

Analysis of Organic Farming Practices in Arecanut (*Areca catechu* L.) in South India

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ABSTRACT

The study was conducted among 90 arecanut growers drawn randomly from three districts *viz.*, Coimbatore in Tamil Nadu, Calicut in Kerala and Dakshina Kannada in Karnataka during August 2012 to January 2013. Also include little bit of research variables and their measurements. Majority of farmers (70%) belonged to middle age category, ninety nine per cent of farmers were literates, majority were having rich experience in arecanut cultivation, nearly fifty eight per cent of farmers had less than 2 ha area under arecanut, sixty seven per cent farmers had livestock, majority were having medium level of social participation, extension orientation and mass media exposure, nearly fifteen per cent of farmers had undergone training on organic farming, more than one third of farmers (34.4%) were maintaining farm records, soil testing was done by only 28 per cent farmers and very few farmers (3.3%) had done organic certification. The main reason for adopting organic farming practices was 'to maintain the soil fertility'. Growing of intercrops, mulching and use of green manure crops were the main agronomic practices. Main organic inputs which were produced or prepared at the farm were, farm yard manure, crop residues, ash and vermicompost. Farm yard manure, neem cake, biofertilizers, poultry manure etc. were the major inputs which were purchased from outside. Majority of arecanut farmers (77.8%) had medium level of knowledge on organic farming practices. Non availability of labour, lack of knowledge about organic farming practices, non availability of quality organic inputs and high labour wages were the major constraints.

Keywords: Arecanut, Constraint analysis, Knowledge test, Organic farming

INTRODUCTION

Arecanut (*Areca catechu* L.) is one of the important commercial plantation crops grown in parts of Karnataka, Kerala, Assam, Meghalaya, West Bengal, Tamil Nadu and Andaman & Nicobar Islands. India is the largest producing country with a production of 6.49 lakh tones from an area of 4.45 lakh ha (DASD, 2013). Karnataka, Kerala and Tamil Nadu are the major southern states where arecanut is cultivated in an area of 3.28 lakh ha with a production of 4.87 lakh tones.(DASD, 2013).Arecanut is the major source of livelihood for small and marginal farmers. Long pre bearing period, fluctuations in market prices, unexpected loss due to adverse environmental conditions, pests and diseases etc. are some of the major problems in arecanut cultivation. Diverse agricultural

production systems had been practiced by arecanut growers 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 since for the last 20-25 years, but no systemic 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

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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 farmers, trainers, entrepreneurs, policy makers, agricultural scientists, processors and extension personnel for varied reasons such as it minimizes the dependence of external inputs thus not only reduces the cost of cultivation but also safeguard as well as preserves quality of resources and environment. Government and private agencies have started advocating organic farming practices in plantation crops including arecanut. If organic farming practices are to be advocated for increasing the production of good quality arecanut, it requires the support of research findings. With this background the study was conducted with the specific objectives of investigating the profile characteristics of arecanut growers, identifying organic farming practices practiced in arecanut, assessing the knowledge of arecanut growers on organic farming practices and analyzing the constraints in adoption of organic farming practices.

MATERIALS AND METHODS

The study was conducted among 90 arecanut growers drawn randomly from three districts *viz.*, Coimbatore in Tamil Nadu, Calicut in Kerala and Dakshina Kannada in Karnataka primarily on the ground of its advantage in having maximum area under arecanut cultivation. A list of farmers was prepared based upon information from farmers' organizations, State Department of Agriculture and agencies involved in arecanut cultivation in the district. 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 per district constituting the total sample size of 90 farmers. The data collection was done during August 2012 to January 2013 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. was made through observation as well as interview schedule based interactions with farmers.

A standard teacher made knowledge test was developed for measuring the knowledge of the farmers about organic farming practices by following the procedures adopted by Bonny (1991) and 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 a 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.

RESULTS AND DISCUSSION

Profile characteristics: Thirteen socio-personal and economic characteristics of farmers were analyzed and are furnished in Table 1. Majority of farmers (70%) belonged to middle age category and young farmers were only 4.4 per cent. Farming was considered to be a non profitable business, therefore, most of the youngsters were not willing to take up arecanut cultivation as their occupation. Ninety nine per cent of farmers were literates. Eighty seven per cent farmers were having rich experience (>15 years) in arecanut cultivation. Nearly fifty eight per cent of farmers had less than 2 ha area under arecanut which typically represents the small and marginal category of holdings. Sixty seven per cent farmers had livestock component

Table 1: Profile characteristics of arecanut growers (n=90)

S.No.	Profile characters	Classification	Respondents	
			F	%
1	Age (years)	Young (<35)	4	4.4
		Middle (35-60)	63	70.0
		Old (>60)	23	25.6
		Mean: 53.32; SD: 12.49		
2	Educational Status	Illiterate	1	1.1
		Primary	6	6.7
		Secondary	31	34.4
		Higher secondary	22	24.4
		Graduate	21	23.3
		Post graduate	9	10.0
		Mean: 2.92; SD: 1.16		
3	Farming experience (years)	Low (<15)	12	13.3
		Medium (15-43)	66	73.4
		High (>43)	12	13.3
		Mean: 29.02; SD: 13.99		
4	Area under arecanut (ha)	Marginal (<1)	32	35.5
		Small (1-2)	21	23.3
		Medium (2.1-4)	30	33.4
		Big (4.1-10)	7	7.8
		Very big (>10)	0	0
		Mean: 2.00; SD: 1.92		
5	Total Area under cultivation (ha)	Marginal (<1)	13	14.4
		Small (1-2)	21	23.4
		Medium (2.1-4)	36	40.0
		Big (4.1-10)	15	16.6
		Very big (>10)	5	5.6
		Mean: 3.50; SD: 3.04		
6	Livestock possession (Rs.)	Very low (0)	30	33.3
		Low (<10,000)	6	6.66
		Medium (10,001-30,000)	22	24.4
		High (30,001- 50,000)	21	23.3
		Very High (>50,000)	11	12.2
		Mean: 30572; SD: 45392		
7	Social participation	Low (<3)	2	2.2
		Medium (3- 5)	78	86.6
		High (>5)	10	11.2
		Mean: 4.3; SD:1.20		
8	Extension orientation	Low (<4)	4	4.4
		Medium (4-8)	76	84.4
		High (>8)	10	11.2
		Mean: 5.75; SD: 1.70		
9	Mass media exposure	Low (<4)	3	3.3
		Medium (4-6)	78	86.7
		High (>6)	9	10.0
		Mean: 5.55; SD: 1.55		
10	Training attended on organic farming	Yes	13	14.4
		No	77	85.6
11	Maintenance of farm records	Yes	31	34.4
		No	59	65.6
12	Soil testing	Yes	25	27.8
		No	65	72.2
13	Organic certification	Yes	3	3.3
		No	87	96.7

in farming. Majority of farmers belonged to medium category with respect to social participation (86%) 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 84% of farmers. Majority of farmers (86%) 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 (14.4%) had undergone training on organic farming which shows farmers could not get the opportunity to attend the training on organic farming practices in arecanut. Only 34.4 per cent of farmers were maintaining farm records as farmers did not have the knowledge of maintaining the records to know the expenditure and returns from arecanut farming. Soil testing was done by only 27.8 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 adopting organic farming practices:

The reasons for adopting organic farming practices were

Table 2: Reasons for practicing organic farming practices (n=90)

Reasons	Respondents		Rank
	F	%	
Soil/Human health			
To maintain the soil fertility	70	77.8	I
To minimize the environmental pollution	58	64.4	II
To use locally available resources efficiently	53	58.9	V
Concern for human health	29	32.2	VIII
Economic			
To minimize the use of external inputs	54	60.0	IV
To reduce the production cost	49	54.4	VI
Social			
Traditional practice	56	62.2	III
Influence of institutions and other farmers	41	45.6	VII

collected using open ended schedule. Reasons were classified into soil/human health, economic and social reasons and they were ranked in the order of importance based on the number of farmers perceived it. It is revealed from the Table 2 that the reason 'to maintain the soil fertility' was ranked first with 70 farmers (77.8%) perceived it out of 90. The other reasons in the order of importance were to minimize the environmental pollution (64.4), traditional practice (62.2), to minimize the use of external inputs (60.0), to use locally available resources efficiently (58.9), to reduce the production cost (54.4), influence of institutions and other farmers (45.6) and concern for human health (32.2).

With respect 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. John (2000) and Jaganathan (2009) reported similar findings. Farmers realized the ill effects of chemical farming on environment. Contamination of water, soil, air etc and groundwater depletion were other negative effects of inorganic farming. Therefore, farmers were interested in practicing organic farming to minimize the environmental pollution 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 the inputs. Farmers could not do the operations timely which in turn led to yield loss. By practicing organic farming, farmers become self dependent and enjoyed freedom in doing agricultural operations since most of the inputs were available within the farm itself. Farmers knew the ill effects of chemical farming on the health of human beings. Farmers used fertilizers and pesticides to increase the yield of arecanut. 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).

Among the economic reasons 'to minimize the use of external inputs' was perceived by more than sixty percent of farmers. Since inputs were costly and were not available in time farmers adopted organic farming practices. Farmers had to procure agricultural inputs for

which they depended on money lenders so they started practicing organic farming to reduce the production cost. Veeresh (1997) reported similar findings.

Social reason *viz.*, ‘traditional practice’ was perceived by 62.2 per cent of farmers as they wanted to be the custodians of indigenous knowledge and value systems. The other reason was ‘influence of institutions and other farmers’. The organic experts conducted many training programmes and meetings on organic farming. The efforts of different KVKs, CPCRI, State Department of Agriculture and SAUs were also noteworthy. These external influences changed farmers to go for organic farming practices.

Adoption of organic farming practices by arecanut growers

Adoption of agronomic/cultural practices: The practices *viz.*, growing of intercrops (71.1%), mulching (43.3%), use of green leaf manure (31.1%) and growing of green manure crops (5.6%) were adopted by arecanut farmers and are furnished in Figure 1.

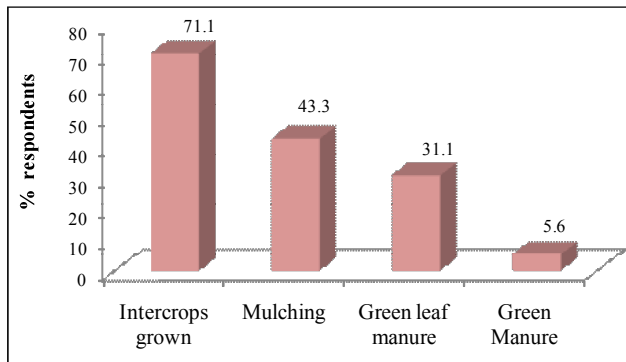


Figure 1: Agronomic/Cultural practices by arecanut growers

Intercrops *viz.*, cocoa, banana and black pepper were mostly adopted by Dakshina Kannada and Calicut farmers because of suitable agro climatic and socio economic factors. Mathew (2010) reported similar findings. Majority of farmers in Coimbatore district were not interested in intercrops because they felt intercultural operations would be difficult. Mulching was practiced using residues of arecanut, banana, cocoa etc. to conserve the soil and water. Green manure crops like sun hemp (*Crotolariajuncea*) and Kolinji (*Tephrosiapurpurea*) were raised by the farmers for enriching the soil fertility. Green leaf manure crops like

Glyricidia, neem leaves, *Calotropisetc* were also used by farmers.

Use of organic inputs produced/prepared at farm by arecanut growers: Farm yard manure (66.7%), crop residues (53.3%), ash (20%), vermicompost (16.7%), cow dung slurry (10%) and poultry manure (2%) were found to be the major organic inputs which are given in Figure 2.

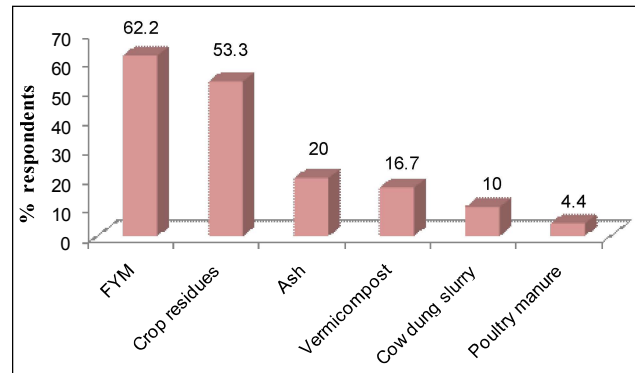


Figure 2: Use of organic inputs produced/ prepared at farm by arecanut growers

Sixty six per cent of farmers had livestock component which resulted in application of FYM for arecanut. Crop residues of arecanut, banana, cocoa and other weeds were used as organic matter for enriching the soil fertility. Ash was used by 20 per cent of farmers. Vermicompost was also prepared and applied by few farmers as they had undergone training on vermicompost preparation and its application. Few farmers made cow dung slurry/*Jeevaamirtham* to increase the microbial load for enriching the soil fertility. Poultry manure was used as organic manure by very few farmers.

Use of organic inputs purchased from outside by arecanut growers: From the Figure 3, it is observed that organic inputs *viz.*, farm yard manure (45.6%), neem cake (25.6%), biofertilizers (17.8%), poultry manure (16.7%), vermicompost (14.4%), neem based insecticides (13.3%), etc. were the major inputs which were purchased from outside.

As the farmers strongly believed that farm yard manure would increase the soil fertility, majority (45.6%) of them purchased it and applied. Neem cake was purchased for controlling root grub. Biofertilizers like

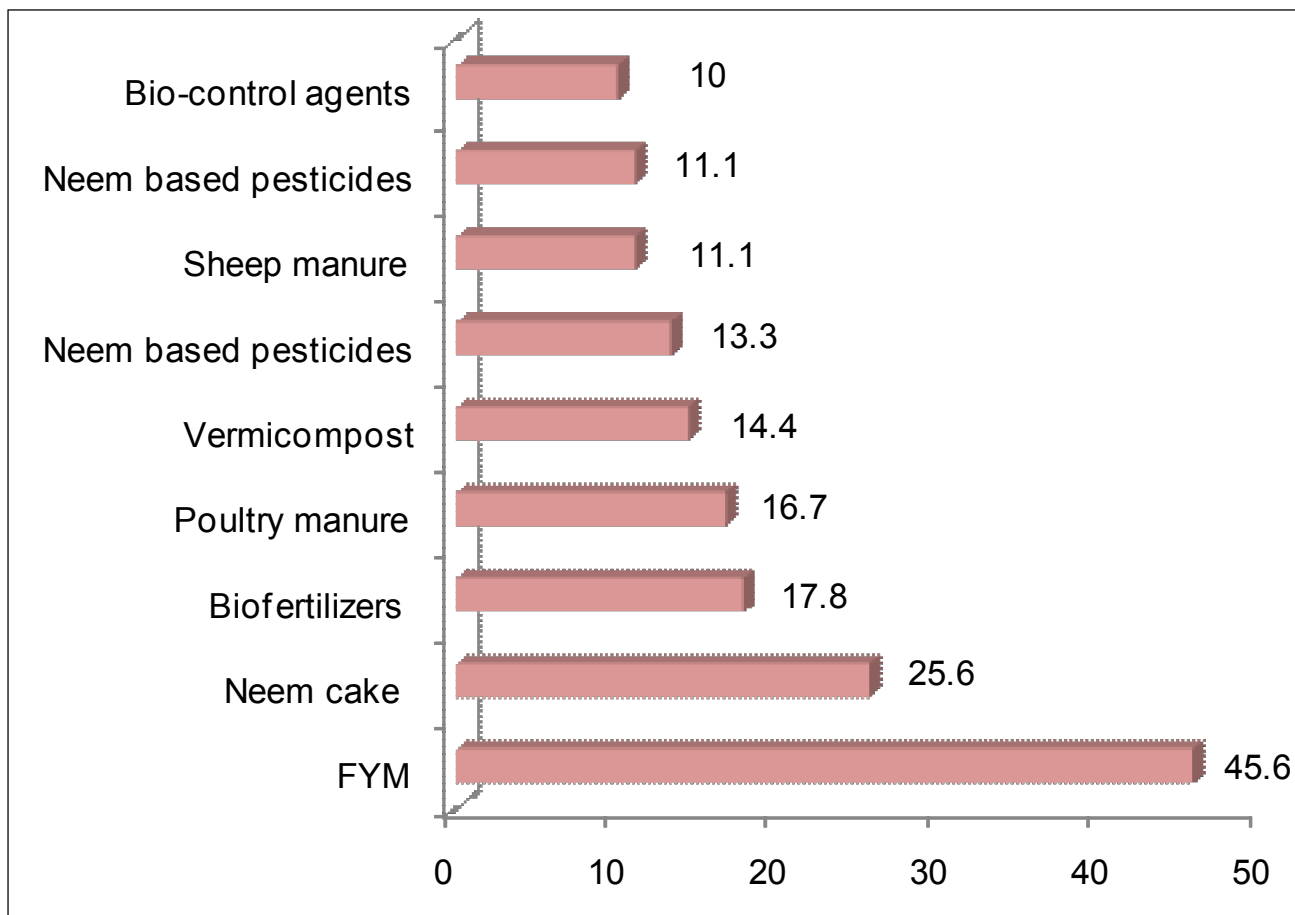


Figure 3: Use of organic inputs purchased from outside by arecanut growers

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.*, vermicompost, neem based insecticides, sheep manure, bone meal, bio control agents etc. were used by few farmers as they could not afford to procure with reasonable price and quality in time.

Knowledge of arecanut growers on organic farming practices: It is inferred from the Table 3 that majority of arecanut growers (77.8%) had medium level of knowledge about organic farming practices followed by low (17.7%) and high (4.5%) levels of knowledge based on the knowledge index classification using mean and SD. Arecanut growers had better extension orientation and training which might have influenced knowledge of farmers on organic farming practices.

Table 3: Knowledge Index of arecanut growers on organic farming practices (n=90)

Category	Score range	Respondents	
		F	%
Low (<Mean-SD)	<52.0	16	17.7
Medium (Mean±SD)	52-80.0	70	77.8
High (>Mean+SD)	>80	4	4.5

Mean: 65.4; SD: 12.5

It is found from the Table 4 that knowledge of farmers on green manures (72.2%), oil cakes (81.1%), intercropping (85.6%), mulching (71.1%), earthworm as farmers' friend (94.4%), compost using earth worms (80%) and recommended intercrops (80%) were fairly high when compared to the knowledge of farmers on botanical pesticides (30%), biofertilizers (28.9%) and biocontrol agents (32.2%). This conveys strong message to the scientists, extension workers, input dealers and change agents that knowledge of farmers were high on

Table 4: Knowledge of arecanut growers on organic farming practices (n=90)

Knowledge items	Respondents with correct answer	
	F	%
Name one green manure crop which is used for increasing the soil fertility	65	72.2
Name two oil cakes used for pest and disease control	73	81.1
Advantages of Intercropping are	77	85.6
Mulching is done for	64	71.1
Which one is called as farmers' friend?	85	94.4
Mention one bio-control agent which is used for disease management	29	32.2
Name one botanical pesticide which is used for pest management	27	30.0
The method of producing compost using earthworms is	72	80.0
Recommended intercrops in arecanut are	72	80.0
Name one bio-fertilizer	26	28.9

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

Relationship between profile characteristics and knowledge of arecanut growers on organic farming practices:

Profile characteristics like extension orientation and training attended were found to have positive and significant relationship with knowledge on organic farming practices (Table 5). Farmers with more extension orientation and training would have accessed information which resulted in more knowledge on organic farming practices when compared to other farmers.

Farmers with extension orientation had an opportunity to know the benefits of organic farming practices. Farmers acquired information on organic farming through exposure and interaction within and outside the social system which might have influenced

Table 5: Correlation between profile characteristics and knowledge on organic farming practices

Profile characteristics	r value
Age	0.157
Educational Status	0.146
Farming experience	0.196
Livestock possession	0.155
Social participation	0.182
Extension orientation	0.308**
Mass media exposure	0.185
Training attended	0.227*

*Significant at 5% level; **Significant at 1% level

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. Authentic information from reliable sources might have facilitated in increasing knowledge.

Constraints in adoption of organic farming practices:

The constraints in adoption of organic farming practices were categorized into input, technical/extension and economic constraints (Table 6). The constraints under each category were ranked based on the number of farmers' responses.

Among the input constraints, 'non availability of labour' was expressed by about eighty seven per cent of the farmers as they faced great difficulty in getting labour for their field works. Similar result was reported by Anithakumari *et al.* (2012). Labourers had some other opportunities like National Rural Employment Guarantee Act (NREGA) programme. As per farmers' opinion, labourers earn good wages under NREGA. Majority of the farmers (65.6%) expressed 'non availability of quality organic inputs' as the constraint. Inputs like bio-fertilizer, oil cakes, vermicompost and bio-control agents were not available in time. Thamban *et al.*, (2006) and Mathew (2010) reported that lack of availability of organic inputs and their poor quality was a major constraint faced by farmers. Farmers mostly used 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.

Among the technical/extension constraints 'lack of knowledge about organic farming practices' was the first

Table 6: Constraints in adoption of organic farming practices in arecanut (n=90)

Constraints	Respondents		Rank	Overall rank
	F	%		
Input constraints				
Non availability of labour	78	86.7	I	I
Non availability of quality organic inputs	59	65.6	II	III
Technical/Extension constraints				
Lack of knowledge about organic farming practices	65	72.2	I	II
Difficult to control pests and diseases by organic methods	51	56.7	II	VI
Lack of standard package of practices for organic farming	33	36.7	III	VIII
Economic constraints				
High labour wages	57	63.3	I	IV
High cost for transporting organic inputs	56	62.2	II	V
Low yield during conversion period	45	50.0	III	VII
Inadequate subsidies for adopting organic farming practices	22	24.40	IV	IX

constraint and farmers opined that they require know-how on biofertilizers, bio control agents, bio pesticides etc. 'Difficult to control pests and diseases by organic methods' was expressed by more than fifty 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. 'Lack of standard package of practices for practicing organic farming' was perceived as a constraint. Package of practices for organic farming have to be evolved to make the farming economically viable (Mathew, 2010).

Farmers (63.3%) felt that labour wages were high for doing weeding, organic manure application, irrigation etc. but their produce fetch same price every year. 'High cost for transporting organic inputs' was expressed by more than sixty per cent of farmers. For getting inputs like FYM, poultry manure, etc. farmers had to hire vehicles for transporting them to the field of application and the cost incurred was high. 'Low yield during conversion period' was felt as a constraint by 50 per cent of farmers. Farmers had fear that there would be yield reduction if they adopt organic farming practices. 'An inadequate subsidy for adopting organic farming practices' was expressed as a constraint. Farmers who wished to adopt organic farming practices did not receive any subsidy unlike inorganic farming which enjoyed subsidies for fertilizers and other chemicals.

CONCLUSION

It is apparent that the arecanut growers who have adopted the organic farming practices do reflect the

concern for sustainable agriculture. 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. Organic farming culture in our country is experiencing a transition regime and yet to be evolved as an organized practice, especially in the case of perennial crops like arecanut. Lack of good quality organic inputs, timely availability of the inputs and higher transaction costs, etc. are the important matters of concern from the farmer front. While proposing shift to organic farming, it is imperative to recommend a comprehensive package. Nevertheless, the concerted efforts from stakeholders of organic farming would ensure the sustainable arecanut cultivation.

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