

Figure 5. Generalization of what happens to soil porosity as a coarse-textured amendment is added to soil in increasing amounts (see Figure 3).

SOIL AMENDMENTS

Continued from page 28

bulk volumes. Bulk volume equals the total volume (solid + pore volumes).

Beginning with 100 percent soil (10 yd³), mixture porosity first decreases then increases with the addition of sand in increasing proportions. Porosity initially decreases because the sand floats in the soil or excludes soil and soil porosity without adding any large pores.

The minimum porosity occurs at the threshold proportion which is the mixture in which the "mixing bin" or green excavation is exactly full of sand and the large pores between the sand particles are exactly full of soil. In other words, the threshold proportion is determined primarily from the amendment's interporosity. This is called the threshold proportion.

Since at the threshold proportion the amendment particles first exhibit particle-particle contact, this sets the limits for the amount of amendment required to improve the soil's resistance to compaction. As the proportion of sand is increased beyond the threshold, the large pores between the sand particles (amendment interporosity) become voided of soil and both total and aeration porosity increase (Figure 5).

A simple mathematical model can be used to predict mixture total and aeration porosities. This theo-

Continued on page 32

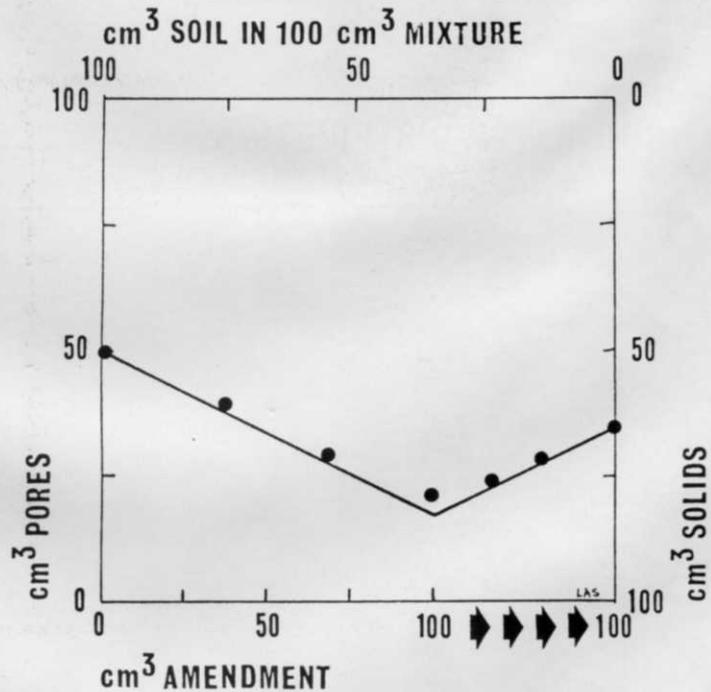


Figure 6. Theoretical (line) and actual (dots) porosity in soil mixtures containing different amounts of sand.

SOIL AMENDMENTS

Continued from page 31

retical model is compared with actual, total and aeration porosities of selected sand-soil mixtures in Figure 6. This data demonstrates that the theory accurately predicts the mixture's physical properties.

A simple graphic method for predicting soil total and aeration porosities from component individual porosities and bulk volumes has also been developed by the author and will be published at a later time.

The effect of pore size on soil water distribution in a drained putting green is illustrated in Figure 1-B. In general, soils with smaller pores (soil) retain more water in the upper levels than those with larger pores (sand). The effect of different amounts of soil amendment on soil

water distribution in a drained area is illustrated in Figure 7.

The addition or amendment (sand) up to the threshold proportion has no effect on the water distribution pattern, it merely decreases the total porosity. However, when more amendment than the threshold is added, the water distribution pattern changes to that typical of the sand indicating that large pores have been formed and that aeration should increase. As amendment particle size decreases, the soil water distribution pattern shifts towards the upper soil levels.

When selecting an amendment, it is usually best to use one which has a relatively narrow range of particle sizes. Well-graded amendments with large amounts of fine-textured particles should be avoided because they are generally less efficient (larger amounts are usually required to produce soil physical improvement). Particle shape also

affects amendment efficiency, but is much less important than size and size distribution.

This article does not recommend any specific putting green soil mixture, but briefly describes what happens when an amendment such as sand is added to a soil. The "take-home" lesson is that a certain minimum proportion of amendment, the threshold proportion, is required before soil physical improvement is affected and this amount is usually quite high (75-90 percent of the total bulk volume of components).

The optimum soil mixture depends on soil, amendment, climate, drainage depth and plant species and is therefore difficult to determine without professional assistance. □

Art Spomer is associate professor of plant pathology in horticulture at the University of Illinois, Urbana.

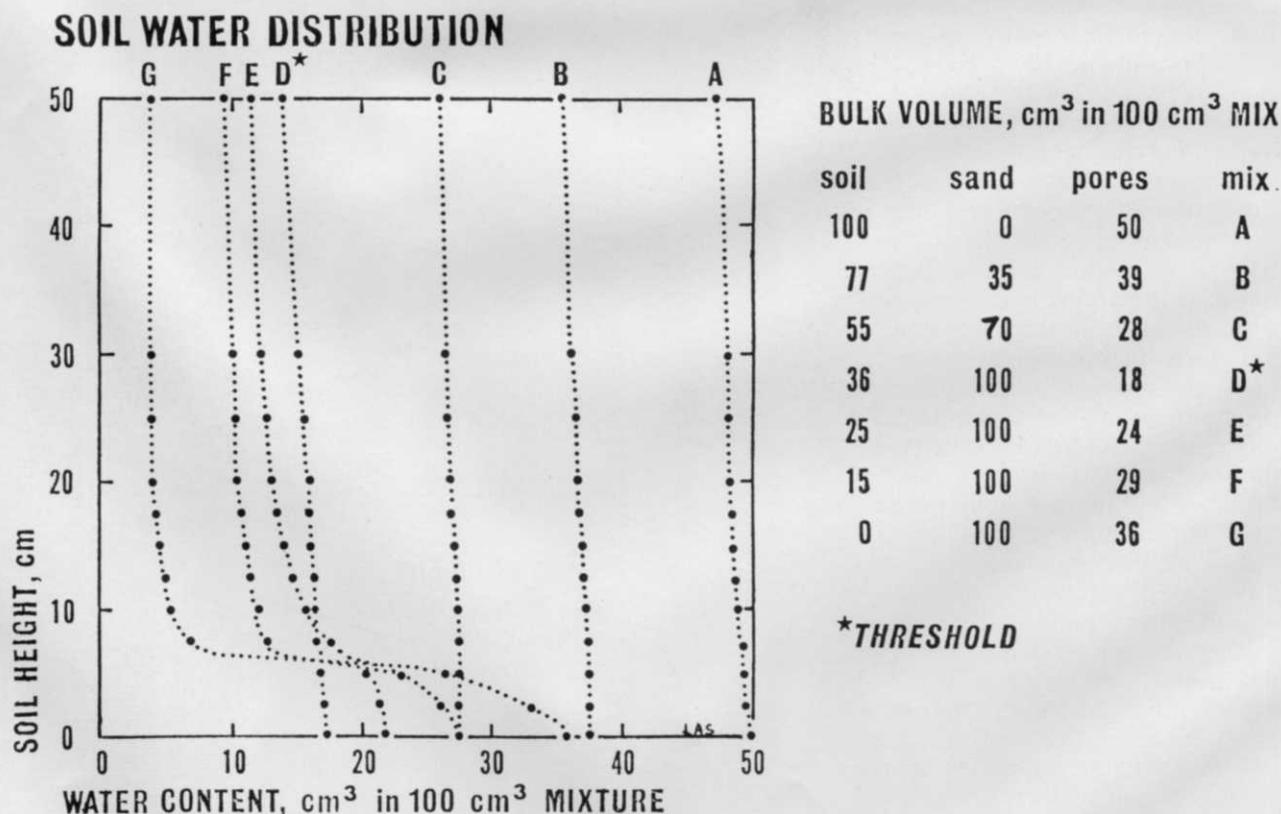


Figure 7. Water distribution patterns of different sand-soil mixtures in a drained putting green.



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Water shortage theme of irrigation meeting

Maintaining grass and shrubs with scant water was the subject of the recent 15th annual Turfgrass Sprinkler Irrigation Conference at Lake Arrowhead, Cal., sponsored by the University of California Cooperative Extension and the sprinkler irrigation industry.

The theme was "Irrigation Technology for Tomorrow (and Today's Drought)". With golf courses in some areas cut to as little as 50 percent of the water they were using before, and Mayor Tom Bradley of Los Angeles calling for a 10 percent mandatory cutback in water use over the summer, the situation is becoming more and more serious in California.

William Wood, Jr. and Jewell Meyer, University of California, and Don Brooks of the Metropoli-

tan Water District put California's water situation into perspective.

Planning that has taken place in southern California the last 50 to 75 years has resulted in four aqueducts bringing water into that area. Because of the drought, two of these are out of operation completely, a third has been cut back half or more, but the fourth is running at a capacity higher than even originally planned, according to Brooks.

California uses about 37 million acre feet of water a year, Brooks said. This is only about half of its actual water resources. With the other half locked up in wild river status, questions about land use planning are coming to bear. Public interest will play an important role in California's future land use laws,

according to Wood.

Meanwhile, agronomists are showing how to become more water efficient. Don Parsons, Knollwood Golf Course, described the watersaving potential of Purr-wick greens.

Correct installation and performance of irrigation equipment was emphasized. This is very necessary in order to ensure efficient water use. How to manage with insufficient water was another key topic.

By showing how to look ahead to design for water shortages and using turfgrass cultural practices related to this, California extension service is educating its professional people to cope with drought now and to be prepared should it occur again. □

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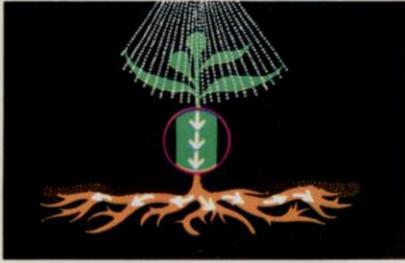
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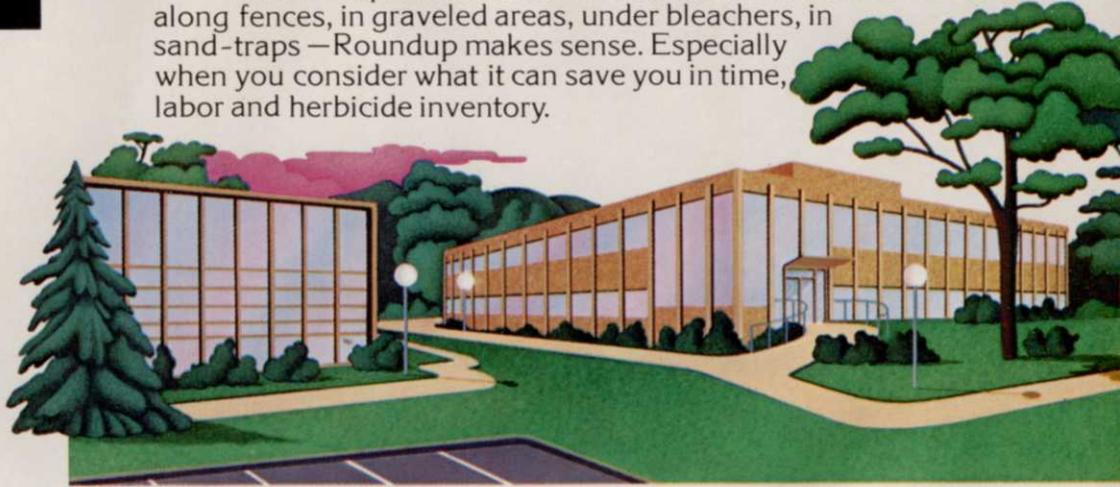
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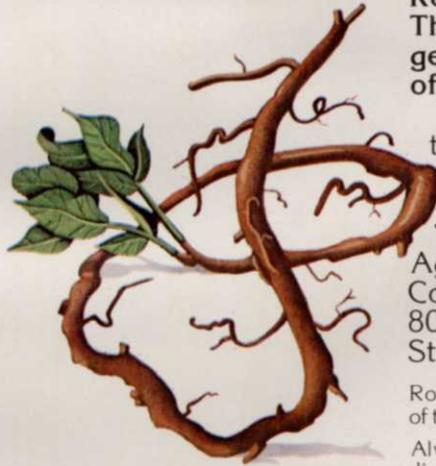
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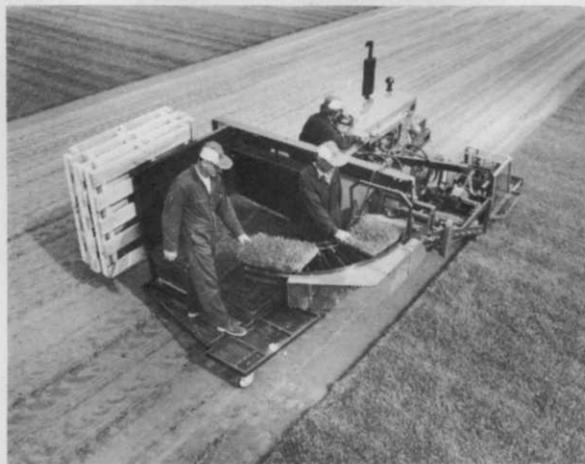
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LETTERS

Rebuttal

We are writing with regard to the first item reported in the "Government News" section of your February issue.

The facts in this instance are quite different than you imply. We give you below a summary:

1. Nowhere in the entire file does the word "inferior" appear; this is evidently the result of perfunctory literary license. The fact is that the people of The United States received \$8.92 excess value in the seed lots concerned.
2. The actual amount of the settlement attributable to the Maryland instance was \$305.56; not \$2,750.00.

Inasmuch as The United States and Seaboard — and I quote "consented to the entry of this final judgment herein without trial or adjudication of any issue or fact or law herein and without admission of any liability on the part of said defendant in respect of any such issue" it would seem the item was published with questionable intent, rather than as information of use and interest to your readers.

Also, we are completely puzzled by your publishing this item without any attempt to contact us prior to publication in order to determine the veracity of the statements contained therein.

Alan Henry Hirsch
Vice President—
Marketing
Seaboard Seed Co.
Bristol, Ill.

Ed. Note: Our apologies. It is never our intention to misconstrue the news. Obviously, there was an error made in interpretation by our reporter.

Thanks

I have received copies of your publication for which please accept my thanks. I have found it most helpful, and especially enjoyed your article in the April issue "OSHA-EPA."

Vito Russo
Landscape Superintendent
Cresthaven Enterprises, Inc.
Pompano Beach, Fla.

Error

An error occurred in my recent article "Understanding Slow-Release Nitrogen," which may lead to confusion. The caption for Figure 2 states IBDU was applied at 6 lb/N100 ft.². This is incorrect and should read 6 lb./N1000 ft.²

James F. Wilkinson, Ph.D.
Director of Research
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