NEW HOST RECORDS FOR *CALIOTHRIPS STRIATUS* (THYSANOPTERA: THRIPIDAE) ON *MAGNOLIA* SPP. WITH THE DESCRIPTION OF THE SECOND INSTAR

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In the current literature, apart from brief descriptions of feeding hosts, little is known regarding the habits of *Caliothrips striatus* Hood. This species is native to North America with a range of the eastern United States; and Wilson (1975) described it as mainly using tulip trees, *Liriodendron tulipifera* L., as a host plant and only occasionally being found on magnolias.

The host association information for *C. striatus* is limited. The feeding behavior is known only on *L. tulipifera*, and the plant hosts utilized for reproduction have not been documented. The current study addresses this issue.

In the present study observations were conducted at arboretums in South Carolina (N 34° 53' 52.22", W 82° 49' 43.90", 315 m asl), Georgia (N. 34° 16' 08.61", 83° 26' 58.82", 222 m asl) and Tennessee (N 35° 52' 21.85", W 88° 50' 40.08", 125 m asl) from Sep to Nov in 2010 and 2011. In the arboretums the thrips were found in large numbers causing severe feeding damage to the leaves (Fig. 1). Damage caused by *C. striatus* on species

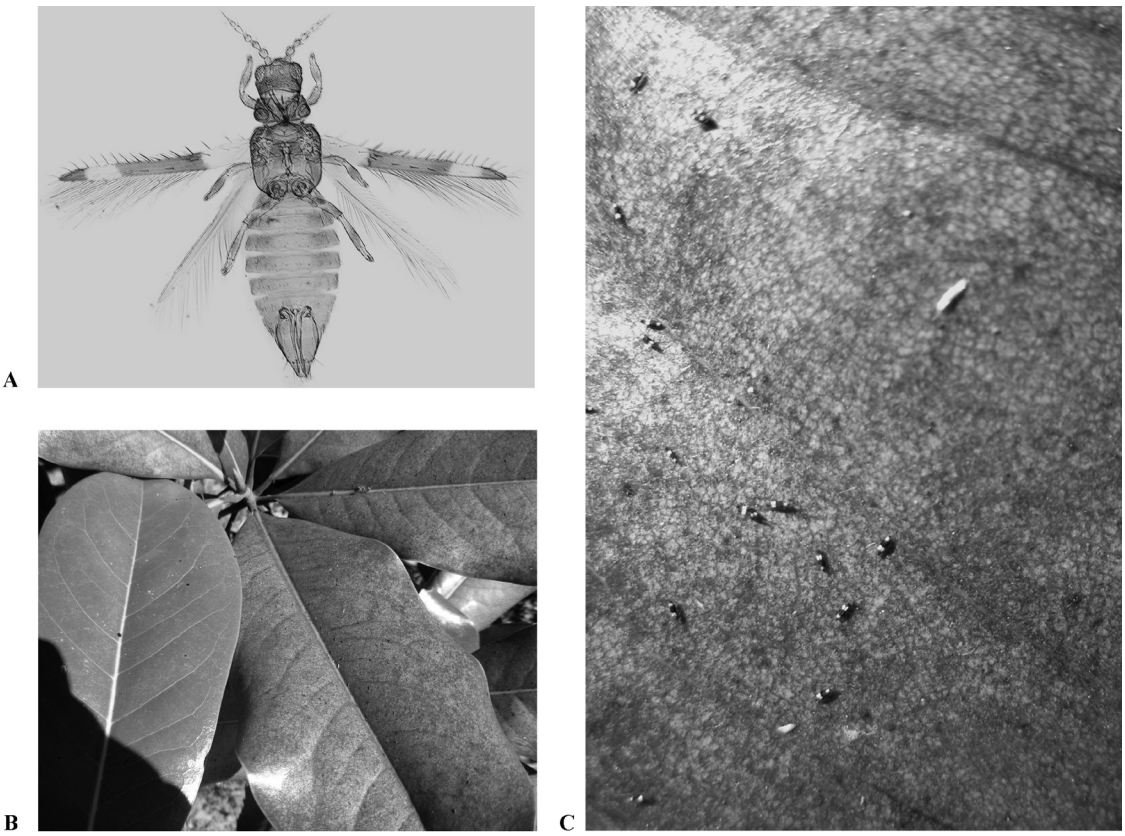

Fig. 1. Adult female *Caliothrips striatus* Hood from Quincy, Florida (A), leaves with feeding injury compared to healthy leaves (B) and adults on *Magnolia grandiflora* leaf (C). Photographs B and C were taken at the arboretum in South Carolina.

of *Magnolia* appeared as yellow-brown flecks covering the leaf surface, and sometimes the adults were visible on the leaves appearing black with 2 white bars. The adults inhabited the upper sides of the leaves except when temperatures dropped below 4° C at which point they took refuge on the undersides of the leaves.

Samplings were made from Aug to Nov 2011 at 2 locations in Quincy, Gadsden County, Florida: North Florida Research and Education Center (N 30° 32' 54.1", W 84° 35 '74.5", 71 m asl) and Lake Talquin State Forest, Bear Creek Tract (N 30° 28' 58.6", W 084° 37' 39.6", 45 m asl). The strike method (Steiner 1962) was used to sample the thrips on *Magnolia grandiflora* L. and *L. tulipifera*. Three branches were sampled at heights ranging from 30 cm to 4 m on 5 *L. tulipifera* trees and 13 *M. grandiflora* trees weekly from 8-VIII-2011 to 25-X-2011 for a total of 11 sample dates. These thrips were placed into vials containing 70% ethyl alcohol. Thrips also were collected by visual examination of the leaves and captured with a fine brush. Adults and larvae were mounted on slides in Hoyer's and Canada balsam media, respectively. The collected adults were identified from (Wilson 1975), and compared with type specimens at the United States National Museum. In order to ascertain a positive identity of the larvae of *C. striatus*, which has not been previously described, live adult individuals were reared in a growth chamber (26 ± 1 °C, 50% RH) and fed with *M. grandiflora* leaves. This study provides the first known description of the second instar of *C. striatus*.

In the study 9 new host associations for *C. striatus* were confirmed. In the South Carolina arboretum *C. striatus* was found on: *Magnolia delavayi* Franch*, Magnolia foveolata* (Merr. ex Dandy) Figlar*, Magnolia grandiflora* L.*, Magnolia laevifolia* (Y. W. Law & Y. F. Wu) Noot., *Magnolia lotungensis* Chun & C. H. Tsoong, *Magnolia maudiae* (Dunn) Figlar*, Magnolia tamaulipana* Vazquez, *Magnolia virginiana* L. and *M. insignis* × *M. grandiflora* (hybrid). The thrips were found in large numbers at the arboretums in Tennessee and Georgia on *M. grandiflora*.

In Quincy, Florida, more *C. striatus* were found on *M. grandiflora* (36 adults [28♀, 8♂], 8 larvae) than on *L. tulipifera* (3♀ adults, 0 larvae). A supplementary collection method utilizing Winkler traps (Belshaw & Bolton 1994; Sabu et al. 2011) was used in order to determine the presence of *C. striatus* in the leaf litter. Five different points were sampled on 5 dates from 29-IX-2011 to 7-XI-2011 for a total of 25 samples. At each site 0.15 m^2 of leaf litter was collected from 4 different locations underneath the canopy. One sample yielded 5 (4♀, 1♂) adult individuals among the leaf litter below *M. grandiflora* and *L. tulipifera* trees on 6-X-2011.

At the arboretum in South Carolina a drought caused *L. tulipifera* to lose the leaves earlier than usual during late summer and early fall of 2010 and 2011. This may have caused *C. striatus* to shift to other hosts such as *Magnolia* due to environmental conditions. In Florida, *L. tulipifera* and *M. grandiflora* kept their foliage throughout Sep and Oct of 2011. Populations of *C. striatus* reproduced on *M. grandiflora*, but no larvae were found on *L. tulipifera.* During the study more adults were found on *M. grandiflora*. The infestation of *C. striatus* on numerous species of *Magnolia* in the arboretums in the southeastern United States raises concern about potential damage for nursery owners and growers.

Below is the second instar description of *Caliothrips striatus* Hood. The chaetotaxy and other morphological designations in this description are the same used in descriptions of the second instars of other *Caliothrips* spp. in Vierbergen et al. (2010).

Body, 1.07 mm length, color creamy white, with a continuous crimson marginal pigmentation that extends from the apex of prothorax to posterior margin of tergite VIII (Fig. 2A). Legs and antenna shaded gray. Antenna 7-segmented with the final segment, nearly 10 × longer than its basal width. Most dorsal setae clavate with their bases set on tubercles. Ventral setae apically pointed. Mesothorax, metathorax and abdominal tergites I-VII with transverse rows of longitudinally elongate dermal plaques without microtrichia. Thoracic sternites and abdominal sternite I with randomly oriented minute plaques and sternites II-IX with transverse rows of minute plaques.

Head with setae D3 pointed; all others clavate. The D1 setae are nearly half the length of the D2 setae. The D4 and D2 are similar in length (Fig. 2B). Pronotal setae D4 pointed and D6 bluntly pointed with the other 5 pairs clavate. Discal integument with small oval randomly oriented plaques. Mesonotal setae D3 blunt, D6 minute and the other 5 pairs clavate with the D2 being the shortest. The derm between the D1 and D2 setae composed of uniform transverse rows of longitudinally elongate plaques with each row being alternated by a row of smaller plaques (Fig. 2C). The rows of smaller plaques are oriented in a disorganized array between and posterior of the D1 setae. Metanotal setae D2 pointed, with the setae of the other 3 pairs clavate, integument similar to mesonotum.

Tergite I D1 setae minute, D2 clavate similar in length to the D2 seta of the other abdominal segments. Tergites II-VIII, each with 3 pairs of clavate setae. Abdominal segments IX and X each with 3 pairs of thin, apically pointed setae. The medial integument of tergites II-VIII with alternating transverse rows of plaques of 2 different sizes, similar to the mesonotum, but the rows of smaller plaques are present after every 3 consec-

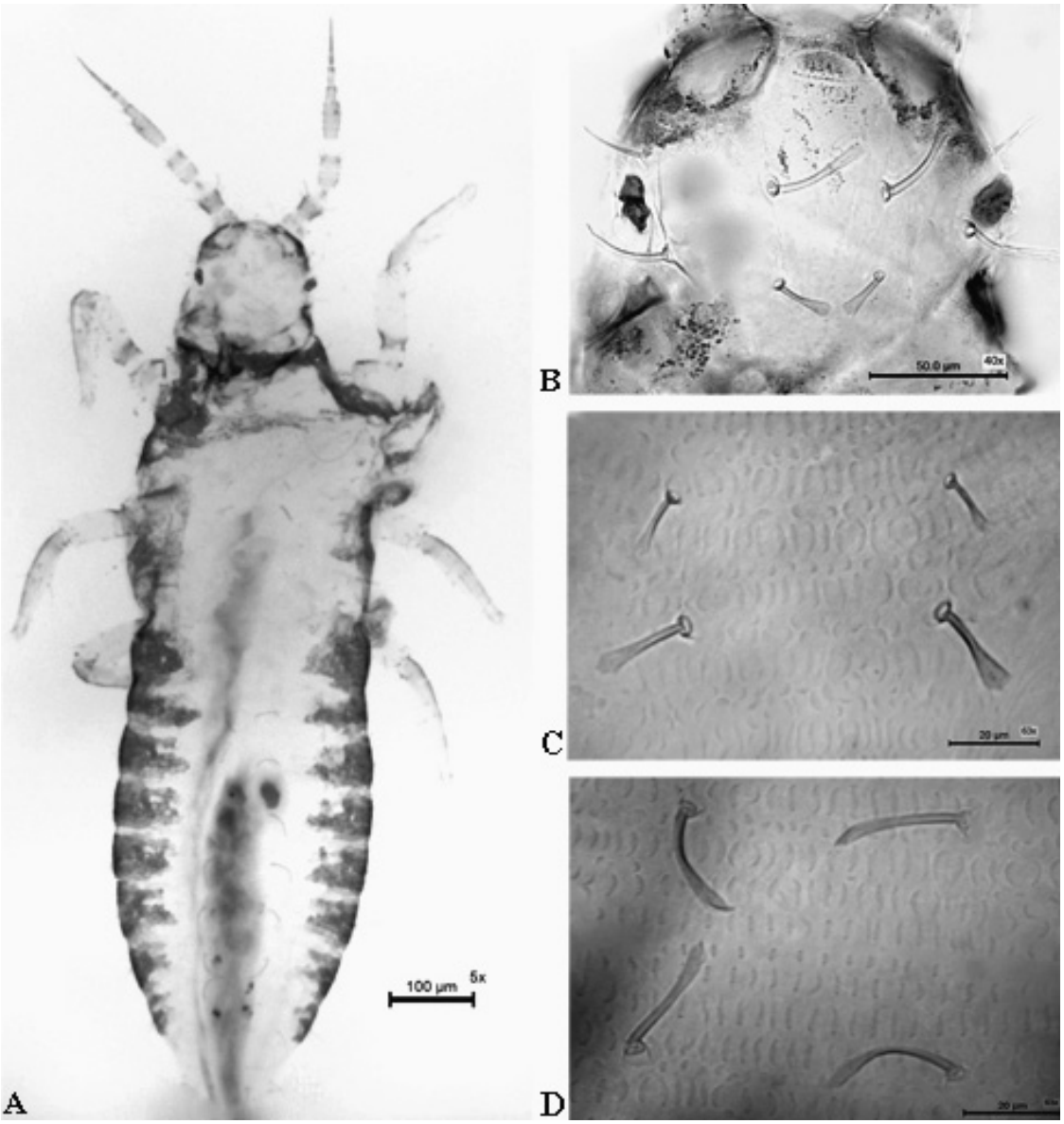

Fig. 2. The second instar of *Caliothrips striatus* Hood: full body (A), head (B), mesonotum (C), abdominal tergites III and IV (D).

utive rows of larger plaques. This character state is most evident on tergites II-VI (Fig. 2D). Tergite IX with 2 to 3 transverse rows of closely set minute plaques and the posterior margin lacks sclerotized teeth.

Summary

Previous reports of *Caliothrips striatus* Hood implied that the species is mainly found on *L. tulipifera* and only occasionally on *Magnolia* species. Results from the current study clarify the known hosts of *C. striatus* which include *L. tulipifera* and 9 *Magnolia* spp. The discovery of numerous adults and larvae on the leaves showed that *M. grandiflora* is a host used for feeding and reproduction by *C. striatus*.

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