

Variety Trial and Fertility of Fescue Cultivars in Southeast Kansas

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Summary

In fall 2021, five varieties of fescue were planted at the K-State Research station outside of Columbus, Kansas. The varieties included two endophyte free (E-) varieties, two novel endophyte (NE) varieties, and one endophyte (E+) variety. The varieties were Atlas (E-), Cajun (E-), Bar Optima (NE), Estancia (NE), and K-31 (E+). Three rates of nitrogen were applied in the spring to each variety; 0, 50, and 100 units and each treatment was replicated three times. Due to the drought, measurements were not taken in 2022 but samples were obtained in 2023. The only stress the plots received was lack of moisture as the drought persisted in 2023. These plots were not grazed. Overall, addition of nitrogen increased biomass production in all cultivars evaluated. There was no difference in biomass produced in K-31 fescue between 50 or 100 units of nitrogen. Bar Optima had the greatest response to the additional nitrogen in regard to biomass production. However, as nitrogen increased, the crude protein increased for each variety. When biomass was measured in May, Cajun at both 50 and 100 units of nitrogen had the greatest yield, followed closely by yields with 100 units of nitrogen on Bar Optima and Estancia. Atlas and K-31 fescue varieties at both 50 and 100 units of nitrogen had similar biomass and had the lowest yields of the fertilized treatments. However, for total accumulation through the growing year, varieties fertilized with 100 units of N varieties out-yielded K-31. At 50 units of N the Bar Optima had the lowest total yield.

Introduction

Fescue is a cool season perennial forage that has many uses, primarily in the Southeast United States. This grass was first identified as a “wonder” grass that remained green in Kentucky during the winter. After many producers utilized this forage, they started observing signs of toxicity such as cattle that spent more time in ponds, gains were reduced, cattle had more hair, and pregnancy rates were reduced. Researchers then found the endophyte organism, which is a fungus that has a symbiotic relationship with the fescue plant that makes it very hardy. This fungus can produce toxins called ergot alkaloids, and these lead to symptoms of fescue toxicity. After this fungus was found to be leading to reductions in animal performance, plant breeders worked on removing the fungi from the plant and developed endophyte-free varieties of fescue. When grazing endophyte-free fescue pastures, the cattle performance was enhanced; however, the stand persistence was not as good as with Kentucky-31 fescue. Then plant breeders worked on developing varieties of fescue that had the endophyte organism as it made the plant hardier, but the varieties had an endophyte that did not produce

toxins. That is where the name Novel came from. It indicates a fescue plant that has the fungi but does not produce toxins. In general, this variety results in better cattle performance than endophyte-free pastures but the fescue has close to the same stand persistence as endophyte-positive pastures. The balanced goals of stand persistence and cattle performance measures are important, and thus the purpose of this field trial was to determine performance of different varieties of fescue in Southeast Kansas.

Methods

In fall 2021, five varieties of fescue were planted at the Southeast Research and Extension Center Columbus branch. The varieties included two endophyte free (E-) varieties, two novel endophyte (NE) varieties, and one endophyte (E+) variety. The varieties were Atlas (E-), Cajun (E-), Bar Optima (NE), Estancia (NE), and K-31 (E+). Three rates of nitrogen were applied in the spring to each variety; 0, 50, and 100 units and each treatment was replicated three times. Due to the drought, measurements were not taken in 2022 but samples were obtained in 2023. The only stress the plots received was lack of moisture as the drought persisted in 2023. These plots were not grazed. No additional nitrogen was added after the initial spring application. The plots were harvested in May and again in September and measured for forage accumulation.

Results and Discussion

Forage accumulation for each variety that was collected in May is illustrated in Figure 1. There were few quality differences between varieties when sampled in May, but as nitrogen application increased, crude protein values increased across treatments, demonstrating that nitrogen application to fescue directly affects the crude protein value of the plant (Figure 2). Forage accumulation in September is illustrated in Figure 3. Total forage accumulation through the 2023 year is illustrated in Figure 4.

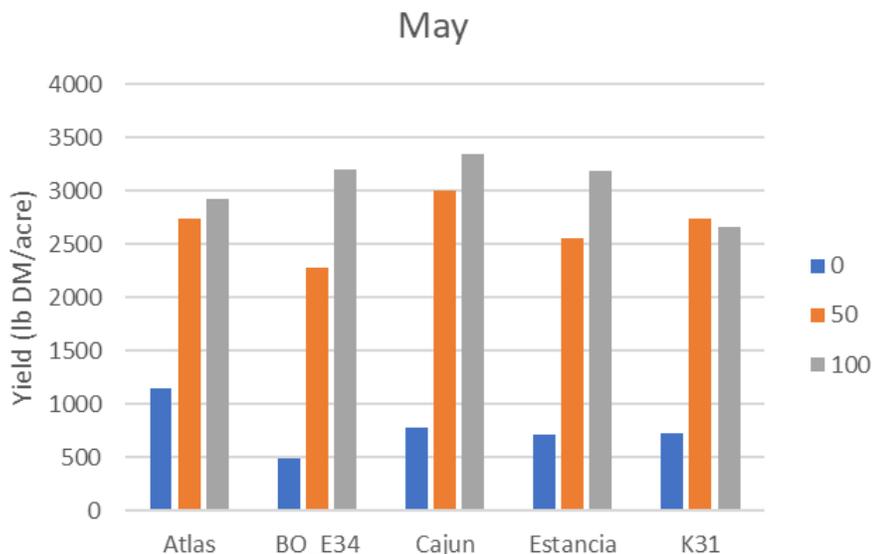


Figure 1. Forage accumulation of 5 varieties of fescue collected in May.

Atlas: endophyte free fescue.

BO_E34: Bar Optima is a novel endophyte fescue.

Cajun: endophyte free variety.

Estancia: novel endophyte fescue variety.

K-31: Kentucky-31 fescue contains the endophyte and often produces ergot alkaloids.

Blue bars are no nitrogen; Orange bars are 50 units nitrogen; Grey bars are 100 units of nitrogen.

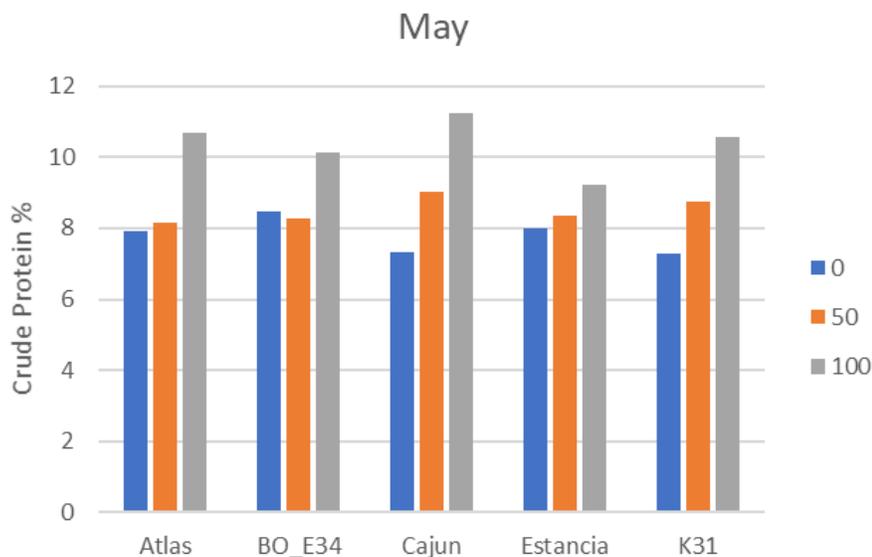


Figure 2. Crude protein of 5 varieties of fescue collected in May.

Atlas: endophyte free fescue.

BO_E34: Bar Optima is a novel endophyte fescue.

Cajun: endophyte free fescue.

Estancia: novel endophyte fescue variety.

K-31: Kentucky-31 fescue contains the endophyte and often produces ergot alkaloids.

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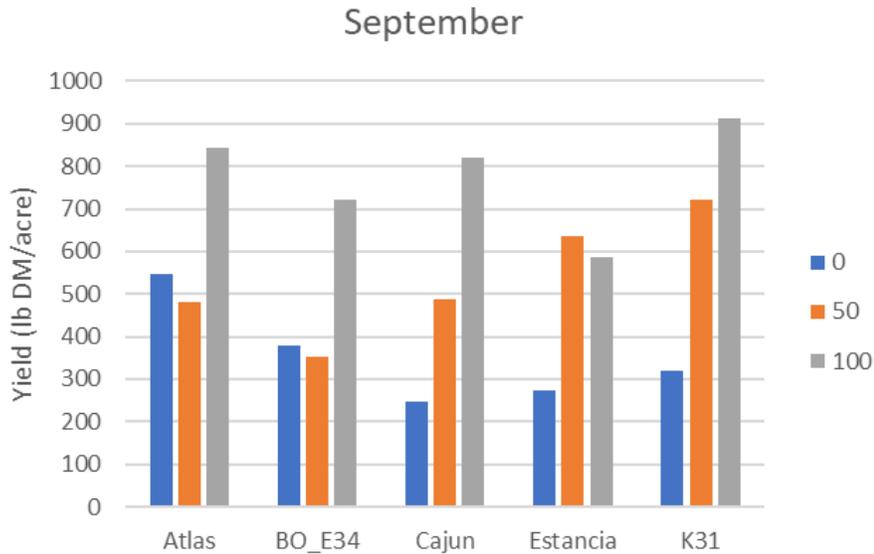


Figure 3. Forage accumulation of 5 varieties of fescue collected in September.

Atlas: endophyte free fescue

BO_E34: Bar Optima is a novel endophyte fescue.

Cajun: endophyte free.

Estancia: novel endophyte fescue variety.

K-31: Kentucky-31 fescue contains the endophyte and often produces ergot alkaloids.

Blue bars are no nitrogen; Orange bars are 50 units nitrogen; Grey bars are 100 units of nitrogen.

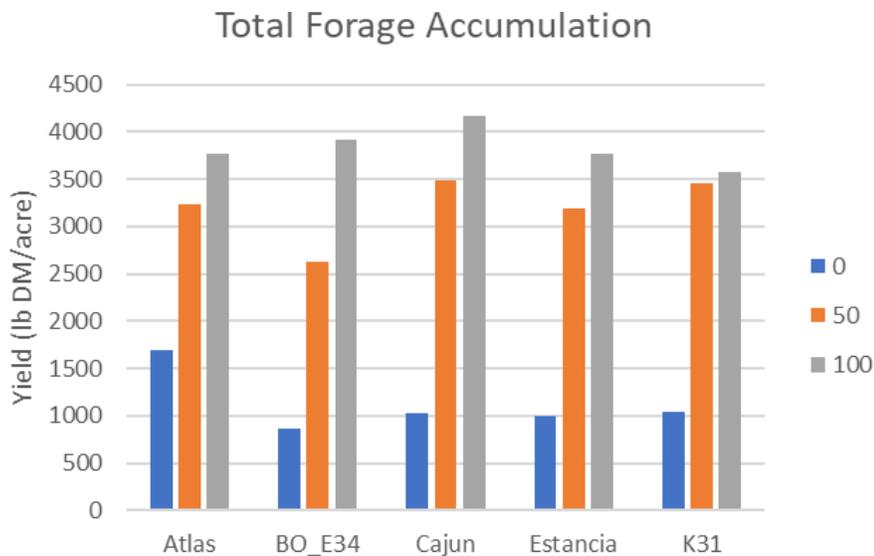


Figure 4. Forage accumulation of 5 varieties of fescue accumulated through a May and September collection.

Atlas: endophyte free fescue

BO_E34: Bar Optima is a novel endophyte fescue.

Cajun: endophyte free.

Estancia: novel endophyte fescue variety.

K-31: Kentucky-31 fescue contains the endophyte and often produces ergot alkaloids.

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