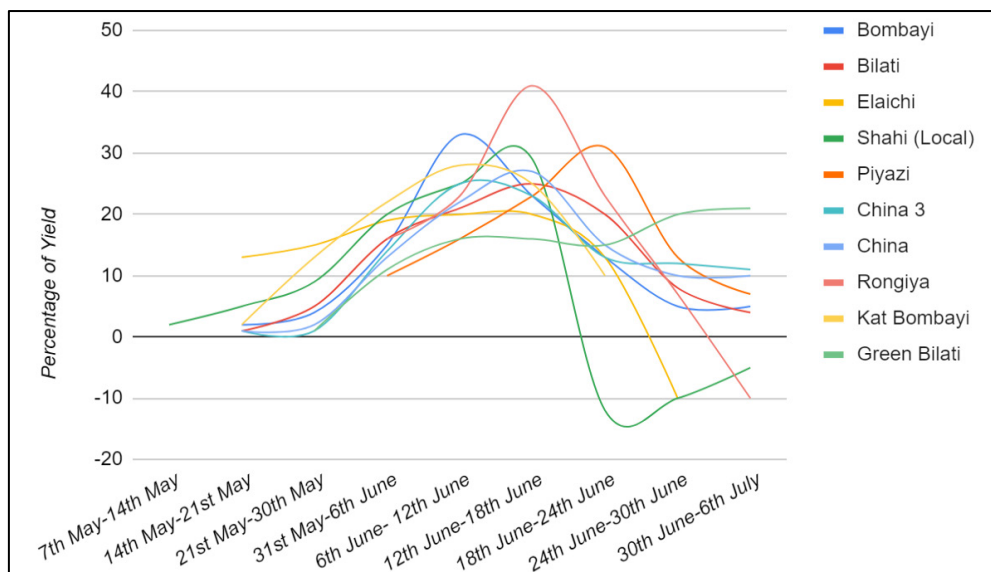
Cultivars are plant varieties selectively bred to pass desirable traits from parent to offspring. In India, around 33 major litchi varieties are cultivated, with 10 of the varieties produced in Sonitpur district's Poruwa area. The different varieties of litchi are grown in accordance to the farmers and owners of the plot. About 14-16 plants are sown in an area of 0.33 acre (1 bigha) that accounts for about 6000-7000 matured litchi plants by 2028 in the total land area.



Graph 1 : Cultivation Pattern of Litchi Varieties

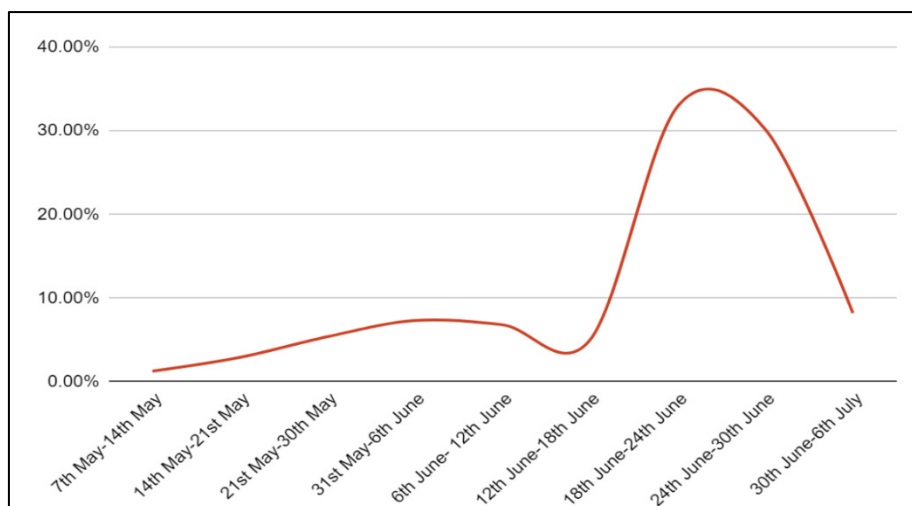
The Season of Cultivation and Harvest

Litchi is a kharif crop, sown in May June. Its varieties have different ripening seasons, classifying them as early, mid, or late season. Understanding peak seasons is crucial, as litchi prices are heavily influenced by harvest timing.



Graph 2 : Production (%) in Harvest Month (early May to early July)

From the chart, it is inferred that the Shahi (Local) litchi is an early season crop, closely followed by Bilati and Bombayi, China and China 3. Pyazi is a late season crop.



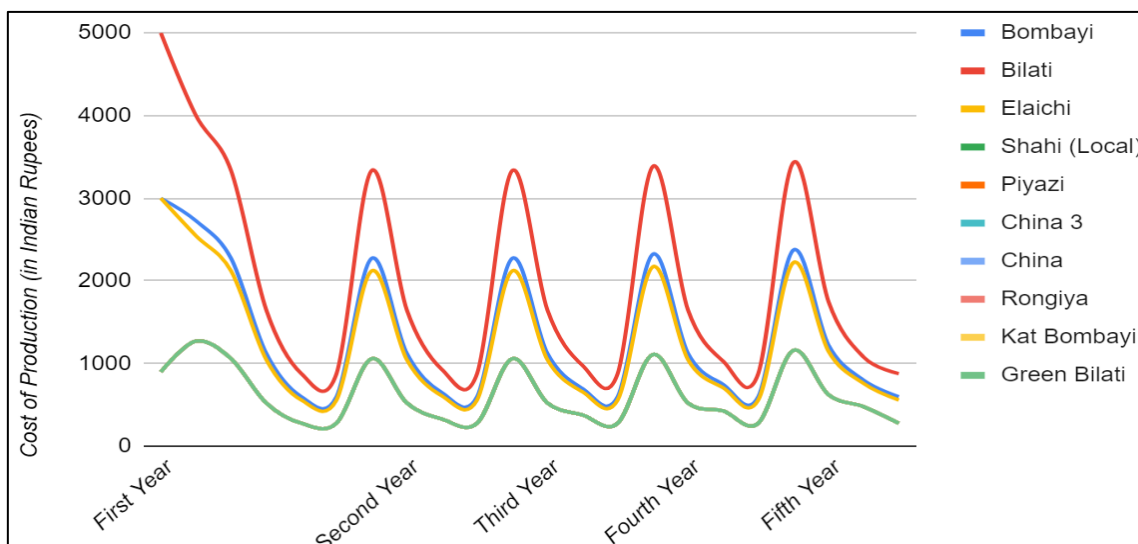
Graph 3 : Average Production (%) during Harvest Month

The Cost-Benefit Analysis

A cost-benefit analysis was conducted to determine the most profitable litchi cultivar by assessing investment and returns over one batch, spanning from cultivation in 2022 to the harvest period projected for 2028.

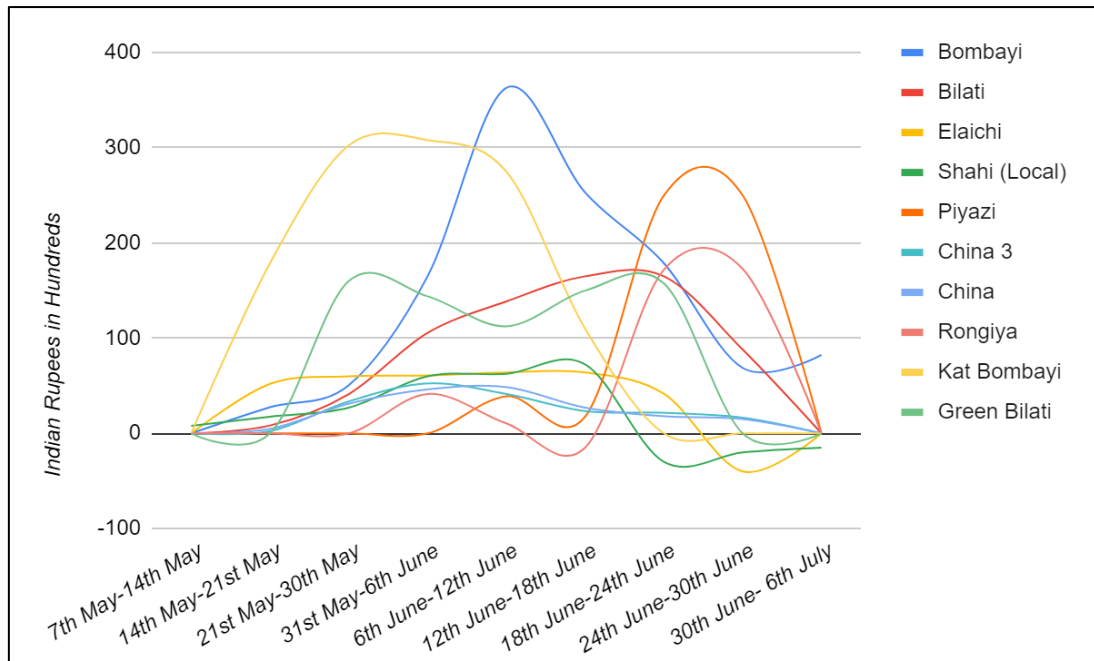
It is inferred that the cost of production for one batch of litchi is ₹1,96,236 or ₹2,59,344.83.

The average cost of production comes out to be around ₹39,247.2 or ₹47,096.64 per year.



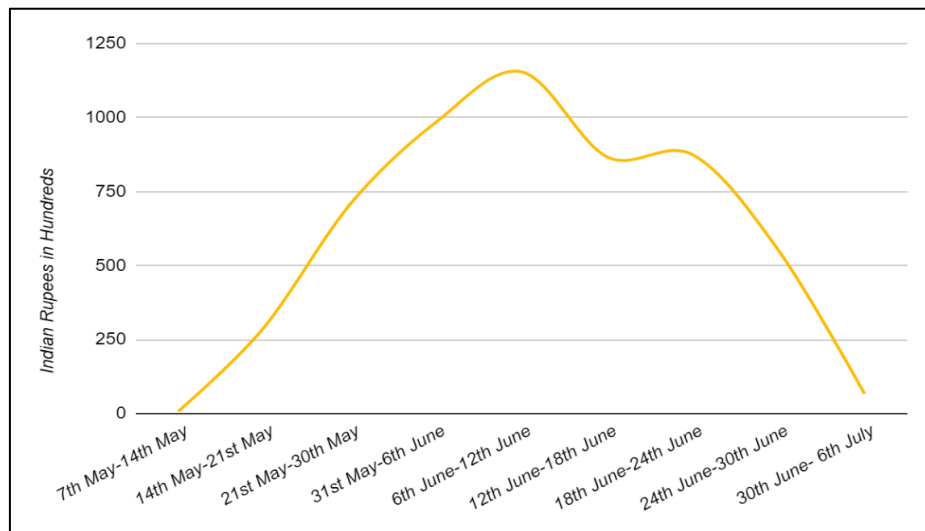
Graph 4 : Cost of Production per Cultivar

The flowering of early season litchi varieties starts from February and the late season varieties flower up till April. The price in the early season starts of high and meddles down in peak season. Prices rise again in the end of the season of litchi.



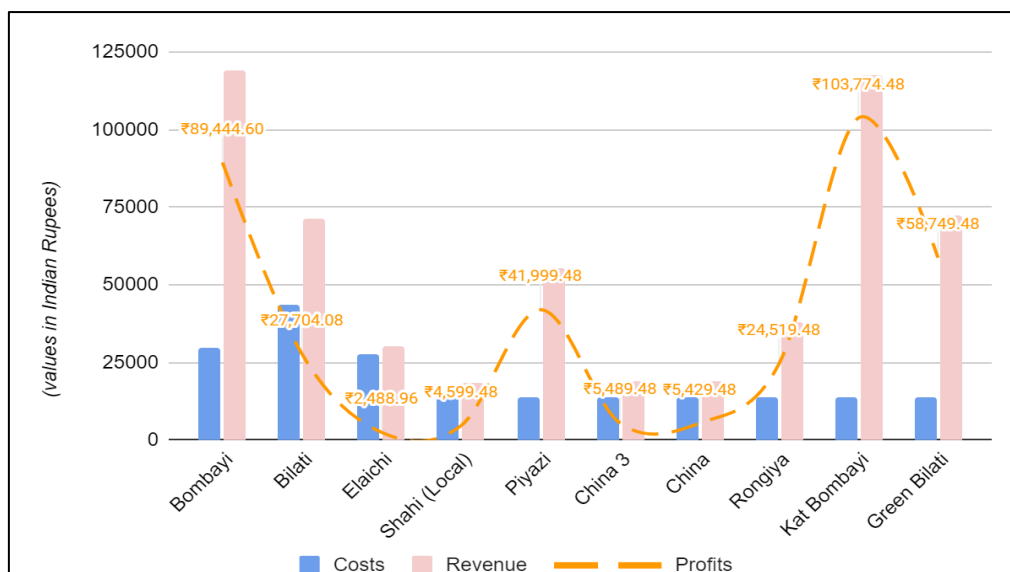
Graph 5 : Pattern of Expected Revenue Generated

It is observed that throughout the harvest season, the price of litchi fluctuates owing to the yield patterns.



Graph 6 : Average Expected Revenue Generated in Harvest Season

It is inferred that most revenue gets generated in early June, there is a dip in the prices by mid-June owing to the post-harvest losses and rotting of litchi.

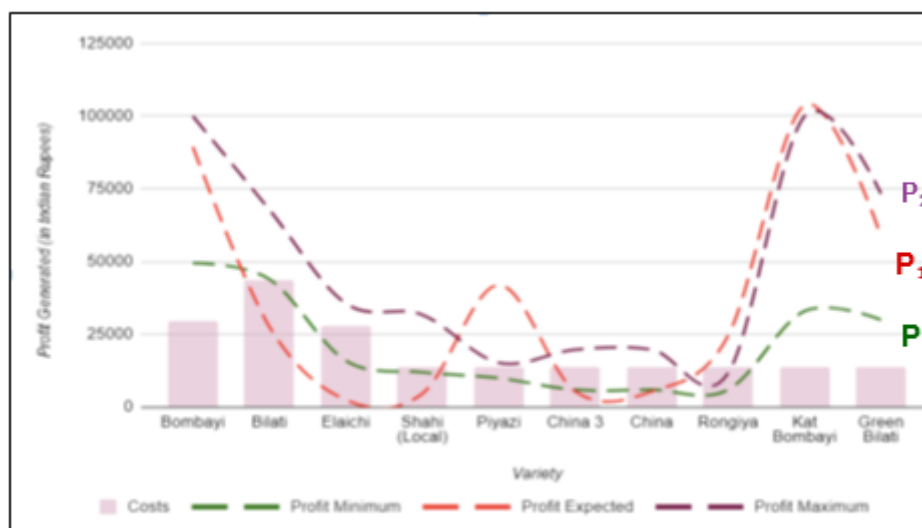


Graph 7 : Representation of the Costs, Revenue and Profit per Cultivar

The average profit is 185% of costs. Kat Bombayi and Green Bilati have the highest profit percentages due to limited supply and alternate bearing patterns, which drive up market prices.

Though the Shahi variety yields more, its profit percentage is lower as excess supply leads to rot and prices dropping to ₹2 per litchi. Late-season varieties, face fewer losses from oversupply but suffer from delayed maturity.

However, actual profit may differ due to potential losses and challenges, creating a “profit gap.”



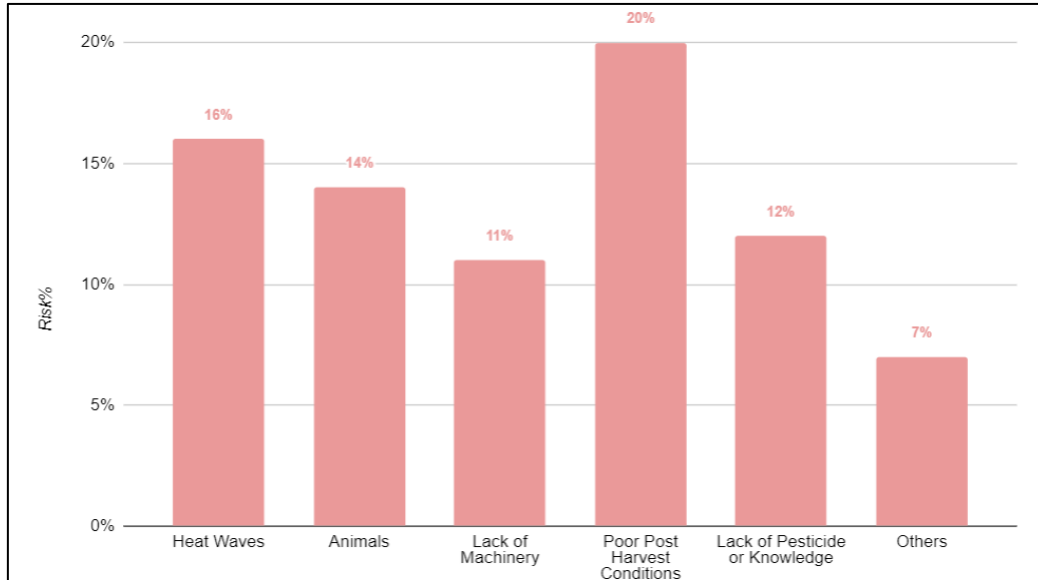
Graph 8 : Gaps in Expected Profit Level and Potential Profits

The P_0 line shows the minimum level, P_1 shows the expected level of profits, and P_2 shows the maximum level of profits that could be generated. Throughout litchi

cultivation, farmers face challenges like unequal land distribution and untimely rainfall. These challenges are classified as risks in the litchi business.

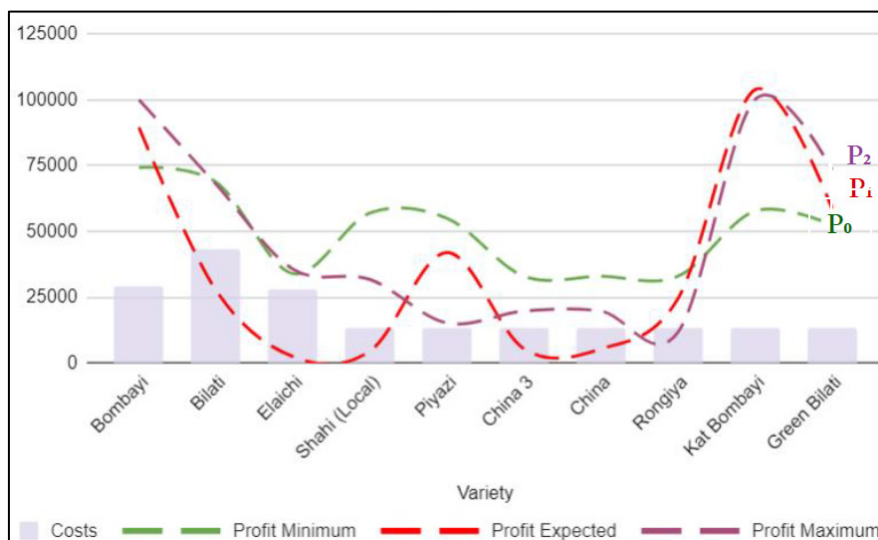
$$\text{Risk\%} = \text{Probability} \times \text{Loss}$$

Equation 1 : Risk Percentage Calculation



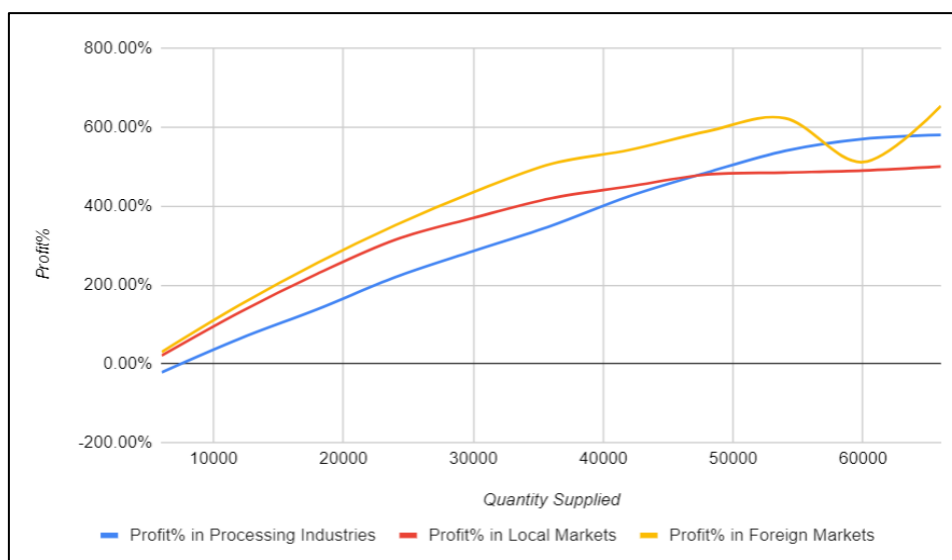
Graph 9 : Risk% of the Challenges in Litchi Production

Redirecting litchis with good pulp to processing industries. This approach would reduce risk by 45%, while boosting profit margins and enhancing yield efficiency. It is inferred that a total of 28575 litchi can be used for processing. In Assam, secondary packaging for beverage industries is done in tin cans, primarily from Amingaon and Sonapur. Sourcing from Jorhat and Nagaon can enhance profitability.



Graph 10 : Profit Gap after Processing Industries

The basic idea behind the concept of sustainability is to know when to stop. It is understood that with increase in supply, the prices reduce, hence, the profit level also goes down.



Graph 11 : Combined Supply Profit Graph

It is concluded that supplying litchi to foreign markets is most profitable for up to 50,000 litchis. supply relationship. For 2028, from expected 280,000 litchis, 50,000 will serve local markets, allowing the rest for foreign and processing markets, which yield better profits beyond that threshold.

CONCLUSION

The study highlights Tezpur litchi's growth potential, indicating that supplying to foreign markets is most profitable up to 50,000 litchis. Improved processing facilities and supply chain efficiency can enhance returns and sustainability, ultimately benefiting farmers and supporting the development of a robust litchi industry in Assam.

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