Why Grasspave2 Uses Sand Based Root Zones

Since 1982, Invisible Structures, Inc. has manufactured Grasspave2 porous paving system. Often, ISI sales staff is asked why sand is used in the Grasspave2 structure, instead of soils or organic additives mixed with the sand. Grasspave 2 utilizes a sand based root zone because it provides excellent drainage, resist compaction and provide strength where soil systems prove inadequate.

Sand as a growing medium for turf applications is not new. It's superior to organic based soils. Experts and turf professors from major horticultural universities have proven this fact. These experts have studied the benefits of sand over organic based soils and tested their theories on sport fields, turf farms, and general use areas. For the last eighty plus years, the golf industry has been looking for a better way to propagate turf grass. Their scientists have come to a simple conclusion; grass does better in a sand based aggregate. Horticultural science is why Invisible Structures' Grasspave2 uses sand in its specifications. With sand, the grass germinates faster, grows a thicker root zone, drains better and is easier maintained than organic soils.

Drainage + Compaction Issues

Many native soils around the U.S. have a high silt or clay content and are subject to compaction and poor drainage.[4+5] Silty and clay based soils make golfing and sports fields hard surfaces to play on. These surfaces require hours of maintenance to make the surface acceptable for performance.[4] Fields primarily silt or clay and subject to high traffic are unlikely to have *any* significant internal drainage.[3] Golf course and athletic field managers use sand based root zones when they require a lot of drainage control.[3]

Invisible Structures, Inc. uses sand with Grasspave2 because it provides porosity and doesn't compact like soil or organic additives. A USGA research project from July 2001 mentions that sand offers good drainage, good aeration qualities, is excellent for high traffic areas, and resists compaction.[1] "One can learn very quickly from experience that the two predominant factors in growing turf in high-traffic areas are compaction and drainage," wrote Eugene Meyer in "Compaction Resistance and Drainage: The Driving

Force Behind Sand Based Root Zones." Meyer also wrote that sand also encourages "more pore space, deep rooting, minimized disease factors . . .. "[4]

USGA research also mentions how organic materials, such as peat moss, decompose over time. "The gradual decomposition may adversely affect the root zone physical properties and this, in turn, may contribute to poor performance of turfgrasses grown on these declining root zones."[1]

Invisible Structures, Inc. doesn't use organic additives because they break down, eventually exposing the rings. These organic soils loss of porosity and overall lack of performance because of the compacted organic material. Grasspave2 would have to be constantly top-dressed if soil were used. In turn, that would make Grasspave2 very high in maintenance.

Breathing Soil

A healthy root zone needs a good oxygen supply. A research paper, "How Do Soils Breathe?" by Southern Illinois University – Carbondale mentions: "Renewal and movement of soil air are governed by air permeability of the rooting medium…."[2.1] The paper mentions "it is extremely important to pick the right sand and amendment in preparation for the root-zone mix."[2] Sand naturally provides excellent air supply to the root zone because it is porous and resists compaction. The SIUC study also explains that root zones need fifty percent more oxygen levels supported than what is supplied in the atmosphere.[2] Sand helps maintain proper oxygen levels and carbon dioxide in the soil because of its natural porosity. Organic soils trap carbon dioxide molecules, becoming dangerous to root zones.

The study goes on to explain: "Understanding air movement in the soil profile is important because soil air content in the root zone depends on air exchange between the soil and atmosphere, the respiration rate of microorganisms and plant roots, and the solubility of gases in water."[2] Water supplies oxygen to the root zone of the grass through run-off and irrigation. The study goes on to explain: "Infiltration and drainage of water may flush or displace air and consequently trigger airflow in the profile. In addition,

irrigation and rainfall may carry dissolved oxygen to the root zone. Similarly, when excess water is removed by drainage, air will replace the water."[2]

Another Southern Illinois University—Carbondale laboratory study about hydraulic flow in soil also found "that increasing peat moss content increases resistance to the flow of both air and water."[2] Invisible Structures, Inc. doesn't add peat moss or organic additives to the sand in the rings because it will cut down in the available air flow to the grass roots and cut down in porosity of the Grasspave2 system.

Aeration isn't needed with Grasspave2. Mechanical aerators can't be used on porous paving systems – damage to the plastic may occur; jeopardizing the integrity of the system.

History of Sand Based Root Zone Systems

USGA

In his article, Meyer explains the history of sand based root zones began with the difficulty of early putting greens constructed from native soils. During the early 1900s, early golf courses were hard to grow grass on and maintain the surface of the green because of hard native soils with high silt and clay contents. Unhappy with these hard surfaces; people started adding sand to the soils.[4]

In 1920, the United States Golf Association founded the Green Section to fund research for improved turfgrass and "the promotion of environmentally sensitive construction and maintenance practices."[5.1] By 1960, the USGA Green Section recommended using sand based root zones because the sand provides porosity and resists compaction. Meyer wrote, "By providing improved resistance to compaction, increased and more rapid drainage, and a better root environment, these advantages make possible a more acceptable putting or playing surface with a tolerance for more play."[4]

The USGA states their vision for turfgrass and environmental research is to "use science as the foundation to benefit golf in the areas of turfgrass and resource management, sustainable development, and environmental protection."[5] Since 1983, the USGA has funded $21 million worth of research projects. Sustainable land use and course construction practices are a couple of research areas supported by the USGA.[5]

Sportsturf

Athletic fields all around the world use sand based root zones, over native soils, for healthier grass, increased drainage and better playing conditions in adverse weather. Oregon State University uses sand based root zones for their sports fields. “We build fields out of sand to take advantage of the natural drainage properties of sand. Sand fields are meant to perform when conditions are too wet for soil fields,” said Tom Cook, as associate professor for Oregon State University’s department of horticulture. He continues, “When the wet season arrives, soil fields all fall apart real fast. The surface becomes mushy, water penetration drops almost to zero, and the result is a nearly impossible surface to play on.” An article by Turf Diagnostics and Design, Inc. mentions: “These sand-based turf systems are popular because they provide an excellent medium for sports-turf growth, superior water-management capabilities and because they resist compaction even under high-use situations.”[3]

Additives

Invisible Structures, Inc. also uses a soil conditioner, Hydrogrow, under the ring structure to encourage root growth. Hydrogrow encourages the establishment of new rootzones with the Grasspave2 structure and helps maintain porosity.

Hydrogrow is a synthetic crystal (polyacrylamide) soil additive which absorbs water and dissolved nutrients. A high percentage of Hydrogrow is made up of Zeopro™, commonly used as a soil additive for golf greens and sports turf. Invisible Structures uses Zeopro™ because it delivers “essential fertility through three primary nutrients, nitrogen (as ammonium), phosphorus, and potassium.”[6]

“A major benefit of using Zeopro™ is lower unwanted environmental releases of nutrients to ground water and surface water and volatile loss to the air.”[6] The crystals are non-toxic, pH neutral, and slow to biodegrade, and is not affected by minerals and salts in soils or water.

Other additives to Hydrogrow include humate, for helping soil bacteria and enzymes to convert NPK fertilizer elements into plant food. Isolite, a porous ceramic, that provides storage and facilitating spaces for micronutrients and bacteria.

Benefits of Hydrogrow include:
-Less frequent irrigation
-More moisture retained in sandy soils
-Greater utilization of fertilizers
-Quick establishment of new plants

Sand based root zones offer many advantages over soil based systems, including natural porosity and resistance to compaction. Research by universities and turfgrass experts proves these advantages. Invisible Structures, Inc. has sold
Over 25 million square feet sold of Grasspave2 confirms sand is ideal for porous paving applications.

Sources

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