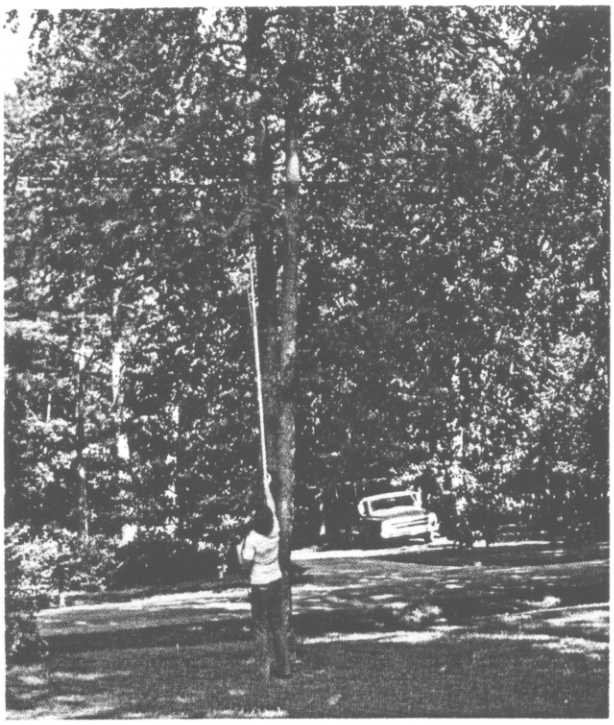
GEORGIA FOREST RESEARCH REPORT

10
JUNE, 1980



TREATMENT AND UTILIZATION OF WOOD SALVAGED FROM DUTCH ELM DISEASED TREES

BY

C.W. Berisford, E.A. Brown, J.L. Hanula,
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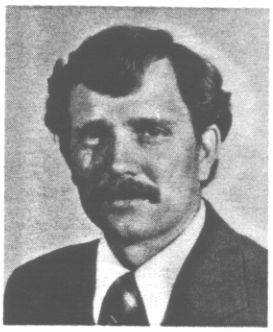

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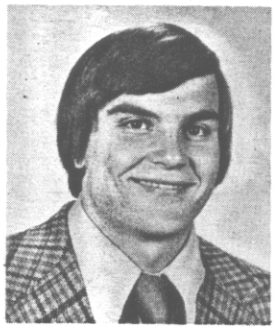

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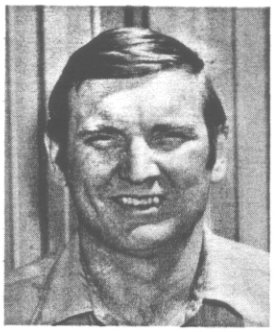

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GEORGIA FORESTRY COMMISSION

DEPARTMENT OF ENTOMOLOGY

AND

COOPERATIVE EXTENSION SERVICE

UNIVERSITY OF GEORGIA

ATHENS, GEORGIA

INTRODUCTION

Dutch elm disease (DED), caused by the fungus Ceratocystis ulmi (Buisman), has been a serious pest of ornamental elms, Ulmus spp., in the United States for several years. In some areas American elm, U. americana L. has been almost eliminated as an ornamental tree. In Georgia, DED has been a pest for 10-15 years primarily on American elm and winged elm, U. alata Michx. The disease is carried by bark beetles, primarily the smaller European elm bark beetle, Scolytus multistriatus and occasionally by the native elm bark beetle, Hylurgopinus rufipes. Beetles carry fungus spores from diseased trees when they emerge from the inner bark where they developed as larvae (Figs. 1 & 2). Healthy elms are innoculated with the disease when adult beetles feed on the twigs and the fungus is introduced into the feeding scars.

1. Supported in part by USDA Forest Service, Urban Forestry Project, Athens, Georgia, and the Georgia Agricultural Experiment Stations. The opinions, findings and recommendations are those of the authors and not necessarily those of the USDA.
2. Georgia Forestry Commission.
3. USDA Forest Service, Urban Forestry Project Leader, Athens, Georgia.

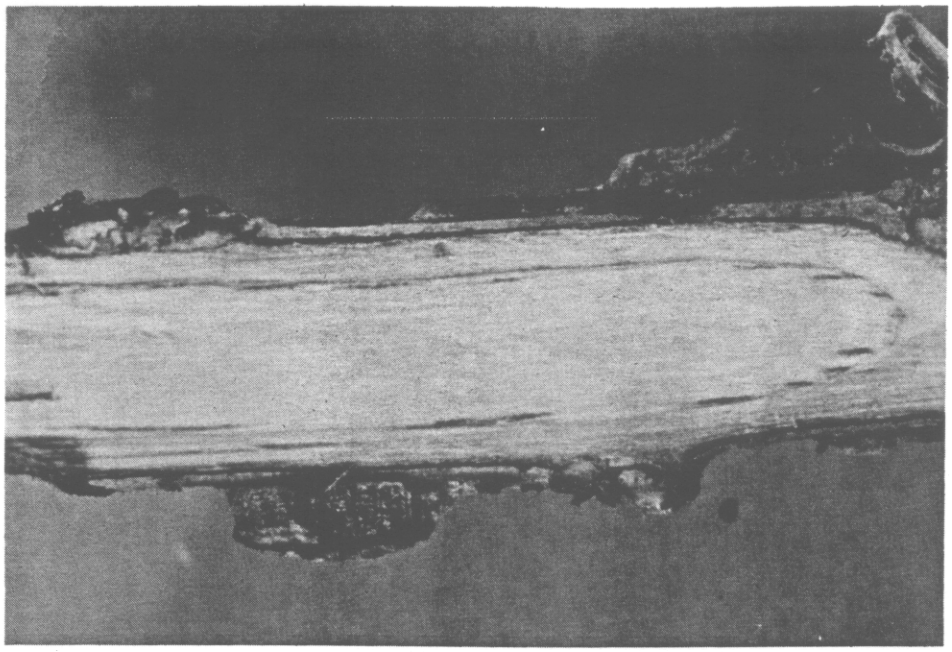


Figure 1 - Elm twig showing discolored phloem characteristic of DED infection.

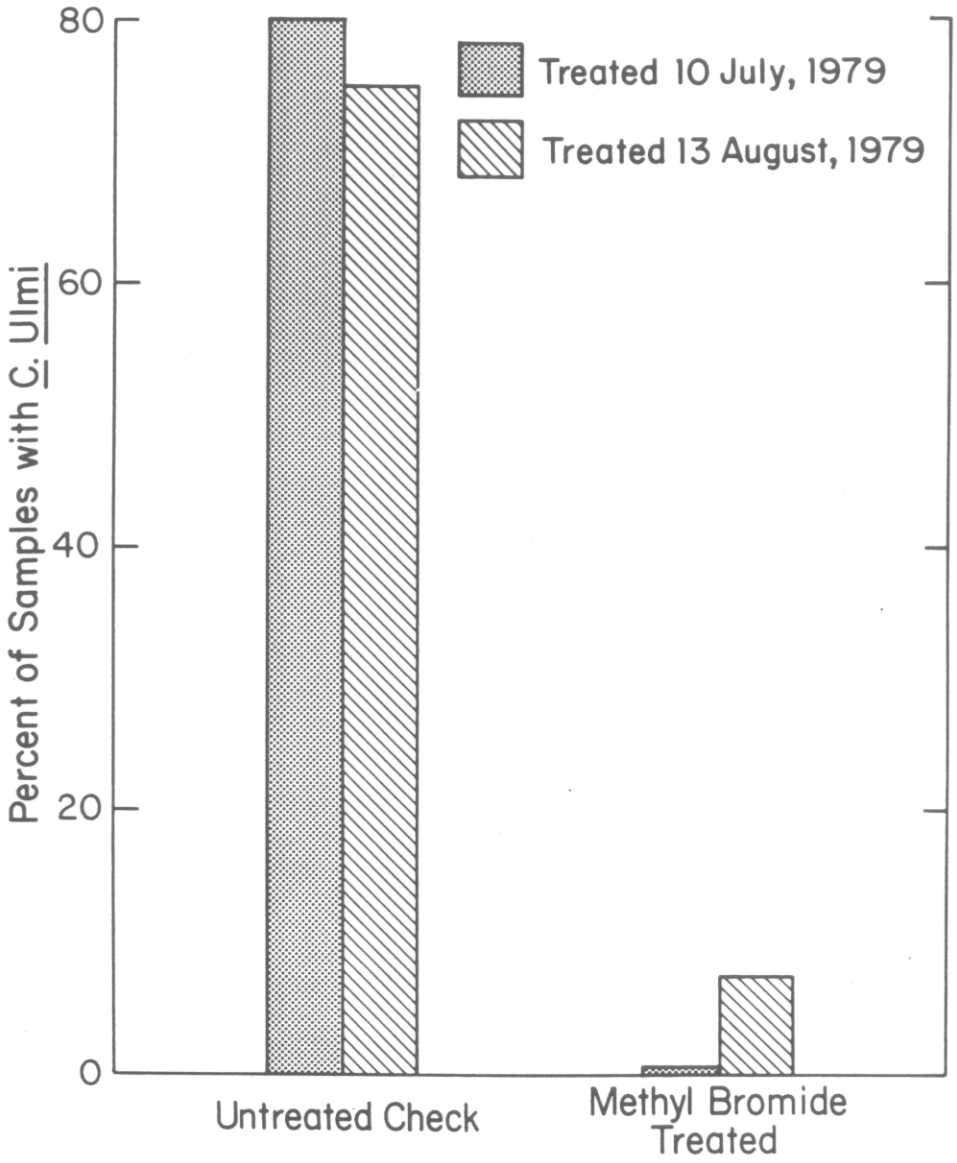


Figure 1a - Percentage of samples from which DED fungus was isolated in treated and untreated logs.

In 1978, the U. S. Forest Service (Forest Insect and Disease Management) and the Georgia Forestry Commission initiated a DED control demonstration project at several sites in the Atlanta, Georgia area. Elms infected with DED were identified and infested portions were removed. Frequently whole trees were removed if 20 percent of the tree was infected. Wastewood generated by these operations is potentially a valuable source of firewood. Also, valuable landfill space is used if the wood is buried. However, much of the wood removed in these sanitation-salvage operations is infected with DED fungus and infested with bark beetle broods which can emerge and carry the disease to healthy elms. Therefore, it is necessary to kill the fungus and/or the beetles before salvaged wood may be safely utilized for firewood. Georgia Forestry Commission personnel fumigated salvaged wood with methyl bromide in hope that it could be more safely utilized for firewood.

In 1979, a study of the efficacy of the methyl bromide treatment was conducted by the Georgia Forestry Commission, the Department of Entomology and the Cooperative Extension Service (Plant Pathology), University of Georgia. The study had three objectives: (1) To determine if the methyl bromide was effective in killing beetle broods in salvaged elm wood (2) To determine if the DED fungus was killed by the treatment and (3) To determine if uninfested wood could be reinfested by elm bark beetles subsequent to fumigation.

PROCEDURES

Tests were conducted in 1979 on diseased winged elm trees cut during the DED Demonstration Project in Covington, Georgia. Wood for the initial test, conducted in mid July, was collected from routine sanitation operations. The wood was stacked into two stacks of approximately equal dimensions (1.5 x 3.0 x 4.6 M). Prior to treatment, elm logs from 10-43 cm diameter were removed from the stacks and used as checks to determine if the fumigation would kill elm bark beetles inside. A second test on August 13-15 was similar except that elm bolts known to be heavily infested with elm bark beetles were placed in the piles prior to treatment.

Concurrent with removal of untreated logs to check beetle mortality, 15 samples of discolored wood were removed from selected bolts to determine if C. ulmi was present. Samples were removed with a knife, labeled individually and re-

turned to the laboratory. Wood pieces were flamed with 95 percent ethanol (ETOH) and placed in petri dishes containing potato dextrose agar (PDA, Difco). Petri dishes were placed on a laboratory bench under fluorescent lights at 20-22C for 14 days before reading.

In each test, both stacks were covered with six mil polyethylene film. One stack was treated with 32g per cubic meter with methyl bromide and the cover was removed from both stacks after 48 hours. Temperature and humidity data were recorded on a hygrothermograph placed under the cover.

After removal of the cover, wood samples were again taken from the same logs to determine the effect of the treatment on the fungus. Samples were handled as previously described. At the same time, log bolts were removed from the treated and check piles, respectively, and placed in ventilated rearing containers. Emerging S. multistriatus adults were collected in glass jars containing 70 percent glycerine. After 30 days the beetles were counted and the surface areas of the bolts were determined.

To determine if treated wood may be reinfested with beetles after treatment, 22 elm sections were removed from each pile following the August test and placed in an area where S. multistriatus populations were known to be high. Each section was randomly sampled after 90 days by excising four $25cm^2$ bark samples for each $2000cm^2$ of bark surface area. Each sample was dissected and the number of living and dead larvae were recorded.

Figure 2 - (Above) Galleries of the smaller European Elm bark beetle which carries the DED fungus. Figure 3 - (Bottom left) Removal of diseased elms to prevent spread of DED. Figure 4 - (Below) Wood from diseased elms stacked prior to treatment with methyl bromide.

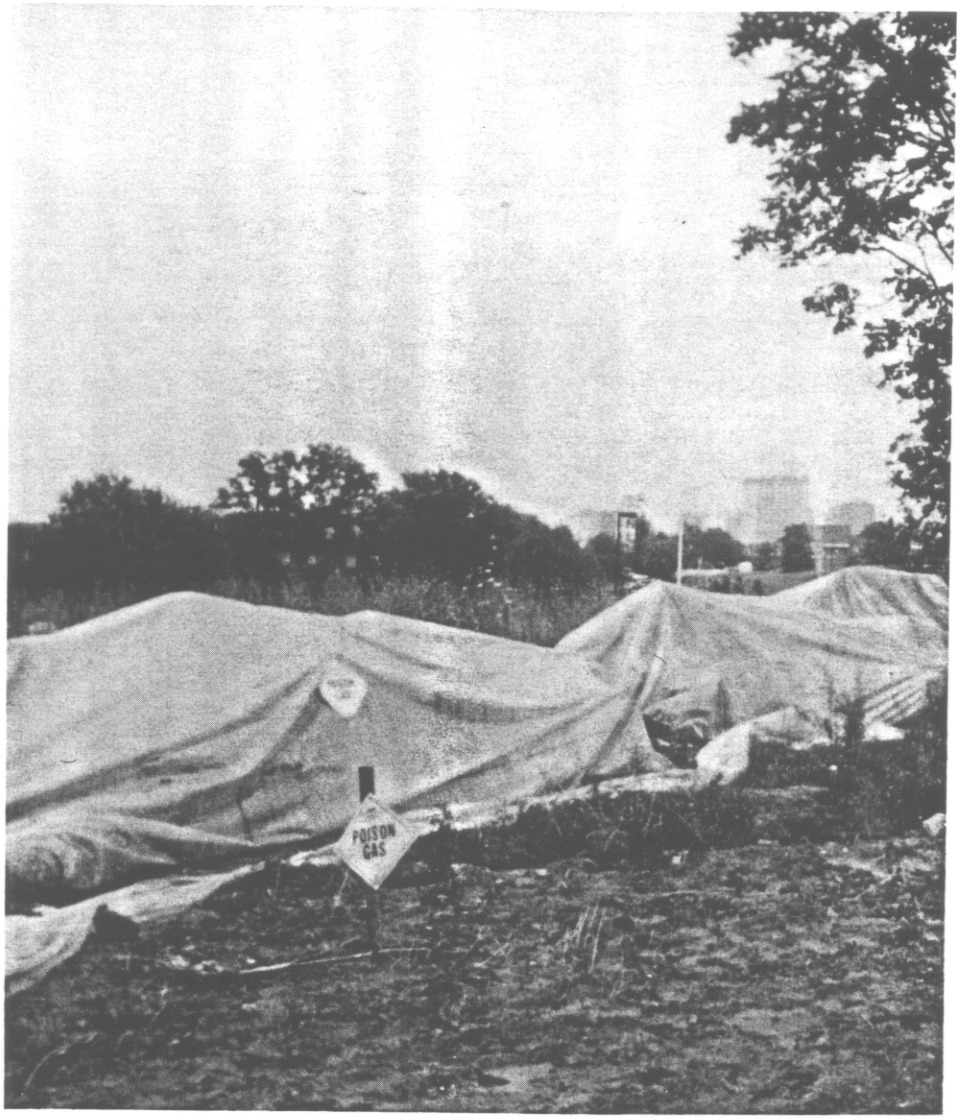


Figure 5 - (Above) Wood stacks covered with polyethylene prior to fumigation with methyl bromide. Figure 6 - Treated wood which has been split and made available to area homeowners for firewood.

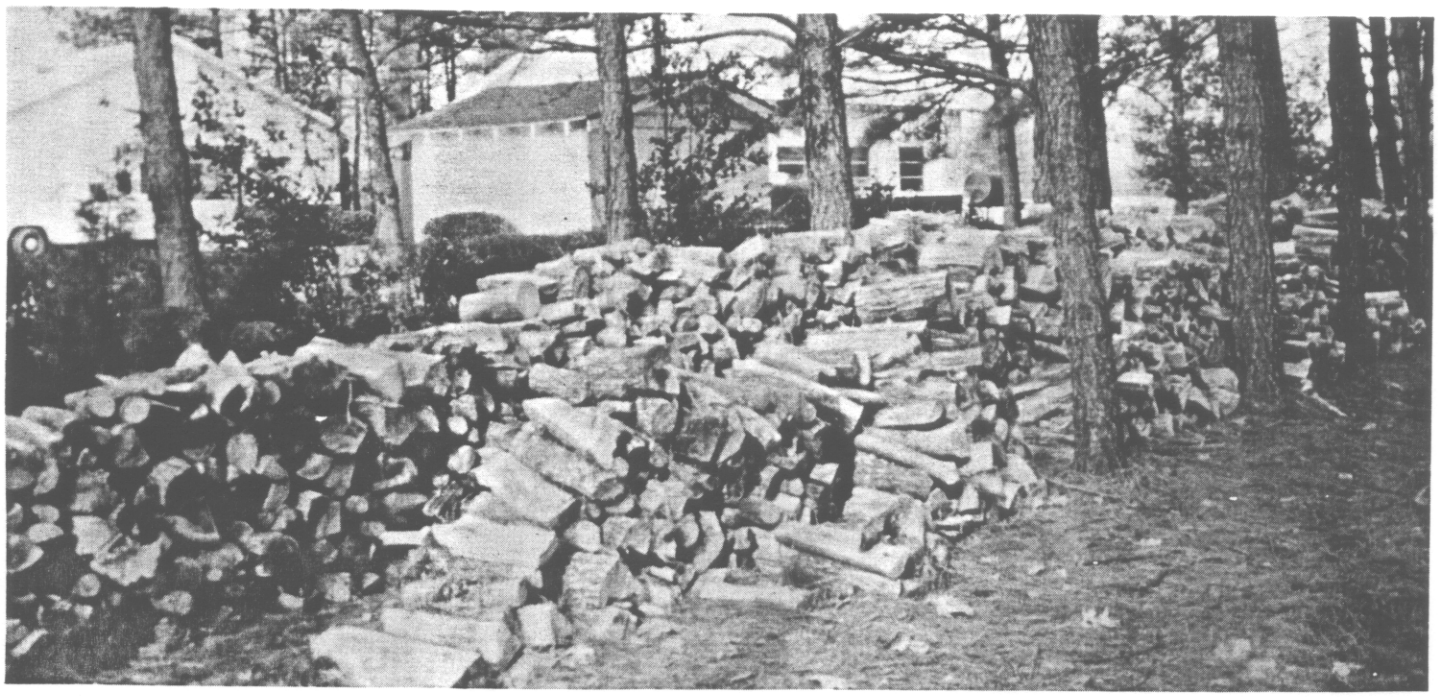
RESULTS AND DISCUSSION

In the first test, ulmi was isolated from 80 and 86 percent of the samples collected from the stacks prior to methyl bromide treatment and plastic cover only respectively. No organisms could be isolated from the methyl bromide treated wood and 33 percent of the plastic covered treated wood yielded C. ulmi (Fig. 1a).

Figure 1b shows the number of S. multistriatus adults emerging per 100 cm^2 bark surface area from treated and untreated bolts. Only a very small number of beetles successfully emerged from treated bolts.

The second test in August showed a similar pattern except that the piles with only a plastic film cover had high beetle emergence and a relatively high percentage of samples with C. ulmi fungus. Although high temperature of up to 40°C under the film cover appeared to be effective in the first test, the subsequent test with similar temperatures showed that conditions lethal to the beetles may occur.

The preliminary data from the test conducted in August indicate that reinfestation of treated wood by S. multistriatus is not a serious problem. Although some reinfestation occurred, brood production was very low. In the operation, the wood was split before it was made available for firewood, further reducing the chance of reinfestation since the wood dried rapidly.



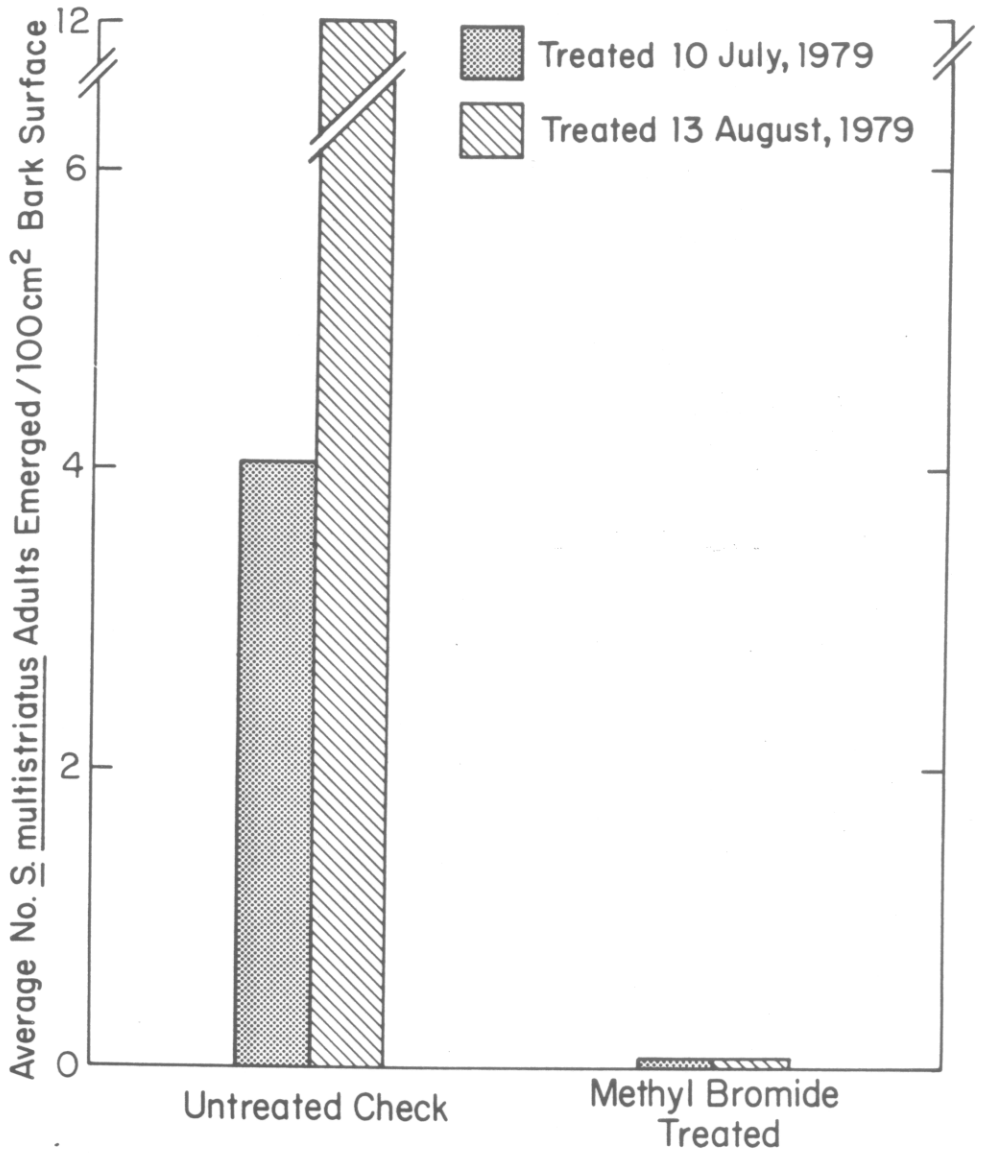


Figure 1b - Numbers of smaller European elm bark beetles which emerged from treated and untreated logs.

CONCLUSIONS

Treatment of small lots of elm wood with methyl bromide to kill both the DED fungus and the beetle vectors provides an alternative to burying, debarking, burning or treating with insecticides. Wood can frequently be treated at various sites within city limits and it is not necessary to transport wood long distances to a central point for treatment. If future tests confirm that reinfestation of treated wood is not a problem, wood may be treated on homeowners' property and the wood can be left at the site to further reduce transportation and handling costs. The fumigation treatment provides for safe utilization of the salvaged wood as firewood, instead of contributing to the DED problem and/or occupying scarce landfill space.

Additional information on wood utilization and the Dutch elm disease control program in Georgia can be obtained by contacting your local Georgia Forestry Commission representative, your local office of the Georgia Cooperative Extension Service or the United States Forest Service, Forest Insect Disease Management Office.

ACKNOWLEDGEMENTS

We wish to express our sincere appreciation for guidance given by Mr. John Godbee, Pest Management Project Leader, Union Camp Woodlands Corporation, and Dr. Gene Moody, Extension Plant Pathologist; and technical assistance provided by Ms. Lutricia Harrison and Ms. Janet Anderson, Program Assistants.

A. Ray Shirley, Director
John W. Mixon, Chief of Forest Research

Cost $1,104.00
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