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An Empirical Analysis of Organic Farming Models Practiced by Farmers in Tamil Nadu

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ABSTRACT: Farmers in Tamil Nadu conducted a study on organic farming models to evaluate the cost and profitability associated with organic farming methods. For the study, three case studies were purposively selected from Coimbatore, Erode, and Nilgiris districts. Farmers in these districts employed various organic farming models. Specifically, three models were chosen: a turmeric-based cropping system in the Erode district, a coconut-based cropping system in the Coimbatore district, and a hill vegetable-based cropping system in the Nilgiris district. In the coconut-based cropping system, it was observed that the yield of coconuts was 6,724 nuts per acre. In comparison, the on-station experiment recorded a yield of 7,910 nuts per tree, resulting in a yield gap of 8%. Similarly, when comparing the yield of bananas, it was found to be 9,610 kg per acre in organic cultivation, whereas the on-station experiment yielded 12,000 kg per acre, indicating a yield gap of 9%. In the turmeric-based cropping system, the organic cultivation resulted in a yield of 11,190 kg per acre, which was lower than the on-station trial output of 13,000 kg per acre, resulting in a yield gap of 14%. However, despite the lower yields, organic farming exhibited a higher benefit-to-cost (B:C) ratio of 1:45 due to its lower cultivation costs compared to inorganic farming showed through case studies that the cost of cultivation is less in organic farming when compared to chemical farming. During the study, it was observed that several challenges arose, including the varying levels of farmer knowledge and experience with organic farming methods, as well as the limited availability and accessibility of organic inputs and resources in the selected districts.

Keywords: Organic farming, cropping system, coconut farming, hill vegetable, cost returns, marketing B:C ratio.

INTRODUCTION

Organic farming is a unique production management system that promotes and enhances the health of the agro ecosystem, including biodiversity, biological cycles, and soil biological activity. This is accomplished by using on-farm agronomic, biological, and mechanical methods while excluding all synthetic off-farm inputs. India has the potential to produce all varieties of organic products due to its agro-climatic regions, and the inherited tradition of organic farming in several parts of the country is an added advantage (APEDA, 2010).

Over the last decade, organic farming systems have attracted increasing attention because they are perceived to offer solutions to the problems currently besetting the agricultural sector. The interplay between organic farming and sustainability conservation models and how it has evolved during the sustainability era has been studied (Charyulu and Dwivedi 2017). The state of Maharashtra in Central India has emerged as a significant hub for organic farming, particularly in the cultivation of vegetable crops, fruits, and sugarcane. Among all the states in India, Maharashtra ranks second in terms of the total cultivated area dedicated to organic farming (Kiran Kumara *et al*., 2015). This indicates a strong resonance and widespread adoption of organic farming practices within the state. According to Tzouvelekas *et al.* (2002), for organic farming to thrive and succeed, it is essential to focus on achieving efficiency. The authors emphasize that policy efforts aimed at supporting organic farming should prioritize ensuring an adequate level of efficiency within individual farms. This highlights the importance of optimizing resource utilization, improving productivity, and implementing effective management practices to enhance the overall efficiency of organic farming systems. Practicing organic farming as an organic farming system (OFS) has shown more sustainability. Developed sustainable organic farming system models pave the way for safe food with nutritional security. Sustainable integrated organic farming system models will enhance agricultural productivity and attract more area under organic farming (Das *et al.*, 2017). Cost-effective integrated organic farming system models are the need of the hour. Hence, this study focuses mainly

on the issues of organic farming models practiced by farmers.

MATERIALS AND METHODS

For this study, three districts with a higher area under organic farming were purposively selected: Coimbatore, Erode, and Nilgiris (TNOCD, 2019-20). In each district, farmers were practicing different organic farming models, namely, Turmeric based cropping system in the Erode district, Coconut-based cropping system in the Coimbatore district, and Hill vegetable-based cropping system in the Nilgiris district. The study employed a case study approach with three cases selected for analysis.

The three case studies models. Turmeric-based cropping system (Erode district) -Case -I

Coconut based cropping system (Coimbatore district) - Case -II

Hill vegetable based cropping system (The Nilgiris district) - Case –III.

RESULTS AND DISCUSSION

Turmeric based cropping system- CASE I

In the first case study, the turmeric-based cropping system was practiced in the Erode district. The main crop is turmeric, followed by fodder/green manure crops. This cropping strategy had been adopted by about 80% of farmers. A farmer named Th.S. Dinakaran possessed 2.5 hectares of alluvial land that was irrigated at Karaivaikal thottam, Thannerpanthal puthur, Kugalur (Po), Gobichettypalayam (Tk), Erode. Two times, a chisel and disc plough were employed to plough the main field. The variety used was PTS 10, also known as Roma regionally, and had a curcumin content of 6.50%. The seed rate was 1000 kg of rhizome per acre with 45 × 15 cm spacing. A variety of organic inputs were used such as FYM, vermicompost, amritha karaisal, fish amino acid, EM solution, castor oil, and groundnut cake.

Table 1 showed that the yield of turmeric grown under inorganic conditions was 12600 kg per acre and that of turmeric cultivated under organic conditions was 11190 kg per acre, in comparison to the on-station trial output of 13000 kg per acre. A yield gap was 14%. However, the B:C ratio in organic farming was higher at 1:45 because organic farming's cultivation costs were lower than those of inorganic farming was higher (Venkatram and Mani 2006). The turmeric-based cropping method proved appropriate for organic farming. Because turmeric can be cultivated in a variety of tropical regions and also thrives in different types of soils (https://agritech.tnau.ac.in/banking/pdf/Tumeric.pdf).

Table 1: Cost and Returns.

Variety	Treatment	Yield as per on-station experiment (kg/ac)	Yield at farmers field (kg/ac)	Yield gap (%)	Inputs used	Total Cost	Returns (Rs.)	Net return (Rs.)	Price of the produce /kg	B:C
Turmeric (Variety-PTS10)	Inorganic	14500	12600	11	Urea, MOP, SSP MN mixture	154290	221760	67470	17.60	1.44
	Organic	13000 (HC&RI PKM)	11190	14	FYM, vermicompost, amritha karaisal, fish amino acid, EM solution, castor and groundnut cake	134290	194371	60081	17.00	1.45
Fodder sorghum	Organic	Grain yield 1290	Grain yield 1032	20		33500	44100	10600	42.50	1.32
		Fodder yield 1800	Fodder yield 1620	10						
Daincha	Organic	8000	7200	10		3800	6000	2200	10.00	1.57

Coconut based cropping system - CASE II

Table 2 inferred that a small farmer named Tmt. Rathna cultivated 1 ha of land on Narasipuram main road, Deenampalayam, Thondamuthur, Coimbatore district. The farmer adopted various varieties such as coconut (DJ), banana (karpuravalli, kathali), chilli (bullet and samba), and turmeric (pragathi), onion (local variety). A 5-layer farming strategy was used for the coconut cropping pattern. In the organic cultivation, coconut yield was recorded at 6724 nuts /ac when compared with the on-station experiment (7910 nuts/ tree). The yield gap was observed at 8%. Comparing the yield of Banana was recorded as 9610 kg/ac to the on-station experiment's12000 kg/ac. Yield gap was observed at 9%.

From Table 2 revealed that Compared to the on-station experiment's 12000 kg/ac production, turmeric yield was measured at 10080 kg/ac. A 20% yield gap was noted. Onion yield was recorded at 5040 kg/ac as compared to 6300 kg/ac in the on-station trial. A 20% yield gap was observed. Banana and turmeric have higher net returns under inorganic cultivation, reasons are long-lasting crops needed a lot of nutrients, careful pest and disease management, and a lot of labour. However, coconut yielded better under organic cultivation compared with inorganic because all of these companion crops are different in duration and require continuous watering for long-term maintenance in addition to nutrient which might have a positive effect on nuts yield was reported by Basavaraju *et al*. (2008); Krishna Kumar *et al*. (2011).

Table 2: Cost and Returns.

Crop	Treatment	Yield as per on-station experiment (kg/ac)	Average yield at farmers field (kg/ac)	Yield gap (%)	Inputs used	Total expenditure	Gross Returns (Rs.)	Net return (Rs.)	Price of the produce /kg	B:C
Coconut (D J variety)	Organic	7910 nuts	6724 nuts	15	FYM, Jeevamrutham Biofertilizers T. *Viride* Fermented butter milk solution	17115	63280	46165	9.50	3.70
Banana (Kathali)		12000	9610	9		51236	96000	44764	10.00	1.87
Turmeric (Pragathi)		12000	10080	20		60062	100000	39938	10.00	1.66
Onion (Small-CO5)		6300	5040	20		40828	75600	34772	15.00	1.85
Coconut (Tall)	Inorganic	7210 nuts	6489 nuts	10	Urea , SSP, MOP, MN mixture	17230	64890	47660	10.00	3.77
Banana (Kathali)		16000	13600	10		71230	145000	73770	11.00	2.04
Turmeric (PTS 10)		13000	11960	8		80000	192000	112000	16.00	2.40
Onion (Small) CO 5)		7200	6480	10		51200	135000	83800	20.00	2.64

Hill vegetable based cropping system- CASE III

According to Table 3 a small farmer named Mr. B. Chandrasekar from Kakhuchi village, the Nilgiris district cultivated carrots (zubera) and cabbage red (bejo, taklia) on a one ha of irrigated land using organic inputs like FYM, vermicompost, vermin wash, neem cake, neem seed kernel extract, neem oil, and herbal leaf extract. The yield of cabbage obtained was 15000 kg/ac, a yield difference of 43% from the on-station experiment's yield of 26200 kg/ac. This finding was in line with Yadav *et al.* (2001) reported that vermicompost along with organic fertilizer showed better yield than other fertilizers in increasing the yield of cabbage. But it was notable that, without chemical fertilizers, vermicompost or other organic fertilizers could not give better yield. The yield of onions was recorded at 4500 kg per acre, which was 25% less than the yield of the on-station experiment, which was 6000 kg per acre. At a B:C ratio of 1:84, the net return on cabbage was Rs. 102778/ac. The onion's overall profit was Rs. 49000/ac with a B:C ratio of 2:19. Vegetable production was lower in organic farming's early years. It needs to be sustained for about four to five years (Singh *et al.*, 2016; Bhattacharya and Chakroborty 2005).

Table 3: Cost and returns.

Crop	Treatment	Yield as per on-station experiment (kg/ac)	Average yield at farmers field (kg/ac)	Yield gap (%)	Inputs used	Total expenditure	Gross returns (Rs.)	Net return (Rs.)	Price of the produce /kg	B:C
Cabbage (Bejo, Taklia)	Organic	26200	15000	43	FYM, Vermicompost Vermin wash, Neem cake , Neem seed kernel extract, Neem oil, Herbal leaves extract-(5 leaves)	122222	225000	102778	15.00	1.84
Onion (Small-CO5) as inter crop		6000	4500	25		41000	90000	49000	20.00	2.19
Cabbage	Inorganic	30000	25000	17	Urea,MOP, SSP	150000	300000	150000	12.00	2.00
Onion (Small)		9000	7000	22		52000	126000	74000	18.00	2.42

Constraints faced by the farmers

- Bulk quantity of organic inputs is required.
- Difficulty in managing pests, diseases, and high incidence of weeds.
- Decline in yield during the transition period.
- Labour-intensive and time-consuming.
- Lack of premium prices for organic products.
- Lack of proper marketing facilities.
- Lack of government support for marketing organic produce.

The observation revealed that the major challenges in organic farming include the limited availability of bulk organic inputs like fertilizers and pesticides, difficulties in managing pests, diseases, high weed incidence, and a decline in yield during the transition period. Ensuring a sufficient supply of these inputs is crucial to support organic farmers in maintaining soil fertility, effectively managing pests and diseases, and minimizing yield losses. According to a study by Ramesh and Santha (2002), farmers adopt different organic farming practices at varying rates. The most widely adopted practices are in situ incorporation of crop residue, with a high adoption rate of 96%, followed by the application of neem oil cake (95%), green leaf manure spraying (92%), farmyard manure application (90%), use of light traps (45%), and crop rotation (43%). The study also identified several major obstacles to practicing pure organic agriculture. These obstacles include limited technological options, high marginal costs and risks associated with shifting from conventional farming, low awareness about

organic farming systems, lack of marketing and technical infrastructure, and additional costs related to inspection and certification.

CONCLUSIONS

In conclusion, the success of organic farming practices is influenced by various factors including crop type, cultivation system, and environmental conditions. The performance of organic farming in coconut-based and vegetable-based cropping systems differed due to factors such as crop variety, duration, canopy, field topography, soil type, and quality. On the other hand, the turmeric-based cropping system demonstrated promising outcomes for organic cultivation under the specific system-based approach. Organic farming further. Additionally, organic farmers face difficulties in marketing their produce. Establishing effective marketing channels and creating awareness among consumers about the benefits of organic products can help increase the demand for organic produce. This, in turn, will provide organic farmers with better market opportunities and financial returns. By addressing these challenges and providing necessary support, more farmers can be encouraged to adopt organic farming practices. This shift towards organic agriculture will contribute to sustainable agricultural practices, promote soil health, conserve biodiversity, and provide consumers with higher-quality and healthier produce.

FUTURE SCOPE

The study emphasizes the significance of organic farming models in promoting sustainable agriculture and rural development. Highlight the implications of the research that may help policymakers, farmers, and other stakeholders to promote various organic farming models among organic growers.

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Conflict of Interest. None.

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