## Pine Beetle Battle *continued*

lot of these people had taken out half of their trees, they might not have had an outbreak in the first place." Averill adds that "there are very few forestry consultants in this area. The same is true for custom applicators who are equipped to do such work as applying preventive sprays. There's plenty of room for expansion here," he says.

The fact that homeowners are plenty concerned about the pine beetle was illustrated last summer when a large number of residents drove all the way from Denver or Boulder to Greeley — about 50 miles one way — to obtain one or two gallons of Balcom's "Pine Tree And Ornamental Spray" insecticide. The entomologists say most of these homeowners were applying the preventive spray themselves with small hand sprayers.

"And while they might not have been getting the chemical up as high as they needed to, they were probably getting it up high enough to catch most of the beetles," Averill says. Averill says that homeowners should be saturating the trunk of the tree to a height of about 30 feet. "They need to spray the trunks of trees because that's where the beetle actually enters the tree," he says.

He points out that the two types of sprayers he and Lister have been using in their work — the mist blower and hydraulic pump — perform equally as well. But he also adds that the mist blower has a definite advantage in portability because of a backpack model which is available for less than $500.

The spray should be applied during the first half of July — just before the mature beetles emerge from trees they killed last summer to move to live healthy trees to repeat their deadly life cycle. The female beetle first bores into the ponderosa pine — the main tree species on the front slope of the Rockies — then starts boring out vertical galleries where she then lays her eggs. After they hatch, the young larvae start boring out horizontal galleries.

"It's this physical girdling of the tree that kills it. It takes from only 500 to 1,000 beetles to kill a pine," Lister says. The beetles also can introduce a bluestaining fungus which is capable of killing the trees," Averill says. The fungus is injected into the tree by the salivary secretions of the beetle.

Mid-July to mid-September is when the beetles are attacking new trees. Even though the tree is usually killed within a matter of weeks, it isn't until the next spring that the needles actually start turning brown. The two USDA entomologists say that if these trees are cut down and burned or cut up for firewood, it helps break the beetle's life cycle.

But they point out that eradication is pretty much out of the question. "We have such a large scale infestation going on that there just isn't that many dollars or that much time and interested people available to even try an eradication program," Averill says. "In Colorado alone, we have more than a million infested trees." And even if there were funds and time available to launch an eradication program, it still wouldn't be feasible on large commercial timberlands. "The current price of timber won't justify it," Lister says.

"The cost of the preventive spray will run about 75 cents a tree," he adds. That might not seem like much if you're treating 20 or 30 trees. But when you start talking about 20,000 acres, you're talking about thousands of dollars.

Averill points out, however, that homeowners don't need to apply preventive sprays to every one of their trees. "What they really need to do is sit down with someone who knows what trees have been weakened by roads, homes and other construction. Then they need to identify the trees they want to save. Those trees are the ones I'd treat with a preventive spray," he says. He adds that they have to be sprayed every year until the infestation outbreak subsides. "The homeowner can then take a chance on the other trees or he can cut them down himself," Averill continues.

He concludes by saying that if we don't manage the forest, then insects, disease or fire will do it for us. And he adds that as more people move up into the mountains around Denver it will mean more problems. And that puts even more importance on forest management and preventive spraying. □

*Dr. John Hall Moves from Maryland to VPI*

# Not A Test Tube Rattler

Dr. John Hall, noted for his turfgrass work the last few years at the University of Maryland, this month moved his base of operations to Virginia Polytechnic Institute and State University in Blacksburg. He is turfgrass extension specialist replacing Dr. A. J. Powell, who recently moved to the University of Kentucky.

Dr. Hall is one of the most active turf researchers around when it comes to working with all aspects of the turf industry. "I don't see how a researcher could operate if he did not communicate closely with the industry," he told WEEDS TREES & TURF late one afternoon recently in his office at College Park. "Practical research is still the most prevalent in the turf industry because we are still in our infancy. Few universities can afford to do basic research for the stage we are in now."

To spend time "rattling test tubes", as he calls it, would probably alienate much of the practical side of the industry, he said. When he came to Maryland four years ago, he began building the turf program with his colleagues from this practical approach, evaluating herbicides to advise people in the field and heavy testing in management and variety trials.

He works closely with golf course superintendents, sod producers and other green industry associations in his area, and said "it is absolutely essential to get involved because only in association meetings and industry contacts can you find out on what to emphasize research." Turf people give up their land and maintain much of the areas after researchers like Hall do initial work.

"For example," he said, "we have not had *Fusarium* blight on our research farm since I have been here, so I have had to go out to the people I have met in the associations to work on it."

*'I don't see how a researcher could operate if he did not communicate closely with the industry.'*

He said he tried to stay on the fence when he first came to Maryland, not wanting to make any recommendations or step on anybody's toes, but has learned that by taking stands and giving opinions is where the real service to the industry can be done. "I tried to put out too many fires when I first came here too," he said, "helping people with very real but still singular problems they were having. But I have found out that with the limited time we all have here that the best thing we can do is things like develop educational programs for a larger number of people, write articles on the work we are involved in, and put out mimeos and data sheets on variety testing and things like that."

He said manufacturers and other companies in the industry are also a tremendous help. They are doing more basic research on herbicides and fungicides, and he feels it is absolutely essential to maintain a close relationship with them. "The universities have the reputation that is respected in the industry," he said, "and we do the field testing with the products after the manufacturer does all of the ground work to come up with something he feels will be useful."

The companies make direct contact with researchers like Hall to do studies on the products they develop, and he feels this is a good system. The contact is usually on an individual basis with technical representatives from the various companies.

"I have enjoyed the University of Maryland immensely, and I have enjoyed the people I worked with both in the university and in the field," he said. "It has also been good for me personally because working in the transition zone has enabled me to see both warm and cool season grasses, and insects and diseases you can only see in the transition zone." □

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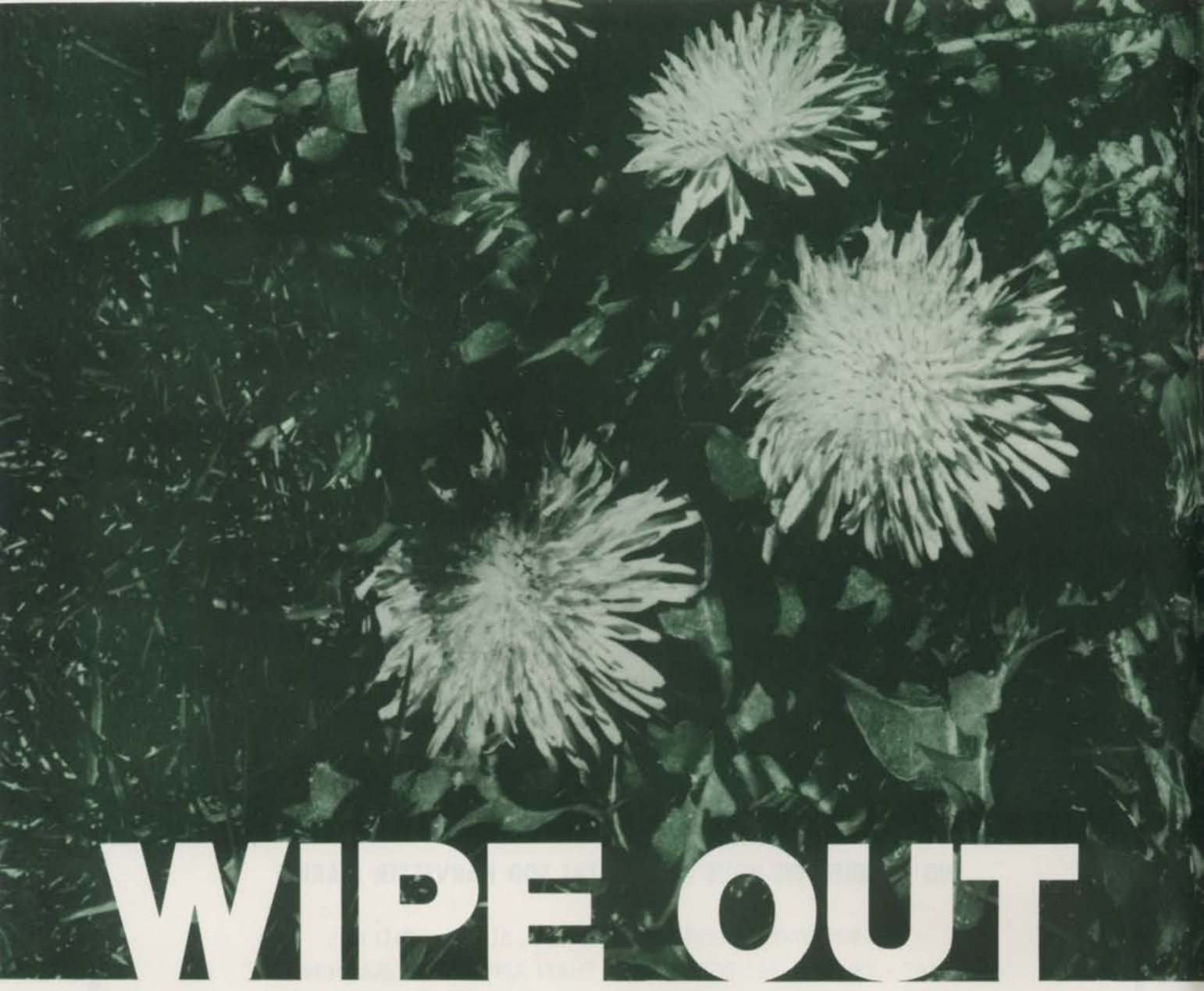

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|---|---|---|---|---|
| Bindweed | S | S-I | S-I | S |
| Bittercress | S | S-I | S-I | S |
| Black medic | R | S-I | I | S |
| Buttercup | S-I | I | I | S |
| Carpetweed | S | S | S | S |
| Chickweed, common | R | S | S-I | S |
| Mouse-ear | I-R | S | S-I | S |
| Chicory | S | S | S | S |
| Clover, crimson | S | S | S | S |
| Hop | I | S | S | S |
| White | I | S | S | S |
| Cranesbill | S | S-I | S-I | S |
| Daisy, oxeye | I | I | I | I |
| Dandelion | S | S | S | S |
| Dock | I | I-R | I-R | S |
| Dogfennel | I | S | I | S |
| Garlic, wild | S-I | R | R | S-I |
| Ground ivy | I-R | S-I | I | S-I |
| Hawkweed | S-I | R | R | S-I |
| Henbit | I | S | I | S |
| Knapweed, spotted | I | S-I | I | S |
| Knawel | R | S | I | S |
| Knotweed | R | I | I | S |
| Lambsquarter | S | S | S | S |
| Lespedeza | I-R | S | S | S |
| Mugwort | I | I-R | I-R | S-I |
| Mustards | S | S-I | I | S |
| Nutsedge | I | R | R | R |
| Onion, wild | I | R | R | S-I |
| Ornamental plants | S-I | S-I | S-I | S |
| Woodsorrel | R | S | R | I |
| Pennycress | S | S-I | I | S |
| Pepperweed | S | S-I | S-I | S |
| Pigweed | S | S | S | S |
| Plantains | S | I | I-R | I-R |
| Poison ivy | I | S | R | S-I |
| Pony foot | S | I | I | S-I |
| Prostrate spurge | I | I | I | S |
| Purslane | I | S-I | R | S |
| Red sorrel | R | I | R | S |
| Shepherdspurse | S | S | S-I | S |
| Speedwell | I-R | I-R | I-R | I-R |
| Spotted spurge | I-R | I | S-I | S-I |
| Thistle, musk, curl | S | I | I | S |
| Thistle, Canada | I | I | I | S |
| Vegetables | S | S | S | S |
| Wild carrot | S | S-I | S-I | S |
| Wild strawberry | R | I | R | S-I |
| Yarrow | I | I-R | I-R | S |
| Yellow rocket | S-I | I | I | S-I |

S = weed susceptible; I = intermediate, good control at times with high rates, sometimes poor, usually require more than one treatment; R = resistant weeds in most instances.

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# HOW NATIONAL CAPITAL PARKS CONTROL DUTCH ELM DISEASE

by James L. Sherald
Richard S. Hammerschlag
National Park Service

Despite the constant threat from Dutch elm disease (DED), the elm continues to play the dominant role in the landscape of the Federal Enclave of our nation's capital. Over twenty-five hundred elms lend a graceful and majestic flavor to the streets, parks, monuments and buildings of one of the world's most significant park areas.

The successful perpetuation of our national elms has not been without a tremendous investment of time and effort. At a time when elms throughout the northeast and midwest were being devastated by DED, the National Capital Parks (NCP) took immediate action to maintain and preserve this elm resource. Successful elm management has been achieved through the conscientious implementation of an expanding, comprehensive, integrated control program. The purpose of this article is to outline the various facets of our current DED program which are being used to sustain one of our country's few remaining elm populations.

*American elms lining 14th Street near the Washington Monument.*

*American elms surrounding the Tidal Basin and the Jefferson Memorial.*

Within the Washington, D.C. area, the European elm bark beetle is the common vector of the fungus *Ceratocystic ulmi* (Buism.) C. Moreau, the causal agent of DED. The beetle vector has always been considered the most readily controlled factor in the disease cycle. In the early years of the DED control program, NCP like many other municipalities, applied DDT in late winter or early spring to protect twig crotches from bark beetle feeding and the concurrent inoculation with the disease organism. The publishing of Rachel Carson's Silent Spring and the revelation of the persistent and hazardous nature of DDT resulted in the introduction of methoxychlor, another insecticide which is less persistent and therefore less hazardous to the environment. Thus NCP, as well as most other organizations involved in DED control, relies extensively on the thorough application of a dormant methoxychlor/xylene spray for bark beetle control.

Although a dormant spray may effectively minimize bark beetle feeding, the key to long-term beetle control is a thorough sanitation program. The European elm bark beetle seeks weakened or dying elm wood to breed in. Sanitation involves efficient detection, rapid removal, and destruction of these diseased or dying limbs and trees to eliminate the favored beetle breeding sites. By limiting beetle reproduction, spread of the fungus to other trees is lessened.

Recently the Forest Service and the State University of New York College of Environmental Science and Forestry have made advances in the biological control of bark beetles through pheromone (attractant) trapping thereby offering a new prospect for beetle suppression. The Ecological Services Laboratory

to page 30

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| Ants, Armyworms, Clover mites, Springtails (Collembola), Crickets, Cutworms, Digger wasps, Earwigs, Frit flies, Lawn billbugs, Sod webworms (Lawn moth), Sowbugs, White Grubs (such as Japanese Beetle larva) | 4 fl. oz. | 3 gals. | Spot spray anthills and wasp ground nest openings. For lawn billbugs and grubs, irrigate the lawn thoroughly immediately after treatment. For frit flies, mow grass and water well before treatment but delay application until grass is dry. Do not water again until necessary. |
| Brown dog ticks, Bermuda mites, Chiggers, Fleas, Leafhoppers | 1¼ fl. oz. | 3 gals. | Do not apply to animals. For brown dog ticks spray grass and under shrubbery, particularly near house. |
| Millipedes | 8 fl. oz. | 3 gals. | |
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*Application may be made in 3 gals. of water per 1,000 sq. ft. Thoroughly water treated area immediately following application.

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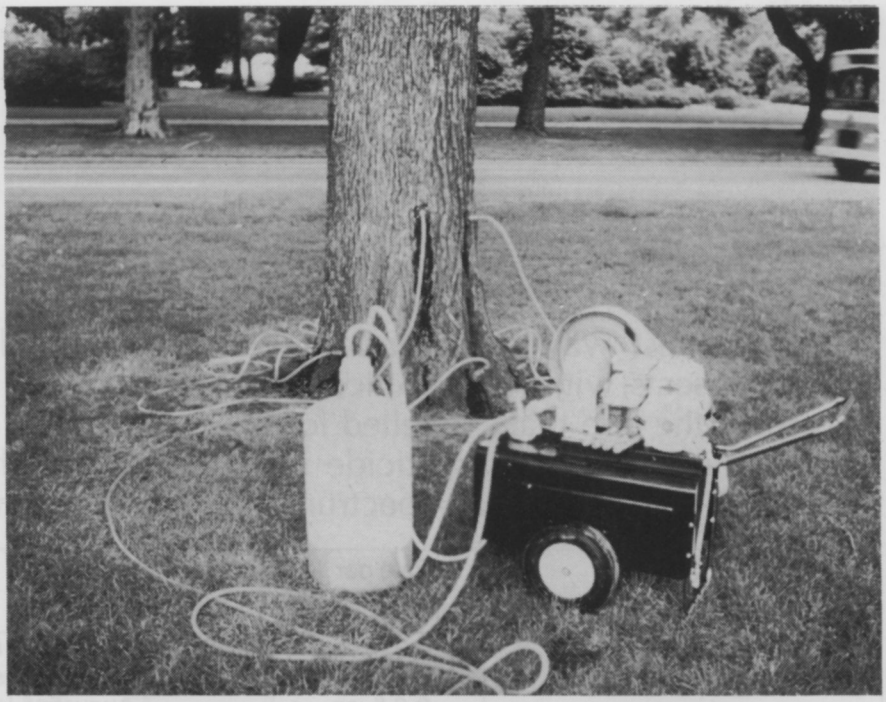
## DUTCH ELM DISEASE

*continued*

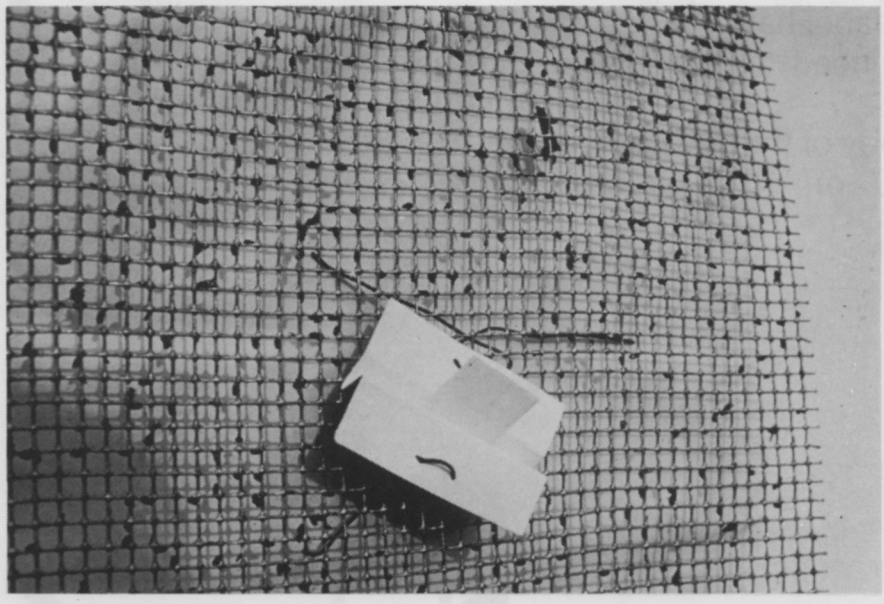


*Power sprayer injection apparatus for treatment.*

(ESL) and the USDA Northeastern Forest Experiment Station, Delaware, Ohio, are currently using pheromone traps in NCP. A number of traps consisting of hardware cloth coated with Stikem Special® and baited with dispensers containing the synthetic pheromone combination, Multilure, have been installed throughout the Park to survey the beetle population. Such widely spaced survey traps have been helpful in indicating areas of high beetle density. Emergence periods, which usually occur twice throughout the summer, can also be accurately monitored through weekly beetle counts of survey traps. Emergence monitoring may be useful for timing cover sprays to the beginning of emergence periods. Ultimately mass beetle trapping may prove to be an effective procedure for reducing DED.

The earlier diseased elms can be detected the more effective will be the control program. In early spring, shortly after bud break, trained scouts begin a thorough examination of each tree for DED symptoms. When detected, symptomatic trees are numbered and twig samples collected for culture diagnosis at the NCP, ESL. Although most cases of DED are detected in June and early July, surveillance is continued throughout the summer.

Examination of individual trees by trained scouts is generally successful in achieving thorough diagnosis. However, when large numbers of trees grow in an extensive area, such as the Federal Enclave, this procedure becomes time consuming thereby making early detection throughout the region difficult. In addition, scouting may miss crown symptoms not visible from the ground. These scouting problems have elicited a cooperative remote sensing program between NASA at Wallops Island, Virginia, and the ESL. Remote sensing coupled with imagery enhancement is currently being evaluated as a system for early detection of DED in NCP. It is hoped that a film/filter combination will be found that will allow efficient detection of diseased or stressed trees before they are noticeable with the naked eye. Early diagnosis presents a greater opportunity for successful treatment of diseased trees.



*European elm bark beetle trap infested with beetles. The trap consists of hardware cloth coated and baited.*

In spite of thorough spray and sanitation programs, control is never absolute. Each year several large, stately elms are lost. These trees, because of their size and location, are often prominent components of our Capital's landscape and their loss is severely felt. Recently, the Ecological Services Laboratory of NCP in cooperation with USDA Northeastern Forest Experiment Station, initiated an experimental program to save diseased elms by utilizing high pressure trunk and limb injections with the systemic fungicide MBC.HCl (methy 2-benzimidazole carbamate hydrochloride). As soon as detected

*please turn page*