

Subsurface Phosphorus Fertilization with Water Injection

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The use of sand for putting green construction and topdressing material produces a root zone having a low nutrient retention capacity. Because of low nutrient reserves in a sand-based root zone, nutrient deficiencies are likely to occur when a particular nutrient is neglected in a fertility program. Phosphorus is one nutrient currently being found deficient in some sand-based root zones.

This study was designed to evaluate the effect of phosphorus fertilization on a loamy sand soil having a deficient level of phosphorus in the surface 3 inches of the root zone. Two methods were used to apply phosphorus to the soil: i) surface applied spray, and ii) subsurface injection with water. The treatments were 1) check (no phosphorus), 2) water injection (no phosphorus), 3) 2.5 lb P₂O₅/1000 sq. ft./year spray, 4) 2.5 lb P₂O₅/1000 sq. ft./year injected, and 5) 5.0 lb P₂O₅/1000 sq. ft./year injected. Data is being collected on phosphorus levels in the thatch and soil, clipping yield, and root growth. Treatments were applied in two applications on 17 August and 13 October, 1990.

Injection application increased phosphorus levels more uniformly throughout the soil profile (9 inches) compared to the spray application. The spray application of phosphorus resulted in very high phosphorus levels in the thatch layer.

Visual quality improved within 10 days after treatment on plots sprayed with phosphorus (Table 1). Plots receiving injection of phosphorus had a gradual improvement in quality compared to the spray application and by 19 June, 1991 surpassed the spray application treatment in visual quality ratings. The water only injection treatment improved turf quality by 2 Aug, 1991 compared the check suggesting that root growth may have extended below the depth where soil phosphorus levels were deficient.

Table 1. Visual quality of creeping bentgrass as influenced by spray and injection application of phosphorus.

Treatments	8/27/90	5/8/91	6/19/91	8/2/91
	----- Visual Quality (9=ideal) -----			
Check	6.8 b	3.2 b	4.2 c	5.2 c
Water Inject	6.5 b	3.8 b	4.8 c	6.8 b
Spray 2.5#/M	8.0 a	5.5 a	6.0 b	6.2 b
Inject 2.5#/M	6.0 b	5.2 a	7.0 a	8.2 a
Inject 5.0#/M	6.2 b	6.0 a	7.2 a	8.2 a

Numbers followed by the same letter are not significantly different at the 5% probability level.