



## A Review on Cluster Based Large Scale Demonstrations towards Promoting Agricultural Technologies among Small-holder Farmers in Ethiopia

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### Abstract

This review article analyzes the status and role of cluster based large scale demonstrations in Ethiopian institute of Agricultural Research. The main objective is to assess modality of conduct, success story and lessons learned in the process of large-scale demonstrations. This study follows research methodology of desk review research, but it also some empirical study approaches. By promoting large scale demonstrations more advantageous for farmers to be situated in a certain area, the cluster approach to development seeks to promote technology transfer. Cluster farming is a voluntary practice in Ethiopia where smallholder farmers with nearby farm plots combine their land to take advantage of large-scale demonstrations and commercial farming. The Ethiopian Institute of Agricultural Research uses the large-scale demonstration idea of field demonstration to market agricultural innovations and varieties that have been released and registered. In cluster farming, use of mechanization is an important component to minimize post-harvest losses. In Ethiopian Institute of Agricultural Research, large-scale demonstration is the technological commercialization strategy. The findings show that increasing technology commercialization through large-scale demonstration and cluster farming boosts productivity and acceptance of new technologies. Through enhanced quality, information and knowledge access, and stakeholder engagement, the demonstration process makes it easier to access output markets.

**Keywords:** Large scale demonstration; cluster farming; Ethiopian institute of agricultural research; status; Agriculture

### Introduction

Agriculture, which has a great deal of potential for long-term growth, is still controlled by smallholders in many developing nations (Galvez-Nogales, 2010; Abafita et al., 2016). However, a shift from subsistence farming systems to those centred on commercially orientated production is necessary for agriculture to function as a sustainable engine of growth (Zhou et al., 2013; Woldeyohanes et al., 2017). A crucial route to reducing poverty, increasing food security, and improving farm households' nutritional status is the shift from subsistence to commercial production (Gidelew et al., 2022). According to Barrett (2008) and Jaleta et al. (2009), smallholder commercialization is linked to large-scale production and economies of scale, as well as a growth in the variety of commodities marketed nationally and in specialization based on comparative advantage at the regional and farm levels. One of the most prevalent aspects of agricultural technology transfer strategies is agricultural technology demonstrations.

Farmers can gain firsthand knowledge about advanced agricultural technologies through demonstrations. For farmers, demonstrations may convey a wide range of messages, much like a picture can convey a thousand words. Adoption of technology can be greatly aided by well-presented demonstrations. Farmers are more inclined to try a technology if they can personally verify its effectiveness. On the other hand, badly done demonstrations might hinder the learning process and discourage farmers from implementing new technologies (Dejene, 2019).

By making it more advantageous for farmers to be situated in a certain area, the cluster approach to development seeks to promote economic growth. Cluster farming is a voluntary practice in Ethiopia smallholder farmers with adjacent farm plots combine their land to take advantage of large-scale demonstrations and commercial farming (ATA, 2019a). Cluster farming important for farmers as access to markets and market information; it also made it easier for them to get financial and technical support; and it gave them more opportunities to interact with other farmers and build social networks. Conducting large-scale demonstrations without multidisciplinary teams create resource duplication and weak linkages between researcher and the extension worker. Technology demonstration in small land and minimum farmers hinder technology commercialization. Due to such problems large scale demonstrations through cluster farming approach boost technology adoption and commercialization.

In general, this manuscript is valuable to the scientific community as it explores the impact of cluster-based large-scale demonstrations on agricultural productivity and commercialization in Ethiopia. It emphasizes how cluster farming enhances technology adoption, improves market access, and optimizes resource use among smallholder farmers. By analyzing the approach of the Ethiopian Institute of Agricultural Research, the study provides key insights for policymakers, researchers, and extension professionals seeking to expand agricultural innovations. Furthermore, it discusses challenges and highlights success stories, making it a useful resource for shaping future agricultural development strategies.

### Objectives

1. To analyze the cluster based large scale demonstrations as new approach in Ethiopian institute of agricultural research
2. To assess success story and status of large-scale demonstrations and cluster farming

### Analysis

#### Definition of Cluster farming and Demonstrations:

Since 2006 E.C., the Agricultural Transformation Agency introduced the idea of cluster farming on a nationwide scale. The Agricultural Transformation institute (ATI) formerly ATA and other relevant sectors, including universities, research institutes, seed enterprises, and malt companies, implemented agricultural commercialization and clustering at the pilot level at various locations, primarily on cereal crops like wheat and malt barely. In Ethiopian cluster farming is a novel method of agricultural production that uses physically connected farms or lands for specific crops with the aim of commercialization. Subsistence farmers who cannot afford to buy contemporary production technology on their own can use substantial mechanization and other farm inputs in geographically grouped farming communities. Because the government has been utilizing cluster farming since

2010 as a means of reducing poverty and promoting rural development, Ethiopia makes an intriguing case study (Louhichi et al., 2019). Technology transmission is aided by "learning by doing" and "believing through seeing," which are achieved through demonstrations. Because this technique is founded on the ideas of "learning by doing" and "seeing believes," it generates attention and enhances adoption. Technology demonstrations are divided into two categories based on their intended use: technique demonstrations and result demonstrations.

#### Method Demonstration:

To ensure that a given operation is carried out methodologically and produces superior results, a method demonstration is performed to explain how to carry it out in accordance with its production packages. We teach farmers how to do things by demonstrating our methods. The farmers will either learn about a new technique that has been introduced to them or be given the proper way to perform an old activity. In addition to teaching new skills, the technique demonstration gives the learner practical knowledge regarding enhanced agricultural production packages that they may use in their daily lives.

#### Result Demonstration:

By comparing the final product or outcome to the current practice, the value of a new practice can be better understood. Thus, in extension education, the presentation of results is a crucial tool for persuading farmers of the benefits of a new concept or innovation that is presented to them as an alternative to their current methods. It becomes challenging for the extension agent to persuade the farmer to adopt the suggested variety or practice unless they can personally observe the outcome or results of the recommended practice in comparison to their current practice. The result demonstration makes the extension worker's job easier in these situations. From the above discussion it is understood that result demonstration is: i) the method to show the worth or end product or outcome of a practice or an idea. ii) Conducted mainly to show the differences between two practices especially when one is considered more superior than the other in giving the result or outcome. iii) to compare the results. For comparisons, records are to be maintained (Porter, 1998).

#### Why large-scale demonstrations start in EIAR:

The Ethiopian Institute of Agricultural Research uses the large-scale demonstration idea of field demonstration to market agricultural innovations and varieties that have been released and registered. Because the technologies are shelved, the demonstrations carried out under the careful supervision of EIAR experts are referred to as large-scale demonstrations. Before being expanded into the Ministry of Agriculture's primary extension system, the researchers themselves conducted the demonstration for the first time. As seen by their own pre-extension demonstrations, EIAR only carries out extensive demonstrations on technologies that are appropriate for their particular area. Large-scale demonstrations, as their name suggested, addressed a lot of farmers and a lot of land. The geographical and adjustment fragmentation of farmers' land led to the creation of cluster farming as a means of demonstrating similar technologies. A group of farmers that collaborate on a common objective and based on similar interests is known as cluster farming (Abdala, A. 2023). Farmers are grouped together in clustered land on nearby land to

farm as a single unit in the large-scale demonstration. The use of improved seeds, fertilizer application, and other farming best practices are among the current full package farm recommendations that these clustered farmers must follow (ATA, 2019/20). The following are the main reasons to begin large-scale demonstration in EIAR:

1. Number of technologies/varieties shelved
2. Farmers demand on agricultural technologies increased
3. Government expectation on the EIAR higher
4. The new emerging department in the EIAR (agricultural extension research directorate) formed
5. EIARs top management decision to disseminate our technologies

In order to ensure quick, sustainable, and equitable development for value chains that priorities agricultural commodities, the agricultural commercialization initiative was created as a means of integrating interventions that are spatially tailored. Supports for smallholder farmers participating in cluster farming include assistance with market connections, input supply, new technology introduction, training, and advisory services. Using mechanization technology and preventing post-harvest losses are two practical benefits of cluster farming. As they prepare their grounds, manage weeds and pests, and harvest crops at similar times, farmers participating in cluster farming can rent tractors, combines, and pesticide spray machines together. This also gives a cost minimization due to economies of scale in both input and output markets (Addisu and Dawit, 2021).

### **Steps in Conducting large scale demonstration:**

Large-scale demonstration is occasionally set up in a standard way because it is frequently employed as an extension technique. A well-executed demonstration should assist the subject matter expert in completing the process of farmers' and extension workers' attitude changes and enhancing their knowledge, comprehension, and abilities. When performing a large-scale demonstration, the general procedures listed below must be followed.

#### **Planning Phase**

##### **1. Know the Vicinity:**

In order to understand the farmers' farming methods, resources, and systems, the researchers need to establish rapport with them. It is necessary to collect data on the cropping system, the degree of input utilization at the moment, and the productivity of the target commodity in the area. There are several ways to calculate closeness. Both formal and informal ones exist. A few of them are as follows: Choosing the location and farmers, information gathering with PRA tools, consulting office records of the target commodity and fundamental agricultural practices, as well as meeting with development agents and host farmers to share information.

##### **2. Select Technologies:**

Select just those technologies that can be incorporated into the existing farming systems and conditions of the area/farmers and that have shown greater potential in terms of yield, quality, and disease resistance. Technologies classified as frontiers are those that have been created within the last five years. Make sure the demonstration technology is a lot more productive than what farmers are now employing. The researcher in charge of the technology's release and the subject matter expert in charge of the demonstration must now have enough discussions. They should

ask the research experts relevant questions and be content with the technology's dominance.

##### **3. Select Demonstration Site and farmers:**

Choose just those technologies that have demonstrated greater potential in terms of productivity, quality, and disease resistance and that can be integrated into the region's and farmers' current agricultural practices. Frontier technologies are those that are as new as feasible and haven't existed for more than five years. Make sure the technology used for the demonstration is significantly more advanced than what farmers are currently using. The person in charge of the demonstration, development agents and the research experts responsible for the technology's release still need to talk frequently. They should ask the pertinent inquiries of the research professionals and be satisfied with the technology's superiority. Selecting a group of farmers who are prepared to help manage the demonstration and who own technology in the selected demonstration block is the best option. After the demonstration's purpose is explained and the farmers' opinions are gathered, the farmers who will participate should be selected at a village meeting. It is possible to settle any disputes amicably. If not, there's a chance that farmers who aren't selected to take part won't cooperate, which might ultimately defeat the demonstration's purpose.

##### **Finalize Package of Practices:**

This is an important step in the planning of large-scale demonstrations. Obtain the most recent technologies from the Institute or centre, ensuring that they are state-of-the-art and demonstrating a discernible increase in yields or other performance indicators. Talk to as many of the scientists from the parent research station as you can. This will help identify important tasks or practices that need the involvement of scientists, the essential inputs for demonstration, and the details of the technique demonstration sequences that are needed. Understanding farming conditions will be useful at this stage. When the package of practices is being finalized, include the protesting farmers. This will aid in comprehending the degree of farming methods, the resource base needed to maintain technology, and the viewpoints of farmers.

##### **Prepare for demonstration:**

##### **Conducting Phase:**

Assemble the demonstration's necessary elements. Agricultural inputs that farmers have not yet used but that are necessary for the selected technologies to show their output potential on their fields are known as critical inputs. Make advance plans to ensure that inputs like seeds, fertiliser, farm equipment, and other supplies arrive on schedule. All the farmer has to do is provide the necessary inputs. Making arrangements for extra inputs is the farmers' responsibility. Ensure that the farmers can obtain the inputs that they must supply. Farmers should never be given the impression that the demonstration is a means of receiving free inputs.

##### **1. Layout of Demonstration:**

As the farmers prepare the field, take the lead and provide assistance. Each farmer whose plots would be used for demonstrations could have a customized training program. Maintain the control plot if required; if not, treat any other plots in the immediate vicinity as control plots. In block demonstrations, a one-acre plot of land is an effective control. Sometimes the "entire memory of the farmer" is regarded as a "control," or adjacent plots may serve as a control plot, obviating the necessity for one. On the

edge of the demonstration plot, post a promotional board that includes the technology being demonstrated, the demonstration's duration, and the technology donor. Additionally, write the center's or institute's name on the board.

## 2. Crucial Farm Operations:

The development agent should make sure he is there for important activities such as weeding, fertiliser application, irrigation, harvesting, threshing, plant protection measures, and weigh-in of produce. Two things are important at the moment: (i) Providing farmers with demonstration-based training; and (ii) Keeping records. All operations should be included in farmer training. Ask questions from the farmers at each of these operations. This will make it easier to understand the task and how it works.

## 3.4. Role of large-scale demonstrations through cluster farming:

Agricultural demonstrations are used in a variety of settings worldwide. They are an essential component of an agricultural extension agent's toolbox and a key tactic for initiatives aimed at agricultural development. Originally developed in the United States in the early 1900s, they have since been modified for a variety of uses, including teaching agricultural techniques or assessing outcomes (Hancock 1997). From the straightforward application of better seeds and fertilizer to intricate multi-season techniques like conservation agriculture, they have also influenced a variety of agricultural methods. Agricultural demonstrations can take many different shapes, but the product or service is usually a new technology or novel agricultural technique, and the farmer is the potential customer. Agricultural demonstrations have as many names as there are variations on the term. Demonstrations may be called demonstration plots, model farms, or on-farm or field demonstrations, depending on the situation. According to studies, cluster farming links agriculture to industries, draws the interest of the government, non-governmental organizations, private input delivery companies, and infrastructure development, which benefits producer farmers as well as the entire agricultural sector and national development.

However, there were several challenges to carrying out large-scale demonstrations in EIAR, such as limited access to improved or hybrid seed, limited capacity for seed multiplication, low fertilizer profitability and efficiency because of the lack of complementary improved practices and seed, and limited irrigation and water. The main challenges that agriculture faces today are increased input costs, budget shortage, detail data collection, and lack of agricultural machineries (Seguya et al, 2021).

## 3. Success story in large scale demonstrations:

In Ethiopian Institute of Agricultural Research, large-scale demonstration is the technological commercialization strategy. Therefore, by identifying demonstration models to commercialize enhanced agricultural technologies in large-scale demonstrations, the findings improved the path for further evaluation of the practices. The following are some of the top lessons learnt from this novel and inventive method and are shared with others: Increased productivity as a result of thorough agronomic management, constant field monitoring, enhanced agricultural inputs like fertilizer, agrochemicals, and varieties, as well as mechanized farming tools like tractors and combine harvesters. Strong market connections were established with supermarkets, exporters, and agro-processors.

Additionally, because of increased awareness, skill development,

and confidence in market connectivity, both cluster members and nearby farmers adopted improved agricultural methods. Demonstration site implementation frequently depends on a number of stakeholders. The study team wanted to know how implementers engage stakeholders and coordinate their participation to ensure that stakeholders are engaged effectively (FAO, 2012). Through clustering, large-scale demonstrations enable farmers to pool resources for food production and group marketing. Farmers are better able to adapt to changes in the market as a result. It supports collective bargaining, which raises the prices and premiums for farmers who work in groups. These activities ensure that farmers become more consistent in their planning and production activities which are favorable for attracting micro-financial institutions.

## 4. summary

This assessment evaluates the application of improved agricultural technologies in Ethiopia and the importance of large-scale demonstrations at the Ethiopian Institute of Agricultural Research. The researcher specifically reviewed articles about knowledge transfer, cluster farming, and large-scale EIAR demonstrations. The findings show that increasing technology commercialization through large-scale demonstration and cluster farming boosts productivity and acceptance of new technologies. Through enhanced quality, information and knowledge access, and stakeholder engagement, the demonstration process makes it easier to access output markets. However, both cluster farming and large-scale demonstration make it simple to obtain better agricultural inputs and guarantee efficient extension advising services. Overall, Farmer organizations through cluster encourage financial investment for seeds, fertilizers, farm machinery and agro chemicals and increase bargaining power for their marketing. Overall, the study used for the scientific community the following:

1. Findings from this study are likely to inform tutors in the agricultural research institutions of higher learning on the need to disseminate agricultural technology to farmers
2. Farmers are also likely to be informed on the importance of combining land and other resources in order to benefit from economies of scale
3. The extension agents who serve as technology discriminators to farmers are also likely to be informed on the logical steps of conducting demonstrations on new technologies
4. This study is likely to inform the governments on the role of research institute in disseminating agricultural technologies to farmers thus the need to facilitate the program through more fund allocation

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**Disclaimer (Artificial intelligence):** Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript. But have been used only Quill bot tool during paraphrasing of this manuscript.

## References

1. Addisu and Dawit (2021). Review on Agricultural Extension Systems in Ethiopia: A Cluster Farming Approaches. *Inter. J. Econ. Bus. Manage.* 9(5): 111-117
2. Abafita, J., Atkinson, J., & Kim, C. S. (2016). Smallholder commercialization in Ethiopia: Market orientation and participation. *International Food Research Journal*, 23(4), 1797–1807.
3. Abdala, 2023. Cluster based large scale demonstration of improved food barley technology in gurage and silte zone, Southern Ethiopia. *Ukrainian Journal of Ecology*. 13:50-57.
4. Agricultural Transformation Agency. (2019/20). approach/agriculturalcommercialization-clusters-2/. <http://www.ata.gov.et/our>
5. ATA - Ethiopian Agricultural Transformation Agency. (2019a). ‘Annual Report 2010 (2017-18)’, Addis Ababa, Ethiopia. Available online at [www.ata.gov.et](http://www.ata.gov.et)
6. Barrett, C. B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy*, 33(4), 299–317. <https://doi.org/10.1016/j.foodpol.2007.10.005>
7. Dejene Mamo, 2019. cluster farming as new approach in ethiopia. <https://www.researchgate.net/publication/347976115>
8. FAO (2012). Good practices in building innovative rural institutions to increase food security. Rome: FAO. [Google Scholar]
9. Gálvez and Nogales. 2010. Agro-based clusters in developing countries: Staying competitive in a globalized economy. *Occasional Papers No. 25*, FAO Agricultural Management, Marketing and Finance, Rome, Italy.
10. Gidelew, G. E., Tefera, T. L., & Aweke, C. S. (2022). From staple food to market-oriented crop: Commercialization level of smallholder teff (*Eragrostis teff*) growers in Jamma District, Ethiopia. *CABI Agric Biosci*, 3, 53. <https://doi.org/10.1186/s43170-022-00123-5>
11. <https://cgspace.cgiar.org/items/1388de1c-b778-4261-9ef1-c884317ae1a2>
12. Louhichi, K., Temursho, U., Colen, L., & Paloma, S. G. (2019). Upscaling the productivity performance of the Agricultural Commercialization Cluster Initiative in Ethiopia. JRC Science for Policy Report. Publications office of the European Union. <https://jrc.ec.europa.eu/repository/117562>
13. Porter, M., 1998. Clusters and the new economics of competition. *Harvard Business Review*. Available at: <http://hbr.org/product/clustersand-the-new-economics-of-competition/an/98609-PDF-ENG>.
14. Seguya, H., Robinson, D. S., Mwango, H. R., Flock, J. A., Manda, J., Abed, R., & Mruma, S. O. (2021). The impact of demonstration plots on improved agricultural input purchase in Tanzania: Implications for policy and practice. *PLoS ONE*, 16(1). <https://doi.org/10.1371/journal.pone.0243896>.