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Research Article

Large Scale Demonstration (LSD) of improved malt barley Technologies at Dodola District of West Arsi Zone, Oromia Regional State, Ethiopia

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Abstract

Pre scaling up of malt barley was conducted at Dodola District of West Arsi Zone to increase production and productivity among malt barley producer's farmers. Dodola district was selected due to its potential for barley production. Again three kabeles namely Ganata, Danaba and Kechemba were selected purposively based on potential of the crop for malt barley production. From selected kebales 139 farmers were selected, for cropping season (2017/18). An improved variety of malt barley called IBON 174/03 distributed for farmers. One hundred quintals of malt barley seed was given for the selected farmers. The seed covered the land size of 83.5 ha at the rate of 125kg per hectare by the malt barley during the production year (2017/18). Orientation was given for the farmers on the advantages of producing in cluster over the conventional (traditional) way. In Addition to this awareness on production and packages of malt barley was also delivered to the farmers on set of June which was sponsored by Ethiopian Institute of Agricultural Research (EIAR). Two times Monitoring and evaluation have been done in collaboration with Sinana research center researchers and agricultural office experts of Dodola district. Exchange visit as well as both villages based and large scale field day were arranged for further promotion of malt barley to other potential areas. From one hectare the productivity of improved malt barley (IBON 174/03 an average grain yield scored 45.1 q/ha, 40 q/ha and 35 q/ha at Ganata, Danaba and Kechemba Kabeles respectively. Malt barley is potential crop in the highlands of West Arsi Zone in general and at Dodola 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, early maturity. After harvesting farmers like the variety IBON 174/03 due to its productivity (high yield per hectare). 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 for addressing potential areas.

Background and justification

Barley (*Hordeum vulgare L.*) is one of the main cereal crops produced in the World. It ranks fourth in the world in terms of production after wheat, maize and rice [1,2]. There are three subgroups of barley grown; six-row (*H. vulgare*), two-row (*Hordeum distichon*) and the rarely cultivated intermediate (*Hordeum irregulare*). Both two-row and six-row barleys are used for malting, but the best malt quality for beer is produced from two-row varieties [3].

Barley is believed to have been cultivated in Ethiopia before 3,000BC [4,5]. In Ethiopia, it can grow in wide range of agro ecology with an altitude 1800–3,400m above sea level but it grows best at altitudes ranging from 2300–3000 m.a.s.l. [3,6].

In Ethiopia, among the cereals, barley is the fifth most important crop next to teff (*Eragrostis tef*), maize (*Zea mays L.*), sorghum (*Sorghum bicolor L.*) and wheat (*Triticum aestivum L.*) [5,7,8].

Barley which includes both food and malt barley species is



cultivated in Ethiopia [9]. The majority of barley production is food barley with its share estimated to be 90% compared with malt barley [2]. With Oromia, Amhara, Tigray, and Southern Nations, Nationalities, and People's Region (SNPPR) are the main areas of production in Ethiopia [10]. In general in Ethiopia, barley grain is used for the preparation of different traditional foodstuffs, such as injera, kolo, and local drinks, such as tela, borde and beer [1,8,9,11]. Malt is the second most important use of barley that is used mostly in beer [3,6].

Ethiopia is among the top 10 producers of barley in the globe [5]. Ethiopia is the second largest producer of barley in Africa next to Morocco [3,6]. The major Market shares of barley in Africa are concentrated in three countries- Morocco, Ethiopia and Algeria-accounting for 87% of the total barley production in the continent [7]. In Ethiopia, the market potential and use of malt barley as a row material in brewery factory has increased from year to year [3,6].

In general, demand and supply side of malt barley is not balanced; as a result the brewery and malt factory are forced to import from abroad, in order to satisfy the ever-increasing demand for raw materials and this has a direct and negative impact on hard currency of the country, so in order to minimize the shortage of improved malt barley technologies this activity was initiated with the following objectives.

Objectives

- ❖ To scale up improved malt barley variety called IBON 174/03 in the community.
- ❖ To increase production of malt barley in the highlands of Arsi zone particularly in West Arsi Zone.
- ❖ To increase industrial supply of malt barley particularly for Asela malt factory and others in the country.
- ❖ To improve the farmers income from the sale of malt barley as a seed for other farmers or as a malt input for factories across the country.
- ❖ To provide recommendation for further scaling up of the technology.
- ❖ To document about the large scale demonstration approach for further implementation as a new extension modality for development practioners.

Materials and methods

Description of the study areas

The scaling up was executed at Dodola district during the main cropping season of 2018 under rain fed condition. Most parts of West Arsi zone have elevations of ranging from 1500 to over 3300m. Shashemene town is the administrative center of the zone it located at 250km from Addis Ababa. It is located in the Rift Valley Region The Astronomical location of West Arsi zone lies between 6012'29" to 7042'55" latitude and 38004'04" to 39046'08" longitude [12].

The area is know with producing wheat, maize, barely, teff and others some highland crops. The agroecology of the area is suitable for those cereal crops. Ganata, Danaba and Kechma are Kebeles of areas that belong to under Dodola district in West Arsi.

Site and farmers selection

The Large Scale Demonstration (LSD) of improved malt barley variety was conducted at dodola district in three kabeles (Ganata, Danaba and Kechema). The district was selected based on potentiality of the districts for malt barley production. And the selection of Large Scale Demonstration sites was purposive based on convenience of the area to the technologies. A total of 139 farmers were selected from the threes kabeles as shown in Table 1.

Methods of data collection

Data on Yield and yield component with social attributes were collected (Table 1) regarding the actual grain yield, scope of promotion and package comparison was made.

Data analysis method

The collected data (quantitative data) were analyzed by using average and frequency distribution while qualitative data were analyzed using descriptive statistics [13].

Result and Discussion

LSD of improved IBON 174/03 malt barley variety was conducted at Dodola district west Arsi Zone Oromia Regional State. From the district three kabales were selected based on potentiality of the district. After selection of farmers 100 quintals of improved malt barley namely called IBON 174/03 was distributed for selected farmer's sowing on 83.5 ha of land, 100 q of improved seeds of malt barley was delivered. So that 83.5 hectare of land was covered by the variety (IBON 174/03). Training was given for all beneficiary farmers on the productivity of improved variety of this crop with its all packages for both farmers who got seeds and who not got seeds in order to share information on the technologies. One Main field day was organized at (at Ganata and at Danaba) kabeles at national level. Different levels of Field days have been organized by Kulumsa agricultural research center in collaboration with Sinana Agricultural research center and district level experts and barley growing farmers (host farmers) and several informal farmers to farmers and Researchers group visit were conducted. To raise farmers awareness on the performance of the malt barley, by these field days, a total of 596 farmers, 36 experts and 20 researches and other invited gusts were attended the field days and awareness were raised (Table 2).

Table 1: Yield obtained from LSD of malt barley variety (IBON 174/03).

District	Kebele	Area / hec	Number of farmers			Input utilization in q			Total production in q	Average Yield
			M	F	Total	Seed	N.P.S	UREA		
Dodola	Ganata	57.5	75	14	89	69	57.5	14.4	2415	45.1
Dodola	Danaba	15	24	1	25	18	15	3.8	600	40
Dodola	Kechma	11	25	-	25	13	9	2.3	315	35

As indicated in Table 1 below that during 2017/18 production season yield data was collected from the three clusters and obtained 45.1 q/ha, 40 q/ha and 35 q/ha obtained from Ganata, Danaba and Kechma kebeles respectively.

Grain yield Comparison among the study district, Oromia regional state and Ethiopian national average barley yield were made. From the result it was observed that the study area has 54 % yield advantages than the Oromia regional barley average yield and a 66 % yield advantage than the Ethiopian national barley average yield as showed in Figure 1. The study areas scored an average yield of 40.0 q/ha for IBON 174/03 malt barley at Dodola district, 24.1 q/ha of Oromia regional average barley yield and 21.6 q/ha of Ethiopian national barley average yield.

As Table 2 showed that among the malt barley varieties, IBON 174/03 is earlier than all varieties under the production at the study areas. Again the variety IBON 174/03 has a yield advantage over the other varieties grown in the study areas Table 3.

Conclusion

The LSD of malt barley in west arsi Zone was conducted in the highlands of Dodola district to increase the production

Table 2: Days to maturity and grain yield of IBON 174/03 Vs other varieties.

Variety	Days to flowering after emergence*	Grain yield (q ha ⁻¹)
Bekoji-1	77	35-50
EH1847	80	35-44
Holker	80	24-31
IBON174/03	67	30-57
Sabini	72	25-49

Source: [14,15]

Barley average yield at study district, regional and national

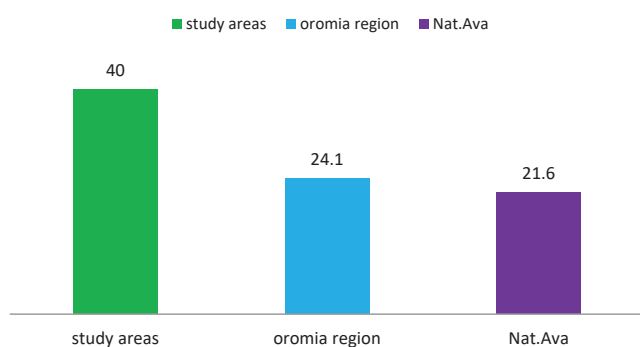


Figure 1: Barley production comparison at study areas, regional and national level.

Table 3: Main and Mini Field Days Participants Of 2017/18 Cropping Season.

Kabales	Participants							
	Farmers		Experts		Researchers and others		Sub_total	
	Male	Female	Male	Female	Male	Female	M	F
Ganata	323	31	13	5	8	2	354	38
Danaba	225	17	13	5	8	2	248	24
Grand_Total							602	62

of malt barley in the community. Malt barley is potential crop in the highlands of Ethiopia in general and at Dodola district in particular. The crop is used for household consumption as well as cash crop in generating income for farmers. Used for consumption and generate income for household by selling malt barley to the nearby malt factory (Asela Malt Factory).

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

Recommendations

1. 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.
2. Further dissemination of IBON 174/03 is expected from concerned body in producing quality seed and addressing potential area
3. New adapted and disease resistant variety of malt barley should be adapted by research center
4. Integration works like coming together of different stakeholders could improve the synergy and minimize effort duplication. Therefore attention should be paid for integration works by concerned body.

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References

1. Terefe D, Desalegn T, Ashagre H (2018) Effect of Nitrogen Fertilizer Levels on Grain Yield and Quality of Malt Barley (*Hordeum Vulgare* L.) Varieties at Wolmera District, Central Highland of Ethiopia. *International Journal of Research Studies in Agricultural Sciences (IJRSAS)* 4: 29-43. [Link: https://bit.ly/3CwSe8h](https://bit.ly/3CwSe8h)
2. Abera T, Tufa T, Midega T, Kumbi H, Tola B (2018) Effect of Integrated Inorganic and Organic Fertilizer on Yield and Yield Components of Barley in Liben Jawi District. *International Journal of Agronomy (Hindawi)* 2018: 7. [Link: https://bit.ly/3jzCSXO](https://bit.ly/3jzCSXO)
3. Kassie MM, Awoke Y, Demesie (2018) Evaluation of Malt Barley (*Hordeum distichon* L.) Genotypes for Grain Yield and Malting Quality Parameters at Koga Irrigation in Western Amhara Region. *International Journal of Plant Breeding and Genetics* 12: 13-18. [Link: https://bit.ly/3jEuUwF](https://bit.ly/3jEuUwF)
4. Gebremedhin TW (2015) Adaptation of Food Barley (*Hordeum Vulgare* L.) Genotypes. *Journal of Agricultural Sciences* 60: 227-235. [Link: https://bit.ly/2U48j3S](https://bit.ly/2U48j3S)



5. Moges T, Melese A, Tadesse G (2018) Effects of lime and phosphorus fertilizer levels on growth and yield components of malt barley (*Hordeum distichum* L.) in Angolelana Tera District, North Shewa Zone, Ethiopia. *Advances in Plants & Agriculture Research* 8: 8. [Link: https://bit.ly/37yQtE](https://bit.ly/37yQtE)
6. Asres T, Tadesse D, Wossen T, Sintayehu A (2018) Performance Evaluation of Malt Barley: from Malting Quality and Breeding Perspective. *J Crop Sci Biotech* 21: 451-457. [Link: https://bit.ly/3CJvYbB](https://bit.ly/3CJvYbB)
7. Bezabeh A (2018) Malt barley commercialization through contract farming scheme: A systematic review of experiences and prospects in Ethiopia. *African Journal of Agricultural Research* 13: 2957-2971. [Link: https://bit.ly/2VEVWmo](https://bit.ly/2VEVWmo)
8. Abebe A, Bizuneh W (2019) Malt Barley (*Hordeum distichon* L.) varieties performance evaluation in North Shewa, Ethiopia. *African Journal of Agricultural Research* 14: 503-508. [Link: https://bit.ly/3AoDI5W](https://bit.ly/3AoDI5W)
9. Begna B, Gurmu MY, Lemma E (2014) Characterization of a barley-based farming system in the Arsi Highlands, Ethiopia. *Journal of Agricultural Extension and Rural Development* 8: 309-320. [Link: https://bit.ly/2VCQAKy](https://bit.ly/2VCQAKy)
10. Awulachew MT (2019) Productivity and Grain quality of Holker, Ibon and Franka malt barley (*hordeum vulgare* L.) varieties to the rate of nitrogen fertilizer at central highland of Arsi, Ethiopia. *Journal of eSciences* 2: 21. [Link: https://bit.ly/3jlsnli](https://bit.ly/3jlsnli)
11. Kebede WM, Koye AD, Mussa EC, Kebede DT (2017) The Roles of Institutions for Malt-Barley Production in Smallholder Farming System: The Case of Wegera District, Northwest Ethiopia. *International Journal of Agriculture and Forestry* 7: 7-12. [Link: https://bit.ly/2XgjUy7](https://bit.ly/2XgjUy7)
12. Ullisido A, Abebe A (2020) Analysis of Wheat Value Chain in Denaba Kebele, Dodola Districts West Arsi Zone, Oromia Region, Ethiopia. *International Journal of Food Engineering and Technology* 4: 36-45. [Link: https://bit.ly/3ywiFIR](https://bit.ly/3ywiFIR)
13. IBM SPSS Statistics 2011. IBM corp.
14. Directorate MOAPHR (2013) Crop Variety Register Addis Ababa 293.
15. Molla A, Nigussie D, Bishaw Z, Mulugeta W, Biradar C (2020) Integrated Multi-criteria Land Suitability Evaluation and Mapping for Scaling Malt Barley Varieties in Rain-Fed Production Areas of Ethiopia. *Journal of Agricultural Science* 12. [Link: https://bit.ly/2VEUqKc](https://bit.ly/2VEUqKc)

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