

**Host-use Patterns of *Eriotremex formosanus*
(Hymenoptera: Siricidae) in South Carolina, U.S.A.**

Author(s): Michael D. Ulyshen and James L. Hanula

Source: Entomological News, 121(1):97-101. 2010.

Published By: The American Entomological Society

DOI: 10.3157/021.121.0118

URL: <http://www.bioone.org/doi/full/10.3157/021.121.0118>

BioOne (www.bioone.org) is an electronic aggregator of bioscience research content, and the online home to over 160 journals and books published by not-for-profit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Web site, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/page/terms_of_use.

Usage of BioOne 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.

HOST-USE PATTERNS OF *ERITREMEX FORMOSANUS* (HYMENOPTERA: SIRICIDAE) IN SOUTH CAROLINA, U.S.A.¹

Michael D. Ulyshen² and James L. Hanula³

ABSTRACT: Based on emergence data, *Eriotremex formosanus* (Matsumura), an exotic horntail established in the southeastern United States, was found to be 1) significantly more abundant in *Quercus nigra* L. than in *Liquidambar styraciflua* L. and absent from *Pinus taeda* L., 2) significantly more abundant in snags than logs, 3) similarly abundant in upland pine-dominated forests and bottomland hardwood-dominated forests, and 4) present at all heights along the bole but not in branches. Captures of *E. formosanus* in flight intercept traps positioned next to snags, logs and living trees of each tree species support these findings.

KEY WORDS: vertical distribution, forest canopy, saproxylic, non-native, Symphyta, Tremicinae, water oak, sweetgum, loblolly pine

Only 2 of the 23 species and subspecies of Siricidae found in North America are known from angiosperms (Schiff et al., 2006): 1) the native pigeon tremex, *Tremex columba* (L.), has been reported from numerous hardwood species and is widely distributed in North America (Schiff et al., 2006) and 2) the exotic Asian horntail, *Eriotremex formosanus* (Matsumura), first captured in Florida and Georgia in 1974, has been reported from numerous hardwood species as well, and is now well established in the southeastern United States (Smith, 1996; Schiff et al., 2006; Warriner, 2008). Unlike the European woodwasp, *Sirex noctilio* Fabricius, *E. formosanus* is not considered an economically important pest because it apparently only attacks dying or dead trees (Warriner, 2008). However, the species may someday emerge as a pest in North America or elsewhere, and its ecological impacts in North American forests remain unknown. Therefore, information on the biology and host-use patterns of *E. formosanus* is of interest. Here we present the results from a recent study in which a number of *E. formosanus* emerged from wood collected from different forest types, tree species and wood postures on the upper coastal plain of South Carolina, USA.

METHODS

The study took place in two forest types, an upland pine-dominated forest and a bottomland hardwood forest, on the Savannah River Site, South Carolina, USA (for a detailed description of the study areas, see Ulyshen and Hanula, 2009). On 5-6 June 2006 we created 9 snags (i.e., standing dead trees) and 9 logs (i.e., fallen dead trees) in each forest type, equally divided among *Liquidambar styraci-*

¹ Received on January 22, 2009. Accepted on February 9, 2009.

² USDA Forest Service, 320 Green Street, Athens, Georgia 30602 U.S.A. E-mail: mulyshen@fs.fed.us

³ USDA Forest Service, 320 Green Street, Athens, Georgia 30602 U.S.A. E-mail: jhanula@fs.fed.us

flua L. (Hammamelidaceae), *Pinus taeda* L. (Pinaceae), and *Quercus nigra* L. (Fagaceae) (i.e., three snags and logs of each species at each site). Approximately 11 months later, in May 2007, we returned to collect 0.5 m sections from the lower bole, middle bole, upper bole and crown of each snag and log (Ulyshen and Hanula, 2009). All sections were transported to Athens, Georgia, where they were placed in rearing bags for 20 weeks (4 May-21 Sept and 9 May-26 Sept for upland and bottomland samples, respectively) to collect emerging insects (Ulyshen and Hanula, 2009). Bole and crown samples from each snag or log were combined before conducting an analysis of covariance on the three-way factorial design using $\log(x+1)$ transformed abundance data as the response variable. Surface area and bark surface area (recorded from each bole and crown section) were the covariates and the main effects were forest type, tree species and wood posture. All effects were fixed and there were no missing or incomplete samples.

We also collected *E. formosanus* arriving at trees using flight intercept traps (Ulyshen and Hanula, 2007) suspended at three positions (1 m, 6 m, and 11 m) along the boles of snags, logs and living trees. Using 54 traps, we sampled next to one snag, log and living tree of each tree species in each forest type. The traps along logs were suspended from metal poles driven into the ground (Ulyshen and Hanula, 2007) while those along snags and living trees were suspended from ropes. The trees were killed on 5-6 June 2006 and sampling took place from 21 June to 5 July 2006, 12-26 August 2006, 28 October to 11 November 2006 and 15-29 March 2007. Because this part of the study was not replicated, statistical tests were not possible. Voucher specimens have been deposited in the Georgia Museum of Natural History, Athens, Georgia.

RESULTS

Overall, 68 specimens of *E. formosanus*, including 3 males, emerged over the 20-week period. Specimens were reared from all bole positions, but none emerged from the crown sections (Table 1). Abundance varied significantly among tree species ($F_{2,22}=46.7$, $P<0.0001$), with *Q. nigra* yielding the most specimens (Fig. 1). *L. styraciflua* produced only two specimens and *P. taeda* produced none (Table 1). Abundance also varied significantly between snags and logs ($F_{1,22}=29.8$, $P<0.0001$), with snags yielding all but three of the specimens (Table 1, Fig. 1). Abundance did not differ significantly between forest types ($F_{1,22}=1.8$, $P=0.2$).

Ten specimens were collected in flight intercept traps, eight next to snags of *Q. nigra* and one each next to a snag and log of *L. styraciflua*. None were collected near *P. taeda*. Seven and three specimens were captured between 12-26 August and between 28 October to 11 November, respectively.

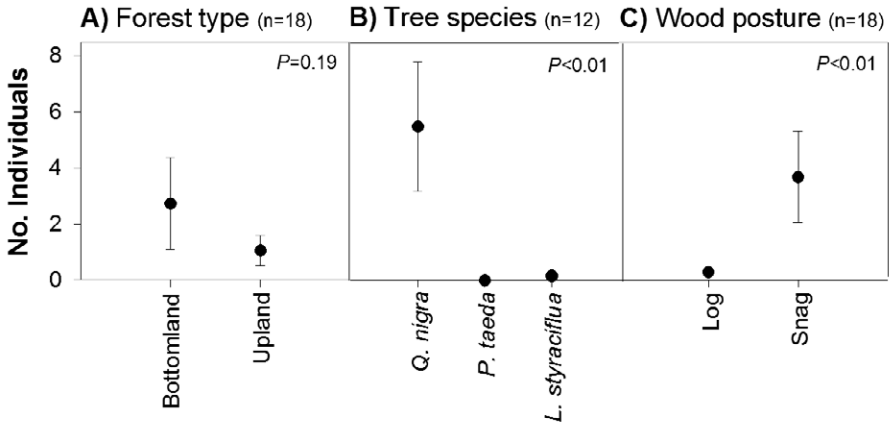


Fig. 1. Mean \pm SE number of *E. formosanus* from two forest types (A), three tree species (B) and two wood postures (C) in South Carolina, USA.

DISCUSSION

Our results suggest that *E. formosanus* is able to complete development in logs but strongly prefers snags, particularly those of *Q. nigra* compared to *L. styraciflua* and *P. taeda*. There are previous records of *E. formosanus* from *Q. nigra* and *L. styraciflua* and reports of the species ovipositing in pines (Smith, 1996). However, there is no evidence that the species can complete development in pines and no specimens were collected from *P. taeda* in this study. Because *E. formosanus* emerged in large numbers from all bole positions, the species appears to utilize the entire bole. However, no specimens were collected from the crown sections, possibly due to diameter restrictions. That no specimens were collected in flight intercept traps within a month after tree death is likely due to the species being late-seasonal (Smith, 1996) as opposed to its avoiding freshly killed wood.

The geographic and host ranges of *E. formosanus* overlap with those of *T. columba*, the only native siricid species in North America known to breed in hardwoods (Schiff et al., 2006), raising the question of whether there is any risk of displacement of *T. columba* by *E. formosanus* in southeastern U.S. forests. This possibility warrants further research, particularly given the expanding range of *E. formosanus* (Warriner, 2008) and the fact that no specimens of *T. columba* were collected in association with *E. formosanus* in this study.

Table 1. Number (male/female) of *E. formosanus* collected from 0.5 m sections of wood removed from snags and logs in two forest types in South Carolina, USA. Sections were taken from three sections of the bole as well as from the crown of each log and snag.

Tree Species	Bottomland Forest						Upland Forest					
	Lower Bole	Middle Bole	Upper Bole	Upper Crown	Lower Bole	Middle Bole	Upper Bole	Middle Bole	Upper Bole	Crown	Total	
<i>Quercus nigra</i> (Fagaceae)	log	0/1	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/1	
	snag	0/6	1/23	1/16	0/0	0/3	0/6	0/8	0/0	0/0	2/62	
<i>Liquidambar styraciflua</i> (Hamamelidaceae)	log	0/0	0/0	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/1	
	snag	0/0	0/0	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/1	
<i>Pinus taeda</i> (Pinaceae)	log	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	
	snag	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	
Total	0/7	2/23	1/16	0/0	0/3	0/8	0/8	0/0	0/0	0/0	3/65	

ACKNOWLEDGEMENTS

We thank Scott Horn and Mike Cody for assisting with field work, Nathan Schiff for specimen identification and Dan Miller for reviewing an early version of the manuscript. Support was provided by the Department of Energy-Savannah River Operations Office through the U.S. Forest Service Savannah River under Interagency Agreement DE-AI09-00SR22188.

LITERATURE CITED

- Schiff, N. M., S. A. Valley, J. R. LaBonte, and D. R. Smith.** 2006. Guide to the siricid woodwasps of North America. USDA Forest Service, Forest Health Technology Enterprise Team. FHTET-2006-15. 102 pp.
- Smith, D. R.** 1996. Discovery and spread of the Asian horntail, *Eriotremex formosanus* (Matsamura) (Hymenoptera: Siricidae), in the United States. *Journal of Entomological Science* 31: 166-171.
- Ulyshen, M. D. and J. L. Hanula.** 2007. A comparison of the beetle (Coleoptera) fauna captured at two heights above the ground in a North American temperate deciduous forest. *American Midland Naturalist* 158: 260-278.
- Ulyshen, M. D. and J. L. Hanula.** 2009. Habitat associations of saproxylic beetles in the southeastern United States: A comparison of forest types, tree species and wood postures. *Forest Ecology and Management* 257: 653-64.
- Warriner, M. D.** 2008. First record of the Asian horntail, *Eriotremex formosanus* (Hymenoptera: Siricidae), in Arkansas, U.S.A. *Entomological News* 119: 212-213.