



Demonstration of Improved sorghum Thresher at Bambasi districts of Assosa zone, Benishangul Gumuz

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Abstract

Engine driven sorghum thresher is a machine used to thresh sorghum to separate sorghum grain from the panicle. It uses engine to operate and undertake the threshing task. This sorghum thresher was demonstrated to the farmers and communities in Bambasi woreda of Assosa zone during the 2021 cropping season. The objective of the demonstration was to introduce farmers and other stakeholders with sorghum threshing machine, creating awareness about the machine, reduce crop loss during threshing. Selama Dabus kebele was selected from the district purposively based on the potential and experience of sorghum production. A total of 60 farmers were selected and produced Assosa-1 improved sorghum variety in a cluster based approach contributing 0.5 ha of land per individual farmers. Both theoretical and practical training were given for farmers, DAS and woreda experts on advantages, how to handle and operate sorghum thresher. Engine driven sorghum thresher was demonstrated to the farmers in the presence of different stakeholders after sorghum crop was harvested. The thresher can thresh 14-16qt per hour operated by two persons while it takes more than ten persons the whole day to get this much amount of threshed sorghum. During the demonstration all participants prefer sorghum thresher machine by seeing its capacity to increase the threshing efficiency, threshing capacity and to reduce the cost of threshing in comparison with traditional sorghum threshing. Even though using sorghum threshing is preferable due to time and labor saving quality, the participants raises their concern regarding availability and affordability of the machine. So, we have suggested to the government, NGOs and cooperatives to provide this sorghum thresher in to the area so as create job opportunity for youth and women.

Keywords: Sorghum thresher; Demonstration; training; Threshing efficiency; Job opportunity

Introduction

Sorghum (*Sorghum bicolor L.*) is widely adapted and cultivated crop in arid and semi-arid tropics at which the annual rain fall is lower and its pattern is unpredictable. Sorghum is one of the significant cereal crops farmed in Ethiopia and ranked fourth in terms of total number of holders, area allocated and overall production after Maize, teff and Wheat (CSA, 2021). According to production and harvested area, Ethiopia's productivity was less than 2.7 tons ha⁻¹, which is extremely low when compared to the crop's potential yield. It is the primary food security grain for more than 750 million people living in semi-arid climates in Africa, Asia and Latin America [1]. The largest group of producers are subsistence farmers who have limited access to production inputs like fertilizers, pesticides, improved seed (hybrid or variety), good soil, water and improved credit for their purchase (FAO, 2010) [2].

In sorghum production, it was found that the majority of the work such as clearing, manual soil preparation, cultivation, row planting, broadcasting, threshing, harvesting, throwing and winnowing was done by men, followed by women (A.H. Mesfin and F. Girma, 2022). Sorghum threshing is the process of removal of grain from panicles of the sorghum. In the case of small holder sorghum producing farmers of Benishangul Gumuz, threshing is mainly carried out by men (57.27%) and women (32.62%) who beat the well dried panicles of the sorghum with a stick to loosen the grain (A.H. Mesfin and F. Girma, 2022) [3]. Threshing machines are used for large-scale commercial farms. Threshing of sorghum is one of the most laborious after-harvest processes. This is due to the fact that the sorghum seed is firmly attached to the inedible scaly chaff surrounding it, as well as the lack of (inadequate) threshing technology. Traditional threshing techniques are time-consuming and inefficient. However, in most developing countries, such as Ethiopia, women take the lead in post-harvest processing, which typically includes threshing and winnowing

of sorghum, as well as storage of sorghum (D.B. Kumar, 2013) [4].

The improved small-engine driven sorghum thresher was designed and produced at Melkassa Agricultural Research Center with an intention to solve critical threshing problem of farmers consecutively reducing cost of threshing, labor power and grain loss [5]. Using improved sorghum threshing machine has been evaluated and attained the threshing efficiency and output capacities of 88.97-97.08% and 7-12 qt.h⁻¹ respectively, and proven to reduce labor power, cost of threshing, and grain loss in comparison with traditional means of threshing sorghum (Bedada T., 2018 and Teha et al., 2020). Thus, this activity is aimed at demonstrating this engine driven Sorghum thrasher technology to the target area [6].

Objective

- To demonstrate engine driven Sorghum Thrasher technology
- To create awareness among farmers, developmental agents and other stakeholders on engine driven Sorghum Thrasher technology
- To strengthen linkage among stakeholders

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Materials and Methods

Description of the area

Sorghum thresher machine demonstration was held in Bambasi districts of Assosa zone, which is the major sorghum producing district of the zone during 2021 cropping season. Bambasi district is found at a distance of approximately 615 kilometers west to Addis Abeba and 45 kilometers toward the east from the Assosa town, capital city of Benishangul Gumuz regional state [7]. The altitude of the district is 1425 m.a.s.l and it is geographically located at the latitude of 9°07'5"N and longitude of 34°07'3"E. The agro-ecological zone of the district is mainly intermediate or mid altitude with long rain duration starting from May extended to October. The sorghum variety grown in the district is mainly long maturing ones [8].

Site selection

Bambasi district was selected purposively based on sorghum production potential and experience of technology adoption of the districts over the others. One Kebele known as Selama Dabus was selected purposively from the district based on sorghum production potential and willingness of the farmers to host the demonstration. A total of sixty (60) farmers were selected purposively based on their willingness and production of sorghum and each farmer contribute 0.5 ha of land to produce on his/her farm. A total of 30ha of land were covered by Assosa-1 improved sorghum variety which was used for threshing during the demonstration. The farmers that hosted the demonstrations were selected in collaboration with development agents (DAs) [9].

The evaluation and demonstration methods of sorghum thresher

One of the most popular and effective ways to demonstrate the advantages of best practices in agriculture is by demonstrating new technologies on farmers' fields (AGRA, 2016). On farm engine driven sorghum thresher demonstrations were organized in Selama dabus Kebele, and Farmers came to see the engine operated thresher in action thereby evaluate it and compared it to their traditional manual threshing practices. The farmers were demonstrated with how sorghum thresher machine operated the capacity of the thresher and the quality of sorghum grained threshed by engine driven sorghum thresher [10].

Training

The training was provided by a team of researchers from the Assosa Agricultural Research Center for farmers, Development agents, and district agricultural experts on the significance, function, management and operation of engine driven sorghum thresher.

Data collection and analysis

During the demonstration, capacity, time, and labor data was collected for the sorghum thresher machines, whereas for traditional processing, labor, time and capacity data were collected as per the FRG agreement during the demonstration. Simple descriptive statistics (mean, frequency and percentage) were used to summarize quantitative data, while qualitative data collected through group

discussion, field observation, and oral histories were analyzed using narrative explanation.

Result and Discussion

Introduction of engine-driven sorghum thresher and Awareness creation to the area

Engine driven sorghum thresher was brought from Melkassa Agricultural Research center and installed at Assosa Agricultural research center. Training was provided for farmers, DAs and woreda experts on overall operating, relative advantage of technology over local practices and handling of the sorghum thresher and post-harvest handling of sorghum (Table 1).

Training alone is not enough to create awareness and capacitate the farmers and experts to use the machine. Hence it was found to be very important to supplement it with demonstrations to ensure a complete knowledge transfer. Demonstrations are used to exhibit the correct application of the machines to enhance the exchange of information between farmers and researchers on the performance of the technology and its suitability under the farmer's conditions (Snapp (1999).

During the demonstration, all concerned bodies like regional bureau of Agriculture, Rural technology multiplication, Bambasi woreda agricultural mechanization team, and other non-governmental organization dealing with agricultural production were involved. All stakeholders showed positive interest toward the technology and the regional rural technology multiplication director promised to facilitate how to provide the thresher for the farmers [11].

Threshing capacity of technology

Threshing sorghum manually is a labor-intensive, and slow in process that is mostly done by pounding the harvested heads on bare ground with sticks. Not only is it a labor-intensive and time-consuming process that exposes the workers to grain dust, that can cause skin and respiratory issues, but it also leads to losses due to spilling, incomplete grain removal from the head, damage to the grain, and soil, stone, and other contaminants. During the demonstration, the participated farmers stated that, while threshing sorghum manually, it takes almost a day for threshing and winnowing one quintal per one person. During the demonstration of engine driven sorghum thresher, fourteen to sixteen quintals of sorghum with grain breakage of less than 2% was threshed and winnowed by the machine operated by two persons in one hour. To thresh similar amount of sorghum traditionally, it needs more than ten persons the whole day. Based on the dryness of sorghum head, feeding rate, grain straw ratio, crop sheaf length, experience of the operators, the demonstrated thresher has the capacity to thresh more than six quintals per hour. This result is in agreement with other findings in different areas like (Aliyi A. and Abdurahman S., 2023, Bedada T., 2018 and Teha et al., 2020).

Farmers' Opinion/Perception

During the demonstration process, the opinion of participated farmers on the sorghum thrasher performance was collected. Farmers mentioned the machine capacity, threshing efficiency, less grain damage, reduce labor, minimize human effort and reduce time of

Table 1: Number of participants of the training on sorghum thresher.

No.	Kebele	Farmer		DAS		Experts	
		Male	Female	Male	Female	Male	Female
1	Selama Dabus	60	13	2	1	2	0

thrashing as major criteria for selecting the sorghum thresher. Based on these criteria, all farmers preferred engine driven sorghum thrasher than traditional thrashing mechanisms. This result is in agreement with some prior demonstration activities done in other areas (Aliyi A and Abdurahman S., 2023). During the demonstration, almost all participants agreed on the use of sorghum thresher preferably as it reduces labor pressure of women and children. They also mention the issue of availability and affordability of the machine for small scale farmers. On the same demonstration, the rural technology multiplication and regional bureau of agriculture mechanization team discussed and promised to the farmers to facilitate the way the machine can be availed for the farmers [12].

Conclusion and Recommendation

Pre-extension demonstration of sorghum thresher was done at Selama dabus kebele of Bambasi district. The result of the demonstration showed that using sorghum threshing machine is preferable over the traditional threshing due to high threshing capacity and reducing labor cost needed for threshing. The machine is simple, easy to operate, efficient, minimal grain damage. But due to its high cost, having this threshing machine at individual farmer level is difficult. So, it is better if cooperatives, NGOs and the government itself provide the sorghum threshing machine so that it can provide the job opportunity for youth and women in the area.

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Conflict of Interest

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