

Short Communications

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## Piloting of Improved Open Drum Threshers in Bihar

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### ABSTRACT

In Bihar threshing of paddy is generally done by women farmers and manual threshing causes high drudgery and time consuming operation. So to address this issue, a rapid assessment study was conducted. So it is very necessary to adopt women friendly technologies such as open drum thresher which reduced drudgery of women farmers during threshing and solved problems such as labour, time and cost. Here the women farmers can increase their source of income by using this machine for custom hiring to other farmers. This improved open drum thresher is designed with more safety concern and the threshing efficiency is around 5-6 qtl per hour. The additional wheel system helps the women farmer to make it as a business model for them. The thresher has wire-loop type threshing drum like pedal operated Thresher having powered by a diesel engine (4.5hp). In this type of thresher operator has to hold the paddy bundles over threshing drum which was rotated with the help of diesel engine. The length of threshing drum is generally of 4 to 5 feet long and having 1 feet diameter.

#### Keywords

Open drum, Thresher,  
Diesel engine, Drudgery,  
Women farmers, Safety

#### Article Info

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### Introduction

In agriculture, postharvest handling is the stage of crop production immediately following harvest, including threshing, drying, storage and marketing. The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate. Postharvest treatment largely determines final quality, whether a crop is sold for fresh consumption, or used as an ingredient in a processed food product. The most important goals of post-harvest handling are avoid moisture loss and slow down undesirable chemical changes, and avoiding physical damage such as bruising, to delay spoilage. So Agricultural Mechanization involves use of tools, implements and machines to improve

the efficiency of human time and labor (Starkey, 1998). Mechanization is viewed as package of technology to

Increase productivity of land and other inputs more effectively and

Increase labor productivity using labor saving and drudgery reducing devices.

In India, farmers with large landholdings from prosperous agricultural states like Punjab can often buy expensive and sophisticated machines for their farm operations. However, resource-poor farmers from states such as Bihar and Odisha may not be able to afford the same machines or services and, given that their landholdings may be considerably

smaller, may have different needs. Farmers all along the spectrum of landholdings need to be able to access differently priced appropriate machinery based on their specific requirements. Machinery for mechanized threshing is one such example. The farmers do the threshing of paddy, maize by hand manually which is time consuming. It creates problem as it is difficult to find labour and cost for threshing is high. In Bihar generally women farmers are involved for harvesting and threshing operations. Due to manual operation drudgery is the big problem for women farmer. So it is very necessary to adopt women friendly technologies such as open drum thresher (ODT) (for paddy) which reduced drudgery of women farmers during threshing and solved problems such as labour, time and cost. Here the women farmers can increase their source of income by using this machine for custom hiring to other farmers.

In the relatively poor eastern state of Bihar, India, the lack of awareness of mechanical threshing options and inability of marginal smallholders to access them, result in significant delays in processing and preventable postharvest losses.

This poster presents the results of the Cereal Systems Initiative for South Asia (CSISA), funded by the USAID and BMGF, which used multi-stakeholder learning platforms to pilot diesel-powered open-drum threshers (ODTs) among women and poor marginal farm families. This improved access to threshing options and offered farmers potential income opportunities through value-creating contract services to obtain more from paddy harvests.

### **Objectives**

Assess current practices and needs for mechanical threshing options.  
Modify and pilot diesel-powered open-drum threshers for evaluation and verification by stakeholders, including women farmers.

Capture lessons and recommendations for business model options for scaling income-earning contract services.

### **Methods and Findings**

A postharvest survey of 335 marginal smallholders in 45 villages revealed:

Severe labor bottlenecks exist in threshing. Many smallholders are unaware of various mechanical options and lack access to them. All (100%) of those surveyed currently practice manual threshing over a wooden bench or *chauki*.

The drudgery of manual threshing largely falls on women as unpaid household labor. Women interviewed complained of shoulder, neck, and wrist pain; respiratory problems from chaff/dust; and even eye injuries.

Farmers reported losses in threshing at 5% due to delays in processing over many weeks and even several months.

A rapid market assessment of commercially available open-drum threshers revealed:

Local dealers in Bihar began importing pedal-type open-drum threshers (Fig. 1) from neighbouring regions around 2012. The cylinder drums are made from wood or iron slats. However, neither diesel-powered nor electric motor-operated threshers were found on sale among dealers.



**Fig.1** Pedal-type open drum threshers sold in the market

Dealers offer no warranty or after-sales repair service.

Local fabricators generally are not interested in producing threshers because of weak demand (i.e., low farmer awareness of options).

The thresher has wire-loop type threshing drum like pedal operated Thresher having powered by a diesel engine (4.5hp). In this type of thresher operator has to hold the paddy bundles over threshing drum which was rotated with the help of diesel engine. The length of threshing drum is generally of 4 to 5 feet long and having 1 feet diameter.

Technical modifications (Fig. 2) included installation of:



**Fig.2** This CSISA-modified diesel-powered open drum thresher offers poor and marginal farmers a more efficient option.

A shield to stop grain from flying from the threshing cylinder,

A 1.5 ft diameter fan (350-400 rpm) attached to the PTO for winnowing output,

A four-foot handle for pulling during transport, and Three 16-inch diameter rubber wheels to aid mobility (for farm-to-farm

services).

Here the technology is mainly targeting to women farmers. So on safety issue and for easy transferable thresher is modified by PH specialist. For safety issue one concave cover is attached in front of the threshing drum to avoid any kind of accident.

Additionally, one fan is attached to solve the cleaning problem i.e. winnowing and threshing are done in one operation.

So this will solve the drudgery issue that generally women farmers faced. For easy transport three rubber wheels are also provided with a handle.

The women farmers are generally small and marginal farmers and hence they need straw for the cattle feed/selling so that they can earn some money. So tractor operated axial flow thresher or combine harvester, were not widely adopted in the region. So in this study we are comparing the cost of operation of ODT and manual threshing as well as check the drudgery issues by focus group discussion. In addition to here we are also comparing the adoption rate of the technology in year 2013-14 and 2014-15 and the decision making power of women farmers for the adoption along with using the technology as a source of income.

**Table.1** Below is a comparison of the commercially available and improved ODT options:

<b>OPEN-DRUM THRESHER</b>			
Type	Available commercially in Bihar		Improved option
	Wooden threshing cylinder	Iron threshing cylinder	Iron threshing cylinder (diesel-powered)
Threshing capacity (kgs/hr)	50-60	60-70	450
Power type	Pedal-type	Pedal-type	Diesel engine 4.5 hp
Drum length (ft)	2-2.5	2-2.5	4-5
Drum diameter (ft)	2.5	2.5	2
Threshing and winnowing	2 stages	2 stages	1 stage

## Key results and next steps

During kharif (October-November) 2013, one farmer federation and one woman's self-help group provided contract threshing services to 32 farmers. In all, revenues of INR 8,020 and a net profit of INR 950 were generated. A local fabricator was convinced to make 15 threshers for kharif 2014 to meet newly emerging demand.

Two women's self-help groups, after seeing benefits in August 2014, invested INR 16,000 to purchase two threshers.

The project will work with fabricators to make the following suggested improvements from stakeholders:

Fan speed should be reduced to prevent grains from flying.

A belt guard should be added for safety.

A starter clutch should be added to ease starting of diesel engine by women.

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