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Key challenges faced in coconut farming across Coimbatore and Tirupur districts, Tamil Nadu

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Abstract

The study intends to analyze the major challenges in coconut farming in Coimbatore and Tirupur districts of Tamil Nadu. The study was carried out through personal interview of 180 respondents (coconut farmers) through a well-structured questionnaire in 6 coconut cultivating blocks of both the districts during the year 2022-23. For the present study, challenges were grouped under crop protection, production management, mechanization and marketing. Under each category various challenges were observed among the respondents. The results show that the major challenges are high labour dearth, which ranks first and high wages, followed by fluctuating nut selling price, higher inputs cost, root wilt disease, Rugose spiralling white flies infestation, rodents damage, water scarcity (Tirupur district) and nutrition management. Positive correlation has been found between farm size and labour dearth. Out of various issues with labour dearth and higher wages advocates the need for suitable advanced mechanization, especially for coconut harvesting. Also, the study discusses the mechanization aspects with respect to observed challenges in coconut cultivation.

Keywords: Coconut farming, current challenges, production, labour cost, mechanization

Introduction

India ranks third and 31.45% of world coconut (*Cocos nucifera*) production, with the production of 20,308 million nuts and area of 2.17 million ha. Fig.1 explains increasing growth in area, production and of coconut in India, also the population of the country. Currently the export of coconut products, (non-coir products) was about Rs.32,500 million (41% increase from past decade). Govindasamy (2018) [3] has mentioned that the global exports of some coconut products for the past few decades, there was a decrease in the export of copra, coconut oil, coconut crease and copra meal, and a significant increase in coco chemicals, coconut shell charcoal, coir as well as coir products. The availability of research support by reputed research organizations such as CSIR, ICAR and DRDO has improved the production and export of coconut products, but still there is a drop in some products.

Pole *et al.* (2014) [15] reported the status of coconut farming and the associated challenges by interviewing 170 farmers in Kenya. There are numerous constraints associated with coconut farming such as senility, unabated cutting of trees, low yielding coconut varieties, poor soil nutrition, pest and diseases, natural calamities, land conversions, research and extension services on value addition, technical skills, and entrepreneurial skills and land tenure-related troubles (Peace and Equity Foundation 2016; Moreno *et al.*, 2020) [11]. According to Parthiban and Anjugam (2021) [13], the most

important marketing constraint for organic farmers was labour dearth followed by price fluctuations. No exclusive market for organic produce was the next important constraint and incidence of pest and diseases was found to be comparatively a least constraint.

Hebbar *et al.* (2022) [4] projected a model, indicates some current coconut cultivation areas will become unsuitable in the South interior Karnataka and Tamil Nadu, favours crop shift, while some other areas (East coast and the south interior plains) may demand, adaptations in agronomic or genotypic management, and the climatic suitability for growing coconut will increase in west coast.

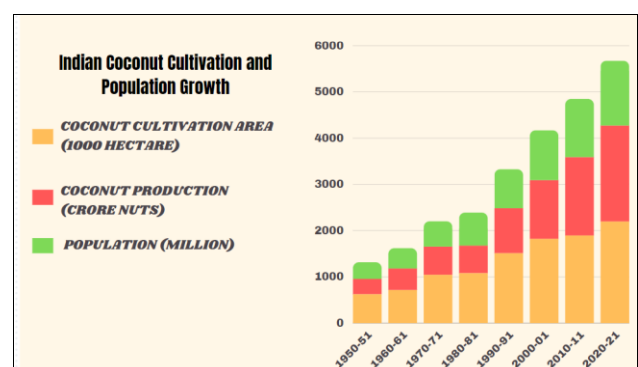


Fig 1: India's Coconut cultivation area, production and population trend of the country (1950-2021)

Between 2013 and 2019, Sivakumar *et al.* (2022) stated a decrease of coconut cultivation area by 5.4% of in Coimbatore and negligible decrease (0.2%) in Tirupur district was found through GIS mapping tool.

It is important to understand the dynamic status of challenges in agricultural crop for policy decisions and effective solution searching researches. Coconut being important crop in Tamil Nadu, challenges favouring its decline must be studied. Hence a study was undertaken at Coimbatore and Tirupur districts for exploring various different challenge aspects of coconut cultivation.

Methodology

Research methodology followed in the study was explained as follows in different sections.

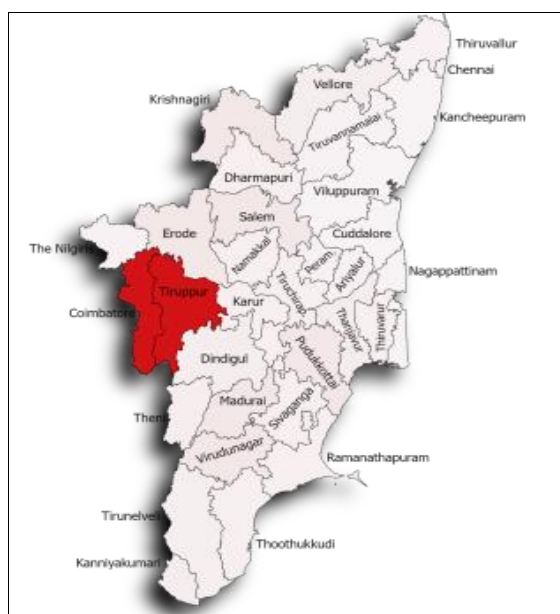
- **Locale of the study:** Map of coconut cultivation in Tamil Nadu (Fig.3b) was developed for understanding the spatial variations in coconut cultivation. From the secondary data collected on annual crop production, it is evident that coconut cultivation was intense at Coimbatore and Tirupur districts (Fig.3a) in Tamil Nadu. The same was confirmed by previous studies as well (Fig.3c). The study area lies in the western agro-climatic zone of Tamil Nadu, surrounded by the Western Ghats. Coconut is the major plantation crop cultivated in both the districts. The other crops in study area include millets, pulses, oilseeds, cotton and sugarcane. Coconut Development Board (CDB), National Mission on Oilseeds and Oil Palm (NMOOP)

Schemes has been implemented in the study area. The blocks Anaimalai, Kinathukadavu, and Thondamuthur were selected from Coimbatore district. The blocks Gudimangalam, Udumalaipet and Pongalur blocks were selected from Tirupur district.

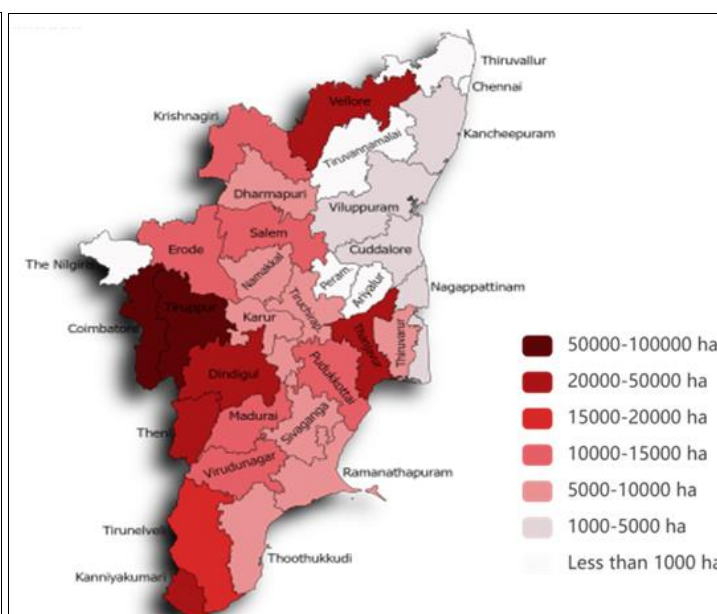
- **Sampling:** Data collection was done during 2022-23. Proportionate random sampling technique was used to select the respondents. 180 respondents (30 from each block) were selected from various blocks of both the district. Further, personal interview method (fig.4) was adopted for collection of the primary data using a well structured interview schedule for this study.
- **Questionnaire:** The study focused on the challenges faced by the coconut farmers in the above mentioned locale. The questionnaire was developed including socio-economic data, cultivation practices and associated challenges, mechanization adoption above challenges, supports required sections. Ranking method was used to design questions on challenges investigation. Closed ended questions were framed for assessing the support requirement.
- **Analysis:** From the collected responses percentage analysis was carried out and results were interpreted. The challenges were categorized into protective challenges, mechanization challenges, marketing challenges, and production challenges. Pearson Correlation coefficient was used to analyse relationship using SPSS software.

Table 1: Demography of Study area

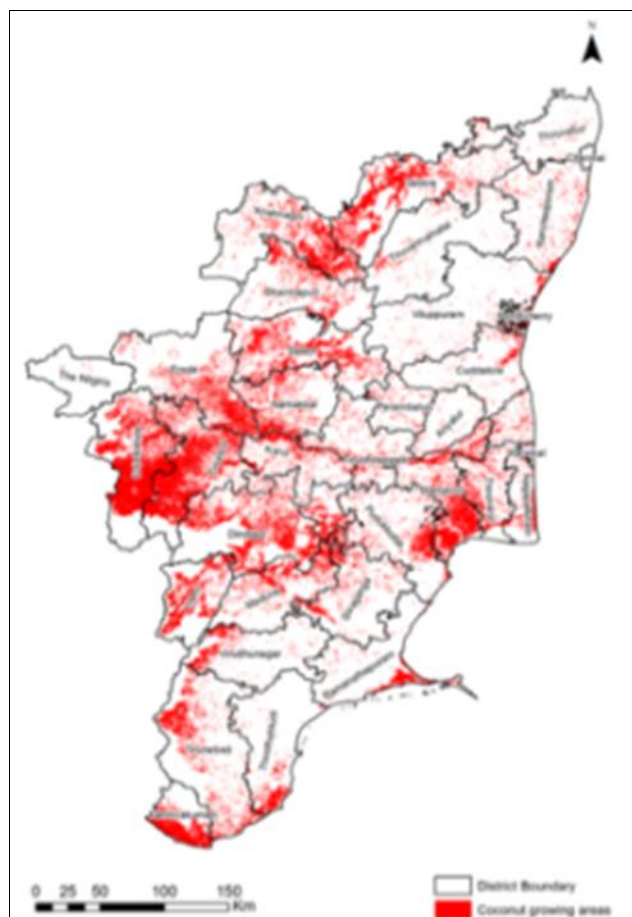
S. No	Details	Coimbatore	Tirupur
1	Geographical area (ha)	3,67,097	4,72,629
2	Net cultivable area (ha)	1,65,260	1,84,645
3	Coconut cultivation area (ha)	88,467	62,000
4	Annual normal rainfall (mm)	708 Manikandan <i>et al.</i> (2011)	551 Vivek <i>et al.</i> (2019)
5	Soil type	Deep red soil and black soil	Loamy, alluvial and clayey soil
6	Total no. of villages	295	265
7	Percentage of farm labours upon total labour population	22.5	19.5



(a)



(b)



(C)

Fig 3: (a) Study area (Coimbatore and Tirupur districts)
 (b) Coconut growing areas in Tamil Nadu
 (c) Coconut growing areas in Tamil Nadu (Kannan *et al.*, 2017) ^[8]





Fig 4: Survey at some locations of study area

Results and Discussion

The respondents' farm size was analysed and results are shown in table no.2. The sample represents the study area population. Fig.5 represents the challenges reported by the respondents.

Table 2: Respondents Farm Size Characteristics

S. No	Sample Parameter	Result
1	Average farm size (Mean)	6.8
2	Most prevalent farm size (Mode)	4
3	Farm size (Range)	18 – 0.75
4	Sample (Numbers)	180

Protection challenges: Pest and disease was a challenge in the Coimbatore district since many years as reported by the previous studies (Nasrin and Parthiban, 2020; Pragadeesh *et al.*, 2022)^[16]. Coconut wilt was observed to be an important challenge faces by the respondents especially in the Anaimalai block. Upon this risk, Tamil Nadu Agricultural University conducted a massive survey at Pollachi taluk in earlier 2024 for assessing the severity of the disease spread. Rugose Spiraling Whitefly (RSW, *Aleurodicus rugioperculatus* Martin) was the common challenges mentioned by the respondents in both the districts. There are various strategies followed to control the same, but still the measures give poor results. Rhinoceros beetle, Red palm weevil attack was reported by few respondents but not as a major challenge. Traces of animals such as elephant and wild boar issues were found at the Thondamuthur block of Coimbatore district. Rodents destroy the developing nuts and causes of mechanical damages were reported in Kinathukadavu block of Coimbatore and commonly in Tirupur district. Adopting mechanical structures, lures, integrated pest and disease management etc., were suggested.



Fig 5: Coconut Wilt Affected Tree

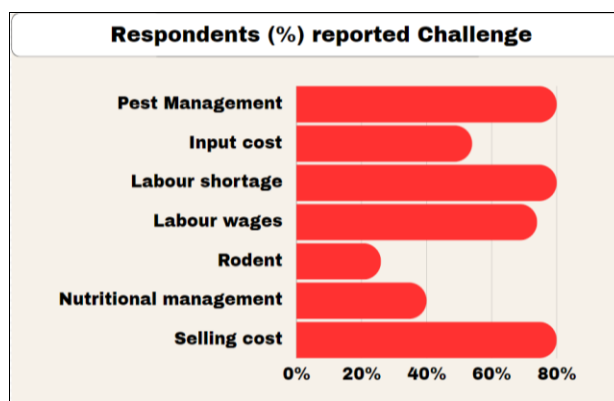


Fig 5: Major Challenges Reported by the Respondents (%)

The above discussion is comparable with Eswaran and Murugan (2019) ^[1] study. Even though, coconut being the highest remunerative commercial crop and less risk-oriented crop, climatic condition, new pest emergence and health status may influence minor diversification.

Mechanization challenges: Pearson Correlation coefficient of 0.413 between farm size and labour dearth shows a positive correlation between farm size and labour dearth. Respondents with small farm holdings are not in great demand for intense labours/mechanization. Onus of intense labour dearth, larger the farms have high demand on mechanization, especially for harvesting machinery. Basin listing is almost mechanized in large farms through walk-behind tractor. Research and developments (table no.3) such as Tamil Nadu Agricultural University, Coimbatore recently obtained a patent for robotic coconut climber-harvester, research outcomes on drone based harvesting, basin listing cum fertilizer application, coconut size grader. Lack of awareness, higher investment, poor effectiveness etc., represents the poor/no adoption of mechanization developments among the respondents.

Production challenges: Hike in chemical inputs such as urea, potash, pesticides etc were reported by the respondents. Marketing of tender coconut is challenging in water scarce parts of Tirupur district due to the desirable size and appearance of product. Previous studies (Kalidas *et al.*, 2020; Kalimuthu & Dharani, 2020; Parthiban & Anjugam, 2021) ^[6, 7, 13] has also mentioned about the price fluctuations as one of the key constraint in coconut farming under this study area. According to Kalidas *et al.* (2020) ^[6], pest and diseases (protective) challenge and fluctuating selling price ranked first and labour issues challenges ranked next followed by high input cost ranked the least. Comparing their results with this study, differences occurred may be due to the presence of other districts in the study area and/or chronological changes.

Nutrition management is found to be a challenge and respondents reported about the poor fruit setting from flowering due to poor nutrition and change in climate which leads to flower fall off. Earlier studies (Pragadeesh *et al.*, 2022) ^[16] reported about the nutritional management challenges in Coimbatore district. The previous research results of the linear regression indicate that the coconut yield responded significantly to inputs such as farmyard manure, bio-fertilizer and coconut cake (Parthiban and

Anjugam, 2021) ^[13]. Tamil Nadu Agricultural University's coconut tonic on enhancing micronutrients was promising to farmers (Kalarani *et al.*, 2009) ^[9]. Awareness dearth and accessibility were limiting TNAU's coconut tonic use. Recently, the product was included with digital marketing platform (*tnauagricart*) of TNAU.

Over exploited (water resources) in 53 out of 71 revenue blocks in the study area. With comparatively less rainfall, blocks of Tirupur district were observed with water scarcity for coconut irrigation. This was comparable with Eswaran and Murugan (2019) ^[1] study, states a diversification of agriculture due to drought reasons. In blocks under Coimbatore district, currently water scarcity was not a significant challenge, contradictory reported (Nasrin and Parthipan, 2020) stated water scarcity as a major constraint during 2019-20.

Marketing challenges: Fluctuating selling price was the major challenge observed. In recent times, coconut price felt a drastic reduction due to the enormous production. About 50 to 75% price decline on nuts as reported by the respondents. Farmers request government for rationalizing the price fluctuations and/or direct procurement of copra for a reasonable price, directly from them without intermediaries. Also there exist a request to sale coconut oil and its products on public stores and carts in order to increase the consumption. On the other side, government encourages the farmers to involve value addition of coconut, in order to combat the price fluctuations. Lack of awareness and higher investment cost are the major obstacles for value addition. The Market Intelligence Cell displays data on arrival and transaction of important agricultural commodities in the Regulated Markets in Tamil Nadu made available through 'AGMARKNET' may help. Optimizing the fertilizer usage through advanced technologies such as variable rate technology can be suggested. Technical and financial assistance are advocated by earlier researches (Govindasamy 2018) ^[13].

Mechanization adoption over challenges: Mechanization in various operations was featured with numerous inventions nationally and internationally. But the adoption level of such commercially developed machines were low. The table no.3 describes the coconut machinery inventions and adoption trends in the study area.

Table 3: Comparison of inventions and respondents' existing adoption of coconut farm mechanization

S. No	Operation	Inventions	Adoption by respondents
1	Establishment	Auger digger, Laser levelling	Front loader with back hoe (100%)*
2	Spraying	UAV, Various sprayers Variable rate technology	Power operated sprayers (74%)
3	Bund forming	Bund former, Fertilizer attachment cum bund former	Power tiller operated bund former (44%)
4	Weeding	Various mechanical orchard weeders	Spraying with power operated sprayers, manual weeding (MGNREGA labourers)
5	Harvesting	UAV based harvesters, Tractor mounted crane, coconut climbers (manual and petrol powered), Robotic coconut tree climbers	Manual Pickers and climbers, manual skilled labours
6		Nutrition management	Manual through spade, knife
7	Logistics	Cable robotic loader	Manual cart (15%), Tractor with trailer (81%)
8	Grading	Automatic coconut size grader	Manual
9	Irrigation	Automated Fertigation system, Precision irrigation system	Flooded irrigation, pipe irrigation
10	Waste management	Coconut shredder	Manual processing

*(% of respondents adopted)

Table 4: Percentage of various support requirements by respondents

S. No	Supports	Coimbatore		Tirupur	
	Age of respondents	<40	>40	<40	>40
1	Value-addition training	32	64	21	66
2	Mechanization	83	92	90	88
3	Water management	20	27	89	91
4	Pest & Disease management	70	31	56	44
5	Nutrition management	72	79	92	89
6	Marketing strategies	83	70	84	83

Support requirements

Various supports demanded by the respondents (table no.4) from government, NGO's, reflected from the priority on constraints reported. Also the literacy gap, age factor, severity of constraint, location had effected the support demands. The results were comparable with the Pragadeesh *et al.*, (2022)^[16], and the major difference can be observed as follows. The mechanization and drought management supports were not reported in previous study, but the respondents needs the most in this study. And other differences in prioritizing may be due to sample variation and chronological changes.

From the above discussion, it is inferred that currently the major challenges were labour dearth demanding mechanization (large farms) and fluctuating selling price. Dynamic nature of challenges on coconut farming, demands various measures in different categories which have to be seriously analysed. Considering this, revision on government efforts in the policy making to combat the challenges and to focus the increased farmer's income may be helpful. Several value addition techniques can be effectively provided along with mechanization packages exclusively for the coconut crop along with effective training to the needful individuals. Plant protection management also comes to crucial play from this study.

Conclusion

The study reported the major challenges experienced by the coconut farmers in Coimbatore and Tirupur districts. Also confirms that challenges are dynamic chronologically. Support from government sectors exists upto some extent, which has to be increased to wider extent as per their requirements. Further studies based on the identified challenges individually can bring more insights and efficient solutions towards the challenges.

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