

SEASONAL AND VERTICAL DISTRIBUTIONS OF PLANTHOPPERS (HOMOPTERA: FULGOROIDEA) WITHIN A BLACK WALNUT PLANTATION

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ABSTRACT

Information on the seasonal and vertical distributions of 34 species (eight families) of planthoppers was obtained from window trap collections in a North Carolina black walnut plantation in 1977 and 1978. The most commonly collected species were *Acanalonia conica* (Acanaloniidae), *Liburniella ornata* (Delphacidae), *Oliarus ecologus* (Cixiidae), and *O. quinquelineatus*.

Black walnut, *Juglans nigra* L., is grown in intensively managed plantations for veneer and high quality lumber. Many of its potential insect pests have only recently been determined (Kearby 1975, Nixon and McPherson 1977). As a result, biological information is available for only a few species (Blair and Kearby 1979).

Nixon and McPherson (1977) collected 15 species of planthoppers on walnut, nine of which were recorded feeding as adults. Eggs and nymphs have also been associated with walnut (Nixon and McPherson 1977, Wilson and McPherson 1979). The life histories of a few species on black walnut have been investigated (Wilson and McPherson 1979). For most, however, little biological information is available.

The objectives of this paper are to provide a list of the planthopper fauna found in a black walnut plantation and, for four species, to provide information on seasonal and height distribution.

MATERIALS AND METHODS

The study area was a 4.9 ha black walnut plantation established in 1973 about 64 km east of Asheville in McDowell County, North Carolina. Tree heights averaged 2.42 m and 2.84 m in 1977 and 1978, respectively.

Understorey vegetation included *Silene antirrhina* (L.) (Caryophyllaceae), *Oenothera laciniata* Hill (Onograceae), and *Solidago canadensis* L. (Compositae). The plantation was disked at least once a year to control herbaceous vegetation.

Insects were collected by 28 window traps, modified from Chapman and Kinghorn (1955), within a 2.0 ha section of the plantation. The trap heights ranged from 1 to 7 m at 1 m vertical intervals, with four traps randomly located at each height. Collections were made weekly from 1 April to 14 October and 31 March to 13 October in 1977 and 1978, respectively.

RESULTS AND DISCUSSION

Thirty-four species of planthoppers in eight families were collected (Table 1), compared with 123 species for the entire state (Brimley 1938, 1942; Wray 1950). Eight of the 34 species

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Table 1. Seasonal and vertical distribution of Fulgoroidea collected in window traps at the black walnut plantation, McDowell Co., North Carolina.

Taxon	Number of specimens	Trap heights (m)	Collection dates (day/month)
ACANALONIIDAE			
<i>Acanalonia bivittata</i> (Say) ^a	7	1	12/8-13/10
<i>A. conica</i> (Say) ^a	31	1-5	22/7-6/10
ACHILIDAE			
<i>Catonia bicinctura</i> Van Duzee	1	6	15/9
<i>C. nava</i> (Say)	1	3	15/9
<i>C. picta</i> Van Duzee	1	5	22/9
<i>C. pumila</i> Van Duzee	2	2-7	8/7-29/9
<i>Eiptera pallida</i> (Say)	1	4	16/6
<i>Synecdoche impunctata</i> (Fitch)	1	7	22/7
CIXIIDAE			
<i>Cixius</i> sp.	1	6	6/5
<i>Myndus pictifrons</i> (Stål)	13	1-7	10/6-23/7
<i>Oecleus borealis</i> Van Duzee	1	7	30/6
<i>Oliarus aridus</i> Ball	1	2	15/7
<i>O. ecologus</i> Caldwell	38	1-6	9/6-25/8
<i>O. quinque-lineatus</i> (Say)	25	1-6	24/6-8/9
DELPHACIDAE			
<i>Delphacodes campestris</i> (Van Duzee)	5 ^b	1-5	8/9-13/10
<i>D. lutulenta</i> (Van Duzee)	1 ^b	7	10/6
<i>D. puella</i> (Van Duzee)	10 ^b	2-7	9/6-13/10
<i>D. recurvata</i> Beamer	1 ^b	5	8/9
<i>D. rotundata</i> (Crawford)	4 ^b	3-7	15/4-2/9
<i>Liburniella ornata</i> (Stål) ^a	32	1-7	2/6-13/10
<i>Megamelus unguilatus</i> Beamer	3	4-5	2/6-4/8
<i>Pissonotus brunneus</i> Van Duzee	2	5	8/9-6/10
<i>Stobaera tricarinata</i> (Say)	13	1-7	31/3-9/9
DERBIDAE			
<i>Cedusa</i> sp.	3	1-7	28/7-22/9
<i>Syntames uhleri</i> (Ball) ^a	1	4	22/9
DICTYOPHARIDAE			
<i>Scolops angustatus</i> Uhler	13	1-6	30/6-23/9
<i>S. pungens</i> (Germar)	3	1	11/8-15/9
<i>S. sulcipes</i> (Say)	5	1	30/6-2/9
FLATIDAE			
<i>Anormenis septentrionalis</i> (Spinola) ^a	22	1-6	19/8-6/10
<i>Metcalfa pruinosa</i> (Say) ^a	3	2	4/8-29/9
<i>Ormenoides venusta</i> (Melichar) ^a	2	1	8/9-15/9
ISSIDAE			
<i>Bruchomorpha oculata</i> Newman	1	4	22/7
<i>B. tristis</i> Stål	1	1	2/9
<i>Thionia simplex</i> (Germar) ^a	1	1	16/9

^aReported feeding on black walnut in Illinois (Nixon and McPherson 1977).^bMale specimens only.

were recorded feeding on walnut by Nixon and McPherson (1977). Most of the species listed (Table 1) are often collected in meadow habitats and are probably not directly associated with black walnut (O'Brien, pers. comm.).

The number of specimens collected of each species ranged from one to 38. Twenty-four species (ca. 70%) were represented by five or fewer specimens. This may reflect restricted habitat requirements, few available host plants, incidental occurrence, or the general rarity of a species. On the other hand, window traps may not be an efficient collecting method for some species of planthoppers. We cannot determine patterns for height and seasonal distributions for most species owing to the small number of specimens, but for four species, represented by 25 or more specimens, we examined height and seasonal distributions in further detail.

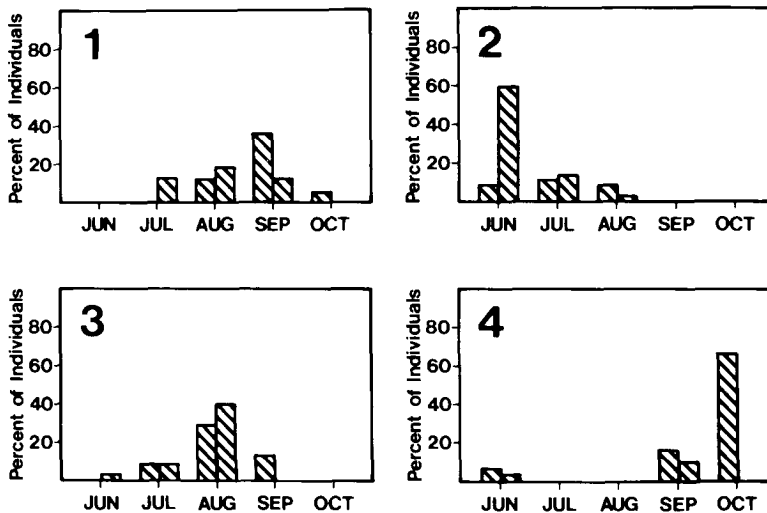
Acanalonia conica (Say) adults were collected from mid-July to early October with peak abundance during early September (Fig. 1). This corresponds with the seasonal distribution of adults in southern Illinois (Wilson 1980). The eggs of *A. conica* hatch in early May; adults appear in early July; and females lay eggs from late summer to early fall.

Over 75% of *A. conica* adults were collected at 2 m or lower (Fig. 5). This may reflect their feeding preferences for low woody and herbaceous vegetation (Wilson 1980), including immature black walnut (Nixon and McPherson 1977).

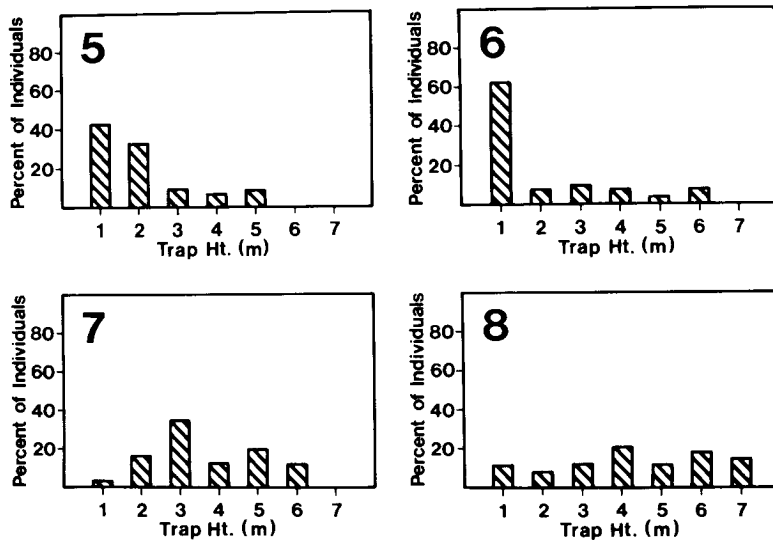
Oliarus ecologus (Caldwell) adults were collected from early June to late August with peak abundance in late June (Fig. 2). Little information is available on the life history of this species. Based on the observations of other *Oliarus* species, Mead (1968) speculated that *O. ecologus* feeds on roots as nymphs, is univoltine, and overwinters as nymphs underground. The range of collecting dates of adults (Fig. 2) appears to support Mead's suggestion that this species is univoltine.

O. ecologus adults were collected from 1 to 6 m with 65% collected at 1 m (Fig. 6). The only recorded host plant for adults is *Lespedeza cuneata* Don (Mead 1968).

O. quinque-lineatus (Say) adults were collected from mid-June to mid-September with peak abundance in August (Fig. 3). Sheppard et al. (1979) noted that nymphs overwinter underground in masses of pine and saw palmetto roots in Florida.



Figs. 1-4. Seasonal distribution (percent frequency biweekly) of planthopper adults collected in window traps in a North Carolina black walnut plantation during 1977-1978: (1) *Acanalonia conica*, (2) *Oliarus ecologus*, (3) *O. quinque-lineatus*, (4) *Liburniella ornata*.



Figs. 5-8. Vertical distribution (percent frequency) of planthopper adults collected in window traps in a North Carolina black walnut plantation during 1977-1978: (5) *Acanalonia conica*, (6) *Ollarius ecologus*, (7) *O. quinquelineatus*, (8) *Liburniella ornata*.

O. quinquelineatus adults were collected from 1 to 6 m (Fig. 7). This species has been collected on *Pinus rigida* (Miller), *P. virginiana* (Miller), and under the bark of *Quercus ellipsoidalis* Hill (Mead 1968).

Liburniella ornata (Stål) adults were collected in June and from September to mid-October with peak abundance in early October (Fig. 4). Glick (1939) also reported that this species is abundant in late summer.

L. ornata adults were collected at all heights in approximately equal numbers (Fig. 8). We have often collected this species by sweeping grasses and low vegetation. On the other hand, Glick (1939), using airplane traps, collected *L. ornata* at altitudes up to 4,400 meters.

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