

## A. SOIL TESTING TO MAINTAIN OPTIMUM SOIL FERTILITY

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The maintenance of optimum soil pH and adequate phosphorus and potassium levels in the soil are important factors for turfgrass growth. Periodic soil testing is a valuable management tool to monitor these pH and nutrient levels.

### Soil Sampling

A meaningful soil test is dependent upon proper soil sampling. A representative soil sample from a uniform area is necessary. Always sample the soil at the same time of the year that previous samples were taken. Twelve to fifteen subsamples from the 0-2 or 3 inch soil depth should be taken throughout the area with a soil probe or small trowel. If there is a significant thatch layer (3/4 inch or more), it may be desirable to sample and test the thatch separately to determine the thatch pH. Otherwise, include the thatch layer with the soil sample. Mix the subsamples together in a clean plastic pail. Package at least 1/2 pint of soil and send it to your county Cooperative Extension Service Office or a reputable commercial soil testing laboratory.

### Test Results

Be sure the soil testing laboratory makes recommendations specifically for established turf. Lime and nutrients cannot be worked into the soil to the 9 or 12 inch soil depth that farmers plow their fields. Recommendations should be based on the needs for the top 3 inches of soil.

The soil test report should give the pH and list a specific lime recommendation in pounds per acre or pounds per 1000 square feet. Nutrient levels are usually given in pounds per acre and the test results should list the amount of phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ) needed to bring those levels to an optimum. Most labs will also test for micronutrients and soluble salts for an additional fee.

### Adjusting Soil pH

Turfgrasses vary as to the optimum pH range for growth. Usually these ranges are quite broad. Most grasses prefer a pH in the range of 6.0-7.0. Kentucky bluegrass and perennial ryegrass will tolerate higher pH's while sheep fescue and fine fescue are tolerant of lower pH's. Any pH adjustment should be based upon the turfgrasses growing in the area.

Low pH (acid) soils are rather easily corrected by liming. Ground limestone (calcium carbonate) is the most widely used material due to low cost and general availability. Dolomitic limestone is usually preferred for turf because it contains magnesium as well as calcium. Particle size of the liming material determines how fast it will react. At least 50 percent of the ground limestone should pass a 100-mesh sieve. As a general rule, a maximum of 25 to 50 pounds of ground limestone should be applied to established turf in one year. The pH should be rechecked in 2 to 3 years to determine further lime needs.

Other liming materials can be used for turf but may contain impurities, be difficult to apply or injure the turf under stress (calcium hydroxide, for example).

High pH (alkaline) soils are more difficult to correct. At a pH of 7.5 or above, some turfs may show deficiencies of iron. Sulfur can be used to lower the pH of the soil, but the potential for turfgrass injury is quite high. Table 1 shows the effects of sulfur on soil pH and turfgrass injury on a sand soil at Traverse City. The powdered form of sulfur (flowers of sulfur) is faster acting than the ground form, but has more potential for injury. As a general rule, a single application of readily oxidizable sulfur (powdered form) should not exceed 5 pounds per 1000 square feet. Avoid sulfur applications during the summer stress periods. To prevent excessive acidification, recheck the soil pH in the 0-2 inch soil depth every one to two years prior to further sulfur applications. Remember, when using sulfur to lower soil pH, proceed cautiously!

### Phosphate and Potash

Adequate phosphorus (P) and potash (K) levels should be present in the soil to ensure turfgrass vigor and stress tolerance. A soil test report will indicate P and K levels in the soil and should include a recommendation for additional phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ). If the soil test indicates quite high levels of P and K, recommendations from most soil testing labs will be based on maintaining adequate P and K. In this case, retest the soil every 3 to 5 years. If the P and K tests are very low, the recommendation is designed to build up the levels of these nutrients, and the soil should be retested within 2 years. Tables 2 and 3 show the annual  $P_2O_5$  and  $K_2O$  applications based on M.S.U. soil tests.

Recommendations for  $P_2O_5$  and  $K_2O$  are usually made for a 2-3 year period. For example, if 2 pounds of  $K_2O$  per 1000 square feet is recommended, this level should be applied each year for 2-3 years or until the next soil test is taken. Rates higher than 1 pound per 1000 square feet per year of  $P_2O_5$  or  $K_2O$  are best split into multiple applications of 1 pound per 1000 square feet or less and spread over the entire season to prevent turf injury. Phosphate and potash can be supplied through complete fertilizers or can be supplemented by carriers containing only  $P_2O_5$  or  $K_2O$ .

Most soils will not readily lose P and K through leaching. In sands, however, potassium can be readily leached, especially when the turf is irrigated. Supplemental  $K_2O$  is recommended in these situations, and the necessary rate may even be close to the annual level of nitrogen that is applied.

### B. NEW TURFGRASS PUBLICATIONS

As many of you already know, we have a new bulletin series entitled "Turf Tips". These bulletins are short, single topic publications. Some are designed for both homeowners and commercial people while others are mainly geared towards commercial turf managers. The series is continuing to expand as we add new topics, and will eventually be comprised of 30 or more titles. Single copies can be obtained, usually free of charge, from your county Cooperative Extension Service Office or from the bulletin office located in room 10 in the basement of Agriculture Hall. Bulk copies are available in the Central Services Building on the third floor.

In addition to the bulletin series, we have put together a Turfgrass Management Handbook. This contains all of the Turf Tips as well as Turf mimeos, other turf related publications from M.S.U. and publications from North Central