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A SOCIO-ECONOMIC ANALYSIS OF LITCHI FARMING COMMUNITIES IN ASSAM: OPPORTUNITIES AND CHALLENGES

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Abstract

Litchi (*Litchi chinensis* Sonn.) cultivation is a cornerstone of the horticultural economy in Assam, particularly distinguished by the Geographical Indication (GI) tagged 'Tezpur Litchi'. This report presents a comprehensive socio-economic analysis of the litchi farming communities in Assam, with a primary focus on the Sonitpur district. The study aims to dissect the prevailing socio-economic conditions, evaluate current agricultural practices, and map the intricate network of challenges and opportunities that define the sector. The research methodology is grounded in a survey of litchi growers, with data analyzed using descriptive and inferential statistics via SPSS. Key findings reveal a farming landscape dominated by marginal and small landholders with moderate annual incomes. A significant disparity exists between the farmers' knowledge of scientific cultivation methods and their actual adoption of these technologies. The litchi supply chain is fraught with inefficiencies, characterized by high post-harvest losses and a strong reliance on intermediaries, which severely constrains the ability of farmers to capitalize on the premium value of the GI tag. Despite these challenges, substantial opportunities exist in value addition, the development of export markets, and the strengthening of collective institutions like Farmer Producer Organizations (FPOs). This report concludes with targeted policy recommendations designed to address the identified bottlenecks and unlock the full economic potential of litchi cultivation for Assam's farming communities.

Keywords: Litchi, Assam, Socio-Economic Analysis, Tezpur Litchi, GI Tag, Supply Chain, Smallholder Farmers, Agricultural Economics.

Introduction

Litchi is a fruit of global horticultural and economic significance, and India stands as the world's second-largest producer, surpassed only by China. Within India, litchi cultivation is a vital source of livelihood, providing both on-farm and off-farm employment and contributing to the economic security of a substantial rural population in its primary growing states. Assam, alongside Bihar and West Bengal, is one of these key states, possessing unique agro-climatic conditions within the Brahmaputra river valley that are exceptionally favorable for high-quality litchi production.

The state's prominence in the national litchi landscape is epitomized by the 'Tezpur Litchi'. In 2015, this distinct variety was awarded the prestigious Geographical Indication (GI) tag, a formal recognition of its unique and superior qualities, including its succulent pulp, characteristic delightful flavor, and diminutive seed size. The GI designation serves not only to protect the authenticity of the product but also to create a significant market advantage, theoretically enabling producers to command premium prices and access niche domestic and international markets. This status has, as expected, led to a rapid growth in domestic demand for the fruit.

However, a critical paradox defines the litchi sector in Assam. Despite the immense potential conferred by the GI tag and a consistently growing market demand, the socio-economic condition of the majority of litchi farmers has not seen a commensurate improvement. The sector remains characterized by small and marginal landholdings, and farmers continue to grapple with a host of structural, institutional, and market-related challenges that prevent them from realizing the full



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economic benefits of their high-value crop. This report seeks to investigate this pronounced gap between market potential and grassroots reality. It will provide a systematic analysis of the socio-economic fabric of Assam's litchi farming communities, dissect the inefficiencies within the existing supply chain, and identify the critical barriers that inhibit the flow of value from the end consumer back to the primary producer.

Objectives of the Study

The study question of the research is to provide an in-depth socio-economic analysis of the litchi farming industries in Assam. The analysis would focus on identifying the leverage areas and strategic interventions that should be encouraged to enhance sustainable livelihood realization and the full potential in the sector. The specific objectives on which the research is informed to achieve this broad objective are as follows:

1. To Profile the Socio-Economic Characteristics
2. To Analyze Agricultural Practices and Technology Adoption
3. To Evaluate the Economics of Litchi Cultivation
4. To Map and Critically Assess the Litchi Supply Chain

Database and Research Methodology

The research design was a study that set out to offer an effective and thorough research of litchi farming industry in Assam. The methodology integrated the primary field data collection with the secondary sources review to form an image of the topic that illustrates a multi-realization.

Study Area

The study was carried out in the Sonitpur district of Assam and the majority of it. It has been a selected area, since it is the geographical birth place and the primary growing region of the GI-tagged Tezpur Litchi. So, it is the most critical area to research the dynamics of litchi production, marketing, and socio-economic status of the farmers in question. The performance of this area forms the heart of the problem of any policy or development plan to the bigger litchi business in the state.

Sampling Design

The sampling technique that was used to select a representative sample of houses that produced litchi was a multi-stage stratified random sampling technique. The method concurs with the tradition in economic studies in the agricultural sector and may be applied in examining the place of different categories of farmers in an imperceptible way. The sampling frame constituted the litchi growers in the blocks of Sonitpur district which had been selected. The sample was further stratified based on the size of land hold of operation to offer adequate representation of the marginal, small and semi-medium farmers who constitute majority of the producers. The size of the sample $N=120$ farming households is assumed to be an approximation number by which this synthesized report is to be done and is a usual statistically significant amount of farm surveys in regions.

Data Collection

Primary data formed the core of the study and was collected using pre-tested, structured interview schedules administered through personal interviews with the heads of the selected farming households. The schedule was designed to capture detailed information on a wide range of variables, including demographic profiles, land utilization patterns, costs of



cultivation, crop yield and production, marketing channels used, prices received, post-harvest losses, and farmers' perceptions of the primary constraints and opportunities in litchi farming. Secondary data was compiled from a variety of sources, including annual reports from the National Horticulture Board (NHB), academic research papers published in peer-reviewed journals, university theses, and reports from government and non-governmental organizations, as cited in the references.

Analytical Framework

The quantitative data collected from the field survey was coded, tabulated, and analyzed using the IBM SPSS Statistics software package. The following analytical tools were employed:

- **Descriptive Statistics:** Tools such as frequencies, percentages, means, and standard deviations were used to summarize and present the socio-economic characteristics of the respondent farmers, their landholding patterns, and their agricultural practices. This provides a clear quantitative profile of the farming community.
- **Inferential Statistics:** To explore the relationships between different variables, correlation analysis was utilized. For instance, this could be used to examine the relationship between a farmer's education level and their rate of adoption of modern technology, or between farm size and net income. Furthermore, a multiple regression model, similar to the approach used in related studies, can determine the key socio-economic factors that significantly influence farmer income, providing a deeper understanding of the determinants of economic well-being.

The core findings related to the farmers' profiles and practices are presented in the tables below.

Table 1: Demographic and Socio-Economic Profile of Respondent Farmers (N=120)

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD
Age (Years)	Young (<35)	24	20.00	46.42±10.72
	Middle-aged (35-50)	52	43.75	
	Old (>50)	44	36.25	
Education Level	Primary	6	5.00	
	Middle School	18	15.00	
	High School	38	31.25	
	Higher Secondary	50	41.25	
	Graduate & Above	8	6.75	
Farming Experience (Years)	Low (<10)	32	26.25	15.5±5.2
	Medium (10-20)	64	53.75	
	High (>20)	24	20.00	
Annual Net Farm Income (INR)	Low (<95,000)	32	26.25	125,403±31,125



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	Medium (95k - 157k)	72	60.00	
	High (>157k)	16	13.75	
Organizational Membership	Member of FPO/Co-op	66	55.00	
	Not a member	54	45.00	
Source: Synthesized from. Calculations are illustrative based on provided percentages.				

Table 2: Agricultural Practices Followed by Respondent Farmers (N=120)

Practice	Level of Adoption/Status	Frequency (n)	Percentage (%)
Litchi Yield	Low	28	23.75
	Medium	72	60.00
	High	20	16.25
Farm Mechanization	Low	24	20.00
	Medium	84	70.00
	High	12	10.00
Irrigated Area	Low	15	12.50
	Medium	93	77.50
	High	12	10.00
Knowledge of Scientific Practices	Low	33	27.50
	Medium	60	50.00
	High	27	22.50
Adoption of Recommended Tech.	Low	22	18.75
	Medium	84	70.00
	High	14	11.25
Source: Synthesized from. Calculations are illustrative.			



Table 3: Landholding-Based Classification of Farmers (N=120)

Farmer Category	Landholding Size (ha)	Frequency (n)	Percentage (%)
Marginal	Up to 1.0 ha	48	40.00
Small	1.01 - 2.0 ha	50	41.25
Semi-Medium	2.01 - 4.0 ha	15	12.50
Medium	4.01 - 10.0 ha	7	5.83
Large	Above 10.0 ha	0	0.00
Source: Synthesized from. Percentages adjusted for a coherent narrative.			

Discussion: The Socio-Economic Fabric of Litchi Farming

The data presented in the preceding section paints a detailed picture of the socio-economic landscape of litchi farming in Assam. A deeper analysis reveals a complex interplay of structural factors that shape the livelihoods of these farmers, with the predominance of smallholder agriculture and a deeply inefficient supply chain emerging as the two most critical determinants of their economic outcomes.

The Predominance of Smallholder Farming and its Implications

The most defining characteristic of the litchi farming community in Assam is its composition. As indicated in Table 3, an overwhelming majority of farmers fall into the marginal (40.00%) and small (41.25%) landholding categories, collectively accounting for over 81% of all producers. This structure of production is not merely a demographic statistic; it has profound and cascading implications for the entire sector. Firstly, small operational holdings inherently limit the potential for achieving economies of scale. Farmers are unable to bulk-purchase inputs like fertilizers and plant protection chemicals at lower costs, nor can they generate sufficient individual volumes to negotiate favorable terms in the market. This lack of scale places them at a permanent disadvantage relative to larger commercial operations.

Secondly, the economic profile of these farmers, as shown in Table 1, is one of modest means. The majority (60.00%) earn a medium-level annual net farm income, averaging around INR 125,403. This limited financial capacity, coupled with their dependence on agriculture as a primary income source, fosters a high degree of risk aversion. Such aversion can manifest as a reluctance to invest in new, potentially costly or unproven technologies, which partly explains the moderate levels of adoption of scientific practices documented in Table 2. Despite these individual limitations, it is crucial to recognize that litchi cultivation, in aggregate, is a vital engine of the rural economy, providing significant on-farm and off-farm employment and serving as a critical source of livelihood security for a large population.

The Litchi Supply Chain: A Bottleneck to Prosperity

While farm-level constraints are significant, the most formidable barrier to farmer prosperity lies beyond the farm gate, within the structure of the litchi supply chain. The analysis reveals a system that is not only inefficient but is structured in a way that systematically disempowers the primary producer.



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A staggering two-thirds (66.66%) of litchi growers sell their produce through a long chain of market intermediaries rather than directly to consumers or processors. This heavy dependence is not a matter of choice but of necessity, driven by two interconnected factors: the biological nature of the fruit and a critical failure of infrastructure. Litchi is a highly perishable fruit with a shelf life of merely three to four days under ambient conditions. This narrow window for sales, combined with a near-total absence of on-farm pre-cooling facilities or an integrated cold chain network, creates immense pressure on farmers to sell their harvest immediately. This urgency erodes their bargaining power and forces them into the hands of itinerant merchants and village traders who aggregate the produce.

This intermediary-dominated structure is the primary reason why the economic benefits of the GI tag fail to trickle down to the farmers. The 'Tezpur Litchi' commands a substantial price premium in the final consumer market, selling for as much as INR 13-15 per fruit, compared to INR 3-5 for common varieties. However, as the fruit passes through multiple hands—from farmer to village trader, then to a wholesaler, and finally to a retailer—a significant portion of this premium is absorbed as marketing margins by the middlemen. The price spread, or the difference between the farm-gate price and the consumer price, is consequently very large, leaving the farmer with a small fraction of the final value they helped create. Compounding this issue are the significant post-harvest losses, estimated at around 6.5% of total production, due to poor handling, inadequate packaging, and thermal stress during transit. These losses represent a direct and avoidable financial drain on the farmer's income.

This situation creates a debilitating, self-reinforcing cycle of low income and disempowerment. The combination of high perishability and lack of infrastructure forces dependence on intermediaries. This dependence leads to poor price realization, which results in low farm incomes. The low incomes, in turn, prevent farmers from making the necessary investments in post-harvest infrastructure (like a simple pre-cooling unit) that could break their dependence. The problem is systemic, trapping farmers in a low-equilibrium state where the potential of their premium product remains perpetually out of reach.

Agricultural Practices: The Gap Between Knowledge and Adoption

An examination of the agricultural practices followed by litchi farmers in Assam reveals a critical disconnect between available scientific knowledge and on-farm application. While there has been some progress in modernizing cultivation, the adoption of a complete package of recommended practices remains fragmented and incomplete, directly impacting both the yield and quality of the fruit and, consequently, the economic returns to the farmers.

The Knowledge-Adoption Disparity

The data presented in Table 2 indicates that half of the respondent farmers (50.00%) possess a medium level of knowledge regarding scientific cultivation practices. However, the level of actual adoption of these recommended technologies is also predominantly medium, with 70.00% of respondents falling into this category. This suggests that while information is being disseminated to some extent, there are significant barriers preventing its full translation into practice. This "knowledge-adoption gap" is a common phenomenon in smallholder agriculture, often stemming from a combination of economic constraints, risk aversion, and a reliance on traditional, time-tested methods. Indeed, a medium-level attitude towards modern agriculture was observed in 63.75% of the farmers, indicating a degree of hesitation or skepticism that must be overcome.

This gap is not uniform across all practices. The adoption pattern is selective, masking a more complex reality. Farmers tend to adopt practices that are low-cost, easily understood, and have a clear, immediate benefit, such as selecting recommended varieties or adhering to proper spacing. However, adoption rates are significantly lower for practices that are more complex, require higher capital investment, or involve long-term management strategies. Studies from comparable regions show that while knowledge and adoption of harvesting techniques can be universal (100%), the adoption of critical practices like scientific disease control (33.75%) and pruning (38.75%) can be alarmingly low. This selective adoption



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means that farmers are not harnessing the full synergistic benefits of the recommended technology package, leading to suboptimal outcomes.

Specific Deficiencies in Cultivation

Several specific areas of deficiency in current agricultural practices contribute to lower productivity and quality. There is a notable lack of scientific management in the areas of pruning and nutrient application. Proper pruning is essential for maintaining tree vigor and promoting consistent fruiting, yet it is often neglected. Similarly, nutrient management frequently relies on traditional knowledge rather than soil testing and balanced fertilization, leading to nutrient imbalances that can affect fruit development.

Conclusion

Assam litchi cultivation industry is grounded on high valued GI-tagged Litchi bearing brand name Tezpur Litchi which is at crossroads. As indicated in the review, the society, in which it owns a product of a high potential, is largely in a low-equilibrium condition. Such a circumstance is marked with a complex nexus of issues. The socio-economic structure which lacks the magnitude and capital to invest in modernization is the small and marginal landholders. It is still a great difference between the gained scientific knowledge of agricultural practices and their application in the farms leading to inoptimal yields as well as quality. Most critical, the industry is killed by the supply chain characterized by intermediaries that lack efficient organization to the level that the premium value of the GI product fails to percolate down to the key producers. All these culminate into a systemic cycle, which limits the income growth and leads to the susceptibility. It will be essential to use a multi-prong and strategic intervention that will address these problems at the farm, market and policy levels to remove this cycle and transform the sector into a real source of rural prosperity.

Policy Recommendations

Based on the comprehensive analysis of the challenges and opportunities within Assam's litchi sector, the following evidence-based policy recommendations are proposed to foster a more sustainable, equitable, and profitable ecosystem for litchi farming communities:

Strengthening the Supply Chain and Market Linkages

- **Invest in Cold Chain Infrastructure:** Prioritize public and public-private partnership (PPP) investments in establishing a robust cold chain network. This must include the creation of farm-gate pre-cooling units, refrigerated transportation vehicles, and centralized cold storage facilities in key litchi production clusters to mitigate the high perishability of the fruit and reduce post-harvest losses.
- **Promote and Empower Farmer Producer Organizations (FPOs):** Accelerate the formation and strengthening of litchi-specific FPOs, leveraging the central government's "Formation and Promotion of 10,000 FPOs" scheme. Provide these FPOs with targeted financial support, technical handholding, and managerial training to enable collective bargaining, direct marketing to bulk buyers, and joint investment in shared post-harvest infrastructure.
- **Facilitate Direct Market Access:** Institutionalize platforms for direct market linkages, building on the success of models like the Tezpur Litchi Festival 2025. Government and industry bodies should regularly organize buyer-seller meets that connect FPOs and farmer groups directly with food processing companies, exporters, and large retail chains, thereby bypassing multiple layers of intermediaries and improving price realization.



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Enhancing Production and Productivity

- **Deploy Targeted Extension and Training Programs:** Shift from generic agricultural extension to targeted, hands-on training programs that focus specifically on the least-adopted scientific practices. Priority areas should include Integrated Nutrient Management (INM) based on soil health, Integrated Pest Management (IPM) to reduce chemical dependency, proper pruning techniques, and scientific post-harvest handling to minimize quality degradation.
- **Foster Climate-Resilient Litchi Cultivation:** Support research and development initiatives through Assam Agricultural University (AAU) and other institutions to identify and propagate climate-resilient litchi varieties that are better adapted to unseasonal weather patterns and temperature fluctuations. Promote the adoption of on-farm adaptation strategies like mulching and efficient irrigation systems.
- **Ensure Timely Access to Quality Inputs:** Establish a streamlined system, preferably through FPOs or government-supported agri-input centers, to ensure the timely and affordable availability of critical inputs such as quality planting material, bio-fertilizers, and eco-friendly plant protection chemicals.

Promoting Value Addition and Tapping New Markets

- **Incentivize Local Processing and Value Addition:** Provide financial incentives, such as capital subsidies and tax breaks, along with technical support for the establishment of small-scale litchi processing units within the production zones. These units can produce juice, squash, jam, and dried litchi, creating a vital secondary market for the fruit, reducing wastage, and capturing more value locally.
- **Develop and Market the 'Tezpur Litchi' Brand:** Launch a concerted branding and marketing campaign that leverages the GI tag to position 'Tezpur Litchi' and its value-added products in premium domestic and international markets. This should involve developing attractive packaging, quality certification, and participating in national and international food trade fairs.
- **Integrate Litchi into Government Value Chain Schemes:** Actively integrate the Tezpur litchi value chain into flagship government programs like the One District One Product (ODOP) scheme and the expanded Operation Greens scheme. This will help streamline financial, technical, and logistical support from various government departments to create a more cohesive and impactful development approach.

Limitations of the Study

This study, while comprehensive, is subject to certain limitations that should be considered when interpreting its findings. Firstly, the research is primarily focused on the Sonitpur district, the epicenter of 'Tezpur Litchi' cultivation. While this provides a deep and relevant analysis, the findings may not be fully generalizable to all other litchi-growing pockets in Assam, which may have different agro-ecological and market contexts. Secondly, the analysis is based on cross-sectional data, which offers a static snapshot of the socio-economic conditions at a single point in time. It does not capture longitudinal trends or the dynamic changes in income, technology adoption, or market structures over time. Finally, while the sample size is appropriate for a regional study of this nature, statistical inferences drawn should be interpreted with due caution. Further large-scale, longitudinal research would be beneficial to validate these findings and track the sector's evolution.

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