Strategic Interventions for Improving Rainfed Farming Systems in Bolangir district of Orissa

G.R. Desai[1], P.L. Manohari[2], Sanat Mishra[3] and S.V. Ramana Rao[4]

Introduction

Orissa comprises of 4.74 per cent of India's landmass and 36.80 million people (2001 Census) which accounts for 3.58 per cent of the population of the country. Nearly 85 per cent of its population live in the rural areas and depend mostly on agriculture for their livelihood. The State has been divided into ten agro-climatic zones. The Agricultural Census 1995-96 shows that there were 39.66 lakh operational holdings in the State. Of the farming population, only 0.38 per cent are big farmers (>10 ha), 3.93 per cent are medium farmers (4-10 ha), 13.72 per cent are small-medium farmers (2-4 ha), 27.89 per cent are small farmers (1-2 ha) and 54.08 per cent are marginal farmers (<1 ha).

The total cultivable land of the State is nearly 65.59 lakh hectares, of which only 26.89 lakh hectares has been provided with irrigation facilities by the end of 2003-04. This constitutes around 40 per cent of the cultivable land. The remaining 60 per cent of the land is under Rainfed situation. This situation demands an understanding of the present status of rainfed agriculture being followed by the farmers and the performance of farming systems so that efforts could be made for improving the same. Hence, an attempt was made to undertake a study in this direction with the following objectives.

1. To understand the profile of farmers in the rainfed areas
2. To know the accessibility of inputs, technical services and advisory support by the farmers in rainfed areas
3. To explore the types of farming systems being followed by the farmers and examine their level of economic performance in the rainfed areas
4. To understand the constraints faced by the farmers in rainfed agriculture along with their suggestions for improvement.
5. To suggest strategies for improving the performance of farmers in rainfed areas.

[1]Director (Organisational Development and Process Consultancy) MANAGE, Hyderabad
[2]Research Associate, MANAGE, Hyderabad
[3]Consultant (Livelihoods) Orissa Tank Irrigation Project, Bhubaneswar
[4]Senior Scientist (Agricultural Economics) DOR, Hyderabad

Methodology

The study was carried out on an ex-post facto research design since many developmental activities have been undertaken over a period of time. Bolangir district in Orissa was selected using random sampling methodology from among the districts with higher levels of rainfed areas. Agalpur block in Bolangir district was selected to represent the larger area under rainfed agriculture using random sampling methodology. From this block, two villages Asurmunda and Manupally were selected, considering their level of response for developmental interventions.

From each one of the villages, three categories of farmers were selected representing marginal, small and medium holder categories. Fifteen farmers from each of the three categories were selected on a random sampling basis from each village.

The data was collected from all farmers by using a pre tested well designed structured schedule. The data collected has been analyzed by using means and percentages. The presentation of the data has been done on a comparative basis for various categories of the farmers relating to different aspects of the study in a simple tabular format.

1. Profile of Rainfed Farmers in Orissa

The profile of the rainfed farmers in Orissa is presented in table-1.

Table 1. Profile of Rainfed farmers in Orissa

S. No.	Indicator	Category of farmers			Average
		Marginal	Small	Medium	
1	Age (yrs)	48	46	53	49.0
2	Education	-	2	3	1.7
3	Family size (No)	6	6.4	6	6.1
4	Male members (No)	2.9	3.5	3.6	3.3
5	Female members (No)	3.1	2.9	2.4	2.8

The data reveals that the marginal farmers had a mean age level of 48 years with a six member family size along with half of them in the female category. The small farmers had a mean age level of 46 years with 2 years of education, with a family size of 6.4 members, half of them being females. The medium farmers were 53 years of age, with three years of schooling and a family size of 6 with half of them females. Overall it was observed that the farmers did not differ in their background.

2. Land Resources among the Rainfed Farmers

The land holding pattern among the marginal farmers is to the tune of 0.97 ha, followed by 1.17 on small farms and 3.5 on the medium farms (table-2).

Table 2. Land Resources among the Rainfed Farmers

S. No.	Indicator (av in ha.)	Category of farmers			Average
		Marginal	Small	Medium	
1	Ownership status				
a	Owned	0.97	1.17	3.5	1.9
b	Total operational holding	0.97	1.17	3.5	1.9
2	Irrigated area	0.08	0.12	0.46	0.2
3	Rainfed area	0.89	1.05	3.04	1.7
4	Net cultivated area (ha)	0.97	1.17	3.5	1.9
5	Source (%)				
a	Open wells	50	67	67	61.3
b	Canals	50	67	67	61.3
6	Seasonal availability				
a	Kharif	75	100	100	91.7
b	Rabi	12	100	100	70.7
7	Cost of irrigation (Rs/ha)	900	1200	1350	1150
8	Rainfed land value (Rs/ha)	86000	79000	81000	82000
9	Irrigated land value (Rs/ha)	180000	160000	157000	165666

None of the farmers had leased in or leased out land. On an average 0.08 ha area among the marginal farmers was irrigated. A similar pattern was found among the farmers of other categories. Open wells and canals were the main sources of irrigation covering 61per cent of the irrigated area. The availability of irrigation during the season was limited to 70.7 per cent during rabi and 91.7 per cent during kharif seasons across different farm sizes.

3. Livestock Ownership among Farmers

The results relating to various types of livestock being operated by the different categories of farmers is presented in table 3.

It could be observed from the data that a small percentage of the marginal farmers owned local breed of bullocks, buffaloes, cows, sheep and poultry. On the contrary, 79 per cent of the small farmers and 60 per cent of the medium farmers owned bullocks. Very few small farmers owned buffaloes and goats. The common livestock pattern

among all the farmers seemed to be bullocks and cows. Accordingly, any improvement in the farming systems has to take into account the preferences and needs of the farmers relating to various livestock, feed and fodder resources.

Table 3. Livestock Ownership among Farmers

S. No.	Details	Category of farmers			Average
		Marginal	Small	Medium	
1	Bullocks	19	79	60	52.7
2	Buffaloes	6	21	-	9.0
3	Cows	6	36	40	27.3
4	Goats	12	29	0	13.7

4. Ownership of Farm Assets

The major investments of the marginal farmers towards improving their infrastructure were found to be on agricultural implements such as ploughs, sickles, spades etc. This was followed by providing the infrastructure for cattle through investment on cattle shed and storage shed. Since the area is prone to higher level of rains and moisture, development of threshing yards has been undertaken by some percentage of farmers. The marginal farmers have not invested on large scale machinery.

Table 4. Ownership of Farm Assets

S. No.	Items	Category of farmers			Average
		Marginal	Small	Medium	
1	Farm Building	-	-	20	6.7
2	Cattle Shed	50	86	80	72.0
3	Storage Shed	31	50	80	53.7
4	Threshing Yard	19	36	80	45.0
5	Ploughs	88	100	100	96.0
6	Sickles	81	93	60	78.0
7	Hand Hoes	19	21	20	20.0
8	Spades	50	57	20	42.3
9	Blade Harrow	12	-	-	4.0
10	Thresher	-	14	20	11.3
11	Sprayers	-	43	60	34.3
12	Farm Machine	6	21	60	29.0
13	Others	-	14	-	4.7

Among the small farmers, major investments were towards agricultural implements

such as ploughs, hoes, spades, sickles etc. followed by cattle shed and storage shed, threshing yard. Many of the farmers had sprayers and threshers. The medium farmers invested more on infrastructure such as farm building, cattle shed, storage shed, threshing yard apart from farm implements, threshers, sprayers etc.

5. Access to Research Organizations

Contact with the research agency is one of the measures to improve the efficiency of farming.

Table 5. Access to Research Organizations

S. No.	Details	Category of farmers			Average
		Marginal	Small	Medium	
1	Contact with researchers (%)	6	7	60	24.3
2	Trials undertaken (%)	6	7	40	17.7
3	Participation in krishi mela / extension activities	12	29	40	27.0
4	Getting print material	6	7	20	11.0
5	Visit of researchers to farmers' fields				
a	Yearly	-	-	20	6.7

Accordingly, it could be visualized that 60 per cent of medium farmers apart from a small percentage of small and marginal farmers were in contact with the research personnel. Forty per cent of the medium farmers took up on farm trials and participated in the krishi mela and extension activities. On the contrary, a limited percentage of the marginal and small farmers participated in these activities and received the printed material. Twenty per cent of the medium farmers were found to have visits of the researchers to their farm atleast once in a year. Since contact between farmers and researchers has not developed as a mechanism for achieving regularity, it is necessary that specific mechanisms be promoted as a part of the action plans within the delivery systems so that these linkages could be developed and maintained.

6. Access to various Extension Services

6.1. Access to Extension Services in Agriculture

The results indicated in table 6.1 reveal that a very large percentage of marginal, small and medium farmers were in contact with the extension officials of the Department of Agriculture.

Table 6.1. Access to Extension Services in Agriculture

S. No.	Details	Category of farmers			Average
		Marginal	Small	Medium	
1	Contact with extension officials	88	100	100	96.0
2	Frequency of contact %				
a	Weekly	12	-	-	4.0
b	Fortnightly	38	29	60	42.3
c	Monthly	6	36	40	27.3
d	Quarterly	38	-	-	12.7
e	Half Yearly	31	36	-	22.3
3	Contact Place of farmers (%)-Gram Panchayat	88	100	100	96.0
4	Participation in extension activities				
a	Demonstrations	75	100	20	65.0
b	Minikits	-	-	20	6.7
c	Trainings	-	-	40	13.3
d	Exposure visits	-	-	20	6.7
5	Soil testing				
a	Availing soil test facility (%)	0	29	40	23.0
b	Payment of services	12	29	60	33.7
c	Distance (km)	0	10	21	10.3
6	Satisfaction with services	12	57	40	36.3

Most of the medium farmers had monthly or fortnightly contacts whereas others had a differential pattern of contacts. Majority of the contacts were found to be in the gram panchayat office. A large number of marginal and small farmers took up demonstrations and medium farmers were participating in demonstrations, mini kits and exposure visits. None of the farmers availed subsidy or inputs. A few farmers in the small and medium category availed soil testing facility on payment basis. Around half of the small farmers were satisfied with the services provided. Since agriculture was the main line activity of the farmers, contact with the extension agency was found to be highly promising. So also the farmers participated in some of the activities. There is further need to strengthen the intensity of the activity of the department to improve the delivery system for the farmers in a better way.

6.2. Access to Horticulture Extension Services

The contact of farmers with the extension officials of the Dept. of Horticulture as indicated in table 6.2 reveals that 40 per cent of the medium farmers only indicated

having contacts. Most of the farmers had contacts once in a fortnight or monthly at the gram panchayat office. None of the farmers participated in any of the extension activities of the department. Twenty per cent of them were found to be satisfied with the services.

Table 6.2. Access to Horticulture Extension Services

S. No.	Details	Category of farmers			Average
		Marginal	Small	Medium	
1	Contact with extension officials	-	-	40	13.3
2	Frequency of contact %				
a	Fortnightly	-	-	20	6.7
b	Monthly	-	-	20	6.7
3	Place (%)				
a	Gram Panchayat	-	-	40	13.3
4	Satisfaction with services	-	-	20	6.7

Since horticulture has a large potential in the state, both for family consumption and market demand, it is necessary that intensive efforts are made to provide greater extension services to the farmers. The limited contacts exhibited by the extension agency were mainly due to the limited extension personnel available within the organization. This needs to be geared up and improved for the benefit of the farmers.

6.3. Access to Extension Services of Department of Animal Husbandry

More than 60 per cent of the farmers in all the three categories were found to be in contact with the extension officials of the Animal Husbandry Department. The maximum range of contact was found to be monthly or fortnightly at the Gram Panchayat office. The farmers participated in the demonstrations only and did not receive any subsidy or inputs. Forty five per cent of farmers have availed A.I services, half of them on payment basis within a distance of 2 kms. and were satisfied with the services provided.

Table 6.3. Access to Extension Services of Department of Animal Husbandry

S. No.	Details	Category of farmers			Average
		Marginal	Small	Medium	
1	Contact with extension officials	62	71	60	64.3
2	Frequency of contact %				
	a. Weekly	12	-	-	4.0
	b. Fortnightly	12	14	40	22
	c. Monthly	31	50	20	33.7

3	Place of contact - Gram Panchayat	50	71	60	60.3
4	Extension services - Demonstrations	50	71	60	60.3
5	Support services				
	a. Availing of services (AI, vaccination etc.)	44	50	40	44.7
	b. Position of payment	25	43	20	29.3
	c. Distance	1.5	2	1.6	1.7
6	Satisfaction with services (%)	12	57	60	43.0

Since livestock is one of the sectors, adding to the income generation of the farmers irrespective of different categories, it would be helpful to integrate the livestock in the farming system through intensive efforts of the extension agency.

7. Access to Inputs

7.1. Access to Seed Material

The input seed is one of the crucial requirements in the agricultural crop production process. Accordingly, various channels have been used by different farmers to access seed material of different crops.

Table 7.1. Access to Seed Material

S. No.	Seeds	Category of farmers			Average
		Marginal	Small	Medium	
1	Source				
	a. Input dealer	44	64	60	56
	b. Own + fellow farmer	56	36	40	44
2	Distance (km)	9.5	9.5	9.2	9.4
3	Adequacy of seeds (%)	44	93	100	79
4	Mode of purchase – by credit (%)	56	36	-	30.7
5	Timely availability	44	64	100	69.3
6	Satisfaction with the quality (%)	44	79	60	61

The data presented in table 7.1 reveals that irrespective of the category of farmers most of the farmers depended on input dealers and fellow farmers in the area apart from their own sources to meet the seed requirements. The farmers procured seeds within a radius of 9 to 10 kms. Most of the farmers purchased on cash basis and were found to be satisfied with the quality, timeliness and adequacy. Since, seed is a very important input, it is necessary that the seed is replaced every five years to get the maximum returns. However, in the present case 44 per cent of the farmers were depending on their own sources of seed production and supply without introducing new genetic material in the production process. The situation leads to degradation in the yield levels normally over a period of time. Hence, it is necessary that proper seed production and supply arrangements are made through farmers groups and organizations for maintaining a seed replacement ratio of 30 per cent.

7.2. Access to Fertilizers

Fertilizer is an input introduced in the crop production system mainly to be met through external sources.

Table 7.2. Access to Fertilizers

S. No.	Fertilizers	Category of farmers			Average
		Marginal	Small	Medium	
1	Source - Input dealer	100	100	100	100.0
2	Distance (km)	5	5	5	5.0
3	Adequacy of fertilizers (%)	100	86	100	95.3
4	Purchase by credit (%)	-	14	-	4.7
5	Timely availability	100	100	100	100.0
6	Satisfaction with the quality (%)	88	100	80	89.3

Accordingly, all the farmers irrespective of categories were found to depend upon the input dealers for their supply of fertilizers within a distance of 5 kms. Majority of the farmers purchased fertilizers on cash payment and were satisfied with the timeliness, adequacy and quality.

7.3. Access to Plant Protection Chemicals

As in the case of fertilizers, the plant protection chemicals are also external to the village community and hence all the farmers depended upon the input dealers for the supply of pesticides within a 5 km. radius. Most of the farmers purchased the input on cash payment basis and were satisfied with the quality, timeliness and adequacy.

Table 7.3. Access to Plant Protection Chemicals

S. No.	Pesticides	Category of farmers			Average
		Marginal	Small	Medium	
1	Source - Input dealer	100	100	100	100
2	Distance (km)	5	4.4	5	4.8
3	Adequacy of pesticides (%)	100	100	100	100.0
4	Purchase by credit (%)	-	-	20	6.7
5	Timely availability	100	100	80	93.3
6	Satisfaction with the quality (%)	75	100	60	78.3

7.4. Access to Credit

The credit requirement of the farmers for production of various enterprises was found to be met from Banks, cooperatives, money lenders SHGs & fellow farmers in the area apart from their own personal investments. Most of the farmers traveled a distance of 5 kms. to access credit and they found it to be adequate and available timely.

Table 7.4. Access to Sources of Credit

S. No.	Credit	Category of farmers			Average
		Marginal	Small	Medium	
1	Source				
a	Banks	-	-	33.33	11.11
b	Cooperatives	25	16.7	16.7	19.5
c	Money lenders	12.5	-	-	4.1
d	SHG	62.5	8.3	83.3	51.4
2	Distance (km)	4.6	3.9	5	4.5
3	Adequacy	88	100	100	96.0
4	Timely availability	81	93	60	78.0

7.5. Access to Market

Five sources of information were used by farmers to access the details relating to marketing. Most of the farmers depended on fellow farmers, input dealers, mass media apart from extension workers and others in the area to access information relating to marketing and prices of agricultural products.

Table 7.5. Access to Market

S. No.	Marketing	Category of farmers			Average
		Marginal	Small	Medium	
1	Source				
	a. Extension worker	5	10	10	8.3
	b. Fellow farmer	20	30	30	26.7
	c. Mass media	20	20	10	16.7
	d. Input dealer	20	20	20	20.0
	e. Others	40	30	20	30.0
2	Sale of produce by farmers (%)	44	93	100	79.0
3	Type of produce				
	a. Sale of raw produce (%)	75	86	100	87.0
	b. Sale of processed produce (%)	25	14	-	13.0
	c. Place of selling				
	i) Village	12	7	-	6.3
	ii) Weekly market	19	64	60	47.6
	iii) Regulated market	50	-	-	16.7
	iv) Trader	31	29	40	33.3
4	Market distance (km)	2.2	4.6	6	4.3
5	Satisfaction with price (%)	12	29	20	20.3
6	Mode of Selling				
	a. Individual	75	100	100	91.7
	b. Group	25	-	-	8.3

The results indicate lack of a specific agency specialized in the process of providing adequate and appropriate information on marketing in the rural areas. It also highlights that the extension workers were contacted by a minimum number of farmers for the information. The situation demands creating a particular source nearer to the village level for providing this information or upgrading the skills of extension workers and providing online information support for dissemination of marketing information.

Most of the farmers were found to be selling the produce in the raw form in the weekly markets and the traders within a distance of 2-6 kms. Very few of them were found satisfied with the price they received. Most of the farmers sold their produce on individual basis. The results reveal a situation wherein farmers as individuals are marketing the produce in a limited environment to one or two channels thereby getting exploited in the process. To assist farmers in the process of marketing, and get them a better bargaining power it would be helpful to build their capacities through promoting farmers groups and organizations for marketing of their produce.

8. Factors influencing Farmers' Decisions

Many factors influence the production decisions being taken by the farmers. An attempt was made in the study to identify the factors being considered by the farmers.

Table 8. Factors influencing Farmers' Decisions

S. No.	Factors	Category of farmers			Average (%)
		Marginal	Small	Medium	
1	Availability of Labour	62	57	100	73.0
2	Availability of Irrigation	100	100	100	100.0
3	Availability of Credit	75	71	100	82.0
4	Crop varieties and their duration	31	7	-	12.7
5	Home needs	56	64	20	46.7
6	Market situation	25	100	100	75.0
7	Agro climatic conditions	38	43	60	47.0
8	Soil type and fertility	38	-	-	12.7
9	Availability of Seeds	56	64	20	46.7
10	Availability of Fertilizers	25	-	-	8.3

The results indicate that farm decisions were mainly influenced by the availability of the inputs such as irrigation, labour, credit, seeds, fertilizers and market situations. Almost half of the farmers were influenced by the home needs.

9. Share of different Inputs in Agriculture and allied sectors

9.1. Agriculture

Among the agricultural enterprises, the major share of the cost factor was found to be needed for the input labour as indicated in table 9.1.

Table 9.1. Percentage share of Inputs in Agriculture

S. No.	Items	Category of farmers			Average
		Marginal	Small	Medium	
1	Seeds	5.3	5.4	9.5	6.7
2	FYM	4.4	4.5.	5.1	4.7
3	Fertilizers	19.8	19.9	13.6	17.8
4	Plant Protection	4.1	4.2	6.9	5.1
5	Irrigation	8.6	8.8	8.4	8.6
6	Labour	57.8	57.2	56.5	57.1
7	Cost of cultivation	100.0	100.0	100.0	100.0

Fifty seven per cent of the resources of the farmers were being ploughed into the labour component which was very high. Apart from this, other items needing investment were fertilizers, irrigation, seeds, plant protection etc. Since labour is the major component in the agriculture sector, in order to make marginal farms comparatively more profitable it will be necessary to introduce labour saving devices and minimize cost of production.

9.2. Animal Husbandry

In the case of livestock enterprises, the major cost components were found to be labour and feed management, followed by general management and health care. Since feed is the basic requirement of the livestock sector, though part of it could come from the farm, the farmers have to purchase half of their feed requirements during the off season. Apart from this, they will have to supplement the fodder with certain nutritional feeds. This would consume maximum inputs.

Table 9.2. Percentage share of Inputs in Animal Husbandry

S. No.	Items	Category of farmers			Average
		Marginal	Small	Medium	
1	Feed management	16.2	40.8	40.9	32.6
2	Health care	2.7	2.8	2.9	2.8
3	General management	16.6	9.0	9.1	11.6
4	Labour cost	64.5	47.4	47.1	53.0
5	Total expenditure	100.0	100.0	100.0	100.0

Apart from the feed, management and maintenance of animals or livestock would require continuous attention by some members. Hence, there is need for the labour force to be involved in managing, maintaining and operating the livestock production systems. Hence, the labour costs were found to be quite high.

9.3. Horticulture

In the horticulture related farming systems, the labour has demanded a contribution of 35 per cent followed by seed material, plant protection, fertilizers, irrigation etc. Since establishment and management of horticultural production systems require external inputs, apart from the labour force to convert these inputs into products, there has been an increased demand on labour.

Table 9.3. Percentage share of Inputs in Horticulture

S. No.	Items	Category of farmers			Average
		Marginal	Small	Medium	
1	Seeds	16.6	16.7	16.8	16.7
2	FYM	8.9	9.1	9.1	9.1
3	Fertilizers	12.8	12.9	12.9	12.9
4	Plant Protection	14.4	14.5	14.5	14.5
5	Irrigation	11.2	11.3	11.4	11.3
6	Labour	36.1	35.5	35.3	35.6
7	Total expenditure	100.0	100.0	100.0	100.0

Farm mechanization could be one of the ways for improving the labour saving pattern among farmers and reduce cost of production.

10. Economics of Rainfed Farming Systems

The results of the different farming systems operational in the study region are discussed in detail. It was observed that the systems viz., agriculture based and agriculture livestock based systems and agriculture + business / ancillary activities were in vogue (Table 10).

Agriculture based: The single crop, double crop and three crop enterprises were prevalent in the study area.

Single crop enterprise: It is evidenced that 25% of the marginal farmers were resorting to cultivation of paddy. The results indicated that the average yield was 25.67 qtl / ha thus realizing net returns of Rs.1499/ha.

Double crop enterprise: It is observed that this enterprise was operational on 25 percent of the marginal farms. Paddy based cropping with tomato and brinjal were the two crops cultivated in the above system. The net returns realized under paddy-brinjal was Rs.4083/ha. while the returns realized by paddy-tomato was Rs.2911/ha.

Three crop enterprise: This enterprise was operating on 16.67 percent of the small farms. Paddy-tomato-brinjal was the crop combination followed in the system. The net returns accrued for the system was Rs.5836/ha.

Agriculture +livestock based: This system ranged from cultivating one to four crops with different livestock components viz., bovines and caprines. The details of the respective combinations in practice are discussed individually for different farm sizes.

Single crop + caprine: This system was followed on 25 percent of the marginal farms and 16.67 percent on the medium farms with paddy and goat. The results indicated the farm size relationship with respect to the productivity of paddy which ranges from 22 to 28.5 qtls./ha on marginal and medium farms. It was of interest to note that the caprine (goat) provided substantial net income to the total net returns. The total net returns were Rs. 2670 and 3224 on marginal and medium farms respectively.

Double crop + bovines: Paddy-tomato-bovine was the major farming system in existence. It is observed that 66 percent of the small farmers and 16.67 percent of the medium farmers resolved to this farming system. The study revealed that the net returns were Rs.7912 and 7441 on small farms with one livestock component viz., buffaloes and cows respectively. On medium farms, the net returns realized for the system was Rs.15994 with two livestock components (buffaloes + cows).

Three crop enterprise + caprine: This system was operational on 33.33 percent of the medium farms with paddy-tomato-brinjal-goat being the system ingredients. The net returns realized were Rs.10056.

Three crop enterprise + bovines: Paddy-groundnut-brinjal-bovines (cows+buffaloes) was the system resorted by 16.67 percent of the medium farms the net returns realized were Rs.36031. The aforesaid farming system with cows when operated on 12.5 percent of the marginal farms realized net returns of Rs.9697.

Three crop enterprise + bovine + caprine: This system was operational on 16.67 percent and 6.25 percent of the small and marginal farms respectively with paddy-tomato-brinjal-cow-goat. The results indicated that the net returns were Rs.15553 on small farms and Rs.10752 on marginal farms.

Four crop enterprise + bovines: The farming system was prevailing on 16.67 percent of the marginal farms. The results revealed that the net returns accrued for the system as a whole was Rs.17523.

Table 10. Costs and Returns from Farming systems

Farm Category / Enterprise	% of farmers to total under the respective farm size	Average yield (qtl/ ha)	Gross Returns (Rs/ha)	Operational Costs (Rs/ ha)	Net Benefit (Rs/ha)	Input-Output Ratio
Single crop						
Marginal						
Paddy	25	25.67	12733	11234	1499	1.13
Single crop + caprines						
Marginal						
Paddy	25	22	10890	10070	820	1.08
Goat			4400	2550	1850	1.73
Total			15290	12620	2670	1.21
Medium						
Paddy	16.67	28.5	14250	126267	1624	1.13
Goat			3600	2000	1600	1.8
Total			17850	14626	3224	1.22
Double cropped enterprise						
Marginal						
Paddy	25	24.67	12007	10226	1780	1.17
Tomato		37.5	10367	9236	1130	1.12
Total			22374	19462	2911	1.15
Marginal						
Paddy	6.25	25	12500	11633	2183	1.07
Brinjal		25	8850	6950	1900	1.27
Total			21350	18583	4083	1.15
Double cropped enterprise + Bovines						
Small						
Paddy	33.33	29.25	15600	12099	3501	1.29
Tomato		41.25	12450	11040	1410	1.13
Bovines			9854	6853	3001	1.44
Total			37904	29992	7912	1.26

Small						
Paddy	33.33	25	13360	11370	2006	1.18
Tomato		38.5	12130	10500	1630	1.16
Cows			8505	4700	3805	1.81
Total			33995	26570	7441	1.28
Medium						
Paddy	16.67	25.5	13770	11996	1774	1.15
Tomato		51.5	15450	11100	4350	1.39
Cows			6240	3660	2580	1.7
Buffaloes			22740	15450	7290	1.47
Total			58200	42206	15994	1.38
Medium						
Paddy	33.33	27	13615	12064	1551	1.13
Tomato		40	12338	10875	1463	1.13
Brinjal		58	13000	9850	3150	1.32
Goat			6855	2963	3893	2.31
Total			45808	35751	10056	1.28
Three crop enterprise						
Small						
Paddy	16.67	28	14000	11179	2821	1.25
Tomato		35.5	10650	9635	1015	1.11
Brinjal		61.25	12850	10850	2000	1.18
Total			37500	31664	5836	1.18
Three crop enterprise + Bovines						
Marginal						
Paddy	12.5	25.33	12320	10773	1547	1.14
Tomato		37.33	11200	9167	2033	1.22
Brinjal		75	12300	11750	3250	1.05
Cows			9167	6300	2867	1.46
Total			44987	37989	9697	1.18
Small						
Paddy	16.67	30	15000	11557	3443	1.3
Tomato		42.5	12750	11500	1250	1.11
Brinjal		9.63	19975	17250	2725	1.16
Cows			10140	5980	4160	1.7
Goat			6725	2750	3975	2.45
Total			64590	49037	15553	1.32

Medium						
Paddy	16.67	30	16200	12438	3763	1.3
Ground nut		6.13	9422	7838	1584	1.2
Brinjal		54	10750	9600	1150	1.12
Cows			70080	43000	27080	1.63
Buffaloes			7254	4800	2454	1.51
Total			113706	77675	36031	1.46
Marginal						
Paddy	6.25	42	14400	12078	2322	1.19
Tomato		44	13200	10500	2700	1.26
Brinjal		55	11000	9500	1500	1.16
Cows			9560	6100	3460	1.57
Goat			2570	1800	770	1.43
Total			50730	39978	10752	1.27
Four crop enterprise + Bovines						
Medium						
paddy	16.67	27.5	14850	12701	2149	1.17
green gram		2.25	4513	2400	2113	1.88
tomato		44	14605	10375	4230	1.41
brinjal		66	13250	11638	1613	1.14
Cows			15444	9000	6444	1.72
Buffaloes			5200	4225	975	1.23
Total			67862	50339	17523	1.35

It is thus evident that paddy-vegetables were the most important crops in different combinations adopted in the study. The livestock of bovine-caprine were supplementing the income of the farmer.

The element of risk is high in all the agricultural crops (irrespective of the systems), since the diversification aspect is very low. Adequate measures are to be taken up for advocacy of the promising cropping systems for generation of substantial income. A systematized road map has to be developed as such. The livestock activity also has to be intensified by way of introducing the newer breeds of bovines / caprines and also introducing backyard poultry for nutritional security and income generation activity. The feed / fodder bank are to be introduced for enhancing the productivity of milch cattle.

11. Problems in Rainfed Farming Systems

The problems in rainfed areas as identified and perceived by farmers, are presented in table-11.

Table 11. Problems faced by Rainfed Farmers in the State

S. No.	Problems	Farmers (%)
1	Use of traditional technologies	47
2	Lack of quality seeds	23
3	Non availability of new technology	49
4	Lack of credit facilities from banks	73
5	Long term credit is not available	72
6	Market price is decided by traders	74
7	Market is unorganized	71
8	Fluctuations in price	69
9	Low fertility of soils	39
10	Lack of support of agriculture department	48
11	Non-availability of water at critical stages of crop growth	37
12	Water scarcity for rabi crops	32
13	No compensation in case of crop failure.	33
14	Lack of soil testing	42
15	Organic matter content in the soil is less	46
16	Acidity problem of the soil	31
17	Non availability of the labour at critical stages	51
18	Lack of training	36
19	Lack of health coverage	28
20	Young members in the family are not interested in agriculture	34

Most of the farmers found lack of availability of inputs including credit as the major problem. Marketing issues were found to be another major problem among the farmers. Technical aspects such as acidity, low organic content, water scarcity, low fertility, were identified as the third major problem apart from farmers indicating that the young members in the family were not interested in agriculture. These issues have to be incorporated and analyzed in the strategic planning exercise, so that appropriate measures could be suggested to address the issues.

12. Suggestions for Rainfed Farming Systems

Rainfed farmers have provided many suggestions for their own improvement as mentioned below.

Table 12. Suggestions for Rainfed Farming Systems

S. No.	Suggestions	Farmers (%)
1	Watershed approach has to be intensified	33
2	Promotion of other enterprises like livestock & Mushroom.	48
3	Strengthening of the concept of mixed cropping system	41
4	Linkages with banks to promote timely credit.	73
5	Development of marketing network	67
6	Market linkage with organized transportation facilities	78
7	People need to be organized for getting inputs	81
8	Promotion of biological pest control	23
9	Provide animal health care in the village	38
10	More number of training programmes for young farmers to create interest in agriculture	29
11	Water & fertilizers have to be managed scientifically	27
12	Fertilizer made available on credit	33
13	Revitalization of public extension	37

Majority of them have suggested organizing farmers for getting better inputs. Linkages with market, banks etc., promotion of multiple enterprises, natural resource management, apart from revitalization of public extension system for provision of services to the farmers are other suggestions.

13. Summary and Conclusions

1. The data suggests that the productivity of paddy is very low due to poor input and management level adopted by the farming community across different sizes. The yield gap has to be plugged through effective transfer of technology wherein the SAU / Department of Agriculture are to play a vital role. This can help in increasing the productivity from the present yield levels, thereby facilitating in enhanced income.
2. Paddy based alternative cropping system models are to be developed and promoted by the SAU / Dept. of Agriculture for risk mitigation and diversification.
3. Vegetable and fruit crops have great potential in the region. Appropriate horticulture based cropping system models are to be developed, tested and promoted by

the State Department / SAU's for increasing the economic returns to the farming community.

4. The existing level of milk yield from the milch cattle is very low due to the local breeds with low levels of production management. It is of paramount importance to enhance the productivity of milk for nutritional and economic security. This calls for introduction of improved breeds with scientific production management techniques for which the SAU / Department of Animal Husbandry should play a catalytic role in awareness and expansion of the same.

5. The study area warrants the introduction and intensification of caprine and poultry enterprise since they hold high promise and score over the other livestock in terms of the ease of maintenance and management.

6. Greater emphasis has to be laid down by the extension department for upscaling exposure visits, trainings and demonstrations for creating greater awareness and capacity building of the farming community.

7. Enhanced farmer-researcher interactions are necessary for conduct of frontline demonstrations under real farm situations with respect to proven technologies to visualize the benefits of the technology on the farmers' fields.

8. The formation of thrift society / self help groups is warranted for micro-finance to the agriculturists. This can help more number of farmers access credit at reasonable rates.

9. The State Government should promote agri-clinics for providing the need based inputs and facilitating in the marketing of the produce, for the benefit of farmers.

10. Emphasis is to be laid on watershed activities for harnessing the water through in situ soil and moisture conservation, percolation tanks, appropriate land capability based cropping systems, contour cultivation etc.

References

Desai. G.R. et al, 2007. A study on improving the performance of farming systems in Rainfed Areas, (unpublished research study) National Institute of Agricultural Extension Management (MANAGE), Hyderabad.