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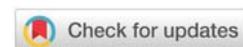
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## Research Article

# Cluster based pre-scaling up of improved malt barley technologies at Kofele district of West Arsi zone, Oromia regional state, Ethiopia

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## Abstract

Pre-scaling up of malt barley was conducted at Kofele District of West Arsi zone of Oromia regional state, to increase farmers' capacity in production and management practices. Kofele district was selected due to its potential for barley production. One "kebele" was selected in collaboration with Kofele district agricultural and natural resource expert purposively based on potential for malt barley production and availability of land for cluster farming purpose. From selected "Kebele" 85 farmers were selected as team leader, with 410 of follower farmers and a total of 495 farmers were selected for the activity in cropping season (2018/19).

An improved variety of malt barley called IBON 174/03 distributed to farmers. Ninety (90) quintals of malt barley were given for the selected farmers. 80 quintals of them were basic seed class whereas the rest 10 quintals had a pre-basic seed class. The seed covered the land size of 72 ha by the malt barley during the production year (2018/19). Training were arranged and delivered on production of malt barley, and chemical applications methods. Besides this awareness on production and packages of malt barley was also delivered to the farmers on the set of June 2019 which was sponsored by Ethiopian Institute of Agricultural Research (EIAR)-AGP2 program. Continues Monitoring and evaluation have been done at different time with different experts. Exchange visit as well as both villages based and large scale field days were arranged for further promotion of malt barley to other potential areas.

Malt barley is potential crop in the highlands of west Arsi Zone in general and at Kofele District in particular. The crop is used for household consumption as well as industrial crop in generating income for small holder farmers. IBON 174/03 was acceptable during field day by farmers due to their disease tolerant and early maturity. After harvesting farmers like the variety IBON 174/03 due to its productivity (high yield per hectare). From one hectare the productivity of improved malt barley IBON 174/03 an average grain yields 40.2q/ha was recorded. Thus, highland farmers should use IBON 174/03 variety of malt barley in order to increase their malt barley production and generate more income for their livelihood. Further dissemination of malt barley is more expected from concerned body and addressing potential areas.

## Introduction

Barley (*Hordeum vulgare L.*) is among the cereals cultivated in Ethiopia and believed to be started cultivation more than 5,000 years and also originated in Ethiopia. It is a cool-season; rain fed crop which is dominantly cultivated in the northern and central highlands of the country[1]. Suitable barley growing regions in the country are the highlands ranging from 2300 to 3000m.a.s.l [2]. In Ethiopia the major food and malt barley producing Zones are in Oromia and Amhara regions (Arsi, Bale,

North Shewa in Oromia; and North Gondar and West Gojjam in Amhara)[3].

According to the data obtained from the Food and Agriculture Organization Corporate Statistical Database .The total world barley production for the year 2016 was 141,277,993 metric tons. In 2018 production was increased to 170 mln tones[4].

Market shares of barley from Africa Morocco, Ethiopia and Algeria accounting for 87% of the total barley production .Even though Ethiopia is the second largest producers of barley and



contribute more than a quarter of production a lot should be done on the value chain [5].

From 10,232,582.23 hectares of land allocated for cereal in 2017/18 production season, barley (food and malt) covered 951,993.15 ha of land from which 20,529,963.72 quintals of grain was produced with the average productivity of 21.57 q/ha [6].

In Ethiopia, barley grain is used for the preparation of different traditional food stuffs, such as “Injera”, “Kita”, “Dabo”, “Kolo”, “Genfo”, “Beso”, “Chuko”, “Shameta”, “Kinche”, and Shorba are the most commonly known traditional Ethiopian barley-based foods[7]. And local alcoholic drinks, such as “Tela”[8]. The straw is used as animal feed, especially during the dry season and for roofing (thatching) houses and bedding[9].

## Objectives

To create awareness on the importance of malt barley technologies among farmers, DAS, SMSs and other participant stakeholders, such as farmers cooperatives, unions and non-governmental and governmental organizations working on improved seed production.

To scale up improved malt barley variety called IBON 174/03 in study area (Kofele district) and to collect the farmers' feedback towards the variety IBON 174/03.

## Materials and methods

This cluster-based pre-scaling improved malt barley technology research activity was conducted in Oromia Region at Kofele district of Gurmichu kebele. This site was selected based on the potential malt barley production.

The pre-scaling up of improved malt barley variety was conducted at Kofele district a “Kebele” named “Gurmichu” of “ILu-Dendena” cluster. The district was selected based on potentiality of the districts for malt barley production. And the selection of pre-scaling up site was purposive based on convenience of the area to the technologies and availability of large sized land 72 hectares in one place or cluster. A total of 495 farmers (381 young men whose age ranges between 19–26 and 114 women) were selected from the kebele. A “Kebele” could be equivalent to a county or wards, and is the smallest formal unit of Ethiopia's local government administrative structure[10].

After site selection in collaboration with district level experts two training were organized at two stages the first training which was given on the set of July 2019 and focused on the production of improved variety of barley crop with its all packages for in order to share information on the technologies. The second training was organized on the field after planting of the plant on the first week of September 2019; the training objectives were mainly focused to raise awareness among farmers on crop protection and chemical application as shown in Table 1 below.

After delivering training 90 quintals of improved malt barley namely called IBON 174/03 were given for selected farmers and sowing on 72 ha of land. So, that 72 ha of land were covered by the variety IBON 174/03.

## Result and Discussion

### Yield comparisons of average barley productions at District, regional & national level

Comparison among the research practice (full package) at Kofele district, regional barley average yield and national average barley yield were made. From the result it was observed that the full package /practices has 40% yield advantages than the Oromia regional barley average yield and a 46.3% yield advantage than the Ethiopian national barley average yield.

The result (Figure 1) indicated that in full package utilization of input by the research recommendation showed that a yield scored an average yield of 40.2 q/ha for IBON 174/03 malt barley at study district (Kofele), 24.12 q/ha of Oromia regional average barley yield and 21.57q/ha of Ethiopian national barley average yield.

In general cluster based approach with full package input utilization demonstration was successful in terms of yield, in that the highest mean grain yield obtained from full package 40.2 q/ha was 40 % more productive than oromia regional state barley average yield (24.1q/ha) and 21.6 q/ha or more 46 % productive than the Ethiopian national barley average yield. Therefore, based on this result the researchers recommend farmers and other development practitioner to focus more on full package in cluster farming approach for scale up activity with best performed malt barley variety (IBON 174/03) has to be done

Table 1: Training Organized for awareness creation.

No.	Topic of training	Farmers		Expert & DA		others	
		Male	Female	Male	Female		
1	Agronomic practices of malt barley	84	13	7	0	6	1
2	Chemicals application and utilization	69	7	10	0	0	0

### Barley average yield at study district, at regional & at National level

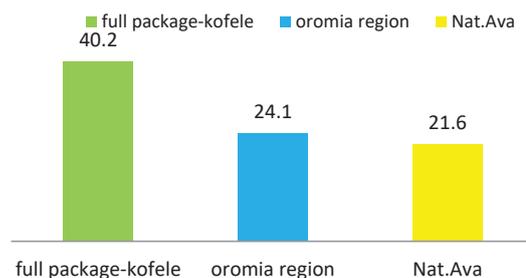


Figure 1: Shows comparisons of average barley Yield at District, regional and national level.

in areas where malt barley is not scaled up especially in areas where malt barley is potential.

### Field days

To improve farmer's awareness on the performance of the malt barley, two round field days were organized. One main and one mini field days were organized at national level by Kulumsa agricultural research center with financial support of AGP-II program, by these field days, a total of 269 participants were attend the field events. Among these 150 participants were farmers (121 Male and 29 Female), 36 of participants were Researchers (29 Male and 7 Female), 134 participants were Experts & others special guests (119 Male and 15 Female) were attended the field days and awareness were created among stakeholders (Table 2).

During field days event farmers expressed their interest by observing how malt barley perform in its agro ecology and demand was created to scaling up in the farming system thereby to improve their household income and seed source Figure 2.

### Farmers feed backs during monitoring and evaluation and field days

Farmers suggested a couple of issues concerned to the technology specific to the merit of the malt barley variety "IBON 174/03" as showed on Table 3 that the Techninology (IBON 174/03) has a high disease resistance and high yielder than the local variety and in addition to this the seed color and leaf color are attractive as a merit of the technologies. Whereas they have been facing challenges through the production of malt barley from planting to marketing, un availability and accessibility of farm machinery such as planter, combiner harvester, and so on, market price fluctuation. And they suggested that if these problems solved early, they would be more benefit from the technology and improve production and productivity of malt barley.

### Summery and Conclusion

The pre scaling of malt barley in west Arsi Zone was

**Table 2:** Summery of field days participants of in two rounds.

No	Participants	Gender	
		Male	Female
1	Farmers	121	29
2	Experts, DAs & others (journalist...)	119	15
3	researchers	29	7
	Total	269	51



**Figure 2:** Shows sign board (left), field day participants (middle) and key note speaker from AGP-II project (right).

**Table 3:** Farmer's feedback at different stage (field days, field monitoring and evaluation).

no	Feedback specific to the merit of the Technology ( IBON 174/03)	General feedback as challenge
1	has a high disease resistance & high yielder than the local variety	un availability & accessibility of farm machinery such as planter, combiner harvester, and so on
2	the seed color & leaf color are attractive	Market problems to sell their produce at air price

conducted in the highlands of Kofele district to increase the production of malt barley in the community. Malt barley is potential crop in the highlands of Ethiopia in general and Kofele district in particular. The crop is used for household consumption as well as industrial crop in generating income for farmers. Used for consumption and generate income for household by selling malt barley to the nearby malt factory (the former Asela Malt Factory-now Oromia Agricultural Cooperatives Federation LTD).

Training, exchange visit and both main and mini field days capacitated farmers on production of malt barley. IBON 174/03 was acceptable by farmers due to disease tolerant and productivity per hectare and early maturity of IBON 174/03 malt barley variety. The variety has got wide acceptance by participants during main and mini field days. The variety IBON 174/03 has scored a yield advantage over the regional as well as the national.

Generally the crop technology on cluster based has given a good impact over the farming community as they were motivated by recommended technology applied in the demonstration fields. Barley in general malt barley specific to the variety IBON 174/3 becomes a new entry in the farming system, moreover the technology is highly accepted by client and non-client farmers from the performance of the crop and several farmers came to get seed of malt barley variety (IBON 174/3 ) due to the awareness created during field day events.

### Recommendations

- ❖ Highland farmers should use malt barley variety of IBON 174/03 in order to increase their malt barley production and generate more income for their livelihood.
- ❖ Further dissemination of IBON 174/03 is expected from concerned body in producing quality seed and addressing potential areas.
- ❖ New adapted and disease resistant variety of malt barley like IBON 174/03 should be multiplied in large amount by seed enterprises and injected to the seed systems as soon as possible.
- ❖ Since mechanization is a key input like improved seeds, so emphasis should be given by the concerned body on availability and accessibility of farm machinery such as planter, combiner harvester, thresher and so on should be consider in the future because these farm machineries can contribute a lot on production and productivity.



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## Credit authorship contribution statement

Sintayehu Abebe: proposal write up, Data analysis, Writing – original draft

Martha Gichamo: participated during data collection, review and editing of the manuscript.

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