

INJURY AND BIOLOGY OF THE CLEARWING BORER *SYNANTHEDON KATHYAE* ON HOLLY

G. M. GHIDIU

Vegetable Entomologist, Rutgers University,
R.D. #5, Box 232, Bridgeton, New Jersey 08302

L. VASVARY

Extension Specialist, Ornamental Entomology,
Rutgers University, New Brunswick, New Jersey 08903

T. D. EICHLIN

Insect-Taxonomy Laboratory, Division of Plant Industry,
California Department of Food and Agriculture, Sacramento, California 95814

AND

J. D. SOLOMON

Southern Hardwoods Laboratory, U.S. Forest Service,
Stoneville, Mississippi 38776

ABSTRACT. *Synanthedon kathyae* Duckworth & Eichlin was reared from infested holly cultivars (*Ilex* spp.) at Bridgeton, New Jersey. This is the first reported host for *S. kathyae*. Signs of infestation were wilting, yellowing, and dying foliage. Frass galleries around the root collar and cracked, loose bark at the base of the plant provided further evidence of infestation and injury. There appears to be one generation annually.

Additional key words: Sesiidae, *Ilex* spp., galleries.

When originally described, *Synanthedon kathyae* Duckworth & Eichlin was known only from six specimens collected from Lewisboro and Long Island, New York; Oconee Co., South Carolina; and Halifax, Nova Scotia (Duckworth & Eichlin 1977). Subsequently, one moth was captured in a pheromone-baited (Z,Z isomer of 3,13-octadecadien-1-ol acetate) trap in Kent Co., Maryland (Neal & Eichlin 1983) and three males were trapped with the same attractant in Barnstable, Massachusetts. Nothing was known of its hosts or biology. We report rearing this species from ornamental holly trees commercially grown in Cumberland Co., New Jersey, describe its injury, and outline its biology.

MATERIALS AND METHODS

This insect first came to our notice in 1981 when we received two mature or nearly mature larvae collected from an American holly (*Ilex opaca* Ait.) tree on 13 October 1981 in Millville, New Jersey. The larvae were identified as *Synanthedon*, but species determination had to await association with characters of the adult.

In fall 1982, a borer infestation in container-grown holly trees (*Ilex* spp.), in greenhouses at Millville was called to our attention. In No-

vember 1982, we began rearing the larval borers to the adult stage for identification, and recording injury and effects on the trees. Sixteen container-grown, four-year-old hollies (all of "Blue Angel" variety), including eight infested trees showing decline symptoms and eight apparently healthy trees, were selected from the Millville tree farm for study. These trees were moved to the Rutgers Research & Development Center at Bridgeton, New Jersey, for close and frequent observation.

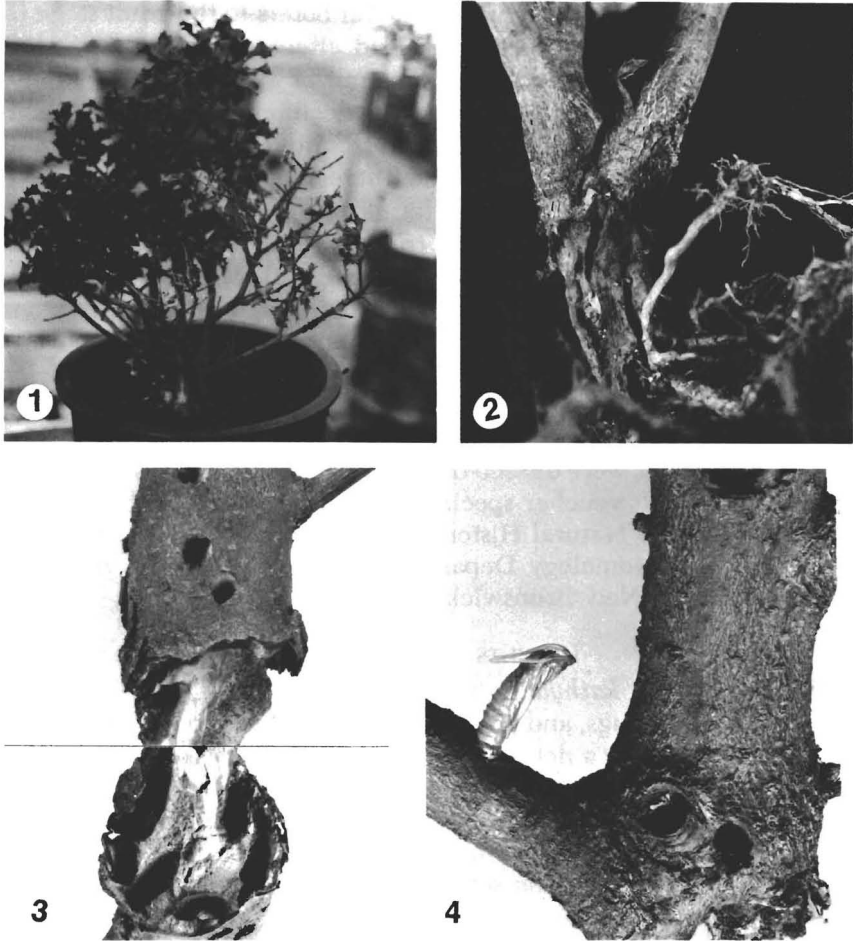
Four infested and four healthy trees were placed on wooden platforms under shaded screen emergence cages in a heated greenhouse, and the other eight were placed similarly in the field for natural seasonal emergence. The cages were constructed of wood frames and covered with 18×16 -mesh galvanized screen wire 0.028 cm diam. to enclose an area of about 0.5 m³. The caged plants were inspected weekly until the first moth appeared, and daily afterward. After moths emerged, the infested plants were dissected to study burrowing habits and gallery dimensions. Adult voucher specimens were deposited in the U.S. National Museum of Natural History, Washington, D.C., and in the collection at the Entomology Department, Cook College, Rutgers—The State University, New Brunswick, New Jersey.

RESULTS AND DISCUSSION

The adult of *S. kathyae* is a bluish black moth with clear wings, yellow body markings, and prominent yellow bands on abdominal segments four and five; a detailed description is presented in Duckworth and Eichlin (1977). The mature larva is creamy white with a dark brown head and light brown spiracles, and ranges from 15 to 21 mm in length. The egg is small, brownish, and oval.

Initial signs of infestation were wilting and drooping of tender terminal and branch shoots. The foliage first became chlorotic to yellowish, and finally brown and curled. Girdled branches sometimes dropped their leaves (Fig. 1), while the rest of the plant remained green. Heavily infested plants exhibited progressive dieback with one or more dying limbs, and eventually the entire plant succumbed. Dieback and mortality were most noticeable in early to mid-November.

Light brown frass was ejected from bark entrances just above the soil line. The frass gradually became coarse granular and accumulated in piles on the ground around the root collar. Raking away frass revealed cracked, loose bark that was easily removed to expose larvae and their tunnels (Fig. 2). Multiple galleries in the wood were common; up to six with pupal exits were observed on single plants 3 to 4 cm in diam. at the root collar (Fig. 3). Plants of this size infested by three or more larvae usually died. Galleries were irregular in shape but oval in cross-section, measuring 4 to 8 mm wide and 5 to 8 cm long. Most galleries



FIGS. 1-4. Injury and signs of *Synanthedon kathyae*. 1, Dieback on potted holly; 2, Galleries at base of main stem; 3, Pupal exit holes and galleries; 4, Pupal skin protruding from exit hole.

extended 1 to 2 cm below the soil line and 3 to 7 cm above it. Galleries were usually kept open and clean; few contained loose frass.

Ten male and three female moths emerged between 7 and 17 February 1983 from the four infested plants in the heated greenhouse. Two males and one female emerged 30-31 May 1983 from the infested plants in outdoor cages. Single moths of *S. kathyae* have been captured on 25 and 30 June and 14 July in Massachusetts (not previously reported); 17 and 24 July in New York; 25 June in South Carolina; and 2 July in Maryland (Duckworth & Eichlin 1972). Field emergence dates

reported here are similar to those (May–July) for other clearwing species in the region (Neal 1982, Schread 1965, Wallace 1945, Potter & Timmons 1983, Gentry et al. 1978).

The mature larva prepared for adult emergence by cutting a round exit hole 4 mm in diam., leaving only a thin bark flap as a cap. Pupation occurred head-upward in the gallery. Pupal exuviae protruding from exit holes were easily visible around the root collar and lower branches during the emergence season, and provided additional evidence of infestation (Fig. 4). Galleries, larvae of uniform size, and emergence within a single year suggests one generation per year.

Several varieties of holly were attacked. Records and observations at the holly farm suggest that variety “Blue Angel” (*Ilex* × *meservae*) was most susceptible, followed by “Nellie Stevens” (*I. cornuta* [Lindley] × *I. aquifolium* L.) and “Inkberry” (*I. glabra* L.). The varieties “Blue Prince” (*I. aquifolium* × *I. rugosa* [Schmidt]) and “Blue Princess” (*I. rugosa* × *I. aquifolium*) were less attacked. Stressed and weakened plants appeared more susceptible to borer attack than did healthy, vigorous plants.

A question arises as to where the nursery infestation originated. The plants were started in the nursery at Millville and grown in pots to age 4 years for marketing as either 30–38 cm or 38–48 cm tall plants. The nursery was surrounded by a mixed stand of American holly, oaks, white pine, and an undergrowth of shrubs. The insects might have moved from firewood cut in nearby stands and hauled to the nursery for heating, or moths might have flown from natural infestations in the surrounding woodland.

The nurseryman stated that about 30 percent of the “Blue Angel” variety were infested during 1981–82, amounting to an estimated loss of \$6,000.

ACKNOWLEDGMENTS

We thank the American Holly Farm, Millville, New Jersey; J. Johnson, Cumberland County Agricultural Agent; D. DeBlois, New Jersey Department of Agriculture; and Rutgers Research & Development Center farm manager S. B. Sheppard for providing facilities and technical assistance; also D. Weisman, National Museum of Natural History, for identifying larvae. New Jersey Agricultural Experiment Station Publication No. D-08120-03-87 supported by State Funds and by the United States Hatch Act.

LITERATURE CITED

- DUCKWORTH, W. D. & T. D. EICHLIN. 1977. Two new species of clearing moths (Lepidoptera: Sesiidae) from eastern North America clarified by sex pheromones. *J. Lepid. Soc.* 31:191–196.
- GENTRY, C. C., R. L. HOLLOWAY & D. K. POLLET. 1978. Pheromone monitoring of peach tree borers and lesser peach tree borers in South Carolina. *J. Econ. Entomol.* 71:247–253.

- NEAL, J. W., JR. 1982. Rhododendron borer: A worthy competitor. *J. Am. Rhododendron Soc.* 36:57-61.
- NEAL, J. W., JR. & T. D. EICHLIN. 1983. Seasonal response of six male Sesiidae of woody ornamentals to clearwing borer (Lepidoptera: Sesiidae) lure. *Environ. Entomol.* 12: 206-209.
- POTTER, D. A. & G. M. TIMMONS. 1983. Flight phenology of the dogwood borer (Lepidoptera: Sesiidae) and implications for control in *Cornus florida* L. *J. Econ. Entomol.* 76:1069-1074.
- SCHREAD, J. C. 1965. Dogwood borer. *Conn. Agr. Exp. Stn. Cir.* 199. 4 pp.
- WALLACE, P. P. 1945. Biology and control of the dogwood borer, *Thamnosphesia scitula* Harris. *Conn. Agr. Exp. Stn. Bull.* 488:373-395.

Received for publication 19 March 1987; accepted 10 June 1987.