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HONEYLOCUST TWIG-GALL MIDGE
(DIPTERA: CECIDOMYIIDAE) IN MICHIGAN

C. G. Wertheim and H. L. Morton

ABSTRACT

Emergence and oviposition data were gathered for Neolasioptera brevis, a recently described pest of honeylocust. In 1984 the insects first emerged on 21 May and first oviposited on 4 June; in 1985 they first emerged on 28 April and first oviposited between 5–20 May. Average raceme length at emergence and at oviposition were 2.7 and 4.4 cm in 1984 and 2.6 and 4.8 cm in 1985. Approximate duration of the emergence period was one week. In 1985 observed oviposition wounds averaged 0.5 cm.

A twig gall of honeylocust, Gleditsia triacanthos inermis (Pursh.) Schneid., was recognized and its cause identified in 1911 as an unknown species of Neolasioptera (Felt 1911). Interest in the causal agent of the gall has intensified as the use of honeylocust (with accompanying damage) has increased. The insect has since been described as Neolasioptera brevis Gagne (Gagne and Valley 1984).

Honeylocust cultivar selections that lack both thorns and pods have been widely planted throughout the country. Cultivars also have been selected for leaf color, growth habit, and tree form (Wyman 1965). Until recently, all cultivars have been considered relatively free of pests. In recent years, however, widespread planting of honeylocust has made it more vulnerable to pests. Damage may be a result of any of several pests. For example, where mimosa is found, honeylocust is susceptible to the mimosa webworm, Homadaula anisocentra Meyrick. The honey locust pod gall midge, Dasineura gleditschiae (Osten Sacken), causes reddish galls on the leaves, and the honeylocust spider mite, Eotranynchus multidigitulii (Ewing), causes a bronzing of the leaves. The honeylocust plant bug, Diaphnocoris chlorionis (Say), and a leafhopper, Macropsis fumipennis (Gillette & Baker), stipple and eat foliage (Pirone 1978).

The objectives of this study were to (1) document damage to honeylocust cultivars in Michigan, (2) determine cultivar susceptibility to N. brevis, including dates and conditions for adult emergence and dates of oviposition, and (3) relate phenology of the host to pest development.

MATERIALS AND METHODS

Cultivars. Wild honeylocust and the following cultivars were studied: ‘Moraine,’ ‘Shademaster,’ ‘Skyline,’ ‘Sunburst,’ and ‘Rubylace.’ All trees used in this study were located on the campus of The University of Michigan in Ann Arbor.

Emergence. Several tests and observations were made to determine time and conditions for emergence. To ensure that natural emergence was actually observed as early as possible in the field, insects were forced to emerge in the laboratory, and the decreasing time for adult emergence was recorded. Groups of heavily infested trees were

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located in the field and 10 or more individuals chosen randomly for sampling. Three twigs from each tree were then randomly sampled. Only infested twigs were used in the experiment. For each twig, the past three year's growth was removed, placed in petri dishes on moistened filter paper, and incubated at 24°C. This treatment was done within 3 h of collecting the samples and was repeated weekly until the insects emerged. When adults emerged in the lab within one day after sampling, daily observations were made in the field. Emergence was recognized by the presence of pupal skins protruding from emergence holes (Fig. 1).

To determine the length of the emergence period, three twigs were collected weekly from each of 10 'Moraine' trees. These were collected the day following first field emergence and continued weekly for two months.

The age of twigs from which emergence took place was also examined by a similar test. One-, two-, and three-year-old twigs were collected the day following first emergence and incubated separately as above. These twigs were kept for three weeks and observed.

Oviposition. Oviposition, studied in the field only, was recognized by the presence of a localized swelling of new shoots and an associated brown spot (Fig. 2). Dissection of these swellings revealed white eggs. To relate the stage of plant development to that of the insect, the length of both the rachis of the inflorescence (to be referred to as ‘raceme’) and the new shoots were measured at the time of emergence and oviposition. Fifty measurements of both characteristics were made. Ten trees were examined in 1984 and six trees in 1985, using those trees where emergence was first observed. In 1985 the same six trees were also examined to determine degree of oviposition. Five current terminal shoots from each tree were randomly selected and measured, and the numbers of wounds were tabulated.

To compare emergence and oviposition from year to year, degree-days were tabulated using a 10°C base and average daily temperatures for both years from records of The University of Michigan Department of Atmospheric and Oceanic Sciences. The number of degrees above 10°C for each daily average temperature was calculated from the beginning of the year, and a cumulative total was kept for the period of interest.

RESULTS

Cultivars. Midge damage was observed on wild honeylocust and all the cultivars. Unlike other pests of honeylocust, the twig gall midge does not damage foliage. It causes
Fig. 2. Twig swellings and necrotic regions following oviposition by *N. brevis*

Fig. 3. Twig dieback and sprouting caused by *N. brevis*

swollen twigs, tip dieback, and sprouting from the base of dead tips (Figs. 2, 3). In this study, no cultivars were found to be free of damage; they did not appear to differ in susceptibility.

**Emergence.** In 1984 emergence began 21 May at 81 degree-days (Table 1). Emergence in 1985, however, was nearly a month earlier, on 28 April at 99 degree-days. The length of the emergence period was quite short. Emergence was heavy during the first week from the first weekly-incubated collection on 22 May, but only one insect emerged from twigs collected one week later and none emerged from material collected weekly through 31 July. The twig-age emergence test was also conclusive. Insects emerged from all 24 of the one-year-old twigs, but from none of the 24 two- or 24 three-year-old twigs. Shoot lengths at emergence ranged from 5.7 cm in 1984 to 4.1 cm in 1985, whereas raceme lengths...
Table 1. Average shoot and raceme length (with standard error), degree-days, and date at the time of emergence and oviposition in 1984 and 1985, and the differences between the two years (n = 50).

<table>
<thead>
<tr>
<th></th>
<th>Emergence</th>
<th>Oviposition</th>
<th>Difference between emergence and oviposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoot length, (cm)</td>
<td>5.7 ± 0.36</td>
<td>4.1 ± 0.27</td>
<td>17.0 ± 0.86</td>
</tr>
<tr>
<td>Raceme length, (cm)</td>
<td>2.7 ± 0.14</td>
<td>2.6 ± 0.11</td>
<td>4.4 ± 0.23</td>
</tr>
<tr>
<td>Degree-days</td>
<td>81</td>
<td>99</td>
<td>148</td>
</tr>
<tr>
<td>Date</td>
<td>May 21</td>
<td>April 28</td>
<td>June 4</td>
</tr>
</tbody>
</table>

1985 dates and degree-days for oviposition reflect the earliest observation. No observations were made for two weeks before this date, and therefore oviposition may have occurred earlier.

DISCUSSION

The twig gall midge was found in all trees examined. The damage caused by the honey locust twig gall midge is more harmful than from other pests because it persists after leaf drop. The form of the tree is changed, and the dead tips are clearly visible. There is also the chance that the tree will become weakened and less able to withstand damage from other pests.

The phenology of the host proved to be a good general guide to pest development. The difference in both emergence and oviposition dates between 1984 and 1985 was due to a week of unseasonably warm temperatures (ca. 28°C) in April of 1985. Although degree-days and shoot length were inconsistent from year to year, time of emergence and oviposition remained consistent with raceme lengths. Adult emergence was associated with raceme length of about 2.5 cm, whereas oviposition was associated with raceme length of about 4.5 cm.

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LITERATURE CITED


