

4. When the recommended amount of P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O is small, e.g., 20 lbs/A, the grower must identify the minimum amount that can be practically applied. Often a choice must be made between applying no fertilizer this year or applying a larger amount, e.g., 50 lbs/A, which will supply the crops for the next two years.
5. Changing the recommended amount of P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O by 10 to 20 lbs/A seldom results in observable differences.

**ADDITIONAL INFORMATION**

Additional information may be obtained from University of Delaware Cooperative Extension Service offices in Newark, Dover, and Georgetown.

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Revised: August, 1999



**SOIL TEST NOTES**

**NOTE 3: Forage Crops**

**LIME**

In general, incorporation and thorough mixing of limestone to a depth of at least inches is necessary for best results. Thus, it is best to lime prior to seeding forage crops, particularly perennial crops. Uniform spreading is also important. The following are guidelines for lime applications where tillage is possible.

**Applications of more than 2.0 T/A** -- 1/2 to 3/4 of the lime should be spread, disked into the soil, and plowed under. The remainder can then be spread and disked in. This method results in good incorporation and mixing - important when the pH is low and the lime rate is high. This should be done as far in advance of planting as possible to allow time for the lime to react. Re-sample the field in 4 to 6 months to see if further liming is necessary.

**Applications of 2.0 T/A or less** -- All of the lime can be spread in a single application. At rates of 1.5 to 2.0 T/A, disking in the lime, followed by a plow-down and re-disking gives best results. For applications of 1.0 T/A or less, disking to 6 inches alone is usually adequate.

Existing pastures and hayfields may be renovated by topdressing limestone. This practice is less likely to produce satisfactory results when the recommended rate of application exceeds 1 to 2 tons /A. Where the existing stand is in poor condition and not yielding well, it would be worthwhile, where possible, to plow up the existing sod, apply lime as described above, and re-seed. This is especially important for alfalfa, a very acid-sensitive crop that declines markedly when the soil pH is too low.

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## **NITROGEN**

Established pastures and hayfields where legumes such as alfalfa and clover are the dominant species require no nitrogen fertilizer. The legumes fix enough N from air in the soil to satisfy their own needs, and provide enough extra N, through decomposition of residues, to nourish the grass species as well. However, as the percent clover in a mixed grass-clover stand drops below about 50%, N fertilization or re-seeding of the clover will be necessary to insure an adequate supply of N and top yields. Forage quality also depends heavily on nitrogen, a major component of protein. If fertilization is chosen, apply 50 lbs/A N in early spring and an additional 25-50 lbs/A after each cutting or grazing. Similarly, if an alfalfa stand contains less than about 25% alfalfa, fertilization or re-seeding is necessary. Fertilizing legume stands with N will tend to promote growth of grasses which will force out the legume, eventually resulting in a 100% grass stand.

Over-fertilizing forage with N can lead to a high nitrate level in the forage which is toxic to some livestock. Care should be taken when fertilizing forages and when applying N-containing materials such as manure.

When seeding forages, some nitrogen should generally be applied at planting, even for alfalfa. The recommended rates are 20-40 lbs/A N for alfalfa, 0-30 lbs/A for clover-grass mixtures, and 20-60 lbs/A for grass alone. In addition, legume seed should be inoculated with the proper type of nitrogen-fixing bacteria. This is especially important if the field has not had a recent, successful crop of the same legume as is being planted.

## **PHOSPHORUS, POTASSIUM**

Most Delaware soils test high in phosphorus. When the soil test is low, it is preferable to broadcast and incorporate the recommended P prior to seeding. At medium soil test levels, topdressing phosphorus gives satisfactory results. For alfalfa seedlings, banding P with the seed helps to develop good stands by stimulating root and seedling growth.

In general, all of the recommended potash can be topdressed in the early spring for both seeding and maintenance of forages. For seedings this can be done before or after planting, with or without incorporation. Alfalfa is unique in its very high K requirement and its

ability to take up large, "luxurious" quantities of K. When the recommended rate of potash is greater than 90 lbs/A K<sub>2</sub>O, it is best to topdress alfalfa using split applications, one in early spring and one after each cutting. This insures adequate availability of K to the crop and prevents wasteful crop removal of K by the early cuttings.

## **TRACE ELEMENT NEEDS**

The only trace element deficiency known to occur on forage crops grown in Delaware is boron deficiency on alfalfa. Alfalfa has a very high boron requirement and generally should receive 2 lbs/A actual B annually as a broadcast application. See *Soil Test Note 4* for more information on boron needs and fertilization.

## **FERTILIZER DECISION-MAKING**

Your soil test report contains only a suggested fertilizer program. It represents the best information available and considers crop, soil, and management factors to the extent that these are known. The grower has additional information available to them regarding management and individual field history as well as the field experience necessary to make management decisions. Modifications of the suggested fertilizer program may be appropriate. The grower must make the final decision whether or not to modify the fertilizer program for specific situations. When doing so, the following points should be considered:

1. The amount of fertilizer recommended is based on the best management practices currently in use and is designed to produce maximum economic yields assuming that no other factors such as temperature, moisture, disease, etc. are limiting yields.
2. Recommendations will be more reliable for the more common crops and soil types in the state due to the greater amount of information available.
3. When the soil test level is very low or low, banding fertilizer will maximize yields immediately but will not raise the soil test level. Alternatively, broadcast applications at the appropriate rate will raise the soil test level over a period of time but yields may not be optimal the first year. Where possible, a combination of the two methods may be the best practice.