

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

Region. All publications are placed in a handsome binder, indexed and supplemented with new material periodically. Supplements are guaranteed until January, 1984. The cost to MTF members is \$8.00 and for non-members, \$15.00. MTF members who purchased the notebook originally for \$15.00 as well as non-members who join the MTF before October 1, 1981, will receive a \$7.00 refund in the mail.

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Table 15. Sulfur effects on soil pH and Kentucky bluegrass injury.
 Treatments applied to Kalkaska sand in October, 1978.
 Ratings taken in 1979.

Treatment		Soil pH (11/79)		Turf Quality Rating (9 = best)	
Source	Rate (lbs/M)	0-2 inch	4-6 inch	Sept 13	Dec 11
None	-	6.9	6.6	9.0a*	6.3a*
Powder	5	6.4	6.2	9.0a	7.0a
Powder	10	5.4	6.0	6.5b	5.7b
Powder	20	4.6	5.8	1.0c	2.0c
Ground (Chip)	5	6.5	6.3	9.0a	6.7ab
Ground (Chip)	10	6.6	6.6	9.0a	6.7ab
Ground (Chip)	20	6.0	6.2	9.0a	6.7ab

*Numbers in columns followed by the same letter are not significantly different from each other at the 5% level.

Table 16. Annual Phosphate (P₂O₅) Applications Based on M.S.U. Soil Tests.

Soil Test (lbs. P/Acre)	Pounds Phosphate (P ₂ O ₅) Recommended			Recommendations based on:
	General Turf		High Maintenance Turf*	
	Per 1000 Sq Ft	Per Acre	Per 1000 Sq Ft	
Less than 15 (very low)	3	130	4	Buildup
16-25 (low)	2	85	3	Buildup
26-40 (medium)	1	45	2	Maintenance
41-70 (high)	0	0	1	Maintenance
More than 70 (very high)	0	0	0	

* High maintenance turf would include golf greens and tees.

Table 17. Annual Potash (K₂O) Application Based on M.S.U. Soil Tests.

Soil Test (lbs. K/Acre)	Pounds Potash (K ₂ O) Recommended			Recommendations based on:
	General Turf		High Maintenance Turf*	
	Per 1000 Sq Ft	Per Acre	Per 1000 Sq Ft	
Less than 50 (very low)	4	170	5	Buildup
51-101 (low)	3	130	4	Buildup
101-175 (medium)	2	85	3	Intermediate
175-250 (high)	1	45	2	Maintenance
More than 250 (very high)	0	0	1	Maintenance

* Including golf greens and other high maintenance turf on sandy soils with high irrigation rates.