Q&A

What is the minimum amount of sand I need to till into a field to receive benefits?

Table 1.

Particles < 0.1 mm (smaller than fine sand)	less than 3% by wt.
Particles > 2.0 mm (larger than very coarse sand)	less than 3% by wt.
Particles 0.25 to 1.0 mm (medium + coarse sand)	more than 60% by wt.

by: David Minner, Ph.D.

This is a very direct question, and you might think it would have a very simple and direct answer. After receiving this type of question, I start the answer by asking some questions of my own.

What are you trying to accomplish by adding sand, and what is your new expectation for the field?

The assumption is often made that rapidly draining sands will translate into more macro-pores and better drainage when mixed with slower-draining soils. In reality, thorough testing of potential materials must be completed before a mixture of sand and soil can be considered. Recommendations for combining sand and soil based on particle size testing alone are misleading. Performance criteria that define water movement and water holding will have a profound effect on plant growth and surface footing during high-moisture conditions. Additional parameters that must be evaluated when designing a rootzone mix of sand/soil include: bulk density, saturated hydraulic conductivity, aeration porosity, capillary porosity, saturation, organic matter content, and coefficient of uniformity. In most cases, an acceptable saturated hydraulic conductivity of eight to 12 inches per hour requires at least 90 percent sand on a weight basis. So, if you're looking for rapid internal drainage, you will need:

1. A very high sand content in the final sand/soil mix(usually greater than 90 percent by weight).
2. Sand that conforms to the specifications in Table 1.
3. Physical testing of a compacted sample of the sand/soil mixture to insure that the final mix ratio will produce adequate internal drainage (infiltration rate between eight and 12 inches per hour).

How do I mix the sand and soil?

Sand/soil mixtures that meet acceptable performance criteria

should be considered. Off-site mechanical blending of materials will be required to produce a laboratory designed rootzone mix. Laboratory-designed rootzone criteria can not be reproduced by on-site tilling of sand into an existing soil. Again, if rapid internal drainage is your goal, tilling-in sand from the surface is probably not the solution. Rootzone mixtures of sand and soil that have high infiltration rates should also have a network of drains that can remove water after it rapidly moves through the profile.

What if I don't have the budget for off-site mixing and I just want to reduce the hardness of my field for better aerifier penetration, better root growth and improved water infiltration?

Some athletic field soils will not improve with addition of sand, while others have shown benefits. Soils with silt contents exceeding 2-1/2 times that of the clay fraction are not suitable for amendment with sand. Soils having silt-to-clay ratios of 2.0 or less are preferred. As a target, amend at least the top four to eight inches of the existing field. I generally find that field hardness is reduced and growing conditions improve when the final sand/soil mixture contains at least 80 percent sand by weight. Use the sand specifications provided when amending soils. Spread half of the sand on the field and till to your target depth. Apply the other half and till again. Do not till too much; it is better to leave some clods of soil and channels of sand to aid water infiltration. Continue with a regular coring and sand topdressing program so that the sand content near the surface will remain high enough to reduce compaction and improve water movement into the field.

Laboratory designed sand based systems that are mixed off site and are fitted with a subsurface drainage system are the preferred means of building fields that resist compaction and have rapid internal drainage. To guarantee the performance of a sand/soil mixture, it must be laboratory tested and also mixed off-site. Tilling sand into an existing field may improve some conditions, but few guarantees concerning field performance can be made. By not adding enough sand or by adding the wrong size sand, you could increase compaction and make the situation worse. ❑

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