Towards a Multi-Stakeholder Approach to Barley Breeding in Ethiopia: Integrating Gender-Specific Preferences

Dina Najjar, Meseret Tsige Abebe, Dorsaf Oueslati, Muluken Zeleke, Ali Oumer, Miguel Sanchez Garcia, Aymen Frija, Jane Wamatu

International Center for Agricultural Research in the Dry Areas

Introduction and Research Question

Barley is a key staple crop in Ethiopia, crucial for food security, malt production, and livestock feed. Smallholder farmers rely heavily on traditional landraces, making them particularly vulnerable to climate change and yield variability (Mohammed et al., 2016; Wada et al., 2022). This study aims to inform trait prioritization for the delivery of high-yielding barley genotypes with tolerance to biotic and abiotic stresses, while integrating gender-specific preferences in the breeding process to enhance adoption rates and ensure food security. Women play a pivotal role in agriculture, yet their preferences in seed traits are often overlooked, especially in the Global South (Puskur et al., 2021). This gap leads to the development of crops that do not adequately address the needs of all farmers, particularly in terms of resilience, nutritional quality, and labor requirements (Weltzien et al., 2019; Badstue et al., 2022). The focus of this research is to explore gender-based preferences for seed traits and their implications for agricultural productivity and food security. We attend to the question of what role does a multi-stakeholder approach play in identifying and incorporating trait preferences for barley varieties, including food and feed traits, to enhance the adoption rates among smallholder farmers in Ethiopia? Our study highlights the importance of incorporating women's preferences into breeding programs to improve adoption, benefits, and ensure sustainable agricultural practices.

Methods

The study employed a multi-stakeholder, participatory approach to understand and integrate gender-specific preferences for barley breeding in Ethiopia. The methods included:

-**Farmer Surveys**: Conducted among 427 farmers (231 women and 196 men) to capture gender-differentiated trait preferences for barley varieties.

-**Consumer and Processor Panels**: 225 consumers participated in the evaluation, including 75 injera consumers, 75 kolo consumers, and 75 tela consumers (45 women and 30 men in each category).

-**Processors**: 60 experimental women processors (20 for injera, 20 for kolo, and 20 for tela) assessed the barley varieties based on processing.

-**Field Trials with Farmers**: 15 experimental barley growers (5 women and 10 men) evaluated the varieties in on-farm trials.

-**Stakeholder Involvement**: The study further engaged a broad range of stakeholders, including 9 shopkeepers, 9 breeders, and 4 malt factory experts to ensure a comprehensive understanding of market demands and on-the-ground realities for farmers.

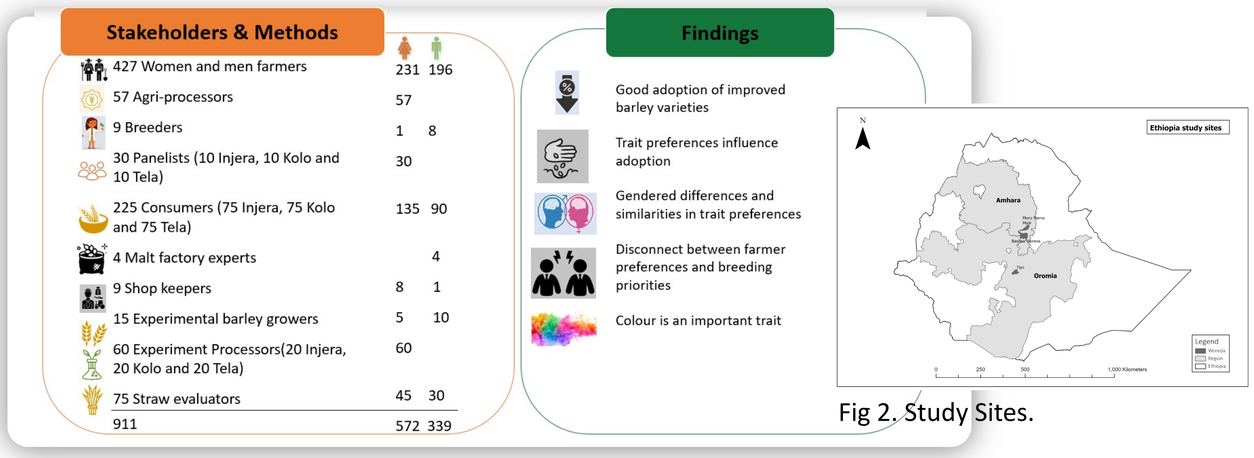

Fig 1. Stakeholders surveyed and main findings.

Fig 2. Study Sites.

Fig 3. Consumer panels for three main barley products: Injera, Kolo, and Tela. V1= *Agegnehu* (Crossbreed food barley released in 2007), V2= IBON 174/03 (Malt barley released in 2012), V3= *Misirach* (Cross food barley released in 1997/98), V4= Holker (Malt barley released 1979), V5= Local (General and mixed from many landraces), V6= HB 1964 (Malt barely released in 2016), V7= HB1307 (cross food barley released in 2006), V8= *Hagere* (cross, food barley released in 2018).

Key results from the study

Gendered Trait Preferences:

-Women farmers prioritized traits such as white grain color, ease of cooking, taste, and storability. They valued barley varieties that align with traditional food preparation needs, such as injera, kolo, and tela.

-Men also valued white grain varieties but emphasized yield, frost tolerance, and marketability.

-Both men and women demonstrated a strong preference for local landrace varieties alongside improved varieties for their resilience in challenging climates.

Panel Evaluations:

-Both male and female panelists and consumers ranked IBON 174/03 highly for its desirable traits like flavor, texture, and ease of processing. Women especially preferred it for its white color and aroma when used for injera preparation.

For producers:

-Local landraces were valued for their resistance to pests and ease of fermentation.

-Livestock keepers, who make up the majority of farmers, prioritized not only a greater quantity of feed but also softer feed.

Breeders and malt factory experts:

-This group highlighted market needs for barley varieties with high starch and low protein content, with Traveler and IBON 174/03 meeting these criteria.

Conclusions and Future Research

The study emphasizes the importance of breeding programs that incorporate the preferences of multiple stakeholders, including farmers, processors, and market experts. Both men and women seek specific traits, with women prioritizing ease of cooking, grain color, and storability, and men focusing on yield and marketability. Barley breeding program, particularly the malt and food TPPs were updated to integrate while colour and soft feed quality (not only more) to meet these preferences. Moreover, targeted efforts are needed to enhance women's access to improved seeds and agricultural information through extension services. Breeding programs should also prioritize climate resilience traits, such as drought and frost resistance, which stakeholders are increasingly looking for. Taken together this realignment stands to benefit wider adoption and the long-term sustainability of Ethiopia's barley sector.

References

Mohammed, J., Seleshe, S., Nega, F., & Lee, M. (2016). Revisit to Ethiopian traditional barley-based food. Journal of Ethnic Foods, 3(2), 135-141.

Wada, E., Abdulahi, A., Tehelku, T. F., Ergando, M., & Degu, H. D. (2022). Farmers' knowledge on cultivation, utilization and conservation practices of barley (Hordeum vulgare L.) in three selected districts in Ethiopia. Journal of Ethnobiology and Ethnomedicine, 18(1), 58.

Puskur, R., Mudege, N. N., Njuguna-Mungai, E., Nchanji, E. B., Vernooy, R., Galiè, A., & Najjar, D. (2021). Moving beyond reaching women in seed systems development.

Weltzien, E., Rattunde, F., Christinck, A., Isaacs, K., & Ashby, J. (2019). Gender and farmer preferences for varietal traits: evidence and issues for crop improvement. Plant breeding reviews, 43, 243-278.

Badstue, L., Krishna, V. V., Jaleta, M., Gartaula, H., & Erenstein, O. (2022). Gender, wheat trait preferences, and innovation uptake: Lessons from Ethiopia and India. Outlook on Agriculture, 51(4), 394-403.

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