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Branching beyond monocropping: A study on farmers' attitudes towards coconut-based farming systems in coastal Karnataka

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Abstract

The present study was undertaken to assess the attitude of coconut growers towards various Coconut-Based Farming Systems (CBFS) in coastal Karnataka. A structured attitude scale comprising 33 statements was developed and administered to a sample of 200 coconut growers practicing five major farming systems: mono-cropping, intercropping, mixed cropping, multi-storeyed cropping, and mixed farming. Responses were recorded on a five-point continuum and analyzed using mean scores and ranking methods to evaluate the perception of farmers across five key dimensions: crop diversification, resource management, economic benefits, social benefits, and ecological benefits. The results revealed that growers generally exhibited a positive attitude towards CBFS, with mixed farming and multi-storeyed cropping systems emerging as the most preferred due to their higher perceived benefits in enhancing productivity, ensuring income stability, conserving natural resources, and promoting collective social welfare. Statements related to disaster resilience, biodiversity conservation, income diversification, and reduced environmental impact received higher agreement across all groups. However, lower awareness and acceptance were observed in areas like mulching practices and soil microorganism enhancement. The study concludes that CBFS is widely regarded as a sustainable and resilient farming approach. To maximize its potential, it is essential to promote farmer awareness and strengthen support systems through extension services, training programs, and policy interventions tailored to specific farming contexts.

Keywords: Coconut-based farming systems (CBFS), coconut growers, coastal Karnataka

Introduction

Coconut cultivation plays a pivotal role in the agricultural economy of Coastal Karnataka, which includes the districts of Dakshina Kannada, Udupi, and Uttara Kannada. The region's tropical climate-characterized by abundant rainfall, high humidity, and moderate temperatures-creates a highly favorable environment for coconut farming. Traditionally, coconut growers in this region have practiced integrated and sustainable methods of cultivation, often intercropping coconut with arecanut, cocoa, spices, and other compatible crops. These coconut-based farming systems (CBFS) optimize the use of land and natural resources, improve soil fertility through nutrient cycling, and generate additional income for farm households (Parmar, 2018) [1].

In recent years, Coconut-Based Farming Systems have gained increased attention due to their potential to improve the productivity, profitability, and sustainability of coconut holdings. These systems encompass a variety of approaches including monocropping, intercropping, mixed cropping, multi-storeyed cropping, high-density multispecies cropping, and mixed farming that includes livestock and poultry enterprises. Such diversification not only ensures efficient utilization of inputs like sunlight, water, and soil, but also helps reduce the risks associated with monocropping, while enhancing food, fodder, fuel, and medicinal availability. Despite these benefits, the adoption of Coconut-Based Farming Systems is not without challenges. Coconut growers in Coastal Karnataka often face issues such as saline intrusion, waterlogging, pest and disease infestations (notably rhinoceros beetle and bud rot), lack of labor, fluctuating market prices, and declining soil fertility. Moreover, poor access to quality inputs, location-specific technologies, and timely extension support has hindered the widespread adoption of recommended practices. These constraints-whether socio-economic, technical, or infrastructural-highlight the critical importance of understanding the *attitudes* of coconut growers toward different coconut-based farming systems.

The attitude of farmers significantly influences their decision to adopt or reject a particular farming system. Positive perceptions may lead to greater adoption and innovation, while negative attitudes may hinder progress despite available scientific advancements. Therefore, assessing the attitudes of coconut growers toward various Coconut-Based Farming Systems becomes essential for designing effective extension strategies, research priorities, and policy interventions aimed at sustainable coconut cultivation in Coastal Karnataka (Tavethiya, 2006) [7].

This study seeks to explore the attitude of coconut growers in Coastal Karnataka towards different coconut-based

farming systems, identifying the factors that influence their preferences, adoption behavior, and perceived benefits and constraints. Such insights are vital to promote diversified, sustainable, and economically viable farming practices in the coconut sector (Rashmi, 2018) [2].

Methodology

To assess the attitude of coconut growers towards Coconut-Based Farming Systems (CBFS), a structured attitude scale was administered as the primary tool for data collection. The data was collected from 200 coconut growers from Udupi and Dakshina Kannada districts with 40 coconut growers practicing each farming system. The finalized attitude scale comprised 33 carefully framed statements (as detailed in Table 4), designed to capture a comprehensive range of perceptions, beliefs, and dispositions of farmers regarding various aspects of CBFS.

Each statement in the scale was framed to elicit the respondent's level of agreement on a five-point Likert-type continuum, with the following response categories and corresponding scores:

- Strongly Agree - 5
- Agree - 4
- Undecided - 3
- Disagree - 2
- Strongly Disagree - 1

Out of the 33 statements, some were positively worded while others were negatively worded to avoid response bias and ensure balanced measurement. Appropriate reverse scoring was applied to negatively worded items to maintain consistency in interpretation.

The attitude scale was personally administered to the selected coconut growers through face-to-face interviews. Respondents were briefed about the purpose of the study and assured of confidentiality before the administration of the scale. They were encouraged to respond independently and honestly, without external influence.

The attitude score of each respondent was calculated by summing up the scores obtained across all 33 items. Thus, the minimum possible score on the scale was 33, and the maximum possible score was 165. A higher total score indicated a more favorable attitude towards Coconut-Based Farming Systems, while a lower score indicated an unfavorable or less receptive attitude.

To interpret the results meaningfully, respondents were grouped into three categories based on their total attitude scores. The classification was done using the mean score and half standard deviation as cut-off criteria:

- Highly Favourable Attitude - Scores above (Mean + ½ SD)
- Moderately Favourable Attitude - Scores between (Mean ± ½ SD)
- Unfavourable Attitude - Scores below (Mean - ½ SD)

This classification enabled the identification of variations in farmers' attitudes and helped draw insights on the factors influencing the adoption and receptivity of CBFS among coconut growers. The use of a standardized attitude scale and a systematic scoring method ensured the reliability and validity of the data collected, thereby providing a robust basis for analysis and interpretation.

Results and Discussion

The statement-wise analysis of the attitude of coconut growers towards different Coconut-Based Farming Systems (CBFS) across five major systems - Mono-cropping, Intercropping, Mixed Cropping, Multi-storeyed Cropping, and Mixed Farming - reveals important insights into how farmers perceive the ecological, economic, social, and agronomic value of CBFS. A total of 200 respondents were equally distributed among the five categories, with 40 growers under each system. The results are summarized and discussed under five major thematic areas:

Crop Diversification

Across all farming systems, the statement "Coconut-Based Farming Systems can help to minimize the effects of natural disasters" secured the highest ranks (Mean scores ranging from 3.90 to 4.10), indicating a strong consensus among growers on the resilience of CBFS during environmental uncertainties. Notably, multi-storeyed (4.07) and intercropping (4.10) systems showed the highest agreement. The role of CBFS in preventing migration to urban areas and maximizing land productivity was also viewed positively, albeit with slightly lower scores. The positive perception of coconut canopy aiding in the growth of understory crops was especially high in mixed cropping (3.92) and mixed farming (3.97) systems. This suggests that diversification not only adds resilience but also creates microclimatic benefits, particularly in diversified setups like mixed and intercropping systems (Rajput *et. al.*, 2012) [5].

Resource Management

Farmers practicing mixed farming and intercropping rated resource management benefits of CBFS highly. The statement "CBFS reduces excessive runoff and soil erosion" ranked first across all systems, with the highest mean in mixed farming (3.75) and intercropping (3.65). This reflects awareness among farmers about the conservation benefits of integrated land use. The perception that CBFS prevents overuse of groundwater was most appreciated in mixed cropping (3.62), while the organic practices under CBFS were recognized for their environmental benefits, particularly in mixed cropping (3.72). Although mulching and pest barrier benefits received moderate to low scores (ranging from 2.92 to 3.50), these practices may need further promotion or technical support for better adoption.

Economic Benefits

The economic viability of CBFS was widely acknowledged. Monocropping farmers surprisingly rated CBFS highest for its insurance against crop failure (3.92) and loan repayment benefits (3.87). This might indicate an aspirational outlook toward transitioning to integrated systems. In contrast, multi-storeyed and mixed farming systems reported higher satisfaction with reduced input costs (3.92) and higher total revenues, reinforcing the financial attractiveness of diversified systems. Statements suggesting limitations of CBFS in achieving maximum returns or reduced operational efficiency received relatively low agreement, implying that most growers found CBFS economically feasible and rewarding.

Social Benefits: Social dimensions of CBFS were highly

valued, particularly by growers practicing mixed cropping and mixed farming. The highest-rated statements were related to ensuring quality food, creating social capital, and enhancing coordination among farmers, with mixed farming scoring notably high (up to 4.17). The promotion of FPOs, SHGs, and farm clubs was also positively perceived, especially in multi-storeyed (3.82) and mixed farming (4.00) systems, underlining CBFS's potential in community development and participatory agriculture. However, in systems like monocropping and multi-storeyed, certain aspects such as technical efficiency and individual welfare received relatively lower scores, indicating a need for capacity-building and awareness initiatives.

Ecological Benefits

Coconut growers under all CBFS variants expressed favorable attitudes toward the ecological advantages of CBFS. The statement "CBFS stimulates conservation of biodiversity" received the highest ranks across all systems (up to 3.97 in multi-storeyed and 3.82 in mixed farming), showing a strong ecological consciousness.

The reduction of greenhouse gases and support for pollinators were also positively viewed, especially in mixed cropping (3.57) and mixed farming (3.95) systems. However, organic recycling and soil microbe enhancement received relatively lower scores across all systems, signaling potential gaps in awareness or practice related to soil health and recycling mechanisms.

Table 1: Statement-wise attitude of coconut growers towards different Coconut-based Farming Systems (n=200)

Sl. No.	Attitude Statements	Mono-Cropping (n1=40)		Inter Cropping (n2)= 40		Mixed Cropping (n3) = 40		Multi-storeyed Cropping (n4)= 40		Mixed Farming (n5) = 40	
		Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank
I	**Crop Diversification**										
1.	Coconut Based Farming Systems can help to minimize the effects of natural disasters	4.05	I	4.10	I	3.90	II	4.07	I	3.95	II
2.	Coconut Based Farming Systems prevent migration of growers to urban areas	3.72	II	3.77	II	3.62	IV	33.80	II	3.70	IV
3.	Coconut Based Farming Systems can maximise land productivity in a small area due to farm diversification	3.50	V	3.60	V	3.55	V	3.57	III	3.47	V
4.	Crop diversification due to Coconut Based Farming Systems ensures better growth and yield parameters in crops	3.62	III	3.62	IV	3.45	VI	3.12	VI	3.47	V
5.	Domestication of new crop varieties is possible through Coconut Based Farming Systems	3.55	IV	3.50	VI	3.85	III	3.50	IV	3.85	III
6.	Coconut canopy prevents the air temperature and promotes growth of other crop species growing below the coconut canopy	3.50	V	3.72	III	3.92	I	3.42	V	3.97	I
II	**Resource Management**										
1.	Practice of coconut-based farming system reduces excessive runoff of water and subsequent soil erosion	3.32	I	3.65	I	3.35	III	3.45	I	3.75	I
2.	Formation of root barriers in coconut-based farming systems is an effective measure against water seepage	3.27	II	3.62	II	3.52	IV	3.30	II	3.52	II
3.	Coconut-based farming system prevents over use of ground water and aquifers	3.10	IV	3.30	III	3.62	II	3.32	III	3.50	III
4.	Mulching of the stubble of the subsidiary crop on coconut farms can help to tide over soil borne pathogens and pests	2.95	V	3.12	IV	3.50	V	3.20	IV	3.25	VI
5.	Other species grown along with coconut can be used as vegetative barriers against major pests like rhinoceros beetles	3.27	II	2.92	VI	3.47	VI	3.00	V	3.30	V
6.	Organic farming practices in coconut-based farming system can protect the environment from the ill effects of chemical fertilizers	3.22	III	3.10	V	3.72	I	3.30	II	3.42	IV
III	**Economical- Benefits**										
1.	Coconut-based farming system provides insurance against crop failure	3.92	I	3.62	II	3.67	I	3.42	III	3.50	II
2.	Delay on repayment of loan can be prevented due to practice of coconut-based farming system	3.87	II	3.47	III	3.37	II	3.30	IV	3.45	III
3.	The total revenue accrued from coconut-based farming system was significantly higher than monocrop	3.82	III	3.45	IV	3.22	IV	3.45	II	3.42	IV
4.	Farm operations are not cheaper to carry out while practicing coconut-based farming system	3.67	IV	3.25	V	2.67	VI	3.57	I	3.40	V
5.	Maximum returns from minimum resources is not possible through coconut-based farming system	3.57	V	3.67	I	2.77	V	3.45	II	3.30	VI
6.	Coconut-based farming system reduces the cost on availing inputs	3.55	VI	3.67	I	3.30	III	3.30	IV	3.92	I
IV	**Social Benefits**										
1.	Locally relevant farming practices can be implemented in coconut-based farming systems	3.60	I	3.50	IV	4.02	I	3.15	VI	4.10	II
2.	Coconut-based farming system is not a guaranteed capability to procure food of good quality in a socially acceptable way	3.60	I	3.60	III	3.62	II	3.02	VIII	4.15	I
3.	Coconut-based farming system ensures both collective and individual welfare of growers	3.42	IV	3.70	I	3.37	VII	3.10	VII	3.90	IV
4.	Coconut-based farming system helps in creation of social capital	3.50	II	3.65	II	3.40	VI	3.37	V	3.60	VI
5.	Practicing coconut-based farming system creates better technical efficiency of growers	3.45	III	3.47	V	3.57	IV	3.87	II	3.47	VII
6.	Coconut-based farming system ensures food sovereignty to the farming community	3.40	V	3.40	VI	3.60	III	4.00	I	3.62	V

7.	Coconut-based farming system promotes self- help groups, farmer producer organizations, farm/youth clubs, charitable society and rural technology training centres	3.17	V	3.35	VII	3.52	V	3.82	III	4.0	III
8.	Coconut-based farming system promotes co- ordination among the growers	3.37	VI	3.17	VIII	3.6	III	3.72	IV	4.17	I
V	**Ecological Benefits**										
1.	There is a reduced production of carbon dioxide and green house gases due to practice of coconut-based farming system	3.55	II	3.47	II	3.57	I	3.85	II	3.95	I
2.	Coconut-based farming system stimulates conservation of bio-diversity	3.60	I	3.67	I	3.52	II	3.97	I	3.82	II
3.	Renewal of natural resources cannot be achieved through coconut-based farming system	3.32	III	3.40	III	3.52	II	3.65	III	3.55	III
4.	Coconut-based farming system provides a nature-based solution to environmental problems	3.12	VI	3.30	IV	3.12	III	3.62	IV	3.40	V
5.	Organic recycling due to practice of coconut-based farming systems helps in nutrient enhancement within the farm	3.05	VII	2.92	VII	3.07	V	3.55	V	3.30	VII
6.	Coconut-based farming system ensures welfare of natural pollinators like birds and bees	3.20	IV	3.05	VI	3.10	IV	3.27	VI	3.42	IV
7.	Coconut-based farming system helps in improving beneficial soil micro-organisms	3.17	V	3.12	V	2.95	VI	3.30	VII	3.37	VII

Conclusion

The results clearly indicate that coconut growers perceive CBFS as a sustainable, economically viable, and socially enriching farming model (Shashidhara, 2003) [3]. Particularly, mixed farming and multi-storeyed cropping emerged as the most positively evaluated systems across multiple dimensions, demonstrating their holistic advantages. To further strengthen the adoption and impact of CBFS, efforts should be made to: Disseminate technical know-how related to organic recycling and soil health, Encourage community-based models like SHGs and FPOs, Offer incentives and training for resource-efficient practices. This differentiated attitude analysis also provides a pathway for policymakers and extension personnel to tailor their strategies based on system-specific farmer perceptions. The present study on the attitude of coconut growers towards different Coconut-Based Farming Systems (CBFS) revealed that farmers across all five farming systems - mono-cropping, intercropping, mixed cropping, multi-storeyed cropping, and mixed farming - exhibited an overall positive attitude towards the adoption and practice of CBFS. Among these, mixed farming and multi-storeyed cropping systems were perceived most favorably due to their multidimensional benefits in terms of crop diversification, efficient resource utilization, economic returns, social impact, and ecological sustainability (Nagesh, 2006) [6]. Growers acknowledged the role of CBFS in mitigating the effects of natural disasters, improving land productivity, conserving water, enhancing biodiversity, and generating income security. Social benefits such as the creation of farmer groups, promotion of local knowledge, and food sovereignty were also highly appreciated, especially among growers practicing more diversified systems. However, certain aspects such as mulching practices, organic recycling, and enhancement of soil micro-organisms were comparatively less recognized, indicating the need for targeted awareness campaigns and training programs to bridge the knowledge gaps. Overall, the findings emphasize that promoting CBFS not only supports sustainable agriculture but also strengthens the rural economy and ecosystem. Therefore, it is recommended that government agencies, research institutions, and extension personnel should intensify efforts to popularize the benefits of CBFS through farmer education, demonstration programs, and policy support tailored to specific farming contexts.

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