EFFECTS OF MANGANESE APPLICATIONS ON TURFGRASS QUALITY

Among the micronutrient required for plant growth, iron is used most widely on turfgrasses to improve turf color even though an iron deficiency has not been observed in Michigan. Manganese is suggested as another micronutrient to which turfgrasses might be responsive under certain conditions. In Michigan, many soils test moderately low to low in available manganese, particularly some of the finer-textured soils in eastern Michigan which have Ph levels well above 7.0. A few companies which sell fertilizers recommend the application of manganese on many turfs in Michigan. With these points in mind, we initiated a study at the Hancock Turfgrass Research Center to evaluate the effect of applications of manganese on a Penncross creeping bentgrass green. Treatments applied are given in Table 3. Manganese sulfate was applied at the rate of 1 or 2 ounces per 1000 sq. ft. on the dates shown. For comparison purposes, ferrous sulfate was applied at 2 ounces on the same dates. There was also an untreated check. Plot size was 4 feet by 6 feet. There were 3 replications of each treatment.

Applications of iron consistently provided the best quality turf. On some dates there were no differences among treatments. There appeared to be no consistent benefit from the application of manganese on this putting green.

A separate study was established in August on the putting green to determine if there was any phytotoxicity caused by the application of manganese. In this case treatments were not watered in. Data in Table 4 indicate there was no phytotoxicity from the manganese applications. Buy contrast, 2 ounces of ferrous sulfate caused some phytotoxicity. While foliar applications of iron sulfate have been used for years to improve turf quality, it is clear that too frequent use or applications at too high rates can result in reduced turf quality. When using iron to improve turf color, watch for leaf tip burn in particular.

TOPDRESSING STUDIES

A topdressing study was established in 1986 on a Penncross creeping bentgrass green at the Hancock Turfgrass Research Center. Treatments applied are outlined in Table 5. Materials applied are sand; 80% sand with 20% peat; and 60% sand with 20% peat and 20% loam soil. Each was applied under two topdressing programs: either twice annually (spring and fall) at the rate of 12 cu. ft. per 1000 sq. ft. (referred to as heavy and infrequent) or at 3 cu. ft. per 1000 sq. ft. every 3 weeks during the growing season (referred to light and frequent program). One other set of plots was aerified both spring and fall followed by application of sand at the 12 cu. ft. rate. There was also an untreated plot (Check). There were 3 replications of each treatment.

After 5 years of treatment, generally consistent patterns in turf quality ratings continue to occur. Most years turf quality has improved after topdressing whether for the light and frequent

Table 3 Manganese Sulfate Study
Color Ratings 9 = Dark Green 1 = Pale Green
Initiated July 25, 1990
Treatments Applied, 7/25, 8/10, 8/23, 1990

Treatment	Rate oz/M	Rating Dates					
		7/25	8/10	8/13	8/15	8/24	8/27
$MnSO_4$	1	7.5a*	8.2a	8.0ab	8.0ab	7.5 c	7.5 b
$MnSO_4$	2	7.8a	8.0ab	7.5 b	7.5 b	7.6 bc	7.2 b
$FeSO_4$	2	8.5a	8.5a	8.5a	8.5a	8.6a	8.2a
Check	---	7.5a	7.2 b	7.5 b	7.8ab	8.0 b	7.4 b

* - Means followed by the same letter are not significantly different at the 10% level using Duncan's Multiple Range Test.

Table 4 Manganese Sulfate Study
Unwatered Treatment Evaluation, Burn and Quality
Treated, August 23, 1990
Burn, 9=dead, 1=No Burn, Quality, 9=Excellent, 1=Poor

Treatment	Rate oz/M	Rating Date August 24, 1990	
		Burn Rating	Quality Rating
$MnSO_4$	1	1.5 b*	7.2a
$MnSO_4$	2	1.0 b	7.1a
$FeSO_4$	2	2.8a	7.6a
Check	---	1.0 b	7.1a

* - Means followed by the same letter are not significantly different at the 10% level using Duncan's Multiple Range Test.