

Provided for non-commercial research and education use.

Not for reproduction, distribution or commercial use.



This article was published in an Sjournals journal. The attached copy is furnished to the author for non-commercial research and education use, including for instruction at the authors institution, sharing with colleagues and providing to institution administration.

Other uses, including reproduction and distribution, or selling or licensing copied, or posting to personal, institutional or third party websites are prohibited.

In most cases, authors are permitted to post their version of the article (e.g. in Word or Text form) to their personal website or institutional repository. Authors requiring further information regarding Sjournals's archiving and manuscript policies encouraged to visit:

<http://www.sjournals.com>

© 2020 Sjournals Publishing Company



Contents lists available at Sjournals

Scientific Journal of Crop Science

Journal homepage: www.sjournals.com

Original article

Pre-extension demonstration of improved malt barley varieties in Bale and west Arsi zones, Oromia National Regional State, Ethiopia

Ayalew Sida*, Amare Biftu, Bayeta Gadissa

Oromia Agricultural Research Institute (OARI), Sinana Agricultural Research Center (SARC), P.O.Box-208, Bale-Robe, Ethiopia.

*Corresponding author: ayalew.sida@yahoo.com

ARTICLE INFO

Article history,

Received 12 February 2020

Accepted 13 March 2020

Available online 20 March 2020

iThenticate screening 14 February 2020

English editing 11 March 2020

Quality control 18 March 2020

Keywords,

Demonstration

Farmers' preference

FRG approach

Malt barley

Selection criteria

ABSTRACT

Pre-extension demonstration of improved malt barley varieties was conducted in Dodola district of West Arsi zone and Goba and Dinsho districts of Bale zone using two recently released (Singitan and IBON 174/03) improved varieties against Bokoji-1 (standard check) and Holker (local check). The main objective of the study was to demonstrate and evaluate improved malt barley varieties in order to enhance farmers to select best fit variety/ies for their localities. Mini-field day involving different stakeholders was organized at each respective site. Yield data per plot was recorded and analysed using descriptive statistics, while farmers' preference to the demonstrated varieties was identified using focused group discussion and summarized using pair wise ranking methods. The demonstration result revealed that IBON 174/03 variety performed better than the others. Furthermore, farmers selected this variety. Therefore IBON 174/03 was recommended for further scaling up.

© 2020 Sjournals. All rights reserved.

1. Introduction

Barley is the fourth most important crop in the world after maize, rice and wheat used mainly as feed for poultry, swine and cattle, and for preparing beverages. In Ethiopia, it is one of the top five cultivated cereal crops

after tef, maize, wheat and sorghum. It is grown in the agro-ecology ranging from 2300 to 3000 m above sea level having adequate rain fall throughout the growth period (Bayeh and Birhane, 2011). Regarding to its utilization, barley is a traditional crop and has strong tie with the society; it is a versatile/multipurpose crop: it is deep-rooted to cultural food and local beverages; it is also used as raw material for malt in beer making (linking agriculture with agro-industries); feed for animal (straw); for making thatching roofs; serves as a relief crop or offers early crop harvest (Barley Commodity Strategic Plan Document, 2016).

Currently, the national average productivity of barely in the country is 21.11 qt/ha which is relatively low compared to world average of 3.095 t/ha. Similarly, in Bale and West Arsi zones during the 2016/17 main production season, 44,929.97 and 63,085.81 ha of land was covered by barley, respectively from which 1,108,131.50 and 1,882,627.79 quintals were produced in Bale and west Arsi zones, respectively. The average productivity of the crop was 24.66 and 29.84 quintals per hectare, respectively (CSA, 2017).

Yet, malt barley is among the priority commodities that have attracted the attention of malt factories, breweries and policy makers in general. Because, at the present time, it is considered as one of the cash crops and its demand by agro-industries has increased due to the increased capacity of malt barley processing in line with the expansion of the existing and establishments of new brewery plants. However, until the recent time the local supply is only about 40% of the demand. The balance has been fulfilled through importing malt and/or malt barley grain forms, which costs the country over thirty million USD (Assela Malt Factory, 2015). Even though, malt barley is among crops demanded in large quantity in the country, it lacks supply in which its impact is directly connected with national economy, as beer plants import it from abroad with high hard currency. The gap between current production and consumption levels could be reduced by expansion of improved malt barley technologies through institutional innovation, making the research and extension system problem solving, demand-driven and client oriented for efficient distribution of the technologies to the end users.

Developing high yielding, disease resistant and stable varieties that can meet increasing demand of agro-industries, the growing breweries, improve the income and livelihood of farmers is very important. Consequently, one improved malt barley variety (Singitan) was recently released by Sinana Agricultural Research Center in 2015/16. Singitan has 21-41qt/ha yield potential with 5.13% yield advantage over standard check (Bokoji-1) and 9.64% over farmer's variety (Holker). Similarly, adaptation of the new malt barely variety was undertaken. Therefore, pre-extension demonstration of improved malt barley varieties was initiated to introduce the recently released improved malt barley varieties with joint participation of farmers and concerned stakeholders in the potential areas.

1.1. Objective

- ✓ To demonstrate and evaluate improved malt barley varieties in order to enhance farmers to select best fit variety/ies for their localities.
- ✓ To create awareness on the importance of improved malt barley varieties.
- ✓ To evaluate the cost-benefit ratio (income gained) of the demonstrated varieties.
- ✓ To select the best performing variety/ies with farmers' participation and recommend widely selected improved malt barley variety/ies for further pre-scaling up activity.

2. Materials and methods

2.1. Description of the study area

The activity was conducted in Dodola district of west Arsi zone and Goba and Dinsho districts of Bale zone, Oromia National Regional State (ONRS), Ethiopia. West Arsi and Bale zones are among the 20 Administrative zones located in south eastern parts of Oromia, Ethiopia.

2.2. Site and farmers' selection

Dodola district of west Arsi zone and Goba and Dinsho districts of Bale zone were selected purposively based on the potential of the crop as implementation site. From each district two representative PAs were also selected purposefully based on their accessibility and production potential of the crop. Farmers were selected based on having sufficient land and willingness. Accordingly, three trial farmers from both Goba and Dinsho districts whereas two representative trial farmers from Dodola were selected.

2.3. Materials used and field design

Two recently released (Singitan and IBON 174/03) improved varieties of malt barley were demonstrated, compared and evaluated with Bokoji-1 (standard check) and Holker (farmers' variety). Simple plot demonstration was used with gross area of 100m² (10m x 10m) for each variety. Full packages were applied in which row planting with the spacing of 20 cm between rows; recommended seed rate of 120kg/ha and fertilizer rate of 100kg/ha was applied. In addition, twice hand weeding was done on time.

SARC was the source of agricultural inputs. Hosting farmers provided their land. Farm preparations were carried out by trial/hosting farmers, whereas land leveling, planting, first and second weeding, follow up and visit, harvesting, threshing were handled and managed by SARC.

2.4. Data type and method of data collection

Both qualitative and quantitative data were collected using appropriate data collection methods such as direct field observation/measurements, key informant interview and focused group discussion (FGD). Yield data per plot in all locations were recorded. Farmers' preference to the demonstrated varieties (likes and dislikes, which is the base for plant breeding process and perceptions towards the performance of the technologies) was identified.

2.5. Data analysis

SPSS was used as statistical package (descriptive statistics was used to analyze the data). Pair wise ranking matrix was used to rank the varieties in order of their importance.

3. Results and discussion

3.1. Yield performance of demonstrated varieties

The yield of demonstrated varieties of malt barley were analyzed using simple descriptive statistics like mean. Accordingly, the mean yield obtained from Dodola, Goba and Dinsho were summarized in the graph below.

Table 1

Yield performance of demonstrated varieties.

No	Variety	Yield obtained (Qt/ha)				Yield advantage over Local check (Holker)%	Net return
		Dinsho	Dodola	Goba	Mean		
1	Singitan	18.8	21.13	28.98	22.97	7.6%	1.45
2	IBON 174/03	28	30.31	24.38	27.56	29.1%	1.20
3	Bokoji 01	22	25.75	24.45	24.06	12.69%	1.75
4	Holker	22.8	22.5	18.75	21.35	-	1.35

Among the demonstrated varieties IBON 174/03 gave the highest average yield (27.56qtha⁻¹) followed by Bekoji-1 (24qtha⁻¹) and Singitan (22.97kg/ha⁻¹). It is the highest yielder at Dinsho and Dodola. But, Singitan is the highest yielder at Goba which is 28.98qt/ha. The local check Holker has the lowest average yield (21.35qtha⁻¹). IBON 174/03 has yield advantage of 29.1% over local check. Similarly, Bekoji- 1 and Singitan has 12.69% and 7.6% yield advantage over the local check Holker respectively (Table 1).

The result also revealed that IBON 174/03 gave the highest Net return (22795.00 Birr/ha) followed by Bekoji-1(18489.00 Birr/ha) and Singitan (17133.00 birr/ha) respectively. Holker provide the lowest Net return (15149.00 birr/ha). Similarly, the highest Benefit cost ratio was gained by IBON 174/03 (1.75) followed by Bekoji-1 (1.45) and Singitan (1.35). Holker gave the lowest Cost benefit ratio (1.20).

3.2. Farmers' preference to demonstrated varieties

The farmers' preferences toward the demonstrated varieties were assessed by enhancing them to reflect their preference to varietal attributes by setting their own varietal selection criteria.

Table 3

Pair wise ranking result to rank variety traits in order of importance.

Variety Traits	A	B	C	D	E	F	G	H	I	Frequency	Rank
A										1	8 th
B	B									2	7 th
C	C	C								6	3 rd
D	D	D	C							5	4 th
E	E	E	E	E						7	2 nd
F	F	F	C	D	E					4	5 th
G	G	G	C	D	E	F				3	6 th
H	A	B	C	D	E	F	G			0	9 th
I	I	I	I	I	I	I	I	I		8	1 st

A= Disease Tolerance, B= Lodging Resistance, C= Marketability, D= No of fertile tillers, E= No of rows/spike, F= No of seed/spike, G= Plant Height, H= Plump Seed, I= Yield.

Table 4

Rank of the varieties based on farmers' selection criteria.

No	Varieties	Rank	Reasons
1	Singitan	3 nd	It has lower yield than IBON and Bokoji-1, medium tillering capacity, less disease tolerant, poor crop stand and small head.
2	IBON 174/03	1 st	High yielder, high number of tillers (≥ 7), seeds/spike (≥ 40), disease tolerant, lodging resistant, good plant height, good crop stand, good uniformity, it is adaptable to the environment, but it lacks six rows.
3	Bokoji-1	2 nd	It has lower yield than IBON, medium tillering capacity, less disease tolerant, good crop stand and resistant lodging.
4	Holker	4 th	Susceptible to lodging, few number of tillers and spike, medium crop stand and low yield yielder.

4. Conclusion

Pre extension demonstration and evaluation of malt barley varieties was carried out on eight (8) representative trial farmers' fields. Two improved varieties viz. IBON 174/03 and Singitan were demonstrated along with Bekoji 01 (the standard check) and Holker (Local check). Accordingly, IBON 174/03 gave higher yield than the other varieties.

Moreover, IBON 174/03 was selected by participant farmers in all districts due to it is high yielder, high number of tillers (>7), seeds/spike (>40), disease tolerant, lodging resistant, good plant height, good crop stand, good uniformity, it is adaptable to the environment. Based on these facts, IBON 174/03 variety was recommended for further scaling up.

References

- Asela Malt Factory, 2015. Annual Report (Unpublished).
 Barley Commodity Strategic Plan Document, 2016. Addis Ababa, Ethiopia.
 Bayeh, M., Berhane, L., 2011. Barley research and development in Ethiopia: An overview. Ethiopian Institute of Agricultural Research (EIAR), Holeta Agricultural Research Center (HARC), P.O. Box 2003, Addis Ababa, Ethiopia.
 Central Statistical Agency (CSA), 2017. The Federal Democratic Republic of Ethiopia. Central Statistical Agency Agricultural Sample Survey 2016/2017(2009 E.C.): Report on Area and Production of Major Crops (Private Peasant Holdings, Meher Season), Vol. I. Addis Ababa, Ethiopia.

How to cite this article: Sida, A., Biftu, A., Gadissa, B., 2020. Pre-extension demonstration of improved malt barley varieties in Bale and west Arsi zones, Oromia National Regional State, Ethiopia. Scientific Journal of Crop Science, 9(2), 401-405.

Submit your next manuscript to Sjournals Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in DOAJ, and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.sjournals.com

Sjournals
where the scientific revolution begins