

NEW DURSBAN LABELS CLEAR WAY FOR NATIVE ELM BARK BEETLE CONTROL

New labels for Dursban are providing a backup defense against Dutch elm disease in states where the native elm bark beetle is the primary vector. The Environmental Protection Agency has approved a national label for Dursban 2E and a Local Needs Registration for Dursban 4E in Minnesota where research on native elm bark beetle management has been centered.

"A good sanitation program, including debarking of all elm firelogs, is still the top priority," points out Bill Phillipson, extension entomologist at the University of Minnesota. "We're reaching the point, though, where cost and logistics in epidemic areas are making it very difficult to keep up with diseased tree removal and downed log disposal.

"In the Minneapolis-St. Paul-Bloomington area alone, estimates on diseased elms in 1979 range up around 77,000 trees. With present costs for labor and equipment, the price tag for removal and disposal will run in the neighborhood of \$30 million. We find we're in the same 'catch-up' situation with Dutch elm disease that other communities faced in the lower Midwest and East about 10 to 20 years ago."

The research has been conducted in several communities over the past several months by Phillipson and associates Mark Ascerno and Val Landwehr, under funding from the Minnesota Dept. of Agriculture Shade Tree Program. The product earlier was registered and has been used successfully in native elm bark beetle control programs in Canada.

DED in Minnesota

Dutch elm disease was first reported in Minnesota in 1961. As is typical of many infestations around the country, the disease had relatively little impact on elm populations for 12-14 years. Then DED multiplied rapidly.

"In the last five years, we've lost more than 20 times the number of elms killed in the first 14 years. The rate will continue to escalate unless comprehensive management programs are implemented," explains Phillipson.

"Costs for tree removal are essentially unavoidable. If communities do nothing to slow down the spread of Dutch elm disease, they will still have to remove dead and dying trees to keep them from falling across power lines, into houses, over traffic routes and so forth. We're looking at practical ways to disperse these removal costs over several years."

From a total elm population of about 5 million trees, the Twin Cities seven-county metropolitan area still has 4,500,000 that are disease-free, according to Phillipson. If DED is allowed to progress at its normal logarithmic rate, virtually all elms in that area will be destroyed over the next 10 years.

With today's cost of tree removal averaging nearly \$400 apiece, the expense would add up to a staggering \$1.8 billion. This does not take into ac-

count the aesthetic impact on communities, depreciation in home values due to loss of the majestic shade trees, or damage losses attributed to falling limbs and trees.

Two insects serve as elm fungus disease carriers—the smaller European and the native elm bark beetle. Both reproduce during the summer months in downed elm logs or diseased trees, which points up the importance of sanitation programs to deprive both insects of egg-laying sites, as well as to reduce the natural reservoir of disease fungus.

In some parts of the country, European elm bark beetles are the prevalent species. In Minnesota, however, native beetles far outnumber the European.

"In the northern two-thirds of Minnesota, the native beetle is the main and, in many instances, the exclusive carrier of Dutch elm disease," says Phillipson. "In the southern third, the native is an important carrier along with the European beetle."

Insect studies indicate that only two or three percent of the overwintering European beetles are likely to be carrying the disease fungus. "In our studies, about 30 percent of the overwintering European beetles carried the fungus. It only takes one beetle to infect a tree."

Both insects do most of their damage in the spring when they emerge from overwintering sites. Natives emerge first, starting around mid-April or early May, and fly into larger branches of healthy elms to feed. Trees are particularly vulnerable at this time, when new growth is being added and rapid transmission of the fungus can occur.

European beetles emerge about a month later and feed on smaller twigs and branches. Disease fungus introduced at this time usually spreads more slowly through the tree. If disease symptoms—leaf wilt and brown discoloration in twig cross-section—are detected early enough, it may be possible to save most of the tree by cutting out the infected branches.

A key to stopping native beetles was discovered in a "weak link" in its life cycle, which makes it much more susceptible to insecticide treatment than is the European. Native beetles overwinter as adults in the bark along the lower trunk of healthy elms. European beetles seek out downed trees and logs, overwintering in the larval form.

"By treating the bases of healthy elms with Dursban, we've destroyed over 97 percent of the native beetles overwintering there," notes Phillipson. "In addition to its effectiveness, another important advantage is that it doesn't repel the insects. The beetles do not avoid treated elms even when there are untreated trees nearby."

Application guidelines

Two formulations of the chlorpyrifos-based insecticide are registered for use in Minnesota—Dursban 2E and Dursban 4E. Application rate is .5 percent active ingredient solution with

water, sprayed to wet (not run-off) the basal 2-2½ meters (6-8 feet) of standing healthy elm trees (one gallon of 2E in 45 gallons of water equals .5 percent; enough for approximately 90 trees).

The entomologists do not recommend that this management technique be left to individual homeowners, because effective control of beetle populations must be handled on a communitywide basis. At present, trained municipal employees and licensed pest control operators represent most of the qualified applicators. The Minnesota SLN 24c label must be in the possession of the user at time of application.

"The best time for application is late August to mid-September," adds Phillipsen. "This would be just before native beetles start their search for overwintering sites. Extra care should be devoted to the basal six inches of the tree, including root flare. Young elms (up to 8 inches in diameter) and thin-barked elms are especially vulnerable to the beetles."

Fall treatment is preferred because beetles can introduce the fungus directly into healthy trees as they make their overwintering tunnels. The "bot-

tom up" disease symptoms are similar to those associated with root graft transfer of DED from infected to healthy elms. Spring treatments also can be effective by destroying beetles as they emerge to begin their feeding and reproductive cycle. The research team has monitored Dursban insecticide effectiveness for more than nine months, so a repeat treatment in the fall should not be needed where spring applications are made.

"Tree spray programs we've outlined will normally be conducted early enough in the spring and late enough in the fall that they won't conflict with most of the ongoing sanitation projects," explains Phillipsen. "From this standpoint, communities will be able to utilize their available manpower and equipment without a lot of additional expense."

"The cost of insecticide will run about 25 cents a tree, assuming an average 33-inch-diameter trunk. Most communities already have low-pressure sprayers and water tanks that are used in present weed and insect control programs, which can be used for these applications as well."

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Alternative methods

Essentially all U.S. elms are susceptible to Dutch elm disease. In northern states, approximately 95 percent are American (white) elms, with the remainder made up of red elm and rock elm species. A few foreign species, including the Chinese and Siberian elms, are fairly resistant to Dutch elm disease. Some have suggested importing these to replace native elms that have been lost to DED.

"We're not recommending this because they would serve as reservoir hosts for the disease, making it even more difficult to slow the destruction of our native elms," says Phillipsen. "They have other drawbacks, too. They're fast-growing, but brittle, so they tend to lose their branches. And they don't have the shape and structure of the American elm."

What about pheromone projects?

"The pheromone-trap method may show some promise in wild areas with only European beetle populations, but we haven't discovered a similar sex attractant that works with native beetles," replies Phillipsen. "We consider pheromone traps, at this point, to be a valuable monitoring tool for European beetle infestations."

As for a large-scale program based on pheromone use, there are disadvantages. By attracting a large number of beetles to a certain area, again a reservoir of fungus and beetles will probably build up. And there's the problem of isolating the treatment area. The best results obtained in recent tests indicate at least 3 to 13 percent of the beetles will still escape this method."

A great deal of research also has been focused on methods of combatting the DED fungus itself, instead of concentrating on the insect carriers. Are any of these being utilized on a significant basis?

"A variety of both chemical and biological agents have been tested as tree inoculants, usually under strictly controlled environmental conditions," says Phillipsen. "In a few instances, they've given good results. So far, however, there is nothing that has proved consistently effective in controlling the disease fungus in field applications."

"Translocation of any substance throughout the tree is extremely unpredictable, depending on environmental factors like moisture and temperature, plus size, age, photosynthetic activity and other plant physiological conditions. The interrelationships are very complex."

"Probably the greatest drawback, though, is cost. Most of these methods require specialized equipment and take more time. We feel our efforts should be directed primarily at aggressive sanitation programs to stop the disease carriers. And, since the native elm bark beetle essentially bypasses sanitation programs in its overwintering habits, we believe the insecticide spray method can prove to be a valuable augment to sanitation."

Dursban is a product of Dow Chemical Co., Midland, MI.