PHENOLOGY OF THE HOMOPTERAN COMPLEX ON ORNAMENTAL HONEYLOCUST IN OHIO, WITH NOTES ON HOST IMPACT[1]

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ABSTRACT

Phenology and relative abundance of the homopteran complex, including *Macropsis fumipennis* (Gillete and Baker), *Stragania alabamensis* (Baker), *Empoasca fabae* (Harris), *Erythroneura clavata* DeLong (Cicadellidae), and *Micrutalis calva* (Say) (Membracidae), were monitored on ornamental honeylocust, *Gleditsia triacanthos* L., near Wooster, Ohio. M. *fumipennis*, the most abundant species, completed its life cycle by late July. S. *alabamensis* was present from just after budbreak until frost, with collection data suggesting it is bivoltine. E. *fabae* and E. *clavata* adults were present from mid-June to early October. M. *calva* nymphs emerged in the spring and adults disappeared by mid-July, returning to honeylocust in early September. A second generation may develop on alternate hosts in summer. Observed foliar injury is attributed to the sympatric honeylocust plant bug, *Diaphnocoris chlorionis* (Say) (Hemiptera: Miridae), and not the homopterans reported here.

Key Words: Phenology, *Macropsis fumipennis*, *Stragania alabamensis*, homopterans, *Empoasca fabae*, *Erythroneaura clavata*, honeylocust, *Micrutalis calva*,

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INTRODUCTION

Ornamental honeylocust, *Gleditsia triacanthos* L., is a common constituent of the urban forest (Nielsen et al. 1985). Various homopterans have been reported as pests of honeylocust, including the cicadellid *Macropsis fumipennis* (Gillete and Baker; Johnson and Lyon 1976), other leafhoppers (Kennedy 1979; Miller and Nielsen 1985), and the membracid *Micrutalis calva* (Say) (Betsch 1978; Nixon 1979). These homopterans reportedly cause foliar distortion and discoloration. However, there are no data linking these insects with observed injury. Valley and Wheeler (1985) studied the leafhopper complex on honeylocust in Pennsylvania, including *M. fumipennis*, *Stragania apicalis* (Osborn and Ball), *Orientus ishidae* (Matsumura), and *Empoasca fabae* (Harris); they concluded that these species do not cause serious injury to honeylocust and that observed foliar injury was caused by the sympatric honeylocust plant bug, *Diaphnocoris chlorionis* (Say).

The homopteran complex on ornamental honeylocust near Wooster, Ohio, includes the cicadellids *M. fumipennis*, *Stragania alabamensis* (Baker), *E. Fabae*, and

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Erythroneura clavata DeLong, and the membracid M. *calva*. Our objectives were to determine the phenology and relative seasonal abundance of the homopteran complex on ornamental honeylocust near Wooster and to make observations on their host impact.

MATERIALS AND METHODS

Trees sampled in this study were growing in the Shade Tree Evaluation Project at the Ohio Agricultural Research and Development Center, The Ohio State University, Wooster (Sydnor 1983). In 1981-1983, the honeylocust cultivars 'Moraine' (8 trees, 6 to 9 m tall, planted in 1972) and 'Skyline' (6 trees, 9 to 12 m tall, planted in 1969) were sampled biweekly from mid-April through mid-November.

Two sampling methods were used. Insects were monitored with a stainless-steel beating-tray configured as a four-sided funnel measuring 51 cm long by 32 cm wide at one end and 37 cm wide at the other. The funnel tapered to a 1.5-cm opening to which a hollow metal handle was welded. A glass vial was inserted in the handle to receive dislodged arthropods. Insects were also sampled with a D-Vac® (D-Vac, Inc., Riverside, CA).

On each sampling date, one beating-tray sample was taken from a lower branch on both the north and south side of each tree. The tray was held under a terminal as the branch was struck five times with a rubber-coated wooden rod. Dislodged insects dropped into the funnel and either slid or were brushed into the vial. The vial was replaced before the next sample was taken. Samples were taken between 0700 and 1000 EST.

D-Vac samples were taken immediately following beating tray sampling. In 1981, samples were taken from the north and south side of each tree by sweeping the lower canopy with a D-Vac tube (36 cm diam) for 15 s. In 1982 and 1983, sampling time was reduced to 10 s, and the D-Vac tube was fitted with a cone 20 cm in diam to increase suction. Samples were transferred to plastic bags.

Because populations of these homopterans were small with no significant differences occurring between cultivars, samples, or sampling methods, all samples for a given species were pooled by sampling date.

RESULTS AND DISCUSSION

Phenology

Macropsis fumipennis. This was the most abundant homopteran collected during this study. Valley and Wheeler (1985) also found this species to be the most abundant leafhopper on honeylocust in Pennsylvania.

Nymphs hatched in early (1982) to mid-May (1981, 1983), coinciding with budbreak each year (Fig. 1), as previously reported by Valley and Wheeler (1985). Nymphal populations peaked about two weeks after first hatch; last nymphs were collected in mid-May 1982, early June 1981, and mid-June 1983. Adults first appeared from mid-May (1982) to early June (1981, 1983) and density peaked two weeks later. Populations were not detected after late July.

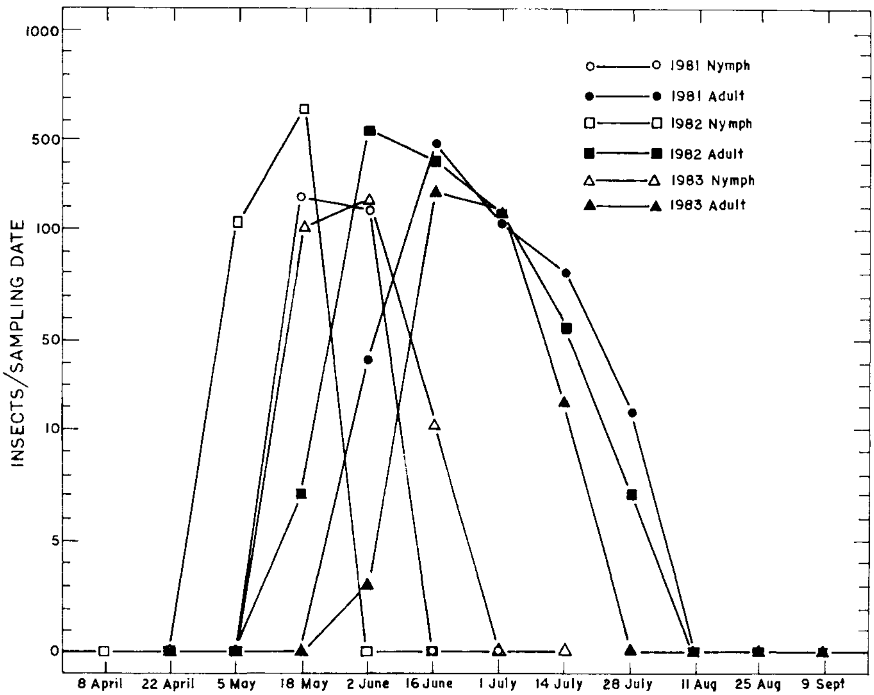

Fig. 1. Seasonal abundance of *Macropsis fumipennis* nymphs and adults on honeylocust near Wooster, Ohio 1981 - 1983.

Stragania alabamensis — Nymphs of *S. alabamensis* hatched from mid-May (1982) to early June (1983) (Fig. 2). This insect was not monitored in 1981. Nymphal populations peaked within two weeks of egg hatch both years. Adult populations peaked in mid-(1982) to late June (1983), but persisted at low levels until early (1982) to late October (1983). A second cohort of nymphs appeared in late July 1982 and early August 1983, indicating a bivoltine life cycle in northern Ohio. Nymphs persisted until mid-September.

Empoasca fabae — The potato leafhopper does not overwinter in Ohio, but migrates each year from the south (Borror et al. 1981). Adults were first collected on honeylocust in mid-(1981) to late June (1982, 1983), with populations reaching a peak in mid-(1983) to late July (1982) and mid-August (1981) (Fig. 3). The last adults were collected from early September (1981) to early October (1982, 1983).

Unidentified cicadellid nymphs were collected from late June through late September in 1982 and 1983 (Fig. 4). It was not determined if this population represents *E. fabae*, *E. clavata*, or both species. In 1982, the nymphs had two population peaks, one in early August and the other in early September. In 1983, the population peaked in late July and declined gradually through late September.

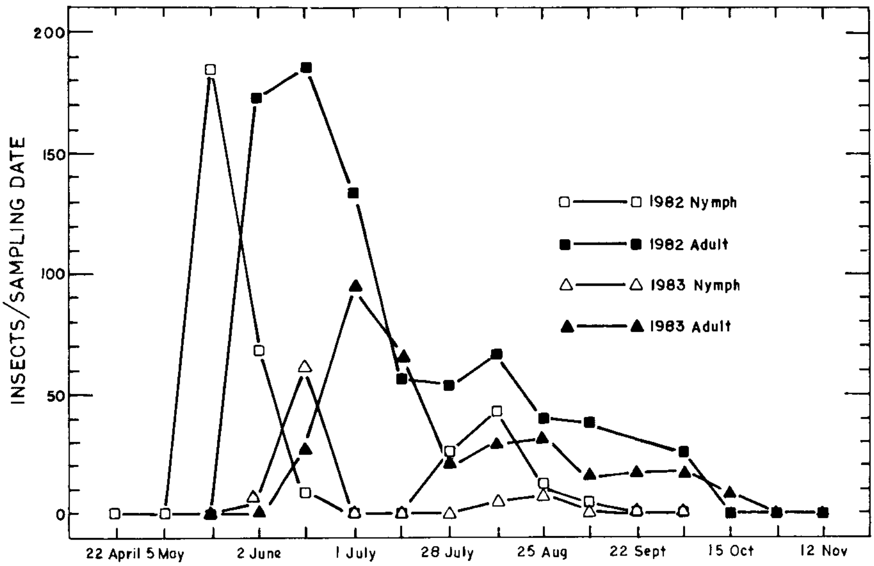

Fig. 2. Seasonal abundance of *Stragania alabamensis* nymphs and adults on honeylocust near Wooster, Ohio, 1982 - 1983.

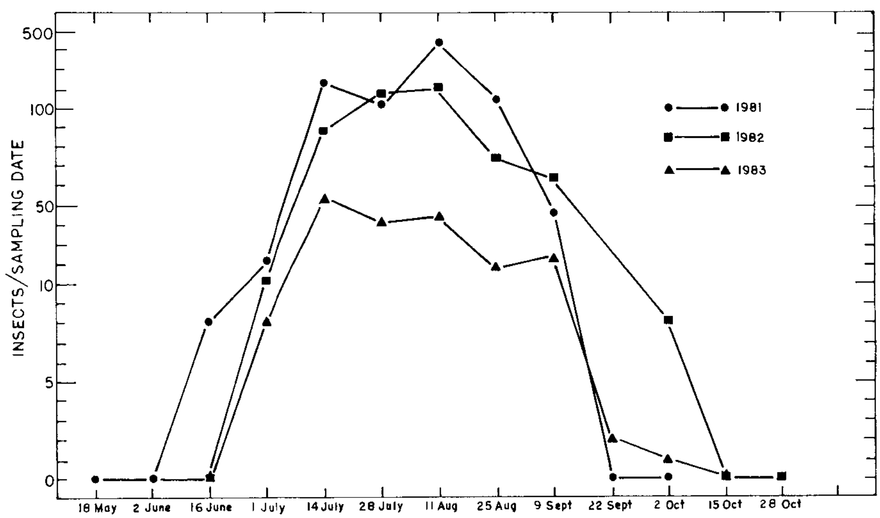

Fig. 3. Seasonal abundance of *Empoasca fabae* on honeylocust near Wooster, Ohio, 1981 - 1983.

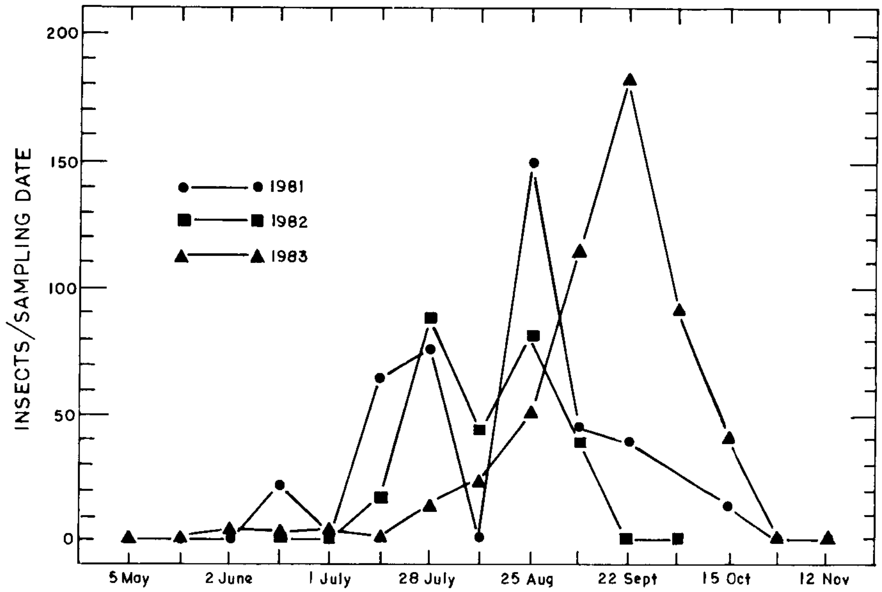

Fig. 4. Seasonal abundance of unidentified cicadellid nymphs on honeylocust near Wooster, Ohio, 1982 - 1983.

Erythroneura clavata — Adults were first collected in early 1983 to mid-June (1981) and mid-July (1983) (Fig. 5). Populations peaked in late July and late August in 1981 and 1982. Only one peak was detected in 1983, occurring in late September. Populations were low in July and early August, possibly obscuring an early population peak. Last adults were collected in early September (1982) to mid-October (1981, 1983).

Micrutalis calva — Nymphs eclosed from eggs overwintering in the stems from mid-May (1982) to early June (1983) (Fig. 6). Nymphal populations peaked from mid-May (1982) to mid-June (1983), disappearing in mid-(1982) to late June (1983). Adults were first collected in mid-(1982) to late June (1983), with population peaks occurring at the same time. Adults disappeared from honeylocust in late June (1982) to mid-July (1983), appeared again in early September, and reached greater numbers in early October than in June. No nymphs were detected after late June. *Micrutalis calva* may move to an alternate host in July, when a second generation develops. Nymphs and adults of *M. calva* have been collected on ironweed, *Veronia noveboracensis* (L.), in the fall (Matausch 1912; Ball 1920).

Host Impact

Although M. fumipennis, M. calva, and leafhoppers in general are reported to discolor and distort honeylocust foliage, there is no conclusive evidence to support these contentions.

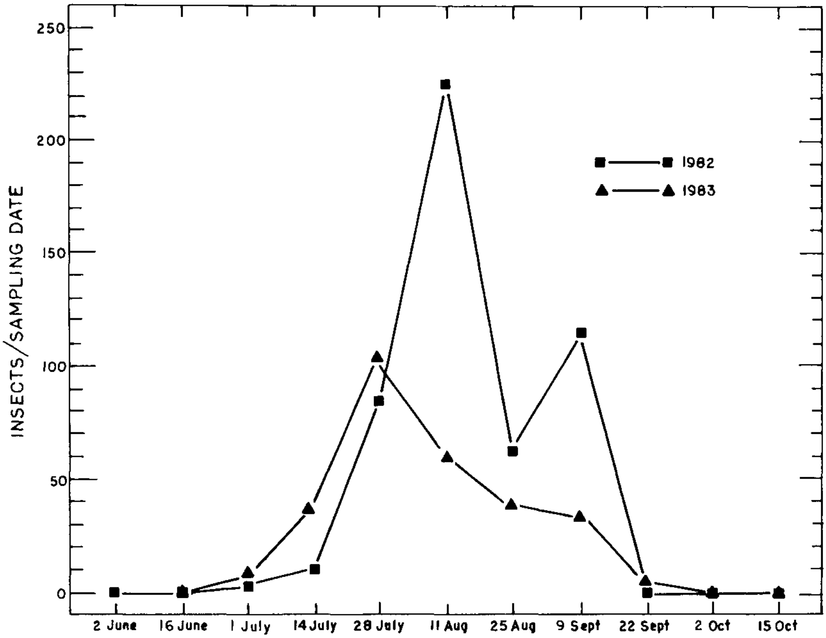

Fig. 5. Seasonal abundance of *Erythroneura clavata* adults on honeylocust near Wooster, Ohio, 1981 - 1983.

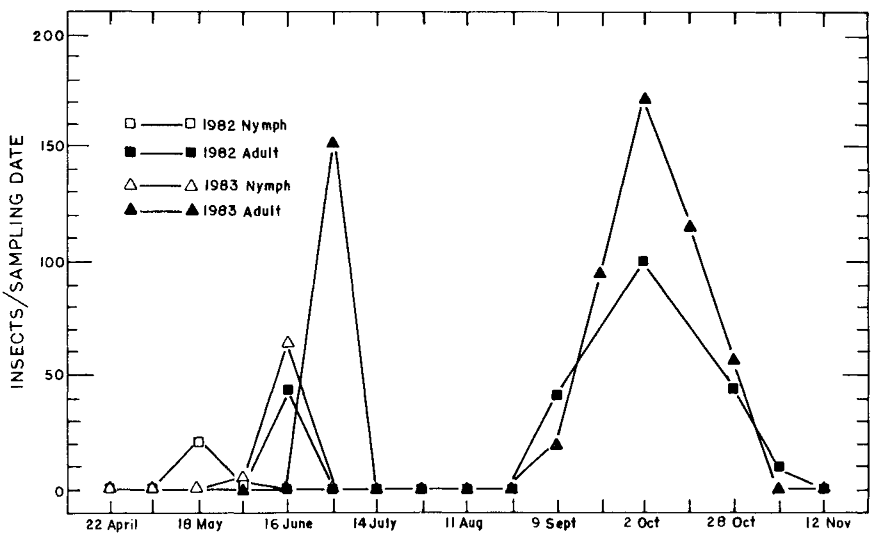

Fig. 6. Seasonal abundance of *Micrutalis calva* nymphs and adults on honeylocust near Wooster, Ohio, 1982 - 1983.

All honeylocust trees sampled displayed various degrees of foliar discoloration, distortion, and defoliation. In all three years, almost all trees suffered early season defoliation sufficient to stimulate varying degrees of refoliation during July. However, we attribute this foliar injury to the honeylocust plant bug, which occurred sympatrically with *M. fumipennis, S. alabamensis*, and M. *calva* but at much higher levels (Herms et al. 1987). The honeylocust plant bug is known to cause the kind of foliar injury observed in our study (Wheeler and Henry 1976). *Macropsis fumipennis, S. alabamensis*, and *M. calva* were observed to feed primarily on petioles, petiolules, and inflorescences, indicating they were not responsible for foliar injury.

Micrutalis calva, *E. clavata*, *S. alabamensis* and *E. fabae* were present on honeylocust after the trees had refoliated and the honeylocust plant bug had disappeared. However, no distortion or discoloration of new foliage was observed, despite close scrutiny. As pointed out by Valley and Wheeler (1985), damage caused by honeylocust plant bug in the spring is evident until leaf abscission in the fall, long after adults have disappeared. The mere presence of these four homopteran species on honeylocust during late summer could lead people to believe that these insects, rather than the honeylocust plant bug, are responsible for the foliar injury. We concur with Valley and Wheeler (1985) that discoloration and distortion of honeylocust foliage should not be attributed to the homopteran complex reported on in this paper.

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