Nitrogen response of bermudagrass genotypes under different irrigation levels and adequate precipitation regimes

PRESENTER:

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INTRODUCTION

Water conservation and nutrient pollution concerns have increased in recent years. Resultant water and fertilizer regulations have posed significant challenges to turfgrass management. **Quantifying the specific nitrogen and water requirements of bermudagrass (*Cynodon* spp.) varieties available in the market will optimize water and nutrient inputs, protecting the environment, and saving money.**

Objectives:

- Evaluate bermudagrass genotypes response to nitrogen (N) under different irrigation regimes
- Identify the minimum irrigation and N fertilizer requirements for acceptable turfgrass quality (=>6)

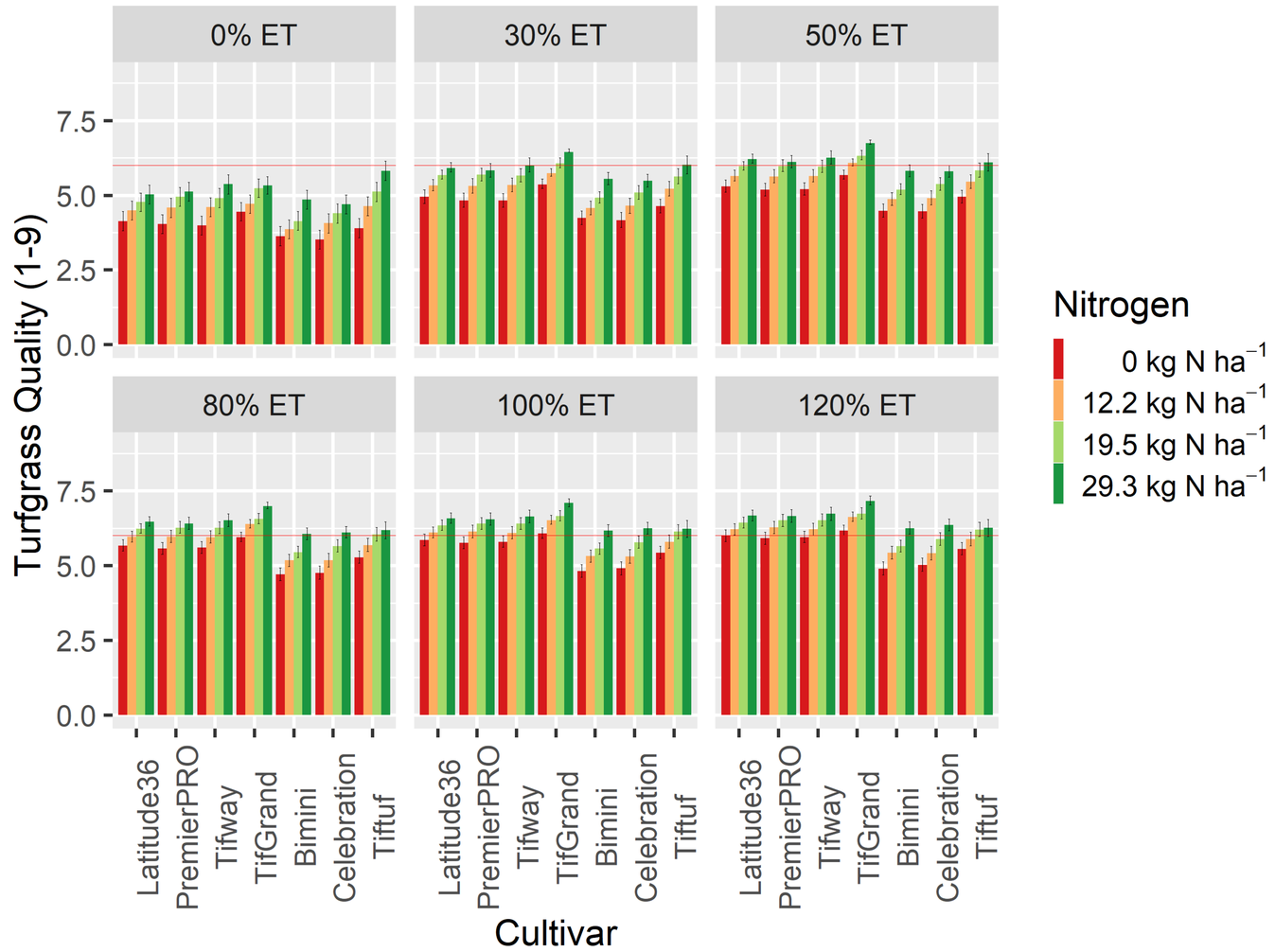
METHODS

- 2018 and 2019, Jay, FL, U.S.
- Bermudagrass genotypes; 'TifTuf', 'TifGrand', 'Tifway', 'PremierPro', 'Latitude36', 'Bimini' and 'Celebration'
- Linear gradient irrigation system (LGIS): Irrigation gradient from 0 to 120% of ET_o.
- Fertility: 0, 12.3, 19.6, 29.5 kg N ha^{-1} urea each month.
- Soil Type: Orangeburg sandy loam with pH 5.5 and 1% organic matter.
- Experiment design: split-split block.
- Digital images and NDVI were collected weekly.
- Dates where weekly precipitation was sufficient (i.e., > 25.4 mm) were identified using available meteorological data.
- Statistics: Modified Michaelis-Menton

$$Y_{ijk} = \beta_{0ijk} + \frac{(\beta_{1ijk} - \beta_{0ijk}) * X}{\beta_{2ijk} + X}$$

Where Y_{ijk} is the overall quality of turf cultivar "I", in block "j", fertilized at nitrogen rate "k". *X* is the irrigation rate, the "β"0's are intercepts (i.e., minimum turf quality), "β"1's the asymptote (i.e., maximum achievable turf quality), and "β"2's are the "concurvity" (response curve becomes linear as "β"2 approaches infinity).

- ✓Genotype response to N varies with different irrigation levels.
- ✓**Tiftuf had the highest response to N under low irrigation.** Celebration and Bimini had the highest N response under ≥ 50% ET_o irrigation.
- ✓Under adequate precipitation, **TifTuf and TifGrand,** may be maintained **without supplemental irrigation.**



Red line = minimun acceptable quality of 6

RESULTS

Previous studies have shown that N fertilization increases water use efficiency (Erickson and Kenworthy, 2011). **In our study, different N responses were observed across genotypes and irrigation levels.**

When irrigation increased from 0 to 120% ET_o, Tiftuf, Tifway, PremierPro and Latitude36 response to N decreased. Whereas, Celebration Bimini, and TifGrand slightly increased their N response.

At 0% ET_o irrigation, Tiftuf improved turf quality from 3.9 (0 kg N ha^{-1}) to 5.8 (29.3 kg N ha^{-1}) having the greatest response to N compared to the other genotypes.

When supplementary irrigation was between 20-30% ET_o, TifTuf (4.6 to 6.0), Celebration (4.1 to 5.5) and Bimini (4.2 to 5.6) had the highest response to N. At >50% ET_o, Celebration and Bimini, both of which are common bermudagrass genotypes, had the greatest response to N.

TifGrand, PremierPro, Latitude36, and Tifway were the only genotypes that reached acceptable quality with low nitrogen rates (0 and 12.3 kg N ha^{-1}). At 29.5 kg N ha^{-1}, TifTuf (1% ET_o), TifGrand (6% ET_o), Tifway (25% ET_o), Latitude36 (24% ET_o), PremierPro (34% ET_o), Bimini (56% ET_o) and Celebration (64% ET_o) needed less than 100% ET_o to maintain acceptable quality (≥ 6).

Results from his study suggest that genotype response to N can vary with different irrigation levels. Furthermore, TifTuf and TifGrand may be maintained without supplementary irrigation when precipitation events are adequate.

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