USING ALFALFA BERMUDAGRASS MIXTURES IN THE SOUTHEAST

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Bermudagrass is widely used warm-season perennial grass in the Southeast. While it is characterized by high yields, especially in the improved varieties, its quality is moderate at best and additional supplementation is often needed to maintain productivity and condition in cattle. Another concern with bermudagrass is the need for high levels of nitrogen fertilization which can be quite costly for producers. The addition of legume species to bermudagrass stands can alleviate both the quality and nitrogen concerns with this forage. Alfalfa is a widely-used throughout the United States as a feed source with high relative forage quality, digestible energy, and crude protein. Alfalfa's ability to fix nitrogen allows it to produce high yields without commercial nitrogen applications. With the development of alfalfa varieties that are well-suited to the Southeast's warm climate, challenging soils, and pest pressures, alfalfa is now a viable option here.

Alfalfa and bermudagrass can be managed very similarly. Soil fertility recommendations for both include high potassium fertilization and other nutrients, and they only differ in that no N is needed on alfalfa. They also have similar cutting intervals of about 4 weeks for optimum yield and quality. Growing these two species together can simultaneously reduce or eliminate the need for N fertilization, produce approximately similar tonnage, all while decreasing the need for livestock supplementation. Land grant universities throughout the Southeast are researching the benefits of an alfalfa-bermudagrass system to provide producers with better recommendations on system establishment, management, and use.

Research on alfalfa-bermudagrass mixtures is ongoing at the University of Georgia Coastal Plain Experiment Station in Tifton, GA. At this location, 10-acres of a bermudagrass hayfield were established in a trial for the purposes of comparing 'Tifton 85' bermudagrass plus recommended fertilization (T85+N) with a mixture of 'Tifton 85' and 'Bulldog 805' alfalfa with no N fertilization (T85+Alf; Figure 1). These stands have been evaluated for stand composition, harvest yield, and forage quality at each harvest throughout the growing system.

Figure 1. Research plots at the University of Georgia Coastal Plain Experiment Station in Tifton, GA were established in February 2016. Ten 0.5-acre plots were designated as either 'Tifton-85' bermudagrass or 'Tifton-85' bermudagrass interseeded with 'Bulldog 805' alfalfa.

Because of an extraordinarily warm fall in 2015 that encouraged the Tifton 85 to grow well into early winter, the plots were established in February of 2016 instead of the normal fall establishment recommended for alfalfa in this area. Despite the late start, the alfalfa established well. Harvests occurred during May, June, July, August, September, and November in 2016. Since this was the establishment year for the alfalfa, the T85+N treatment produced more tonnage in this first season than the T85+Alf mixture (10,569 vs.

7,475 lbs/acre, respectively; Figure 2). However, the reverse was true in 2017, as the T85+Alf yielded substantially more than T85+N (11,201 vs. 6,672 lbs/acre, respectively; Figure 2). One of the key differences in these treatments is that, once the alfalfa is established, the T85+Alf produces enough forage to warrant harvest much earlier in the spring and, in some years, may produce more for a late fall cutting. In 2017, T85+Alf harvests begin in March while the T85+N treatment did not produce a harvestable forage before June.

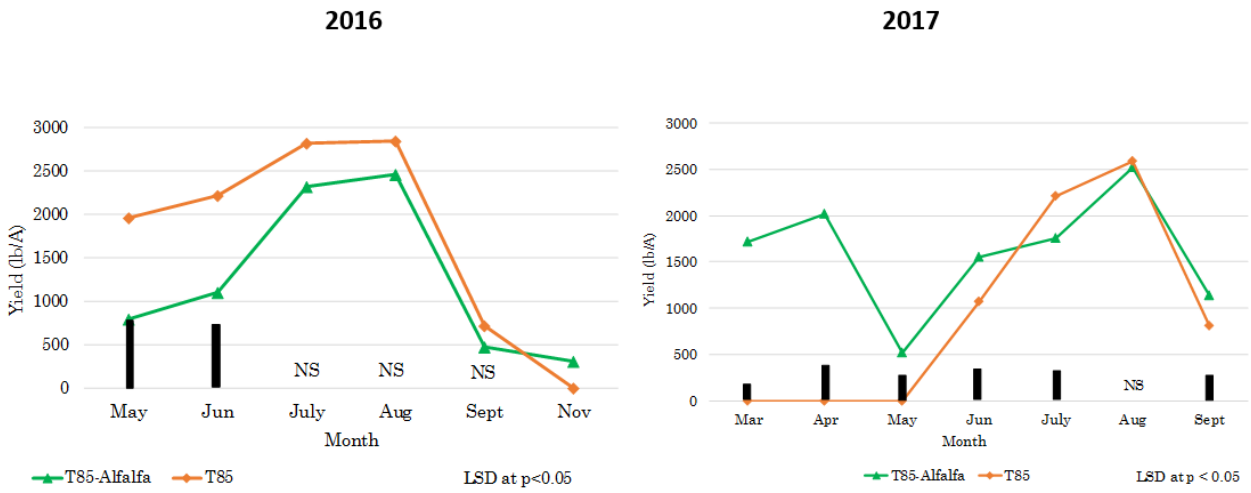

Figure 2. Forage yield (in lb/A) at each harvest of the UGA Coastal Plain Experiment Station research plots during the 2016 and 2017 growing seasons. Bars represent a statistical difference between forage yield of the two treatments at $p < 0.05$.

Cumulative yield over the study period (2016 plus 2017 growing seasons) show that the T85+Alf (18,676 lbs/acre) had produced significantly more than the T85+N (17,240 lbs/acre; Figure 3). We plan to continue this trial for at least 1 more year, with hopes for continuing this research until the alfalfa stand thins out (3 years or more) or we can no longer secure grant funding for the project.

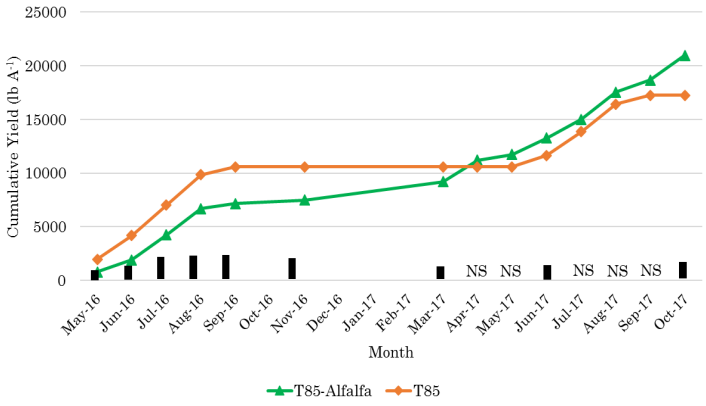

Figure 3. Cumulative forage yield (in lb/A) during the study period (2016 and 2017 growing seasons). Bars represent a statistical difference between the 'T85' and 'T85-alfalfa' treatments at $p < 0.05$.

It is important to point out that the alfalfa was a minor component of the biomass in the first year, which is largely because it was established in February instead of the usual fall planting window. In our on-farm experiences, the alfalfa plays a larger role in the tonnage produced in the first year when the alfalfa is planted in the fall instead of the spring. By 2017, the alfalfa stand density increased contributing to at least 30% of the composition at each harvest of the T85+Alf treatment (Figure 4).

During the 2016 season, T85+Alf had higher crude protein (CP; 14.0% and 11.4%, respectively) and *in vitro* dry matter digestibility (IVDMD; 74.1 vs. 71.1%, respectively) than T85+N. The nutritive value analyses for 2017 are currently being conducted. Increased forage quality in the T85+Alf mixture compared to the T85+N may provide producers with a forage capable of supporting higher production with little or no supplementation.

Figure 4. An 'T85-alfalfa' plot with at least 30% alfalfa is harvested at the UGA Coastal Plain Experiment Station.

Georgia is not the only southeastern state focusing on these mixtures, at Auburn University, researchers are also focusing on their potential use in Southeast forage systems. Dr. Kim Mullenix, a livestock extension specialist, has been working to establish research and demonstration sites to study alfalfa-bermudagrass mixtures throughout the state since 2016.

At the Wiregrass Research and Extension Center in Headland, Alabama, Bulldog 805 was planted into dormant Tifton 85 bermudagrass that had previously been used for stockpiling experiments from 2012 through 2016. Though the bermudagrass stand was negatively influenced by extreme drought and competition following dormancy, the area is currently being used to limit-graze weaned, fall born calves prior to sale.

In 2017, Mullenix continued to expand Auburn's research efforts with the establishment of two new areas of alfalfa-bermudagrass mixtures in Alabama. These mixtures have been established at the E.V. Smith Research Center in Shorter and the Sand Mountain Research and Extension Center in Crossville. These locations are part of a larger multi-state regional grant led by the University of Georgia and sponsored by the NIFA-Alfalfa and Forage Research Program. Additional locations are established in Georgia and Florida. This project is aimed at determining appropriate harvest intensity and frequency intervals for alfalfa-bermudagrass mixtures, as well as developing a method to predict yield of these mixtures using a botanical composition estimates and a grazing stick.

Producers who are interested in learning more about interseeding alfalfa with bermudagrass and University of Georgia research efforts on the subject can do so by attending some of our upcoming "Alfalfa in the South" workshops. These workshops will include on-farm visits on Ernie Ford's farm in Calhoun County (May 1), Scott McRae's farm in Bacon County (May 8), the site of the aforementioned research at UGA-Tifton (May 9), and on Dan Glenn's farm in Irwin County (May 10). In addition to hearing about how these farms are using alfalfa, we will review our research findings at UGA, and Dr. Mullenix will update us on her research with alfalfa at Auburn University. Registration information and other details about these farm visits and other upcoming forage events can also be found at the www.georgiaforages.com website. For additional reading on our success with growing alfalfa in the South, download our in-depth alfalfa publications "Alfalfa Management in Georgia" and "Growing Alfalfa in the South" from www.georgiaforages.com.