

Thomas Turf Results

The USGA recommends testing the stability of golf course green building materials. This is accomplished by using the ASTM C-88 Sulfate Soundness Test. Greater than 12% degradation over a 20-year period is unacceptable.

Western Pozzolan's Lassenite ATS Soil Amendments far exceed this recommendation by degrading less than 3%.

DISCUSSION OF LAB RESULTS

The physical measurements test was performed on the "pure" pozzolan to determine the saturated hydraulic conductivity (infiltration rate), moisture retention at 30 cm tension, bulk density, particle density, total porosity, capillary porosity and air-filled porosity.

The physical measurements of the pozzolan showed it to have acceptable saturated hydraulic conductivity of 10.9 inches per hour which is in the normal range of 6-12 inches per hour recommended by the USGA. The pozzolan retained 62.1% moisture at 30 cm tension. The pozzolan had a low bulk density of 0.81 g/cc and a low particle density of 2.49 g/cc. The pozzolan had a high 67.7% total porosity, a very high 50% capillary porosity and an acceptable 17.7% air-filled porosity.

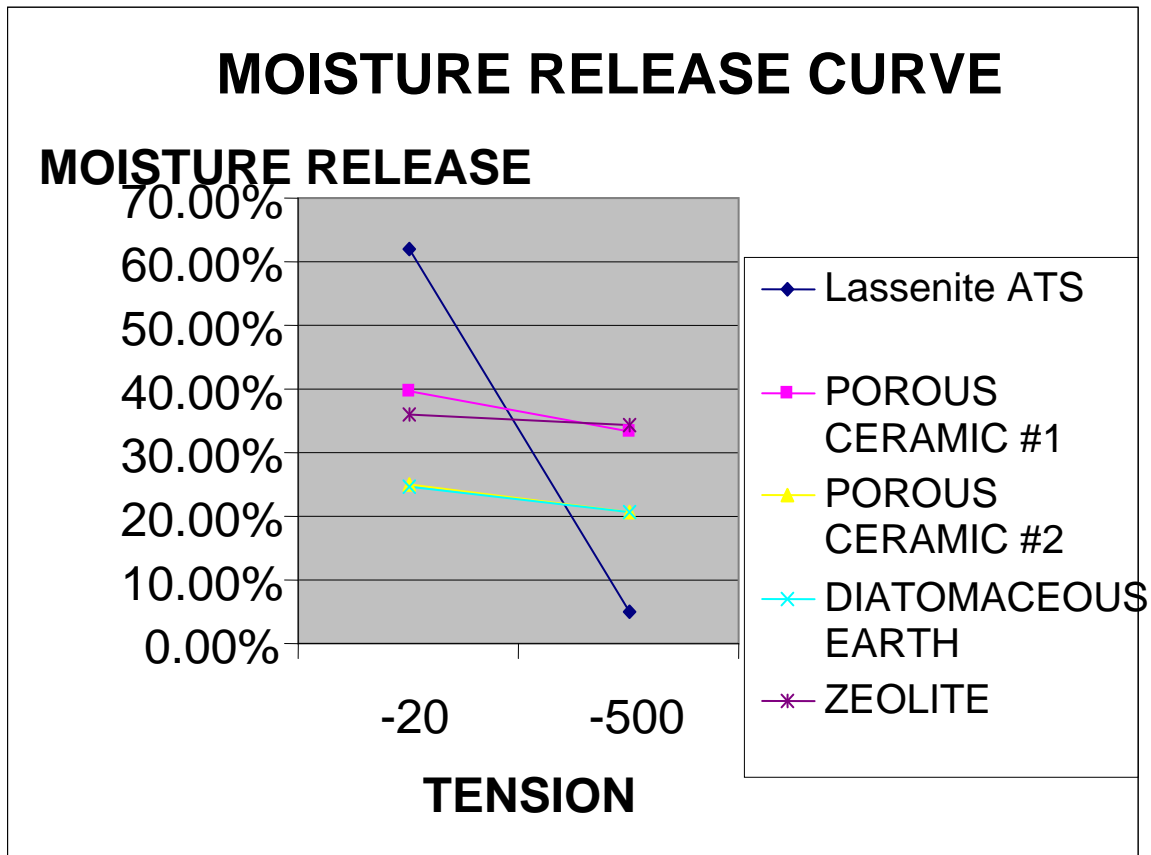
The physical measurements show that the pozzolan will have a high amount of total porosity and retain a very high amount of water. Therefore, the pozzolan will be effective in increasing the capillary porosity of a root zone sand.

To determine at what tension the pozzolan releases the majority of water, the water retention was measured at a range of tension including 0.03 bar, 0.3 bar, 2 bars, and 15 bars. The 0.03 bar moisture retention is representative of the maximum moisture retained by a 12" depth of soil (as in a putting green root zone). The 0.3 bar is the maximum moisture retained in a field situation similar to a fairway using native soil. The 2 bar value is representative of the moisture content at which a turf would be irrigated. The 15 bar value is considered to be the maximum amount of water that can be removed by plants. The measured values for the pozzolan are as follows:

Tension	Moisture Content (%)
• 0.03	• 62.1
• 0.3	• 9.3
• 2.0	• 3.6
• 15.0	• 0.8

Graph based upon studies of pozzolan by a USGA approved laboratory and four of the other top selling soil amendments.

	-20	ATS	-500
Lassenite			62.10% 5.00%
POROUS CERAMIC #1		39.60%	33.20%
POROUS CERAMIC #2		25%	20.80%
DIATOMACEOUS EARTH		24.70%	20.60%
ZEOLITE		36.10%	34.20%



As you can see from the graph Lassenite not only has the ability to absorb a great deal more moisture but will also release it to the plants prior to what is called the "theoretical wilt point" or -500 cm. This value was chosen because under most normal irrigation cycles a rootzone would rarely be allowed to exceed this value before re-supplying water. This information is the key to the ability of Lassenite to eliminate localized dry spots and reduce irrigation requirements.

PHYSICAL ANALYSIS

Hydraulic Conductivity Inches/Hour	Bulk Density g/cc	Capillary Pore Space	Non- Capillary Pore Space
10.9	.81	50 %	18%

Capillary or water holding pore space is made up of small pores that hold water against the force of gravity retaining much of it for use by the plant. Non-capillary or air holding pore space is made up of larger pores. When drained of water these pores fill with air providing oxygen to the root zone. The physical measurements show that Lassenite Pozzolan Soil Amendments have a very high amount of total porosity and retain a very high amount of plant available water.

Therefore, Lassenite Soil Amendments will be very effective in increasing the capillary or water filled porosity of a root zone. Test results determined that the addition of Lassenite Soil Amendments can beneficially change the water release pattern in the soil profile, eliminating localized dry spots and reducing irrigation requirements. Many inorganic amendments maintain the ability to absorb moisture. Lassenite has the unique ability to make the majority of this moisture available to the plant.

The ability of a soil amendment to aerate soil is a function of the compaction properties of the material. Lassenite Soil Amendments blended into a soil horizon result in a dramatic improvement of porosity, attesting to Lassenite's inherent ability to improve the aeration of the soils and reduce compaction.

Ideally, a growing medium has an equal amount of air and water pore space after free drainage. Lassenite is a tool designed to provide the Turf Manager with the ability to change the physical characteristics of the soil profile, depending upon existing site conditions and environmental influences, in order to produce the most desirable balance between air and water filled pore space.