



Analysis of organic farming practices in coconut in South India

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Abstract

The study on 'analysis of organic farming practices' was conducted among 150 coconut farmers selected randomly from five districts viz., Coimbatore and Thanjavur in Tamil Nadu, Calicut and Trivandrum in Kerala and Tumkur in Karnataka during August 2011 to January 2012. Majority of farmers (64%) belonged to middle age category, 97 per cent of the farmers were literates and majority of them were having rich experience in coconut cultivation. Sixty seven per cent of farmers had less than 2 ha. area under coconut and 66 per cent farmers had livestock. Majority of them had medium level of social participation, extension orientation and mass media exposure. Less than one fifth of the farmers (17.3%) had undergone training on organic farming. Only 12 per cent of the farmers were maintaining farm records, only 23 per cent farmers carried out soil testing and very few of them (3.3%) had organic certification. The main reason for adopting organic farming practices was 'to maintain the soil fertility'. Growing intercrops, green manure crops and mulching were the main agronomic practices adopted. Main organic inputs produced or prepared at the farm were crop residues, farm yard manure, cow dung slurry and vermicompost. Farm yard manure, neem cake, neem based insecticides, biofertilizers *etc.* were the major inputs which were purchased from outside. Majority of coconut farmers (68%) had medium level of knowledge on organic farming practices. The mean yield and productivity of coconut was found to be 93 nuts palm⁻¹ year⁻¹ and 13,140 nuts/ha respectively. Gross income from coconut was calculated as Rs. 717 palm⁻¹ year⁻¹ and Rs. 64,825 ha⁻¹. Non-availability of labour, difficulty in controlling pests and diseases by organic methods and non-availability of quality organic inputs were the major constraints.

Keywords: Coconut, constraint analysis, knowledge index, organic farming

Introduction

India is one of the major producers of coconut in the world and about 10 million people are dependent on coconut farming and its allied activities. Coconut is cultivated in 1.89 million hectares with a production and productivity of 15.73 billion nuts and 8303 nuts ha⁻¹ respectively during 2008-09. Kerala, Karnataka, Tamil Nadu and Andhra Pradesh are the four southern states which account for 89.7 per cent of area and 91 per cent of India's coconut production (<http://coconutboard.nic.in/stat.htm>). Diverse agricultural production systems had been practiced by coconut farmers due to diverse agro-climatic conditions. But in the last four to five decades, traditional agriculture was mostly neglected in favour of the modern and intensive agriculture. This had a negative impact not only on agriculture

but also on the economy, environment and social life of people (Mathew, 2010). Organic systems are thriving in various parts of India for the last 20-25 years, but no systematic and institutional work had happened till 2000. National Programme for Organic Production (NPOP) was launched in May 2000 with the objective of promoting organic farming in India. Since then, India is showing rapid progress in organic sector (NCOF, 2008).

Organic farming is a unique production management system which promotes and enhances agro eco-system health, including bio-diversity, biological cycles and soil biological activity and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs (FAO, 1993). Organic farming practices are gaining importance among

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farmers, trainers, entrepreneurs, policy makers, agricultural scientists, processors and extension personnel for varied reasons. It minimizes the dependence of external inputs thus, not only reduces the cost of cultivation but also safeguard and preserve the quality of resources and environment. ICAR Institutes, KVKs, NGOs, State Department of Agriculture and other government and private agencies have started advocating organic farming practices in coconut. If organic farming practices are to be advocated, it requires the support of the research findings for its propagation and implementation. With this background, the study was conducted to investigate the profile characteristics of coconut farmers, to identify the reasons for adopt-ing organic farming practices, to document organic farming practices, to assess the knowledge of farmers on organic farming practices, to record the yield and returns from coconut and to analyze the constraints in adoption of organic farming practices.

Materials and Methods

The study was undertaken in five districts of three states in India *viz.*, Coimbatore and Thanjavur (Tamil Nadu), Calicut and Trivandrum (Kerala) and Tumkur (Karnataka) primarily on the ground of its advantage in having maximum area under coconut cultivation (Table 1). A list of farmers was prepared based on the information from farmers' organizations, State Department of Agriculture and agencies involved in coconut cultivation in the respective districts. Two taluks were identified in each district and from each taluk three villages were selected. Simple random sampling procedure was used for selecting the sample. Five farmers from each village were selected thus the sample was 30 plantations per district constituting the total sample size of 150 farmers. The data collection was done during August 2011 to January 2012 through

personal interview, non-participant observation technique and focus group discussions.

Based on the review of literature, discussion with experts and observation made by the researchers, a list of profile characteristics were identified along with their operational definitions. The profile characteristics of farmers were analyzed by gathering data related to socio-personal, psychological and economic variables. Reasons for adopting organic farming practices were collected using open ended schedule. Documentation of organic farming practices envisaging agronomic practices, nutrient management, pests and diseases management *etc.* were made through observation as well as based on interactions and in-depth discussions with farmers.

A standard test was developed for measuring the knowledge of the farmers about organic farming practices (Bonny, 1991; Jaganathan, 2009). Ten knowledge items were administered to the respondents. A score of 'one' was assigned to the correct answer and 'zero' to wrong answer. The sum of scores obtained for all items indicated the knowledge score of the respondent. Thus, the maximum knowledge score that could be obtained by a respondent was 10 and the minimum was zero. Based on the knowledge score, knowledge index was calculated using the following formula.

$$\text{Knowledge Index} = \frac{\text{Respondent's total score}}{\text{Maximum possible score}} \times 100$$

The constraints in adoption of organic farming practices were collected through open ended schedule. Responses were obtained and the constraints were ranked based on the number of farmers' responses to each constraint. Statistical analysis was done using SAS and the tools employed were mean, standard deviation, percentage analysis, ranking and correlation.

Table 1. Area, production and productivity of coconut in the study area in 2009-2010

Particulars	District				
	Coimbatore	Thanjavur	Calicut	Trivandrum	Tumkur
Area (ha)	79532	32077	119166	71376	4021140
Production (lakh nuts)	11508	4951	8680	5910	285910
Productivity (nuts/ha)	14470	15435	7284	8281	7111

(Source: <http://coconutboard.nic.in/stat.htm>)

Results and Discussion

Profile characteristics of coconut farmers

Thirteen socio-personal and economic characteristics of farmers were analyzed and are

furnished in Table 2. Majority of farmers (64%) belonged to middle age category and young farmers were only 6 per cent. Farming was considered to be a non-profitable business and therefore, most of the

Table 2. Profile characteristics of coconut farmers (n=150)

S. No	Profile characters	Classification	Respondents	
			F	%
1	Age (years)	Young (< 35)	9	6.0
		Middle (35 -60)	96	64.0
		Old (>60)	45	30.0
		Mean: 53.67	SD: 12.88	
2	Educational Status	Illiterate	5	3.3
		Primary	10	6.7
		Secondary	67	44.7
		Higher secondary	26	17.3
		Graduate	33	22.0
		Post graduate	9	6.0
		Mean: 2.66	SD: 1.17	
3	Farming experience (years)	Low (< 15)	32	21.3
		Medium (15- 43)	93	62.0
		High (> 43)	25	16.7
		Mean: 29.17	SD: 14.05	
4	Area under coconut (ha)	Marginal (< 1)	37	24.7
		Small (1- 2)	63	42
		Medium (2.1- 4)	25	16.7
		Big (4.1-10)	15	10
		Very big (> 10)	10	6.7
		Mean: 3.76	SD: 7.96	
5	Total Area under cultivation (ha)	Marginal (< 1)	37	24.7
		Small (1- 2)	54	36
		Medium (2.1- 4)	32	21.3
		Big (4.1-10)	15	10
		Very big (> 10)	12	8
		Mean: 3.91	SD: 7.52	
6	Livestock possession (Rs.)	Very low (0)	51	34
		Low (< 10,000)	5	3.3
		Medium (10,001-30,000)	23	15.3
		High (30,001- 50,000)	23	15.3
		Very High (>50,000)	48	32
		Mean: 66472	SD: 150384	
7	Social participation	Low (< 3)	16	10.7
		Medium (3- 5)	114	76
		High (> 5)	20	13.3
		Mean: 3.93	SD: 1.45	
8	Extension orientation	Low (< 4)	23	15.3
		Medium (4 - 8)	102	68
		High (> 8)	25	16.7
		Mean: 6.14	SD: 2.65	
9	Mass media exposure	Low (< 4)	28	18.7
		Medium (4 - 6)	96	64
		High (> 6)	26	17.3
		Mean: 5.08	SD: 1.71	
10	Training attended on organic farming	Yes	26	17.3
		No	124	82.7
11	Maintenance of farm records	Yes	18	12
		No	132	88
12	Soil testing	Yes	34	22.7
		No	116	77.3
13	Organic certification	Yes	5	3.3
		No	145	96.7

youngsters were not willing to take up coconut cultivation as their occupation. Ninety seven per cent of farmers were literates. Nearly 80 per cent farmers were having rich experience (>15 years) in coconut cultivation. Nearly 67 per cent of farmers had less than two ha area under coconut which typically represents the small and marginal category of holdings. Sixty six per cent farmers had livestock component in farming. Majority of farmers belonged to medium category with respect to social participation (76%) as farmers were members in social organizations like cooperative societies, farmers club, SHGs, *etc.* wherein they had discussion related to farming. Farmers had contact with extension agencies as well as they accessed information from extension sources *viz.*, seminars, meetings, study tours *etc.* which resulted in having medium level of extension orientation by 68 per cent of farmers. Majority of farmers (64%) were having medium level of mass media exposure as they could access information through various news papers, farm magazines, TV, CDs, internet *etc.* Less than one fifth of farmers (17.3%) had undergone training on organic farming which shows farmers do not get the opportunity to attend the training on organic farming practices in coconut. Only 12 per cent of farmers were maintaining farm records, which shows majority of them did not have the knowledge of maintaining the records to know the expenditure and returns from coconut farming. Soil testing was done by 23 per cent farmers which demand the need for strengthening the soil testing facilities in order to follow soil test based manuring schedule. Very few farmers (3.3%) had done organic certification as farmers felt certification as a cumbersome and costly affair. Moreover, certification was mainly done by foreign agencies.

Reasons for adoption of organic farming practices in coconut

The reasons for adopting organic farming practices were collected using open ended schedule. Reasons were classified into health (soil/human), economic and social categories and they were ranked in the order of importance based on the number of farmers perceived it. Maintaining soil fertility was the reason ranked first (Table 3) by 75 per cent farmers as the reason for adopting organic farming

Table 3. Reasons for practicing organic farming practices (n=150)

Reasons	Respondents		Rank
	F	%	
Soil/human health			
To maintain the soil fertility	112	74.7	I
Concern for human health	100	66.7	II
To minimize the environmental pollution	96	64.0	III
To use locally available resources efficiently	66	44.0	IV
Economic			
To minimize the use of external inputs	82	54.7	I
To reduce the production cost	75	50.0	II
Social			
Traditional practice	91	60.7	I
Influence of institutions and other farmers	65	43.3	II

practices in coconut plantations. The other reasons in the order of importance were concern for human health (66%), to minimize the environmental pollution (64%), traditional practice (60%), to minimize the use of external inputs (54%), to reduce the production cost (50%), to use locally available resources efficiently (44%) and influence of institutions and other farmers (43.3%).

With respect to soil/human health reasons, 'to maintain the soil fertility' was found to be the first reason for adopting organic farming practices. Farmers believed that soil is the source of life as reported by John (2000) and Jaganathan (2009). Farmers were aware the ill effects of chemical farming on the health of human beings. Fertilizers and pesticides were used to increase the yield of coconut. However, the indiscriminate use of chemicals not only polluted the soil, water and air but also affected the health of human beings. This changed their mindset to go for organic farming practices and made them conscious of concern for human health, as reported by John (2000). Farmers realized the ill effects of chemical farming on environment. Contamination of water, soil, air and groundwater depletion were other negative effects of inorganic farming. Therefore, farmers were interested in practicing organic farming to minimize the negative environmental effects as observed by Veeresh (1997). Farmers were dependent on external agencies for inputs like seedlings, fertilizers, pesticides *etc.* Moreover, they had to wait for long time for getting the inputs. Therefore, farmers were unable to do the timely management operations leading to yield loss in plantations. By practicing organic farming, farmers became self dependent and

enjoyed freedom in the cultural operations since most of the inputs were available within the farm itself.

Among the economic reasons 'to minimize the use of external inputs' was perceived by more than 50 per cent of farmers. Since inputs were costly and were not available in time, farmers adopted organic farming practices. Farmers had to procure agricultural inputs by availing loan from money lenders. Hence, they started practicing organic farming to reduce the production cost as reported by Veeresh (1997).

Farmers wanted to be the custodian of indigenous knowledge and value systems of the traditional practice. Influence of institutions, other farmers experience and many training programmes and meetings conducted by experts on organic farming influenced the change in cultural operations. The efforts of different KVKs, CPCRI, State Department of Agriculture and SAUs were also noteworthy. These are the major external influences that helped farmers to go for organic farming practices in coconut plantations.

Adoption of organic farming practices by coconut farmers

a. Adoption of agronomic/cultural practices

The practices *viz.*, growing intercrops (80%), mulching (58%), green manure crops (20.7%), green leaf manuring (18.7%) and cover crops (9.3%) were adopted by coconut farmers and are furnished in Table 4.

Intercrops *viz.*, cocoa, nutmeg, banana and black pepper were mostly adopted by Coimbatore and Calicut farmers because of suitable agro-climatic and socio-economic factors. Mathew (2010) reported similar findings. Tuber crops and vegetables

were mostly found in Trivandrum district. Majority of farmers in Thanjavur district were not interested in intercrops because they felt intercultural operations would be difficult. Fodder crops, lemon *etc.* were found as intercrops in Tumkur district of Karnataka. Mulching was practiced using residues of coconut, banana, cocoa *etc.* to conserve the soil and water. Green manure crops like sun hemp (*Crotalaria juncea*) and Kolinji (*Tephrosia purpurea*) were raised by the farmers for enriching the soil fertility. Green leaf manure crops like *Glyricidia*, *Azadirachta*, *Calotropis etc.* were also used by farmers. Leguminous crops like *Stylosanthes gracilis*, *Calopogonium mucunoides*, *Vigna unguiculata etc.* were used as cover crops to prevent soil erosion and for enriching the soil fertility.

b. Use of organic inputs produced/prepared at farm by coconut farmers

Crop residues (66%), farm yard manure (FYM) (65.3%), cow dung slurry (18.7%), vermicompost (10.7%), ash (3.3%) and poultry manure (2%) were found to be the major organic inputs which are given in Table 5.

Crop residues of coconut, banana, cocoa and other weeds were used as organic matter for enriching the soil fertility. Thomas (2010) reported that residues from coconut garden would be 14 t ha⁻¹ year⁻¹ in the form of leaves, spathe, bunch waste and husk. Since they were locally available, farmers could use it as organic manure. Sixty six per cent of farmers had livestock component which resulted in application of FYM for coconut. A few farmers made cow dung slurry/some commercial preparations to increase the microbial load for enriching the soil fertility. Vermicompost was also prepared and applied by some farmers as they had undergone training on vermicompost preparation

Table 4. Agronomic/cultural practices by coconut farmers (n=150)

Organic inputs	Respondents					
	Coimbatore (n=30) F (%)	Thanjavur (n=30) F (%)	Calicut (n=30) F (%)	Trivandrum (n=30) F (%)	Tumkur (n=30) F (%)	Total (n=150) F (%)
Growing of cover crops	2 (6.7)	0 (0)	3 (10.0)	3 (10.0)	6 (20.0)	14 (9.3)
Growing of green manure crops	13 (43.3)	8 (26.7)	4 (13.3)	0 (0)	6 (20.0)	31 (20.7)
Use of green leaf manure	7 (23.3)	4 (13.3)	5 (16.7)	2 (6.7)	10 (33.3)	28 (18.7)
Mulching	19 (63.3)	21 (70.0)	20 (66.7)	13 (43.3)	14 (46.7)	87 (58.0)
Growing of intercrops	30 (100)	6 (20.0)	30 (100)	30 (100)	24 (80.0)	120 (80.0)

Table 5. Use of organic inputs produced/ prepared at farm by coconut farmers (n=150)

Organic inputs	Respondents					
	Coimbatore (n=30)	Thanjavur (n=30)	Calicut (n=30)	Trivandrum (n=30)	Tumkur (n=30)	Total (n=150)
	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
FYM	28 (93.3)	24 (80.0)	18 (60.0)	6 (20.0)	22 (73.3)	98 (65.3)
Poultry manure	1 (3.3)	0 (0)	0 (0)	2 (6.7)	0 (0)	3 (2.0)
Crop residues	22 (73.3)	19 (63.3)	17 (56.7)	19 (63.3)	22 (73.3)	99 (66.0)
Cow dung slurry/ <i>Jeeva amirtham</i>	8 (26.7)	6 (20.0)	7 (23.3)	0 (0)	7 (23.3)	28 (18.7)
Vermicompost	4 (13.3)	5 (16.7)	4 (13.3)	0 (0)	3 (10.0)	16 (10.7)
Ash	0 (0)	0 (0)	5 (16.7)	0 (0)	0 (0)	5 (3.3)

and its application. Ash and poultry manure were used as organic manures by very few farmers.

c. Use of organic inputs purchased from outside source

From Table 6 it is observed that organic inputs *viz.*, farm yard manure (56.7%), neem cake (38%), neem based insecticides (18%), biofertilizers (17%), poultry manure (14%) *etc.* were the major inputs which were purchased from outside.

As the farmers strongly believed that farm yard manure would increase the soil fertility, more than 50 per cent of them purchased it and applied. Neem cake and neem based insecticides were purchased for controlling eriophyid mite, leaf eating caterpillar *etc.* Biofertilizers like *Phosphobacteria*, *Azospirillum* *etc.* were used rarely as farmers could not get them in time with good quality. Poultry manure was the input which was purchased from poultry farm since farmers believed that it would supply essential micro-nutrients. Other inputs *viz.*, sheep manure, vermicompost, bone meal, parasites, bio-control

agents *etc.* were used by a few farmers but, affordability in terms of cost, quality and timely availability was a constraint.

Knowledge of coconut farmers on organic farming practices

Majority of the coconut farmers (68%) had medium level of knowledge about organic farming practices followed by low (22%) and high (10%) levels of knowledge based on the knowledge index classification using mean and SD (Table 7). Coconut farmers surveyed had better education, social participation, extension orientation and mass media exposure which might have influenced knowledge of farmers on organic farming practices.

Table 7. Knowledge Index of coconut farmers on organic farming practices (n=150)

Sl. No.	Category	Score range	Respondents	
			F	%
1	Low (< Mean – SD)	< 51	33	22.0
2	Medium (Mean ± SD)	51-80.6	102	68.0
3	High (> Mean + SD)	> 80.6	15	10.0
		Mean: 65.80	SD: 14.80	

Table 6. Use of organic inputs purchased from outside by coconut farmers (n=150)

Sl. No	Organic inputs	Respondents					
		Coimbatore (n=30)	Thanjavur (n=30)	Calicut (n=30)	Trivandrum (n=30)	Tumkur (n=30)	Total (n=150)
		F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
1	FYM	19 (63.3)	22 (73.3)	18 (60.0)	13 (43.3)	13 (43.3)	85 (56.7)
2	Poultry manure	8 (26.7)	3 (10.0)	1 (3.3)	1 (3.3)	8 (26.7)	21 (14.0)
3	Sheep manure	0 (0)	11 (36.7)	0 (0)	2 (6.7)	8 (26.7)	21 (14.0)
4	Vermicompost	0 (0)	4 (13.3)	1 (3.3)	3 (10.0)	6 (20.0)	14 (9.3)
5	Bone meal	0 (0)	0 (0)	8 (26.7)	0 (0)	0 (0)	8 (5.3)
6	Bio-fertilizers	10 (33.3)	8 (26.7)	4 (13.3)	2 (6.7)	2 (6.7)	26 (17.3)
7	Neem cake	15 (50.0)	19 (63.3)	7 (23.3)	6 (20.0)	10 (30.0)	57 (38.0)
8	Parasites	3 (10.0)	0 (0)	0 (0)	0 (0)	3 (10.0)	6 (4.0)
9	Neem based pesticides	6 (20.0)	7 (23.3)	5 (16.7)	0 (0)	8 (26.7)	26 (17.3)
10	Bio-control agents	4 (13.3)	6 (20.0)	4 (13.3)	2 (6.7)	1 (3.3)	17 (11.3)

It is found that knowledge of farmers on green manures (71.3%), oil cakes (80%), intercropping (84%), mulching (70.7%), earthworms (88.7%), vermicompost (85.3%) and recommended intercrops (79.3%) were fairly high when compared to the knowledge of farmers on botanical pesticides (39.3%), biofertilizers (33.3%) and biocontrol agents (27.3%) (Table 8). This conveys strong message to the scientists, extension workers, input dealers and

Table 8. Knowledge of coconut farmers on organic farming practices (n=150)

Sl. No.	Knowledge items	Respondents with correct answer	
		F	%
1	Name one green manure crop which is used for increasing the soil fertility	107	71.3
2	Name two oil cakes used for pest and disease control	120	80.0
3	Advantages of intercropping	126	84.0
4	Mulching is done for	106	70.7
5	Which one is called as farmers' friend?	133	88.7
6	Mention one bio-control agent which is used for disease management	41	27.3
7	Name one botanical pesticide which is used for pest management	59	39.3
8	The method of producing compost using earthworms	128	85.3
9	Recommended intercrops in coconut	119	79.3
10	Name one bio-fertilizer	50	33.3

change agents that farmers have sound practical knowledge which they have been doing traditionally. So intervention programmes *viz.*, training programmes, exposure visits, demonstrations *etc.* are needed with respect to botanical pesticides, biofertilizers and bio-control agents in order to improve the technical know-how of farmers which will result in better adoption.

Relationship between profile characteristics and knowledge of coconut farmers on organic farming practices

Profile characteristics like education, social participation, extension orientation and mass media exposure were found to have positive and significant relationship with knowledge on organic farming practices (Table 9). Farmers with more education, social participation, extension orientation and mass media exposure would have accessed information which resulted in more knowledge on organic farming practices when compared to other farmers.

Table 9. Correlation between profile characteristics and knowledge on organic farming practices

Sl. No.	Profile characteristics	r value
1	Age	0.074
2	Educational status	0.165*
3	Farming experience	0.061
4	Area under coconut	0.059
5	Total area under cultivation	-0.012
6	Livestock possession	0.012
7	Social participation	0.242**
8	Extension orientation	0.299**
9	Mass media exposure	0.321**

*- Significant at 5 % level, **- Significant at 1% level

Farmers acquired information on organic farming through exposure and interaction within and outside the social system which might have influenced their knowledge. Active participation of farmers in training programmes on sustainable agriculture, interaction with scientists, extension personnel *etc.* might have paved way for increasing their knowledge. Farmers were attracted to organic farming practices since information was disseminated through mass media like television, radio, news papers, other periodicals *etc.*

Yield and returns from coconut

The mean yield and productivity of coconut was found to be 93 nuts palm⁻¹ year⁻¹ and 13,140 nuts ha⁻¹ respectively. Gross income from coconut was calculated as Rs. 717 palm⁻¹ year⁻¹ and Rs. 64,825 ha⁻¹ (Table 1). The productivity of coconut from the study area *ie.*, 13140 nuts ha⁻¹ is more than the all India productivity of 8303 nuts/ha. (<http://coconutboard.nic.in/stat.htm>).

The highest yield and returns was observed in Coimbatore district and the least being the Trivandrum district. This difference might have been due to agro-climatic and socio-economic factors. Still the productivity can be improved by various scientific practices coupling with organic farming practices.

Constraints in adoption of organic farming practices

The constraints in adoption of organic farming practices were categorized into input, technical/extension, economic and institutional constraints (Table 11). The constraints under each

Table 10. Mean yield and returns from coconut

Items	Coimbatore	Thanjavur	Calicut	Trivandrum	Tumkur	Overall Mean
Nut yield/palm (Nos.)	142	99	71	60	96	93
Nut yield/ha (Nos.)	19045	16492	8883	7604	13675	13140
Returns/palm (Rs.)	1282	570	497	487	748	717
Returns/ha (Rs.)	1,72,892	96,935	62,183	60,833	1,04,176	64,825

Table 11. Constraints in adoption of organic farming practices in coconut (n=150)

Constraints	Respondents		Rank	Overall rank
	F	%		
Input constraints				
Non availability of labour	132	88.0	I	I
Non availability of quality organic inputs	99	66.0	II	III
Non availability of quality planting materials	65	43.3	III	IX
Poor electricity supply	56	37.3	IV	XI
Technical/Extension constraints				
Difficult to control pests and diseases by organic methods	106	70.7	I	II
Lack of knowledge about organic farming practices	95	63.3	II	IV
Lack of standard package of practices for organic farming	54	36.0	III	XII
Economic constraints				
High cost for transporting organic inputs	76	50.7	I	V
High labour wages	71	47.3	II	VII
Low yield during conversion period	70	46.7	III	VIII
Inadequate subsidies for adopting organic farming practices	42	28.0	IV	XIV
Institutional constraints				
Lack of specialized markets for organic produce	74	49.3	I	VI
Lack of farmers cooperatives for marketing	64	42.7	II	X
Lack of indigenous certification agencies	53	35.3	III	XIII

category were ranked based on the number of farmers' responses.

Among the input constraints, non-availability of labourers was the major constraint expressed by 88 per cent of the farmers for their field works. Similar result was reported by Anithakumari *et al.* (2012). Labourers had other opportunities like National Rural Employment Guarantee Act (NREGA) programme. As per farmers' opinion, labourers earn good wages under NREGA. Majority of the farmers (66%) expressed non-availability of quality organic inputs as a constraint. Inputs like bio-fertilizer, oil cakes, vermicompost, bio-control agents and traps were not available in time. Thamban *et al.* (2006) and Mathew (2010) reported that lack of availability of organic inputs and their poor quality were the major constraints faced by coconut farmers. They mostly use locally available inputs like green manure, green leaf manure, FYM, *etc.* for meeting the nutrient requirements. For increasing the yield, they were dependent on external

organic inputs. Farmers mostly used locally available seedlings as they (43.3%) faced difficulty in getting quality planting materials. Farmers considered good seedling is the important input for reaping good yield.

Among the technical/extension constraints, difficulty to control pests and diseases by organic methods was expressed by more than 70 per cent of farmers. Organic farming demands high technical know-how especially for pests and diseases management. Pests and diseases were managed by prophylactic methods rather than curative methods. More than two third farmers opined that lack of knowledge on organic farming practices as serious constraint and majority required know-how on biofertilizers, bio control agents, bio pesticides, certification *etc.* Lack of standard package of practices for organic farming was perceived as a constraint for better adoption. Package of practices for organic farming have to be evolved to make the coconut farming economically viable (Mathew, 2010).

High cost for transporting organic inputs like FYM, poultry manure, *etc.* and higher labour wages for farm operations like weeding, organic manure application, irrigation *etc.* were some of the major economic constraints pointed out by farmers. Low yield during conversion period was felt as a constraint by 46.7 per cent of farmers. Farmers fear that there would be yield reduction by adopting organic farming practices. Adopting organic farming did not receive any subsidy unlike inorganic farming which enjoyed subsidies for fertilizers and other chemicals. Hence, adequate subsidy for adopting organic farming practices was expressed as a solution to overcome the economic burden during the conversion period.

About 50 per cent of the farmers perceived lack of specialized markets for organic produce as a constraint. Farmers were ready to produce high quality and residue free produce provided there is market for organic produce with assured price. Lack of farmers cooperative societies for marketing standard products and lack of indigenous certification agencies are some other constraints expressed by the farmers. Assured marketing would help the farmers for profitable farming. At present, certification is done by foreign agencies and the farmers emphasized the need to certify their farm products by national or local agencies with reasonable fee for certification.

Conclusions

From the study it is apparent that the coconut farmers adopting organic farming practices do reflect the concern for sustainable agriculture. It becomes much more evident from the apprehensions expressed by the farmers regarding soil fertility, environmental impact and health hazards. Strikingly, farmers also revealed the flexibility and freedom by minimal dependence on external agencies as an advantage of practicing organic farming. The study highlights the comparatively higher-coconut productivity as well as returns obtained from coconut farming, which are well above the national averages. On the other hand, it is noteworthy that most of the farmers do not have awareness and expertise on advanced organic farming practices such as, application of bio pesticides and bio fertilizers, which could be a point of intervention from the researcher front.

Possibility of occurrence of nutrient deficiencies/pests and diseases due to organic farming practices and appropriate management approaches is another area of concern. While proposing shift to organic farming, it is imperative to recommend a comprehensive package. Therefore, the lack of organized set up and inadequate infrastructure with meager policy support might hamper the interest of those who seriously practicing the organic farming.

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