Root Morphology and Forage Production of Highly Fertilizer Responsive Bermudagrass Genotypes

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Rationale

- Forage breeding is traditionally carried out under recommended or reduced fertilizer rates to produce nutrient efficient cultivars
- However, in dairy operations, significant amounts of manure must be used or disposed
- Dairy producers apply this manure to pastures,
  - Taking advantage of manure as a fertilizer
  - And as a way to dispose of this large amount of "waste"
- Depending on how much manure dairy operations can manage (Nutrient Management Plan) is the number of cows they can milk.

Objetive

- Develop a bermudagrass cultivar with high nutrient uptake and high forage production.

Experiments

- Three different experiments in the field and greenhouse (GH) were established to select the target cultivar.
- Material came from the USDA GRIN collection and the bermudagrass core collection from Tifton, GA.

1st Experiment (Field)

- 281 Bermuda Accessions and 3 controls
- Two repetitions
- Yield tested in two sites in Florida and Georgia

2nd Experiment (GH)

- Mesocosm:
- Seven selected bermuda accessions and one control
- Three Nitrogen Levels: 100, 200 and 400 Kg/ha

3rd Experiment (Field)

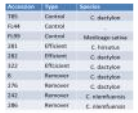
- Split plot design:
- Whole plot. fertilization Level:1/2X, X, 2X & 6X (X=800 Lb/A/yr)
- Split plot: 7 cultivars + 3 controls

Selection Procedure

1st Field Experiment

7 Selection with high N content and high yield. Tifotn85 (T85) was used as a reference

Candidates



Candidates:

- 4 high-uptake
- 3 efficient
- 3 Controls: T85, FL44. & FL99

2nd Exp. Mesocosm

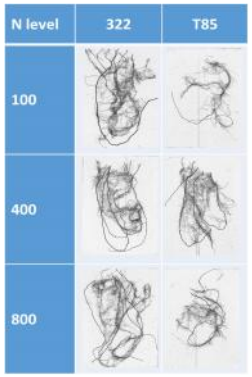
Roots sampled from all selections

Analyzed w/ Epson V800 Photo and Win Rhizo Software

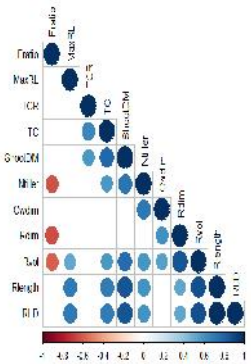
3rd Field Experiment

- Harvesting every 5 weeks
- Yield as dry matter measured

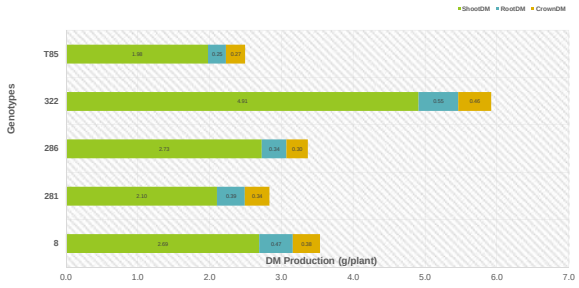
Results



Roots of one candidate (322) and one control (T85)

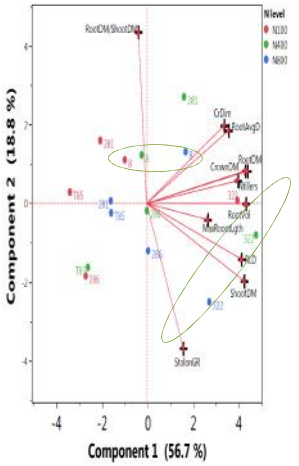


Correlation among traits in mesocosm experiment

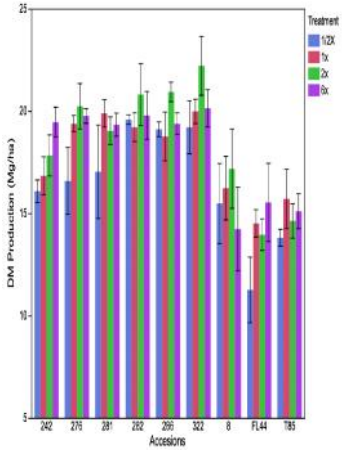


Dry matter partition in mesocosm experiment

Results



PCA for the root traits mesocosm experiment



Preliminary results 3rd field experiment

Conclusions

- Significant variability for forage production and N-content was found in the 281 bermudagrass accessions
- The seven selected accessions showed different root responses with the different levels of fertilization.
- One bermuda accession (322) is a prominent candidate to be used by dairy producers as it is efficient under low fertilization rates and also highly responsive under high fertilization rates

Works Cited

- Anderson B. and Cheek F. Poster presented at the ASA Meeting 2014.Long Beach, CA
- Kidder G. 1999. Florida Forage HandBook. Cooperative Extension Services UF
- Rodriguez, IR, GL Miller and LB McCarty 2001. HortScience 37(1):208-209.

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