Genotype X Environment Interactions in Turf Quality of Selected St. Augustinegrass Hybrids and Cultivars.

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Background/ Rationale

St. Augustinegrass [*Stenotaphrum secundatum* (Walt.) Kuntze] is the dominant turfgrass in Florida, and the predominant cultivar is Floratam. Turf quality and persistence of St. Augustinegrass can be limited by several pests including most frequently Southern chinch bug (*Blissus insularis* Barbar) and grey leafspot caused by the fungus *Pyricularia grisea*. Thus, selection of new genotypes with broad biotic and abiotic stress resistance continues to be a major goal of turfgrass breeding programs throughout the SE USA. The ability to select and identify new St. Augustinegrass cultivars with broad adaptation is restricted by genotype x environment interactions. Our objective was to identify breeding lines that show stability across the target use area.

Figure 1. (A) Southern chinch bug (*Blissus insularis* Barbar) and (B) Grey leaf spot (*Pyricularia grisea*) symptoms on St. Augustinegrass

Methodology

A group of 29 selected hybrids plus the cultivars 'Floratam', 'Palmetto', and 'Captiva' were evaluated at five geographically distinct locations in Florida (Jay, Hague, Citra, Vero Beach, and Arcadia) for three growing seasons from 2011 to 2014. The experimental design at all locations was a randomized complete block of three replications. Plot size was 1.6 x 1.6 m^2 with clean tilled borders maintained between plots. Fertility followed UF/IFAS homeowner recommendations and no fungicides were applied. Plots were mowed at 7.5 cm. Plots were generally evaluated on a monthly basis for turf quality. Primary response variables were turf color and turf quality. Data were analyzed using mixed models in ASReml.

Figure 2. (A)Overview St. Augustinegrass Field Experiment at Citra, FL (Photo September 2015) (B) Heritability of Turf Quality at Various Locations.
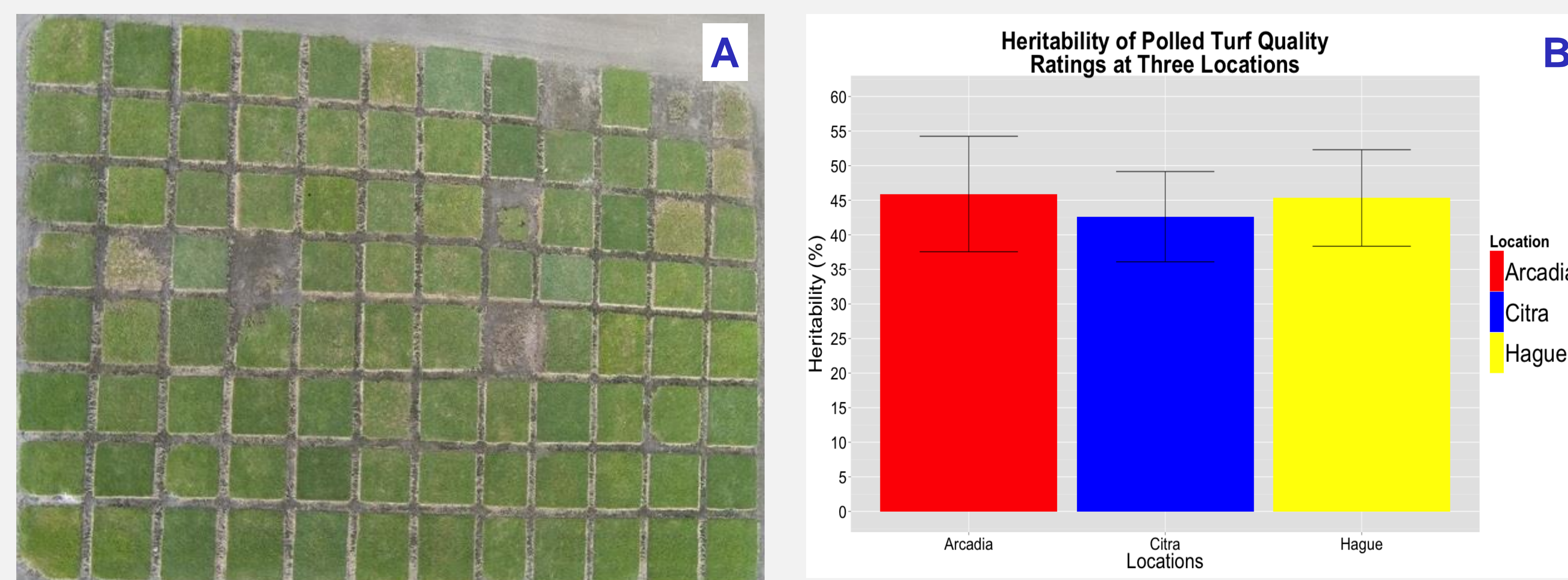
Results

Effects of genotypes, locations, and genotype by location interactions were generally significant at most evaluation dates. Despite significant G x E interactions, several hybrids had turf quality and plot cover superior to the released cultivars at all locations. Among these superior hybrids were UFSA 11, 12, 15 and 17 and NUF 04, 252, 253 and 254 (Table 1). Turf quality ratings at a given location varied over years (Table 2). Neverthe-less, heritability of turf quality over time at various locations varied from 43 to 46 (Figure 2B) indicating potential for selecting superior cultivars.

Table 1. Turf Quality Rankings of Selected Entries After Three Years at Five Locations.

	Citra	Hague	Arcadia	Vero Beach	Jay	Mean
UFSA11	2	1	2	1	3	1.8
NUF04	1	4	-	4	-	3.0
NUF252	1	5	2	2	6	3.2
UFSA12	8	8	1	6	1	4.8
UFSA15	5	13	3	6	1	5.6
UFSA17	5	10	10	2	3	6.0
NUF253	7	14	4	4	2	6.2
NUF254	4	10	-	4	-	6.3
Floratam	3	11	11	7	3	7.0

Table 2. Turf Quality Rankings of Selected Entries Over Years at Citra, FL.

Entry	TQ12	TQ13	TQ14	TQ15	Mean
UFSA11	4	1	1	2	2.0
Floratam	2	5	2	3	3.0
NUF176	11	7	2	1	5.25
NUF254	5	8	5	4	5.5
UFSA14	5	10	6	3	6.0
NUF04	13	9	3	1	6.5
NUF150	10	3	10	4	6.75
NUF252	1	12	14	1	7.0
NUF77	11	8	7	3	7.25

Summary

✓ Although multi-location turfgrass genotype evaluation experiments typically show significant G x E interaction effects, they are critical to determine regional adaptation of potential new cultivars.
✓ Both abiotic and biotic effects may contribute to these G x E effects, thus "management decisions" by multiple cooperators should be closely coordinated.
✓ Despite significant G x E in this series of experiments, several genotypes were consistently in the top statistical grouping at all locations.
✓ Sod grower trials of selected superior hybrids are planned for the 2015 season as we move toward identification of one or more superior hybrids for cultivar release with broad environmental adaptation.