STUDY ON KNOWLEDGE AND ADOPTION OF ORGANIC FARMING IN KARNATAKA - INDIA

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ABSTRACT: The study was conducted to know the knowledge and adoption level of organic farming of areca nut farmers which was undertaken in two talukas (Sira and Pavagada) of Tumkur district of Karnataka state., where Karnataka state horticulture department implemented the Organic conversion programme on cluster base of 50 ha, consists of 20-30 small and marginal farmers during March 2011 to April 2014. Further the objective of the study was (1) measure the knowledge level about the organic Farming practices, like vermi compost practices, Bio digester and (2) to determine soil fertility and soil organic carbon. The data revealed that majority (63.33 percent) of the respondents were having medium level of knowledge followed by 21.66 percent of having high level of knowledge and 15.00 percent of the respondents with low level of knowledge. Organic farming system significantly improved the organic matter (1.96) at the end of third year, 1.51 in the second year and 0.92 in the first year and it was the lowest (0.63) before the commencement of project and there by the soil quality and soil organic carbon was maximum with organics compared to inorganic after three years of study. Organic system brought the benefit cost ratio for areca nut farmers compared to farmers of inorganic system and could get from Rs 1.77 to Rs 2.85 against the every rupee invested in third year. Whereas increasing yield in organic system was 17347 kg of matured whole areca nut ha^{1} compared to 14900 kg in inorganic system. There is a significant increase in yield of 16.40 % recorded in organic system.

Key words: *Bio-digester, organic matter, soil quality, soil productivity, vermicompost*

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Agriculture is the most important livelihood strategy in India, with two thirds of the country's workforce depending on farming. Most farmers are small and marginal farmers cultivating areas of less than two hectares. Increasing land fragmentation, diminishing natural assets, high costs for external farm inputs, indebtedness, and pesticide-related health issues have threatened the livelihoods of many farming families (Ninan & Chandrashekar 1993). Organic farming is defined as a production system which largely excludes or avoids the use of fertilizers, pesticides, growth regulators, etc. and relies mainly on organic sources to maintain soil health, supply plant nutrients and minimise insects, weeds and other pests. Organic Farming is giving back to the nature what is taken from it. It is not mere non-chemicalism in agriculture; it is a system of farming based on integral relationship. Therefore, one should know the relationship about soil, water, plant and microflora and overall relationship between plant and animal kingdom. It is the totality of these relationships, which is the backbone of the organic Farming (Funtilana, 1990). Increased /indiscriminate use of chemical fertilizers and pesticides during green revolution period resulted in several harmful effects on soil, water and air causing their pollution. This has reduced the productivity of the soil by deteriorating soil health in terms of soil fertility and biological activity. The excess/indiscriminate use of pesticides has led to the entry of harmful compounds into food chain, death of natural enemies and development of resurgence/resistance to pesticides. Hence, enhancement and maintenance of system productivity and resource quality is essential for sustainable agriculture. It is believed that organic farming can solve many of these problems as this system is believed to maintain soil productivity and pest control by enhancing natural processes and cycles in harmony with environment. Organic farming is favorable to small farmers. They already have the cows and buffalos needed to recycle biomass at the farm level, which is, essentially, the foundation of organic farming.

A Report Based on the global survey on organic farming carried out in 2009 by the Research Institute of Organic Agriculture (FIBL), the International Federation of Organic Agriculture Movements (IFOAM) and Foundation Ecology & Agriculture (SOEL), the organic agriculture is developing rapidly and is now practiced in more than 141 countries of the world. Its share of agricultural land and farms continues to grow in many

countries. According to the recent survey on global organic farming, about 32.2 million hectares of agricultural land is managed organically as of 2007. Oceania has the largest share of organic agricultural land (37%), followed by Europe (24%) and Latin America (20%) (Source: FiBL and IFOAM 2009) (Anonymous 2009). The proportion of organically compared to conventionally managed land, however, is highest in Oceania and in Europe. In the European Union 4% of the land is under organic management. Most producers are in Latin America. The total organic area in Asia is 2.9 m ha. This constitutes 9% of the world's organic agricultural land. The leading countries are China (1.6 m ha) and India (1 m ha). The country with the largest organic area is Australia (12 million hectares). **(**Source: FiBL and IFOAM 2009).

Organic Agriculture is not a new concept to India and traditionally Indian farmers are organic. But, gradually changed to chemical based cultivation since 1950's and chemicals were increasingly applied during the Green Revolution period. Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. In India about 2.8 million hectares area is under certified organic farming (this includes wild herb collection area of MP and UP) with about 1, 95,741 farmers engaged in organic farming .The Indian organic farming industry is estimated at US $ 100.4 million and is almost entirely export oriented. According to APEDA (2009), a nodal agency involved in promoting Indian organic agriculture, about 9, 76,646 MT of organic products worth 498crores rupees are being exported from India. (Source: APEDA, 2009)

Karnataka is one of the pioneer organic cultivation states in India (Anonymous 2006). In the state, the department of Agriculture and Horticulture has been taking suitable steps for promotion of organic farming in Karnataka. There are over 20000 organic farmers in Karnataka and around 1000 farmers were in Bangalore alone. Area under organic farming recorded the highest in Shimoga followed by Tumkur and Gadag district in the state during 2007-08. Government of Karnataka in 2006 introduced the Karnataka State Policy on Organic Farming (KSPoOF) in order to improve the sustainability of farm livelihoods. The policy defined organic farming as farming that requires less external inputs, relying more on natural and human resources that are available in the farms. Thus, it aims at reducing farmers' financial burden, engaging them in productive activities on-farm and curbing migration to urban areas. It provides support for organic seeds and seedlings, vermin compost pits, azolla culture, bio pesticides and livestock exchange visits and trainings**.** In this context, an investigation was taken up to study the knowledge and adoption of organic farming by areca nut farmers in Karnataka India.

MATERIALS AND METHODS

Study site

The present study was undertaken during March 2011 to April 2014 in two Talukas (Sira and Pavagada) of Tumkur district, Karnataka, which is located at height 1800 ft. from mean sea level which lies between 13^0 N latitude and 77^0 E longitudes having mainly dry climate with temperature ranging from 18^{0}C to 39^{0}C, and an average rainfall of 585 mm. where Karnataka state horticulture department had implemented the Organic conversion programme on cluster base of 50ha, which consists of 20-30 small and marginal farmers. There were 06 clusters of 50ha each and they were registered under society act of government of Karnataka.

1) Sree Maradi Ranganathswamy savayava thotagarika abhivrudhi sangha Kallambella Sira.
2) Bhupsandra savayava thotagarika abhivrudhi sangha Bhupsandra Sira Taluka.
3) Kallambella hobli savayava thotagarika abhivrudhi sangha Uddayana playa Sira taluka
4) Doddahulikunte savayava thotagarika abhivrudhi sangha Hulikunte Sira Taluka
5) Nidgal Hobli savayava thotagarika abhivrudhi sangha.VH playa Pavagada Taluka
6) Madde savayava thotagarika abhivrudhi sangha Madde.Pavagada Taluka.

Planting material

15-20 year old areca nut plantation of local variety existing in farmer field was selected for the study.

Collection of data

Out of total one hundred twenty areca nut farmers, 20 from each cluster (total six clusters) were selected purposively. To evaluate soil fertility and organic carbon 04 farmers out of 20 from each cluster were selected by proportionate random sampling method. Thus 24 organic farmers were taken as respondents and soil samples and yield data of crop were collected yearly and soil samples were analyzed in government soil testing labs. Data on knowledge about organic farming, like vermicompost, bio-digester was collected by personal

interview and observation method. The organic farmers were grouped in to three levels of knowledge on the basis of their knowledge index. A visual survey of the field conducted precede the actual sampling in which the variation in slope, colour, texture, management and cropping pattern were observed by traversing the field. A slice of the plough-layer cut at intervals of 15 to 20 steps. 10 to 20 spots were taken for one composite sample. Scraped away the surface liter to obtain a uniformly thick slice of soil from the surface to the plough depth from each place. A V-shaped cut was made with a spade to remove 1 to 2 cm slice of soil. The sample collected on the blade of the spade and put in a clean bucket. The soil from the bucket was poured on a piece of clean paper or cloth and mix thoroughly. The soil was spread evenly and divides it into 4 quarters. Rejected the two opposite quarters and mixed the rest of the soil again. Repeat the processed till left with about half kg of the soil, collected soil put in a clean cloth bag and marked to identify the sample. The samples were analyzed in the government soil testing laboratory for organic carbon (C), Data were also collected from secondary sources of information such as reports of department of horticulture and agriculture. Discussions were held with officials of these departments, experts, executives, to elicit their views, ideas and opinion on the important issues pertaining to organic farming and its impact.

Areca nut yield was recorded year wise from four trees in each treatment. The collected nuts were counted and weighed. Fresh weights of a sub sample of 100 nuts from each tree were determined. Areca nut garden requires a minimum of seven years to get established and to yield economic return (Prakash Kammadi, 2003) and total cost of establishment of one hectare of areca nut garden compounded for seven years period comes to around Rs 6.38 lakh rupees in traditional region. Out of which 70 per cent is operational cost and remaining 30 per cent is the fixed cost. The labor for production purposes alone forms around 31 per cent of total costs followed by costs of input (21%), maintenance (7%) and interest on working capital (6%).Since the present areca nut garden already established (15 years old) we have considered the operational cost..Since the present areca nut garden already established (15 -20 years old) we have considered the operational cost.

The garden management agronomic practices followed were as follows.

1) Cultural operations: Ploughing is done with the help of cultivator twice a year. Depending upon the intensity of weeds harrowing is done four times a year.
2) Organic Manure: 3 tons of FYM and 1 ton of vermi compost along with 1 ton of green manures was applied once a year which was the practice by the farmers in all clusters.
3) Irrigation: Since the present area is bore well irrigated. The irrigation is done by drip and some time by flooding in regular intervals.
4) Weeding: Most of the weeds were controlled by cultural practices however the hand weeding was done in peak continues rainy season and before harvesting.
5) Bio Digester and vermin compost units: Bio digester and vermin compost units constructed by the farmers under national horticulture mission subsidy scheme.
6) Harvesting: Here in this case farmers were selling the raw matured nut. The harvesting is done by the buyer. Hence the cost is not considered.

Collection of experimental data; Areca nut yield was recorded year wise from four trees in each treatment. The collected nuts were counted and weighed. Fresh weights of a sub sample of 100 nuts from each tree were determined.

1) Sampling procedure; the data were collected on Number of Spadix Plant^{1}, Number of Bunches Spadix^{1}, Number of Nuts Bunch^{1}, and Weight of Nut in g and yield parameters from five plants randomly selected in each 04 replication.
2) Number of Spadix Plant^{1} was counted from the selected plants and worked out.
3) Number of Bunches Spadix^{1}, was counted from the selected plants and worked out.
4) Number of Nuts Bunch^{1} was counted from the selected plants and worked out.
5) Weight of Nut in g was collected from the selected plants and weighing done.
6) Yield per hectare was worked out.

Statistical Analysis

The data was collected through personal interview and secondary source was analyzed by using suitable statistical techniques (frequency and percentage) and tabulated.

RESULTS AND DISCUSSION

Knowledge and adoption level of organic farming;

Knowledge level about the organic farming, vermi compost and bio digester were assessed by personal interview and observation in the field. Total no. of items was prepared to assess the knowledge level of the farmers. A score of one was assigned to correct answer and 'zero' for incorrect answer. On the basis of the score obtained, the respondents were categorized into three categories. It is evident from the table 1 that majority of the respondents (63.33 per cent) were having medium level of knowledge followed by 21.66 per cent with high level of knowledge and 15.00 per cent of the respondents having low level of knowledge. Out of 120 farmers 06 organic farmers established bio-digester unit and 36 had vermicompost units. It is evident from the above data that majority of the respondents had medium level of knowledge. The reason might be that the respondents might have not acquired the perception in adoption of organic farming, vermicopmost and biodigester and lack of awareness about government organic promotion schemes.

Soil organic carbon and yield data of 2011-12:

As per the data given in table 02 in the first year there was no significant difference in organic carbon content in the soil of treated against control. Similarly there is no significant difference in yield parameters like Number of Spadix per plants, Number of bunches per spadix, number of nuts per bunch. Maximum weight of nut i.e. 31.05 g was recorded in inorganic system compared to low weight of nut 30.05 g recorded in organic system which resulted in more yield of 14667 kg ha^{1} of whole areca nut in inorganic system compared to organic system having yield of 13560 kg ha^{1} of whole areca nut.

Soil organic carbon and yield data of 2013-13;

It is implied from the data given in table 3 that in the second year there was a significant difference of organic matter content of soil it was maximum of (1.51) with organic system compared to low organic matter (0.74) in inorganic system. There was no significant difference in yield parameters like Number of Spadix per plants, Number of bunches per spadix, number of areca nuts per bunch during second year. There was a difference of 175 kg whole areca nut yield between organic system and inorganic system with more areca nut yield in inorganic system.

Soil organic carbon and yield data of 2013-14;

From the Table 4, it is very clear that the maximum (1.96) organic matter in the soil recorded in organic system compare to low (0.81) in inorganic system. At the end of

Table 1: Knowledge level about organic farming, vermi-compost and bio-digester

Sr. No	Category (Score)	Organic Farmers Frequency	Percentage
1	Low (0 to 44)	18	15.00
2	Medium (45 to 69)	76	63.33
3	High (above 70)	26	21.66
	Total	120	100.00

Table 2: Showing organic matter of soil and yield parameters of areca nut in 2011-12

Sr. No	Variables	Treated (Organic)	Control (inorganic)
1	Soil organic matter (%)	0.92	0.70
2	Number spadix plant^{1}	3.95	4.05
3	Number of bunches spadix^{1}	12.05	12.00
4	Number of nuts bunch^{1}	7.90	8.10
5	Weight of areca nuting	30.05	31.05
6	Total yield kg ha^{1} (1200plants)	13560	14667

Table 3: Showing organic matter of soil and yield parameters of areca nut in 2012-13

Sr. No	Variables	Treated (Organic)	Control (inorganic)
1	Soil organic matter (%)	1.51	0.74
2	Number spadix plant^{1}	4.10	4.05
3	Number of bunches spadix^{1}	12.10	12.05
4	Number of nuts bunch^{1}	7.90	8.10
5	Weight of areca nut in g	30.95	31.05
6	**Total yield kg ha^{1} (1200plants)**	14555	14730

Table 4: Showing organic matter of Soil and Yield parameters of areca nut in 2013-14

Sr. No	Variables	Treated (Organic)	Control (inorganic)
1	Soil organic matter (%)	1.96	0.81
2	Number spadix plant^{1}	4.15	4.10
3	Number of bunches spadix^{1}	12.30	12.05
4	Number of nuts bunch^{1}	8.85	8.20
5	Weight of areca nut in g	32.00	31.65
6	**Total yield kg ha^{1} (1200plants)**	17347	14900

Table 5: Economic improvement in Areca nut yield through organic farming

Sr. No	Particulars	2011-12		2013-14	
		Control	Treated	Control	Treated
1.	Total yield of matured areca nut in kg ha^{-1} (1200 plants)	144667	13567	14900	17347
2.	Rate obtained per kg of matured whole areca nut	22	22	24	24
3.	Total Revenue Rs ha^{1}	322685	298485	357600	416340
4.	Cost Rs ha^{1} (Operational Cost)	110000	55000	110000	55000
5.	Total cost of establishment 2.55 divided to 7 years Rs ha^{1}	91075	91075	91075	91075
6.	Total Cost of Cultivation ha^{1}	201075	146075	201075	146075
7.	Net profit rupees ha^{1}	121610	152410	156525	270267
8.	Benefit cost ratio	1.60	2.04	1.77	2.85

Table 6: Showing cost of cultivation of organic and inorganic system of areca nut cultivation

Sr No	Particulars	Organic System (Rs ha^{1})	Inorganic System (Rs ha^{1})
1	Cultural practices	15000	15000
2	Fertilizer /FYM Application	10000	47500
3	Irrigation	12500	12500
4	Weeding	12500	12500
5	Plant protection	5000	22500
	Total	**55000**	**110000**

third year due to more organic matter, soil quality increased as a result significant differences in maximum weight of nut 32 gm per nut recorded in organic system compare to inorganic 30.65 gm per nut, Resulted in significant increase in yield of 16.46 percent (17347 kg ha^{1}) recorded in organic system against 14900 kg ha^{1} in inorganic system.

Soil organic carbon is the main source of energy for soil microorganisms, which is one of the most important constituents of the soil due to its capacity to affect plant growth as both a source of energy and a trigger for nutrient availability through mineralization. Organic carbon fractions in the active pool, previously described, are the main source of energy and nutrients for soil microorganisms. Humus participates in aggregate stability, and nutrient and water holding capacity (Edwards 1999), hence organic carbon content in the soil used as indicator.

Economics

It is evident from the table 5 that organic farming played an important role in achieving higher economic returns. Accordingly organically cultivated areca nut farmers could get Rs 2.85 for every rupee invested compared to only Rs 1.77 in case of inorganic system in 2013-14 and Rs 2.04 and Rs 1.60 respectively in 2011-12. From the Table 6, it is very clear that considerable improvement in economic returns has been achieved by organic farming. Cost of cultivation per acre reduced to Rs 55000=00 in organic system compare to inorganic system which is maximum of Rs 110000=00. Organic system records the maximum yield and reduces the cost of cultivation by 50 % as per the table 05 and farmer benefited in terms of more income by reducing cot of cultivation.

CONCLUSION

In the process of organic conversion the first year yield decreases due to the stoppage of chemical fertilizers. The organic matter in both organic system and inorganic system were same in the beginning. Due to the stoppage of chemical fertilizer and plant protection chemicals in organic garden the microbial population increases and the organic carbon level increases. In second year organic farming is on par with inorganic system. At the end of third year organic system comparatively better than the inorganic system due to increased organic matter.

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