

Bromegrass is an important forage in eastern Kansas. Have you ever wondered if farmers are optimizing forage production from their bromegrass fields? If they are not, have you wondered if bromegrass will respond to nitrogen and phosphorus applications?

An extensive study that included 31 site-years was conducted on farmers' fields in Douglas, Jackson, Johnson, Miami and Nemaha Counties to address this question. All sites had been in bromegrass for 15 years or more. Soil test results indicated all sites had organic matter levels greater than 3 percent and soil test phosphorus levels ranged from 4 ppm to 15 ppm. The nitrogen treatments included 0, 40, 80 and 120 pounds N per acre with 0 phosphorus and a phosphorus treatment of 30 pounds P_2O_5 per acre that was combined with the 40, 80, and 120 pounds N per acre treatments, which totaled seven nitrogen-phosphorus (N-P) treatment combinations (0 N-0 P; 40 N-0 P; 80 N-0 P; 120 N-0 P; 40 N-30 P; 80 N-30 P; and 120 N-30 P). Nitrogen and phosphorus applications were surface broadcast in February either as ammonium nitrate or urea as the N-source and triple superphosphate as the P-source.

Averaged over the 31 site-years, forage yields were 2530, 4720, 5360, 6100, 5320, 6310, and 6930 pounds per acre for the 0 N-0 P, 40 N-0 P, 80 N-0 P, 120 N-0 P, 40 N-30 P, 80 N-30 P, and 120 N-30 P treatments, respectively. There was an increase of 2190 pounds of forage per acre or a 87 percent increase in forage yields when the initial 40 pounds of N per acre were applied. There was an additional 14 percent forage yield increase as the nitrogen rate increased up to 80 pounds N per acre and interestingly, there was another 14 percent yield increase as the nitrogen rate was increased from 80 pounds N per acre to 120 pounds N per acre. Overall, that's an excellent nitrogen response.

When 30 pounds P_2O_5 per acre were added to the 40, 80 and 120 pounds N per acre treatments, forage yields increased by 13, 18, and 14 percent over the 40 N-0 P, 80 N-0 P, and 120 N-0 P treatments, respectively. And looking closer, 40 pounds N with 30 pounds P_2O_5 and 80 pounds N with 30 pounds P_2O_5 per acre had approximately the same forage yields as the 80 and 120 pounds N per acre rates without phosphorus, respectively. It would appear there's a possibility of getting a "bigger bang" from your nitrogen dollar when phosphorus is added. However, there were some sites that did not respond to the phosphorus applications because they had medium soil test phosphorus levels, thus making them less responsive to phosphorus applications.

What's the bottom line?

Properly managed, bromegrass is a highly productive and excellent forage for eastern Kansas. It responds well to nitrogen and phosphorus applications. In this set of studies, nitrogen applications increased forage yields with every incremental increase of 40 pounds N per acre up to 120 pounds N per acre.

Consequently, there was a 141 percent increase in forage yields for the 120 pound N per acre treatment over the 0 N-0 P treatment. There was an additional forage yield increase when 30 pounds P_2O_5 per acre were added to the nitrogen rates. However, it should be noted that not all bromegrass fields will respond to phosphorus applications. If soil test phosphorus levels are in the medium test range or higher, a response to phosphorus applications may be negligible. Therefore, taking a soil test to determine phosphorus levels and appropriate phosphorus applications is important for optimal forage production.

For more details about this research see:

Kansas Fertilizer Research 1994-2001. Bromegrass Fertilization Studies. Report of Progress 719, 749, 778, 800, 829, 847, 868, 885. K-State Research and Extension

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