

Farmer centric natural resource development

for socio-economic empowerment in rainfed areas of
Southern Telangana region

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Location and selection of area

Pudur Mandal situated in Vikarabad district of the Southern Telangana zone was selected for this study. The zone supports cultivation of few selected crops under rain-fed conditions predominantly like maize, sorghum, cotton, groundnut, pigeon pea as sole and inter-cropping systems in a vast contiguity stretches as food crops and vegetables in selected pockets.

Pudur Mandal was selected in consultation and after a series of meetings, discussions with Joint Director of Agriculture, other officials of State Agricultural Department, officials at Mandal level, Agriculture Officers and progressive

farmers. The literacy level of the Mandal is 46% and highest illiteracy percentage is in the group with above 35 years of age. The cluster of villages selected based on soil type and socio-economic status were Gangupally, Rakamcharla, Devanoniguda, and Pudugurthy. All the villages equally represent red and black soil areas with majority of small and marginal farmers.

Number of farm families

A total of 8,982 families were present in the Mandal.

OBJECTIVES

- To initiate participatory technology development process module-wise

(crops, cropping system, horticulture, livestock, soil and water management practices, etc) to create livelihood options pertaining to small farm holders including women.

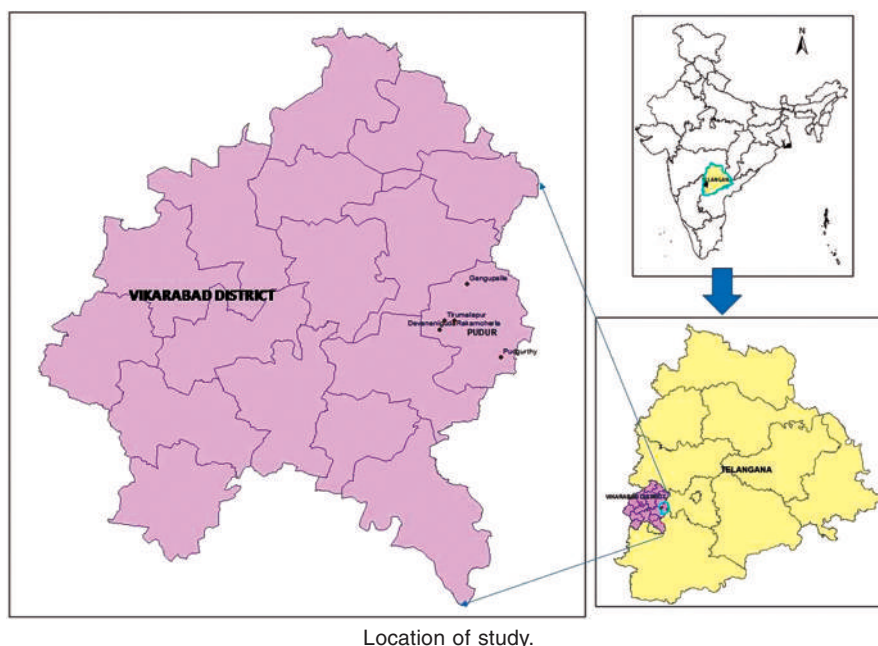
- To develop viable social institutions through building suitable linkages, farmer-producer group and promoting grass root SHG groups for upscaling of participatory climate resilient rain-fed technologies.
- To evaluate performance of adopted technologies and farmer's perceptions on participatory technology development process in the intervened clusters for re-evaluation and upscaling of the technologies in other rain-fed regions.

INTERVENTIONS

The interventions were categorized in five modules as described here.

NRM based module: Soil and water conservation

Plastic film embedded gabion check dam: Three HDPE film embedded structures and one structure without plastic film were constructed and evaluated in the farmers' fields. The intervention reduced the sediment concentration by 70% and farmers were able to store the rainwater in the range of 9,000-15,000 m³/structure, conserve the rainwater up to 60%, thereby increasing the water table in the surrounding wells by 0.6



m. The stored rainwater in each structure was able to provide irrigation to an area of 1 ha. The rise in groundwater level facilitated irrigation to floriculture crops like chrysanthemum, marigold, vegetables and chilli in the village.



Low cost Gabion structure.

Utilization of harvested

water: Through the construction of low-cost gabion structures, an assured irrigation to crop fields during dry spells was established. Micro-irrigation (drip systems) and fertigation system for vegetable crops and portable rain-gun system for field crops was designed and installed at different locations of the village, mostly to demonstrate effective management of harvested water for high value crops such as chilli, tomato and field crops (sorghum).

In situ moisture conservation practices: Conservation furrow as one of the *in situ* moisture conservation practice was demonstrated for pigeon pea crop. After completion of tillage operations and first weeding at 30 DAS, a conservation furrow was opened with bullock drawn plough between two rows (3 m interval)

which helped in rainwater conservation in low rainfall events and for drainage of surplus water during intensive rainfall events. The farmer was able to fetch 25% higher yield as compared to without conservation furrow.

Crop based module

Soil health cards: Farmers of Gangupally, Devanoniguda, Rakamcharla and Pudugurthy villages were provided with 550 soil health cards having details of soil pH, EC, OC, available N, P, K, Fe, Cu, Mn, Zn, etc. Based on the soil test values, the amount of different fertilizers to be applied to major crops (rice, maize, sorghum, red gram, pigeon pea, etc.) were computed and furnished in the soil health cards.

Demonstrations on improved crop

varieties: The climate resilient crop varieties introduced in different adopted villages are given in Table 1.

PRG 176, pigeon pea variety was demonstrated, which yielded on average 15 q per hectare. Good management practices resulted in good yield for

farmers despite reduction of rainfall in the district. Even though the cost of cultivation of PRG-176 variety of pigeon pea was higher than the local varieties, the net returns were 5-6 times higher due to almost 7 times enhancement in yield. The farmers were very enthusiastic to continue with the PRG-176 variety. Even though the cost of cultivation of NBeg-49 variety of chickpea was higher than the local varieties, the net returns were almost 4 times higher due to almost 5 times enhancement in yield.

Enterprise based module: Small Farm Mechanization

After thorough interaction with the farmers of the cluster, seven types of need-based implements have been identified (dryland weeders, self-propelled weeders, bullock drawn weeders, brush cutters, crop stalk shredder, disc harrow and six row planter) (Table 2).

In terms of drudgery load, in the operations like harvesting of crops (52.5), weeding and vegetable transplanting (49) using traditional practices were having high level of drudgery whereas, spraying (38.5) and winnowing (35) operations require lower drudgery. As per the test factors, drudgery load was highly found to be associated with posture and repetitive action of limbs during agricultural operations. The total drudgery load calculated after introduction of small farm mechanization intervention infer that the mechanization actions drastically reduced the load on the operators in various farming operations studied in the range of 40 to 64.3%. The maximum total drudgery load reduction was observed in weeding using wheel hoe and minimum in winnowing operation with winnower

Table 1. Climate resilient crop varieties used in intervention

Village	Crop	New varieties	Total no. of farmers	Total area covered (ha)
Rakamcharla	Pigeon pea	PRG 176	39	13.2
		Asha	10	6
	Chickpea	NBeg 47	12	2
	Safflower	Manjira	3	1.1
	Green manuring	Dhaincha	4	3
Gangupally	Pigeon pea	PRG 176	223	58
		Asha	25	6.3
	Chickpea	NBeg 47	36	6
	Safflower	Manjira	5	1.5
	Green manuring	Dhaincha	3	1.5
Pudugurthy	Pigeon pea	PRG 176	217	43.6
		Asha	10	2
	Chickpea	NBeg 47	70	7.5
	Safflower	Manjira	10	4

Table 2. Coverage of farm implement operations in farmers field

Implement / machine	Crop	No. of farmers covered	Area covered (in acres)
Planter	Red gram, Maize	45	65
Bullock drawn weeders	Maize, Cotton, Vegetables	12	50.5
Hand weeders	Majority of crops	90	211.0
Power weeder	Cotton, Vegetables, Flowers	10	19.0
Power sprayers	Majority of crops	96	345.0
Thresher	Maize	2	3.25



Demonstration of Dryland weeder.



Demonstration of power weeder.

fan. The other operations in which considerable total drudgery load reduction was observed were harvesting using brush cutter (60%), vegetable seedlings transplanting (57.1%) and seed treatment (53.8%) using seed treating drum. The energy expenditure in traditional working style ranged from 9.0 to 9.88 kJ/min when compared with 7.81 to 9.26 kJ/min of improved tools and practices (Table 3).

Horticulture based module

Raising of vegetable seedlings under pro-trays: A shade net nursery of 20 m × 10 m dimension was erected using GI pipes as a support. UV stabilized HDPE shade net of 35 to 50% shade intensity was used to cover the nursery area at a height of 6.5 feet. Wire grid was provided at the top of the structure as support for shade net.

Plastic mulches with drip irrigation schedules: Plastic mulching with drip irrigation was demonstrated in the farmers field with productivity as displayed in Table 4.

Vegetable production by staking: In tomato, plants were staked by jute or nylon string hanging from the top of the tunnel which is less costly. Pruning was also practiced limiting plant growth and divert nutrients to flower clusters on the remaining shoot or stem. Stem pruning and staking system were found to be beneficial for different variety and growing conditions.

Management of fruit fly in Cucurbitaceous vegetables: Keeping in view the importance of the pest and crop, melon fruit fly management was

done using local area management and wide area management. This involved bagging fruits, field sanitation, cue-lure traps and soft insecticides) over field plots. Cue Lure: mix Ethyl Alcohol 60 ml+ cue Lure (p-Acetooxyphenylbutanoic-2) 40 ml + malathion 20 ml (i.e. in the ratio of 6:4:2) was used in bitter gourd, ridge gourd and cucumber crops.

Livestock based module

Introduction of dual-purpose improved backyard poultry variety, Srinidhi: Fifty landless and small

Table 3. Drudgery load and energy expenditure in selected agricultural operations

Practice	Drudgery		Energy expenditure (kJ/ min)	
	Traditional practices	Improved practices	Traditional practices	Improved practices
Seed Treatment	45.5	21	9.40	8.38
Vegetable seedling transplanting	49	21	9.0	7.81
Weeding	49	17.5	9.88	9.26
Spraying	38.5	21	9.25	9.09
Harvesting	52.5	21	9.48	8.83
Threshing	45.5	17.5	9.46	8.83
Winnowing	35	21	9.26	8.62



Demonstration of multicrop thresher.



Nursery in pro-trays.

farmers having prior experience of poultry farming from Pudugurthy village, Pudur Mandal, were selected, geo-tagged and were given day-old chicks of Srinidhi. 1,250 chicks of Srinidhi variety (each 25 chicks) had a small enclosure and little feed resources. Srinidhi in the field under backyard conditions was able to attain 2.64 ± 0.2 kg after 6 months of age, however, local birds could achieve only 1.53 ± 0.3 kg at the same age. The farmers started getting their first egg from Srinidhi birds at the age of 186.4 ± 5.8 days as compared to 268.3 ± 26.8 days for local birds. Thus, with the introduction of new variety in the village, farmers were able to get dual benefit of four times more eggs much earlier (78 days before).

Annually, the farmers were getting 82.6 ± 16.3 eggs per year which almost doubled to 154.4 ± 12.5 eggs per year with the Srinidhi variety. Survivability % up to 6 weeks of age was significantly higher in Srinidhi birds as compared to local birds. Economics of the poultry rearing suggested that at the end of the year, total expenses made for rearing of Srinidhi chicks were ₹ 5,67,500 without including the contributions of family labour.

Introduction of indigenous sheep breeds, Nellore and Deccani: Deccani and Nellore sheep breeds each five ewes and one doe were given to geo-tagged, pre-trained six small farmers from Gangupalle village for rearing. The study revealed significant higher production performances of indigenous sheep (76.4% better body weight) over the non-descript goat gave a better support system to livelihood and nutritional security in the dryland region. Introduction of new species as sheep with improved forage production has improved profitability (₹ 8097.50 per household), nutrition level (energy intake as well as protein sufficiency) and improvement in women and children nutrition. This intervention has been found to tackle malnutrition through ensured availability of nutritious diet.

Mineral supplementation in livestock: Mineral mixture supplementation was



Exposure visit to CRIDA farm.

Table 4. Productivity of tomato under drip system

Treatment	Yield (t/ha)	Water applied (cm)	Water use efficiency (t/ha-cm)
50% ET with PM under drip irrigation	43.75	26.2	1.67
80% ET with PM under drip irrigation	52.58	43.1	1.22
100% ET with PM under drip irrigation	57.87	52.4	1.10
100% ET under drip irrigation without mulch	42.02	52.4	0.80

provided to 23 households and finally to 104 numbers of lactating cows in first stage of lactation. Mineral mixture was given @ 20 gms/day/cattle. An improvement of 0.5 to 1.0 kg in milk yield and attainment of higher peak yield of 20% was observed.

Apart from this, mineral blocks were provided to 15 households rearing goats and blocks were hung from roof inside the shed. Kid mortality in goat was reduced to 5% from 15-20%. With each mineral block in a herd of 2-3 goats, benefit of 0.5 to 1.0 kg was accrued.

TRAINING

Several farmer and scientist interface meetings were held in FFP villages and CRIDA, Hayathnagar Research Farm with participation of farmers, staff of line department - agriculture, horticulture and animal husbandry; and village administration like sarpanch, farmer society president.

WAY FORWARD

Farmers' FIRST programme has

become a very popular and farmer friendly intervention in the whole district due to its flexibility in approach. The farmers have understood the concept of working in a participatory mode. The time has come to move to the adjoining villages in a cluster approach mode. However, in the existing villages, some of the interventions need further work to make the package of technologies under each module sustainable. Apart from this, we need to work on post-harvest processing in order to tap the improved productivity in the area as well as focus more on improving the nutritional status of the farmer too. Common interest group formation will help in marketing ease and allow farmers to fetch more price of their produce as well as timely channelizing their products to the consumers. Capacity building of farmers as well as different stakeholders in the project are required to achieve a higher target in the time to come.

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