

Scientific Note: Insects associated with *Guettarda scabra* in Everglades National Park, Florida

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ABSTRACT

Guettarda scabra leaves are consumed by a variety of moth caterpillars, some with adults that visit the flowers and may serve as pollinators. Flower-opening is hastened by eager flower-flies, and during the night the flowers are visited by hawk moths (Sphingidae); in the morning they are visited by butterflies.

Key words: butterflies, floral visitors, flower flies, herbivores, moths, pine rocklands, pollinators, velvetseed

In pine rocklands of the Everglades, one of the most abundant and conspicuous woody plants is the rough-leaved velvetseed, *Guettarda scabra* (L.) Vent. (Rubiaceae). Though plants reach reproductive size at 1 m or less in height, they can grow to 6 m in hardwood hammocks (Koptur and Garcia 2017). Pine rockland *G. scabra* plants bear many leaves that mature to be tough and small in the bright sun of the pine rockland, whereas their counterparts in hammocks produce fewer leaves that are larger and softer (Koptur and Garcia 2017). The plants are deciduous, and most individuals spend a month or more leafless, though some retain their old leaves while producing new leaves, then dropping the older ones (Koptur unpublished data). The species was categorized as “tropical summer-flowering” (Tomlinson 1980), and plants in Everglades National Park begin blooming in late May, with the last individuals finishing flowering in July; peak flowering is in June (Loope 1980, Gunderson et al. 1983). In studying the floral biology and reproduction of these plants, in pine rocklands of Long Pine Key in Everglades National Park, we encountered a number of insects associated with the flowers, as well as the foliage, of *G. scabra*.

Our observations showed that *Guettarda scabra* flowers open late in the afternoon, becoming fully open to visitors by dusk (Richards and Koptur 1993). With their sweet fragrance, and their pinkish-white flowers with long corolla tubes, we expected to find them visited by moths. As we prepared for our evening observations, we were surprised to note some large flies that lit upon the slightly open buds, prying the corolla lobes open to access their pollen! The fly was determined to be the Mexican cactus fly, *Copestylum mexicanum* (Macquart) Syrphidae [det. H. Weems (SK #53)], and in their eagerness for pollen they hastened the opening of many flowers.

The sun set between 6:30 and 7 pm, and we watched for over an hour until we saw the first hawkmoth flower visitors. Between 8:30 and 10:30 pm, we observed many visitors to the flowers (Table 1). With a camera set up near large groups of open flowers, we were able to photograph three different kinds of hawkmoths, but it is not possible to determine their species from the photos (Figure 1 A, B). At the time the photos were taken, we were not able to catch any hawkmoths with hand-nets, but on subsequent evenings we caught two Sphingidae species that had visited flowers: *Perigonia lusca bahamensis* (Clark), and *Xylophanes tersa* (L.). The *tersa* sphinx caterpillars use *Morinda royoc* as host plant, but we found and reared half-blind sphinx (*Perigonia lusca*) larvae on *Guettarda scabra* (Figure 1 C, D), as well as on *Ilex krugiana* (Tuttle 2007). Neither hawkmoth caterpillars nor evidence of their feeding were seen on *Guettarda scabra* foliage within six months

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Received 4 October 2019; Accepted 20 April 2020

Table 1. A preliminary list of insects associated with *Guettarda scabra* in Everglades National Park, Homestead, Florida.

Order/Family	Latin name	Common name	Observed interaction
Diptera/Syrphidae	<i>Copestylum mexicanum</i>	Flower fly	Prying open buds prior to evening opening time
Hymenoptera/Vespidae	<i>Mischocyttarus sp.</i>	Paper wasp	Nectar robber?
Lepidoptera/Erebidae	<i>Seirarctia echo</i>	Echo moth	Leaf feeding (larvae)
	<i>Spilosoma virginica</i>	Yellow wooly bear/ Virginia tiger moth	Leaf feeding (larvae)
	<i>Pyrrharctia Isabella</i>	Banded wooly bear/ Isabella tiger moth	Leaf feeding (larvae)
Lepidoptera/Nymphalidae	<i>Agraulis vanillae</i>	Gulf fritillary butterfly	Flower visitor (adult)
Lepidoptera/Sphingidae	<i>Perigonia lusca bahamensis</i>	Half-blind sphinx moth	Flower visitor (adult) Leaf feeding (larvae)
	<i>Xylophanes tersa</i>	Tersa sphinx moth	Flower visitor (adult)

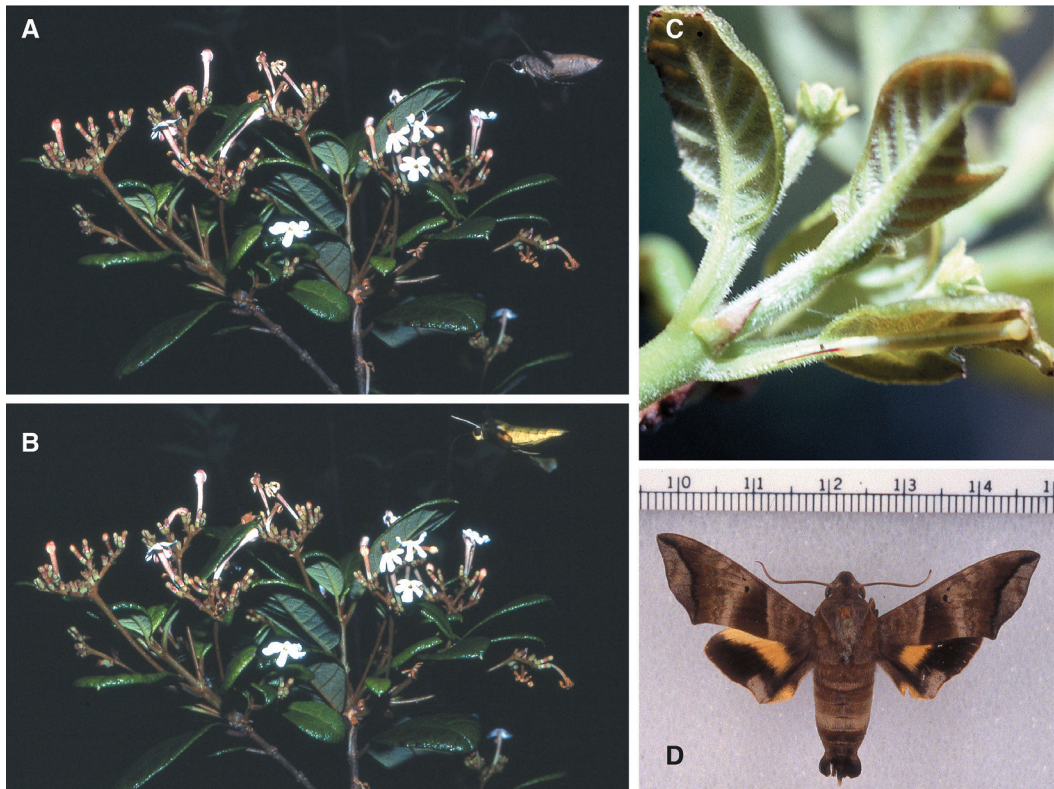


Figure 1. A and B: Hawkmoths visiting flowers of *Guettarda scabra* (spp. indet.); **C:** half-blind sphinx moth (*Perigonia lusca*) larva on *Guettarda scabra*; and **D:** adult reared from caterpillar on leaves of *G. scabra*.



Figure 2. The gulf fritillary (*Agraulis vanillae*) visiting flowers open in the morning.

following hurricane defoliation (Koptur et al. 2002), though substantial herbivory was observed before and after that time.

A flower of *Guettarda scabra* lasts a single day, and in the morning, the flowers that had opened the previous afternoon were still fresh-looking. Between 8 am and 10 am, a few of these were visited by butterflies seeking nectar (Figure 2), most commonly the gulf fritillary, *Agraulis vanillae* (L.). We observed that on a typical hot day, the flowers will turn brown in the late morning and fall or shrivel by afternoon; if it is rainy and overcast, they apparently stay fresh a few hours longer.

On some plants we observed holes pierced in the corolla tube, near the base, evidence of nectar robbing. We observed wasps (*Mischocyttarus* sp.) taking nectar from such holes but did not see them making the holes.

We encountered the larvae of several other Lepidoptera feeding on *Guettarda scabra* leaves in pine rocklands of Everglades National Park, all members of the Erebidae. Caterpillars of the echo moth, *Seirarctia echo* (J.E. Smith), have been observed feeding on leaves and flowers of many pine rockland plants, including cycads (Negron-Ortiz and Gorchov 2000) and palms (Koptur and Khorsand 2018), and ate the leaves of *G. scabra* as well; we reared adults on a diet of *G. scabra* leaves. Two other caterpillars were found eating the leaves: the Virginian tiger moth (or yellow wooly bear)—*Spilosoma virginica* (Fabricius); and the Isabella tiger moth (or banded wooly bear)—*Pyrrharctia isabella* (J.E. Smith). Known to use a wide variety of understory plants as hosts, neither have been recorded eating *G. scabra* previously.

Our studies on the pollination biology of *Guettarda scabra* have continued, and we hope to elucidate the roles of each group of flower visitors in the reproduction of this plant. Do adult echo and tiger moths visit flowers? What are the effects of nectar robbers on pollination and fruit set? Are the

pollinators exclusively the nocturnal hawkmoth visitors, or is pollen also transported by the flower flies as the flowers are opening, and by butterflies the morning after?

ACKNOWLEDGMENTS

For field assistance we thank Monica Parada, Chantal Goulborne, Alan Herndon, Jose Garcia Franco, and Yuria Cardel Sharp; and Maria Cleopatra Pimienta for constructive comments and continued interest. Scott Zona helped improve the figures. This work was completed under Everglades National Park Research Permits #870015 and #970000, for which we thank the National Park Service for access to study sites. This is contribution #374 to the Program in Tropical Biology at Florida International University.

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