Farmer's Perception towards Adoption of Improved Food Barley Varieties in Welmera District, Oromia Region, Ethiopia

[1]Endale Mekonnen and [2]Bogale Ayana

[1]Ethiopian Institute of Agricultural Research (EIAR)
[2]Holeta Agricultural Research Center, P.O.BOX 31, Holeta, Ethiopia

Abstract: This research activity was conducted in Welmera districts of west Shewa zone Oromia with the objective of to examine perception of smallholder farmers toward adoption of improved food barley varieties in the study area. The study used a three stage sampling procedures were followed in which purposive selection of barley growing district and Kebeles. Stratified sampling was employed to identify adopters and non-adopters. Simple random sampling was used to select respondents. The study was based on primary data collected from 142 sample selected through interview schedule assisted survey questionnaire. More information was also obtained from focus group discussion. Responses of sample respondents on the perception related were analyzed using likert scale. Preferable characteristics for farmers were high yield capacity, disease and drought resistance, marketability and early maturity. Improved food barley varieties were thought to be superior over local varieties by both adopters and non-adopters due to its high yielding capacity, marketability, disease resistance and early maturity. However some farmers are discouraged to adopt the variety because, the lack of credit service, Lack of purchasing power to by certified seed and chemicals fertilizer, demand additional inputs Lack of improved food barley varieties are factors contributing to non-adoption of improved food barley varieties in the study area. Therefore, the extension and research system should address these factors to provide solutions.

Key words: Food Barley · Adoption · Improved · Perceived · Respondent

INTRODUCTION

The agricultural sector is the cornerstone of Ethiopia's economy with approximately three quarters of the economically active population engaged in agricultural production activities [1] Creates 33% of gross domestic production (GDP), employs 66% of its population and creates 76% of export commodity value four major cereal crops barley, Tef, wheat and maize account 71% of the total production in 2020/21, growing in 64% of the cultivated land [2]

Barley (*Hordeum vulgare* L.) is one of the main cereal crops produced in the World. It ranks fourth in the world in production after wheat, maize and rice [3]. Global barley production is estimated about 159.465 million tons [4]. Many countries grow barley as a commercial crop. Globally Russian federations Australia, Canada, the United Kingdom and Turkey are the top five largest world barley producers where, Russian Federation is the top country by barley production in the world. As of 2020, barley production in Russian Federation was 20,629 thousand tones that accounts for 19.75% of the world's barley production. The top 5 countries are; Australia (13000), Canada, (10741), United Kingdom (8.117) and Turkey (8100) thousand tones that account for 58% of it. The world's total barley production was estimated at 104,434 thousand tones in 2020 [5].

In Sub-Saharan Africa and Ethiopia is one of the major producers of barley the second largest producer in Africa next to Morocco, accounting for about 26 percent of the total barley production in the continent [6]. In 2017/18, about 3.5 million smallholder farmers grew barley on more than 0.95 million Meher hectares of land and produce 2.053 million tons [7].

The highlands of Ethiopia barley is grown in Oromia, Amhara, Tigray and part of the Southern Nations, Nationalities and Peoples' Regional State (SNNPR) subsistence farmers in the highlands above 1800 meters

Corresponding Author: Endale Mekonnen, Ethiopian Institute of Agricultural Research (EIAR), Ethiopia.

above sea level grow barley, mainly under rain-fed conditions with minimum or no external inputs [8]. It is more preferred than other cereals for its early maturity relieving hunger and amenability for small rains (Belg) growing. Hence, it is used for double cropping and grain yield stability than other cereals under low and erratic rainfall. Its grain has many uses, including livestock feed and human food in Ethiopia, the grain is mainly produced for human consumption and sold for cash. About 90% of the grain is used for human food and it accounts for over 60% of the food of the inhabitants of the highlands [9]

Barley in Ethiopia has produced mainly for human consumption and it is one of the most important staple food crops [10]. It is also the most dependable, desirable and preferable crop by the highland and subsistence farmers due to its early maturity and ability to grow better on poor soil fertility/marginal farms than other cereals [11]. The share of malting barley production is quite low (2%) and most is used for making local bread (Injera). Barley grain is used in the diversity of barley recipes that has deeply rooted in the culture and traditions of people's diets. Furthermore, barley straw is a good source of animal feed and it is a useful material for thatching houses roofs and for use as bedding [10]. Barley cropped twice a year. It is most suitable for Belg-season production than Meher-season production

In Ethiopia, barley production was covered total area of 926,106.90 hectares and total annual production of about 23, 391,098.80 quintals and productivity of 25.26 qt ha^{-1} in main season [12]. At Oromia Regional State level, an area covered by barley in 2020/21 was 440,702.06 ha, production 12, 319,947.95 qt and productivity of 27.96 qt ha^{-1} [12].

Welmera district is one of the major food barley growing areas in West Showa zone of Oromia regional state. They are known for cultivation of many crops which include, among others, cereals such as barley, wheat, tef, faba bean, field pea, potato and etc. In this district, despite its vital role in production improvement, there was no empirical information so far on the adoption of food barley technologies and there are no studies focused on its adoption which could help to broaden the use of technology.

MATERIALS AND METHODS

Description of the Study Area: The study was conducted at Welmera district of Oromia region, Ethiopia. Welmera is one of the districts of west Shewa zone in the Oromia Region of Ethiopia. It is located at distance of 33 km West of the capital Addis Ababa at latitude 9º3'N and 38º30'E longitude. Agro- climatic feature of the district is classified as the total surface area of Welmera district is about 66,299 hectares and the altitude of the district is ranging from about 2,000-3,380 m.a.sl. Climatically, most parts of the district are dega (61%) and woina-dega (39%) of agro climatic zones. The mean monthly temperature (T°) and total annual rainfall are 16.5 °C and 1,067 mm respectively. Farming system of the community was mixed-farming, animal rearing and growing of different crops The district has two crop seasons, which are 'rain fed' and 'irrigation season [13].

Sampling Procedures and Sample Size: This study employed multiple stage sampling method. In first stage, district and three barley producing kebele were
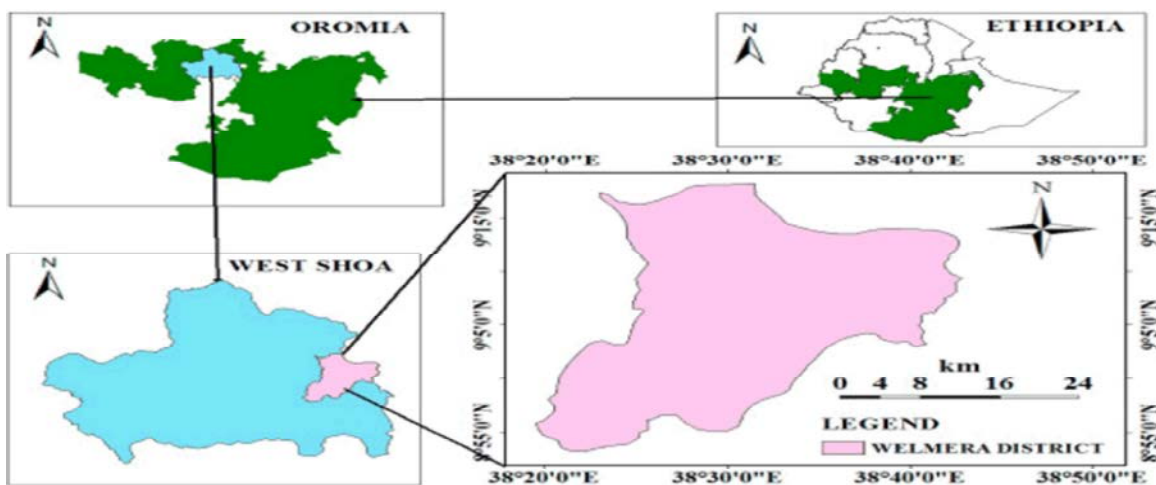

Fig. 1: Map of the study area

Table 1: Sampling frame and sample size

No	Study Area	Sample Kebeles	Total No, of Hhs			Sample House hold		
			Male	Female	Total	Male	Female	Total
1	Welmera Distirict	Elafota	500	61	561	44	14	58
		Telecho	456	88	544	41	7	48
		Dufa	235	169	404	22	14	36
Total			1191	318	1509	107	35	142

Source: OAWD (2021)

purposively selected based on barley production potentials and accessibility to interventions and data collection. In second stage, with the support of district office of agriculture officials Farmers in each purposive selected Kebeles were stratified into adopters and non-adopters of improved barley varieties. In third stage, with the help of the respective kebele level officials, sampling frame (barley farmers) were identified out of which 142 households were randomly selected for interview using probability proportional to size.

Sample Size Determination: The sample size for collecting data through household survey was determined by using the sample size determination formula proposed [14]. The required sample size was determined at 95% confidence level. The study was used the following formula to calculate sample size

$$n = \frac{N}{1 + N\,(e)^2}$$

$$n = \frac{1509}{1 + 1509\,(0.08)^2} = 142$$

Therefore; total sample size will be 142 out of this (58) from Ela fota, (48) from Telecho and (36) from Dufa were selected based on household from each Kebeles were selected in proportional to their population size in their Kebeles.

Methods of Data Collection and Data Source: The data has been collected from primary and secondary sources. Primary data was collected from Welmera district barley producers and extension workers by using a structured questionnaire focus group discussion, Key Informant Interviews (KII). The data were collected during the fiscal year of April 2021. The secondary data sources were collected from Welmera district Office of Agriculture and published and unpublished materials, which include books, journals, scientific research works and office records. The collected data were arranged into coding sheet and inserted into computer statistical software SPSS/PC and analyzed using appropriate statistical techniques.

Data Analysis: To analyze the data both qualitative and quantitative method was used techniques. In this study to analyze the relevant data gathered from different sources, the researcher was used qualitative and quantitative methods of data analysis. The quantitative data was analyzed by using simple descriptive analytical techniques such as frequency and percentages. The analyzed data was presented in the forms of tables. In the qualitative methods of data analysis, the researcher would be use description and explanations.

RESULTS AND DISCUSSION

Demographic and Socio- Economic Characteristics of Respondents: The study 142 sample respondents were selected from three rural Kebeles of Welmera district (Elafota Telecho and Dufa) and interviewed by recruited enumerators that are used for analytical purpose. Some of demographic and socio- economic characteristics of sampled respondents like age, sex, level of education, family size, livestock ownership and farm size are described under this section.

Survey results showed that 72% are male headed and 28% are female headed households. This indicates participation of male's food barley productions higher than females. This also implies there is socio- culture oriented gender division of labor. Survey results showed that the educational levels of sampled household heads are literate 48% and illiterate 52 %.

Age, Family, Farm Size and Livestock of Sampled Respondents: The survey result showed that the minimum and maximum age of sampled respondents was 21 and 77 respectively. The mean age was 46, 82, having standard deviation 12.499. The mean family size of sampled responds from survey results was found to be 5.39 people. The minimum and maximum family size of sampled respondents was 2 and 11 respectively.

The mean farm sizes of sampled responds households are 1.9102; with standard deviation of 1.07444. The minimum and maximum land holding size of respondents households are 0.5 0 hr. and 5.20 hr.
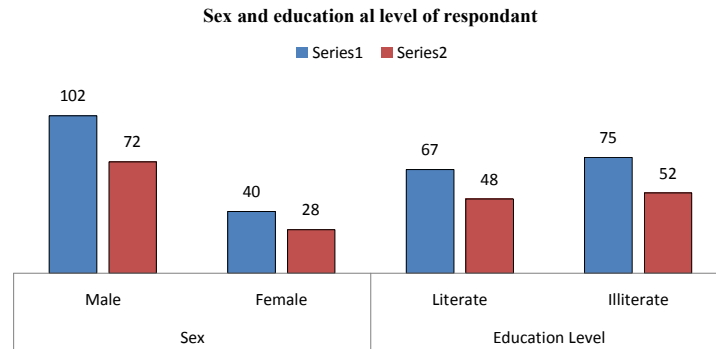
Sex and education al level of respondant

Fig. 2: Source: own Survey result, 2021

perception of improved food barley production

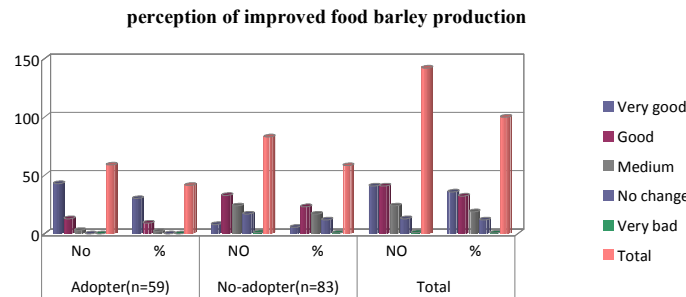
Fig 3: Source: Survey result 2021

Table 2: Descriptive statistics of age, family, farm size and livestock ownership of sampled HH

Variable	N	Minimum	Maximum	Mean	SD
Age of HH head	142	21	77	46.82	12.499
Family size	142	2	11	5.39	1.837
Farm size	142	.50	5.20	1.9102	1.07444
Livestock ownership	142	1	23,84	5.62	3.53454

Survey result 2021

respectively (Table 2). The minimum and maximum livestock ownership of sampled respondents household was 1 and 23.84 respectively. The average TLU was 5.62 with standard deviation of 3.53454.

Perception of Farmers Toward Adoption of Improved Food Barley Technology in the Study Areas: Farmers' opinions about improved agricultural technology affect whether they decide to use it or not. The interaction of technological and socioeconomic elements determines how farmers perceive particular advances in technology. Farmers' knowledge of and opinions on the new technology can come from a variety of experiences and information sources. They look at the impact of using the enhanced food barley versus the local one from several perspectives. The potential and degree of usage of new ideas and practices are influenced by and/or determined by technical, economic and social variables [15].

Perception of Improved Food Barley Technology on Food Barley Production: Looking at farmers' views of improved food barley technology on food barley production of a

particular expertise is very significant in order to gain insight into farmers' decisions of new technology. Therefore, understanding the sampled respondents' evaluation criteria with reference to expertise leveling of perception is necessary. These include: very good, good, medium, no change, very bad. Perception of improved food barley technology between adopters and non-adopters in the study areas explained using percent. Adopters perceived improved food barley technology on barley production that very good (30.3%), good (9.2%), medium (2.1%), no change (0%), very bad (0%). Non-adopters perceived that improved food barley technology on production very good (5.6%), good (23.2%), medium (16.9%), no change (12. %), very bad (0.7%)

Survey result indicate that adopters argued that they perceive improved food barley technology on barley production as medium, no change and very bad. As finding of focus group discussion explained, some of them face the problem of inappropriate agronomic practices such as incorrectly planting and fertilizer, the space between rows is too wide which is above agronomic recommendation or narrow below

Fig. 4: Focus group discussion

Table 3: Food barley technology attributes

	Adopter (n=59)			Non Adopter (n=83)		
Variable IFB attributes	Inferior	The same	Superior	Inferior	The same	Superior
Early maturity	5.6	3.5	32.4	9.9	15.5	33.1
Marketability	7.0	3.5	31.0	14.1	16.9	27.5
Disease resistant	11.3	12	18.3	19.7	16.2	22.5
High yield varieties	7.1	0.o	33.8	4.9	17.5	35.9

Survey result 2021

recommendation, some of them face the problem of not timely weeding, some of them face problem of regular pest and disease inspection on time and some of them did not applied top dressing and in general not fully implement full technology package practice. As result the income they gained from harvest against the cost incurred for buying certified seed, fertilizer and labor hired not profitable.

When discussing the focus group discussion the reason why non-adopters perceive improved food barley technology on food barley production as very good, good is that some of them already adopted in the previous years; but this production year of 2020/21 faced the seed shortage and some of them observed already from adopters how much production per-hectare of land is gained. Some non-adopters farmers perceived that no change and very bad on food barley technology production.

Perception of Improved Food Barley Technology Attributes: It's crucial to look at how farmers view each attributes of a specific area of expertise in order to gain insight into how they choose to use new technologies. So it is necessary to understand the sampled respondent's assessment criteria with reference to expertise qualities. High yielding variety, marketability, disease resistance and early maturity are a few of these. Between adopters and non-adopters, perception of enhanced food barley characteristics relative to local variety is described by percent (Table 3)

Survey result showed adopters perceived improved food barley technology are superior over local varieties by early maturity capacity (32.4%), marketability (31%), high yield (33.8%) and non-adopters argued that improved food barley technology are superior over local varieties by early maturity capacity (33.1%), marketability (27.5%) and high yield capacity (33.9%). Adopters and non-adopters argued that improved food barley technology is inferior over local varieties in disease resistant in 11.3% and 19.7% respectively.

When discussing the focus group discussion, farmers who grow both traditional and improved crop varieties believed that some traditional crops still have desirable traits such as good taste and ease of preservation which the improved crop varieties did not have. Non-adopters described that it is expensive to adopt and they incapable to buy certified seed. As result they used local produced or C-2 (recycled improved seed) varieties. They explained that using the improved crop varieties required inputs such as fertilizers and other chemicals, which they could not afford. Non-adopters stated that they found the improved food barley technology lacking some desirable traits such as good taste and ease of preservation.

CONCLUSION

Agricultural technology adoption is assumed to improve the welfare of adopters through higher crop yields, reduced per unit cost of production and

disposable income However, agricultural technology adoption remains very low in Ethiopia. One of the factors that affect improve agricultural technology utilization is their perception. Preferable characteristics for farmers were high yield capacity, disease and drought resistance, marketability and early maturity the major varietal characteristics contributing towards adoption of improved food barley varieties. Improved food barley varieties were thought to be superior over local varieties by both adopters and non-adopters due to its high yielding capacity, marketability, disease resistance and early maturity. However some farmers are discouraged to adopt the variety because, the lack of credit service, Lack of purchasing power to by certified seed and chemicals fertilizer, demand additional inputs, Luck of improved food barley varieties are factors contributing to non-adoption of improved food barley varieties in the study area., In future research, it is recommended that the extension and research system should address these factors to provide solutions.

REFERENCES

1. Schmidt, E., P. Chinowsky, S. Robinson and K. Strzepek, 2017. Determinants and impact of sustainable land management (SLM) investments: A systems evaluation in the Blue Nile Basin, Ethiopia. Agricultural Economics.

2. Yifru Tafesse, A.T.I., 2022. The Ethiopian Agricultural Transformation Institute Workshop on the Role of Agriculture in Kickstarting Economic Diversification & Structural Transformation in Ethiopia.

3. FAO. (Food and Agriculture Organization Corporate Statistical Database), 2017. Statistical databases and data-sets of the Food and Agriculture Organization of the United Nations.

4. USDA, 2020. The United States Department of Agriculture annual report

5. World data atlas topics agriculture crops production » quantity (tonnes).

6. FAO (food and agriculture organization), 2014. Food balance sheets.

7. CSA (Central Statistical Authority), 2018. Agriculture Sample Survey 2017/2018 (2012 E.C). Report on Area and Production of Major Crops (Private Peasant holdings, Meher seasons). Addis Ababa Ethiopia, The FDRE statistical bulletin.

8. Chilot Yirga, Brehane Lakew and Fekadu Alemayehu, 2000. On-farm evaluation of food barely production packages in the highlands of Welmera and Degem, Ethiopia, pp: 188-199.

9. Berhane Lakew, Y. Chilot and F. Wondimu, 2016. Malt barley research and development in Ethiopia Opportunities and Challenges, pp: 11-20.

10. Firdissa, 2010. On-farm Diversity and Characterization of Barley (*Hordeum vulgare* L.) Landraces in the Highlands of West Shewa, Ethiopia.

11. Berhane Lakew, Hailu Gebre and Fekadu Alemayehu, 1996. Barley production and research. 1-8.Barley Research in Ethiopia: Past work and future prospects.

12. CSA (Central Statistical Authority), 2020. Agriculture Sample Survey 2019/2020 (2013 E.C). Report on Area and Production of Major Crops (Private Peasant holdings, Meher seasons). Addis Ababa Ethiopia, The FDRE statistical bulletin.

13. AOWD, 2020. Agricultural office Welmera District unpublished document.

14. Yamane Taro, 1967. Statistics: An Introductory Analysis, 2nd Ed. New York: Harper and Row. Zodpey, S P (2004): Sample size and power analysis in medical research, Indian J. Dermatol. Venereol. Leprol., 70(2): 123-128.

15. Milkias, D., 2019. Farmer 's Perception Towards Agricultural Technology. The Case of Improved Highland Maize Varieties Adoption in Selected Kebeles of Toke Kutaye District. West Showa Zone.