Regd. No.: S-2504 of 1964-65

indian journal of extension education

IJEE Vol. 42 JAN - JUNE - 2006 No. 1 & 2

THE INDIAN SOCIETY OF EXTENSION EDUCATION
Division of Agricultural Extension, IARI, New Delhi 110 012

ndian Journal of Extension Education
Vol. 42, No. 1 & 2, 2006 (8-13)

Field level Utilization of Microirrigation Technology in Coconut

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ABSTRACT

The study was conducted among the farmers of Kasaragod District in Kerala state with the objective to analyse the utilization of recommended practices for the effective implementation of microirrigation technology in coconut farming. The study was conducted with an ex-post-facto research design among 200 adopters of microirrigation technology engaged in coconut farming. An adoption index was developed for analyzing the extent of adoption of recommended practices of microirrigation technology in coconut farming. The results showed that about one-fifth of the farmers were belonging to the low adoption category. Items, viz., type of filter used, type of emitter used and ensuring field uniformity had higher levels of adoption. None of the farmers adopted the fertigation in their drip irrigation unit. Volume of water applied per palm per day, placement of dripping point and root zone area wetted were the other items which had low adoption scores. It was revealed that variables viz., farm size, annual income, scientific orientation and extension contact had significant and positive relationship with extent of adoption. The results of the study revealed the urgent need to plan and implement appropriate educational efforts for enhancing the adoption of recommended practices by the coconut farmers who had already implemented the technology in their orchards.

Future water shortages and emerging environmental concerns place microirrigation in the forefront of technological alternatives for the sustainable development of agricultural sector. According to Annan (2002), in order to save two thirds of the world's population from facing serious water shortages in the decades ahead, leakage and wastage of water must be reduced, especially in agriculture by following the approach, what he termed as, 'more crop per drop'.

Coconut is the most important crop cultivated in Kerala State, which plays a vital role in the agrarian economy of the State. However, the productivity level remained low in the State compared to many other states of India. Lack of irrigation is one of the major reasons attributed to the low level of productivity of coconut in Kerala State (Rajagopal *et al.*, 2001). Scarcity of irrigation water is also considered as one of the major constraints in resource use management in coconut farming in Kerala. The northern parts of the State receive 75 per cent of the rainfall during the period from June to August. A prolonged duration of summer results in moisture stress which adversely affects the crop productivity.

Farmers became aware of the microirrigation technology for coconut during the early 1980's and consequently many coconut growers have installed microirrigation system in their gardens. Government also implemented programmes that encouraged farmers to adopt water conserving microirrigation technology by providing

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incentives in the form of subsidy up to 75 per cent, under the centrally sponsored scheme on "Use of plastics in agriculture" through the State Department of Agriculture. In spite of the complexity of the technology, farmers are increasingly becoming aware of the need for adopting frontier technology like microirrigation to combat the issues related to sustainable water resource management. Effective field implementation of microirrigation technology will help the farmers in the judicious use of scarce water resources for enhancing the productivity of coconut. In this background, a study was conducted to analyse the adoption behaviour of farmers for installation and maintenance of microirrigation system in coconut garden.

METHODOLOGY

The study was conducted in Kasaragod District of Kerala state. From Kasaragod district, all the four development blocks were selected for the study. From the list of coconut farmers adopting drip irrigation in the four development blocks, 50 coconut farmers each were selected for the study through simple random sampling. Thus a total of 200 adopters were selected for the study. Pre-tested interview schedule was used to collect the required data. Appropriate statistical tools were employed to analyse the data.

Measurement of variables

Adoption of recommended practices: Performance of microirrigation system in farmers' field is directly influenced by the extent to which microirrigation system is correctly installed and maintained as per the recommendations. The extent of adoption of recommended practices for installation and maintenance for effective field performance of micro-irrigation systems in coconut gardens was analysed as per the following procedure:

A list of 13 parameters related to recommended practices for installation and maintenance for effective field performance of micro-irrigation systems in coconut gardens was prepared in consultation with the scientists in the field of agronomy and irrigation engineering. Observations were made in the farmers' gardens as to what extent the recommended items were adopted. Appropriate scoring procedures were followed for giving weightages to the extent of adoption of each of the items.

Adoption index : In the present study, the maximum possible score for a farmer for the adoption of recommended practices of microirrigation technology in coconut farming was 26. An adoption index for the adoption of recommended practices of microirrigation technology in coconut farming was worked out for each respondent using the following formula:

$$\text{Adoption index} = \frac{\text{Total score obtained}}{\text{Maximum possible score}} \times 100$$

Based on the adoption index, respondents were categorized into low, medium and high by adopting percentile method.

Total scores were obtained for each of the recommended item by adding the scores obtained by the individual farmer on each item and indices were worked out. The items of the recommended practices were also categorized into low, medium and high by adopting percentile method.

RESULTS AND DISCUSSION

Table 1. Distribution of farmers according to adoption index (n = 200)

S.No.	Category	Frequency	Percent
1.	Low	43	21.50
2.	Medium	121	60.50
3.	High	36	18.00
	Total	**200**	**100.00**

The results on the distribution of farmers according to the extent of adoption of recommended practices of microirrigation technology showed that 18.00 per cent of farmers were high adopters, 60.50 per cent medium adopters and 21.50 per cent low adopters. Earlier studies (Thampan (1999), Thamban and Venugopalan (2002)) had revealed that the extent of adoption of irrigation in coconut farming was low and that of microirrigation technology was only negligible. The result obtained under the present study that about one-fifth of the farmers, who had installed the microirrigation system in their coconut gardens, were under the category of low level of adoption indicate that even the adopters of a farm innovation did not follow all the practices recommended for the effective field implementation of the technology. Further, it also emphasizes the need to plan and implement appropriate educational efforts for enhancing the adoption of recommended practices by the farmers who had already implemented the technology in their orchards

Item wise adoption of recommended practices of microirrigation technology in coconut farming.

The summary of results of the analysis of adoption of various recommended practices of microirrigation technology in coconut farming by the farmers is presented in Table 2.

Table 2. Adoption of recommended practices of microirrigation technology in coconut farming

(n = 200)

S. No.	Item	Percentage of adopters	Rank
1.	Selecting pumping unit with suitable capacity	78.00	4
2.	Method of water supply	42.50	5
3.	Volume of water applied per palm per day	2.00	10
4.	Number of dripping points	28.50	6
5.	Location of dripping points	10.00	9
6.	Placement of dripping point	2.00	10
7.	Root zone area wetted	1.50	11
8.	Ensuring field uniformity	81.50	3
9.	Type of emitter used	95.00	2
10.	Type of filter used	96.50	1
11.	Flushing of pipelines	24.00	7
12.	Backwashing	17.50	8
13.	Fertigation	0.00	12

The results on the adoption of recommended practices of microirrigation technology in coconut farming presented in the Table 2 indicate that type of filter used, type of emitter used and ensuring field uniformity ranked I, II and III respectively based on the extent of adoption, which had adoption level of 96.50, 95.00 and 81.50 per cent, respectively. It is worthwhile to note that the item on fertigation got an adoption index of zero, and hence ranked last among the items, as none of the farmers adopted the same in their drip irrigation unit. Volume of water applied per palm per day, placement of dripping point and root zone area wetted were the other items, which had low (2.00, 2.00 and 1.50 respectively) adoption scores. Thus, it can be concluded that there is wide variation in the extent of adoption of the selected items of recommended practices of microirrigation technology in coconut farming. Very low adoption indices of some of the recommended practices indicate that much emphasis has to be given for creating awareness among farmers about the recommended practices of microirrigation technology in coconut farming. Demonstration farms could be established in innovative farmers' plots with the active participation of stakeholders and local leaders. These successful farmers would serve as local examples for the neighbourhood to follow. Further, adequate attention has to be paid at the time of field installation to ensure that the recommendations for effective field performance are taken care of.

Relationship of socio-personal characteristics of farmers with the adoption index

The socio-personal characteristics of farmers play a prominent role in determining their extent of adoption of recommended practices of microirrigation technology. In order to assess the relationship between socio-personal characteristics of farmers and their adoption index, correlation coefficients were worked out and tested for its statistical significance. The results are presented in Table 3. Out of 13 independent variables studied, four variables viz., farm size, annual income, scientific orientation and extension contact were found to have positive relationship with adoption index. The remaining variables, namely, age, educational status, occupation, family size, farming experience, economic motivation, risk preference, social participation and information source utilization were not found significantly related with the adoption.

Cultivators with larger farm size tend to seek more information on innovative farm technologies like microirrigation for enhancing their income and also become more inclined to bear the risk for adopting the same in their orchards and hence there is a positive and significant relationship between farm size and extent of adoption. Thamban and Venugopalan (2002) also had reported a similar finding.

Adoption of innovative farm practices like microirrigation requires high financial investments by the farmers. Those who are endowed with adequate income for affording higher investment are more likely to adopt capital-intensive technologies like microirrigation. Hence there is a positive relationship between the annual income of the farmers and level of adoption. This is in line with the findings of Ahire *et al.* (1999).

Table 3. Relationship between the adoption index of farmers on recommended practices of microirrigation system and their socio-personal characteristics

(n = 200)

Variable No.	Socio-personal characteristics	Coefficient of correlation (r)
X_1	Age	-0.012
X_2	Educational status	0.013
X_3	Occupation	-0.116
X_4	Family size	0.067
X_5	Farm size	0.359**
X_6	Farming experience	0.075
X_7	Annual income	0.795**
X_8	Economic motivation	-0.048
X_9	Risk preference	-0.028
X_{10}	Scientific orientation	0.385**
X_{11}	Extension contact	0.312**
X_{12}	Social participation	0.089
X_{13}	Information source utilization	0.028

**Significant at 1% level

Scientific orientation also had a similar relationship with extent of adoption. A cultivator having a high level of scientific orientation generally takes more interest in innovative farm technologies and tries to experiment the worth of such technologies in their farm. Microirrigation being an innovative practice of many scientific dimensions will thus be more acceptable to those farmers with high level of scientific orientation. And, hence, there is a positive and significant relationship between the scientific orientation of the farmers and level of adoption of recommended practices of microirrigation technology in coconut farming. This is in conformity with the findings of earlier studies by Nirmaladevi and Manoharan (1999).

Various extension agencies are functioning at grass root level that organise educational programmes on improved agricultural practices for the benefit of farming community. 'Krishi Bhavan', the grama panchayat level office of the State Department of Agriculture, is the prominent one among them. Centrally sponsored schemes that provide incentives in the form of subsidy to farmers were implemented through Krishi Bhavan, for popularizing microirrigation technology. Obviously, farmers having high level of direct contact and access with these agencies are likely to become more aware of such innovative technologies and adopt the same in their fields with the technological backstopping by the extension agencies. Hence a positive, significant relationship between extension contact and level of adoption was observed.

Relative importance of socio-personal characteristics in explaining the level of adoption

Stepwise regression analysis was employed to select the best regression equation and thereby select the best sub-group of variables out of many for predicting the variation in the level of adoption of recommended practices of microirrigation technology by farmers. The sequence of variables entered during the step-wise regression analysis is furnished in Table 4.

The six variables included in this final step accounted for 84.80 per cent of variation in the level of adoption of recommended practices of microirrigation technology. The F value (178.85) was found to be significant at one per cent level which indicated the significance of the regression equation in predicting the level of adoption of recommended practices of microirrigation technology. The regression coefficients of the six variables finally included in the model are furnished in Table 5.

The factors are presented in their descending order of importance in explaining the variation in the adoption level of farmers on microirrigation technology. It is evident from the Table 6 that annual income was the most important factor followed by extension contact, scientific orientation, education status, farm size and family size in that order. As discussed earlier, adoption of microirrigation technology required high financial investments on the part of the farmers. Those who were endowed with adequate income could afford to make such high investment and adopted such innovative technologies. And hence annual income turned out to be the most important factor in explaining the variation in the adoption level of farmers on microirrigation technology. Other variables like extension contact, scientific orientation, education status, farm size and family size also

Table 4. Stepwise regression analysis showing the significant steps included in the regression of level of adoption of microirrigation technology by farmers

(n = 200)

Step	Variables entering regression	Degree of freedom	F-value	Percentage of variation explained by R^2
1.	Annual income	1	341.173	63.3
2.	Annual income Extension contact	2	267.373	73.1
3.	Annual income Extension contact Scientific orientation	3	298.503	82.0
4.	Annual income Extension contact Scientific orientation Education status	4	251.834	83.8
5.	Annual income Extension contact Scientific orientation Education Status Farm size	5	209.180	84.4
6.	Annual income Extension contact Scientific orientation Education Status Farm size Family size	6	178.856	84.8

Table 5. Stepwise regression analysis showing the final step with all significant variables included in the adoption level of farmers on microirrigation technology

(n = 200; R^2 = 0.848)

Variable No.	Socio-personal variable	Regression coefficient (b)	SE of regression coefficient	't' value
X_7	Annual income	0.003	0.000	25.831
X_{11}	Extension contact	1.437	0.130	11.014
X_{10}	Scientific orientation	2.723	0.260	10.457
X_5	Farm size	0.272	0.084	3.232
X_2	Education status	0.542	0.186	2.907
X_4	Family size	0.213	0.094	0.259

influenced the adoption level of farmers on microirrigation technology as discussed earlier and accounted for the variation in the adoption level of farmers on microirrigation technology in the decreasing order of importance.

CONCLUSION

A considerable proportion of farmers, who had installed the microirrigation system in their coconut gardens, were under the category of low and medium level of adoption of practices recommended for the effective field implementation of the technology. Hence there is an urgent need to plan and implement appropriate educational efforts for enhancing the adoption of recommended practices by the coconut farmers who had already implemented the technology in their orchards. While organising educational programmes on microirrigation technology, emphasis should be given on topics such as location of dripping points," placement of dripping point, root zone area wetted, ensuring field uniformity and fertigation. The result obtained in the present study that extension contact and scientific orientation were relatively more important in influencing the adoption of microirrigation technology by farmers reiterates the significance of organising more extension programmes for the effective utilisation of microirrigation technology by the farmers.

REFERENCES

Ahire, M. C., Tawade, M. D. and A. J. Nirban. (1999). Factors associated with the use of drip and flow irrigated systems by farmers. *Maharashtra Journal of Extension Education.* **18**: 57-60.

Annan, Kofi. A., (2002). A chance to secure our future. *The Hindu,* Saturday, June 1, 2002.

Nirmaladevi, M. and M. Manoharan. (1999). Contributing characteristics of guava cultivators. *Journal of Extension Education,* **10**(2): 2431-2437.

Rajagopal, V., Arulraj, S. and C. Thamban. (2001). *Interface programme for coconut development.* Central Plantation Crops Research Institute, Kasaragod.

Thamban, C. and M.Venugopalan. (2002). Extent of adoption of recommended package of practices for coconut cultivation. In: Rethinam, P., Khan, H.H., Reddy, V.M., Mandal, P.K. and K. Suresh (Eds.) *Research and Development in Plantation Crops in the new Millennium.* Proceedings of the International Conference on Plantation Crops (PLACROSYM XIV) held during December 12-15 at Hyderabad, pp. 218-223.

Thampan, P.K. (1999). Enhancing the income and employment in the coconut sector through conservation and sue of special coconut ecotypes in India - Report on farmer participatory survey. Peekay Tree Crops Development Foundation, Kochi.