

PARTICIPATORY RESEARCH IN PADDY CULTIVATION IN KASARAGOD DISTRICT OF KERALA: A CASE STUDY*

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Abstract: Paddy cultivation in Kerala is declining due to non-remunerative returns owing to high cost of labour combined with poor productivity. Analysis of problem-cause relationship through farmer participatory approach revealed that low profitability was mainly due to the reasons of unavailability of quality seed, imbalanced use of fertilizers, improper plant protection measures, weed menace and high labour cost. The technological intervention points identified through farmer participatory approach and implicated on-farm conditions revealed that high yielding medium duration variety Aishwarya out-yielded local variety with substantial higher returns in the project area. Application of recommended dose of fertilizers gave around 500 kg grains per ha extra over farmers practice. On farm research on weed control in paddy revealed that application of weedicide gave an average yield of 2.5 t ha⁻¹ as compared to farmers practice of 2.2 t ha⁻¹. Control of insect pests like leaf roller and stem borer gave additional net returns of Rs. 1105/ha by way of increased yield over farmers' practice.

Key words: Farmer participatory research, fertilizers, insecticides, paddy, weedicides

INTRODUCTION

Paddy cultivation in Kerala, of late is proving to be a less remunerative enterprise due to the small holding size, high cost of inputs like hired labour, manures and fertilizers, non-availability of quality seeds, pests and diseases and low productivity. This necessitates the need to develop technologies taking into account the diversity and micro-environmental specificity that characterize small farm conditions. The traditional agricultural research in India has certain fundamental limitations. The resource-poor farmers seldom have access to institutionalized channels for communicating with technology designers about their actual problems and technology requirements. Further, micro-environment diversity imposes severe limitations on the capacity of formal research system to exhaustively screen new technology for its suitability to small farm conditions. Under such limitations, participatory research strategies are needed to institutionalize feedback channels to researchers and extension workers about farmer-level constraints and the acceptability of new technologies by small farmers. In most of the small farm production systems, informal trials and experimentation by farmers themselves are common features of their traditional practices to identify acceptable, location-specific management techniques from blanket recommendations (Biggs, 1980; Biggs and Clay, 1981;

Chambers, 1983). Of late, emphasis is given for evolving appropriate technologies matching the prevailing farming and agro-ecological situations with active participation of farmers. Introduction of the concept of farmer participation into the diagnostic and prioritization phases of on farm research is a meaningful and practical approach (Norman, 1980).

Taking into cognizance, the above efforts were made to design and implement a few farmer participatory research initiatives in paddy cultivation in Kasaragod district of Kerala under the Technology Assessment and Refinement (TAR) programme of the ICAR. This paper highlights the research efforts made through farmer participation to evaluate different production and protection technologies at farm-level in paddy cultivation.

MATERIALS AND METHODS

The project area consisting of 5379 ha covered 710 contiguous farm families located in three villages namely Edneer, Pady and Nekhraje of Kasaragod district in Kerala. During the rainy season, farmers cultivate paddy, the most important staple crop under rainfed conditions. Since paddy cultivation during kharif is under rainfed condition, the time and type of cultivation (transplanted or broadcasted) purely depend on onset and withdrawal of the monsoon. If the onset is delayed, most of the farmers ei-

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ther cultivate the kharif crop as broadcasted paddy or do not cultivate the second crop during rabi season. The cultivation of paddy in the area is declining due to factors like non-remunerative returns, high cost of labour combined with poor productivity. Brain storming cum data recording sessions were conducted with the active participation of the farmers, farm women and farm youth. The participants were asked to spell out the problems experienced. After the problems were chalked out, screening was done to eliminate the superfluous, incomplete and unclear problems. The list of problems in relation to the cultivation of paddy was subjected to matrix ranking and the problems were prioritized based on the severity, extent and frequency of the problems. The problems on paddy cultivation on prioritization were: labour scarcity, fertilizer use, pest and diseases, improved variety, weeds and problem on availing government facilities.

A flow diagram depicting the problem and causes (Fig. 1) was prepared by the same group of farmers facilitated by the core team members. On the perusal of the problem-cause diagram, it was found that the low profitability of paddy was mainly due to the unavailability of quality seeds. Moreover, in the area, paddy cultivation was either totally devoid of chemical fertilizers or was with an imbalanced dose of NPK. Farmers applied organic manure before planting as per the availability to the main field. They were unable to control weeds during the early stages of crop growth due to scarcity and high cost of labour. During the rabi season, the farmers of the selected villages who had irrigation facilities mostly grew H-4 variety. But due to the continuous use of their own seeds year after year, the problem of seed mixing with other varieties and occurrence of wild rice had been observed. Further, pest and disease attack was found to be a common feature in the area due to the inadequate plant protection measures causing damage to the tune of 25 per cent yield.

The above said problems as well as their related causes were triangulated with the farmers' group as well as the core team members and strategies were developed to tackle and solve them. The crux of the problem was in

the wrong selection of paddy variety, which was tall, lodging, poor yielding and non-fertilizer responsive. The primary strategy was to experiment and demonstrate the advantage of cultivating a high yielding variety of medium duration, semi-tall, fertilizer responsive and suitable for both transplanted as well as broadcasted condition. Moreover, as the farmers were continuously using their own seeds, there was a need to replace the local seed material with certified seeds in the region for realizing the actual yield potential of the variety. Other related strategies to enhance the yield were to convince the farmers of the economic advantage of the balanced use of fertilizers and judicious use of plant protection chemicals against major pests and diseases and weed control measures during early stages using weedicides.

Based on these intervention points identified by the participants, the core team fixed and implemented on farm trials (OFT) / on farm research (OFR) and demonstrations.

RESULTS AND DISCUSSION

For two consecutive years, high yielding varieties of paddy were introduced in the project area. During the kharif season in 1997, three high yielding medium duration, fertilizer responsive varieties viz. Aishwarya, Athira and Jayathi were introduced. Out of these, it was found that the variety Aishwarya performed better than the others. The grain and straw yield from Aishwarya were found to be 3.0 t ha⁻¹ and 2.05 t ha⁻¹, respectively as compared to the respective grain and straw yield of 2.05 t ha⁻¹ and 3.5 t ha⁻¹ in Athira, 2.89 t ha⁻¹ and 2.52 t ha⁻¹ in Jayathi and 1.5 t ha⁻¹ and 4.01 t ha⁻¹ in Kayama (local control). The net return was obviously higher in Aishwarya (Rs 8183/ha), followed by Jayathi (Rs 7499/ha), Athira (Rs 1493/ha) and Kayama (Rs 66/ha).

Aishwarya was once again tried in the farmers' fields for the second consecutive year in kharif 1998 along with other high yielding medium duration varieties viz. Pavizhom and Kairali. It was observed that the performance of Aishwarya remained fairly consistent during this season as well. Its performance was comparatively better than the other varieties. The grain yield and straw yield of Pavizhom

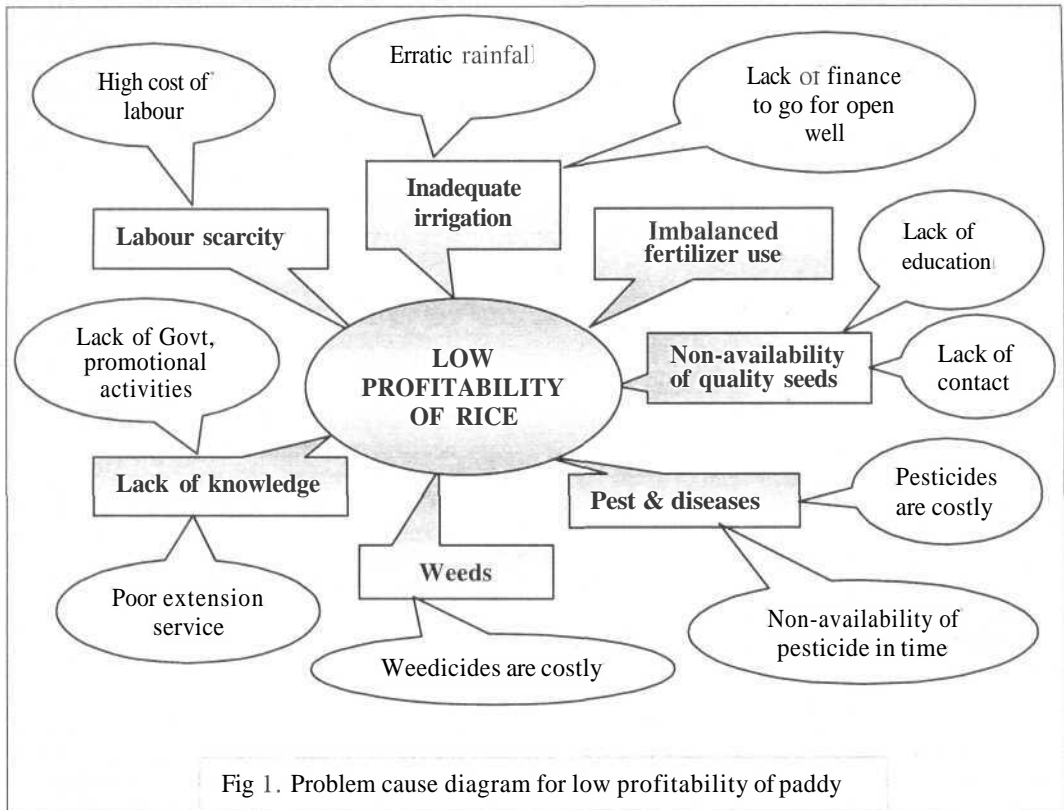
Table 1. Yield and net returns due to various interventions in paddy cultivation under farmers' condition

Sl. No.	Name of the intervention	Type of intervention	No. of farmers	Treatments	Yield, t ha ⁻¹		Net returns Rs ha ⁻¹
					Grain	Straw	
1	Evaluation of the performance of medium duration HYV of rice under transplanted condition during first crop season under rainfed and limited resource condition	OFR	16	1. Local variety (Kayama)	1.50	4.01	66
				2. Athira (HYV)	2.05	3.50	1493
				3. Aishwarya (HYV)	3.00	2.05	8183
				4. Jayathi (HYV)	2.89	2.52	7499
2	Use of balanced chemical fertilizers in HY medium duration rice varieties under transplanted rainfed condition during kharif season	Demonstration	20	1. Farmers practice	2.25	2.9	3818
				2. Recommended fertilizer dose	2.75	2.5	5908
3	Control of stem borer in paddy under rainfed transplanted condition	Demonstration	11	1. Farmers practice - No pest control	2.30	2.70	6073
				2. Spraying quinalphos at the recommended dose	2.70	2.75	7438
4	Control of leaf roller on rainfed transplanted paddy during kharif season	Demonstration	11	1. Farmers practice - No pest control	2.25	2.60	5643
				2. Spraying quinalphos at the recommended dose	2.65	2.80	7078
5	Use of balanced chemical fertilizers for irrigated paddy during rabi season	Demonstration	24	1. Farmers practice	1.50	2.80	203
				2. Recommended fertilizer dose	2.30	3.00	4813
6.	Control of stem borer and leaf roller in paddy under low land transplanted condition during rabi season	Demonstration	27	1. Farmers practice - No pest control	2.49	2.80	8123
				2. Spraying quinalphos at the recommended dose	2.87	2.80	9228
7	Weed control in paddy using weedicides	OFR	10	1. Farmers practice (Manual weeding)	2.20	2.50	5513
				2. Weed control using pendimethalin + 1 hand weeding	2.50	2.60	6193
				3. Weed control using pendimethalin + 2,4-D	2.45	2.60	5618
8	Assessing the performance of medium duration paddy varieties during kharif season	OFT	43	1. Local variety (Kayama)	0.75	0.21	-7075
				2. Aishwarya (HYV)	3.00	2.21	8250
				3. Kairali (HYV)	1.93	1.86	140
				4. Pavizhom (HYV)	2.45	2.35	4130

were noted as 2.44 t ha⁻¹ and 2.35 t ha⁻¹ respectively, while in Kairali it was 1.93 t ha⁻¹ and 1.86 t ha⁻¹ and in Kayama, 0.75 t ha⁻¹ and 0.21 t ha⁻¹, respectively as compared to the grain yield and straw yield 3.00 t ha⁻¹ and 2.21 t ha⁻¹ respectively of Aishwarya. So, as far as the grain yield was concerned Aishwarya could be adjudged as the best variety while Pavizhom seemed to have better straw yield. As far as the net return was concerned a maximum profit of Rs 8250/ha was obtained

from Aishwarya, followed by that from Pavizhom (Rs 4130/ha) and Kairali (Rs 140/ha) while from Kayama there was a loss of Rs. 7075/ha.

Out of the HY varieties introduced in kharif, the performance of Aishwarya was found best as far as the growth parameters and grain yield were concerned as compared to the other varieties Athira, Kairali and Jayathi. The cultivation of the local variety Kayama incurred a



loss during kharif 1998 due to the untimely rains at the time of harvest. Kayama being a tall variety was more affected by the rains than the other varieties resulting in low yield during the period. The high yielding varieties being of medium height were not affected to that extent. Another intervention to demonstrate the benefits of recommended doses of fertilizers (90:45:45) was also implemented. It was observed that use of chemical fertilizers @45:45:45 kg NPK as basal dose and 45 kg N as top dressing at 25 days after transplanting in HY medium duration paddy varieties under transplanted condition increased the grain yield by around 0.5 t ha^{-1} and the straw yield increased by 0.4 t ha^{-1} over the control. The net returns also increased by Rs 2090/ha due to balanced application of fertilizers.

A demonstration carried out during the rabi season of 1997-98 in H-4 variety of paddy gave the average yield 2.3 t ha^{-1} of grain and 3.0 t ha^{-1} of straw due to application of bal-

anced chemical fertilizers as compared to 1.5 t ha^{-1} of grain and 2.8 t ha^{-1} of straw under farmers practice. The total profit obtained on using the recommended dose of fertilizers was Rs 4813/ha in comparison to Rs 203/ha obtained under farmers practice.

The findings revealed that application of balanced dose of chemical fertilizers in both the seasons resulted in increased yield from paddy. The farmers were also convinced with the effect of application of fertilizers on the yield of paddy. But they were not keen on spending on fertilizers on paddy cultivation more because it is no longer being considered profitable.

Another intervention demonstrating the effectiveness of using plant protection measures to control insect pests like leaf roller and stem borer was carried out in both the seasons during 1997-98, since the farmers did not follow the recommended control measures against

pests to prevent loss in yield of paddy. In the demonstration to control stem borer in paddy during kharif, a slight difference in the yield was noticed as a result of spraying quinalphos @ 750 ml of EC/ha at 15-20 days after transplanting and then at boot leaf stage. It was observed that the average grain yield was 2.3 t ha⁻¹ and straw yield was 2.75 t ha⁻¹ in control plots while the plots where control measure was taken up gave an average grain yield of 2.5 t ha⁻¹ and straw yield of 2.7 t ha⁻¹ thus obtaining an average net return of Rs 7438/ha as compared to Rs 6073/ha under farmers practice (control).

In a demonstration conducted for the control of leaf roller during kharif in rainfed transplanted paddy, the realized average yield under farmers practice was 2.25 t ha⁻¹ of grain and 2.6 t ha⁻¹ of straw with a total profit of Rs 5643/ha and leaf roller controlled by spraying quinalphos @ 750 ml of 25% EC/ha at 15-20 days after transplanting and then at boot leaf stage gave an average grain yield of 2.65 t ha⁻¹ and 2.8 t ha⁻¹ straw with a net profit of Rs 7078/ha.

The intervention demonstrating the control of insect pests like leaf roller and stem borer using quinalphos @ 750 ml of 25 % EC per ha at 15-20 days after transplanting and then at boot leaf stage was carried out once again during rabi season and it was noticed that yet again the farmers who took up the control measures against these pests got additional net returns of Rs 1105 per ha as compared to the control plot where no control measure was taken. With the demonstration on using control measures against pests and diseases they were convinced that on application of pesticides at the right time in the right concentration would reduce the incidence of pests considerably. Another intervention was taken up to demonstrate the effect of weedicides. It was observed that

the farmers who had used on weedicide (pendimethalin) 6 days after transplanting and took up one hand weeding 30 days after transplanting obtained an average grain yield of 2.5 t ha⁻¹ and straw yield of 2.6 t ha⁻¹ with total profit of Rs 6193/ha. Those who had used two weedicides, pendimethalin @ 3 l ha⁻¹, 6 days after transplanting and 2,4-D@1.25 kg in 400 litres of water after 25 days of transplanting obtained 2.45 t ha⁻¹ grain yield and 2.6 t ha⁻¹ straw yield thereby gaining a total profit of R 5618/ha and those who had not used weedicides obtained 2.2 t ha⁻¹ grain yield and 2.5 t ha⁻¹ straw yield. By this intervention the farmers were also convinced that using weedicides not only led to increase in the yield but also saved them from spending huge amounts on labour thus reducing the cost of cultivation of paddy and thereby increasing the net returns.

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