the study of the soil and geology than Dr. Francis Hole. His influence on students is legend, and he is the man who finally persuaded the legislature to declare the Antigo Silt Loam the "State Soil," the first state to do so.

The staff included Dr. Dick Corey, one of the finest teachers in the entire University, not just the Department or the College. Dr. Dennis Keeney assumed a major role in the study of pollution problems of soils and sediments, and taught a terrific course that brought together the two disciplines of chemistry and soils. At one time I shared an office with Dr. Jaya Iyer, a native of India who came to this country with an M.S. and Ph.D. and promptly earned another of each in Soil Science. M.L. Jackson conducted much of his research in Soils at the atomic level of soil minerals and made extensive use of electron microscopy. Many of you now know John Harkin and the diverse and interesting background he brings to the Department and its students. And so it went with the ever friendly Art Peterson and his almost unrestrained good spirits, and with Emmett Schulte and his dry wit and sense of humor that made him a favorite of students.

But for all of these professors and their strengths and brilliance and influence among students, no one has left a greater mark on so many that passed through the Department than Dr. Jim Love. He has, over the past thirty-plus years, touched thousands of UW students as a teacher. He has been, for hundreds of Soil Science students, the surrogate father they may have needed, an advisor helping point the way through the University, and a trusted counselor and true friend when the need was present. His door was always open to a student needing special help with course work. He never will be replaced as a teacher in that Department, and many of us are sad to think that in just one short year he is going to retire.

I cannot imagine a group as distinguished as the one I knew will ever again be assembled. But generations before have probably felt the same way, and generations to follow most likely will too. This shows the strength of the Department and the University and their attitude about quality teachers and researchers.

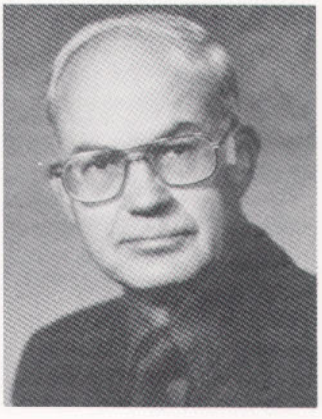
Every Golf Course Superintendent should not only be a student of the soil, but should join me in the ranks of the romantics. Soil is, after all, the stuff golf courses are made from.

Monroe S. Miller

Wisconsin Pathology Report

Recent innovations in elm injections for DED control

By Dr. Gayle L. Worf



We still have some valuable American elms on many Wisconsin golf courses—not as many as we used to, but we'd still hate to lose the remaining ones. I've seen the data and listened to discussions of improved injection techniques and modified application rates. I'm impressed with their possibilities, and want to pass them along to you.

Two major changes have occurred in recent years: (1) a **modification in injection technique** that places the chemical through root flares (just below the soil line), and (2) **use of Arbotect 20S at three times the former rate.**

These have been made possible through the research of Mr. Mark Stennes, a former graduate student at the University of Minnesota, and EPA label expansion that permits legal injection at the higher rate. Although other chemicals and low trunk-site injections are still possible, considerably improved uptake, distribution, and retention of active ingredient results from the newer system, and in turn results in much greater protection and greater survival. If you've injected elms previously—or even if you haven't—the modifications are relatively simple and easy to follow. I've offered a general summary below:

1. Timing. For preventive treatments—anytime during the growing season (June-September) after leaves reach full size. Do not inject defoliated trees until they are refoliated.

Therapeutic treatments can be made with good chances for success on trees that develop symptoms after July 1. Injections on trees showing earlier symptoms rarely work—the fungus is too far advanced and widespread in the tree. Also, trees infected via root grafts (including those showing epicormic branch wilting) won't respond for the same reason.

2. Equipment and chemical. Materials required are the following:

a. a corrosion-proof injection container that will hold 30 gallons or more:

b. a pressure system to deliver 5-12 psi constant pressure; (gravity units will do for this, but other systems may be better.)

c. a leak-proof "harness" consisting of high quality polyvinyl tubing of sufficient length, and with a sufficient number of tapered injection tees to surround the "root flare" base of the tree. A tree with a DBH of 30 inches will require from 45-60 injection sites. There should be 12 inches of tubing between each injection tee on the harness. Best tee size is 3/16 to 5/16 inch diameter. Introduce the chemical into the harness at two locations on opposite sides of the

tree for uniform pressure.

d. An electric hand drill equipped with a sharp, high quality wood-boring bit to make clean, snug-fitting holes.

e. A chemical solution. Arbotect 20S is the most persistent and effective chemical. The amount needed is determined by multiplying the DBH (tree diameter at 4.5 feet above the soil line) by 12/5 (12 ounces per 5 inches DBH). This is the "3 year treatment" rate as it appears on the label. (Chemical cost is about $1.30 per ounce.)

After equipment and chemical are assembled, follow these steps:

1. Excavate around the base of the tree, out a distance of 2-3 feet, and 8-18 inches deep, depending on the accessibility of root flares. Avoid tree damage.

2. Dilute the chemical required into water containing low salts such as rain, deionized or distilled water. Lake or river water might do. Check water quality by adding one teaspoon of Arbotect to 12 ounces of water, stir, and let sit for 3 hours. If cloudiness or settling occurs, the water is not suitable. To mix, first place the required amount of chemical in the tank, then add one gallon of water for each 2 ounces of chemical.

3. Drill injection holes perpendicular to the root surface, and not deeper than one inch into the sapwood. Space them 4-8 inches apart in the root flares all around the tree, spacing farthest apart on widespreading buttress roots and closer together where there are no flares. Where sidewalks disrupt, place as low as possible on the trunk at 2-4 inch intervals. Then use a lower dosage rate (8 ounces/5 inches) to minimize phytotoxicity.

4. Insert the tees all around the tree by tapping in place as promptly as possible to avoid drying out the tissue. Allow an extra tee on each side of the tree—replace these with ordinary connecting tees for attaching the supply tubes.

5. Connect the supply tubes to the two sites of the harness and also the tank.

6. Evacuate the air from the system by pulling out two injection tees from opposite sides of the tree and away from the supply lines. Then open the supply valve. After air bubbles stop coming through, re-connect tees to the tree, and allow injection to continue.

7. When the tree has taken all the solution, or uptake has stopped for several hours, remove the harness. Allow 30 minutes for drying before replacing the soil. Wound dressings are not necessary.

8. Dispose of leftover chemical according to directions, or save to use on another tree.

9. Clean and sanitize tees and drill bit before using on another tree.

10. If it is a therapeutic treatment, remove wilted branches within a month.

Another injection should not be necessary for two to three years. When needed, drill holes 2-3 inches above or below and to the side of previous sites.

Red elms should not be treated as they may be injured by the chemical. Some epicormic branches and mineral bark splitting of American elms has occurred, but damage has generally been minimal or none at all, and results have been good. I hope they will be for you, too!