Genetic Variability and Association Analysis in US Soft Wheat Panel for Fruiting Efficiency Under Post Anthesis Drought and Supplemental Irrigated Conditions

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Introduction

- Drought affects morphological, chemicals and physiological mechanism in wheat.
- The yield and harvest index are heavily reduced when drought stress is imposed during and after anthesis (Bauder, 2001; Gupta et al., 2001).
- It has been reported that reduction of 40% water can cause 20.6 % yield reduction in wheat.
- Maximum partitioning of assimilates to spike is crucial to increase grain number, above ground dry matter and harvest index (HI) to raise yield under drought conditions.
- Genetic improvement is the most effective and sustainable method to achieve this goal.

Objectives

- Study genetic source of variations for fruiting efficiency, grain number, yield and HI in US soft wheat association panel under post-anthesis drought stress.
- Identify traits and mechanisms determining genetic variation in fruiting efficiency (FE).

Figure 1. Citra and Quincy

Materials & Methods

- Plant Material: 300 soft wheat genotypes
- Location: Citra and Quincy , Florida
- Experimental design: Modified Augmented design with 3 repeated checks
- Drought imposed after Anthesis
- Sowing date: November, 23-30 2016
- Harvesting date: May 10-18, 2017

- **Fruiting Efficiency**
  - ✓ Fruiting efficiency is considered to be a potential venue for increasing grain number under stress and non stress conditions
  - ✓ Ratio of grain number to spike dry chaff weight

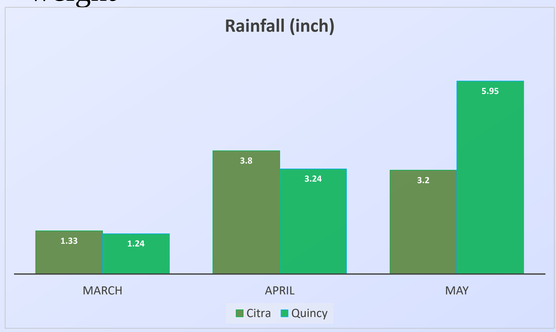


Figure 2. Rainfall Citra and Quincy

Results

Significant (P<0.05) genetic variations differences were observed for grain yield, fruiting efficiency, harvest index, and thousand grain weight.

Table 1. Combined Analysis of Variance

Source	Grain Yield (g)	Harvest Index %	Fruiting Efficiency	Thousand Grain Wt. (g)
Checks	<0.0001	<0.0001	<0.0001	<0.0001
Location	<0.0001	<0.0001	<0.0001	<0.0001
Block x Location	0.2177	0.2571	0.6814	0.2845
New x Entry x Location	0.9095	0.9603	0.2137	0.6763
New x Entry	0.0062	0.0004	0.0052	<0.0001

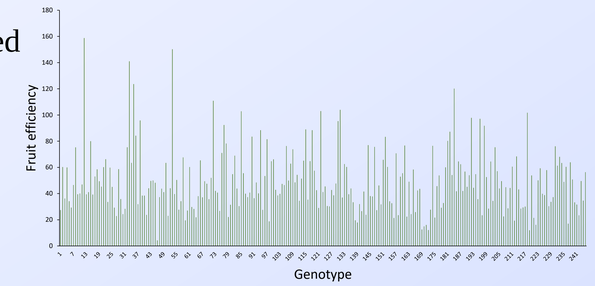


Figure 3. Histogram for Lsmeans of FE

Preliminary Results form two locations showed R^2 values of 0.2511 and 0.2258 for fruiting efficiency with grain yield and harvest index

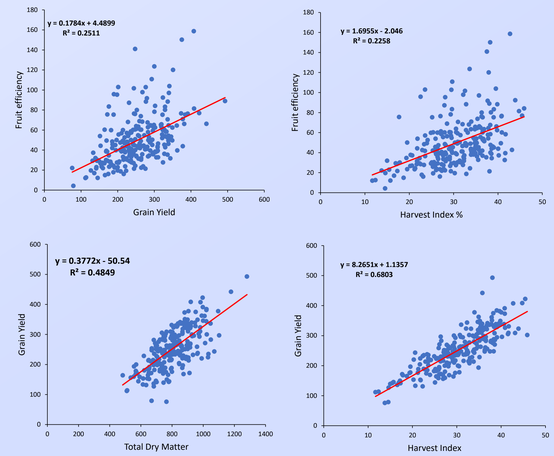
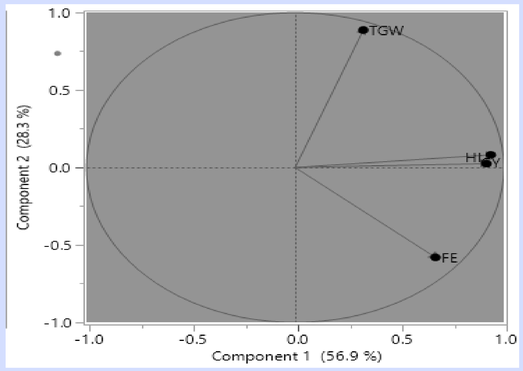


Figure 4. Regression Analysis of FE and related traits



PCA for both locations showed positive correlation between FE and other related related traits and PC1 accounted for 56.9 % of variation.

Conclusion

- Significant genetic variability and good correlation observed for spike fertility, harvest index and grain yield traits under drought conditions.
- Strong correlations were observed between FE with harvest index and grain yield.
- Identification of loci involved with higher FE and related traits in soft wheat is in progress.
- Understanding of physiological basis of increasing fruiting efficiency and the contributing of different spike components is in progress.

Bibliography

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Acknowledgment

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