

## Fertilizing Grasses and Mixed Stands

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Nitrogen, grasses and forages: Several researchers from MSU (S. Lorbeer, J. Jacobsen, H. Houlton, R. Lund, J. Martin, and G. Carlson) reported in an article in the Montana AgResearch (Spring, 1994, pg. 7-11) on a study involving nitrogen fertilization of grass stands near Havre. They reported on the results of a study of top-dressing dryland hay/grasses with nitrogen. They proposed that application of nitrogen to dryland hay could be profitable.

In a six-year study in North Dakota involving western wheatgrass, blue grama, thread-leaf sedge, nitrogen rates of 0, 30, 60, 120, 240, and 480 lbs/acre were compared. All N was applied either: 1) the first year, 2) split into three equal amounts and applied in the first, second, and third years of the study, or 3) equally split between six years. They concluded that timing, i.e., all at once, first three years, or every year, made no difference in total production. However, total production increased with N application. They reported: since a single N fertilizer application increased production for multiple years, the additional time and expense of smaller annual applications could not be justified.

J. Wight and A. Black conducted a study near Sidney where they fertilized a mixed stand of cool season grasses, forbs, sedges, and shrubs with nitrogen and phosphorus. They reported that over a 10-year period, the yields on the fertilized plots were increased 114 percent over the check. In a couple wet years, the yields from the fertilized plots were as much as 218 percent of the check plots. However, when P was applied without N, there was little or no increase in yield. They concluded that for non-legume crops, a balanced N and P fertilizer program was necessary.

The study reported by Lorbeer and others was carried out near Havre, starting in 1971. Nitrogen fertilizer rates were 50 and 100 lbs N/acre, applied to several different grasses, both introduced and native. All N was applied the first year of the study and yields were measured for the next six years. They reported that introduced grasses such as crested wheatgrass, Russian wild-rye, and tall wheatgrass responded better to N fertilizer than did native grasses. The addition of N the first year increased yields in five of the six years of harvest. Their results showed that on these grassland sites, fertilizer N will become available several years after it is applied - apparently positive climatic factors (favorable rainfall and warm temperatures) may subsequently release previously applied N. A single application of 100 lbs N/acre produced a cumulative yield increase of 2,852 lbs/acre over the check during six years. The total increase with a single 50 lbs N/acre application was 2,573 lbs/acre.

In summary

- Introduced grasses responded better to N fertilizer than native grasses
- N (as fertilizer) did not need to be applied each year; when conditions are good, the plants used the available N stored in the soil
- During dry seasons, much of the fertilizer N remains for the following year
- At least two to three years of positive response to fertilizer N are likely to



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occur after application

- A single application of N fertilizer may produce benefits for as much as five or six years after application
- Using costs and values of \$40/ton for hay and \$210/ton for N fertilizer, 50 and 100 lbs N/acre in one year would have resulted in \$46 and \$39 more return per acre over the six-year period
- Fertilizing grasses at 50 lbs N/acre produced more profit over time than fertilizing grasses at 100 lbs N/acre.