



# Mechanizing Tribal Rainfed Agriculture in India Using Small Farm Machinery

Prabhakaran Raghu, Kalaiselvan Nagappan, Arivudai Nambi Venkatachalam and P.I. Maria Philip

M S Swaminathan Research Foundation (MSSRF), Biodiversity Department, Chennai, India

## Background

- The present study was carried out in three tribal locations in India: Koraput district of Odhisa, Wayanad district in Kerala and Kolli Hills of Namakkal district in Tamil Nadu.
- Small and marginal holders constitute 55.7 % to 82.3 % of the total surveyed farming households.
- Off-farm job opportunities that provide higher wages attract small and marginal holders. Members from 40.7 % of households in the Kolli Hills, 12.0 % from Koraput and 10.9 % from Wayanad undertake seasonal and long term migration to other locations including major cities, leading to shortage of labour in the agriculture sector.
- Seasonal labour shortage delay timely agricultural operations, thereby impinging productivity. In addition, some traditional methods of food processing involves household labour resulting in elimination of some crops like millets.

## Objective

- To examine if small farm machinery can be an alternate source for dealing with labour shortage, and have a positive effect on timely availability for operation, reduce cost of cultivation and increase productivity and profit.

## Materials and Methods

- Small farm machineries like Power Tillers, Row Markers, Threshers and Mechanical Hullers were provided to tribal and local communities based on their need as part of the Alleviating Poverty and Malnutrition in Agro-biodiversity Hotspots (APM) Project. User registers maintained by farmers clubs (FCs) and self help groups (SHGs) that record indenting farmers, the date, time and duration of operation, land/grain units and income earned from the services of small farm machinery were used for the study. In addition, interviews with individual farmers or groups that have made use of the machinery were conducted to gain insights into the operations.

### Koraput

- Power Tillers** have been provided to communities in seven villages in Kundra block for carrying out agricultural operations related to paddy, finger millet and vegetable cultivation. FCs and SHGs manage the usage of the power tillers. The earnings from these operations are deposited in the accounts of respective FCs and SHGs and later used for covering operational expenses including fuel, maintenance and remuneration of the operator.
- Millet Pulverisers** were installed in five villages for reducing drudgery of women involved in the processing of millets. The pulverisers are managed by the FCs and a nominal amount charged to cover operational expenses. Millets play a vital role in supporting food and nutritional security of tribal communities. Post harvest millet grain processing involves drudgery to women using traditional stone pulverisers and other methods lead to shoulder and back ache.

### Wayanad

- A **Power Tiller** was provided to the Kuruma Tribal Community consisting of 25 families for carrying out timely operation in paddy cultivation. A Executive Committee (EC) consisting of 9 members manage the machine. Farmers requiring the equipment approach one of the EC members, who then direct it to the operator, who decides the time for carrying out the operation. Decisions of the EC are mostly based on transplanting schedules.
- A **Thresher** was provided to the *Padasekarasamithi*, a farmers' group consisting of 149 farm families that cultivate rice. An EC manages the machine. Members of the community requiring the services of the machine will contact the president of EC and place the request, who informs the operator. The service is provided on a first cum first served basis. Preference is made for those having smaller quantities of grain, since it can be completed in a shorter period of time.

### Kolli Hills

- A **Power Tiller** was provided to the FC consisting of 12 members who manage the machine, which is used for paddy cultivation and occasionally for banana. Farmers requiring the equipment approach the FC members who organize deployment of the equipment. Two exclusive members of the FC operate the machine and are paid on an hourly basis.
- Pulverisers** were provided to three villages for milling finger millet, rice and wheat, and are managed by FCs consisting of 12 -15 members. The idea was to reduce drudgery of women and concurrently promote the cultivation and consumption of millets. A nominal amount of Rs.6 per kilogram is charged to meet the operational expenses.

## Results and Discussions

Particulars	Power Tiller					
	Koraput		Wayanad		Kolli Hills	
	Before Project	After Project	Before Project	After Project	Before Project	After Project
Mode of operation	Animal and human labour	Machine	Machine	Machine	Machine	Machine
Managed by	Individual	FCs and SHGs	Individual	FC	Individual	FC
Name of the crop	Paddy, Finger Millet, Vegetable	Paddy, Finger Millet, Vegetable	Paddy	Paddy	Paddy and Banana	Paddy and Banana
Timely availability	No	Yes	No	Yes	No	Yes
Operation time (Unit)	24 hours / acre	6 hours / acre	10 hours / acre	7 hours / acre	10 hours / acre	10 hours / acre
Cost of operation	Rs.1600 / acre	Rs.2100 / acre	Rs.4300 / 0.5 acre	Rs.1750 / 0.5 acre	Rs.5000 / acre	Rs.4500 / acre
Productivity	-	-	8 Q / acre	16 Q / acre	-	-
Benefits	Delay in ploughing and puddling	Timely ploughing and puddling	Delay in ploughing and puddling	Timely ploughing and puddling	Delay in ploughing and puddling	Timely ploughing and puddling

Particulars	Millet Pulverizer				Thresher		
	Koraput		Kolli Hills		Wayanad		
	Before Project	After Project	Before Project	After Project	Before Project	After Project	After Project
Mode of operation	Manual	Machine	Manual	Machine	Machine	Manual	Machine
Managed by	Individual	FCs	Individual	FCs	Individual	Individual	FC
Name of the crop	Finger Millet	Finger Millet	Finger Millet	Finger Millet and Rice	Paddy	Paddy	Paddy
Timely availability	Yes	Yes	Yes	Yes	No	No	Yes
Operation time (Unit)	1 kg / hour	22 kg / hour	1.5 kg / hour	20 kg / hour	270 kg / hour	80 kg / hour	270 kg / hour
Cost of operation	Milling cost is free	Milling cost is Rs.3 / kg	Milling cost is free	Milling cost is Rs.6 / kg	Rs.463 / 100 kg	Rs.513 / 100 kg	Rs.425 / 100 kg
Benefits	Drudgery to women, time consuming	Drudgery reduction, time saving	Drudgery to women, time consuming	Drudgery reduction, time saving	Delay in operation	Delay in operation	Timely operation

## Conclusion

- Agricultural operations are season bound and hence availability of tools and labour extremely critical, more so in the rainfed agricultural tract. Additionally, tribal societies are at a more disadvantaged position. Hence, timely availability of tools like power tillers and threshers ameliorate the situation.
- Provision of machinery has reduced the cost of cultivation for small holders in Wayanad and Kolli Hills. In Wayanad farmers used tractors for first ploughing, followed by two ploughings using power tillers. On the provision of power tillers, farmers changed their ploughing practices by going for two ploughings using power tillers alone. This has brought about a cost reduction of 41%. In the Kolli Hills, use of power tillers has been subsidized by the group operation by bringing down the cost by 10%.
- In Koraput the use of power tiller has basically replaced animal traction and reduced the time of operation by about 65%. In Wayanad the provision of threshers has substituted human labour by about 70% and reduced the time required for carrying out operations.
- In Koraput and Kolli Hills provision of millet pulverisers has reduced drudgery for women involved in processing of finger millets. Small scale pulverisers are able to process anywhere 20-24 kg of grain in an hour compared to about 1 kg using human effort.