Improvement in Livelihoods of Tribal Farmers in Rainfed Farming Systems

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Introduction

The East Godavari district of Andhra Pradesh State is predominantly a tribal populated district with 52 per cent (1,48,920) of the total population of 2,85,848, mostly concentrated in 559 villages of agency area and 49 villages of sub plan area. The predominant tribal groups found here are Konda Reddy, Koya Doras, Konda Kammaras, Valmiki, Manne Doras and Konda Kapus. These tribes are closely attached to their lands and forests. The lands are generally rainfed uplands and their productivity is low. Dwindling forests and non-timber forest produce have also adversely affected their livelihoods.

The tribal habitats in the district are mostly remote and interior, with access through usual means of transport being difficult. Hills and forests often surround the villages. The terrain is moderately elevated. The average rainfall ranges from 900-1400 mm. Nearly 30 % of the total area is under forests, which supports a wide variety of flora and fauna. The soils are mostly red and loamy, however patches of black soil are also found.

The tribal families employ a wide variety of means for their livelihood. There are significant differences in this regard among various sub-tribes. For instance, a majority of the Konda Reddy's are still at a hunter-gatherer stage. They do follow, however, primitive methods of agriculture (locally called *podu*) wherein they clear away patches of forest lands on hill slopes by rotation, by cutting and burning, and raise a mixed crop, which consists of millets, castor, pulses and tuber. On the other extreme are the Valmiki, who have mostly benefited from the efforts of missionaries in the past and have taken to education in a big way. Most of them practice settled agriculture, raising crops like paddy, cotton, tobacco, chilies and others. The Konda Doras subsist on agriculture and cattle rearing, while the Kammaras are the traditional artisans. The level of literacy is very low among all the tribals as compared to the rest of the population. To sum up, rainfed farming, collection of minor forest produce and wage employment during the lean season dominates the livelihoods of the tribals in this district. Hence, land based opportunities are crucial for improving economic situation of the tribes.

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The National Institute of Agricultural Extension Management (MANAGE) implemented the "Participatory Adaptive Research" (PAR) project of Andhra Pradesh Tribal Welfare Department with financial assistance from International Fund for Agricultural Development (IFAD). The main focus of this project was to test technologies developed at research stations in the farmer's fields and test their operational feasibility and site specific suitability and integrate them into recommended farming systems for wider adoption. To undertake the field activities three ITDA centers viz., Rampachodavaram in East Godavari district, Bhadarachalam in Khammam district and Utnoor in Adilabad district were identified. This paper deals with the adaptive research activities undertaken in rainfed farming systems of Rampachodavaram with the following objectives:

1. To identify the existing farming systems in Rampachodavaram agency area.
2. To understand the possibility and feasibility of interventions in different enterprises without disturbing the tribal culture.
3. To examine the economics of the farming systems before and after implementation of the PAR project.

Methodology

The four major Agro Ecological Situations in Rampachodavaram agency area were identified based on source of irrigation, altitude and distance from the urban area. They are as follows:

AES-I: Medium altitude, source of irrigation (Streams) and near urban areas

AES-II: Medium altitude, source of irrigation (streams) and away from urban areas

AES-III: Low altitude, rainfed and near urban areas

AES-IV: Low altitude, rainfed and away from urban areas

Two representative villages were selected from each AES. From each of the villages four resource rich farmers and four resource poor farmers were selected based on factors like size of holdings, availability of irrigation and draught power and covering the dominant community (sub tribe) of the village. As such from each AES, 16 farm families were selected for the study making the sample size 64.

The PAR project was designed based on farming systems, which is an integrated approach of various enterprises operated by different categories of farmers. The farm and family was taken as a unit of operation.

Farm families were categorized as resource rich and resource poor based on factors like size of holdings (5acres and less than 5 acres), availability of irrigation and draught

power so that it becomes easier to focus upon and bring changes by considering the factors that influence production and ultimately the income of the farm family.

Tools Used

Through participatory approaches with the farm families (resource rich and resource poor), the existing farming systems were identified in Agro-ecological situation-I (table-1) and analyzed for improving the system based on the resources and technological gaps in production practices. The production gaps in all the commodities of different enterprises of the selected farmers were identified using structured schedules.

The economic analysis of the farming systems was carried out and presented based on before and after studies. The change in income after interventions of PAR was compared with the base line survey conducted before initiation of the project.

Results and Discussion

After analyzing the existing farming systems with each of the resource rich and resource poor farmers the feasible alternate models of farming systems were tried by considering their resources, culture and source of marketing as shown below.

Table 1: Existing and Modified Farming Systems in AES-I for Resource Rich farmers

n=8

S. No.	Farming systems		No.of farmers	Percentage
	Existing	Modified		
1.	Agriculture + Animal Husbandry + Horticulture + Minor Forest Produce	Agriculture + Animal Husbandry + Horticulture . (Veg.) + Minor Forest Produce	3	37.5
2.	Agriculture + Animal Husbandry + Minor Forest Produce	Agriculture + Animal Husbandry Poultry + Horticulture +Minor Forest Produce	4	50.0
3.	Agriculture + Animal Husbandry + Sericulture + Minor Forest Produce	Agriculture + Animal Husbandry + Horticulture (Veg) + Sericulture + Minor Forest Produce	1	12.5
		Total	**8**	**100**

** Note: (for the present paper only AES-I, is being presented)

It is observed from the above table that the sample resource rich farmers adopted three major farming systems. The common enterprises in all the systems were agriculture, animal husbandry and minor forest produce. Quite a large proportion (50 per cent) of the respondents were adopting the three-enterprise combination system. The major interventions carried out with resource rich farmers in all the enterprises were as follows:

The interventions in agriculture were change in plant material, management practices in sowing, weeding, irrigation and fertilizer at critical stages of the crop growth. Crop Intensification was done through inter cropping, multiple cropping in plainlands and *'Podu'* with jowar, bajra, ragi and dry paddy.

The activities carried out in Horticulture enterprise were block plantation of mango, maintenance of the old gardens by taking up activities like gap filling, pruning of dried branches and pest management (spraying of endosulphan to prevent fruit borers), introduction of turmeric in medium and low altitude areas as a cash crop to improve the economic status of the tribal farmers. Commercial vegetable cultivation was introduced (tomato, brinjal, bitter gourd) in different altitudes.

The activities undertaken in animal husbandry were, management of health (by providing timely vaccines) feed, fodder and up-gradation of local breed of buffaloes through artificial insemination. To improve the nutritional status and income of the family backyard poultry "Vanaraja" was introduced.

The above interventions were carried out and tested for additional income generation.

Table 2 reveals that the resource poor farmers followed three major farming systems with four enterprise combinations. 62.5 per cent respondents were following the farming system comprising of four enterprises i.e. agriculture, horticulture, minor forest produce and wages. One fourth of the sample farmers had the farming system with enterprise combinations of agriculture, animal husbandry, minor forest produce and wages. The remaining 12.5 per cent of the respondents had the enterprise combination with sericulture. The two main enterprises followed by the sample resource poor farmers were agriculture and minor forest produce.

Keeping the stabilization of food and nutrition of resource poor farmers in view, only the activities involved with low investments like back yard poultry, homestead gardens with vegetables and fruit plants were introduced in the existing farming systems along

Table 2: Existing and Modified Farming Systems in AES-I - Resource Poor farmers

n=8

S. No.	Farming systems		No.of farmers	Percen-tage
	Before	After		
1.	Agriculture + Horticulture+ Minor Forest Produce + Wages	Agriculture+ Horticulture +Minor Forest Produce +Wages + Back yard vegetable	5	62.5
2.	Agricuiture + Animal Husbandry+ Minor Forest Produce + Wages	Agriculture + Animal Husbandry (Poultry) + Minor Forest Produce + Wages + Back yard vegetables	2	25
3.	Agriculture+Animal Husbandry+Minor Forest Produce + Sericulture	Agriculture+ Animal Husbandry + Minor Forest Produce + Sericulture + Backyard vegetables	1	12.5
		Total	8	100

with economic development. The other interventions made in agriculture, horticulture and sericulture were, change of seed/planting material and management practices like timely weeding, plant protection etc. In animal husbandry interventions included artificial insemination, health care, feed and fodder management activities in farming systems.

Economics of the Farming Systems

The economics of the farming systems under each agro-ecological situation was studied and is presented below.

Table 3: Cost of Cultivation in different Farming Systems in AES-I (in rupees/ha)

Category of Farmers	AES-I								
	Farming System –I			Farming System –II			Farming system -III		
	Before	After	Difference	Before	After	Difference	Before	After	Difference
Resource Rich	9402.16	13002.60	3600.44	10912.47	14492.87	3580.40	14152.17	15856.03	1703.86
Resource Poor	6845.03	7549.09	704.06	9315.62	9819.27	503.65	8596.26	9656.97	1060.71

From table 3 it is clear that the difference in cost of cultivation was higher in case of resource rich farmers compared to resource poor farmers in all the three farming systems.

The cost of cultivation difference in FS-I with resource rich farmers is Rs.3600.44 whereas with resource poor farmers it is only Rs. 704.06. Similarly in FS-II, the cost of cultivation difference is Rs. 3580.40/- with resource rich farmers, while with resource poor farmers it is only Rs. 503.65/- and in FS-III, the difference is Rs. 1703.86 with resource rich farmers and it is only Rs. 1060.71/- with resource poor farmers.

Table 4 Returns under different Farming Systems in AES-I (in rupees/ha)

Category of Farmers	AES-I								
	Farming System –I			Farming System –II			Farming system -III		
	Before	After	Difference	Before	After	Difference	Before	After	Difference
Resource Rich	18079.13	27304.30	9225.17	21229.87	29982.04	8752.17	26154.23	28656.74	2502.51
Resource Poor	14563.17	19847.44	5284.27	16812.03	21961.62	5149.59	16156.08	18260.71	2104.63

Table 4 indicates that the differential net return in AES-I in all the three Farming systems (I, II and III) with resource rich farmers is considerably higher when compared to the net returns gained by the resource poor farmers. The differential net return of resource rich farmers in FS-I is Rs. 9,225.17, FS-II is Rs. 8,752.17 and FS-III is Rs. 2,502.51 respectively, whereas with resource poor farmers it is Rs. 5,284.27 FS-I, Rs. 5,149.59 in FS-II and in Rs. 2,104.63 in FS-III. Under both the categories the superiority of farming systems I and II is exhibited compared to FS-III. Hence, this type of farming system can be replicated in similar agro-ecological situations for higher monetary returns.

This clearly indicates that the diversified activities of introducing vegetable cultivation and poultry could result in increased income with the resource rich farmers. With the resource poor farmers, the vegetables and poultry which were introduced as a backyard activity (due to their resource limitation) along with better management practices in crops, also resulted in increased incomes though less compared to the resource rich farmers. Food security and risk bearing capacity constrained the increased incomes with resource poor farmers.

Conclusion

The findings strongly support the integrated farming systems approach adopted for increasing the income levels of the tribal farmers of Rampachodavaram. This approach enabled the resource rich and resource poor farmers to realize higher incomes.