

Cultivating Coconuts, Confronting Constraints: Production and Marketing Challenges among Coconut Farmers in Kerala, India

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Abstract: Coconut cultivation constitutes an important component of Kerala's agricultural economy, yet cultivators face persistent production and marketing constraints that affect its economic viability. This study examines the status, cultivation challenges and marketing practices of coconut farmers in Urgattiri Gram Panchayat, Malappuram District, Kerala. Primary data were collected from 85 coconut cultivators across 20 wards using a structured questionnaire administered through Google Forms and telephonic interviews, supplemented by secondary data from relevant institutional sources. Descriptive analysis using frequencies, percentages and averages shows that coconut is predominantly cultivated on relatively small holdings and commonly forms part of mixed-cropping systems. Major production constraints include climate change, limited availability of high-yield planting materials, wildlife and pest attacks, financial and irrigation difficulties, labour shortages and rising harvesting costs. Marketing is characterised by substantial dependence on intermediaries, price uncertainty, inadequate storage and transport facilities, and the absence of cooperative marketing. Although farmers demonstrate considerable awareness of value-added coconut products, their participation in direct marketing remains limited. Strengthening production support, cooperative marketing, market regulation and local value-added processing could improve cultivators' economic prospects.

Keywords: Coconut cultivation; Production constraints; Marketing constraints; Value addition; Kerala

1. Introduction

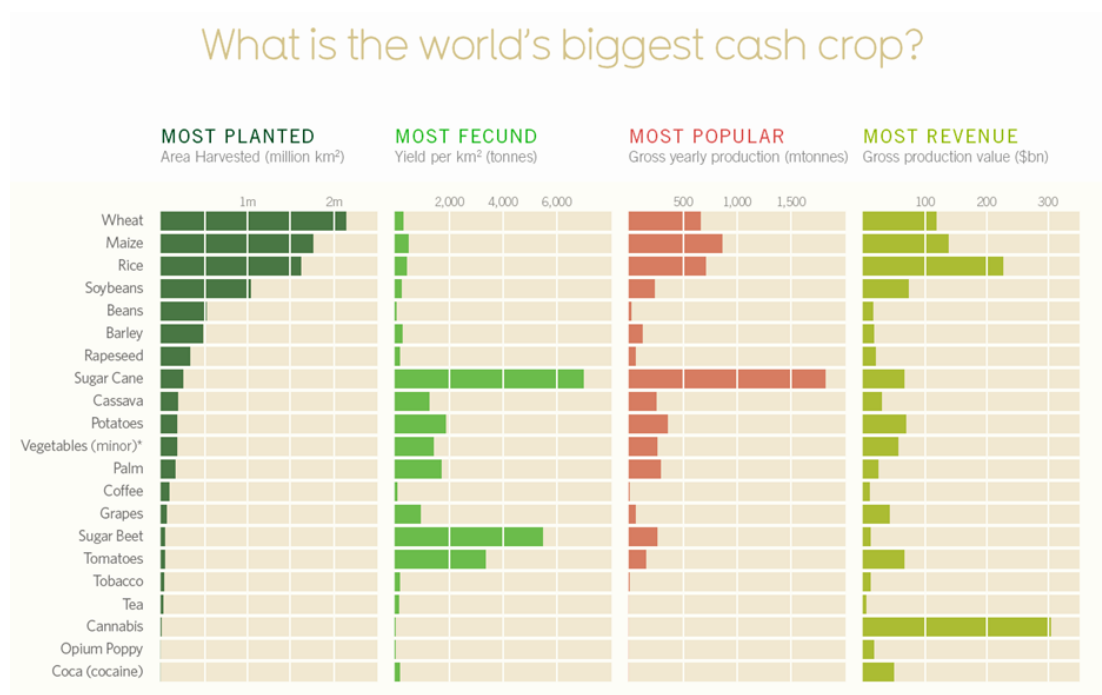
Agriculture remains a fundamental component of economic activity and rural livelihoods, particularly in developing economies where a substantial proportion of the population depends directly or indirectly on farming and allied activities. Within the agricultural sector, commercial crops have an important role in generating farm income, employment and market opportunities. Coconut (*Cocos nucifera* L.) occupies a distinctive position because of its wide range of uses and its importance to small and marginal cultivators. Beyond consumption as a food product, coconut supports several value-added activities involving coconut oil, tender coconut water, copra, coir, shell-based products and other processed products. This economic versatility has contributed to coconut's importance in tropical agricultural systems and rural economies (Hebbbar & Chowdappa, 2017).

Coconut is cultivated in more than 90 countries, particularly across the humid tropical regions. Indonesia, India, the Philippines, Vietnam, Sri Lanka and Papua New Guinea are among the major coconut-producing countries. According to the statistics reported in the present study for 2019–20, approximately 12.57 million hectares were under coconut cultivation globally, producing about 67.70 billion nuts, with an average productivity of 5,386 nuts per hectare. India occupied an important position in the global coconut economy, producing 21,288 million nuts and recording a productivity of 9,901 nuts per hectare in the comparative international statistics reported in the study. Vietnam recorded the highest productivity among the countries presented, followed by India (Horticulture Division, Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India, 2019).

In India, coconut cultivation is concentrated primarily in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh, along with production in several other states and Union Territories. The article's 2019–20 statistics indicate that

India had approximately 2.17 million hectares under coconut cultivation, producing 20,308.70 million nuts with a productivity of 9,345 nuts per hectare. Although the cultivated area generally expanded over the decade, production and productivity fluctuated considerably. Production declined from 23,904.10 million nuts in 2016–17 to 20,308.70 million nuts in 2019–20, while productivity declined from 11,481 to 9,345 nuts per hectare during the same period (Horticulture Division, Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India, 2019).

Figure 1.1: What is the World's Biggest Cash Crop?



Source: United Nations Food and Agriculture Organization and United Nations Office on Drugs and Crime.

Kerala occupies a particularly significant position in Indian coconut cultivation. Coconut is grown across all 14 districts of the state and remains closely associated with its agricultural economy. According to the data presented in the study, Kerala recorded 760,776 hectares under coconut cultivation, production of 48,140 lakh nuts and productivity of 6,328 nuts per hectare in 2019–20. Kozhikode had the largest area under cultivation, while Malappuram recorded the highest reported production at 7,780 lakh nuts. Malappuram also recorded productivity of 7,383 nuts per hectare, placing it among the relatively productive coconut-growing districts of Kerala (Horticulture Division, Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India, 2019).

Within Malappuram, coconut is cultivated across all 16 sub-districts or blocks. Kuttippuram, Tirurangadi, Kondotty, Malappuram and Tanur are among the important coconut-growing areas. The district had 105,381 hectares under coconut cultivation and recorded production of 7,780 lakh nuts, with average productivity of 7,383 nuts per hectare. Considerable variation nevertheless existed across blocks, with Kalikavu, Malappuram and Tirurangadi recording comparatively high productivity. These variations, together with the importance of coconut to local agriculture, provide the geographical basis for examining cultivation conditions at the farmer level.

Despite the continuing demand for coconut and coconut-based products, cultivators face difficulties in obtaining adequate economic returns. The study identifies a mismatch between the commercial potential of coconut and the

conditions experienced by farmers. Declining or unstable productivity, increasing cultivation costs, climate-related pressures, labour constraints, wildlife attacks and difficulties associated with marketing can weaken the economic viability of coconut cultivation. At the same time, limited diversification into value-added products and weak institutional and marketing arrangements can prevent cultivators from benefiting fully from expanding demand. Previous research included in the present study similarly points to the importance of diversification, improved marketing and value addition for strengthening the coconut economy (Banu & Palanivel, 2019; Hebbar & Chowdappa, 2017).

Against this background, the study focuses on coconut cultivators in Urgattiri Gram Panchayat of Malappuram District, Kerala. It has four objectives: (i) to examine the status of coconut farming in India and Malappuram District, Kerala; (ii) to understand the problems faced by coconut cultivators in Malappuram District; (iii) to examine the marketing strategies adopted by coconut farmers; and (iv) to suggest policy measures for improving coconut cultivation and marketing.

2. Review of Literature

2.1 Cultivation, Productivity and Production Constraints

The literature reviewed in the study identifies a range of production-side constraints affecting coconut cultivation, including rising cultivation costs, climatic stress, irrigation difficulties, access to appropriate planting material, and the need for improved cultivation practices. Bhoopathy (2016) observed that although coconut cultivation can remain profitable and provide additional employment opportunities in rural areas, cultivators face considerable difficulties arising from high initial investment and fluctuations in returns. The study emphasized the need for planned and sustained support to improve the economic viability of coconut farming and reduce the problems faced by growers.

Padma, Maheswarappa and Ramanandam (2017) highlighted the vulnerability of coconut cultivation to increasing production costs and abiotic stresses, particularly rising temperature and cyclonic events. Their findings also indicated that farmers practising mixed cropping earned higher incomes than those depending exclusively on coconut monocropping. The authors therefore suggested combining coconut with crops such as cocoa, banana and fodder grasses as a means of strengthening farm income and reducing production risk.

Climate and water management are also important concerns. Darthiya and Lokanadhan (2019) stressed the importance of sustainable and organic coconut cultivation under changing climatic conditions. Their discussion points to the water requirements of coconut and the potential of improved irrigation practices, particularly drip irrigation, to reduce water use. The study argues that organic cultivation combined with appropriate maintenance and irrigation practices can help farmers respond to drought conditions and support long-term production.

Samsudeen and Thamban (2017) further emphasized the importance of conserving and using hereditary coconut varieties within farmers' gardens. According to the study, greater knowledge of coconut diversity can help cultivators plan their planting strategies more effectively while considering sustainability and profitability. Thamban et al. (2017) similarly underlined the importance of effectively extending research findings and technological innovations to coconut farmers and other stakeholders, since cultivators may otherwise remain unable to benefit from available advances in coconut production.

2.2 Coconut Marketing and Market Constraints

The literature also shows that production problems are closely connected with weaknesses in coconut marketing. Aarthi Dhakshana and Rethinavelu (2017), while examining direct marketing among farmers, identified several difficulties that restrict producers' ability to sell directly to consumers. Their study showed that inadequate storage facilities and strong competition constitute important barriers to direct marketing. Such constraints can increase farmers' dependence on existing marketing channels and reduce their ability to obtain better prices for their



produce.

Rethinam (2003) discussed the changing nature of the global coconut market and noted that although India has a substantial position in the export of coir and coir products, its role in exporting several other coconut-based products remains limited. The study linked the changing coconut market to increasing global demand, evolving consumer preferences, concerns relating to product safety and security, and changes in marketing networks. These factors indicate that marketing structures and product positioning are important for improving the competitiveness of the coconut sector.

Banu and Palanivel (2019), in their study of coconut product marketing in Thiruvavur District, emphasized that the coconut sector has considerable scope for expansion but requires changes in marketing practices to respond to emerging market trends. They argued that greater attention to diversification and value addition could improve market opportunities and strengthen the economic prospects of coconut producers.

2.3 Diversification and Value-Added Coconut Products

Diversification and value addition emerge as important opportunities in the reviewed literature. Hebbar and Chowdappa (2017) classified coconut value-added products according to different parts of the coconut, including sap-based, tender coconut water-based, kernel-based, husk-based, shell-based and leaf craft-based products. They identified products such as virgin coconut oil, coconut chips, desiccated coconut powder, coconut milk, tender coconut water, Kalparasa and coconut sugar as potential sources of additional income. Their study suggests that value-added activities can provide cultivators with more stable and profitable income while simultaneously generating employment opportunities in local communities.

Lakshmi (2017) also highlighted the multiple uses of the coconut palm, noting that not only the nut but also the stalk, leaves, shell, fibre and husk can be put to productive use. Such multiple applications strengthen the scope for diversification within the coconut economy. Banu and Palanivel (2019) likewise stressed that product diversification and value addition offer considerable opportunities for recapturing and expanding coconut markets.

2.4 Research Gap

The existing studies demonstrate that coconut cultivators face interconnected problems relating to production, climate, irrigation, input availability, marketing and value addition. However, the literature reviewed in the present study also reveals that region-specific examinations of the cultivation and marketing difficulties faced by coconut farmers remain limited. Findings generated in other regions may not necessarily reflect the specific conditions prevailing in Urgattiri Gram Panchayat. The present study therefore seeks to address this gap by examining cultivation conditions, marketing practices and associated constraints among coconut cultivators in Urgattiri Gram Panchayat, Malappuram District, Kerala.

3. Data and Methods

3.1 Study Area

The study was conducted in Urgattiri Gram Panchayat in Areekode Block of Malappuram District, Kerala. Malappuram is the third-largest district in Kerala in terms of geographical area and has a substantial population dependent directly or indirectly on agriculture. Coconut is one of the major crops cultivated throughout the district. Areekode Block was selected because its coconut productivity was relatively close to the average productivity of Kerala, while Urgattiri Gram Panchayat was selected as the specific study area based on the convenience of sampling. The survey covered coconut cultivators residing across the 20 wards of Urgattiri Gram Panchayat.

3.2 Research Approach and Data

The study adopted a mixed research approach, incorporating quantitative and qualitative primary data along with



quantitative secondary data. The quantitative primary information covered the income, expenditure and other relevant socio-economic indicators of coconut cultivators, as well as information relating to coconut cultivation and marketing. Qualitative information focused primarily on farmers' knowledge and the practices followed in the cultivation and marketing of coconut. The combination of these forms of information was used to examine the status of coconut cultivation and identify the major constraints experienced by cultivators.

Secondary data were also used to establish the broader context of coconut cultivation at the global, national, state and district levels. The secondary information was obtained from sources already identified in the study, including the Coconut Development Board, Department of Agriculture and Farmers Welfare, Kerala Agricultural University, Kerala State Coconut Development Board, Land Revenue Commissionerate, Census of India, and Food and Agriculture Organization, along with other institutional sources listed in the study.

3.3 Population and Sample

The population of the study consisted of major and marginal coconut cultivators belonging to Urgattiri Gram Panchayat, Malappuram District. The respondents were randomly selected from the 20 wards of the Panchayat. The study referred to Census 2011 figures for Malappuram District, according to which there were 11,857 marginal cultivators and 45,710 major cultivators, constituting a total of 57,567 cultivators.

From the study area, a final sample of 85 coconut cultivators was selected for the primary investigation. The sample formed the empirical basis for examining farmers' socio-economic characteristics, cultivation practices, production-related constraints, harvesting and storage difficulties, marketing practices and marketing-related problems.

3.4 Data Collection

Primary data were collected directly from the selected coconut cultivators using a structured questionnaire administered through Google Forms and telephonic interviews. The questionnaire collected information concerning the socio-economic characteristics of respondents, coconut cultivation, yield, cultivation practices, production constraints, harvesting and storage, marketing channels, value-added products and problems associated with the marketing of coconut. The study's abstract similarly specifies that the primary data were obtained from 85 coconut cultivators through Google Forms and telephonic interviews.

3.5 Analytical Tools

The collected data were compiled and analysed using Microsoft Excel and SPSS. Consistent with the descriptive nature and objectives of the study, the analysis primarily employed frequencies, percentages and averages to describe the characteristics of respondents and coconut cultivation in the study area. The responses concerning cultivation and marketing constraints were also presented through frequency distributions based on the rating-scale responses. Tables and figures were used to organise and interpret the results systematically. No inferential econometric or statistical modelling was employed; the analysis remained descriptive in accordance with the analytical approach specified in the original study.

4. Results and Analysis

The results are presented by consolidating the original descriptive analysis into five tables and three figures. All results are based on the primary survey of 85 coconut cultivators in Urgattiri Gram Panchayat. The rating-scale tables retain the study's original coding from 1 to 5.

4.1 Socio-economic Profile of Coconut Cultivators

The socio-economic profile indicates a substantial gender imbalance among the respondents: 83.5% were male and 16.5% female. The age distribution was concentrated in the economically active middle-age groups.

Respondents aged 35–40 constituted the largest group (24%), followed by 40–45 years (21%) and 30–35 years (16%). Together, these three groups accounted for more than three-fifths of the sample.

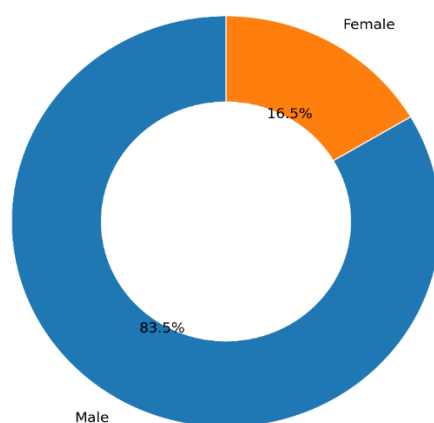


Figure 4.1. Gender Composition of Coconut Cultivators (%)

Source: Primary data collected by the researcher.

Figure 4.1 presents the gender composition of the 85 coconut cultivators surveyed in Urgattiri Gram Panchayat. The distribution shows a substantial gender difference among the respondents, with 83.5% being male and 16.5% female. Thus, more than four-fifths of the surveyed coconut cultivators were men, while women represented less than one-fifth of the sample. No respondents identified themselves under any other gender category.

The predominance of male respondents indicates that coconut cultivation within the surveyed population is largely represented by men. The original study associates this pattern with the prevailing social structure and particularly with the comparatively limited ownership of agricultural land among women. Since the survey was conducted among coconut cultivators and landholders, differences in land ownership are reflected in the gender composition of the sample. The figure therefore demonstrates that the farmer population covered by the study is characterised by a pronounced male majority.

Educational attainment was predominantly at the school level. Higher secondary education accounted for 41.2% of respondents, followed by SSLC (25.9%), upper primary (20%), lower primary (5.9%) and graduation (7.1%). No respondent reported postgraduate or diploma-level education. Regarding marital status, 78% were married, 12% unmarried and 8% widowed; 2% did not disclose their status.

Table 4.1. Annual Income of the Respondents

Annual income (₹)	Frequency	Percentage
Below 10,000	0	0.0
10,000–25,000	2	2.4
25,000–50,000	19	22.4

Annual income (₹)	Frequency	Percentage
50,000–100,000	42	49.4
Above 100,000	22	25.9

Source: Primary data collected by the researcher.

Nearly half (49.4%) earned ₹50,000–₹100,000 annually, while 25.9% earned above ₹100,000. Thus, approximately three-fourths reported annual incomes above ₹50,000. However, farming was not the principal income source for the majority: only 44% obtained the major part of their income from farming, whereas 54.1% did not consider farming their main source of income.

4.2 Farm and Coconut Cultivation Characteristics

Landholdings were predominantly small. About 21.8% cultivated 10–50 cents, 28.2% between 50 cents and one acre, 18.2% between one and two acres, and 23.5% between two and five acres. Only 8.2% possessed more than five acres. The study consequently reports that 68% of the sample owned less than two acres.

Table 4.2. Number of Coconut Trees Cultivated

Number of trees	Frequency	Percentage
Below 50	12	14.1
50–100	24	28.2
100–200	23	27.1
200–500	13	15.3
500–1,000	7	8.2
Above 1,000	6	7.1

Source: Primary data collected by the researcher.

The distribution of coconut trees broadly reflected the landholding pattern. The largest group (28.2%) cultivated 50–100 trees, followed by 27.1% with 100–200 trees; overall, approximately 69% had fewer than 200 coconut trees.

Considerable varietal diversity was observed. TxD was cultivated by 79 respondents (92.9%), followed by Chowghat Orange Dwarf by 50 (58.8%) and Kalpa Sagara by 43 (50.6%). Kalpa Dhenu was reported by 11 respondents (12.9%) and Kalaparaksha by three (3.5%).

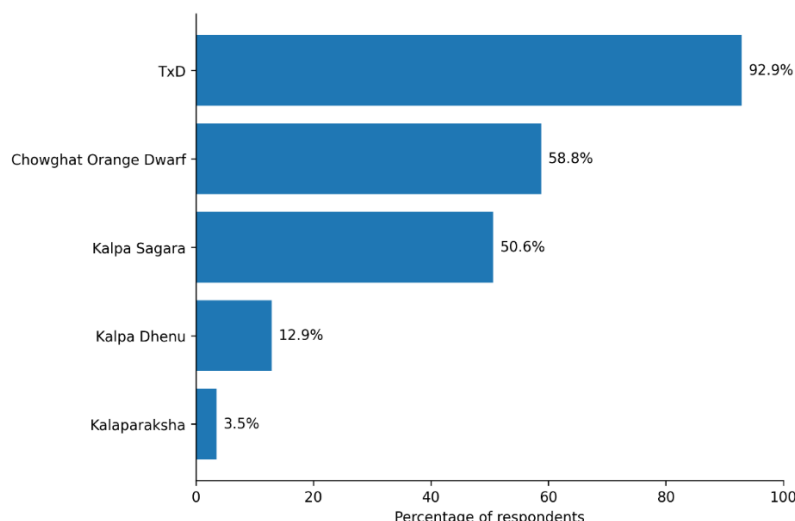


Figure 4.2. Major Coconut Varieties Cultivated (% of Respondents)

Source: Primary data collected by the researcher. Multiple varieties could be reported.

Figure 4.2 illustrates the different varieties of coconut cultivated by respondents in the study area. TxD was the most widely cultivated variety, reported by 92.9% of respondents (79 out of 85). This was followed by Chowghat Orange Dwarf, cultivated by 58.8% (50 respondents), and Kalpa Sagara, cultivated by 50.6% (43 respondents). In comparison, Kalpa Dhenu was cultivated by only 12.9% (11 respondents), while Kalaparaksha was the least commonly reported variety, at 3.5% (three respondents).

The percentages are not mutually exclusive because individual cultivators could have more than one coconut variety on their land. The distribution consequently demonstrates both the presence of varietal diversity and the strong predominance of TxD in the surveyed farms. The original study identifies TxD, Kalpa Sagara and Chowghat Orange Dwarf as the principal varieties cultivated in the study area, with TxD being particularly common among newly planted coconut trees. The findings therefore show that while several varieties coexist within the farming system, cultivation is strongly concentrated around a few major varieties, especially TxD.

Annual yield was concentrated between 40 and 60 nuts per tree. 58% obtained 40–50 nuts, 32% obtained 50–60 nuts and 10% obtained 60–70 nuts. The reported average was 53 nuts per tree per year. Coconut was rarely cultivated alone: 96.5% grew other major crops alongside coconut, particularly nutmeg, cocoa, seasonal tuber vegetables and seasonal spices. Furthermore, coconut constituted the main source of farming income for only 11.8% of respondents, compared with 80% who reported that it was not their main source.

4.3 Constraints in Germination and Planting

Table 4.3. Constraints in Germination and Planting (N = 85)

Constraint	1	2	3	4	5
Climate change	0	0	2	40	43
Pests/wild animals	0	0	30	41	13
Low availability of high-yield nuts/plants	0	0	0	10	75

Constraint	1	2	3	4	5
Low availability of fertilizers/pesticides	0	0	0	18	67
Lack of knowledge	34	13	22	14	2

Source: Primary data collected by the researcher.

The planting-stage results reveal particularly strong concern regarding the availability of high-yield planting material: 75 respondents selected rating 5 and 10 selected rating 4. Climate change was similarly prominent, with 43 respondents selecting 5 and 40 selecting 4. The availability of fertilizers and pesticides also received high ratings, with 67 respondents selecting 5 and 18 selecting 4. Pests and wild animals were identified as another constraint, although 30 respondents remained neutral. In contrast, lack of knowledge was comparatively less important, with 47 respondents selecting ratings 1 or 2 and only 16 selecting ratings 4 or 5. The original analysis therefore identifies quality planting material, climate change and pest/wild-animal attacks among the principal planting-stage concerns.

4.4 Constraints in Growing and Nurturing

The growing and nurturing stage was also characterised by multiple interconnected constraints. Climate change received the strongest response, with all 85 respondents falling within the two agreement categories in the original analysis (17 agreement and 68 strong agreement). Wildlife and animal attacks were likewise identified as a major problem. Financial constraints were substantial: 49 respondents agreed and 16 strongly agreed that inadequate finance limited growing and nurturing activities.

Table 4.4. Major Constraints in Growing/Nurturing Coconut Trees (N = 85)

Constraint	Main result reported in the study
Inadequate finance	49 agreed; 16 strongly agreed
Fertilizers/pesticides	36 agreed; 14 strongly agreed
Climate change	17 agreed; 68 strongly agreed
Pests/wild animals	Identified as a major constraint
Irrigation methods/techniques	Identified as a problem of concern
Knowledge	Relatively less important

Source: Primary data collected by the researcher.

Availability of fertilizers/pesticides and irrigation practices were additional concerns. However, lack of knowledge was not considered as serious as climatic, wildlife, financial and irrigation constraints. The study consequently identifies climate change and wildlife/animal attacks as the dominant nurturing-stage problems, accompanied by inadequate finance and irrigation difficulties.

4.5 Harvesting and Storage Constraints

Harvesting introduced another set of production difficulties. High harvesting costs were widely reported: 60 respondents agreed and 15 strongly agreed that these costs constituted a major limitation. Labour availability was also problematic, with 45 agreeing and 29 strongly agreeing that inadequate labour constrained harvesting/storage

activities. Wildlife attacks were particularly prominent, with 17 respondents agreeing and 66 strongly agreeing that pests/wild animals represented a major limitation.

Machinery availability was less uniformly perceived: 60 respondents were indifferent, while 20 fell within the two agreement categories. The original analysis nevertheless identifies machinery availability as an issue alongside labour and wildlife. Overall, the harvesting results show that wildlife attacks, labour shortages and rising harvesting costs formed the central difficulties encountered by coconut cultivators.

4.6 Marketing Practices and Constraints

The marketing results reveal both considerable awareness of coconut-based value addition and strong dependence on traditional marketing channels. 81.2% of respondents were aware of coconut value-added products, while 11.8% lacked such knowledge and 7.1% reported mixed responses. The products with which farmers were most familiar included coconut oil, soap, coir, and processed foods and beverages.

Despite this awareness, the marketing channel was overwhelmingly dominated by intermediaries.

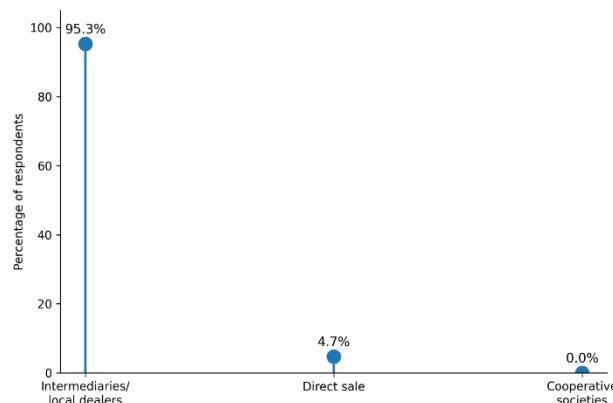


Figure 4.3. Marketing Channels Used by Coconut Cultivators

Source: Primary data collected by the researcher.

Figure 4.3 presents the marketing channels through which the surveyed farmers sold their coconut produce. The results reveal an overwhelming dependence on intermediaries or local dealers. Of the 85 respondents, 81 farmers, representing approximately 95% of the sample, sold their produce through intermediaries, whereas only four respondents, or approximately 5%, sold directly to manufacturers of value-added coconut products. None of the surveyed cultivators marketed their produce through cooperative societies.

This distribution demonstrates that intermediary-based marketing is the dominant marketing arrangement among coconut cultivators in the study area. Direct marketing has only a marginal presence despite farmers' relatively high awareness of value-added coconut products. In fact, 81.2% of the respondents reported awareness of value-added products such as coconut oil, soap, coir, and processed foods and beverages. Nevertheless, this awareness had not translated into widespread direct marketing, since only four respondents used the direct channel.

Another important feature is the complete absence of cooperative marketing. The original study attributes the zero participation in this channel to the non-existence of cooperative societies for coconut marketing in the study area. Consequently, cultivators have limited alternatives to local intermediaries. This finding becomes particularly important when considered alongside the marketing constraints reported by the 81 intermediary-dependent farmers, including high risk or uncertainty, price fluctuations, inadequate transport facilities, inadequate storage facilities, and limited storage or marketing knowledge.

Overall, Figure 4.3 therefore highlights a highly concentrated marketing structure in which approximately nineteen out of every twenty surveyed cultivators depend on intermediaries, while direct marketing remains very limited and cooperative marketing is absent. This pattern constitutes one of the central marketing findings of the study.

Of the 85 cultivators, 81 (approximately 95%) sold through intermediaries/local dealers, whereas only four (approximately 5%) sold directly to manufacturers of value-added products. None marketed through cooperative societies because such societies did not exist in the study area.

Table 4.5. Marketing Constraints by Marketing Channel

Constraint	Intermediaries (N=81): 1–5 ratings	Direct selling (N=4): 1–5 ratings
High risk/uncertainty	0, 0, 0, 14, 67	0, 0, 0, 1, 3
Storage facilities	0, 0, 0, 58, 23	—
Price fluctuations	0, 0, 17, 28, 33	—
Inadequate transport	3, 0, 4, 43, 34	—
Storage/marketing knowledge	0, 0, 4, 44, 23	—
Forced to sell at low price	—	0, 0, 0, 3, 1
Irregular payment	—	0, 0, 0, 2, 2
Price fluctuation/lack of market regulation	—	0, 0, 0, 3, 1

Source: Primary data collected by the researcher.

Among those using intermediaries, high risk or uncertainty was the most uniformly perceived constraint, with all 81 respondents selecting either rating 4 or 5. Storage-related difficulties were also prominent, while price fluctuations, inadequate transportation and limited storage/marketing knowledge emerged as additional concerns. The original analysis consequently identifies high risk and price fluctuations as the major problems associated with intermediary-based marketing, accompanied by inadequate transport and storage facilities.

Although direct selling involved only four respondents, their responses indicate that this channel was not free from difficulties. Three strongly agreed and one agreed that high risk was a constraint. All four also reported being forced to sell at low prices; irregular payment was unanimously regarded as a problem, and all four identified price fluctuations and lack of market regulation as constraints.

Taken together, the empirical results show that coconut cultivation in the study area is predominantly undertaken on relatively small holdings and alongside other crops rather than as an exclusive livelihood activity. Production is constrained at different stages by climate change, availability of planting materials and inputs, wildlife attacks, finance, labour and harvesting costs. At the marketing stage, the overwhelming dependence on intermediaries, combined with price uncertainty, transport and storage limitations and the absence of cooperative marketing, restricts the marketing options available to cultivators. These results correspond with the principal findings identified in the original study.



5. Discussion

5.1 Production-side Constraints

The findings demonstrate that the constraints experienced by coconut cultivators extend across the different stages of production. During germination and planting, the limited availability of high-quality, high-yield planting materials emerged as a major concern, together with climate change, pest and wild-animal attacks, and the availability of fertilizers and pesticides. During the growing and nurturing stage, climate change and wildlife attacks remained prominent, while inadequate finance and irrigation difficulties further affected cultivation. These findings are consistent with the concerns identified in the literature included in the study. Padma et al. (2017) observed that coconut growers experienced production difficulties arising from increasing cultivation costs and abiotic stresses, including rising temperatures and cyclonic events. Darthiya and Lokanadhan (2019) similarly emphasized the importance of appropriate irrigation and cultivation practices for sustaining coconut production under changing climatic conditions.

The constraints continue into harvesting, where wildlife attacks, labour shortages and increasing harvesting costs become particularly important. The predominance of relatively small landholdings and mixed cultivation also characterises coconut farming in the study area: 68% of respondents owned less than two acres, while 96.5% cultivated crops other than coconut. This corresponds with Padma et al. (2017), who found that mixed cultivation could improve farmers' income compared with coconut monocropping. The findings therefore indicate that coconut cultivation is embedded within a diversified farming system rather than functioning as the exclusive agricultural activity of most respondents.

5.2 Marketing-side Constraints

The marketing findings reveal a strong dependence on intermediaries. Approximately 95% of respondents sold coconut through intermediaries or local dealers, while only about 5% sold directly to value-added-product manufacturers, and none marketed through cooperative societies. This dependence is accompanied by high risk and uncertainty, price fluctuations, inadequate transport and storage facilities, and limited storage and marketing knowledge. Direct sellers also reported high risk, low selling prices, irregular payments, price fluctuations and lack of market regulation. These findings reflect the marketing difficulties identified by Aarthi Dhakshana and Rethinavelu (2017), particularly inadequate storage facilities and difficulties associated with direct marketing. Banu and Palanivel (2019) similarly emphasised the need for improvements in coconut marketing and greater attention to changing market conditions.

5.3 Opportunities in Diversification and Institutional Support

Despite these constraints, the findings indicate scope for strengthening farmers' returns through diversification and value addition. 81.2% of respondents were aware of value-added coconut products, including coconut oil, soap, coir and processed foods and beverages. Hebbar and Chowdappa (2017) identified products such as virgin coconut oil, coconut chips, coconut milk, tender coconut water and coconut sugar as opportunities for generating more stable and profitable income from coconut cultivation. Banu and Palanivel (2019) also stressed diversification and value addition as important avenues for expanding coconut markets.

The study's findings therefore point towards the importance of local value-added production, improved marketing arrangements and institutional support. Cooperative societies could provide an alternative to the present dependence on intermediaries, while government intervention in planting materials, wildlife-related protection, market regulation and value-added production could address several constraints simultaneously. These measures remain consistent with the opportunities and recommendations already identified in the study.

6. Conclusion:

The study examined the cultivation and marketing conditions of coconut farmers in Urgattiri Gram Panchayat, Malappuram District, based on primary information collected from 85 cultivators. The findings show that coconut cultivation is predominantly undertaken on relatively small holdings and generally forms part of a mixed-cropping system. Although coconut has substantial economic and commercial potential, cultivators experience constraints throughout planting, nurturing, harvesting and marketing. Climate change, wildlife and pest attacks, availability of high-quality planting materials, financial and irrigation difficulties, labour shortages and increasing harvesting costs emerged as important production-side challenges.

Improvement in cultivation requires greater availability of high-quality, high-yield planting materials and measures to reduce the risks associated with climate change and wildlife attacks. The study particularly recommends mechanisms to protect cultivators against losses caused by wild animals, including appropriate insurance coverage, together with government support for strengthening coconut production.

Marketing conditions require comparable attention. Price fluctuations and the absence of effective market regulation reduce farmers' ability to secure adequate returns. The study therefore recommends an appropriate base price for coconut, stronger market regulation, establishment of cooperative societies and encouragement of local manufacturing units for value-added coconut products. Such arrangements could reduce dependence on intermediaries while creating additional market opportunities for cultivators.

Overall, climate change, animal attacks, labour shortages, price fluctuations, limited value addition and the absence of cooperative marketing arrangements restrict cultivators from fully benefiting from the continuing demand for coconut and coconut-based products. Strengthening production support, marketing institutions and local value addition is therefore central to improving the economic prospects of coconut cultivators.

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