

Farmer participatory technology assessment and refinement in coconut through Institution-Village Linkage Programme – experiences of CPCRI in India

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Abstract

Studies have shown that the extent of adoption of available technologies in coconut is not at a satisfactory level and there exists a wide gap between the productivity achieved at Research Stations and in field. Recommending technology based on the results at the research station without adequate and proper testing in the farmers' fields under the farmers resource and risk situations leads to inadequate technology integration. Ensuring farmer's participation in research and extension invariably enhances the extent of technology utilisation at farm level. There is scope for participatory technology assessment and refinement in coconut for achieving higher productivity. Indian Council of Agricultural Research (ICAR) started a project in 1995 for Technology Assessment and Refinement through Institution Village Linkage Programme (IVLP) under National Agricultural Technology Project (NATP). Central Plantation Crops Research Institute (CPCRI) is one of the selected centres to implement the project. Under this project the scope for farmer participatory research and extension in coconut was widened. IVLP is a novel front line extension programme, the implementation of which begins with the selection of a suitable village, that is followed by a detailed agro-ecosystem analysis of the selected village. diagnosing the problems of each production systems and prioritizing these; identification of technological interventions based on problem-cause relationship; the development of action plans and their implementation; and detailed socio-economic evaluation including farmers reaction and perception about the interventions. This is carried out using various PRA and RRA tools and techniques. In all these stages the active participation of farmers was ensured. CPCRI has been implementing IVLP in three villages, viz., Pady, Edneer and Nekraje of Kasaragod, Kerala with coconut as one of the important crops in the production system of the villages. This paper, besides detailing the IVLP approach, gives an account of the technological interventions relating to coconut production system namely performance assessment of high yielding varieties, intercropping technology and nutrient management. The impact of these interventions in enhancing the productivity and income from coconut is also discussed in this paper.

Key words : Coconut, farmer participatory technology, refinement, IVLP

Introduction

Coconut is cultivated in India since ages and it plays an important role in the social, economic and cultural activities of millions of people. In India, the annual coconut production is 12,597 million nuts from an area of 1.84 million ha., four southern states viz., Kerala, Tamil Nadu, Karnataka and Andhra Pradesh accounting for more than 90 per cent of area and production. Research works carried out by the Central Plantation Crops Research Institute (CPCRI) and other agencies such as State Agricultural Universities have resulted in a substantial number of technologies for improving the production and productivity of coconut. But studies have shown that there exists still a gap

between the productivity level of coconut at Research Stations and that is realized in farmers' gardens (Rajagopal *et al*, 2004). Thus there is a great scope for enhancing the production and productivity of coconut through the adoption of appropriate cultivation practices.

Ensuring farmer's participation in research and extension invariably enhances the extent of technology utilisation at farm level. Ashby (1990) defined Farmer Participatory Research as a set of methods designed to enable the farmers to make an active contribution as decision makers in planning and execution of agricultural technology generation. Participation of farmers in the research process highly facilitates the means of obtaining feed back for research and extension process, paves way

for the consecutive dissemination and adoption of the technologies and builds up the confidence of peasants in research activity and in their innovativeness (Daniel and Terefe, 1999). In this context, the relevance of farmer participatory technology assessment and refinement in coconut for achieving higher productivity assumes much significance. Realizing the potential of participatory approach in the identification of appropriate technologies and their faster spread amongst the clientele, CPCRI has initiated interventions related to farmer participatory technology assessment and refinement in coconut under the Institution Village Linkage Programme (IVLP).

Concept of Institution Village Linkage Programme

It is an innovative project initiated by the Indian Council of Agricultural Research (ICAR) on a pilot basis from 1995-96 which was later brought under the World Bank funded National Agricultural Technology Project (NATP) since 1999. It is different from the earlier first line extension efforts of ICAR, in the sense that it lays emphasis on the research aspect through the participation of farmers to be carried out by the multidisciplinary team of scientists. Moreover, IVLP is a production system oriented project with agro-ecosystem analysis of the adopted village as the basis to identify problems, prioritize them and find out technological intervention points which are further developed into action plans to overcome the problems through assessment and refinement of technologies. Active participation of the farmers has to be ensured throughout the implementation of this project and in this regard various PRA tools and techniques are to be employed to study the agro-ecosystem, develop action plans, implement the same and assess their appropriateness to the village.

The IVLP is conceptualized based on the realization of the fact that majority of the agricultural technologies are developed and perfected at the research institutes under ideal conditions which seldom exists under small and marginal farmers situation, that form the bulk of the farming community in India. The impact analysis of the various transfer of technology (TOT) projects of yester years brought to the lime light that the cause for non adoption/partial adoption of agricultural technologies by the farmers operating under complex, diverse, risk prone (CDR) production system really did not lay with the farmers or extension system or input supply system as believed generally, rather it was the technology that was found to be a mismatch to the production system of the farmers. It is against this background, the need to evaluate agricultural technologies for their appropriateness to the

environmental and socio-economic conditions of small and marginal farmers was felt strongly. Hence, a more holistic approach encompassing the detailed analysis of the agro-ecosystem of an adopted village, problem diagnosis, assessment and refinement of identified technological interventions etc. with farmers' participation as the underlining principle was thought of by ICAR and named as Institution Village Linkage Programme (IVLP) to address the problems of farming community particularly of CDR system.

Objectives of IVLP

The significance of client oriented research projects received higher attention among the planners and policy makers, which had led to the genesis of the concept, Technology Assessment and Refinement (TAR) through Institution Village Linkage Programme (IVLP). The Overall objectives of the project is technology assessment and refinement which means to introduce technological interventions with emphasis on stability and sustainability along with productivity of different production systems. This project aims in developing technologies, which are suited to specific farming situations. As the technologies are assessed and refined with full association and participation of the farmers, its adoption and dissemination will be better and faster.

Selection of project area

The project was taken up at Kasaragod district of Kerala state, which is located in the northern most region of Kerala bordering Karnataka. The project area covering 770 contiguous farm families are located in three villages namely Edneer, Pady and Nekraje. These villages are situated about 10-15 km away from the Central Plantation Crops Research Institute.

Constitution of multidisciplinary team

The project is to be implemented by a multidisciplinary Core Team of scientists drawn from the institute with one amongst them acting as the Nodal Officer. Apart from the Core Team, an Optional Team is also constituted with members from other institutions to render technical guidance as per the need of the project. The core team of CPCRI consisted of five members, an agronomist, a plant protection scientist, an agricultural economist and two extension specialists.

Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal (PRA) technique has been employed in this programme to ensure the actual involvement of people and the developmental agencies (both Government and non-Governmental) to gather

General information on broadly defined problems and focus on priority issues. This also helps further research to deepen knowledge on a particular topic and generate more specific hypothesis with recommendation for intervention, to evaluate the results of a programme (or) intervention and reconsider prior hypothesis in the light of experiences and modify the intervention programmes, and to involve the population in planning or review action effecting them and chalk out a programme or plan of action researched and designed by the local people.

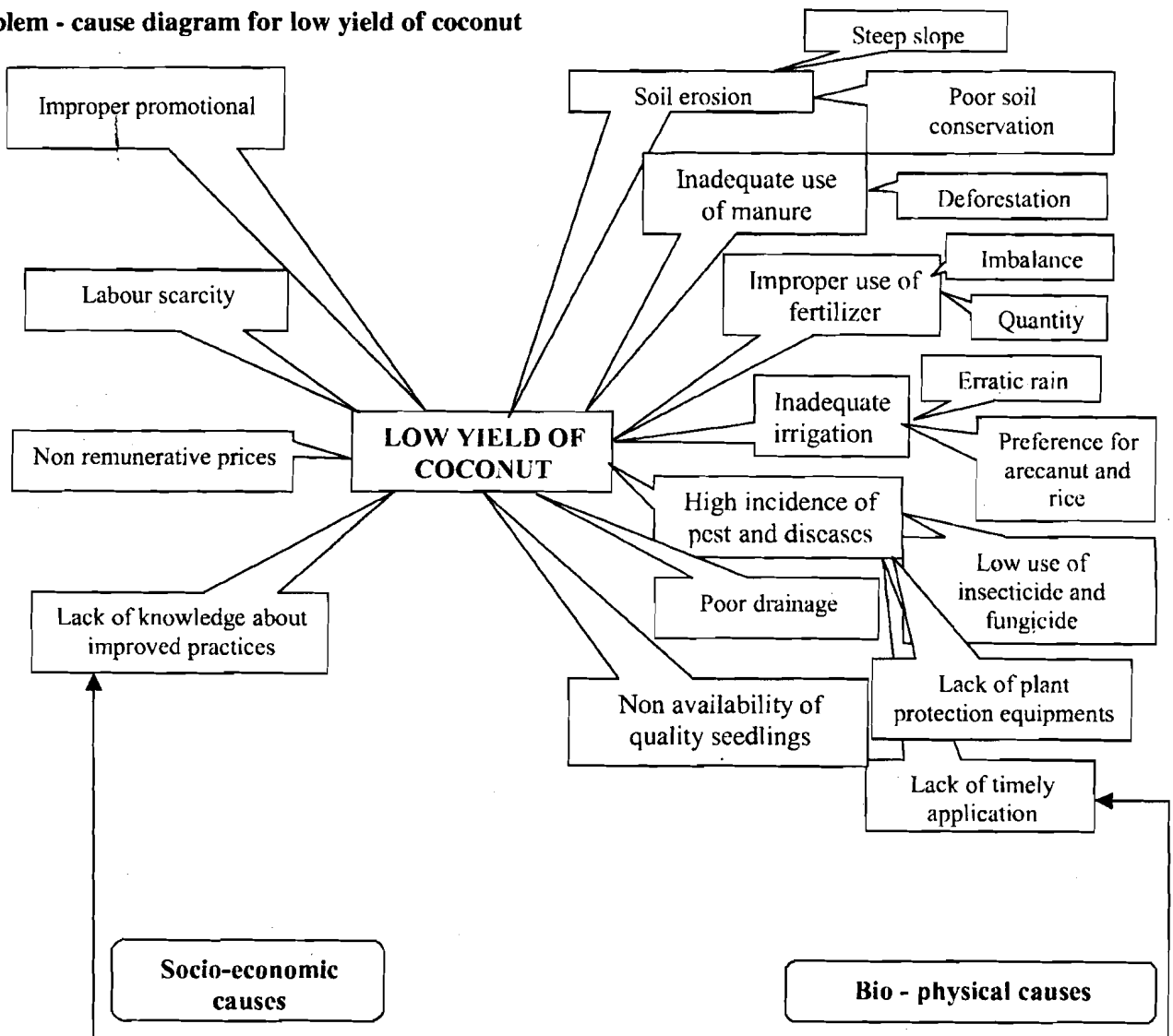
Agro-ecosystem analysis is one of the important activities to be undertaken before the implementation of the programme. This will provide an idea about farmers' present production practices, resource levels and specific problems to be intervened under various crops and systems. Space Analysis was done to collect information on social fabric of the villages, physical features and details on land use pattern. These are necessary to know

the problems of the farmers and then to formulate concrete programmes. Various PRA tools such as social, physical and land use map, village transect, time line analysis, seasonality analysis, matrix ranking, trend analysis and livelihood analysis were employed under the project.

Problem diagnosis and prioritization

By effectively utilizing the techniques of key informant interview, focused group discussion and direct observation, the various problems confronting production of crops and other enterprises are diagnosed. The basic causes for problems are also enlisted and grouped into bio-physical and socio-economical. In consultation with the farmers and concerned experts in the field, the causes are prioritized for possible technological interventions. This exercise is depicted in the form of problem-cause relationship diagram in respect of low productivity of coconut and represented as below.

Problem - cause diagram for low yield of coconut



Action plan for technological interventions

Keeping the problem-cause relationship as the basis, action plans are prepared for each technological interventions with the active participation of farmers facilitated by IVLP Core Team. Each intervention may be either in the form of On Farm Trial (OFT) or Verification Trial (VT). For those problems wherein solutions are experimentally proved elsewhere were taken as verification trial and for those technology for which the results are yet to be confirmed under farmers' field conditions are taken as On Farm Trials. In both this farmers' practice is taken as control. The action plan gives

an account of the micro-farming situation, problem and its causes, intervention points, potential solutions, nature of intervention, treatments, critical inputs etc. The technological interventions contemplated under the action plans are implemented in the selected farmers field either as on-farm trial or verification trial. At each and every stage of the trial, the participating farmers are involved in assessing the interventions using various performance indicators such as technical observations, economic observations, farmers reaction etc. The details of technological interventions implemented are furnished in table 1 below.

Table 1. Details of technological interventions implemented in coconut based farming systems under IVLP

Sl. No.	Technological intervention	Nature of intervention	Farmers' practice	Treatments	No. of farmers involved in the trial
1.	Assessing the performance of improved coconut varieties under rainfed conditions	OFT	Cultivation of West Coast Tall cultivar	1. West Coast Tall (Local) 2. Lakshadweep Ordinary 3. Philipines Ordinary	20
2.	Assessing the performance of improved coconut hybrids under irrigated conditions	OFT	Cultivation of West Coast Tall cultivar	1. West Coast Tall (Local) 2. West Coast Tall x Chowghat Orange Dwarf 3. Lakshadweep Ordinary x Chowghat Orange Dwarf	20
3.	Assessing the performance of tapioca as an intercrop in adult coconut gardens under rainfed conditions	VT	Coconut monocropping	1. Monocrop of coconut 2. Intercropping coconut garden with tapioca (M-4 variety)	43
4.	Assessing the performance of ginger as an intercrop in adult coconut gardens under rainfed condition	VT	Coconut monocropping	1. Monocrop of coconut 2. Ginger as an intercrop in coconut	35
5.	Assessing the performance of turmeric as an intercrop in adult coconut gardens under rainfed condition	VT	Coconut monocropping	1. Monocrop of coconut 2. Turmeric as an intercrop in coconut	37
6.	Assessing the performance of elephant foot yam as an intercrop in adult coconut gardens under rainfed conditions	VT	Coconut monocropping	1. Monocrop of coconut 2. Elephant foot yam as an intercrop in coconut	20
7.	Assessing the performance of amaranthus as intercrop in adult coconut gardens under rainfed conditions	VT	Coconut monocropping	1. Monocrop of coconut 2. Aamaranthus as an intercrop in coconut	20
8.	Assessing the performance of Bhendi varieties as intercrop in adult coconut gardens under rainfed conditions	OFT	Coconut monocropping	1. Monocrop of coconut 2. Local variety of Bhendi 3. New Bhendi variety - Arka Anamika	20
9.	Assessing the performance of green manure crops in the basins of adult coconut palms under rainfed conditions	OFT	Application of about 10 kg FYM/green leaf manure per palm	1. Farmers practice: 10 kg FYM/green leaf manure 2. Cultivation of <i>Calapogonium muconoides</i> in coconut basins 3. Cultivation of <i>Mimosa invisa</i> in coconut basins	20
10.	Assessing the performance of integrated control for stem bleeding disease in coconut .	VT	Chip the bark and apply coal tar or Bordeaux paste or drive nails into the stem above the portion of infection	1. Removal of affected tissue 2. Removal of affected tissue 3. 2+ application of calixin in the affected areas +coal tar	12

11.	Rat control in coconut gardens	VT	No control measures	application + root feeding with calixin (5 ml in 100 ml of water) + 5 kg neem cake application/palm. 1. No control measures 2. Use of Bromodialone cakes @ 10 g (0.005% Bromodialone)	19
12.	Assessing the performance of integrated management of rhinoceros beetle in coconut.	VT	No control measures	1. No control measures 2. IPM practices 3. a. Naphthalene balls in leaf axils b. Phorate satchets in leaf axils	19
13.	Pitcher irrigation in coconut	VT	Unirrigated coconut	1. Unirrigated coconut 2. Irrigation through earthen pots @ 3 pots/palm with 15 litre capacity filling once in 4 days during rainless period.	19
14.	Assessing the efficiency of composting of farm waste in coconut based homesteads through earth worms	VT	Farm waste in the homesteads not used properly	1. Improper utilisation of farm wastes 2. Vermicomposting of farm wastes using earthworms	20

Participatory assessment of technological interventions

Assessment of technological interventions were mainly done based on the performance indicators, both technical and economic, farmers reaction through matrix scoring, compatibility with internal resource of household, compatibility with existing farming system and general feedback from the farmers. Accordingly suggestions for refinement of the technologies were made.

In coconut based farming systems the performance of different high yielding varieties as well as hybrids are compared with that of the local West Coast Tall (WCT). The farmers opined that hybrids and high yielding varieties need to be encouraged in medium and large farms where the farmers are able to adopt better spacing and their capital availability is rich enough to follow better management practices.

In the recent past the price of coconut and its products had declined and the farmers were facing acute problems. Under this situation, research institutes suggest for intensifying the cropping in coconut gardens using the interspaces of coconut. The wide interspace between two coconut palms could be effectively utilized for the cultivation of annuals, biennials and perennials to sustain the gross farm income. Accordingly interventions were carried out to test the performance of tapioca, ginger, turmeric, elephant foot yam, vegetables like amaranthus and Bhendi. The results indicate that all these crops performed better as intercrops in coconut gardens. However, the small and

marginal farmers could not realize the economics of scale of intercropping and hence the marketed surplus was less. In those gardens where the interspaces between the coconut palms are optimum to take up intercropping and where the farmers have adopted optimum planting density for the intercrops, the marketed surplus and the profitability was high.

The current research efforts indicate that coconut basins could be effectively utilized for the cultivation of green manure crops like *Calopogonium mucunoides*, *Mimosa invisa* etc. which can provide 15-20 kg green manure per basin. This can meet about 50 per cent of nitrogen requirement, in addition to improving soil organic matter content. The farmers have accepted this low cost technology, but at the same time were facing serious problems to purchase the seed materials.

In the field of crop protection effective control measures were identified for the treatment of stem bleeding, rhinoceros beetle and rat menace in coconut gardens. The efficacy of these control measures were tested through OFT's and it was found that depending upon the intensity of the disease, treating the palms with calixin would effectively check the spread of the disease in the case of stem bleeding and naphthalene balls and phorate effectively control the attack of rhinoceros beetle. The rat damage in coconut gardens could be effectively controlled using rat poison (Bromadiolone cakes).

The verification trial on pitcher irrigation in coconut was partially successful in coconut gardens. Some of the farmers have faced clogging problems of the holes. One of the most successful verification trials

was vermicomposting of farm wastes using *Eudrilus sp.* of earthworms. Farm wastes especially from coconut palms were collected in big pits and in that fresh cultures of the earthworms were released. The farmers were fully convinced with the technology which is being projected as a success story of this project.

Conclusions

Coconut plays a pivotal role in the agrarian economy in many states in India and provides livelihood to millions of farm families. The extent of adoption of available technologies in coconut is not at a satisfactory level and there exists a wide gap between the productivity achieved at Research Stations and the end productivity in field. There is scope for participatory technology assessment and refinement in coconut for achieving higher productivity. Institution Village Linkage Programme (IVLP) is a novel farmer participatory programme for technology assessment and refinement to enhance technology utilisation at farm level. Central Plantation Crops Research Institute, Kasaragod has been implementing IVLP in selected areas with coconut as one of the important crops in the production systems of the villages. Using various PRA and RRA tools and

techniques, activities like a detailed agro-ecosystem analysis of the selected village, diagnosing the problems of coconut based production systems and prioritising these; identification of technological interventions based on problem-cause relationship; the development of action plans and their implementation; and detailed socio-economic evaluation including farmers reaction and perception about the interventions were carried out under the project. Implementation of the project revealed the effectiveness of participatory approach in the performance assessment of various technologies related to high yielding varieties, intercropping, nutrient management and crop protection in coconut.

References

- Ashby J.A. 1990. Evaluating technology with farmers. *In: A Hand Book of IPRA Projects*. CIAT and the Kellogg Foundation. CIAT, Colombia. 938.
- Daniel Shamebo and Terefe Belehu. 1999. Peasants participatory evaluation in release of early maturing sweet potato varieties in southern region of Ethiopia. *Journal of Extension systems* 15(1): 70-78.
- Rajagopal. V., Arulraj S. and Thamban, C. 2004. Research-Extension interface for transfer of technology on coconut. CPCRI, Kasaragod.