Seasonal Group Behavior of Adult Jadera haematoloma (Hemiptera: Rhopalidae) in Central Florida Following Host Seed Exhaustion

Author: Zych, Ariel F.

Source: Florida Entomologist, 93(4) : 644-646

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.093.0426

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 22 Sep 2024
Terms of Use: https://bioone.org/terms-of-use

SEASONAL GROUP BEHAVIOR OF ADULT *JADERA HAEMATOLOMA* (HEMIPTERA: RHOPALIDAE) IN CENTRAL FLORIDA FOLLOWING HOST SEED EXHAUSTION

ARIEL F. ZYCH
University of Florida, Department of Biology, Gainesville, FL 32611

Jadera haematoloma Herrich-Schäffer (Hemiptera: Rhopalidae) is a specialist seed predator on Sapindales (Sapindaceae) and is common throughout North and Central America (Carroll & Loye 1987). In North-Central Florida *J. haematoloma* occurs on the recently-acquired host, the Goldenrain tree (*Koelreuteria* sp. Laxmann). *Koelreuteria* trees produce tens of thousands of seeds in the canopy on floral rods after flowering in early fall. By mid-fall, seeds fall to the ground and are fed upon by *J. haematoloma* until the seed base is exhausted in early summer (Carroll & Loye 1987; Carroll 1988). Though dispersal morphs are common in other host populations of *J. haematoloma*, they are not favored in *Koelreuteria* populations due to the synchronous exploitation of *Koelreuteria* sp. seeds among host plants. Instead, non-reproductive diapause in adults follows seed exhaustion (Carroll et al. 2003). During this period from May to Sep 2009, I observed adults forming dense, physically-touching groups in the canopy following the exhaustion of seeds. My goal was to determine the demographic composition of these groups and identify where they occur in time as well as their position within and among host trees.

I observed individuals foraging on seeds on the ground around host trees in large aggregations through late May and early Jun in the northwest Gainesville area (Alachua County, FL) in the manner described by previous investigators (Carroll & Loye 1987). Following seed exhaustion and a noticeable decline in the density of individuals on the ground, I completed an extensive survey of the canopy and surrounding ground area of 12 large *Koelreuteria* trees using binoculars and a spotting scope to view higher canopies. Trees were classified according to their seed productivity, branching, height, and trunk diameter to determine if these influenced group number or insect abundance. Seed productivity was estimated by counting the number of bare floral rods in the canopy as a proxy for the number of seed-yielding flowers produced the previous fall. Samples of seeds were collected from the ground at each tree to verify seed exhaustion (after Carroll et al. 2003). I defined a group of bugs as 10 or more stationary individuals spaced less than 2 body lengths apart from one another (Fig. 1) in hopes of avoiding confusion with the ground foraging "aggregations" around host plants previously described in *Jadera* literature (Carroll & Loye 1987). To determine whether groups were randomly distributed around host trees, I recorded the branch position, compass position relative to trunk, height, radius from the trunk, and number of participating insects for each observed group; a picture was taken to verify counts and each group was assigned a number. One quarter of the number of groups was randomly selected based on a random numbers table and then destructively sampled using a bag net at each tree. Sex ratios within groups were estimated for each tree from the collected group(s). Statistical analyses were conducted with JMP (SAS institute 2008).

In total, 46 groups were observed. Fewer than 20 individuals were observed on the trunk or ground of any given tree during sampling. Trees contained between 0 and 17 groups within the canopy (mean = 4.6). The proportion of terminal branches with florescence rods (a proxy for seed productivity) reliably predicted the total number of individuals found on a tree (ANOVA, $df = 45$, $F = 37.29$, $P = 0.0005$) and the number of groups within a tree (ANOVA, $df = 8$, $F = 7.14$, $P = 0.0319$). Three trees without insects were excluded from the following analyses of group location and participation. Group positions were biased towards more terminal branches as described by Strahler and Botanical branch ordering systems (Strahler 1957; Wilson 1966, Fig 2). Number of branch meet-ups from most terminal branches (Strahler) was biased towards terminal branches, but position was not biased in the number of branch meet-ups from the trunk (Botanical). This is contrary to the expectation that groups are more likely to occur in positions on the tree which are more abundant, which would bias the number of groups both towards most terminal branches, and branches furthest from the trunk, as more positions are available at the exterior of the crown. These data show that bugs are distributed in terminal sites regardless of where terminal sites occur within the crown. The distribution of aggregations in the crown closely corresponds to where floral rods are produced within the crown (Fig. 2).

Groups varied in size from 10 individuals to just over 300 (mean = 79.4, median = 63, 75% quartile = 85.5, 25% quartile = 37.5, SD = 68.71, SE = 10.24, $n = 45$) with individuals often positioned on top of one another. Group size did not change with height from ground or compass direction. All groups observed in the canopy occurred

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 22 Sep 2024
Terms of Use: https://bioone.org/terms-of-use

Fig. 1. Group of adult *Jadera haematoloma* in the canopy of a host Goldenrain tree (*Koelreuteria* sp.), Alachua County, FL, Jul 2009. Inset: Adult and nymphs of *J. haematoloma* from Mar 2009.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 22 Sep 2024
Terms of Use: https://bioone.org/terms-of-use

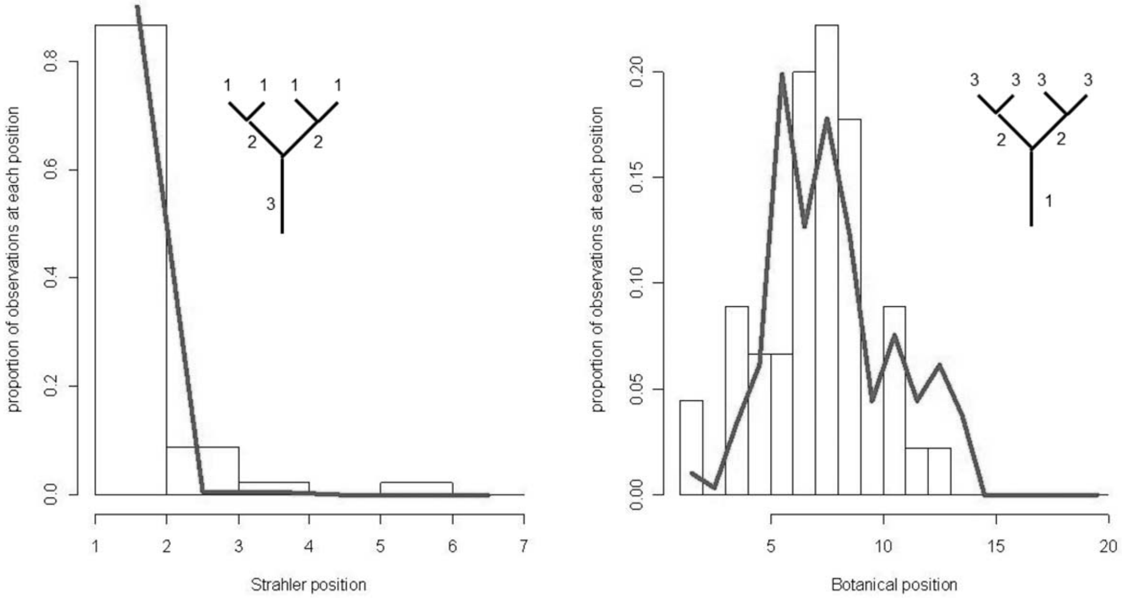

Fig. 2. Parallel distributions of the positions of *Jadera haematoloma* adult groups and flower production in the host tree canopy. Bars = group position distribution, line = floral rod position distribution. Position in the canopy of sampled host Koelreuteria trees is expressed as branch meet-ups from most terminal branch (Strahler position) and branch forks from trunk (Botanical position).

on the undersides of leaves or branches parallel to or at an angle less than 30° relative to the ground. Individuals within a group were never observed mating and did not appear to be feeding on the leaves. Movement within groups was negligible during each 2-h observation period following collection. There were no groups observed on the upper sides of leaves, though they could have been easily viewed due to high-transmittance of light through the leaves. Fifteen groups were destructively sampled; groups comprised over 99% adults. Sex ratio (M/F) was unbiased (1.17 ± 0.20, *n* = 15). Groups at all study trees persisted in the same locations for the duration of the summer (13 weeks) then dispersed within 1 week of the start of flower production in early Sep. Following dispersal from groups many individuals were observed foraging within the floral rods before seeds were produced.

The data presented here suggest that group formation by adult *J. haematoloma* in central Florida (Alachua County) occurs during the period between seed exhaustion and flowering. Unlike previous studies of group formation in *J. haematoloma,* this form of aggregation appears specific to adults and occurs with a unique spatial and temporal signature which anticipates future food abundance.

Thanks to Jamie Gillooly, April Hayward, and Teala Tyson for helpful discussions and manuscript assistance. Funding provided by NSF Pre-Doctoral Fellowship to AZ.

SUMMARY

Summer-diapausing adult *Jadera haematoloma* (Hemiptera: Rhopalidae) were observed forming non-mating stationary groups in the canopy of host trees following exhaustion of host seeds on the ground. Group position was biased towards the terminal leaves throughout the crown, corresponding to where flowers are produced. Groups dispersed within a week of the onset of host flowering.

REFERENCES CITED

CARROLL, S. P., AND LOYE, J. E. 1987 Specialization of *Jadera* species (Hemiptera: Rhopalidae) on seeds of Sapindaceae (Sapindales), and coevolutionary responses of defense and attack. Ann. Entomol. Soc. America 80(3): 373-378.

CARROLL, S. P., MARLER, M., WINCHELL, R., AND DINGLE, H. 2003. Evolution of cryptic flight morph and life history differences during host race radiation in the soapberry bug, *Jadera haematoloma* Herrich-Schaeffer (Hemiptera: Rhopalidae). Ann. Entomol. Soc. America 96(2): 135-143.

CARROLL, S. P. 1988. Contrasts in reproductive ecology between temperature and tropical populations of *Jadera haematoloma,* a mate-guarding hemipteran (Rhopalidae). Ann. Entomol. Soc. America 81: 54-63

WILSON, B. F. 1970. The Growing Tree. University of Massachusetts Press. Amherst, MA.

SAS INSTITUTE INC. 2008. JMP Version 8. Cary, NC.

STRAHLER, A. N. 1957 Quantitative meausurement of watershed geomorphology. Trans. American Geophys. U. 38: 913-020.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 22 Sep 2024
Terms of Use: https://bioone.org/terms-of-use