

# Effect of Fertilizer on Yield of Native Grass

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Fertilization of native grass fields is generally not recommended in the Southern Great Plains region of the United States. The primary reason for not fertilizing native grass is the belief that the benefit of fertilization is outweighed by the fertilizer and application costs. Native grass plant communities contain a mixture of grass, broadleaf and woody perennial plant species, and compose a large percentage of the forage base in this area.

A research project was developed to determine the effect of fertilizer rate on yield and profitability of native grass. The project had two locations: St. Louis, Okla., (Pottawatomie County) and Ardmore, Okla. (Carter County). The test at each location had five fertilizer rates: 0-0-0, 50-0-0, 50-50-0, 100-0-0 and 100-50-0 pounds per acre of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O. Each location was replicated three times. The test was conducted in 2008 and 2009.

The soil series at the St. Louis site was Aydelotte clay loam and the soil series at the Ardmore site was Weatherford fine sandy loam. Soil test results showed very low levels of phosphorus (Mehlich 3 soil test P levels of 6 pounds per acre at the St. Louis site and 8 pounds per acre at the Ardmore site). The St. Louis site had a better stand of native grass than the Ardmore site, due to a combination of past management practices and more productive soil.

Fertilizer was applied to existing stands of native grass in April of each year. Fertilizer sources were ammonium nitrate (34-0-0) and diammonium phosphate (18-46-0). Plots were harvested in mid-July of each year and then again after frost. This



*Derick Warren, Ag Research Assistant, harvests native grass plots at the St. Louis, Okla. location.*

was done to mimic either intensive grazing or a hay harvest in early summer, then grazing after frost. Quality measurements for crude protein and total digestible nutrients (TDN) were collected at each harvest. An economic analysis was conducted on

each treatment to determine profitability. The economic analysis used input prices and forage values that were present at the time of the study. Differences in input prices, forage values or both could change the results of the economic analysis. Yields and ►

profitability rankings are shown in Table 1.

## Findings

Fertilizing native grass resulted in large increases in yield. At both locations, applying 50 pounds of nitrogen per acre produced yields as high as those obtained with 100 pounds of nitrogen per acre. It was essential to apply phosphorus along with the nitrogen to optimize yields on these soils which have low soil test phosphorus levels.

There were no clear differences in crude protein or TDN among fertilizer treatments. All treatments produced similar forage quality.

There were no significant differences in profitability among treatments except for the 100-0-0 per acre fertilizer treatment. This treatment was less profitable than the other systems. All other systems were equally profitable within a 95 percent probability level. When there is no clear economic benefit to fertilization, it is usually not recommended due to increased risk associated with the added cost.

We are currently evaluating the test to see if there are carryover effects from the fertilizer treatments. The plots were fertilized in 2008 and 2009, and were not fertilized after

Table 1. Effect of fertilizer rate on yield and profitability ranking of native grass at two Oklahoma locations (two-year average 2008-09)

Treatment	Location		Profitability Ranking 1 = most profitable 5 = least profitable
	St. Louis, Okla.	Ardmore, Okla.	
0-0-0	2536 D	1504 B	1 A
50-0-0	3674 C	2213 B	3 A
50-50-0	4648 AB	3720 A	4 A
100-0-0	4014 BC	2161 B	5 B
100-50-0	5212 A	4024 A	2 A

those years. The plots were harvested in 2010, and plots that received phosphorus (P) in 2008-09 yielded significantly more than any of the other treatments. The plots were harvested again in 2011, and there were no yield differences in any of the plots, but overall yields were very low due to severe drought. We will continue to harvest the plots each year until yield differences between plots disappear. This could revise the profitability figures if there is a long-term carryover effect of fertilization.

## Recommendations

1. If there is sufficient land area available to run the number of cattle desired, do not fertilize native grass. Economic analysis showed that not fertilizing native grass was as profitable as applying relatively large amounts of fertilizer.

2. If a rancher needs to increase carrying capacity and does not have introduced species such as bermudagrass available to fertilize, an application of 50 pounds of nitrogen per acre plus the amount of phosphorus and/or potassium recommended from soil test results can roughly double the carrying capacity of the land if sufficient rainfall occurs to allow the grass to fully utilize the fertilizer. Proper grazing management must be incorporated into this plan to ensure that overgrazing does not occur.

3. If the decision is made to fertilize, soil tests from each field to be fertilized are essential. Do not fertilize without determining the amount of phosphorus and/or potassium that are needed along with the nitrogen. ■

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