DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

ASSESSMENT OF FOLIAR APPLIED AND FERTILIZER-IMPREGNATED MOLYBDENUM FOR EFFECT ON NITRATE-NITROGEN CONCENTRATION IN JOHNSONGRASS

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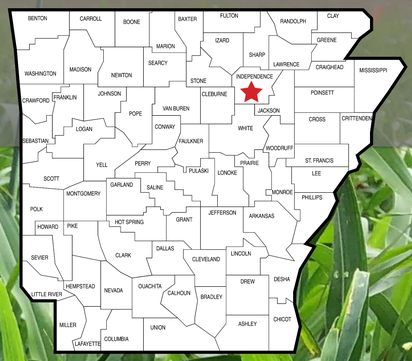

This experiment was conducted at the Livestock and Forestry Research Station in Batesville, AR

Introduction:

Toxic nitrate accumulation is a recurring problem in summer forages including sorghum-sudangrass and johnsongrass during drought periods in the summer. Nitrate toxicity occurs most often during periods of drought, combined with nutrient deficiency, cloudy weather, or when heavy N applications have been made. However, toxic levels can occur under high N fertilizer application even with good rainfall. Although numerous studies have been done to determine the mechanism of toxic nitrate accumulation, no good recommendation exists for reducing these toxic levels in forages so that they can safely be used for livestock feed. Producers need a way to reduce toxic nitrate levels in these forages before advancing maturity ruins forage quality.

Micronutrients play a major role in nitrate reductase (NR) activity. Molybdenum (Mo) deficiency can lead to high nitrate levels since Mo is required by NR. Foliar application of Mo has been shown to reduce nitrate levels in cantaloupe. Spraying a solution of sodium molybdate decreased leaf nitrate levels within eight days after treatment (*Evans, 1956).

Objectives:

1. To determine the effectiveness of foliar applied Mo to reduce nitrate-nitrogen levels in johnsongrass forage
2. To determine effectiveness of Mo impregnated fertilizer application in reducing occurrence of toxic nitrate-nitrogen accumulation in johnsongrass forage.

Materials and Methods:

- Johnsongrass was mowed to an average height of six inches on June 7
- Nitrogen fertilizer was applied at 0, 50 and 150 lb/acre of N on June 7
- Potash was applied according to soil test recommendations
- Plant samples were collected from all plots on days 11, 18, & 25 after N fertilizer application
- Samples were dried for 72 hours at 55°C and analyzed for nitrate nitrogen at the U of A Agricultural Diagnostic Laboratory

Mo foliar application study

- Compared foliar applied Mo with an untreated control at three levels of nitrogen fertilization for effect on nitrate-nitrogen concentration in johnsongrass
- Plots receiving Mo were sprayed with sodium molybdate at 10 ounces/acre on day 11 after N application

Mo Impregnated fertilizer study

- Compared plant nitrate-nitrogen concentration of johnsongrass treated with Mo applied as an impregnated fertilizer treatment with an untreated control at three levels of nitrogen fertilization.
- Plots receiving Mo were treated with 25 ounces per acre of Mo as sodium molybdate impregnated on the potash fertilizer on the same day as the N application

Results:

- Foliar application of Mo had no significant effect on forage nitrate-nitrogen concentration in johnsongrass (Figure 1)
- Fertilizer-impregnated application of Mo had no significant effect on forage nitrate-nitrogen concentration in johnsongrass (Figure 3)
- Forage nitrate-nitrogen concentration increased with increasing fertilizer N rate (Figures 2 & 4)
- Nitrate-nitrogen was highest at the first sample date on day 11 and declined over the next two sampling dates
- Nitrate-nitrogen concentration was above safe levels at each sampling date for the 150 lbs/a N fertilizer rate
- Nitrate-nitrogen concentrations on second-cutting regrowth on August 6 were below the threshold level of 700 ppm

Conclusion:

Application of Mo as foliar applied or impregnated fertilizer did not reduce incidence or concentration of high nitrate-N levels in post-application samples of johnsongrass forage
Forage nitrate concentration was not as high as expected at the highest N rate
Application of nitrogen fertilizer at 150 lbs/a increased nitrate-nitrogen concentrations above safe levels (700ppm)

*Evans, H.J. 1956. Role of molybdenum in plant nutrition. Soil Sci. 81:199-208.

Figure 1:
Effect of Mo applied as impregnated fertilizer on nitrate-nitrogen concentration of johnsongrass

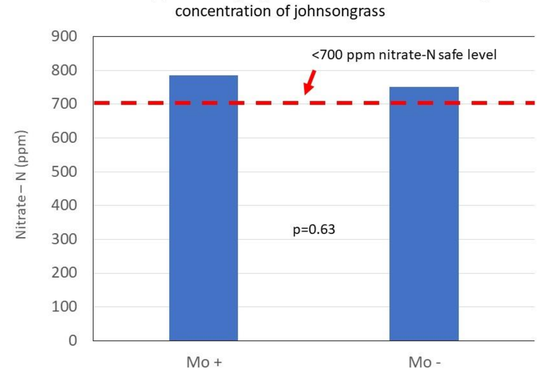

Figure 2: Mo Impregnated Fertilizer Trial
Effect of N rate and sampling date on nitrate-nitrogen concentration of johnsongrass

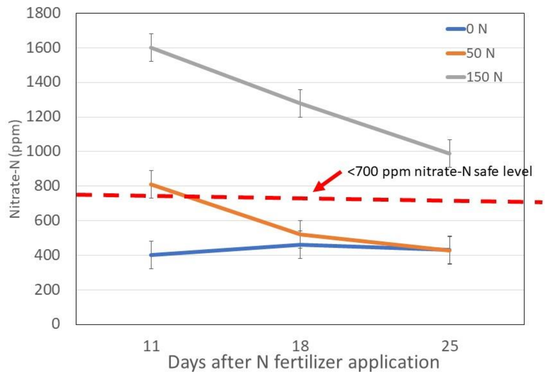

Figure 3:
Effect of foliar Mo application on nitrate-nitrogen concentration of johnsongrass

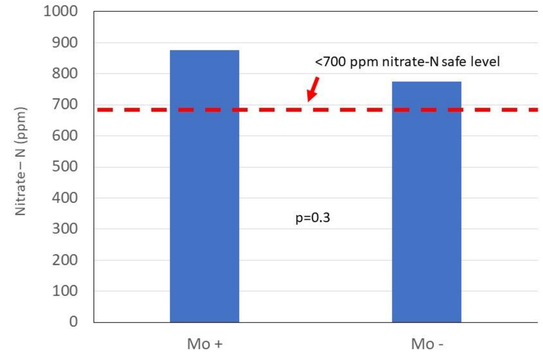

Figure 4: Mo Foliar Application Trial
Effect of N rate and sampling date on nitrate-nitrogen concentration of johnsongrass