

Comparison of Barley Accessions from Ethiopia, ICARDA, and the U.S. for Adaptation Traits and Protein Content

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Introduction

- ❖ Introduced barley germplasm from breeding programs, such as ICARDA have been among the major sources of variability in breeding programs in Ethiopia.
- ❖ These materials can be used for selecting potentially new cultivars or parental material for crossing.
- ❖ The choice to use them as new cultivars or as parents for crossing depends on their adaptation.
- ❖ This poster reports on the comparison of four groups of barley accessions for adaptation to production in the barley growing regions of Ethiopia.

Materials & Methods

- ❖ Replicated trials were grown at Bekoji and Koffele, Ethiopia in 2011 & 2012.
- ❖ Four groups (origins) of accessions were used, including Landraces = 1, Ethiopian crosses = 2, ICARDA accessions = 3, and NDSU accessions = 4.
- ❖ Data were collected on crop stand (%), plant height (cm), lodging (%), scald (0-9), yield (t/ha), and grain protein content (%).
- ❖ Data are presented in the form of box plots.

Results

- ❖ Poor adaptation of NDSU lines is reflected in low stand establishment (Figure 1), susceptibility to scald (Figure 3), and low yield (Figure 4).
- ❖ NDSU accessions generally had better resistance to lodging than Ethiopian breeding lines and Landraces (Figure 2).
- ❖ ICARDA accessions were comparable or better in stand establishment and yield compared to Ethiopian breeding lines and Landraces (Figure 1 & 4, respectively).
- ❖ NDSU accessions generally had the lowest grain protein content (Figure 5) and may be sources of genes for low protein not found in the Ethiopian or ICARDA accessions (Figure 5).

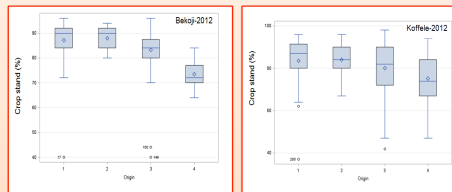


Figure 1. Box plot of crop stand for 4 groups of barley at Bekoji and Koffele in 2012. The box indicates 75% of the distribution. Diamonds and circles indicate the means and extreme values, respectively.

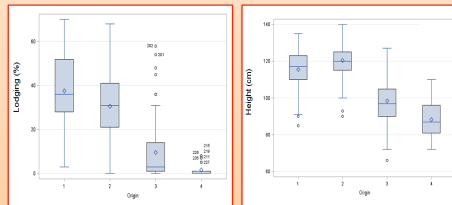


Figure 2. Box plot of lodging and plant height for 4 groups of barley based on mean over locations (Bekoji and Koffele) and years (2011 and 2012). The box indicates 75% of the distribution. Diamonds and circles indicate the means and extreme values, respectively.

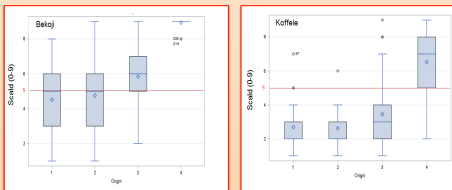


Figure 3. Box plot of scald for 4 groups of barley at Bekoji and Koffele based on mean of 2011 and 2012. The box indicates 75% of the distribution. Diamonds and circles indicate means and extreme values, respectively. Scald scoring of 0 = resistant and scoring of 9 = susceptible. The red line indicates the cut point separating susceptibility from resistance or moderate resistance.

Experimental sites in Ethiopia

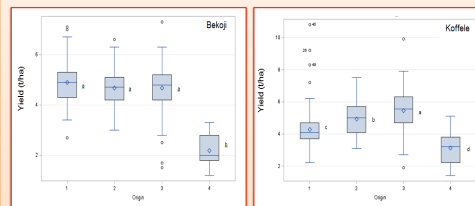
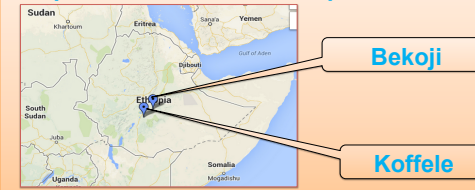


Figure 4. Box plot of yield for 4 groups of barley at Bekoji and Koffele based on mean of 2011 and 2012. The box indicates 75% of the distribution. The diamonds and circles indicate means and extreme values, respectively. Means followed by the same letter are non-significant.

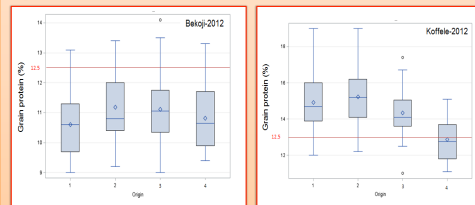


Figure 5. Box plot of grain protein content for 4 groups of barley at Bekoji and Koffele in 2012. The box indicates 75% of the distribution. The diamonds and circles indicate means and extreme values, respectively. The red lines indicate the maximum acceptable grain protein content for malting in Ethiopian Malting Factories.

Conclusions

- ❖ Among the introduced accessions, only some ICARDA accessions may be suitable for release as cultivars in Ethiopia.
- ❖ Some NDSU accessions could be useful sources of genes for reduced plant height, improved straw strength, and reduced grain protein content.
- ❖ The resistance to scald found in Ethiopian accessions should be maintained.

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