March 2008 Newsletter
Fact Sheet: Fertilizing Alfalfa and Pasture

Careful water and fertilizer management are required to maximize production of alfalfa and pasture, the two commonest crops grown in the Hammond Conservancy District (HCD). In about a month (April 15), irrigation water will again be available to landowners in the District and, if fertilizer was not applied in the fall, now (March) is a good time to fertilize. Fertilizer costs are at an all-time high so it's important to apply the recommended amount – not too little and not too much. This fact sheet provides some fertilizer recommendations for alfalfa and pasture based on studies conducted by various researchers at universities in the western U.S.

Alfalfa (no grass):

Nitrogen

Alfalfa, as a legume, has a symbiotic relationship with nitrogen fixing bacteria (rhizobia) that grow in nodules on the plant roots. These microorganisms 'fix' atmospheric N^2 into a form (i.e. ammonia) that can be used by the crop in the formation of amino acids, proteins, vitamins and nucleic acids. Consequently, except for newly planted alfalfa seedlings, which may benefit from a small quantity of supplemental N fertilizer (20-50 lbs/N acre) for establishment, N fertilization of established alfalfa is usually not required.

Phosphorus (P)

An adequate amount of phosphorus (P) is essential for maximum production potential of alfalfa and this is probably the element that is most lacking in soils of the HCD. An analysis of soil samples taken from the top foot of soil will indicate if soil P deficiencies exist and it will provide guidance on how much to apply to correct the deficiencies. Generally, if soil analyses show a P concentration of greater than 15 ppm, P fertilization is probably not required. If soil P is less than 15 ppm, the following fertilizer guidelines have been recommended:

Test Value (P)	**Classification**	**lbs. of P_2O_5 to apply per ton of hay**
0 – 3 ppm	Very deficient	20 - 25
4 – 7 ppm	Deficient	15 - 20
8 – 10 ppm	Marginal	10 - 15
11 – 15 ppm	Adequate	5 – 10
> 15 ppm	High	0 - 5

Note that P recommendations are based on the production potential of the alfalfa stand. For example, if hay production is expected to be 5 tons per acre, and the soil test indicates P to be very deficient (i.e. less than 4 ppm), the recommended P fertilization level would be between 100 to 125 lbs P_2O_5/acre (20 or 25 x 5).

Some common fertilizers used to correct P deficiencies include:

Dry, granular products that are broadcast:

- Treble superphosphate (0-45-0) – 45% P_2O_5
- Ammonium phosphate (11-52-0) – 52% P_2O_5 plus 11% N

Liquid products that are dribbled, sprayed, banded or applied with irrigation water*:

- Ammonium polyphosphate (10-34-0) – 34% P_2O_5 plus 10% N
- Phosphoric acid (0-52-0) – 52% P_2O_5

*Liquid phosphorus fertilizers may have advantages over dry forms in that they are capable of being injected into the irrigation water and the P may become available quicker. However, they are generally more expensive and, when injected, can form a precipitant in irrigation pipes which can decrease water flow and plug sprinkler nozzles if not adequately flushed.

Manure:

Animal manure can also provide P (and other nutrients) to the soil but they should be used with caution due to potential build up of salts and weed seeds. It is best to send a sample of the manure to a lab for analysis to establish effective and safe rates.

Notes:

Phosphorus is not very soluble and hence is relatively immobile in soil, compared to N and K (potassium), so it will take some time (60-90 days) before it becomes available to the plant. Therefore, it should be applied as early in spring as possible (or in late fall after the final alfalfa harvest). Because of its insolubility, when it's broadcast to the soil surface, it can easily be carried off the field with runoff water, contributing to stream and river pollution. Because of this, excessive irrigation that results in runoff should be avoided.

In most cases, soils of the HCD contain sufficient levels of the other macronutrients (S and K) and most micronutrients except for possibly iron (Fe) and Zinc (Zn). Soil sample analyses will identify nutrient deficiencies and may provide fertilizer recommendations to correct the deficiencies.

To get a soil sampling kit, which includes sampling instructions; contact New Mexico State University's Cooperative Extension Office in Aztec 334-9492.

Grass only (no alfalfa):

Nitrogen

Solid grass pastures will benefit from N fertilization. In fact, many studies have shown grass hay production from fertilized fields (i.e. 150- 200 lbs N/acre) to be 2 times or more that of unfertilized fields (i.e. 1.5 tons dry hay /acre to more than 3 tons dry hay/acre). Nitrogen may be a component of various fertilizers but it appears the two most common products available in the Farmington area are urea (46-0-0) and ammonium sulfate (20-0-0). Unfortunately, for security and safety reasons, many dealers no longer carry ammonium nitrate (34-0-0) fertilizer.

Since 2 to 3 cuts of grass hay are possible on the HCD, N fertilizer should be applied in split applications (i.e. 50-60% in early spring, and 20-30% after the first and second cuts) for maximum effectiveness.

Other Elements

Although phosphorus (P) and potassium (K) may also be lacking in some soils, the benefits of fertilizing grass pastures with these elements may not be as obvious as with N and P. However, for maximum efficiency of N fertilization, these nutrients should be at adequate levels for maximum production potential. Preseason soil tests will identify deficits and provide an indication of how much to apply, if necessary.

Grass/Alfalfa Mixtures

Nitrogen

There is little need for additional N fertilizer in mixed pasture or hay fields if alfalfa makes up more than 50% of the stand. If the percentage of alfalfa is less than 50%, some N fertilizer may be beneficial. As a general rule, it is recommended that N fertilizer on mixed pasture or hay fields be reduced from solid grass pasture recommendations by the percentage of alfalfa. For example, if 100 lbs N/acre is recommended for a solid grass pasture but 25% of the forage consists of alfalfa (or other legume), the applied N fertilizer recommendation would be 75 lbs N/acre (100 – 0.25 x 100).

Other Elements

P and K (and micronutrient) fertilization should be based on results from soil sample analyses.

For more details click on the link below ‘Fertilizing Alfalfa and Grasses’:
http://www.ext.colostate.edu/PUBS/CROPS/00537.html

For a series of interesting articles on grass pastures for cattle production see:
http://www.sharpseed.com/pdf/Irrigated%20Pastures%20Book.pdf