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THE EFFECT OF PLASTIC TREE WRAP ON BORER INCIDENCE IN DOGWOOD

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Abstract. In an integrated pest management program developed for the National Park Service, tree wrap was applied to young dogwoods to protect the trees from deer. The presence of vinyl wrap was found to have a significant effect on the incidence of dogwood borers in these trees. Dogwood borers attacked wrapped trees more frequently and more successfully than unwrapped trees.

Résumé. Dans le cadre d'un programme de gestion intégré des insectes et des maladies développé pour le National Park Service (Service national des parcs), l'enveloppement des troncs était employé pour les jeunes cornouillers afin de protéger les arbres des cervidés. La présence d'enveloppes de vinyle était perçue par la suite comme ayant un effet significatif sur l'incidence des perceurs du cornouillers sur ces arbres. Les perceurs du cornouillers attaquaient avec plus de succès les arbres enveloppés que ceux ne l'étant pas.

Flowering dogwood, *Cornus florida,* is one of the most popular landscape trees used today. *Cornus* was listed as the 17th most commonly planted street tree genus in 1980 (4), and was found to be from the second to the thirteenth most commonly occurring genus in four studies of homesite landscapes in Maryland (1, 2, 3, 8). This tree is not without its drawbacks, which include the dogwood borer, *Synanthedon scitula.* The eggs of this clearwing moth are laid on the trunks of its host plant, often near calluses or trunk wounds. The larvae enter through breaks in the bark and tunnel in the cambium of the trunk or major limbs. This causes callus formation, wilting and dieback in the crown, and can occasionally kill the entire tree. The dogwood borer has been found to occur more frequently in trees having trunk damage (7). In trees having diameters less than 15 cm, attack was most likely to occur on the main trunk within 50 cm of the ground (7).

At Valley Forge National Historic Park, flowering dogwood is the most common ornamental tree, accounting for 25% of the planted trees (Owen, unpub. data). Tree care at Valley Forge is complicated by a large endemic deer population. Male deer rub their antlers on small trees, often dogwoods, during the fall. Damage from this activity alone can kill some trees, but those trees that survive are susceptible to borer attack. To prevent extensive damage, the trunks of trees are wrapped with a vinyl tree wrap when they are planted. However, previous studies have suggested that tree wraps may increase the likelihood of infestation by clearwing moths (5, 6, 9). The relationship between tree wrap and the incidence of dogwood borer infestation was the objective of this study.

Materials and Methods

This study took place at Valley Forge National Historic Park in southeastern Pennsylvania during the summer of 1988. Trees were selected from a large, open area planted mainly in dogwood. Normally, several dozen dogwoods of 2.5 cm diameter are planted by park personnel in spring, and a ring around each tree is mulched to reduce mower damage. Plastic tree wrap is applied shortly after planting. However, for a variety of reasons some trees lack wrap. The wrap would fall off, be rubbed off by deer, be removed by visitors to the park, or the newly planted tree would be overlooked and never receive tree wrap. Ideally, the wrap was designed to spiral loosely around the tree trunk. This allowed the wrap to expand as the tree

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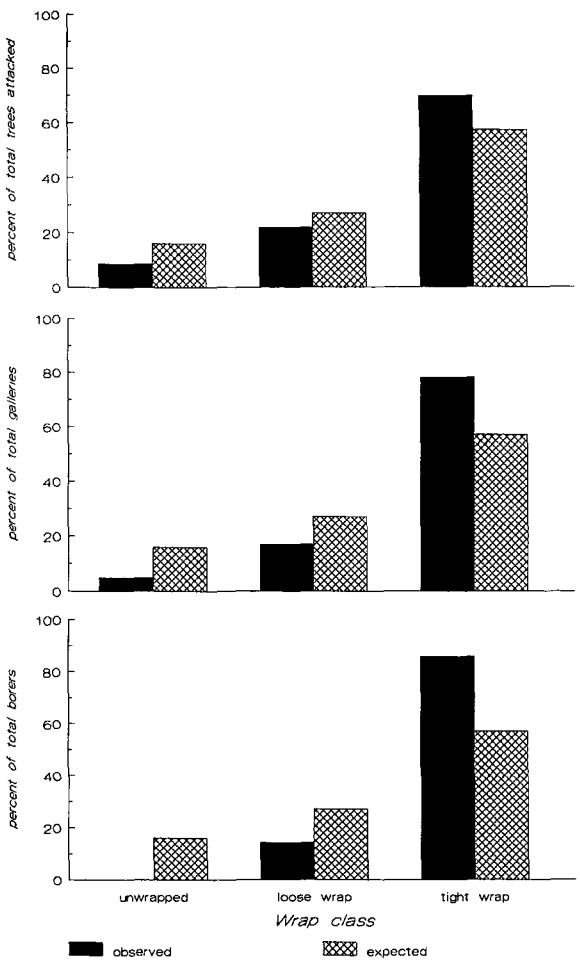

Figure 1. Observed vs. expected incidence of attack by the dogwood borer, galleries observed, and live borers excavated from galleries in 56 trees.

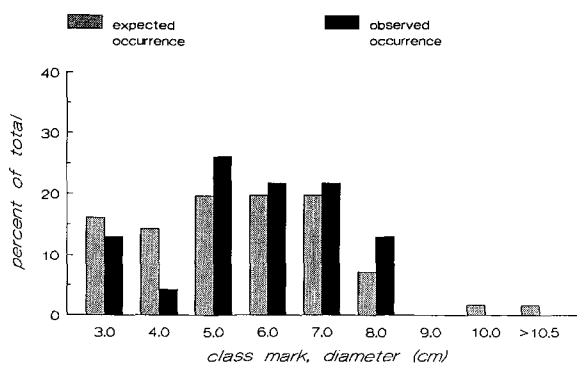

Figure 2. Observed vs. expected occurrence of borer galleries by tree diameter.

grew. Occasionally, the wrap would adhere to the trunk of the tree, and depending on the length of time that the wrap was in place, the wrap would eventually fit snugly against the bark. This variation in the tightness of the tree wrap created three classes of wrap, which were evaluated in this study: unwrapped trees, trees with loose fitting wrap, and snugly wrapped trees. In all cases, the trees were planted and wrapped from one to five years.

For each wrapped tree in the study, the circumference at the top and the bottom of the wrap and the length of the wrap from top to bottom was measured. To determine the tightness, the wrap was pulled from the trunk of the tree at the top and bottom of the wrap, and the gap between the wrap and the trunk was measured. If there was no gap, the wrap was noted as tight. The wrap was removed from the tree, and the trunk was closely observed for galleries or signs (frass, larvae, pupal cases) of borers. Galleries were excavated, and larvae, if present, were removed. For each unwrapped tree in the study, the circumference at the top and bottom and the length of the longest continuous section of trunk were measured. The tree was closely observed for signs of borers and galleries, which were excavated when observed as previously described.

Results and Discussion

A total of 56 trees were examined, and twenty three of these were found to be infested by the dogwood borer. Using the G test for equal frequencies (10), and assuming an equal probability of infestation among different categories of tree wrap, the number of infested trees was not significantly different than expected. However, the numbers of galleries observed and live borers excavated were significantly different from the expected occurrence (galleries: P 0.025, 2 df; borers: p 0.005, 2 df) (Figure 1). This suggests that while the incidence of infestation is not different between wrapped and unwrapped trees, the frequency and success of infestation was greater in wrapped trees.

The smallest tree that was infested had a diameter of 3 cm. The largest infested tree was 7.9 cm in diameter. The largest tree in the study was 12.5 cm in diameter. Potter and Timmons (7)

found that trees less than 15 cm in diameter were more likely to be attacked by borers on the main trunk. Because all of the trees were in this vulnerable size category, studies were initiated to determine the relation between borer infestation and tree size. Dogwood trees were grouped into size categories and compared to the probability of borer attack among size classes. Borer infestation was not found to be related to a specific size category (G test, p 0.75, 8 df) (Figure 2).

These results confirm the findings of earlier studies suggesting that tree wraps may increase the likelihood of infestation by clearwing borers (5, 6, 9). The frequency of borer infestation was clearly higher in trees that were wrapped than in those unwrapped. Snugly wrapped trees were infested more frequently than loosely wrapped trees. The bark of the snugly wrapped trees was usually observed to be damp and soft, while the bark of the unwrapped and the loosely wrapped trees was dry. Holes in the wrap and spaces between the winds afforded areas of entry for the borer adult egg laying females. The snug wrap may have provided a favorable environment for larvae by protecting them from the elements and from predation and parasitism. Parasitism rates of up to 50% have been reported (11). King (5) used paper wrappers on peach trees to rear lesser peach tree borers, *Synanthedon pictipes,* for research purposes. He concluded that wrapping created conditions favorable for the larvae and should not be considered as a means of protection from borers.

At the present time we do not know the relative risks and benefits associated with tree wraps. Tree wrapping may reduce injury to the trunk from deer, rodents, lawnmowers, and sun. However, they may also increase the frequency and success of borer infestations. Species of trees that are known to have frequent borer pests may be better protected from them as well as vertebrate, lawnmower, and sun injury through the use of something other than close-fitting tree wraps. As a standard management practice, tree wraps should be checked and refitted periodically.

Summary

Damage from deer activity has prompted Valley Forge National Historic Park to apply plastic tree wraps to the trunks of young ornamental flowering dogwoods. These wraps have been found to contribute to the frequency and the success of infestation by the dogwood borer. Trees under 15 cm in diameter were found to be equally susceptible to infestation. These data suggest that an alternative means of deer protection is necessary in dogwood plantings.

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Literature Cited

1. Davidson, J., J.L. Hellman, and J. Holmes. 1981. Urban ornamentals and turf IPM. **In** Proceedings of Integrated Pest Management Workshop, The National Cooperative Extension, Dallas, TX. 173 pp.
2. Hellman, J.L., J. Davidson, and J. Holmes. 1982. Urban integrated pest management in Maryland. **In** H.D. Niemczyk and B.G. Joyner (eds.) Advances in Turfgrass Entomology. Hammer Graphics, Inc., Picqua, Ohio, 149 pp.
3. Holmes, J.J. and J.A. Davidson. 1984. *Integrated pest management for arborists: implementation of a pilot program in Maryland.* J. Arboric. 10(3):65-70.
4. Kielbaso, J., G. Haston, and D. Pawl. 1982. *Municipal Tree Management in the U.S.—1980.* J. Arboric. 8(10):253-257.
5. King, J.L. 1917. The Lesser Peach Tree Borer. Ohio Agricultural Experiment Station Bulletin #307:399-448.
6. Peterson, A. 1923. The Peach Tree Borer in New Jersey. New Jersey Agricultural Experiment Station Bulletin #391, 143pp.
7. Potter, D.A. and G.M. Timmons. 1981. *Factors affecting predisposition of flowering dogwood trees to attack by the dogwood borer.* HortScience 16(5):677-679.
8. Raupp, M.J. and R.M. Noland. 1984. *Implementing landscape plant management programs in institutional and residential setting.* J. Arboric. 10(6):161-169.
9. Rosen, E.B. 1980. *Plastic rodent guards cause problems for young apple trees.* Horticultural News 61:12-13.
10. Sokal, R.R. and F.J. Rohlf. 1981. Biometry, W.H. Freeman and Company, New York. 859pp.
11. Underhill, G.W. 1935. *The pecan tree borer in dogwood.* J. Econ. Entom. 28:393-396.

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