

2018 USAFRI Research Project Objectives

Impact of Poultry Litter Application on Yield and Quality of Alfalfa Grown in Mississippi Mississippi State University - Rushing

Project Award: \$18,880

Justification:

- Demand for high quality forages has increased in the southeastern U.S. due to the desire to increase livestock productivity and grazing efficiency. Alfalfa (*Medicago sativa* L.) is an ideal species that can be inserted into traditional haying and grazing systems to enhance forage quality. Furthermore, in an era of high-priced protein and energy supplements, the higher quality of alfalfa and alfalfa-grass mixtures is of significant value to the beef and dairy industry, along with other forage-based livestock producers.

In Mississippi, a coordinated research and demonstration/extension effort has substantially increased alfalfa acreage 700% since 2014. As some of the targeted producers in the region have a negative view of alfalfa and its management challenges, many of these efforts have been under a pretext of demonstrating cutting and fertility management techniques. Within the program, discussion about the benefits of alfalfa production and use are integrated. This results in participants realizing that alfalfa has a potential as a forage crop because of the combination of new varieties, better nutrient management techniques, and marketing opportunities for the region.

Alfalfa requires high phosphorus (P) and potassium (K) soil fertility and has a high demand for these nutrients. Alfalfa removes large amounts of nitrogen (N) and K from the field when harvested as hay, and also has the ability to draw down nitrate levels within its root zone, thus decreasing nutrient runoff and leaching potential. Manure, particularly poultry litter, is high in P and K and micronutrients such as boron. Proper applications of poultry litter to alfalfa can provide sufficient quantities of required nutrients without overloading the soil profile. Poorly timed applications, however, can physically damage plants, increase weed competition, and can result in excess soil N, potentially increasing N losses to water and the atmosphere (Lory 2015).

Poultry production was the top agricultural commodity in Mississippi for 2016, grossing nearly \$2.3 billion in sales and ranking 5th in the nation (DAFVM, 2016). Poultry has been the leading commodity in Mississippi for 20 straight years, in which 28,000 employees were paid another \$2.1 billion in wages and salaries (Mississippi Poultry Association, 2014). Poultry litter, a mixture of manure, feathers, and bedding material, is a valuable source of plant nutrients and organic matter that is of great interest to many livestock and row crop farm managers across Mississippi and remains the most sustainable option for disposal (Tabler et al., 2015). The use of poultry litter has shown to increase dry matter yields in bermudagrass production (Evers 2008), lint in cotton, and grain in corn (Mitchell and Tu 2003). For forages, linking dry matter production with litter utilization can be a difficult, yet effective approach for addressing both the problems associated with manure disposal, and impact reductions on the environment (Pant et al., 2004). In 2014, 210 broiler farms (10% of Mississippi total) were sampled to determine average nutrient contents of litter. Concentrations averaged 61.37, 47.44, and 69.39 lb/ton for K₂O, N, and P₂O₅, respectively (Tabler et al., 2015). Often times, poultry litter is the most economical, and most available source of fertilizer in Mississippi.

As part of the 2017 Alfalfa Checkoff program, field trials were conducted in Starkville and Newton, MS, during the 2018 growing season. Four harvests were conducted at the Newton location, however no

harvests were conducted at the Starkville location due to poor establishment and weed control. Yield data can be found in Tables 1 and 2 for the Newton location only. This proposal is being submitted in order to collect a second year of data at the Newton location, and generate first year results at the Starkville location.

As alfalfa acreage across Mississippi and the Deep South increases, information regarding fertility management in this crop will be crucial in helping new farmers produce an economically sustainable forage. This projects seeks to bridge this knowledge gap by evaluating the impacts of poultry litter on alfalfa production in Mississippi.

Objectives:

- The objective of this project is to 1) Determine the impact of poultry litter fertilization on forage yield, plant persistence, forage quality, yield components, and economic analysis of alfalfa in Mississippi.