

Bermudagrass Breeding

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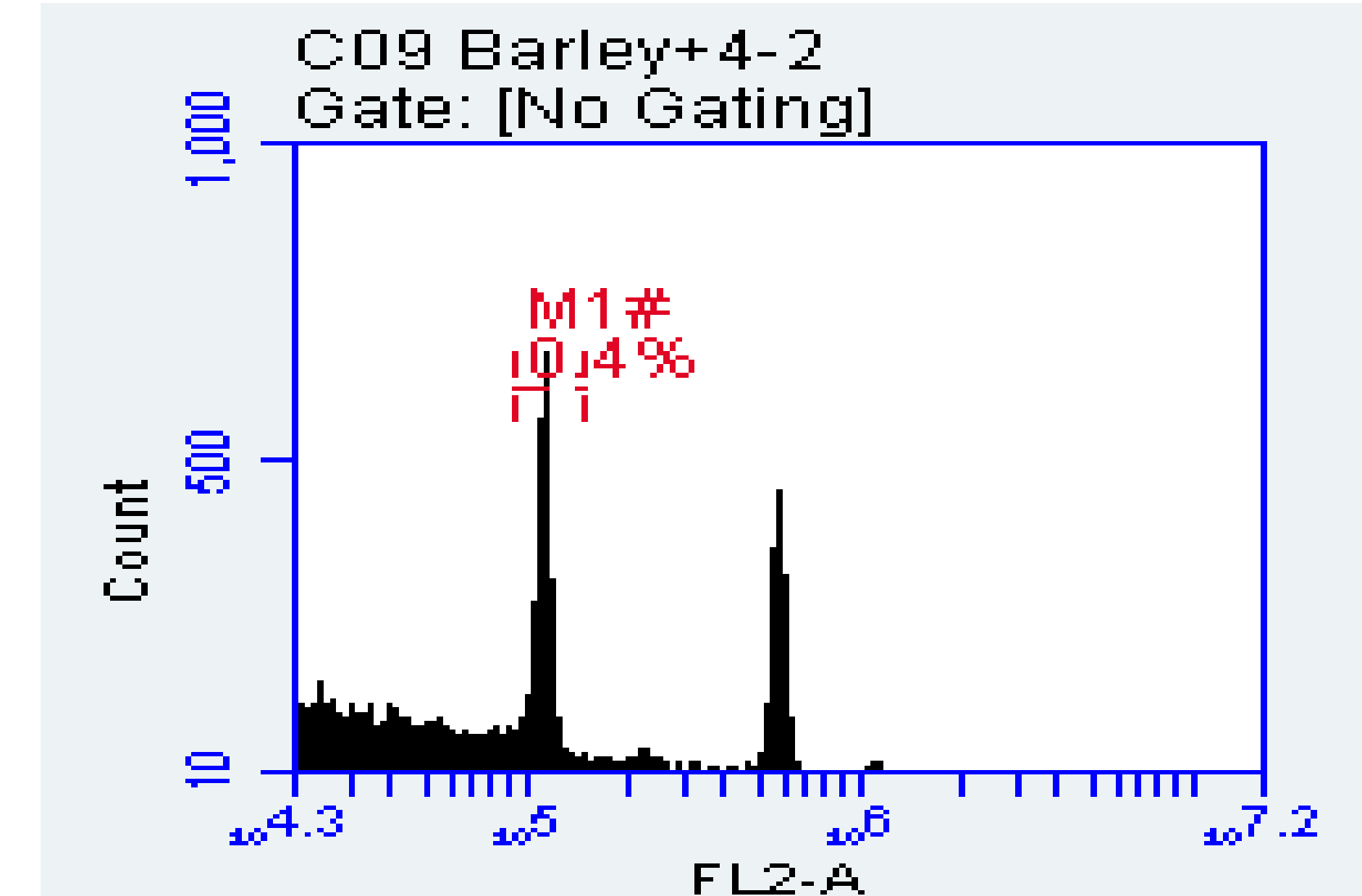
Introduction

- Bermudagrass is the most important warm season forage grass in the South Eastern United States
- Low efforts in breeding lately
- Few new cultivars are being released to the market, usually with high GxE
- New biotic (Stem Maggot) and abiotic (drought) stresses can be addressed by breeding
- The goal is to generate tools to do breeding more efficiently in bermudagrass

Figure 1. Experiment Locations



Figure 2. Flow Cytometer Peaks



Accuri C6 Flow Cytometer estimate ploidy level of bermudagrass (left peak) with high accuracy using barley (right peak) as standard.

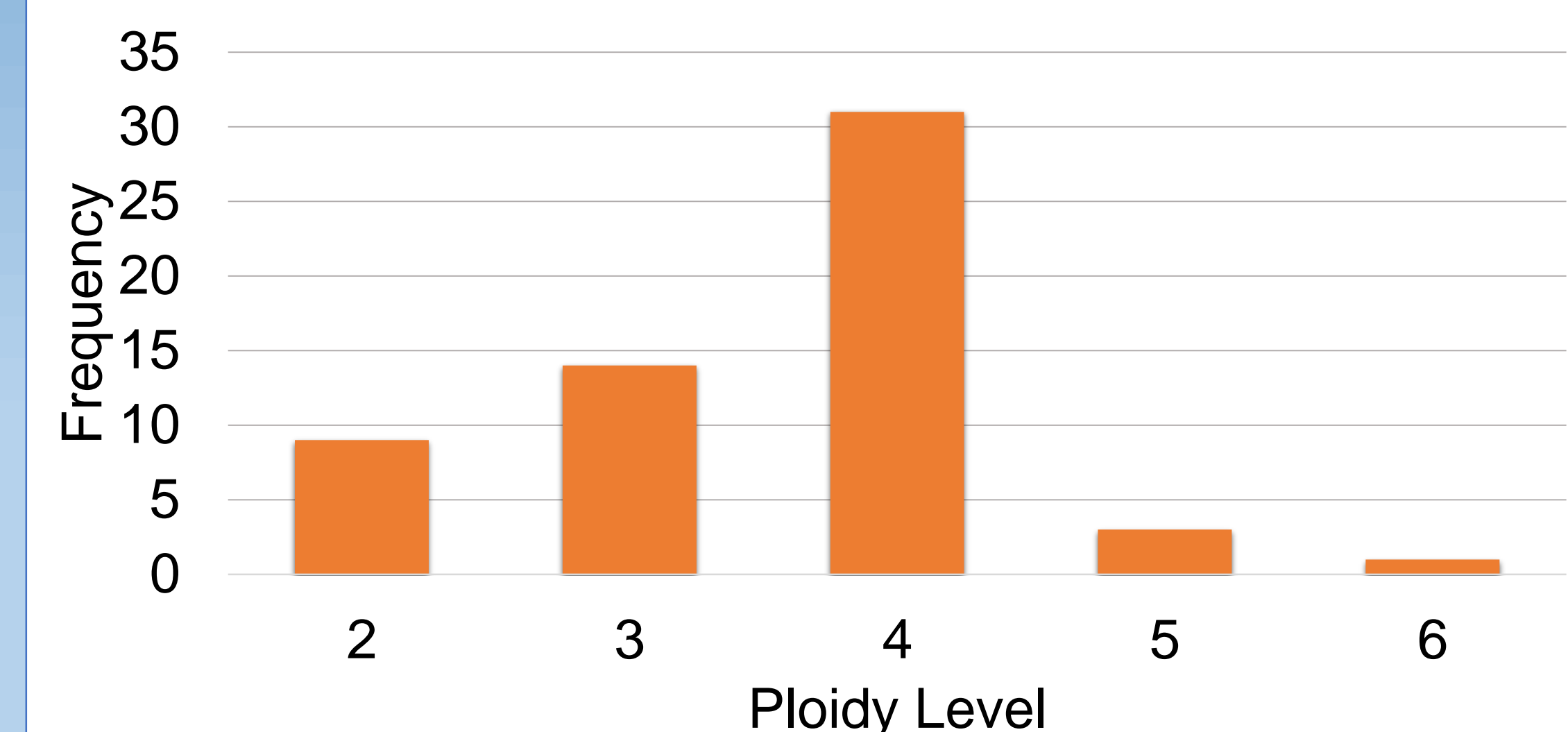
Objectives

- Determine ploidy of bermudagrass collection using flow cytometry
- Estimate genetic parameters using linear mixed models
- Evaluate the capacity to improve forage quality (Nitrogen content)

Materials & Methods

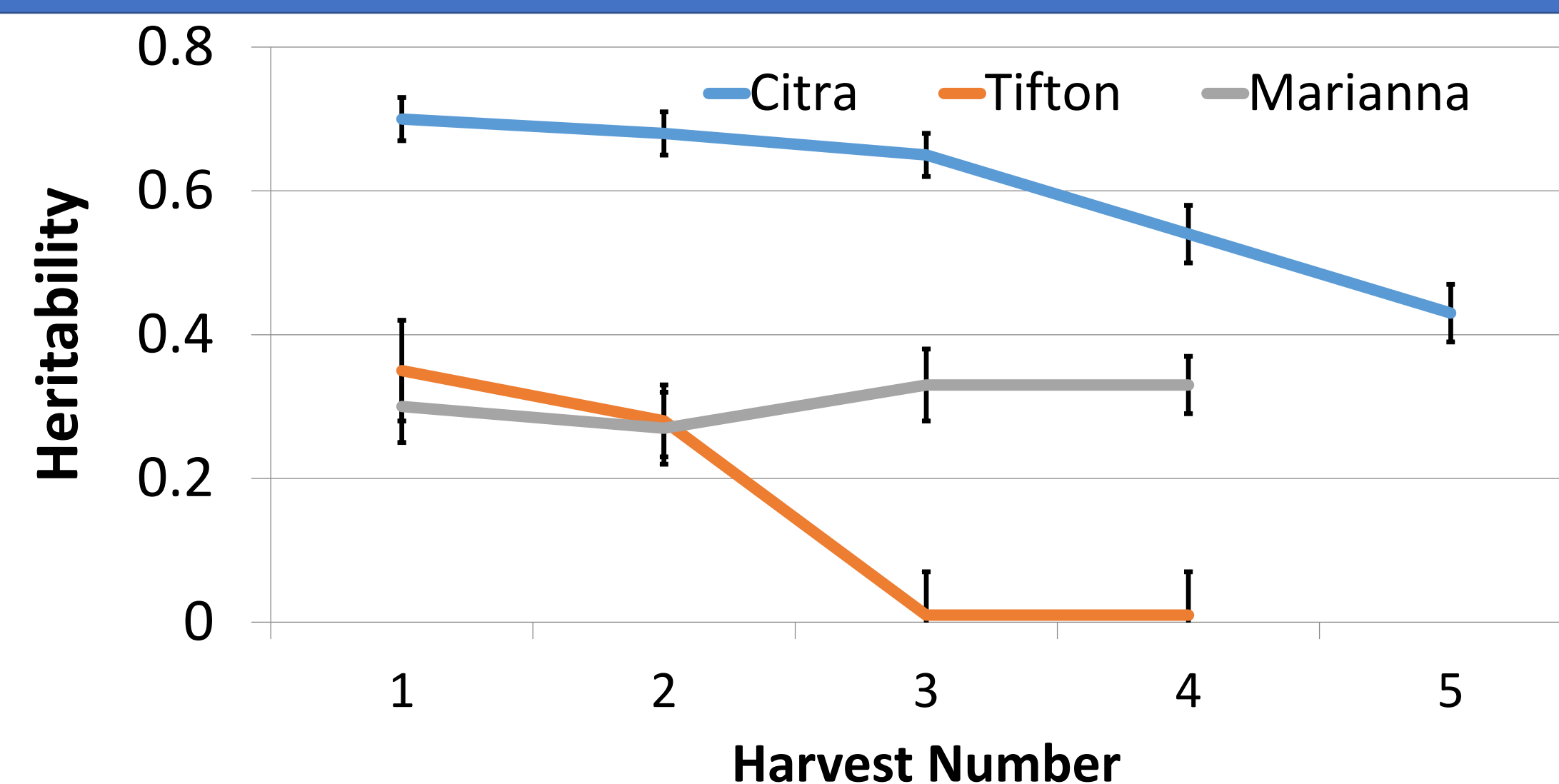
- Experiment established in six locations in four states (Fig. 1), with 284 accessions from two collections: Tifton Core collection and USDA-GRIN collection. Including known cultivars (Coastal, Tifton 85 and Jiggs)
- Experiments were established as row-column designs with two replications with augmented representation of controls
- Leaf samples were taken, chopped and ploidy estimated on Accuri C6 Flow Cytometer, with barley used as the standard (Fig. 2 and 3)
- Forage yield was measured between 4-6 times the year of establishment.
- Genetic parameters analyzed using ASReml (Gilmour et al, 2009) (Fig. 4 and 5)
- Nitrogen content measured on two sites (~1200 samples total) (Fig. 5)

Figure 3. Frequency of Ploidy in Collection



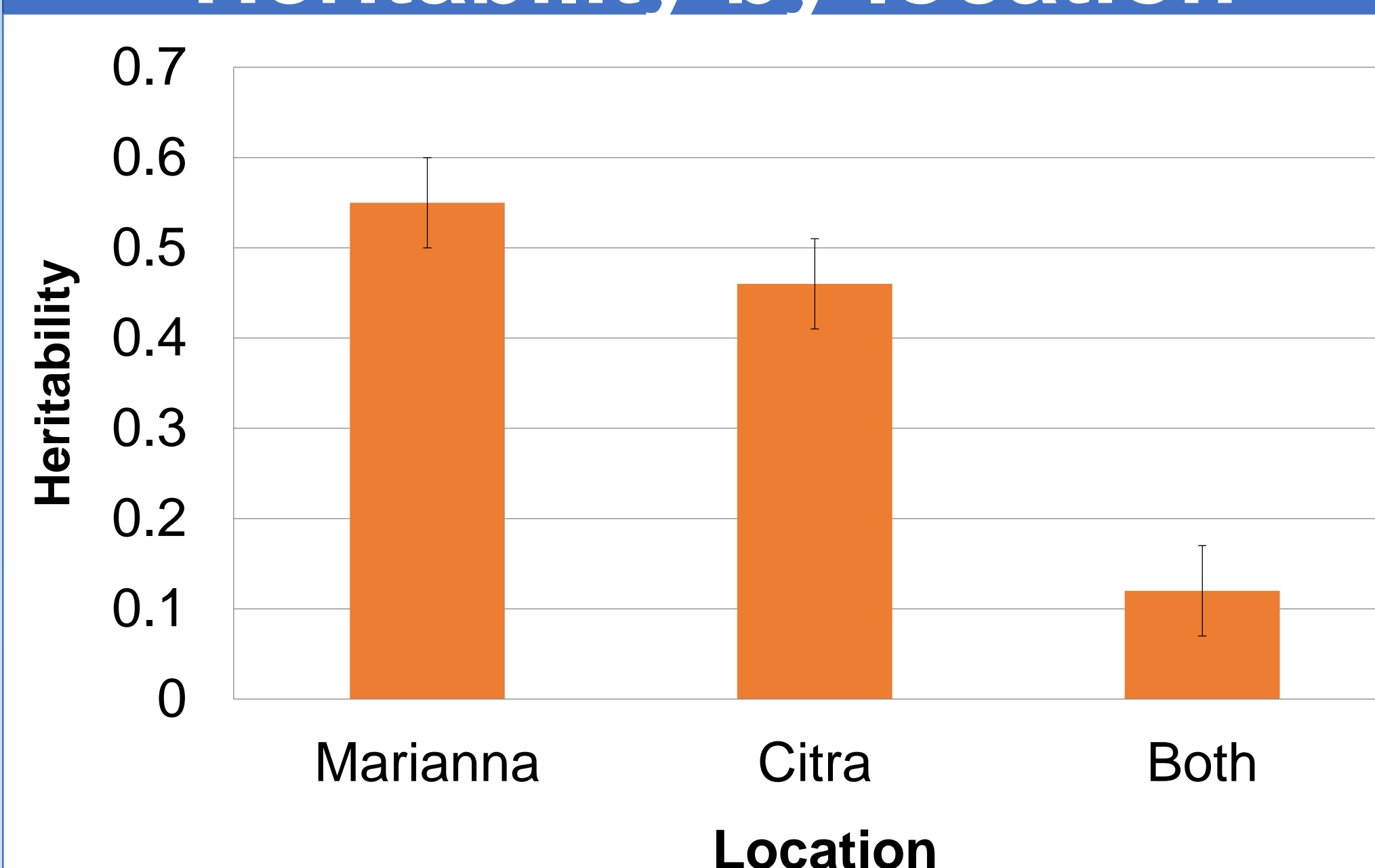
Different ploidy levels were found in the collection of bermudagrass accessions. Tetraploids are the most frequent category.

Figure 4. Heritability of Yield Across Sites and Measurements



H² varies significantly by location from 0.7 in Citra, FL to 0.01 in Tifton, GA. Tifton had a significantly Genotype by harvest interaction.

Figure 5. Nitrogen content Heritability by location



High H² was found for N content at single site level. But, high GxE interaction across sites.

Conclusions

- Ploidy level for 60 accessions have been completed
- Estimation for complete collection is an ongoing process
- The majority of the accessions are tetraploid (>50%). Ploidy levels from 2 to 6 have also been found
- High heritability for yield and nitrogen content indicate possibilities to improve these traits
- GxE plays an important role in bermudagrass forage yield and nitrogen content
- Selection using the tools generated in this study have already begun for yield and nitrogen content
- Ploidy level determination will allow crossing for developing improved cultivars of bermudagrass