The Correct Sand for Putting Greens

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Surprisingly enough, there is considerable agreement among turfgrass soil scientists on the subject of correct sand particle size to be used in construction and top-dressing of putting greens. Unfortunately, we have sometimes lowered our standards in the mistaken belief that the customer would not pay the cost of using the correct materials. This is a mistake needing correction!

The right gradation and size of sand particles can be justified by the builder and the golf superintendent, as well as those who pay the bills.

The first step is to refuse any sand that is retained above a 10 mesh Tyler standard screen. Materials passing through the 10 mesh size are 1.410 mm or .0555 inch or smaller. As the Tyler mesh size drops (10, 8, 6, etc.) the particles get larger. Coarse clinkers (those above 10 mesh) should be eliminated, or tolerated if present in only fractional percentage amounts. The reason is simple. Once the green is turfed it is virtually impossible to work anything larger than .065 inches (10 mesh) into the turf fiber when the putting green is top-dressed.

Suppose, for example, your course has purchased a "concrete grade" of sand under the mistaken belief that it is cheaper because it costs less per ton or per cubic yard. Dr. Donald V. Waddington at Penn State University has found that sand grades are quite variable in particle size, so let us also suppose 50 percent of this sand is retained above a 10 mesh screen, a not uncommon occurrence. You mix this carefully in proper proportions with soil and humus to match the USGA soil specifications used in construction. You even compost the mixture to be sure the particles won't separate in the act of top-dressing. You have a physical soil analysis made just to be sure it's the proper mix. The tests show the 7 parts sand, 2 parts peat and 1 part soil by volume in the mixture to be excellent in terms of infiltration and percolation after compaction.

Then the greens are top-dressed. Your labor crew is a good one. They work carefully and diligently to brush, board and drag mat the top-dressing into the turf. In fact, they spend many extra hours in this attempt. But lo and behold, almost all of the coarse sand fraction is eventually carried to the green collar where it must be picked up and hauled away to create even more work.

The small percent of coarse clinkers that remain on the green and on top of the grass does not escape notice. The golfers are angry, and the mechanic is paid overtime for keeping the dull mowers sharpened by extra grinding and lapping in bedknife and reel. And what of the poor grass after the dust (literally) has settled? Instead of the 7-2-1 mix originally specified and intended in this example, the grass has received a 4-2-1 ratio that makes an excellent substitute for concrete.

Assuming all the peat and all the soil applied can be worked into the grass, look at what this act of removal does to our original mixture on a "by volume" percentage basis. The 70 percent of sand in the original 7-2-1 mixture (100 percent) drops to 57 percent contact on the green after three parts of the coarse sand is hauled away. The peat increases from 20 percent to 28.5 percent, and the soil content jumps from 10 percent to 14.5 percent.

"Hardly the original mixture," you say. *And you are correct!* Even the act of aerating and core removal prior to top-dressing won't solve the problem, because there is still two inches of turfed area between each hole that refuses to accept the coarse sand particle.

So, why not buy an acceptable sand in the first place? Penn State recommends a minimum of 80 percent in the 14-65 mesh size (1.190-0.208 mm, 0.0469-0.0082 inches). Dr. Raymond Kuntze, of Michigan State, who did the original work on the USGA specifications at Texas A & M, favored a gradation of 0.25 mm to 1.0 mm in size. This comes very close to Penn State's suggestion. Most turfgrass soil scientists also would prefer a round sand to a sharp, angular sand where a choice is available, and in this discussion on sand we are referring only to true silicas and not some substitute such as crushed limestone or slag.

Seldom will you find such a sand available without special screening. One sample we

analyzed from Ottawa, Ill., is as near perfect in "run of the pit," as we have seen. It is ideally suited for bunkers as well as construction and top-dressing. The mesh size was as follows:

Mesh	mm	Inches	Percentage Retained
10	1.651	.065	0.30
16	.991	.039	11.24
28	.590	.0232	58.91
48	.295	.0116	26.62
100	.147	.0058	2.60
Pan	—	—	0.33

We would hold out for nothing coarser than the above 10 mesh in screen size, and only then in a fraction of 1 percent as being acceptable. We would approve as much as 20 percent falling below the 48 mesh size, but retained on a 65 mesh screen.

Such a sand screened to specifications, essentially passing through a 10 or 12 mesh and being retained on a 65 mesh screen will obviously cost more per ton than common concrete or mortar sand. Yet, one ton of this sand is equivalent to two tons of the sand used in our horrible example, since none is wasted in top-dressing.

It is appreciated that most of the savings in freight and bulk handling will be realized after and not during construction. Although, even during construction the finer grade of sand specified should go farther because there are more particles per unit of measure now that the coarse clinkers have been removed.

And just think of the fringe benefits. Less labor down time involved in top-dressing; happier golfers; and by no means last, protection in perpetuity of the putting green soil profile you so laboriously and expensively put together in the first place.

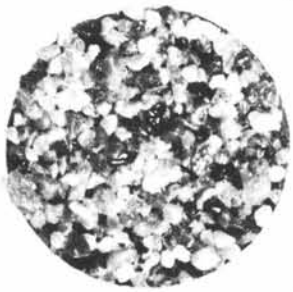
Thus, one should provide a physical soil laboratory, with the competence to carry out the tests described in the USGA Green Section Specifications, with decent sand in the first place. The same can be said for humus and soil, which is another subject and too lengthy to include here.

Follow the USGA Green Section specifications on mixing and construction *exactly* as written.

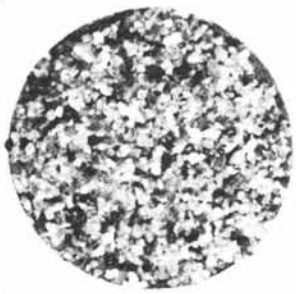
And finally, each club should require an Act of Congress before anyone is permitted to tamper with or alter the soil mixture decided upon, no matter how well-meaning he may be.

PARTICLE SIZE CHART

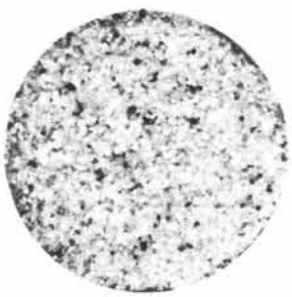
VERY FINE GRAVEL
(5-10 mesh)
(4-2 mm. diam.)



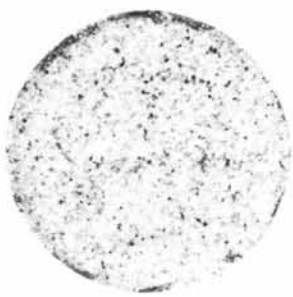
VERY COARSE SAND
(10-18 mesh)
(2-1 mm. diam.)



COARSE SAND
(18-35 mesh)
(1-0.5 mm. diam.)



MEDIUM SAND
(35-60 mesh)
(0.5-0.25 mm. diam.)



FINE SAND
(60-140 mesh)
(0.25-0.1 mm. diam.)

VERY FINE SAND
(140-300 mesh)
(0.1-0.05 mm. diam.)