Control of Borers in Trees and Woody Ornamentals

John C. Schread

Injury caused by the dogwood borer.

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Several species of borers, including lilac borer, dogwood borer, rhododendron borer, and dogwood twig borer may cause considerable harm and even kill many types of woody shrubs and shade trees. Keeping the tree or shrub in a healthy growing condition is by far the best method of saving ornamentals from the damage caused by these insects. Mechanical injury to plants must be avoided. Storm injury, although not always preventable, should be kept in mind and corrective therapy applied when necessary. It is advisable to examine plants occasionally for borer trouble. In the event infestation is present, dead and dying areas should be removed promptly. When this is not practical or convenient, borer galleries should be probed with flexible wire to kill the insects. Fertilizer used sparingly may be helpful in encouraging plants to recover from a serious setback due to borers. Watering during dry seasons is also advisable.

Control measures used in the past against borers have varied in effectiveness. To some extent results appeared to depend on the type of material used and the method of treatment. Wrapping the trunks of newly planted dogwoods with kraft crepe paper has aided in preventing infestation. Wallace (1945) prevented the entrance of borers into injured bark by painting the wounds with shellac or asphalt paint. Woodside (1952) used organic insecticides as bark sprays to kill the clear-wing moths of the pear borer in apple trees. Schread (1956, 1965) controlled borers in dogwood trees with lindane, dimethoate, and endosulfan insecticides sprayed onto the bark of infested trees in late spring and early summer. Lindane aerosol bomb and Borekil® (BHC) paste have also proven effective. This publication reports on the biology of four species of borers and the effect of newer methods of control.

Dogwood Borer

Type of Injury

The dogwood borer is a serious pest of both pink and white varieties of flowering dogwood in the Northeast. Very often cultivated trees are more heavily infested than those growing in wooded areas. Serious injury may result in complete loss of a small tree or dieback of limbs and branches of larger ones. Old dogwood trees infested annually with several borers may persist in an unhealthy condition for years (cover photo). Healthy ones may also be attacked by borers when injured areas are left unprotected by pesticides or tree paint. When the moths are in a neighborhood all nearby trees, when properly conditioned, are liable to infestation. Trees planted 300 or more yards from infested ones, usually are not subject to attack (Wallace, 1945).

Biology

Adult dogwood borers are clear-wing moths. The body is blue-black with yellow markings. The wings are narrow and transparent. Although there is only one annual generation, moths may emerge throughout the summer months with the earliest ones appearing after mid-May in Connecticut. Eggs are laid on smooth or roughened bark, sometimes near an injury to which the moths are attracted. After hatching, the hairless, light brown larvae wander aimlessly until a point of entrance is reached.

Larvae cannot chew through the tough corky exterior of the tree and thus cannot enter directly through the bark (Wallace, 1945). Usually they tunnel under the bark at or just below the surface of the ground. Crotches formed by the limbs and small branches are also likely places for invasion. Wounds or scars likewise provide excellent entrance points to the cambium or growing area of a tree. Feeding is confined to the cambium and bark.

Borers in all stages of development are found throughout the year (Underhill, 1935). Pupation begins in the spring and continues throughout most of the summer.

Control by Spray Treatments

The non-persistent insecticide ethion (47% emulsion) was evaluated against larvae infesting pink dogwood trees. The material was used at the rate of 1-1/3 oz. in 1 gal. of water (8 teaspoons/1 gal.) and brushed onto infested areas of trees. The treatment was allowed to penetrate the bark and borer galleries for 15 minutes and then it was repeated. Ten trees averaging about 2 inches in diameter close to the ground were treated on August 1. Ten other infested trees were used as checks.

Data were taken on September 12 by opening borer galleries with a sharp pocket knife. Eight dead borers and no live ones were found in the treated trees whereas 12 live ones were present in the trees that had not been treated with ethion.

An additional experiment was designed to learn if borers could be prevented from gaining access to the cambium of injured trees. There

were 13 pink dogwoods averaging 4.5 feet in the test. On May 19 a section of bark 1″ to 1½″ in length and ⅜″ to ½″ in width was cut out of the base of each tree close to the ground. In addition a section of bark was removed from the underside of the first one or two side branches. The wounded areas of eight of the trees were then sprayed with 43.5% dimethoate emulsion at the rate of 1 and 2 pints in 100 gallons of water (1 and 2 teaspoons/1 gal.). The treatment was repeated on June 7 and again on June 26. Prior to the last treatment two additional bark wounds were made on each tree. On August 14, examination of the wounds indicated no borer infestation in the protected trees. All of the untreated ones were infested with 1 or 2 borers per tree.

Control by Soil Treatments

Two systemic insecticides were evaluated in 1968 and 1970. On July 2, 1968, dimethoate 10% granules were spread evenly on the ground under each of eight white dogwood trees from their base to their dripline. Four trees received 4 oz. and four received 8 oz. of formulation. There were 14 untreated ones. The trees averaged 1⅜″ in caliper. The granules were not raked nor watered into the soil.

An examination on September 13 of the borer infested areas of each tree was accomplished with the aid of a pocket knife. Six dead borers and no live ones were found in the trees treated with 4 oz. and five dead ones and no live ones in the trees treated with 8 oz. of dimethoate. There were 17 live borers in the 14 untreated dogwoods.

On May 21, 1970, 2 oz. of Di-Syston® 10% granules were distributed in the same manner described for the 1968 dimethoate treatments under each of 10 white dogwood trees. The trees ranged in caliper from 1¼″ to 2″. There were 12 untreated ones. Data obtained on October 29 indicated that 9 out of 14 borers succumbed. In addition one borer had been parasitized by a wasp (species undetermined). There were eight live borers and no dead ones in the 12 untreated dogwoods.

Dogwood Twig Borer or Viburnum Borer

Biology

The dogwood twig borer infests viburnum, elm, and fruit trees in addition to dogwood. The adult is a slender beetle measuring ⅜″ to ⅝″ long and ⅛″ transversely. The head is dark to almost black. There is a triangle of three black spots on the dorsal surface of the thorax. The wing covers are yellow-tan. There is a narrow black line on their inner edge where they meet at the center of the back and a broader, darker one on their lateral margin.

Adults emerge in early summer and lay their eggs in live twigs. Larvae tunnel down through the twigs, making frequent holes to the surface through which frass is expelled. As the borers progress they may cut off part of the twig through which they have tunnelled. Transformation to the adult stage takes place in tunnels which are plugged tightly with frass both below and above the larvae (prior to pupation). Usually

Viburnum borer injury.

there is one generation in 12 months, though occasionally a borer may live into a second year before pupating.

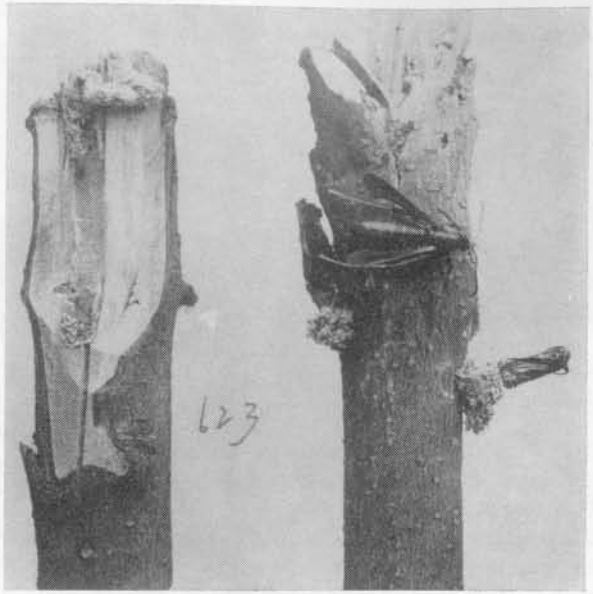
Control by Soil Treatment

Two 4- to 5-foot *Viburnum carlesii* shrubs infested with borers were treated on August 30 with dimethoate 10% granules at the rate of 10 oz. of formulation per shrub. The granules were scattered evenly under the plants from their base to the circumference of the branches. The treatment was not raked into the soil, but it was watered down daily for about one week. An examination on November 25 of the infested areas of the shrubs indicated four dead and one live borer.

Lilac Borer

Type of Injury

The lilac borer is a serious pest of all varieties of lilac growing in Connecticut. Experience suggests that newer, faster growing varieties appear to be more often infested by the borer than older ones. Foliage growing on infested canes looses its healthy green color, wilts and ultimately turns brown and falls to the ground. Very often in young plants small canes break off at the point of borer activity. Some plants may be



Lilac borer injury showing adult and pupa skin.

infested at or close to the surface of the ground where one or more borers entered the sapwood through an injury caused by mowing equipment or tools used to cultivate the soil around the base of a plant. Borers also enter weak, flexible crotches.

Biology

The adult borer is a clear-winged moth measuring about ⅝″ long. The body varies in color from dark brown to almost black. The hind wings are transparent whereas a strong brownish sheen covers most of the primary ones. They are strong fliers, migrating considerable distances during late spring and early summer. Females deposit their eggs on the bark of lilac.

A mature larva averages 1½″ long and is whitish with a light brown to chestnut color head capsule. In small canes borer injury may be confined to the sapwood. However, in older heavy plants 1½″ to several or more inches in diameter borers may leave the sapwood and enter the heartwood, boring at right angles to its diameter. Larvae feed throughout the summer and early fall, but do not pupate until May and June of the following year. In a recent year the first moths emerged in New Haven on June 2. There is one generation a year.

Control by Spray Treatments

An early spring experiment intended to control overwintered lilac borer larvae was undertaken on April 5. Endosulfan (Thiodan®) 25% emulsion was used as a bark drench at the rate of 4 pints of formulation

Table 1. Control of lilac borer with Thiodan

Dilution, pints per 100 gallons	Borers		Percent control
	Dead	Alive	
8	9	1	90.0
4	7	6	53.8
2	4	7	36.3
Checks		12	

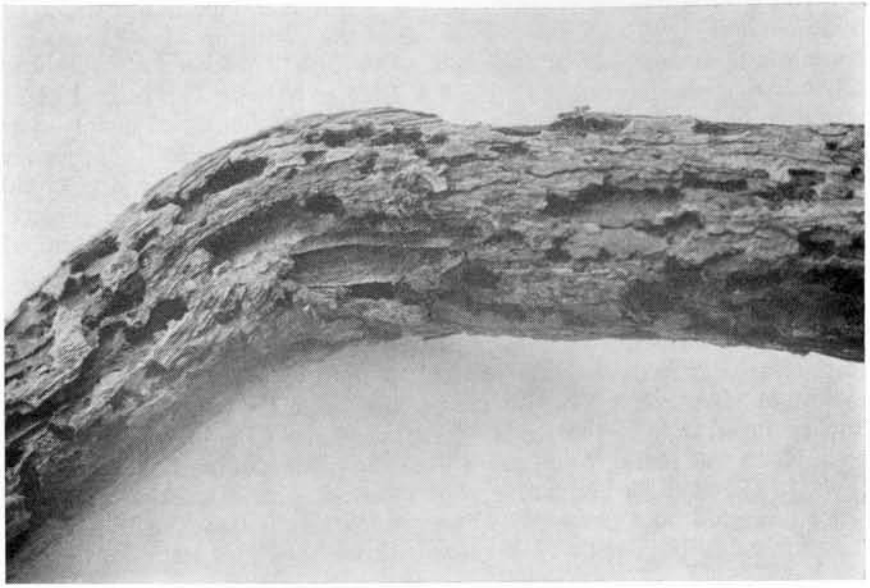
in 100 gallons of water (4 teaspoons/1 gal.). There were 14, 2- to 4-foot lilac plants in the test. With the exception of one plant in which two borers occurred all indicated one borer each. Results assayed on April 19 were as follows: eight dead and six live borers.

On August 7 a midsummer experiment was pursued using endosulfan 25E at the rate of 8, 4, and 2 pints of formulation in 100 gallons of water (8, 4 and 2 teaspoons/1 gal.). The bark of 10, 2- to 3-foot borer-infested plants was saturated per rate of treatment. Ten lilacs were left untreated. There was an average of 2.5 borers in a range of one to four per plant. Data were obtained on August 27 by splitting open the infested areas of the plants with a hatchet and knife. Results are shown in Table 1. Good but not complete control was obtained at the highest concentration used.

An additional experiment was started on August 7 using dimethoate (Cygon®) 44% emulsion as a bark drench at the rate of 8 pints of formulation in 100 gallons of water. There were 20 treated and 20 untreated 4-foot lilacs comprising 12 new varieties. The presence of borers in the plants was recognized by bleeding wounds (resulting in wet bark) and an accumulation of frass at the entrance to the galleries as well as on the soil immediately below them.

Effectiveness of dimethoate was determined by removing frass from the entrance to galleries and also from the soil below them. This procedure was followed from time to time from the date of treatment until the end of August. By then, borers were considered dead if frass had stopped accumulating and the plants were not bleeding. Fourteen treated plants showed these conditions. Four plants produced five live borers. The status of the two remaining lilacs was uncertain. Dissection of plants in which the borers were assumed to be dead showed they had actually been killed by dimethoate. None was found alive. All 20 untreated plants were examined by splitting open the infested areas. Twenty-four live and one dead borer were found.

Fifteen 4-foot average infested lilacs were sprayed on August 15 and again on August 30 with ethion 47% emulsion at the rate of 8 pints in 100 gallons of water. Infested areas of the plants examined by splitting the wood on September 19 produced 16 dead and 2 live borers, i.e., 88.8% control. There were 10 live and no dead ones in 10 untreated checks.



Borer damage in rhododendron.

Rhododendron Borer

Type of Injury

Oftentimes rhododendrons are seriously injured or killed by borers. The latter condition may occur mostly when small plants are attacked. Infestation may initially be recognized by the appearance of off-color and wilted foliage. When this is allowed to continue in older and larger plants, unsightly scars and wounds develop, annual growth may be sparse and in time, dieback occurs, hence impairing the natural appearance of the shrub. In recent years the widespread use of new varieties of rhododendrons has contributed greatly to the increase of borer injury in residential communities, parks, and other areas.

Biology

The small whitish larvae tunnel under the bark close to its surface. They may occur several inches or higher above the surface of the ground, in the supporting stem of a small plant, or in the larger branches, twigs and trunk of older ones. They feed throughout the summer months, reaching maturity in mid-autumn. Transformation to small, clear-wing moths takes place in late May or early June of the following year. Eggs are deposited on the bark of rhododendrons in addition to azaleas and occasionally other broadleaf evergreens, including mountain laurel, when these shrubs are growing close to rhododendrons (Schread, 1965). There is one annual generation in Connecticut.

Control by Bark Treatments

On May 4, two 5- to 6-foot rhododendron plants seriously infested with borer larvae (to the extent that one plant was virtually dead) were

sprayed with lindane 20% at the rate of 1 pint in 100 gallons of water (1 teaspoon/gal.). An examination of one of the plants on May 21 was accomplished by opening all infested areas with a pocket knife. It was obvious that the treatment had not killed the borers. The second plant was then retreated with PDB crystals (paradichlorobenzene) dissolved in Xylene®. The material was painted into the bark of the single leader and all side branches (several times in about 15 minutes) so as to include all borer infested areas of the plant. Control assayed on May 28 indicated 14 dead larvae, 5 dead pupae, 1 dead pre-pupa and 1 undetermined species of Ichneumonid parasite. No live borers were found.

An additional borer-infested rhododendron was available for test purposes in early October. The plant consisted of several 4- to 5-foot leaders arising from the crown of the plant. They averaged about 4.5 inches in circumference. The borers measured 1/3″ to 1/2″ in length and occurred only in the leaders in a range of 2 to 10 inches above the soil. None was found inside branches. The plant was treated on October 3 with PDB as described above. The infested areas of the rhododendron were dissected on October 17. There were 13 dead and no live borers. The foregoing tests with PDB caused no visible injury symptoms to the rhododendron bark or foliage.

Summary

This bulletin includes a description, life history and habits of the dogwood, viburnum, lilac, and rhododendron borers. In addition, sprays and systemic soil insecticides used to control the pests are discussed.

Ethion emulsion brushed onto infested areas of dogwood trees controlled borers. Dimethoate spray prevented borer entrance in wounds. Used as a soil treatment it killed all dogwood and most viburnum borers. Di-Syston was somewhat less effective. Endosulfan applied as a bark drench in spring was less effective in controlling overwintered lilac borers than in mid-summer when borers were smaller. Dimethoate and ethion bark treatments indicated reasonably good control of the pest. PDB dissolved in Xylene and painted onto trunk and branches controlled rhododendron borers.

Registrations

All of the insecticides discussed in this Circular are registered for control of insects attacking trees and woody ornamentals.

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