

Title: Training, on farm demonstration, evaluation and maintenance of Agricultural farm machineries in western zone of Tigray, Ethiopia.

Abstract

The training, on farm demonstration and evaluation of different agricultural machineries with the objectives of (1) To familiarize the trainees with different agricultural machineries, (2) How to use and maintain different agricultural machineries, (3) How to operate and use agricultural machineries in different agro –ecologies and different soil types, (4) To create awareness for the trainees on the agricultural machineries and (5) to improve agricultural quality and production on different crops. The training was given about Row planters, Mold board, BBM (Broad Bed Management), different Tractors, Chopper, animal feed hammer grinder, Disc plow, disc harrow, cultivator, sesame harvesters, insecticide sprayer, and sesame seed cleaners. The row planters were demonstrated for different crops such as sesame (0.5ha), sorghum (0.5ha), Mung bean (0.5ha), and soy bean (0.5ha) according to their spacing of each crop. The training on agricultural machineries was given for consecutive 10 days both theoretical and practical. The trainers were highly experienced and they are very familiar with different agricultural machineries two are from Ethiopia and one is foreigner from Kenya. Sixty trainees were participated in the training on the given time and captured enough knowledge about how to operate different agricultural machineries on different soil types, different seasons, and different topography, maintain, when and how to lubricate etc.

Key words: mechanization, row planting, farm machineries, demonstration, opportunity, challenges

Introduction

Mechanization has had a major impact on the demand and supply for farm labor; the profitability of farming; and the change in the rural landscape, including rural communities. The introduction of new technology usually results in losers and gainers. For example, the introduction of the mechanical tomato harvester in California created considerable controversy, primarily due to farm workers not being compensated for lost wages (Schmitz & Seckler, 1970).

Starkey (1998) defined farm mechanization as the development and introduction of mechanized assistance of all forms and at any level of sophistication in agricultural production to improve human efficiency, timeliness of operation and labor involvement. For instance, timeliness of tillage and planting, weeding and/or harvesting are critical factors where affordable labor is insufficient to permit timely operation. Odigboh, (1991) defined agricultural mechanization as the use of any machine to accomplish a task or operation involved in agricultural production. Mijinyawa *et al.*, (2000) expressed farm mechanization as the application of engineering principles and technology in agricultural production, storage and processing; where these activities and applications are not limited within the boundaries of the farm units only. Clarke, (2000) inferred that the term mechanization is generally used as an overall description of the application of agricultural inputs to production, processing and storage of farm products. Ou *et al.*, (2002) reported agricultural mechanization as an engineering system that requires not only advances in machine development and applications but also close cooperation of many sections. In recognition of this fact, certain

environmental, agricultural, social and economic conditions must be ascertained to favor investment in mechanization technologies and their sustainable use.

 Mechanization of agriculture is recognized as one of the greatest engineering achievements of the 20th century. Generally, agricultural mechanization involves the selection, operation, utilization, and maintenance of mechanical devices and systems in agricultural operations and production for the utmost benefits of man. Among several definitions, the followings have been extracted to fully describe the scope of agricultural mechanization as defined by scholars and researchers:

Western zone of Tigray is classified under three agro-ecologies; low land, mid land and high land. The low land is suitable for the production of many lowland crops; sesame, sorghum, pearl millet, rice, soybean, mung bean, haricot bean, sunflower, safflower, cotton, okra, tomato, onion, jearjir, Molokai, tropical fruits. In the mid land and high land agro-ecology different crops are growing; Teff, wheat, barley, wheat, faba bean, lentil, linseed, highland safflower etc. even though the low land area is very suitable to produce many crops and animals by mechanization the farming system is still traditional. The population size growing is increasing at alarming rate but crop production is very low per hectare due to lack of introducing and using agricultural farm mechanization, lack modern agriculture. Investors and farmers have no interest to introduce the agricultural mechanization and modern agriculture as well as to increase the agricultural production because of lack of awareness on the agricultural mechanization and modern agriculture in the area. The training, on farm demonstration and agricultural farm machinery evaluation is design (1) To familiarize the trainees with different agricultural machineries, (2) How to use and maintain different

agricultural machineries, (3) How to operate and use agricultural machineries in different agro –ecologies and different soil types, (4) To create awareness for the trainees on the agricultural machineries and (5) to improve agricultural quality and production on different crops

History of agricultural mechanization in north western and western zone of Tigray

Even though in north western and western zone of Tigray has large flatland, many rivers, suitable farm lands for investment and agricultural production there is no agricultural mechanization except plowing by tractors in the area. No row planters, cultivators, harvesters, land leveling machines, seed cleaning machines, threshers etc. until this time small scale farmers using to plow by oxen, investors by tractors that is why the productivity of the area is very low as compared to other countries using modern agriculture, row planters, harvesters etc. Now days only few investors introducing row planters for sesame planting but still they are not operating very well, because they did not take any training how to operate, maintain etc. therefore about 99.9% of the area is planting by broad casting this is difficult for any different management activities (weeding, cultivation, pest assessment, pest control, chemical application, harvesting etc.) As a result the productivity of many crops are always very low specially sesame (personal communication, 2017).

Material and methods

The training was given in off season during 2017 for different agricultural machineries by to Ethiopian expertise and one from Kenya. The training was

sponsored by one Ethiopian investor. Three different hoper precision row planters, land leveling machine, animal feed grinder, Metal silo brought from Brazil and different agricultural machineries such as sesame seed cleaning machines, cultivators, sprayers, disc harrow, disc plow, different types of tractors, mold board, were demonstrated for sixty participants in Humera western zone of Tigray.

Major Challenges in agricultural mechanization in western zone of Tigray

- in appropriate and timely land leveling
- problem of Land clearing
- Lack of awareness and using mechanization options
- Lack of Awareness in agricultural machineries maintenance
- Lack of workshops and agricultural spare parts (HuARC, 2016)

Major Opportunity for agricultural mechanization in western zone of Tigray

- Large area and suitable for investment
- Many crops can grow in this area sesame, sorghum, cotton, mung bean, pearl millet,
- Annually flowing rivers, Tekeze, Mokoza, Bahre selam, Kaza and others
- Near to Sudan, Eritrea and this is suitable for export products
- Accessible roads and other infrastructures (personal observation, 2016)

Advantage of using row planting over broad casting

- Keeps uniform plant density and plant population
- Enables easy weed management
- Suitable for spraying insecticides, herbicide, fungicide

- Suitable for fertilization
- Suitable machine harvesting
- Allows uniform air circulation within the field(personal observation,2015)



Figure: (A) Theoretical training

(B) Practical training



Row planting



Land leveling machine



(A) Five hoper precision row planter



(B) Five hoper precision row planter



(C) video

Figure 1: Multi-crop drilling row planters Brazil branded



Figure: Multi crop seed cleaning machine



20171230_150853.mp4

Figure: demonstration of locally fabricated multi crop seed cleaner



Precision row planters



Multi crop seed drilling row planter



Drilling row planter



BBM (Broad Bed Management) and disc harrow



Disc plow and disc harrow



Different agricultural machineries



Figure: Land plowing and leveling



Figure: mold board



Figure: Metal silo



Mungbean threshing using multi crop thresher



Lad cleaner (Crop residue and weeds cleaner)



Insecticide sprayer



Figure: Animal feed grinder training and demonstration

Summary and discussion

The training and on farm demonstration for different agricultural machineries: Row planters, Mold board, BBM (Broad Bed Management), different Tractors, Chopper, animal feed hammer grinder, Disc plow, disc harrow, cultivator, sesame harvesters, insecticide sprayer, sesame seed cleaners, sesame harvesters were conducted during of season in 2017 in western zone of Tigray, Ethiopia . The row planters were demonstrated at irrigation research field for different crops such as sesame (0.5ha), sorghum (0.5ha), Mung bean (0.5ha) and soy bean (0.5ha) according to the recommended spacing of each crop between rows and plants in the area. The training on agricultural machineries was given for consecutive 10 days both theoretical and practical, on farm demonstration, field observation and evaluation. The trainers were highly experienced and they are very familiar with different agricultural machineries two were from Ethiopia and one was foreigner from Kenya. Sixty trainees were participated in the training on the given time and captured enough knowledge about how to operate different agricultural machineries on different soil types, different seasons, and different topography, how to maintain, when and how to lubricate etc. finally they were took their certificate about the completed training.

Look out for this article and pick some few points there to help make your work better especially on potential and constraints.

SK Amponsah, P Oteng-Darko, F Kumi (2012). Potential and constraints of agricultural mechanisation in Ghana—a review. International Agricultural Engineering Journal 21 (2), 38-43

Reference

- (HuARC, 2016), annual report and training on agricultural mechanization in western zone of Tigray
- (Personal communication, 2017), agricultural mechanization in western zone of Tigray
- (Personal observation, 2015), field day and row planter demonstration in western zone of Tigray
- (Personal observation, 2016), the importance and awareness farmers and investors on agricultural mechanization in western zone of Tigray
- Mijinyawa, Y, K.Ogedengbe, E.A.Ajav and A.K.Aremu, (2000); Introduction to Agricultural Engineering. Stirling-Horden Publishers (Nig) Ltd, Ibadan
- Odigboh, E. U. (1991). Single-row cassava harvester model II. Agricultural Mechanization in Asia, Africa and Latin America (AMA). 22(2): 63 - 66.
- Ou, B., Huang, D., Hampsch-Woodill, M., Flanagan, J.A., Deemer, E.K., 2002. Analysis of antioxidant activities of common vegetables employing oxygen radical absorbance capacity (ORAC) and ferric reducing antioxidant power (FRAP) assays: a comparative study. Journal of Agricultural and Food Chemistry 50, 3122–3128.
- Schmitz, A., and Seckler, D. (1970). Mechanized agriculture and social welfare: The case of the tomato harvester. *American Journal of Agricultural Economics*, 52(4), 569-577.

REVIEW SUMMARY

It is understood that the training occurred at the said location but I have a few comments:

1. No mention of technical characteristics of the various agricultural machinery you trained the participants on was made. Figures were not numbered and well referenced in the text.
2. The results did not give any information on exactly how many participants had hands-on experience (could operate the various machinery) after the training.
3. I was wondering how you were able to know the problems in the zone without using any formal method of inquiry.
4. Personally, I think this report was poorly written and more is required to bring it to an acceptable standard.

REPORT FORMAT:

Introduction

- *Mechanization defined, Importance of mechanization
- *History of agricultural Mechanization in Ethiopia
- *Constraints and Potential of agricultural mechanization

Materials and Methods

- *Study location
- *Number of trainees and trainers and level of expertise etc...

Results and Discussion

- *Various trainings and number of participants who could operate the different machinery