

Pre-Extension Demonstration Of Jimma Modified Engine Operated Rice Thresher In, South Western Oromia

Kemeru Dalecha,

Jimma Agricultural Engineering Research Center Jimma, Ethiopia

Kemerud2012@gmail.com

Abstract—The study was conducted in Jimma and Buno Bedele Zones of Oromia Regional State, Ethiopia. The objective of the study was to create awareness, enhance knowledge and skill and get feedbacks on Engine Operated Rice Thresher for household farmers and private individuals. Three sites (Kishe, Gasera and Chewaka) were selected as hosting centers for the popularization of the technology in two districts (Shebe and Chewaka) for the study. Training was given to farmers DAs and SMS. Total of 97 farmer (29 Female, 68 Male) households have attended the field demonstration at different sites involving men and women participation. The evaluation result showed that the machine has saved farmers' labor and time having average threshing capacity 2.34 kg/min with efficiency of 96.44 that it performed the threshing activity in a better way than the local methods with relatively less percentage of the product loss 0.1. More than fifty participant farmers' perception responses showed that the machine threshing capacity and efficiency was good with tolerable grain loss. While no respondent ranked it to poor level for these criteria. Thus, most of the farmers have positively perceived to the machine on its threshing capacity, efficiency and the grain loss.

Keywords—Rice, Demonstration, Thresher, Engine Operated, Efficiency, Grain Loss, Capacity.

Introduction

Cereals are the first cultivated grasses belonging to the poaceae family. The popular cereal crops of the world include wheat, barley, oat, rice, maize, sorghum, and millets. But the major cereals of the developing countries like Ethiopia are maize, rice, sorghum, and millet.

Threshing is vital part of post harvest activities for cereals and legumes crop. In many developing countries, threshing is mainly carried out by traditional methods and few threshing machines (Ouezou Y.A.et al., 2009). The traditional methods of threshing rice are pounding in mortar with pestle, beating with clubs on the floor, rubbing on the floor, beating gently with clubs in jute bags and threading under the feet of man or hooves of animals.

In Ethiopia, the most common method employed by farmers, to thresh crop is spreading the crop over a prepared floor and beating it with a stick repeatedly. The other widely used method of threshing is trampling by animals. In both cases, a circular plot of land, locally called 'Ogdi, 4-6 meters in diameter is cleared from grasses and plastered with thin layer of fresh cow-dung on which the harvested crop is spread

for beating or trampling to thresh. The maize is also shelling by beating it by stick, by their hands and by mortar and pestle.

According to (Abebe H., Gabriel and Bekele H. 2006) grain harvesting by Ethiopian farmers takes place manually and involves hand mowing of crops using sickles and later threshing by letting a group of animals trampling upon it. Several days could pass before mowed crops are threshed; i.e., crops stay piled for some time either around homestead or in situ before threshing. All these activities can be carried out by rural women and children. Since these activities time consuming, labor intensive and prone to post harvest lose, it is affecting the profitability and effectiveness of the production system and also it puts a lot of additional job burden on the rural women and children.

In general, in many developing countries, labor intensiveness, low grain quality and widespread use of simple farm tools which result in low productivity and high post harvest losses are the common features occur. Now days, rice has become one of the major cereal crop produced in Jimma zone following maize, teff, sorghum, and wheat.

According to Jimma Zone Agricultural development office (JZADO, 2010), The Gera, Goma, Shebe Sombo, Limu-Kosa, and Limu-Saka districts are major rice growing areas covering 2018 hectares with 49736 quintals of rice production. The Chewaka districts of Buno-Bedele zone is also well known for rice production.

Therefore, to increase rice production in the study area, threshing machines was introduced through

demonstration of improved Engine Operated Rice Thresher to overcome the above problems and increase the production of rice in the study area.

Objective of the study:

- To create awareness on Engine Operated Rice Thresher for household farmers and privet individuals
- To Evaluate the performance of the engine operated rice thresher
- To get feedbacks on the technology

Materials and Methods

Materials

The sample Engine Operated Rice Thresher was produced in the JAERC production workshop.

Methods

The sample rice thresher was manufactured and the potential crop producers 2 districts (one from Jimma and other one from Buno-Bedele zones) were selected. The demonstration was carried out on purposively selected sites by considering two Kebeles from Jimma district of and one additional potential rice crop producer Kebele from Chewaka district of Buno Bedele zones. The specific sites were identified in collaboration with distinct agricultural experts and DAs from the selected Kebeles based on crop production potential. Demonstration of rice

threshers was conducted on target rice growing farmers and private producers' farm field.

Field Evaluation

Data collected: -Quantitative data on the machine performance

Qualitative data through: observation and interview and Feedback data and comments from participant farmers

Evaluation

The threshing activity was carried out by feeding unrushed grain in to the machine. The engine speed was adjusted as per the rice threshing fitness required. The performance of the rice thresher was calculated as follows:

$$\text{Threshing efficiency:} = 100 - \frac{Qu}{Qt} \times 100$$

Qu = quantity of un threshed rice grain

Qt = quantity threshed rice grain in sample

Machine Capacity: The capacity of the machine is calculated by using the formulae:

$$\text{Capacity} = \frac{\text{mass of out put}}{\text{duration of operation}}$$

$$\text{Breakage} = (1 - \frac{\text{input-broken}}{\text{input}}) \times 100$$

Farmers' perception on the technology attributes

Data on technical operation and user participant perception aspects were collected and analyzed as well. Feedback was taken during and after demonstration to analyze farmers' perception on

Method of data analysis:

The quantitative and qualitative data collected on the technical performance and the perception through interview, observation and group discussion and analyzed using descriptive statistics.

the rice thresher. The common machine attributes used in the analysis were threshing efficiency (%), breakage percentage (%) and threshing capacity (kg/min).

Data collection and analysis methods

The quantitative and qualitative data were collected on the technical performance and perception through interview, observation and group discussion and analyzed by using descriptive statistics.

Result and Discussion

Training of Farmers, SMS and DAs on Jimma modified rice thresher was both practical and theoretically for the 29 participant farmers, the 4 Subject Matter Specialists (SMS) and 12 Development Agents (DAs) on machine operation and maintenance.

Table 1: Training given to farmers, DAs & SMS on Rice Thresher Technology

No	Training Site		Farmers				DAs	SMS		Total	
			Adult		Youth			M	F		
	District	Kebele	M	F	M	F	M	F	M	F	
1	Shebe	Kishee	4	0	5	1	1	1	1	1	14
2	Shebe	Gasara	4	1	4	1	2	0	1	0	13
3	Chewaka	Chewaka	3	1	3	2	2	0	1	0	12
Total			11	2	12	4	5	1	3	1	39

On-farm Performance Evaluation

Table 2: Average performance of the rice thresher (efficiency, breakage and threshing capacity)

No.	Rep.	Threshing efficiency (%)	Breakage percentage (%)	Threshing capacity (kg/hr)
1	Rep	Threshing Efficient (%)	Threshing capacity (kg/min)	Breakage (%)
	K1	95.21	2.55	0.1
	K2	96.33	2.25	0.08
	K3	97.55	2.66	0.09
2	Av	96.33	2.48	0.09
	G1	96.33	2.45	0.1
	G2	95.33	2.20	0.11
	G3	97.66	2.31	0.09
3	Av	96.44	2.32	0.10
	C1	96.26	2.30	0.1
	C2	96.55	2.14	0.12
	C3	96.84	2.22	0.11
	Av.	96.55	2.22	0.11
Grand total		96.44	2.34	0.1

The letters C, G & K, indicate the thresher evaluated at three different sites.

On farm evaluation of the technology was made in teamwork with participant farmers, SMS and DAs. Evaluation of the thresher was based on the attributes recognized as important showed that average threshing efficiency (%), breakage

percentage (%) and threshing capacity (kg/min) of 96.44, 0.1 and 2.34 values, respectively as it has good performance compared to the local threshing method.

Thus, the above table indicates that this the Jima modified rice thresher have good threshing efficiency and capacity with minimum breakage as preferred by the participant farmers.

Demonstration

Farmer to farmer learning was used to promote the technology simply by arranging threshing program at the host farmer’s farm site.

Mini-Field days conducted

Table 3: Participants on mini field days

No	Location		Participants of field days											
			Farmers				SMS		DAs		Stake holders		Total	
			Adult		Youth		M	F	M	F	M	F	M	F
District	Kebele	M	F	M	F	M	F	M	F	M	F	M	F	
1	Shebe	Kishe	12	3	8	4	1	-	1	0	1	-	23	7
2	Shebe	Gasara	9	6	13	5	1	-	2	1	1	-	26	12
3	Chewaka	Chewaka	11	3	15	8	-	1	2	1	1	1	29	14
Total			32	12	36	17	2	1	5	2	3	1	78	33

Mini-field days were organized at different sites (Kishe, Gasera and chewaka) which was attended by different stake holders. In view of that, 97 farmers (29 Female, 68 Male), 3 SMS, 7

Farmers’ perception on the technology attributes

Data on technical operation and social perception aspects were collected and analyzed as well. Perception feedback during and after

The demonstration was done through organizing mini field day. The farmers’ feedback after the demonstration of Mini rice thresher technology were collected based on evaluation criteria jointly set by researchers and farmers like grain damage, optimum output capacity, and threshing efficiency.

DAs, and 4 Administrators (Kebele Level residents) have attended the mini field days.

demonstration to analyze farmers’ opinion about the thresher on some of the rice attributes threshing efficiency (%), Breakage percentage (%) and threshing capacity (kg/min) obtained were described in table below.

Table4. Farmers' Perception on Engine Operated Rice Thresher

The thresher attributes and its acceptance degree by farmers	Scale measurement	Participant Respondents	
		Frequency (Fr)	Percentage (%)
Threshing capacity (kg/min).	Poor	-	-
	Medium	14	46.66
	Good	16	53.34
Threshing efficiency (%)	Poor	-	-
	Medium	10	33.34
	Good	20	66.66
Breakage percentage (%)	Poor	-	-
	Medium	5	16,67
	Good	25	83.33

Among the total respondents, 53.34% replied that the Jimma modified rice thresher machine had good threshing capacity and the rest 46.66% ranked it to the medium performance. Yet no respondent responded for its poor level of threshing capacity. This shows that most of the farmers have positively perceived to this machine on its capacity.

Moreover, the respondent farmers were also perceived the machine for good threshing efficiency. More participants (66.66%) replied that it has good efficiency and the rest 16.67% viewed it medium while no respondents perceived as poor performance for the three criteria. The machine is also preferred for its own strength and drawbacks at the farmers' field. Farmers just liked it in its minimum seed breakage, easy to operate and simple to transport.

Generally the feedback data showed that the farmers have positively perceived the machine simply by observing its threshing efficiency (%),

breakage percentage (%) and threshing capacity (kg/min) of 95.5, 0.09 and 173.06 values, respectively as it has good performance compared to the local threshing method.

Conclusion and Recommendation

Conclusion

- The evaluation of Jimma modified rice thresher showed that it has good performance with average threshing efficiency, breakage and threshing capacity of 96.44%, 0.1% and 2.34kg/min respectively.
- The rice producer farmers had appreciated the machine suitable for their rice production activities distinguished that it has good performance compared to the local manual tedious rice threshing method.

- They acquired skill on rice thresher through training for using the improved technology for rice threshing.
- The technology introduction had motivated more rice producer farmers where some have already demanded for the technology supply.

Recommendation

- The stakeholder mainly Zonal and District Agricultural office and the technical micro enterprise manufacturers should closely work in facilitating

technology supply by creating linkage among rice producers and technology manufacturers so as to improve rice production and marketing in a sustainable manner.

- The Jimma modified rice thresher was appropriate and liked by farmers and need local station for regular repair and maintenance at their vicinity

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