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STATES: DISTRIBUTION AND REVIEW OF BIOLOGY**

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## GYNAIKOTHRIPS UZELI (THYSANOPTERA: PHLAEOTHRIPIDAE) IN THE SOUTHEASTERN UNITED STATES: DISTRIBUTION AND REVIEW OF BIOLOGY

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In 2003, an exotic species of thrips, *Gynaikothrips uzeli* Zimmerman (Thysanoptera: Phlaeothripidae) was reported from infested leaf galls on weeping fig, *Ficus benjamina* (Moraceae), in Florida. It was first reported from five counties in Florida (Miami-Dade, Broward, Collier, Orange and Palm Beach). Later in 2003, Highlands County was added to the Florida records. Collections of this species were also made in Alachua, Brevard, Clay, Duval, Flagler, Hillsborough, Lake, Lee, Manatee, Martin, Monroe, Pinellas, Santa Rosa, and Volusia counties in Florida in 2004 (Fig. 1).

In the United States *Gynaikothrips uzeli* was not thought to occur outside of Florida until leaf galls and adults were collected on 5-X-2004 from a containerized *Ficus benjamina* in Long Beach, Harrison County, MS by D. Held. From October 2004 to January 2005, twenty additional collections of live *G. uzeli* on galled weeping fig were made in Mississippi in Harrison, Hancock, George, Lamar, and Pearl River counties; from Alabama in Mobile and Baldwin counties; and in Louisiana from Washington and St. Tammany parishes. In addition, this species was also collected from an unidentified *Ficus* sp. in Nashville, TN (Davidson County). Dead *G. uzeli* were collected from galled *F. benjamina* in Mississippi in Desoto and Jackson counties. Most collections of thrips made in Mississippi were coincident with recent shipments of *Ficus* from nurseries in central and southern Florida. However, two locations in Mississippi where *G. uzeli* was collected had not received plant material from Florida in 2003 or 2004. Similarly, one plant infested in 2004 with *G. uzeli* in Mobile County (AL) was isolated from other *Ficus*. These examples suggest that populations of thrips were already established outside of Florida, or that its introduction into Florida was coincident with other, previously undetected sites

in the southeast. The distribution map (Fig. 1) summarizes all reported occurrences of *G. uzeli* in the southeast United States as of March 2005.

The biology of *G. uzeli* is poorly understood. However, a related species, Cuban laurel thrips, *Gynaikothrips ficorum* (Marchal), has been more widely studied, and is widespread throughout tropical and sub-tropical areas of the southeastern U.S. and California. Both species are native to Southeast Asia including Taiwan, China, and India (Anathakrishnan 1978; Mound et al. 1995; Mound & Marullo 1996). The only reported difference between these two species is the length of the pronotal posteroangular pair of setae (Mound et al. 1995). A more practical, but less accurate, way to distinguish *G. uzeli* from Cuban laurel thrips is by host plant association. Mound et al. (1995) suggests that *G. uzeli* is the primary gall maker (i.e., leaf folder) on *F. benjamina*, whereas *Gynaikothrips ficorum* is the primary gall maker (i.e., leaf roller) on *Ficus microcarpa*. *Ficus benjamina* is the only plant on which *G. uzeli* has been reported to successfully complete its life cycle (S. Nakahara, personal communication).

Newly-formed galls on *F. benjamina* are dominated by *G. uzeli*. As galls age, other thrips including gall makers (e.g., *G. ficorum* and *Liothrips* spp.) and predatory thrips (e.g., *Androthrips* sp.) inhabit these galls as inquilines (Mound et al. 1995). Additional inquilines in galls formed by *G. ficorum* include phytophagous coccids (e.g., citrus mealybug, *Planococcus citri* Risso), whiteflies (Aleyroididae), predatory mites, hemipterans, chrysopids, and parasitic hymenopterans (Tawfik 1967). Leaf galls formed by *G. uzeli* collected from *F. benjamina* plants in MS contained nymphs of the citrus mealybug, brown soft scale (*Coccus heperidum* L.), and Madeira mealybug (*Phenacoccus maderiensis* Green). *Ficus benjamina* is also a host for pink hibiscus mealybug, *Maconel-*

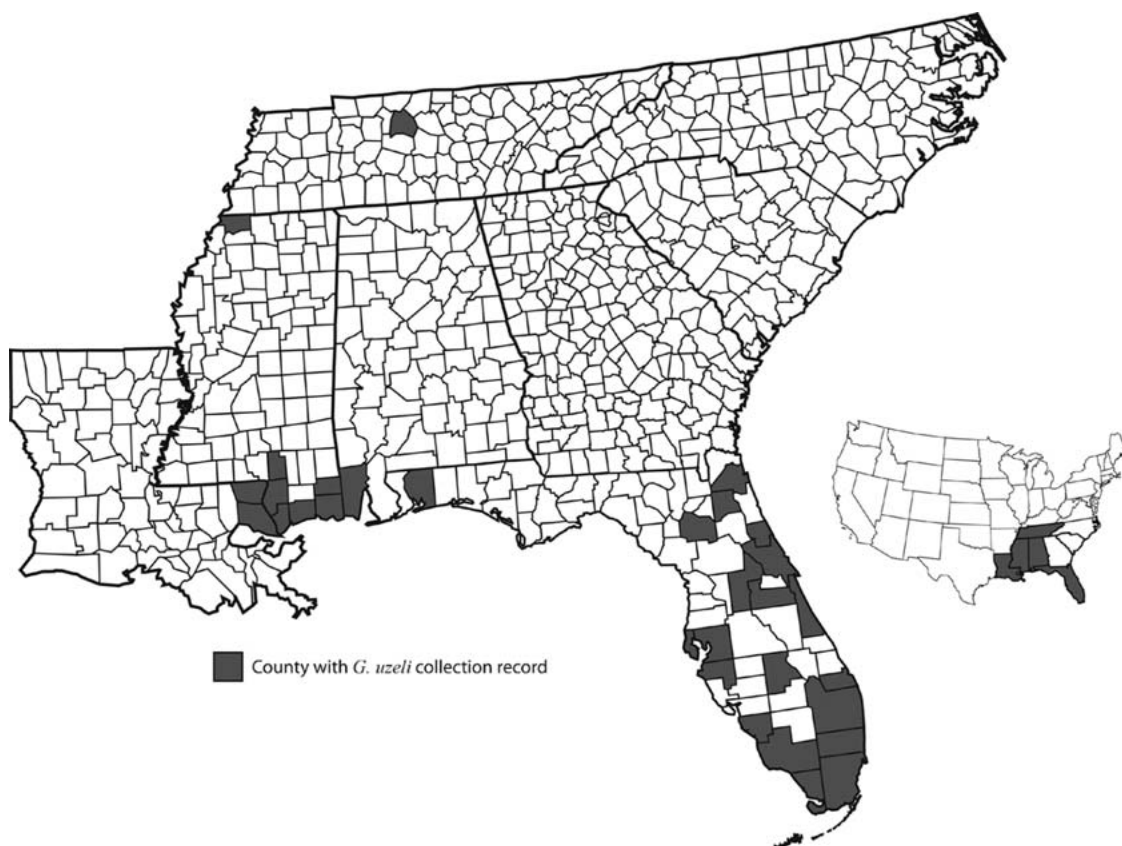


Fig. 1. Known distribution of *Gynaikothrips uzeli* in the southeastern United States.

*licoccus hirsutus* (Green). Pink hibiscus mealybugs and other exotic pests could be inadvertently transported out of Florida in *G. uzeli* leaf galls.

Documented natural enemies of *G. uzeli* have been collected in association with these galls. Galls from *F. benjamina* plants in AL and MS, made by *G. uzeli*, yielded predators such as lacewing larvae (*Chrysoperla* sp.), a minute pirate bug (*Montandoniola moraguesi* Puton), and several unidentified spiders. Also, the eulophid wasp, *Thripastichus gentilei* (del Guercio), imported as a biological control of *G. ficorum* (LaSalle 1994) has been collected from mummies of *G. uzeli* inside leaf galls taken from plants in Tennessee, Alabama, and Mississippi.

*Montandoniola moraguesi* was introduced to Hawaii from the Philippines in 1964, and to California from Hawaii in 1965 for control of the Cuban laurel thrips (Clausen 1978; Henry 1998). However, no records of successful establishment of *M. moraguesi* in California have been reported (Paine 1992). This predator has been established in Florida on plantings of *Ficus* infested with thrips (Dobbs & Boyd 2006). *Thripastichus gentilei* (Hymenoptera: Eulophidae) is a parasitoid that specializes on phlaeothripine thrips, espe-

cially *Gynaikothrips* spp., *Hoplothrips* sp., and *Liothrips* spp. (LaSalle 1993). The combination of the anthocorid predator and the parasitoid could possibly keep populations of *G. uzeli* at low numbers. Collections of both *M. moraguesi* and *T. gentilei* are new species records for Mississippi, Alabama, and Tennessee.

Entomopathogens were not observed inside galls from any field collection. The only fungus observed was on thrips reared in closed containers inside an environmental chamber. It was a white fungal growth found on dead *G. uzeli* inside leaf galls. These dead thrips appeared to be adhered to the leaf by the fungus. Bennett (1965) reported that some dead *G. ficorum* found inside field-collected galls were covered with a white fungal mycelium, however this fungus was not identified. Live thrips in these same galls did not become infected, nor could an infection be induced when dead, infected thrips were placed in galls with healthy thrips (unpublished data). Based on this, the unidentified fungus is likely saprophytic.

Thrips reported from Tennessee were collected by F. Hale (Univ. of Tennessee). Thrips collected in Long Beach, Mississippi and in Nashville, Tennessee were confirmed as *G. uzeli* by G. B. Ed-

wards. Homopteran gall inquilines were identified by G. Hodges (Florida Dep. Agric. and Consumer Serv.). Voucher specimens of *G. uzeli* and *T. gentilei* were deposited in the Mississippi Entomology Museum, Starkville. Jianzhong Sun, Jack Reed, and Christine Coker (Mississippi State University) provided helpful comments on an earlier draft of this manuscript. This paper is No. J-10726 of the Mississippi Agricultural and Forestry Experiment Station.

#### SUMMARY

Leaf galls on *Ficus benjamina* containing immature and adult *Gynaikothrips uzeli* were collected from containerized plants in the landscape and at retail outlets in Mississippi, Louisiana, Tennessee, and Alabama. This thrips, first reported in 2003 on weeping figs in south Florida, and certain associated natural enemies appear to be spreading across the southeast through movement of infested plants.

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