Seasonal Abundance of Thysanoptera Species in Tillandsia usneoides (Poales: Bromeliaceae)

Authors: Demirozer, Ozan, Tyler-Julian, Kara, and Funderburk, Joe

Source: Florida Entomologist, 98(4) : 1179-1181

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.098.0424
Seasonal abundance of Thysanoptera species in Tillandsia usneoides (Poales: Bromeliaceae)

Ozan Demirozer¹, Kara Tyler-Julian², and Joe Funderburk²,*

Abstract

Spanish moss, Tillandsia usneoides (L.) (Poales: Bromeliaceae), is widely distributed in the southeastern United States. A diversity of arthropod species from numerous taxa are known to inhabit this common epiphytic plant. Thysanoptera species inhabiting Spanish moss were sampled monthly over the course of a year from trees in 4 different genera and included 10 species of thrips from 8 genera and 3 families represented. Breeding populations of predatory Karnyothrips (Phlaeothripidae) were common in Spanish moss during all months of the year. The adults of 2 phytophagous species of Frankliniella (Thripidae) were common in the spring months, but only a few larvae were collected over the course of the year. The adults of other species collected were: Heterothrips quercicola J. C. Crawford (Heterothripidae); Chilothrips pini Hood, Neohydatothrips variabilis (Beach), and Selenothrips rubrocinctus (Giard) (Thripidae); and Hoplandrothrips pergandei Hinds and Liothrips ocellatus Hood (Phlaeothripidae). Although a diverse group of phytophagous thrips species inhabited Spanish moss, there was little evidence that it was a host. It may simply have been a temporary shelter with no other biological significance. The predatory thrips were abundant probably feeding on the diverse group of small arthropods that inhabit Spanish moss.

Key Words: thrips; Frankliniella bispinosa; Karnyothrips melaleucus; epiphytic plant

Resumen

El musgo español (o barba de viejo), Tillandsia usneoides (L.) (Poales: Bromeliaceae), está ampliamente distribuido en el sureste de Estados Unidos. Se sabe que hay una diversidad de especies de artrópodos de numerosos taxones que habitan esta planta epífita común. Se muestrearon mensualmente las especies de Thysanoptera que habitan el musgo español en el transcurso de un año a partir de 4 géneros diferentes de árboles y se incluyen 10 especies de 8 géneros y 3 familias de trips representadas. Las poblaciones reproductivas de depredadores Karnyothrips (Phlaeothripidae) fueron comunes en el musgo español durante todos los meses del año. Los adultos de 2 especies fitófagas de Frankliniella (Thripidae) fueron comunes en los meses de primavera, pero sólo unas pocas larvas fueron recolectadas en el transcurso del año. Los adultos de otras especies recolectadas fueron: Heterothrips quercicola J.C. Crawford (Heterothripidae); Chilothrips pini Hood, Neohydatothrips variabilis (Beach) y Selenothrips rubrocinctus (Giard) (Thripidae); y Hoplandrothrips pergandei Hinds y Liothrips ocellatus Hood (Phlaeothripidae). Aunque un grupo diverso de especies de trips fitófagos habitan el musgo español, hubo poca evidencia de que se trataba de ser un hospedero. Podría simplemente haber sido un refugio temporal con ningún otro significado biológico. Los trips depredadores fueron abundantes probablemente alimentándose sobre un grupo diverso de pequeños artrópodos que habitan en el musgo español.

Palabras Clave: trips; Frankliniella bispinosa; Karnyothrips melaleucus; planta epífita

Spanish moss, Tillandsia usneoides (L.) (Poales: Bromeliaceae), is an epiphytic plant that ranges from the coastal plain of the southeastern USA extending through Central America south to Argentina and Chile (Garth 1964). Spanish moss obtains its minerals and moisture from atmospheric conditions as it has no absorbing root system but instead possesses absorbing scales over the entire plant. It is best adapted to well-lighted, moist habitats and requires high relative humidity and regular rains in order to sustain optimal growth. It has a scorpioid dichotomous growth pattern. Growth of the plant is proportional to visible solar radiation, and more plants will be found on the most exposed areas of the tree (Garth 1964). Spanish moss flowers between mid-Apr and early Jun in Georgia, USA, but every plant does not flower every year.

Young & Lockley (1989) studied the diversity and seasonal abundance of species of arthropods inhabiting Spanish moss. No thrips were reported from the 2,600 arthropods collected. Whitaker & Ruckdeschel (2010) were interested primarily in the seasonal abundance of mites in Spanish moss, although the total number of thrips of all species was reported. Thrips were most abundant in the spring. More thrips were found in the Spanish moss that had fallen to the ground than that remaining on the trees.

*Corresponding author; E-mail: jef@ufl.edu

¹Suleyman Demirel University, Faculty of Agriculture, Department of Plant Protection, Isparta, Turkey
²University of Florida, 155 Research Road, Quincy, Florida 32351 USA

© 2015 — Florida Entomologist — Volume 98, No. 4 1179
(Liquidambar styriaciflua L.; Saxifragales: Altingiaceae) in Gadsden County, Florida, USA (30°32’52”N, 84°35’36”W); and oak and dogwood (Cornus florida L.; Caryophyllales: Cornaceae) in Leon County, Florida, USA (30°28’37”N, 84°21’30”W).

**SAMPLING SPANISH MOSS FOR THRIPS**

Sampling procedures were modified from Funderburk et al. (2015). Five samples of 3.8 L bags of moss were collected from each tree species monthly. Samples were collected between 2:00 and 4:00 p.m. Eastern Standard Time or Eastern Daylight Time. Samples were carried immediately to the laboratory and placed in a freezer for at least 24 h, after which time the samples were removed from the freezer and allowed to come to room temperature. Rinsing methods were derived from those used by Frank et al. (2004) on bromeliads and modified by Funderburk et al. (2015) for Spanish moss. Each bag was filled with water, the Spanish moss was agitated in the water, and the water was drained through a sieve to catch the thrips. This was repeated 4 more times. The contents were placed into 70% ethyl alcohol, and the thrips were separated from other materials under a microscope with 40× magnification. Thrips were mounted on slides for identification.

**VOUCHERS**

Keys used in identification included Mound & Marullo (1996) and Vierbergen et al. (2010). Comparisons were made with the Thysanoptera collections at the Natural History Museum, London, United Kingdom, and at the Systematic Entomology Laboratory, Beltsville, Maryland, USA. Voucher specimens are located at the collection at the North Florida Research and Education Center, University of Florida, in Quincy, Florida, USA.

**Results**

Ten thrips species belonging to 8 genera and 3 families were found in the Spanish moss samples (Table 1). The species were Heterothrips quercicola J. C. Crawford (Heterothripidae); Chilothrips pini Hood, F. bispinosa, Frankliniella tritici (Fitch), Neohydatothrips variabilis (Beach), Selenothrips rubrocinctus (Giard) (Thripidae); and Hoplandothrips pergandei Hinds, Liothrips ocellatus Hood, Karnyothrips hartii (Hood), and Karnyothrips melaleucus (Bagnall) (Phlaeothripidae).

In total, 651 adult thrips were collected. Species of Frankliniella and Karnyothrips were 83 and 16%, respectively, of the total adult thrips collected. The adults of F. bispinosa, F. tritici, K. hartii, and K. melaleucus were common species in the moss collected from all trees.

The total number of Frankliniella species larvae collected was less than 1% of the total number of Frankliniella adults collected (Table 2); therefore, the Spanish moss was not a host plant species used for breeding. The total number of Karnyothrips species larvae collected was about 55% of the total number of Karnyothrips adults collected (Table 2); therefore, the Spanish moss was utilized as habitat for breeding. The larvae of S. rubrocinctus were collected from Spanish moss on sweet gum during Nov, Jan, and Feb (Table 2).

**Discussion**

The same Frankliniella and Karnyothrips species commonly were collected from Spanish moss epiphytic on L. indica × fauriei in Leon County, Florida (Funderburk et al. 2015). The phytophagous F. bispinosa and F. tritici are the most common species of thrips in flowers in northern Florida (Paini et al. 2007). All Karnyothrips are predatory on small arthropods (Mound 2005).

The adults of F. bispinosa and F. tritici are highly dispersive in their behavior (Ramachandran et al. 2001) and, as a result, land on a wide range of substrates including plants that are not hosts. Frankliniella adults were collected in this study mostly during Apr and May, which coincides with the traditional period of greatest population abundance and movement on crop (Ramachandran et al. 2001) and uncultivated hosts (Paini et al. 2007). The adults may simply have used the Spanish moss as a landing place, or the Spanish moss may have served as an important feeding or behavioral resource.

Funderburk et al. (2015) previously reported that Spanish moss was habitat for reproduction of Karnyothrips. Small arthropods including Acari, Psocoptera, Collembolla, and Coccidae are common inhabitants of Spanish moss (Whitaker & Ruckdeschel 2010). This suggests an abundance of alternative prey for both adult and larval Karnyothrips. Insects in the order Thysanoptera are mainly phytophagous or mycophagous, and obligate predation is limited to only several lineages (Mound 2005).

Selenothrips rubrocinctus is common throughout the Neotropics feeding on the leaves and fruits of cacao, Theobroma cacao L. (Malvales: Malvaceae) (Fennah 1965). The species is collected rarely in northern Florida, although dense populations were recorded recently in Leon.

| Table 1. The number of male and female adults of each thrips species collected from five 3.8 L samples of Tillandsia usneoides epiphytic on trees of different species in Leon and Gadsden Counties, Florida. |
| --- | --- | --- | --- | --- |
| Thrips family & species | Quercus species | Liquidambar styriaciflua | Cornus florida | Carya illinoiensis |
| Heterothripidae | 1♀ | 1♂ | 0 | 0 |
| Heterothrips quercicola | 0 | 1♀ | 0 | 0 |
| Thripidae | 129♀, 1♂ | 88♀ | 103♀, 3♂ | 139♀ |
| Chilothrips pini | 36♀, 1♂ | 8♂ | 13♀, 1♂ | 10♀ |
| Frankliniella bispinosa | 2♀ | 0 | 0 | 0 |
| Frankliniella tritici | 0 | 1♀ | 0 | 0 |
| Neohydatothrips variabilis | 0 | 1♀ | 0 | 0 |
| Selenothrips rubrocinctus | 0 | 0 | 0 | 0 |
| Phlaeothripidae | 1♀ | 0 | 0 | 0 |
| Hoplandothrips pergandei | 3♂ | 0 | 0 | 0 |
| Liothrips ocellatus | 24♀ | 5♂ | 31♀ | 1♀ |
| Karnyothrips hartii | 17♀ | 8♂ | 4♀ | 4♀, 1♂ |
| Karnyothrips melaleucus | 215 | 113 | 155 | 166 |
County in Florida from *Rosa* species (Rosales: Rosaceae) in Feb 2013 (J. F., unpublished). The restless behavior of thrips can obscure biological significance. Many host-plant records represent nothing more than thrips finding places with no other biological significance (Mound 2013). There was no indication that Spanish moss was a host or even an important shelter for *L. occellatus*, *H. pergandei*, *N. variabilis*, *C. pini*, and *H. quercicola*. At most, a few adults of each of these species were collected over the course of the study, and no larvae of these species were collected.

In this study, the thrips fauna of Spanish moss epiphytic on *Quercus* species, *C. illinoiensis*, *L. styraciflua*, and *C. florida* were very similar to the results of the thrips fauna of Spanish moss epiphytic on *L. indica* reported by Funderburk et al. (2015). Two species of *Karnyothrips* were common reproducing year-round. The adults of *Frankliniella* were common during the spring.

### Acknowledgments

We thank Paul Brown (Senior Curator, The Natural History Museum, London, United Kingdom) and Laurence Mound (Australian National Insect Collection, Canberra, Australia) for assistance with Thysanoptera collections.

### References Cited

Fennah RG. 1965. The influence of environmental stress on the cacao tree in predetermining the feeding sites of the cacao thrips, *Selenothrips rubrocinctus* (Giard), on leaves and pods. *Bulletin of Entomological Research* 56: 333.

Frank JH, Sreenivasan S, Benshoff PJ, Deyrup MA, Edwards GB, Halbert SE, Hamon AB, Lowman MD, Mockford EL, Scheffrah RH, Steck GJ, Thomas MC, Walker TJ, Welbourn WC. 2004. Invertebrate animals extracted from native *Tillandsia* (Bromeliaceae) in Sarasota County, Florida. *Florida Entomologist* 87: 176-185.

Funderburk C, Funderburk J, Tyler-Julian K, Srivastava M, Knox G, Andersen P, Adkins S. 2015. Population dynamics of *Frankliniella bispinosa* (Thysanoptera: Thripidae) and the predator *Orius insidiosus* (Hemiptera: Anthocoridae) as influenced by flower color of *Lagerstroemia* (Lythraceae). *Environmental Entomology* 44: 668-679.

Garth RE. 1964. The ecology of Spanish moss (*Tillandsia usneoides*): its growth and distribution. *Ecology* 45: 470-481.

Mound LA. 2013. Homologies and host-plant specificity: recurrent problems in the study of thrips. *Florida Entomologist* 96: 318-322.

Mound LA, Marullo R. 1996. The Thrips of Central and South America: An Introduction (Insecta: Thysanoptera). Memoirs on Entomology, Volume 6. Associated Publishers, Gainesville, Florida, USA.

Paini DR, Funderburk JE, Jackson CT, Reitz SR. 2007. Reproduction of four thrips species (Thysanoptera: Thripidae) on uncultivated hosts. *Journal of Entomological Science* 42: 610-615.

Ramachandran S, Funderburk J, Stavisky J, Olson S. 2001. Population abundance and movement of *Frankliniella species* and *Orius insidiosus* in field pepper. *Agricultural and Forest Entomology* 3: 129-137.

Whitaker Jr JO, Ruckdeschel C. 2010. Spanish moss, the unfinished chigger story. *Southeastern Naturalist* 9: 85-94.

Young OP, Lockley TC. 1989. Spiders of Spanish moss in the delta of Mississippi. *Journal of Arachnology* 17: 143-148.

| Species                        | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| *Heterothrips quercicola*      | 0   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Chilothrips pini*             | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Frankliniella bispinosa*      | 1   | 0   | 0   | 0   | 211 | 234 | 12  | 5   | 0   | 0   | 0   | 0   |
| *Frankliniella tritici*        | 20  | 11  | 1   | 0   | 13  | 16  | 4   | 0   | 0   | 0   | 0   | 8   |
| *Frankliniella species larvae* | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Neothydatothrips variabilis*  | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Selenothrips rubrocinctus*     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Selenothrips larvae*          | 0   | 6   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 30  |
| *Hoplandrothrips pergandei*    | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Liothrips accellatus*         | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| *Karnyothrips harti*           | 0   | 0   | 0   | 4   | 1   | 24  | 11  | 7   | 13  | 4   | 7   | 5   |
| *Karnyothrips melaleucus*      | 4   | 1   | 1   | 0   | 0   | 4   | 2   | 3   | 4   | 2   | 9   |
| *Karnyothrips larvae*          | 9   | 3   | 1   | 1   | 5   | 1   | 22  | 2   | 4   | 2   | 6   | 6   |

Table 2. The number of adult and larval thrips of each species collected monthly between Dec 2011 and Nov 2012 from five 3.8 L samples *Tillandsia usneoides* in Leon and Gadsden Counties, Florida.