Influence of Cowpea and Nitrogen Rate in a Cropping System with Forage Rye.

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Summer cover crop of cowpea

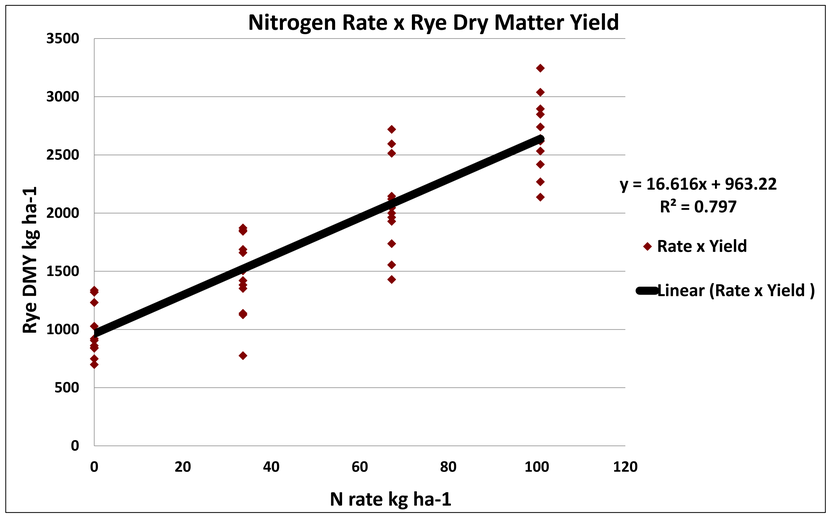

Figure 1. Linear regression of N rate by dry matter yield of rye.

Cowpea germplasm lines in greenhouse 22 days after planting

Introduction

In the southeastern United States, rye (*Secale cereale* L.) is utilized as a winter forage and thrives well in this region. Cowpea (*Vigna unguiculata* [L.] Walp) is also well adapted to this region and can be utilized as the N source, and also for a seed crop.

Objectives

The main purpose for this study was to incorporate both species into a double cropping system to enhance nitrogen use efficiency (NUE) while optimizing rye forage dry matter yield (DMY).

•New cowpea cultivars are needed that will produce high biomass and high seed yields in double-cropping systems in northeast Texas.

Mechanical harvest of rye.

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Methods & Materials

Research was conducted at the Texas A&M AgriLife Research and Extension Center in Overton, TX.

•Soil type was a Darco loamy fine sand.

•Cropping system experiment was a split-plot design.

• Factorial arrangement of three treatments of summer cowpea cover crop (late maturity cultivar, early maturity cultivar, summer fallow) and four N rates 0, 34, 67 or 101 kg ha $^{-1}$

•Data taken on summer cover cowpea included: weekly heights and plant count, two biomass harvests, and leaf stem separations.

•Rye DMY used as an indicator to measure green manure contributions.

•Data taken on rye included heights, percent ground cover, maturity score and DMY at each harvest.

•Rye harvested by a mechanical harvester, Three harvests conducted.

•Thirty-seven cowpea germplasm lines were evaluated for maturity and seed yield in a greenhouse experiment.

•All rye DMY and Cowpea yield data were analyzed using PROC MIXED and PROC REG of SAS 9.4.

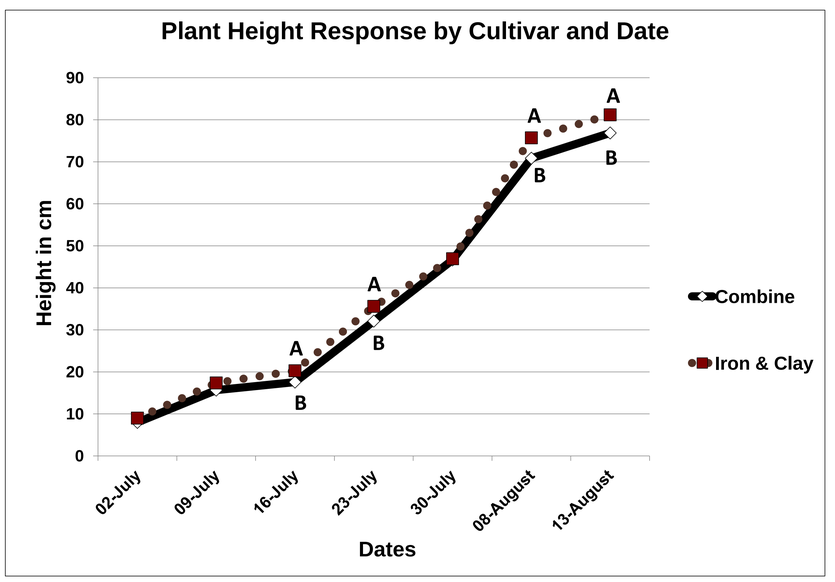

Figure 2. Comparison of cowpea cultivar height by date

Results

•Cowpea dry biomass for Iron and Clay averaged 2729 kg ha^{-1} and for Combine averaged 2924 kg ha^{-1} (ns, P = 0.18). This biomass was incorporated in the two cowpea treatments.

•The summer cover crop treatment had no significant effect on DMY of rye.

•N rate effected (P < 0.0001) DMY of rye in a positive linear relationship (r^2 = 0.79) (Figure 1).

•The cover crop of cowpea was not influential as an N input on forage rye yield during the first year of cropping.

•Cowpea germplasm lines were identified with improved seed yield: line 7 produced more (P < 0.05) seed by weight than lines 35, 11, 23, with all other lines intermediate. Screening occurred for early seed yield.

Conclusions

•Nitrogen fertilizer application increased DMY of rye.

•Summer cover crop of cowpea did not impact DMY of rye for this first year of cropping.

•Cowpea germplasm lines that continue to the second year of testing met maturity requirements and had a promising seed yield; 17 of 37 lines kept for second year of testing.

Height measurement of rye.