

RESPONSE OF SMALLER EUROPEAN ELM BARK BEETLES TO PRUNING WOUNDS ON AMERICAN ELM^{1/}

by Jack H. Barger and William N. Cannon, Jr.

Abstract. From 1982 to 1984, inflight smaller European elm bark beetles, *Scolytus multistriatus*, were captured on American elms, *Ulmus americana*, that were therapeutically pruned for Dutch elm disease control. Pruning wounds were treated with wound dressing or left untreated to determine effects of the treatments on beetle attraction. Significantly more beetles were captured at pruning sites than were captured away from pruning sites, regardless of treatment. No differences were detected in beetle captures at pruning sites with or without wound dressing. Male to female sex ratios were unaffected.

Résumé. De 1982 à 1984, des scolytes européens et vol, *Scolytus multistriatus*, furent capturés sur des ormes américains, *Ulmus americana*, qui étaient élagués thérapeutiquement pour contrôler la maladie hollandaise de l'orme. Les surfaces de coupe furent traitées avec un produit de recouvrement ou laissées non-traitées afin de déterminer les effets des traitements sur l'attraction des insectes. Un plus grand nombre d'insectes furent capturés aux sites d'élagage que capturés loin de ces sites, peu importe le traitement. Aucune différence ne fut détectée dans la capture d'insectes au site d'élagage, avec ou sans produit de recouvrement. Le ratio mâle-femelle ne fut pas influencé.

Hart et al. (7) reported increased incidence of Dutch elm disease (DED), caused by the fungus *Ceratocystis ulmi* (Buisman) C. Moreau, in areas of Detroit, Michigan, where healthy American elms, *Ulmus americana* L., were pruned the previous growing season for routine maintenance and esthetics. Their investigations revealed that the smaller European elm bark beetle, *Scolytus multistriatus* (Marshall), a vector of DED, attempted to form brood galleries in the trunks of these recently trimmed, apparently healthy elm trees. Subsequently, it was recommended that routine maintenance pruning on healthy elms should be done only during late fall and winter when the beetle vectors are inactive.

Therapeutic pruning of elms that show early symptoms of beetle vectored DED is an effective treatment (10, 6, 8, 3, 5). But unlike pruning of healthy elms for routine maintenance, therapeutic pruning of diseased elms, to be effective, must be done during the active period of the beetle vec-

tors. The success of therapeutic pruning is greatly influenced by early detection, prompt removal of symptomatic limbs, length of clearwood, and work experience of the pruning crews.

However, elms with pruning wounds have been shown to attract both bark beetle DED vectors. This may be due to increased host-emitted volatiles (1, 12). In California, Byers et al. (2) found that significantly more smaller European elm bark beetles were attracted to pruned limbs of European and Siberian elm than to healthy, non-pruned limbs. In Minnesota, Landwehr et al. (9) reported that during May and June, more native elm bark beetles, *Hylurgopinus rufipes* (Eichhoff), were attracted to healthy American elms that had been pruned than to those that were not pruned. Healthy elms whose pruned limbs were painted with tree wound dressing did not attract significantly more native elm bark beetles than unpruned elms.

The effects of therapeutic pruning and wound dressing treatments on attraction of *S. multistriatus* to American elms have not been reported. Because of the possible advantages of these combined treatments in managing DED, we conducted a study to determine if tree wound dressing, when applied to pruning wounds of therapeutically pruned American elm, would affect the number of *S. multistriatus* captured at and away from pruning sites.

Materials and Methods

The study was conducted in Shaker Heights, Ohio, from 1982 to 1984, in conjunction with an integrated DED management program. A complete inventory of all public (4,021) and private elms (2,661) was conducted within the city. Each year, at least three ground surveys were made on all public elms (one per year for private elms) to detect new infections of DED. Public elms with 10

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percent or less DED crown symptoms were scheduled for therapeutic pruning. All others were removed within 20 work days following detection.

Elms receiving therapeutic pruning were treated with an asphalt base tree wound dressing (K. K.

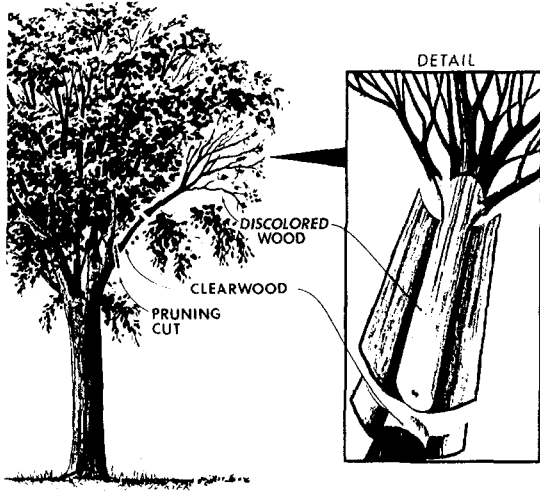


Figure 1. Diseased elm pruned 10 feet (3 m) beyond the last observed discolored wood.

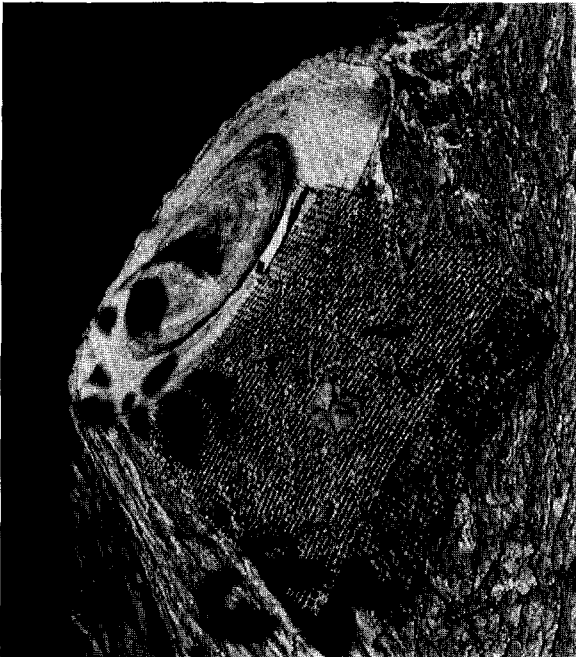


Figure 2. Sticky-coated hardware screen trap attached to pruning wound.

Tree Wound Dressing, Karl Kuemmerling Inc., Massillon, OH) or left untreated on an alternating basis at the actual time of pruning. Only elms scheduled for therapy each year that could be pruned at least 10 feet (3 m) beyond the last observed DED staining (Fig. 1) were used (4).

Treatment effects were monitored in each pruned tree by capturing beetles on paired sticky-coated (Stikem Special[®], Michel and Pelton Co., Emeryville, CA) hardware screen (30.5 by 30.5 cm; 0.64-cm mesh) traps. One trap was attached directly to the pruning wound (Fig. 2). The other trap was attached about 10 feet (3 m) away at the same level (Fig. 3). There was only one pair of traps per tree. Traps were removed in late October of each year.

Trap catches were determined by actual count and summarized by treatment. A chi-square analysis was used to test for differences in numbers of captured male and female beetles. Beetle catches at and away from pruning sites were compared with a Wilcoxon matched-pairs signed-ranks test. A Wilcoxon two-sample test was used to analyze for treatment differences in beetle catches at pruning sites with or without wound dressing (11).

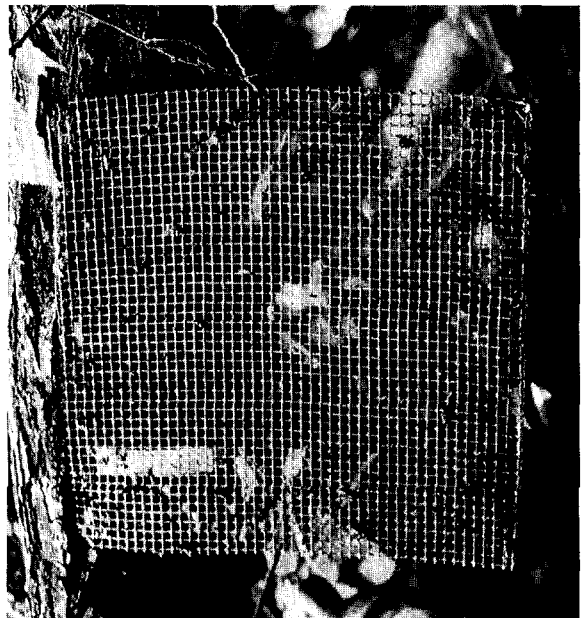


Figure 3. Beetle trap attached about 10 feet (3 m) from and at the same level of a pruning wound.

Results and Discussion

There were slightly more males than females (1.07:1.0) captured at pruning sites and slightly fewer males than females (0.97:1.0) captured away from pruning sites, regardless of treatment, but these differences were not statistically significant (P over 0.05).

The results from paired traps showed significantly more beetles ($P < 0.01$) were captured on traps at pruning sites with or without wound dressing than were captured on traps away from pruning sites (Table 1). But most important, wound dressing had no significant effect (P over 0.05) on the mean number of beetles captured at pruning sites. Unexpectedly, the number of beetles captured was about 18% higher (2,510 to 2,129) at pruning sites with dressing than at sites without dressing.

Although Landwehr et al. (1981) demonstrated reduced native beetle attraction to pruning wounds treated with wound dressing, it appears that the type of wound dressing used in this study had no effect on reducing American elm host-volatiles and the subsequent smaller European elm bark beetle attraction to pruning wounds. Other commercially available wound dressings may be more effective and should be investigated.

The efficacy of therapeutic pruning in saving diseased elms is well established and probably far

exceeds the risk of bole inoculation by attracted beetles visiting pruning wounds. Thus, therapeutic pruning should continue to be one of the major techniques used in integrated management of DED.

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Table 1. Effects of therapeutic pruning and wound dressing on the number of *S. multistriatus* captured per trap from 56 paired traps on American elms, Shaker Heights, Ohio 1982-84.

Wound dressing	At pruning site	Away from pruning site
	Mean $\pm$ SE	Mean $\pm$ SE
With	89.6 $\pm$ 21.1 ^{a/}	33.8 $\pm$ 13.7 ^{a/}
Without	76.0 $\pm$ 30.3	41.1 $\pm$ 22.7
	82.8 ^{b/}	37.5 ^{b/}

^{a/} The two treatment means within site are not significantly different (P over 0.05) by the Wilcoxon two-sample test.

^{b/} Site means are highly significantly different ($P < 0.01$) by the Wilcoxon matched-pairs signed-ranks test.