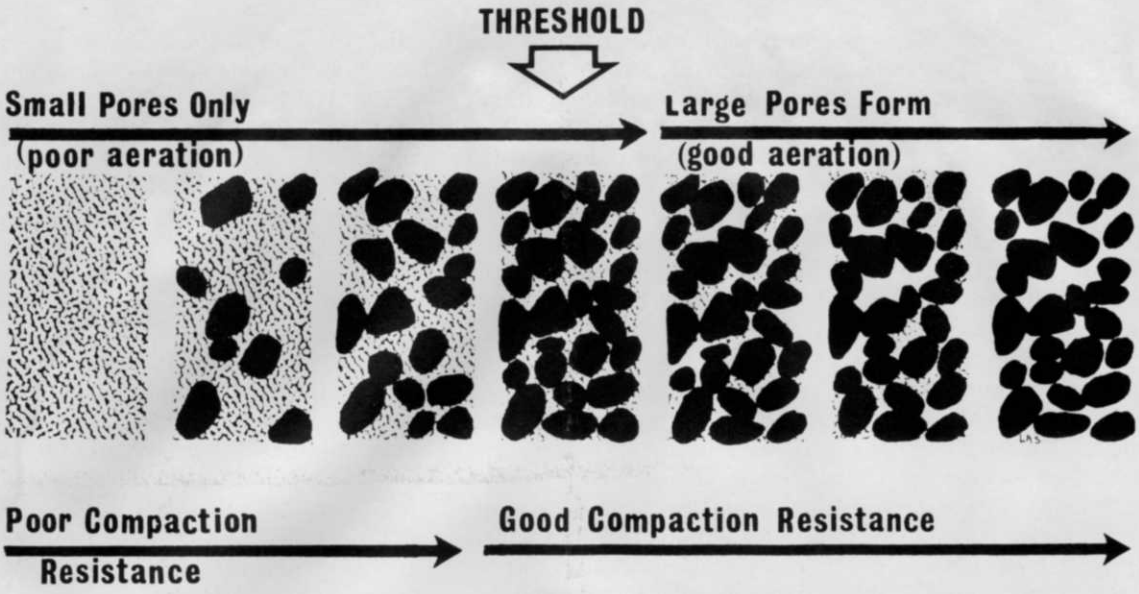


Figure 5. Generalization of what happens to soil porosity as a coarse-textured amendment is added to soil in increasing amounts (see Figure 3).

SOIL AMENDMENTS

Continued from page 28

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

Beginning with 100 percent soil (10 yd^3), 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

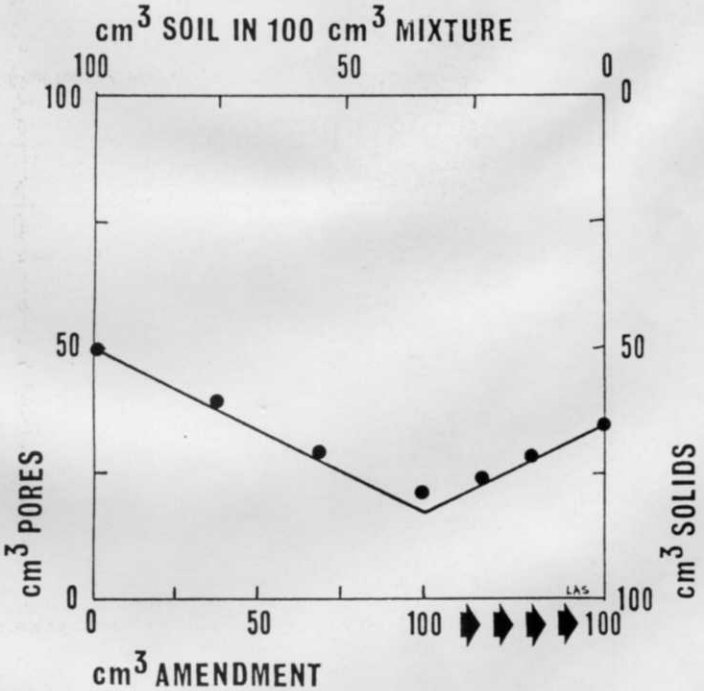


Figure 6. Theoretical (line) and actual (dots) porosity in soil mixtures containing different amounts of sand.

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.

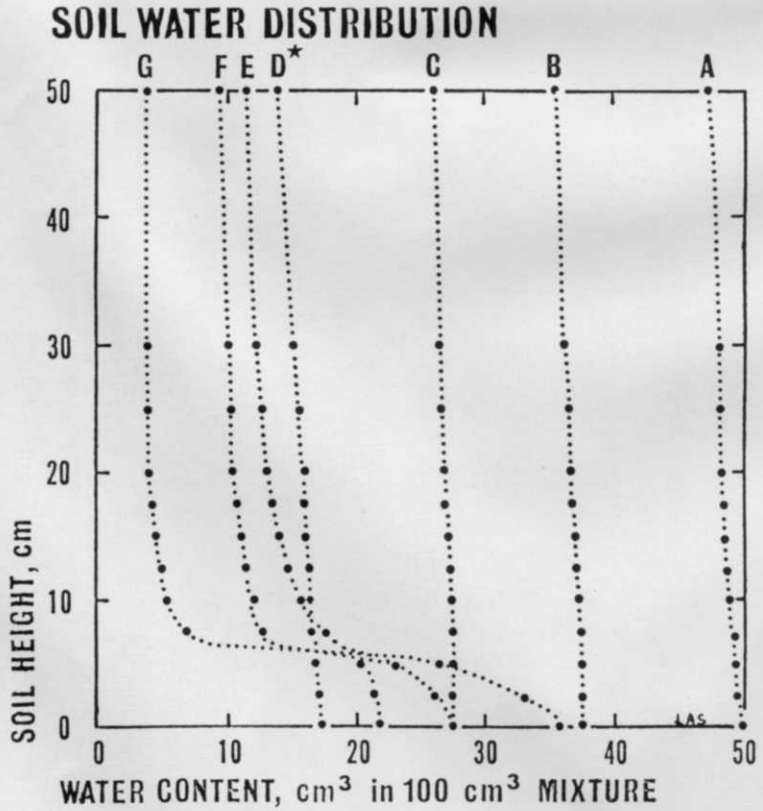
The addition or amendment (sand) up to the threshold proportion has no effect on the water distribution pattern, it merely decreases the total porosity. However, when more amendment than the threshold is added, the water distribution pattern changes to that typical of the sand indicating that large pores 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.



BULK VOLUME, cm^3 in 100 cm^3 MIX

soil	sand	pores	mix
100	0	50	A
77	35	39	B
55	70	28	C
36	100	18	D*
25	100	24	E
15	100	29	F
0	100	36	G

*THRESHOLD

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

Take a knife to your grass. You may find it's choking itself.

Take a knife and cut out a small section of turf. Then take a look at the brown, dead material over the top of the soil around the blades of grass. This is thatch. And it may be choking your grass.

A small amount of thatch is desirable to protect tender shoots from the sun and hold moisture in the soil. But if you have more than a one-half inch build-up, it can keep air, water, and fertilizer from reaching the root zone.

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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 Metropolitan 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 aquaducts 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. □

Healthy little beauty likes shade!

What a beauty little Glade Kentucky bluegrass has turned out to be! A fine, healthy specimen, Glade has a higher level of resistance to powdery mildew, and performs better than many other Kentucky bluegrasses in up to 60% shade as well as open sun. Glade, a Rutgers selection (nationally tested as P-29), has improved resistance to stripe smut and leaf rust. Midwestern and Northeastern university tests indicate that Glade has better than average resistance to Fusarium blight.

Glade is one of the fastest germinating bluegrasses, quickly forming a thick rhizome and root system. A dense, low-growing, leafy turf, Glade has an attractive medium to dark green color.

Glade Kentucky bluegrass is your guarantee of physically pure and genetically true seed. You won't be seeding annual bluegrass (*Poa annua*), short-awned foxtail or bentgrass when you plant Glade. Specify this healthy little beauty in your next lawn seed mix. It blends beautifully with fine fescues and other elite bluegrasses, persists in shade when many others weaken. Glade Kentucky bluegrass is available at your local wholesale seed distributor. Insist on Glade in your mix.

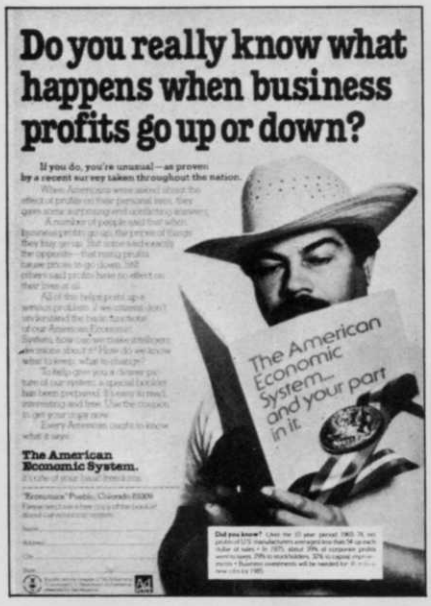
Another fine, quality-controlled product of Jacklin Seed Company.

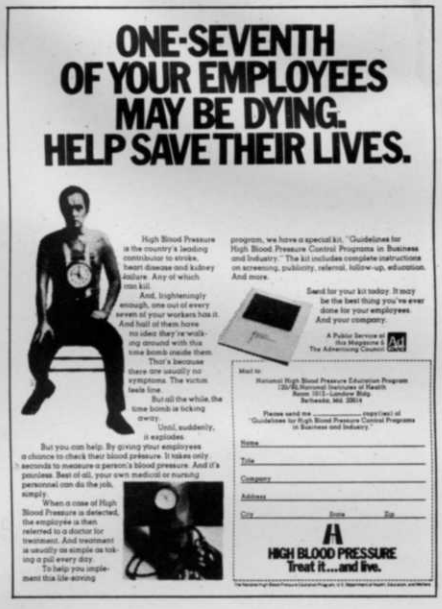
Glade

KENTUCKY BLUEGRASS

U.S. Plant Patent 3151

WHY YOU SHOULD MAKE A CORPORATE CONTRIBUTION TO THE AD COUNCIL





The Advertising Council is the biggest advertiser in the world. Last year, with the cooperation of all media, the Council placed almost six hundred million dollars of public service advertising. Yet its total operating expense budget was only $914,683, which makes its advertising programs one of America's greatest bargains . . . for every $1 cash outlay the Council is generating over $600 of advertising.

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The Advertising Council is a voluntary organization that promotes the public good by conducting information and action campaigns in such areas as support for higher education, drug abuse prevention, rehabilitation of the handicapped, traffic safety and many others. Recently, it added an exciting new campaign to its list: one to encourage Americans to learn more about our economic system.

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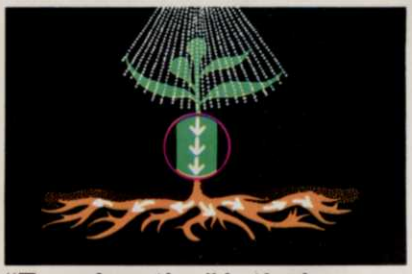
The cost of preparation of this advertisement was paid for by the American Business Press, the association of specialized business publications. The space was donated by this magazine.

There's never been a herbicide like this before.



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Roundup is applied to the foliage of actively growing, emerged weeds. It's absorbed through the leaf surface and "translocated" throughout the entire plant. In this way, Roundup effectively destroys many weeds, including their roots and rhizomes.

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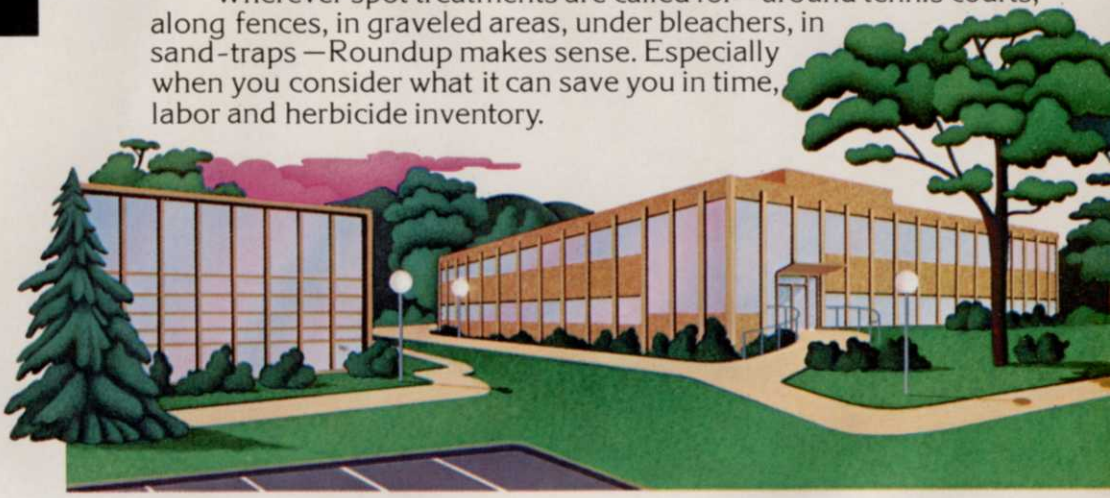
Wherever spot treatments are called for—around tennis courts, along fences, in graveled areas, under bleachers, in sand-traps—Roundup makes sense. Especially when you consider what it can save you in time, labor and herbicide inventory.



Roundup destroys many of your toughest weed problems.
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Roundup. The herbicide that gets to the root of the problem.
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RINST 6/7

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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 defendent 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 Hirch
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
ChemLawn Corp.
450 W. Wilson Bridge Rd.
Columbus, Ohio