The Role of Liquid Soil Aerator on Landscape Drainage on a Heavily Used Softball Complex

by Bob Richardson / Restoration Biologist

Introduction

This test was performed to investigate whether Liquid Soil Aerator can support the claim "loosens and aerates compacted soils" Two tests were selected to determine if Liquid Soil Aerator can support the claim. It is widely believed that soils with high bulk density and high soil strength reduce infiltration and percolation thus increasing runoff and soil erosion. Increased soil compaction reduces air space thereby increasing bulk density or weight of dry soil in a given space. Like bulk density, soil strength, or its resistance to penetration and displacement, increases with compaction.

Question

Does Liquid Soil Aerator reduce both soil bulk density and soil strength?

Purpose

Soils that are compacted have high bulk density and high soil strength. The purpose of this test is to determine whether Liquid Soil Aerator can effectively reduce the bulk density and soil strength of compacted soils.

Test Site

Arrowhead Softball Sports Complex was chosen because the Turf Manager, Jim Hillman had recurrent standing water problems for the last several years, following ordinary precipitation events. Game cancellations were common because the infields were percolating slowly, thereby prolonging the drainage and drying process. This sports complex is recognized nationally as one of the best in fast pitch softball, except for the fact of the infield drainage problem. It has been recommended to Jim Hillman that the way to solve the drainage problem was to construct a "French drain" system for all eight fields. The cost estimate for this project was $4200. for each field.

Control

All eight (8) infields were treated equally with Liquid Soil Aerator. Test measurements were recorded on Field 1, Field 2, and Field 4. (The fields with the most severe drainage problem).

Application

Liquid Soil Aerator was applied on all eight (8) infields. First application was on May 22, 2001. Dilution rate was 2oz Liquid Soil Aerator per 1 gallon water and coverage rate was 4oz Liquid Soil Aerator per 1000 square feet. All areas treated were irrigated with 1/4 inch of water. The second Liquid Soil Aerator application was on June 1, 2001 on all eight (8) infields. Dosage and coverage rates were identical to first application. All treated areas were irrigated with 1/4 inch of water.

Tests Performed

Bulk Density - Soil bulk density is the weight of solid material in a given volume of soil. For laboratory analysis, core samples were taken with a 0.7 inch diameter sampler to a depth of 8 inches. The sample was dried to remove water and weighed. Bulk density is calculated by dividing the dry weight of a sample by its volume.

Penetration Resistance - Soil strength is a measure of the penetration resistance of a soil. A handheld recording cone penetrometer (Rimik-Agridry CP20) with a 0.047 inch diameter cone was used to measure soil strength. The cone penetrometer measures the load required to push the cone down into the soil, recording the penetration resistance of the soil. This penetration resistance is a measure of soil strength and is a measure of the resistance to penetration by root tip elongation.

Table 1: Bulk Density (g/cm3)

Date	Field 1	Field 2	Field 3
5/21/01	1.85	1.82	1.89

7/25/01	1.58	1.49	1.51
% Change	-16.6	-19.2	-20.1

Table 2: Penetration Resistance (lb./in2)

Date	Field 1	Field 2	Field 3
5/21/01	258	240	271
7/25/01	162	152	177
% Change	-27.3	-36.7	-34.7

Interpretation

Bulk Density: The significant reduction in soil bulk density for all three fields means that an increase in soil pore space will allow for greater infiltration and percolation. Individual particle size increased, thereby creating more porosity in the soil.

Soil Strength: The reduction in soil strength for all three fields indicates reduced soil compaction. Jim Hillman noted a remarkable increase in drainage from all the fields. To date there has been no rain cancellation after application of Liquid Soil Aerator. Several rain events have occurred since application, and in every case the fields drained within a few hours. Field 3 in particular was troublesome before the application. Standing water developed between first and second base after a significant rainfall. Before Liquid Soil Aerator application, water would stand in this area up to 3 days. Field 1 between second base and third base was another trouble area. Field 2 in front of second base had persistent standing water problems after significant rainfall. Since the application of Liquid Soil Aerator, no standing water problems beyond the first day have occurred. In some cases significant drainage occurred within one to three hours and play that was impossible before Liquid Soil Aerator resumed.

Conclusion
Liquid Soil Aerator has reduced soil bulk density and soil strength enough to make a remarkable difference in infiltration and percolation. This test supports the product claim that Liquid Soil Aerator "loosens and aerates compacted soils".