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Farmers Buying Behaviour of Micronutrients in Coimbatore District, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Micronutrients play an important role in enriching the soil nutrients and thereby improve the quantity and quality of products. The wide spread occurrence of micronutrient deficiencies over a decade is due to cultivation of crops in problem soils and on marginal lands such as sandy soil which is low in organic matter. The present study is to analyse the multidimensional behaviour of the farmers for adoption of micronutrients and their influence in coconut farming. Both Primary and Secondary data is used for the study. Coimbatore district is purposefully selected for the study as recommended by the case firm. Based on the time and resource available with the researcher the sample size was fixed as 90 farmers. Percentage analysis was used to study the general characteristic of the consumers which include age, education, gender, income, etc. The marginal effects of a change in one of the independent variables on the probability of adoption level were calculated by using probit

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model. Education and experience were the positively influencing factors on adopting micronutrients. Age and annual income of the farmer were the negatively influencing factors for adopting micronutrients among the respondents. Therefore, the firm could concentrate on the factors like experience and education status of farmer to improve its market. Quality of the product was ranked as the most important factor followed by the farmer's preference, company image, promotional activities and credit availability.

Keywords: Coconut; buying behavior; micronutrients; agro inputs.

1. INTRODUCTION

The Coconut Palm (*Cocos nucifera Linn*.) is supposed to be one of the five legendary Devavrikshas and is eulogized as Kalpavriksha (tree of heaven or tree of paradise) because of its manifold uses. It belongs to family Aracaceae (Palmaceae) and it is one of the commercial crop grown in India, since the time immemorial. More than ten million people in India depends on coconut cultivation, processing, marketing and trade related activities for their livelihood, the sustainability of the coconut industry poses a big question. Low coconut farm productivity by the coconut growers is due to mono-cropping practice, poor genetic makeup and nutrient deficiency of the soil. The crop can adapt to a wide range of soil types and environmental conditions. Intensive farming with high yielding varieties in conjunction with large doses of NPK fertilizers resulted in micronutrient deficiencies by depleting their reserves in soils. The wide spread occurrence of micronutrient deficiencies over a decade is due to cultivation of crops in problem soils and on marginal lands such as sandy soil which is low in organic matter. Decreased recycling of crop residues and animal manures resulted in micronutrient deficiency [1,2].

Deficiency of zinc (48 per cent), iron (12 per cent), copper (4 per cent), manganese (33 per cent), boron (13 per cent) and Sulphur (41 per cent) has been noticed Indian soils. Zinc deficiency in soils in further expected to increase from 49 per cent to 63per cent by the year 2025 [3,4]. Recent Research work by Scientists of Coconut Development Board and other Research stations have proved that Coconut needs secondary nutrients and micronutrients for higher yield. By providing balanced fertilizers and abundant water, an average of 150 to 450 nuts can be harvested per year per palm. (www.coconutboard.nic.in). The importance of the crop lies in the fact that it provides a livelihood and sustenance for the millions of small and marginal farmers. In olden days farmers mostly concentrate only on the production rather than quality of their produce. The present scenario in aspect of farmers has precise knowledge about the modern technologies and they tend to concentrate to produce quality products. Micronutrients play an important role in enriching the soil nutrients and there by improve the quantity and quality of products [5,6].

With the above background the present investigation was carried out to study multidimensional behaviour of the farmers for adoption of micronutrients and their influence in coconut farming. This study will help firms to know the future demand for their products and plan their production accordingly.

2. REVIEW OF LITERATURE

Sivakumar [7] stated that buying behaviour was of immense significance and paramount importance to both the buyer and seller: for the former in satisfying his needs and for the latter in meeting the needs of his buyer and realizing more profit. 51.67 per cent of coconut growers of South Canara district in Karnataka were belonged to low adopters regarding inputs like fertilizers and plant protection measures, whereas 35 per cent were belonged to medium adopters group and only 13.33 per cent were belonged to high adopters group. Singha [8] found that more than half (53.33%) of the coconut growers of Kamrup district in Assam had low level of adoption of recommended coconut cultivation practices like application of micronutrients and plant protection, fertilizers, while the remaining 25 and 21.67 per cent respondents were found in high and medium categories of adoption, respectively. Gunasekar [9] found that product quality was the best influencing factor for the purchase of Stanes micro food by farmers followed by dealer influence. Kumar [10] in his study on knowledge level of banana growers in Channa patna and Dodda ballapur taluks of Bangalore rural district and improved practices revealed that 45 per cent of banana growers had medium overall

knowledge level followed by lesser percentage under low (26%) and high (29%) groups of knowledge level. Vedamurthy [11] in his study on management of areca gardens and marketing pattern preferred by the arecanut farmers of Shimoga district in Karnataka revealed that the knowledge level of arecanut growers regarding the recommended cultivation practices. A majority of the arecanut growers categorized under medium knowledge category, 46 per cent of the arecanut growers grouped under low knowledge category, while only 20 per cent of the arecanut growers grouped under high knowledge category. Babanna [12] and Kajisa [13] in their study on arecanut growers of Shimoga district in Karnataka reported that 35 per cent of the respondents belonged to medium adoption category followed by 33.4 per cent belonged to higher adoption category and 31.6 per cent of the respondents have adopted the recommended practices on arecanut cultivation at lower level. Bell and Dell [14] stated that the micronutrients were the source of sustainability in food, feed and production of bioenergy. Rattan et al. [15] studied the importance of micronutrients in plant and human health. Shukla [16] stated the factors influencing the usage of micronutrients in India. Jatav et al. [5] stated the usage of micronutrients and its importance, role in agriculture which helps the crop to improve its yield.

3. DATA AND METHODOLOGY

Both Primary and Secondary data is used for the study. Coimbatore district is purposefully selected for the study as recommended by the case firm. The district has six taluks out of which Pollachi taluk has been selected for the purpose of study since the acerage under coconut was higher in this taluk. Coimbatore district has 12 blocks Anaimalai, Annur, Karamadai, Kinathukadavu, Madukkarai, Periyanayakkampalayam, Pollachi (north and south), Sarcarsamakulam, Sulthanpet, Sulur and thondamuthur. Based on the researcher's available time and resources the sample size was fixed as 90 farmers. All the blocks in pollachi taluk were included in the study. The list of villages growing coconut in each taluk was collected from the office of Assistant Director of agriculture.

A well-structured interview schedule was prepared for the purpose of collecting necessary primary data from the sample respondent. The interview schedule was prepared based on the objectives of the study for the farmer and dealer. The farmers were contacted personally and the objectives of the study were explained to them to get their cooperation. The information collected included general characteristics of farmers, awareness about micronutrients, source of information, reasons for use and non-use of micronutrients, effects after applying micronutrients, willingness to use micronutrients etc. Secondary data required for the study about location of study area, demographic features, rainfall pattern, land use, irrigation and related information were collected from office of the Joint Director of Agriculture, Directorate of statistics and District Collectorate, Coimbatore.

Table 1. Details of selected blocks and sample size in Pollachi taluk

S. No	Block	No of sample farmers
1.	Anaimalai	30
2	Kinathukadavu	20
3	Pollachi north	25
4	Pollachi south	15
Total		**90**

3.1 Percentage Analysis

Percentage analysis was used to study the general characteristic of the consumers which include age, education, gender, income, etc. The factors were first categorized into different levels based on their mean value and percentage was calculated to draw meaningful inferences.

3.2 Probit Model

Theoretical framework of the Probit model can be explained by the threshold concept. Assuming that each farmer has well defined utility function over the adoption of micronutrient for crop improvement.

$$Y_i = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + u_i$$

Where,

Y_i = adoption (1 if adopted, 0 if not adopted)
X_1 = Age of the farmers (in years)

(Age is an important variable. As farmers advance in age, risk aversion increases and adopting a new technology seems to be reduced. This variable is expected to negatively affect the adoption of micronutrients.)

X_2 = Educational status of the of the farmers (1 if higher education, 0 if illiterate and primary education)

(Education is an important variable. Exposure to education will increase the farmers' ability to obtain, process and utilize information relevant to the adoption of new technologies. Education is expected to be positively affecting the adoption of micronutrients in coconut cultivation)

X_3 = Land size of the farmers (in hectares)

(Farmers' total land holding may serve as a good proxy for wealth and status. This variable is likely to have a positive effect on adoption of micronutrients in coconut cultivation practices)

X_4 = Farming experience (Years)

(Age and experience are not the same. This is measured by the number of years of farming. Experienced farmers are assumed to have tried out a number of profitable technologies. Older farmers with say 10 years of farming experience and younger farmers with the same length of farming experience have different relative farming experience. Farming experience is expected to be positively affecting the adoption of micronutrients in coconut cultivation.)

X_5 = annual income (in lakhs)

(Farmers' may serve as a good proxy for wealth and status. This variable is likely to have a positive effect on adoption of micronutrients in coconut cultivation practices Farmer's annual income is likely to have a negative effect on adoption of micronutrient in coconut cultivation. If land size increases there is a decrease in adoption level).

X_6 = inter-crop cultivated (i if yes, 0 otherwise)

(Inter-crop cultivated is expected to be positively affecting the adoption of micronutrients in coconut cultivation.)

b_0 = Intercept, b_1 to b_6 = co- efficient to be estimated and ui = error term

4. RESULTS AND DISCUSSION

4.1 Socio Economic Characteristics of Sample Farmers

Understanding the nature and behavior of the sample farmers would shed light on their overall characteristics. The study is greatly impacted by the general characteristics of the sample farmers, including their level of education, land holding size, and purchasing decision on the use of micronutrients. The results are tabulated to comprehend the conditions under which the farmers decided to purchase and use micronutrients.

4.2 Age of the Farmers

The sample farmers were classified into four groups based on their age. Among the farmers, 45 per cent were in the age of 41-50 years followed by 23 per cent of farmers in the age group more than 51 years, 19 per cent of farmers in the age group 31-40 years. Only 3 per cent of the farmers were in the age group of 20-30 years.

Table 2. Age of the farmers

S. No	Age	Anaimalai	Kinathukadavu	Pollachi North	Pollachi South	Overall
1.	20 -30 years	2 (6.66)	0 (0)	1 (4.00)	0 (0)	3 (3.33)
2.	31 - 40 years	8 (26.66)	3 (15.00)	5 (20.00)	3 (20.00)	19 (21.11)
3.	41 – 50 years	16 (53.33)	10 (50.00)	14 (56.00)	5 (33.33)	45 (50.00)
4.	> 51 years	4 (13.33)	7 (35.00)	5 (20.00)	7 (46.66)	23 (25.55)
Total		30 (100.00)	20 (100.00)	25 (100.00)	15 (100.00)	90 (100.00)

(Figures in parenthesis indicates percentage to total)

Table 3. Educational Qualification of the sample farmers

S. No	Education	Anaimalai	Kinathukadavu	Pollachi North	Pollachi South	Overall
1.	Illiterate	2 (2.22)	2 (2.22)	8 (8.88)	2 (2.22)	14 (15.55)
2.	Primary	7 (7.77)	7 (7.77)	5 (5.55)	4 (4.44)	23 (25.55)
3.	Higher secondary	17 (18.88)	10 (11.11)	11 (12.22)	9 (10.00)	47 (52.22)
4.	Collegiate	4 (4.44)	1 (1.11)	1 (1.11)	0 (0)	6 (6.66)
Total		30 (100.00)	20 (100.00)	25 (100.00)	15 (100.00)	90 (100.00)

(Figures in parenthesis indicates percentage to total)

Table 4. Occupation of sample farmers

S. No	Occupation	Anaimalai	Kinathukadavu	Pollachi North	Pollachi South	Overall
1.	Agriculture only	20 (22.22)	13 (14.44)	18 (20.00)	8 (8.88)	59 (65.55)
2.	Agriculture & Private	8 (8.88)	4 (4.44)	5 (5.55)	5 (5.55)	22 (24.44)
3.	Agriculture & Public	2 (2.22)	3 (3.33)	2 (2.22)	2 (2.22)	9 (10.00)
Total		30 (100.00)	20 (100.00)	25 (100.00)	15 (100.00)	90 (100.00)

(Figures in parenthesis indicates percentage to total)

Table 5. Farm size of sample farmers

S.No	Type	Anaimalai	Kinathukadavu	Pollachi North	Pollachi South	Overall
1.	Large	19 (21.11)	10 (11.11)	14 (15.55)	4 (4.44)	47 (52.22)
2.	Small	9 (10.00)	7 (7.77)	7 (7.77)	9 (10.00)	32 (35.55)
3.	Marginal	2 (2.22)	3 (3.33)	4 (4.44)	2 (2.22)	11 (12.22)
Total		30 (100.00)	20 (100.00)	25 (100.00)	15 (100.00)	90 (100.00)

(Figures in parenthesis indicates percentage to total)

A similar trend could be observed in the Anaimalai, Kinathukadavu, Pollachi North above 50 per cent except Pollachi South 33.33 per cent of the farmers aged between 41-50 years. It could be inferred that, most of the farmers were aged and undertaken earlier studies showed that adoption rate among aged farmers was found to be less.

4.3 Education Qualification

Based on the literacy level of the respondents, they are classified into four categories as primary, high school, higher secondary and collegiate. The educational status of farmers might influence the level of adoption of various modern practices and innovation even usage of micronutrients.

It is evident that, about 47 per cent of the sample farmers have an educated at the higher secondary level followed by 23 per cent at primary level. About 14 per cent of sample farmers are illiterate and 6.66 per cent of farmers educated at college level. Thus, education is not a major constraint in influencing the farmers in adoption of new technologies.

4.4 Occupation of Sample Farmers

The occupation status of farmers influences their interest and adoption practices. Farmers practicing agriculture as their major occupation, farmers having other jobs and considering agriculture as their other occupation were considered under the secondary category.

It could be inferred that, 59 per cent of sample farmers prefer agriculture as their primary occupation followed by 22.22 per cent of sample farmers do both agriculture and private job and 9 per cent of the sample farmers has both agriculture and government job. Since agriculture was the only source of income for majority of the farmers, they farmers provide more attention to generate income from agriculture.

4.5 Farm Size of Sample Farmers

The size of land holding of the sample farmers were classified into three categories namely marginal, small, and large The majority of the sample farmers belong to large category (52.22 per cent) followed by small (35.55 per cent), marginal farmers (12.22 per cent) and the proportion of large farmers was higher in the total sample. This is because only coconut growers were selected and most of the coconut growers operated larger farms.

4.6 Cultivated Area of Sample Farmers

The total area under coconut cultivation would help the firm to assess their future demand for the product. Among the sample farmers, 32.22 per cent were growing coconut in an area of more than 10 hectare followed by 30 per cent of them cultivating coconut in an area of 4-10 hectare, 19 per cent of sample farmers were growing coconut in an area of 2-4 hectare and only 15 per cent of sample farmers were cultivating in 1-2 hectares.

4.7 Farming Experience of Sample Farmers

If the farmers are cultivating the same crop for many years then they will get expertise in growing a particular crop and also it will have an influence on the adoption of different improved technologies. Majority of the farmers (58.88 per cent) have an experience above 15 years followed by 23.33 per cent of farmers have an experience between 11 to 15 years and 16.66 percent of farmers have an experience between 6 to 10 years. Only 1.11 per cent of farmers have an experience less than 5 years. Thus the sample farmers have rich experience in cultivation of coconut and any attempt to introduce new product shall be well acknowledge by them if it proves its efficiency in enhancing the productivity of coconuts.

4.8 Average Yield of Coconut Plantations

Coconut is the crop which comes to harvest once in two months. The average yield of coconut obtained by sample farmers per tree per year was examined. . Majority of the marginal farmers (54.54 per cent) get an average yield of 60 to 75 nuts and both small and large farmers (43.75 per cent and 42.55 per cent get an average yield of 60 to 75 nuts respectively. Thus it is inferred that the sample farmers obtain only an average yield of 60 to 75 nuts from a tree per annum.

Table 6. Cultivated area of sample farmers

S. No	Area Under Coconut	Anaimalai	Kinathukadavu	Pollachi North	Pollachi South	Overall
1.	1ha	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2.	1-2 ha	3 (3.33)	5 (5.55)	4 (4.44)	3 (3.33)	15 (16.66)
3.	2-4 ha	5 (5.55)	4 (4.44)	4 (4.44)	6 (6.66)	19 (21.11)
4.	4-10 ha	8 (8.88)	5 (5.55)	9 (10.00)	5 (5.55)	27 (30.00)
5.	>10 ha	14 (15.55)	6 (6.66)	8 (8.88)	1 (1.11)	29 (32.22)
Total		30 (100.00)	20 (100.00)	25 (100.00)	15 (100.00)	90 (100.00)

(Figures in parenthesis indicates percentage to total)

Table 7. Farming experience of sample farmers

S. No	Experience in years	Number	Percentage
1.	1 - 5 years	1	1.11
2.	6 - 10 years	15	16.66
3.	11 – 15 years	21	23.33
4.	Above 15 years	53	58.88
Total		90	100.00

Table 8. Average yield of coconut plantations

S.No	Category	Average Yield (Nuts / Tree / Year)			Total
		<60	60-75	>75	
1.	Large	10 (21.27)	20 (42.55)	17 (36.17)	47 (100.00)
2.	Small	8 (25.00)	14 (43.75)	10 (31.25)	32 (100.00)
3.	Marginal	2 (18.18)	6 (54.54)	3 (27.27)	11 (100.00)
Overall		20 (22.22)	40 (44.44)	30 (33.33)	90 (100.00)

(Figures in parenthesis indicates percentage to total)

Table 9. Use of agro inputs

S.No	Agro inputs	Once a year	Once in 2 or 3 years	Rare usage	Total
1.	**Organic manure**				
	Farmyard manure	39 (43.33)	2 (2.22)	0 (0)	41 (45.55)
	Compost	58 (64.44)	3 (3.33)	1 (1.11)	62 (68.88)
	Green leaf manure	17 (18.89)	5 (5.56)	3 (3.33)	25(27.77)
	Neem cake	20 (22.22)	9 (10.00)	2 (2.22)	32 (35.55)
	Poultry waste	39 (43.33)	2 (2.22)	(1.11)	42 (46.67)
2.	**Fertilizers**				
	NPK complex	32(35.55)	6(6.67)	9(10.00)	47(52.22)
	Urea	12 (13.33)	4(4.44)	0(0)	16(17.77)
	Muriate of potash	18(20.00)	5(5.56)	0(0)	23(25.55)
	Phosphate	4(4.44)	5(5.56)	5(5.56)	14(15.55)
	DAP	32(35.55)	6(6.67)	9(10.00)	47(52.22)
3.	**Fungicide**				
	Bordeaux mixture	16(17.78)	4(4.44)	3(3.33)	23(25.56)

(Figures in parenthesis indicates percentage to total)

Table 10. Reason for the usage of micronutrients

S. No	Factors	Mean Score	Rank
1.	Healthy growth	87.87	I
2.	Reduced level of flower shedding	83.00	II
3.	Increase in number of nuts	78.00	III
4.	Recover deficiency symptoms	75.00	IV
5.	Increase yield	71.25	V
6.	Quality nuts	70.28	VI

4.9 Use of Agro Inputs in Coconut

The agro inputs used by the sample farmers in coconut cultivation are classified into three categories organic manure, fertilizer and fungicides. Majority of the sample farmers used organic manure regularly. Compost was applied once in a year by 68.88 per cent of sample farmers followed by poultry waste, farmyard manure, neem cake and green leaf manure (46.67 per cent, 45.55 per cent, 35.55 per cent and 27.77 per cent) respectively. In total 52.22 per cent of farmers were using NPK complex fertilizer followed by Muriate of potash and urea (25.55 per cent and 17.77 per cent) and only 15.55 per cent of sample farmers use DAP. Bordeaux mixture was used once in a year by 25.56 per cent of sample respondents as a paste to control exudation of sap on the affected tissue of the trunk. Roots of Coconuts differ from other plants where absorption of nutrients through root hairs is absent. Coconut roots has notches which absorbs nutrients. Therefore, fertilizers should be given in 2-3 dosages instead of single application because of repeated application, notches can absorb nutrients in a better way.

4.10 Reason for using Micronutrients

Healthy growth was the first major reason to use micronutrients followed by reduced level of flower shedding, increased in number of nuts, recovered deficiency symptoms, increased yield, and quality nuts respectively.

4.11 Factors Influencing the Adoption of Micronutrients

The primary data was used to estimate the probit model that explained the factors influencing the adoption level of micronutrients. The independent variables used were age, education status, farming experience, size of land, inter-crop cultivated, annual income and awareness about micronutrients. The marginal effects of a change in one of the independent variables on the probability of adoption level are calculated. The corresponding elasticities (the percentage change in the probability of adoption level given a one per cent change in the value of the variable) are given for the continuous variables, the difference in the probability as the discrete variables changes from zero to one.

Among the various independent variables education and experience of farmers variables were the positively influencing factors on adopting micronutrients. Age and annual income of the farmer were the negatively influencing factors for adopting micronutrients among the respondents. Education status of farmers significantly and positively influenced the adoption level of micronutrients in coconut cultivation. For each one unit increase in education, the probability of adoption level would increase by 1.095 per cent. If experience increases by one year, the probability of adoption level of micronutrients would increase by 0.057 per cent. For each year increase in age the probability of adoption level of micronutrients would decrease by 0.051 percent. If annual income increases by one unit, the probability of adoption level would decrease by 0.001 per cent. From the above analysis it would be inferred that the firm could concentrate on the factors like experience and education status of farmer to improve its market.

4.12 Reasons for Brand Preference of Micronutrients

Quality of the product was ranked as the most important factor followed by the farmer's preference, company image, promotional activities and credit availability. The reason might be due to the improvement in nuts and its quality which thereby earns good market value. This show that quality of the product is seen more than company image and credit availability.

Table 11. Factors influencing the adoption of micronutrients in coconut production

Variables	Estimated Coefficient	Standard Error	T- Ratio
Age (years)	-0.051	0.024	-2.134*
Education status	1.095	0.296	3.701**
Size of land holding (acres)	-0.012	0.014	-0.849
Farming Experience (years)	0.057	0.026	2.153*
Inter-crop cultivated	0.218	0.383	0.570
Annual income (in thousands)	-0.001	0.000	-2.626**

** = Significant at 1 per cent level * = Significant at 5 per cent level

Table 12. Factors influencing Micronutrients brand preference

S .No	Factors	Mean Score	Rank
1.	Quality of the product	92	I
2.	Farmers preference	87	II
3.	Company image	85	III
4.	Promotional support	83	IV
5.	Credit availability	81	V
6.	Profit margin	78	VI
7.	Product price	72	VII

Table 13. Profit Margin and Credit Facilities

S.No.	Brand	Margin (%)	Credit period (days)
1.	Micronol	6	90
2.	Microfood	7	30
3.	MN mixture	7	90
4.	Multiplex	6	30
5.	Agromin	9	90

4.13 Profit Margin and Credit Facilities

Profit margin and credit facilities are the important factors that determine the profitability and motivation the dealers to purchase the product. Highest profit margin was offered by Agromin of 9 per cent followed by Stanes and Kothari with a margin of 7 per cent lowest profit margin of 6 per cent by Micronal and multiplex respectively. In case of credit period, Micronal, MN mixture and Agromin were offering 90 days followed by Microfood and multiplex of 30 days.

5. CONCLUSION AND POLICY RECOMMENDATIONS

Among the various independent variables education and experience of farmers variables were the positively influencing factors on adopting micronutrients. Age and annual income of the farmer were the negatively influencing factors for adopting micronutrients among the respondents. Education status of farmers significantly and positively influenced the adoption level of micronutrients in coconut cultivation. Quality of the product was ranked as the most important factor followed by the farmer's preference, company image, promotional activities and credit availability. The benefits of micronutrients and its importance in balanced plant nutrition, the quality of the product and its superiority over the other brands should be emphasized to the farmers to outweigh the high cost of micronutrients. Majority of them purchased micronutrients from the local dealer or dealer in the village while about one fourth of them purchased from the dealer in the town. Therefore it is essential to cover retailers in the urban and rural areas. Efforts must be made to build up brand knowledge among the farmers. The firm should undertake measures such as campaigns, advertisements in villages among farmers, arranging farmers meetings etc., to increase the awareness about their brands of micronutrients. Conducting demonstrations, field trials and field visits for convincing the farmers about the benefits of their brands of micronutrients. The literacy level was high in the study area they can distribute leaflets, put up wall paintings with logo and distinct colors such that it facilitates brand recall. The symptoms of deficiency, micronutrient to be applied, dosage, and brand name can also be included in leaflets.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Palaniappan G, Subramaniam S. The coconut revival. market survey, lecturers in commerce at Anbu Arts and Science College, Komarapalayam, Namakkal District, Tamilnadu; 2010.
2. Kajisa K, Palanichamy NV. Chemical fertilizer, organic fertilizer, and cereal yields in India. An African Green Revolution: Finding Ways to Boost Productivity on Small Farms. 2013;225-241.

3. Singh MB, Fotedar R, Lakshminarayana J. Micronutrient deficiency status among women of desert areas of western Rajasthan, India. Public health nutrition. 2009;12(5):624-629.
4. Ravikumar R, Palanichamy NV, Kaarthik GM. Usage of fym and Its impact on rice productivity: Empirical Evidence from Tamil Nadu, India; 2014.
5. Jatav HS. et al. An overview of micronutrients: Prospects and implication in crop production. In: Aftab, T., Hakeem, K.R. (eds) Plant Micronutrients. Springer, Cham; 2020. Available:https://doi.org/10.1007/978-3-030-49856-6_1
6. Vinayagamoorthi N, Sekhar C, Palanichamy NV, Sivakumar M. Economic appraisal of different varieties of banana plantations in Central Tamil Nadu; 2019.
7. Sivakumar SD. A study on the market structure and buying behaviour of the farmers with reference to pesticides. Unpublished M. Sc.(Ag) Thesis, Department of Agricultural Economics, TNAU, Coimbatore; 1987.
8. Singha P Cropping patterns, Crop Diversification and Their Spatial Variations in Assam; 2006.
9. Gunasekaran A, McNeil R, Singh D. Activity-based management in a small company: A case study. Production Planning & Control. 2000;11(4):391-399.
10. Kumar HS. A study on knowledge, adoption and economic performance of banana growers in Bangalore rural district. M. Sc. (Agriculture) thesis submitted to University of Agricultural Sciences, Bangalore, (India); 1998.
11. Veda Murthy HJ. A study on the management of areca gardens and marketing pattern preferred by the arecanut farmers of Shimoga district in Karnataka (Doctoral dissertation, University of Agricultural Science, Dharwad); 2002.
12. Babanna T. Information source consultancy and training needs of farmers in arecanut cultivation under Tungabhadra command area in Shimoga district. M.Sc. (Agriculture) thesis submitted to University of Agricultural Science, Bangalore (India); 2002.
13. Kajisa K, Palanichamy NV. Impacts of organic farming in a developing country: Evidence from Tamil Nadu, India, from 1993 to 2003. In International Association of Agricultural Economists Conference, Beijing, China. 2009;16-22.
14. Bell RW, Dell B. Micronutrients for sustainable food, feed, fibre and bioenergy production. International Fertilizer Industry Association (IFA); 2008.
15. Rattan RK, Patel KP, Manjaiah KM, Datta SP. Micronutrients in soil, plant, animal and human health. Journal of the Indian Society of Soil Science. 2009;57(4):546-558.
16. Shukla AK, Tiwari PK, Prakash C. Micronutrients deficiencies vis-a-vis food and nutritional security of India. Indian J. Fert. 2014;10(12):94-112.

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