

# 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.

### 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.

## RESULTS & DISCUSSION

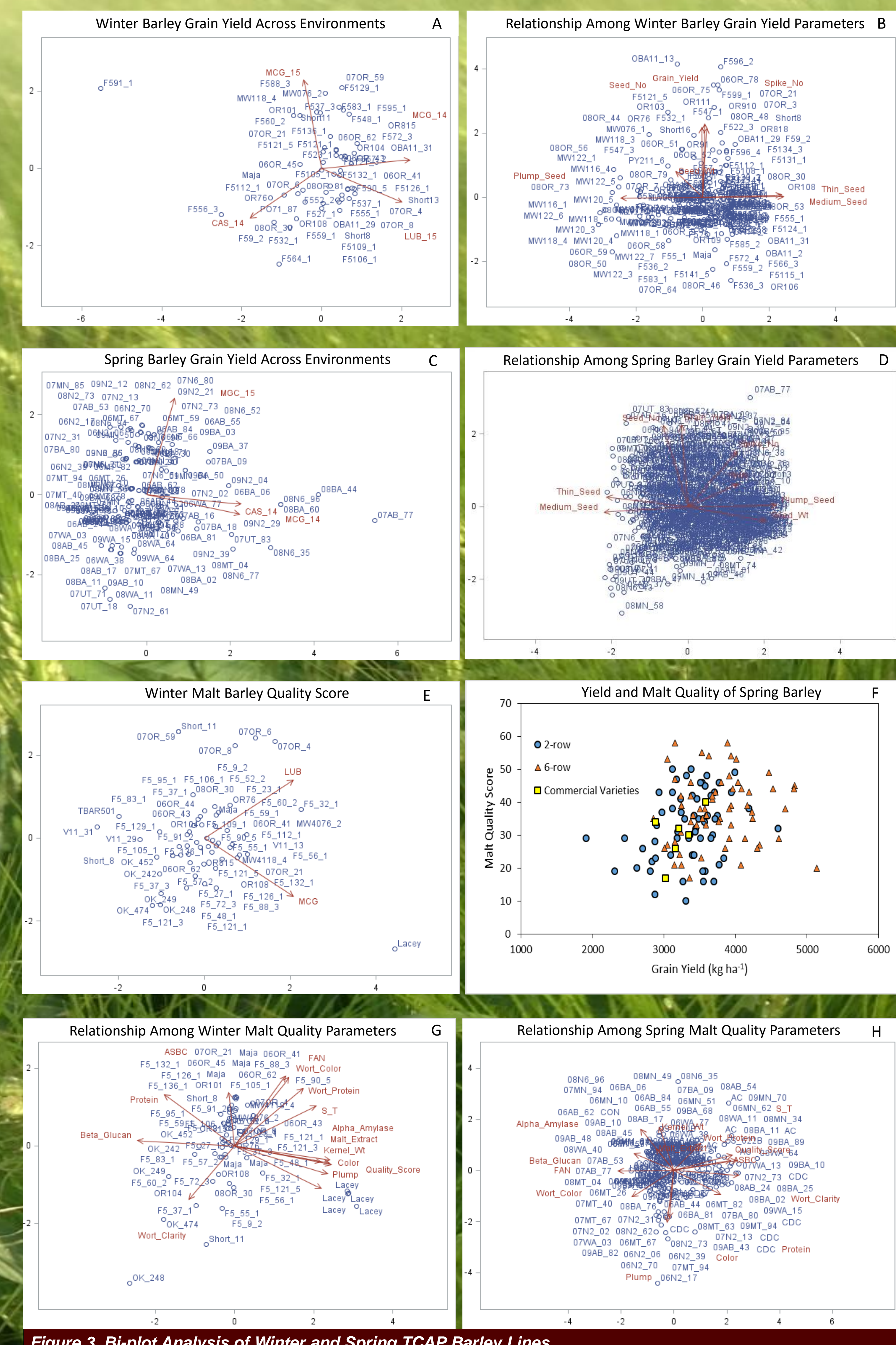


Figure 3. Bi-plot Analysis of Winter and Spring TCAP Barley Lines.

## 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.

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