Boxwood Pests and Their Control

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The evergreen shrubs called boxwoods may be included with other plant materials in landscaping homes, gardens, cemeteries, and public buildings. Many of the boxwoods growing in Connecticut belong to the species *Buxus sempervirens* and its 18 or more varieties. Some of these are slow growing and dwarfed. They are often referred to as English box (*B. sempervirens suffruticosa*). Others are relatively rapid growers and tree-like in general appearance. These are called the American box, (*B. sempervirens arborescens*).

Boxwoods do well over most of Connecticut, especially so in climate zones 6 and 7 — the shore towns from New York to Rhode Island and inland to the central part of the state. Unless protected at higher elevations in the northwestern area, winter scorching and dieback of tender branchlets may occur. Boxwoods are subject to several types of insect damage which we have investigated for several years.

Boxwood Troubles

In addition to problems in the culture of boxwoods, insects and diseases frequently cause disfiguration of the foliage from dieback of branches or the loss of an entire plant.

The following discussion will be limited to the life history, habits, and control of boxwood leaf miner, psyllid, and mites. Although mealybugs and scale insects occur on box in other areas of its established growth range, the pests have not been troublesome in Connecticut.

Experiments in the control of insects and mites with pesticides developed between 1945 and 1955 have been described in earlier publications of this Station (1953 & 1956). DDT, lindane, chlordane, malathion, and Ovotran® were among the materials used in the tests.

BOXWOOD PSYLLID

The boxwood psyllid (*Psylla buxi* L.) hibernates in the egg stage and as a first instar nymph under scales at the base of the boxwood buds. Terminal buds may be more heavily infested than lateral ones. The extent to which the eggs hatch in late summer varies from year to year. An examination of 70 buds collected at random on March 14, 1966, showed 6, or 8.57 per cent, were infested. A total of 17 psyllids in a range of 1 to 8 were found under the bud scales. Of this number only 7, or 41.17 per cent, had hatched. A second examination of 35 buds collected 8 days later (March 22) indicated 100 per cent hatch.

In heavy infestations all of the scales at the base of a bud may be infested, with two or more individuals per scale. Heavily infested buds are often smaller than uninfested ones, and may be killed by the nymphs. As many as 60 nymphs have been counted at the base of clustered flower buds, causing a slow-down in bud development. Data taken in 1964 showed that twig growth from uninfested buds averaged 2.65 times that from infested ones.

Figure 1. The stunted bud on the right shows injury from the boxwood psyllid, in contrast to the uninjured bud on the left.

Seasonal Development

As the buds develop in the spring the nymphs crawl from under the bud scales and infest the leaves. The feeding punctures cause the leaves to curl and form a cup in which the greenish-colored nymphs are concealed. They produce a waxy excretion which may cover part of the body or occur in small waxy pellets side by side with the nymphs. When only a few nymphs emerge from the base of a boxwood bud, later cupping of the leaves may be at a minimum. Conversely, when a number of nymphs are present, all or most of the leaves may be partially or completely cupped.

Development in 1966

Buds examined in a fast growing American boxwood on April 4 showed signs of expansion. Buds that were infested with psyllids were growing slowly, averaging only 1½ mm in length, whereas the uninfested buds indicated faster growth averaging 5½ mm in length. On April 4, 26 per cent of the first instar nymphs were increasing in size and beginning to work their way out (to the extent of one-half their length) from under the bud scales. This, however, was not the case in the slower growing English boxwoods, which still appeared to be dormant.

By April 15, psyllids in the American boxwood had increased in size but none had emerged. Buds were now 5 to 10 mm long. A week later bud length had increased to a maximum of 13 mm. Nymphs now measured ½ to ¾ mm in length. By April 25, 2.5 per cent of the terminal bud leaves were beginning to cup. One nymph was found concealed within each group of cupped leaves. This first observed emergence of nymphs probably occurred between April 22 and 25. By May 2, 40 per cent of the expanding buds (17 to 27 mm long) were infested with 2 to 12 nymphs, an average of 2.66 per growing bud. At this time (May 2) buds in English boxwood measured 3 to 5 mm in length and nymphs had not emerged.

Psyllid Control

Because of the boxwood psyllid's overwintering and early spring habits and the injury which it causes, experiments intended to control the insect were planned to include three series of tests. The first one was meant to determine if the nymphs, protected by the bud scales, could be killed before significant plant growth started in the spring and migration of the insects commenced. Successful control at this time might prevent serious cupping of boxwood foliage. A second series of treatments was applied after the nymphs had entered the expanding leaves and caused cupping. The final tests were meant to kill the adults which appear at the end of May and during early June. (Out of 3024 psyllids counted on June 3, only 21 were adults. From that time on transformation to the adult stage was rapid.)

Early April Tests

Five- to six-foot English boxwoods 18 ft. in circumference were divided into quarters and sprayed on April 5 with Cygon® and Chloropropylate® 24% emulsions at the rate of 1 and 2 pints respectively in 100 gallons of water. Diazinon® 48% emulsion was included at ½ and 1 pint rates. Triton® B1956 was used as a wetting agent. A 30-gallon hydraulic sprayer delivering 200 lbs. pressure and a single nozzle spray gun were used to apply the treatments.

Control data taken on April 26 were obtained by removing the bud scales and counting the number of dead and live psyllids in 10 buds per rate of treatment and checks (Table 1).

Table 1 shows that, with the exception of Chloropropylate,® the insec-

TABLE 1. Psyllid control, boxwoods sprayed on April 5, 1966

Insecticide & rate of treatment		*Psyllids*		*Per cent kill*
		Dead	*Alive*	
	Pints			
Cygon	1	23	0	100
	2	27	3	90
Chloropropylate	1	10	53	15.8
	2	4	80	4.7
Diazinon	½	63	15	80.7
	1	54	0	100
Untreated	....	4	87	....

ticides used in the tests were effective in killing overwintered boxwood psyllids before emergence started.

Nymphs that escaped the April 5 treatments (Table 1) caused some cupping of the 1966 foliage. To determine the extent to which this occurred, five average 6-inch twig clusters were examined per rate of treatment. The data, summarized in Table 2, were taken on August 1. Chloropropylate® was not included.

TABLE 2. Effect of insecticides in preventing cupping of leaves by boxwood psyllids on plants sprayed April 5, 1966

Insecticide & rate of treatment		*Leaf Clusters*		*Per cent cupped*
		Not Cupped	*Cupped*	
	Pints			
Diazinon	½	56	2	3.4
	1	68	1	1.4
Cygon	1	75	5	6.2
	2	70	0	0
Untreated	....	61	37	37.7

Late May Tests

By late May all overwintered psyllids had emerged from under boxwood bud scales and were feeding in the cupped leaves. On May 26 Diazinon® and Cygon® were sprayed on additional English boxwood plants at the same dilutions and in the same manner as that used in the April 5 treatments.

It was necessary to take the control data within 24 hours after treatment, since many of the dead nymphs fell to the ground and therefore were unaccounted for. Complete control of psyllids was obtained with the insecticides used in the tests.

BOXWOOD LEAF MINER

Because the boxwood leaf miner sometimes defoliates and kills part or all of badly infested plants, it is considered a more important pest of boxwood than the psyllid.

The slower growing English varieties of box appear to be less susceptible to attack by the leaf miner than the faster growing American ones.

There is only one generation of leaf miners a year. The adult is a small midge-like insect, orange or orange-yellow. Injury to box is first recognized in late spring and early summer when small pin-point blotchy areas, light gray in color, appear on the new leaves. (Oviposition does not occur in the previous year's foliage.) The blotch-like areas indicate the presence of eggs which have been deposited through the upper surface of the leaves. They hatch in a few days.

Later, as the miners grow, the infested areas appear to be blister-like. They are most noticeable on the underside of the leaves.

The small yellowish-green maggots overwinter in the leaves and resume feeding in the spring. Enlargement of the feeding areas, especially in badly infested leaves, may cause an intermingling of the miners, and some can-

Figure 2. Pupal cases protrude from boxwood leaves showing injury from leaf miner infestation.

nibalism. As many as 17 live miners have been found in a single leaf. Seriously infested foliage becomes yellowish and small, and the plants show an obvious loss of thriftiness.

Transformation to orange-colored pupae occurs in late April and May. An examination of many leaves taken from an American boxwood on May 12, 1966 indicated 61.7 per cent of the miners were in the pupal stage and 38.3 per cent in the prepupa stage. None was in the larval stage.

Before pupation the miners form small, paper-thin, light gray or whitish caps in the underside of the leaves. Adults emerge through them, leaving conspicuous white pupae cases protruding through the exit holes.

Information obtained during two seasons, 1958 and 1966, showed that emergence of adults in both years commenced on May 21. Perhaps if records had been available for the intervening years some variation from May 21 may have been expected. Females live for several days, laying eggs during this time.

Leaf Miner Control with Sprays

During the past 8 years a number of insecticides have been tested for their efficiency in controlling boxwood leaf miner. Most of the treatments were applied as foliar sprays but soil treatments were also tried. Many of the soil treatments provided satisfactory control. Only a few, however, are registered for general use.

TABLE 3. Spray treatments for control of boxwood leaf miner

Date of treatment	Insecticides (emulsions)	Rate of dilution in 100 gallons	Miners Dead	Miners Alive	Per cent kill & date	
		Pints				
July 22	25E Diazinon	1	68	0	100	Sept. 24
		2	44	0	100	”
	Sevin Flowable	1	32	53	37.6	”
		2	45	70	39	”
Aug. 4	25E Cygon	½	31	23	57.4	Oct. 24
		1	37	13	70.4	”

To simplify matters concerning the insecticides used as foliar sprays during the last 8 years, data concerning their use and results obtained are summarized in Table 3. A 3-gallon hand-pressure sprayer was used to apply the treatments. Triton® B1956 was added to the treatments to facilitate wetting the foliage. The treated plants varied in height from about 18 inches to 3 feet. Control data were obtained from an average of 20 leaves taken from 10 4-inch twigs per rate of treatment and untreated checks.

Table 3 indicates effective control of boxwood leaf miner with Diazinon,® but only fair to poor control with Cygon® and Sevin.® None of the materials caused any noticeable plant injury.

Leaf Miner Control—Soil Treatments

On July 15, 1966, 5% Cygon® and on August 3, 1960, 5% Di-Syston® granules were used at the rate of ¼, ½, 1 and 2 lbs. of Cygon® and ¼ lb. of Di-Syston® formulations on the soil under 2 to 3 ft. American boxwoods. The granules were applied evenly by hand (gloved) from the base to the periphery of a plant. No raking nor watering was done.

Control data were obtained for the Cygon® treatments on August 24 and on September 28 for the Di-Syston® treatment. An average of 15 leaves taken from 10 5-inch twigs per rate of treatment and untreated checks were dissected for the purpose. All miners were killed by the 1 and 2 lb. treatments of Cygon® but only 3.8 and 43 per cent respectively for the ¼ and ½ lb. rates. The ¼ lb. rate of Di-Syston® accounted for 65 per cent control of the miners.

MITES

Several mite species attack boxwood, most commonly *Tetranychus bimaculatus* Harvey and *Simplinychus* (*Neotetranychus*) *buxi* Garman. They are very small and difficult to see with the naked eye. The adult red spider mites vary in color from pale yellow with conspicuous darker spots to purplish red. The eggs are white or translucent. Boxwood mites vary from green to yellowish brown, and the eggs are lemon yellow.

Mites feed by sucking the sap from the leaves. They may inject a toxic substance in the course of feeding. When mites are abundant their feeding causes a stippling and blanching, or silver-like appearance to the foliage. Webbing may also be noticeable. Serious infestation causes yellowing of the foliage which may drop from an infested plant prematurely.

To determine the presence of mites, shake a small branch over a piece of white cloth. When present the mites will fall onto the cloth and be readily seen as they move. One may also rub the underside of the leaves onto the cloth. Streaks of reddish-brown "blood" will be seen when the mites are present.

Control

A number of materials have been used to control mites on boxwood. Sulphur dusts or sprays, nicotine, rotenone, and pyrethrum are a few of the miticides in common use some years ago. Recently newer compounds have been tested. They are 15E Mitox,® 12E Tedion,® 2E Cygon,® 48E Diazinon® and 18E Kelthane.® All were used in tests as liquid concentrates at the rate of ½ and 1 pint in 100 gallons of water. Triton® B1956 was added to each dilution. Plants averaged about 24 inches in height. Treatments were applied with a 3-gallon hand-pressure sprayer.

Control of mites was complete with the five miticides at two dilutions each. No plant injury resulted from the use of the materials.

REFERENCES

Schread, John C. Boxwood Pests and Their Control. Conn. Agr. Exp. Sta. Bull. 565. 1953.

Schread, John C. Thrips on Privet and Other Insects on Ornamentals. Conn. Agr. Exp. Sta. Circ. 201. 1956.

Lancaster, F. R. Care of Boxwood Range and Use. The Arboriculturist, Davey Tree Expert Co. No. 6. Ser. 2. 1954.

Weiss, Freeman & R. A. St. George. Culture, Diseases, and Pests of the Box Tree. U.S.D.A. Farmers Bull. 1855. 1959.

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