

Barley: A new perspective on an old crop in Texas

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INTRODUCTION

- In the 1960s, barley (*Horedum vulgare* L.) was grown on nearly 600,000 ac in Texas. Today it is planted on ~40,000 ac, but acres have been increasing.
- Barley in Texas is mainly used for feed and forage for livestock
- A rise in microbreweries in Texas has increased interest of locally grown malt ingredients.
- Increased demand by dairies is helping to support feed grain barley prices.
- Currently there is no active barley breeding program to breed lines specifically for Texas climates.
- Lines for this study were obtained from the Triticeae Coordinated Agricultural Project (TCAP)

Research Objective

Evaluate a wide range of barley types and identify adapted lines for feed and malting in Texas.



Figure 1. TCAP barley evaluation locations.

MATERIALS & METHODS

2013-2014

- 505 spring and 303 winter barley lines were planted in headrows (HR) were planted using a Hege 1000 HR plot drill.
 - Rows were 30" long, 15" spacing between rows.
- 2 locations were used (Fig 1):
 - Castroville, TX [CAS] (irrigated)
 - McGregor, TX [MCG] (dryland)
- In-field evaluations taken over growing season: stand establishment, cold tolerance, insect/disease susceptibility, maturity, plant height, lodging and seed shattering.
- Viable seedheads in each HR were hand harvested and taken to research facilities for further processing.
- Samples evaluated for yield components including: seed yield, # spikes/HR, 1000 seed wt. and test wt.
- Plumpness was tested using a double-screen method. A 24mm screen was placed on top of a 20mm screen, all placed on top of a catch pan
 - Plump >24mm
 - Medium <24mm and >20mm
 - Thin <20mm
- Top 20% of tested lines were selected for planting 2014-2015.

2014-2015

- 224 spring and 136 winter barley varieties were grown in small plots (5'x15') in 3 locations (Fig. 1):
 - Lubbock, TX [LUB] (irrigated, winter lines only)
 - Castroville, TX [CAS] (irrigated)
 - McGregor, TX [MCG] (dryland)
- In-field evaluations taken over growing season were same as previous year.
- Plots were mechanically harvested using a Wintersteiger nursery combine and taken to research facilities for further processing, same as the previous year.

RESULTS & DISCUSSION

Barley & Grain Yield

WINTER

- Analysis of winter barley grain yield across environments revealed little relationship between years or locations (Fig 3A).
- Figure 3B shows grain yield, spike number and seed number are positively correlated, while seed plumpness showed no correlation.

SPRING

- Analysis of spring barley grain yield across environments revealed similar barley performance across locations, but not years (Fig 3C).
- Relationship among spring barley grain yield parameters showed similar trends as winter barley except for seed weight (Fig 3D).

Barley & Malt Quality

WINTER

- Data suggests malt quality of barley lines at LUB and MCG performed differently due to variation in environments (Fig 3E).
- TCAP barley lines were inferior in malt quality to the standard malt check ("Lacey"), but some outperformed commercial lines grown at each location (Fig 3G).

SPRING

- Fig 3F suggests that TCAP barley lines may perform better than commercial varieties in Texas for yield and malt quality. Six-row lines had a slight advantage over two-row lines for both yield and quality.
- Relationship among malt quality parameters showed little similarities between winter and spring lines (Fig 3H).



Figure 2. Small Plots in McGregor, TX.

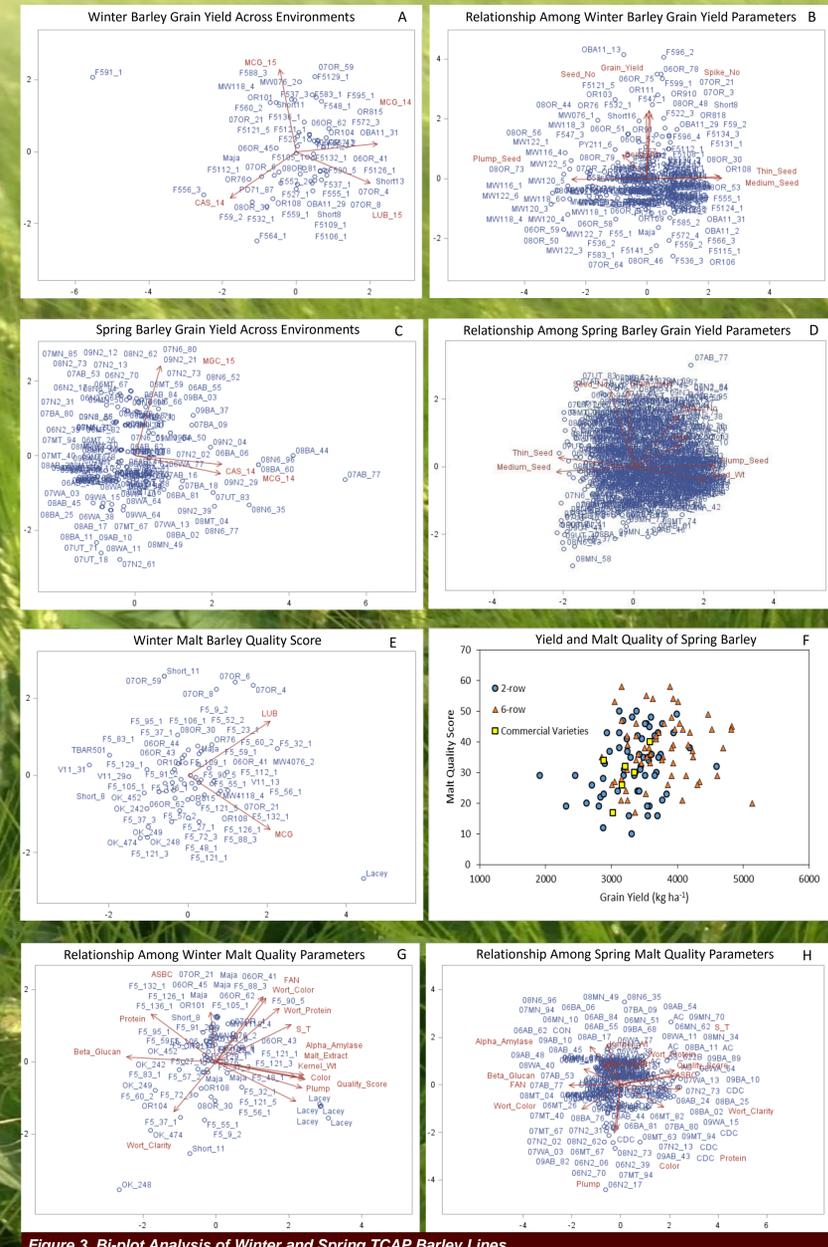


Figure 3. Bi-plot Analysis of Winter and Spring TCAP Barley Lines.

CONCLUSIONS

- Thus far, this study has identified TCAP lines that were superior to current commercial barley varieties under Texas environments for both yield and malting quality.
- Malting quality from barley lines grown in Texas in 2014-15 were inferior to standard checks (variety "Lacey") used in malting tests.

Future Research

- Further screening of lines will continue in order to find productive varieties that produce the best yielding and quality crop for feed and malting
- For the 2015-16 season, barley will be grown in small plots, 2 reps at the following locations (Fig 1):
 - Lubbock, TX (winter barley only)
 - Farmersville, TX (winter barley only)
 - Castroville, TX (winter and spring)
 - McGregor, TX (winter and spring)
- Additional trials of winter barley will be used to screen for Hessian fly resistance and forage production.
- Identify genetic markers found in adapted lines for future screening.
- Continue screening high yielding lines for malting quality.
- Release new barley variety(s) within the next five years.

ACKNOWLEDGEMENTS

We would like to thank the American Malt Barley Association for partial funding of this project and Dr. Calvin Trostle and Russell Sutton for their help with field management in Lubbock and Farmersville, TX.