Group approach for technology integration in coconut holdings

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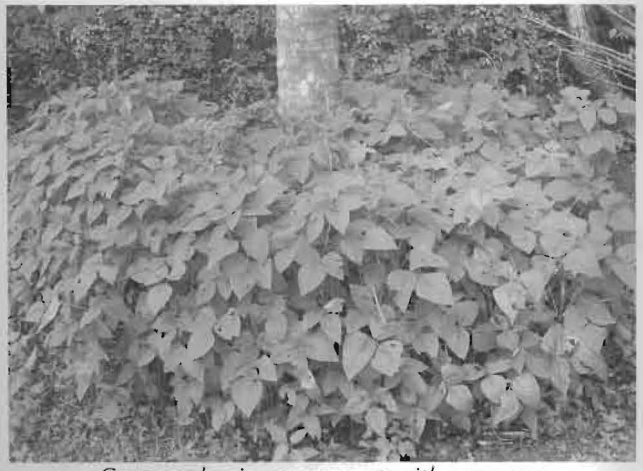
Introduction

A substantial number of families in rural poor communities in India depends on coconut farming for their livelihood. Majority of the coconut holdings are small and marginal in size and many a times, the income generated from coconut farming in holdings does not provide enough for meeting the requirements of families. Technology options for enhancing income from coconut farming in such poor rural communities do exist, but not fully realized in field situation. The fragmented holdings do not render themselves viable for the optimum utilization of resources and the adoption of improved technologies by the cultivators. To augment the production and productivity of such small and marginal holdings it was suggested to have group management of resources, which helps to overcome the inherent weaknesses of the fragmented holdings. The concept of organizing coconut farmers into Community Based Organisations (CBO) for sustainable income enhancement with the objective of efficient management of farmers' resources to reduce cost of cultivation and to increase productivity through integration of technologies even in very small farm holdings have been pilot tested by CPCRI in selected localities under different projects. Farmer participatory group approach through Community Based Organisations (CBOs) was employed for sustainable productivity and income enhancement in small and marginal coconut holdings under the National Agricultural Innovation Project (NAIP) sponsored by ICAR and implemented by CPCRI during 2008-13.

Coconut farming scenario

The project on 'Value chain in coconut' was implemented in 10 selected grama panchayats of Kasaragod district in Kerala state. More than 70 per cent of the agricultural holdings in the district are less than 2 ha in size and predominance of small and marginal holdings indicate the relevance and importance of adopting group approaches in farming for effective utilization of improved technologies. Coconut is the most important crop cultivated in Kasaragod district in Kerala covering an area of about 59,656 ha with an annual production of 508 million nuts. The productivity per hectare is 8,515 nuts. The level of adoption of improved production technologies including nutrient management, irrigation, water management and plant protection was low indicating the need for suitable interventions. Mono cropping of coconut was practiced in 34 per cent holdings. Though many types of crops can be successfully grown simultaneously in a coconut garden, only one or two crops were cultivated in coconut holdings where intercropping was practiced. Optimum number of plant density was also not followed in majority of the gardens. The area under irrigation in the selected holdings was only 40 per cent indicating the need of proper moisture conservation measures in coconut gardens. Incidence of bud rot and stem bleeding diseases were observed in many gardens in the project area. However adoption of

Intercropping of elephant foot yam



Coconut basin mangemnt with cow pea

Banana intercropping

integrated disease management practices was very low. The scenario of coconut cultivation clearly indicated the scope for technology integration in coconut holdings for enhancing productivity and income.

Project approach

The approach for project implementation involved facilitating CBOs of farmers and women SHGs for effective integration of production and processing technologies in coconut holdings for higher income. Collective action for procurement of inputs, community approach for adopting integrated pest and disease management practices, capacity building of farmers on improved production technologies and management of CBOs etc were given emphasis in the project implementation. Under the project, 10 CBOs comprising of a total of 534 farmers in clusters of 25 ha each were formed in the district. The details of CBOs are as follows.

A series of training programmes, both institutional and off-campus, were conducted for the benefit of farmers and farm women on various aspects of coconut production, protection and processing. Besides, a special training programme for rural youth on coconut climbing using mechanical climbing device and Integrated Disease Management practices against bud rot disease of coconut was also organized.

Technological interventions and impact

Need based technological interventions on soil and water conservation, soil health management, Integrated Nutrient Management, inter/mixed cropping and Integrated Pest and Disease Management were implemented in farmers' gardens. Four women SHGs were facilitated to take up microenterprises on production and marketing of coconut value added products like coconut chips.

i. Basin management with legume cover crops

Lack of availability of organic manure is a problem experienced by coconut growers which adversely affects coconut production. Basin management with legume cover crops is an agrotechnique to generate significant quantities of organic manure and nitrogen in coconut garden. It involves cultivation of leguminous creepers having symbiotic association with efficient *Rhizobium* strains in

Table 1. Community Based Organisations (CBOs) facilitated under the National Agricultural Innovation Project in Kasaragod District

Sl.No.	CBO	Grama panchayat	No. of holdings
1	Ajanoor	Ajanoor	56
2	Bedadka A	Bedadka	58
3	Bedadka B	Bedadka	57
4	East Eleri A	East Eleri	42
5	East Eleri B	East Eleri	37
6	Karadka	Karadka	47
7	Madikkai	Madikkai	62
8	Muliyar	Muliyar	51
9	Nileshwaram	Nileshwaram	59
10	West Eleri	West Eleri	65
		Total	**534**

Fied visit to NAIP project site by scientists from CPCRI

Inter cropping of cabbage

coconut basins and interspaces during the monsoon period and harvest and incorporation of biomass generated at the maximum vegetative growth of legumes. Under the project different leguminous crops viz., Cowpea, Sun hemp, Calapagonium, Pueraria and Horse gram were grown in coconut basins. In majority of the coconut gardens cowpea was grown for basin management as the seed material (var. C-152) was readily available. Nearly 25 per cent of the nitrogen requirement of coconut trees could be met by growing leguminous crops in the basin. Details of biomass and nitrogen made available per coconut basin through basin management by growing cow pea in different locations under the project is furnished in table 2.

ii. Organic recycling in coconut garden through vermicomposting

Nearly 6 to 8 tonnes of coconut wastes in the form of leaves, spathe, bunch waste and husk of nuts are available from one hectare of well managed coconut garden. These wastes can be converted into compost and used to meet a considerable part of nutrient requirement of coconut palm. At CPCRI, scientists have identified a local strain of earthworm related to African Night Crawler (*Eudrilus* sp.) which is quite efficient in converting coconut leaves into granular vermicompost. Weathered coconut leaves are kept in layers in a tank mixed with cow dung (one-tenth weight of leaves) and earthworms are then released to the tank. After 60-75 days, 70 per cent of the material will be decomposed. The vermicompost from coconut leaves contain 1.2 to 1.8 per cent of Nitrogen, 0.1 to 0.2 per cent Phosphorus and 0.1 to 0.4 per cent Potassium.

Technological intervention related to organic recycling in coconut garden through vermicomposting was implemented in 60 coconut holdings spread over 10 CBOs under the project. On an average 240 kg vermicompost was produced from 370 kg coconut leaves within a period of 120 days in one production cycle in a vermicomposting tank in farmers' plots.

Table 2. Biomass and nitrogen made available through basin management by growing cow pea in different locations

Location	No. of coconut basins	Availability per coconut basin	
		Biomass (kg)	Nitrogen (g)
Ajanoor	4,476	14.97	126.90
Bedadka A	3,845	17.95	122.76
Bedadka B	3,475	16.12	109.06
East Eleri A	2,746	21.12	160.60
East Eleri B	2,856	15.06	129.20
Karadka	3,395	17.97	117.82
Madikkai	4,857	19.97	127.44
Muliyar	3,699	14.87	106.79
Nileshwaram	4,195	18.12	141.60
West Eleri	4,151	14.94	107.20

iii. Application of balanced dose of chemical fertilizers

One of the factors for low productivity of coconut in farmers' gardens is low level of adoption of Integrated Nutrient Management (INM) practices. Due to various reasons farmers were unable to adopt the recommended INM

Vermicomposting of coconut leaves

provided satisfactory level of nutrient availability for coconut cultivation in the project area. The impact of INM practices on coconut yield was visible and the coconut farmers are now convinced about the importance of adoption of INM for sustainable coconut production.

practices in coconut. As part of the technological interventions under the NAIP project chemical fertilizers were applied to coconut palms in all the holdings in the 10 CBOs as per the recommended quantities during the project period. Arrangements were also made for soil testing in coconut gardens. Integrated nutrient management with chemical fertilizers and organic manures

iv. Inter/mixed cropping

Economic risks and uncertainties due to the high degree of price fluctuation is one of the major problems experienced by coconut growers. Crop diversification in coconut gardens is an important strategy suggested to overcome the difficulties due to price fluctuation in coconut. In spite of the obvious benefits of coconut based farming system over the traditional monoculture, the extent of adoption of the recommended cropping systems is not at a satisfactory level. Under the NAIP interventions on intercropping was given emphasis while formulating the activities related to integration of production technologies. Intercrops such as banana, pineapple, vegetables including cool season vegetables, elephant foot yam, tapioca, colocasia, ginger, turmeric etc., were introduced as intercrops. Perennials such as black pepper, nutmeg and cocoa also were introduced in some coconut gardens. Inter/mixed crops were introduced in the coconut holdings depending on the inter space available for crop intensification. Details pertaining to the average yield of food crops raised as intercrops under NAIP are furnished in Table 3.

Table 3. Interventions on intercropping of food crops in farmers' coconut gardens and output realised

Sl. No.	Intercrop	No. of holdings	Average yield obtained (t/ha)
I	**Vegetables**		
a	Ash gourd (Variety : Indu)	117	17.07
b	Cow pea (Variety : Lola)	140	8.88
c	Pumpkin (Variety : Ambili)	124	12.90
II	**Fruits**		
a	Banana (Variety. Chengalikodan)	123	13.75
b	Banana (Variety : Mysore Poovan)	113	18.77
c	Banana (Variety:. Nadan Nendran)	146	13.87
III	**Tuber crops**		
a	Elephant Foot Yam (Variety : Gajendra)	285	17.06
b	Tapioca (Variety : Sree Vijaya)	275	17.47
c	Dioscorea (Variety: Sree Keerthi)	129	14.07

Elephant foot yam was observed to be the most suitable intercrop under rain fed condition. Gajendra, the variety of elephant foot yam newly introduced to the locality under the project, was very well received by the farmers due to its good cooking quality and taste. Through farmer- to- farmer exchange of seed materials, adoption of Gajendra variety of elephant foot yam as intercrop in coconut garden increased substantially even in the non-project area. Among the different intercrops cultivated, banana (var. Chengalikodan) recorded the highest net returns.

iv. Integrated Disease Management practices

Bud rot disease was prevalent in many coconut gardens in three of the CBOs under the project area, especially in the eastern hilly tracts

of the district, resulting in heavy crop loss. An effective IDM package for the control of bud rot disease was evolved at CPCRI which involves removal of dead palms, treating the affected palms with fungicide (Mancozeb) and prophylactic measures to prevent the spread of the disease. Off campus training and demonstrations were conducted on the IDM practices for the coconut farmers and skilled palm climbers. For the effective control of the bud rot disease community action is essential and hence farmer participatory group approach was facilitated in a contiguous area where the disease was observed in coconut gardens. Adequate quantity of the fungicide was procured and the CBO members were trained to make polythene sachets for placement in leaf axils.

The impact of group approach in the control of bud rot disease in the project area was very much evident. During 2008 the disease incidence was 33 per cent. It was reduced to 6 per cent in 2009 and to 0.7 per cent in 2010. The successful experience of group approach under NAIP project in bud rot disease management motivated three local bodies (Balal, East Eleri and West Eleri grama panchayats) in the district to implement a large scale project for the control of bud rot disease with financial assistance from Coconut Development Board. CPCRI provided the technical support for the project.

Similarly, the integrated disease management practice of stem bleeding disease of coconut was also demonstrated under the project. Application of *Trichoderma* enriched neem cake in the basin of disease affected coconut trees is one of the components of the IDM package for controlling stem bleeding disease apart from removal of affected tissues and fungicide application. *Trichoderma* enriched neem cake was made available to the farmers under the project Thannott Jeevanuvala Nirmana Unit - a women SHG unit established under the project for multiplication and marketing of *Trichoderma*.

Intercropping

Impact of technological interventions on coconut yield

There was substantial improvement in the yield of coconut due to the implementation of various technological interventions under the project through group approach in the small and marginal coconut holdings. The average pre-intervention yield as revealed by base line data was 60 nuts per palm per year. The post intervention yield was assessed during 2011-12 in selected gardens by adopting stratified random sampling procedure. It was observed that the yield was increased to 112 nuts per palm. Location wise yield forecasting and estimate as obtained in the baseline is shown in Table 4.

Table 4. Comparison of pre- and post- intervention yield (number of nuts/palm)

Location	Base line yield (2007-08)	Yield (2011-12)
Ajanoor	80.21	107.89
Bedadka A	40.19	121.50
Bedadka B	44.96	117.41
East Eleri A	73.63	121.54
East Eleri B	86.35	111.53
Karadka	52.25	98.16
Madikkai	52.95	130.68
Muliyar	68.00	118.15
Nileshwaram	46.92	81.68
West Eleri	58.35	120.30
Mean	60.38	112.88

Sustenance and replication of activities of CBOs

Coconut farmers organised into CBOs under the NAIP project implemented by CPCRI are convinced about the benefits of group approach for effectively utilising technologies for enhancing productivity and income from coconut farming. Coconut growers in all the 10 CBOs in Kasaragod

Training programme on stem bleeding

district hence decided to sustain the activities by utilising the opportunities provided by Coconut Development Board (CDB) by facilitating the formation of Coconut Producers Societies and Federations. They are hopeful to sustain activities for better utilisation of improved production and processing technologies through group approach with the support from CDB. Organising coconut growers for implementing the CDB funded project on Integrated Coconut Development Scheme is being enthusiastically carried out by the newly formed producer societies in the district.

Conclusion

The experiences of CPCRI in facilitating Community Based Organisations of small and marginal coconut growers under the NAIP evidently reflects that better technology integration is possible through group approach for enhancing productivity and income. In the project area where group approach was implemented, the average yield of coconut was substantially increased after technology package implementation. The group approach in coconut farming for income enhancement in small holdings can be scaled up through appropriate schemes to be implemented by agencies like Coconut Development Board, State Department of Agriculture and Local Self Governments. Research organisations such as CPCRI would be able to extend technical support for implementing the technological interventions under such schemes.

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