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VISITORS TO RAM'S HORN, *PITHECELLOBIUM KEYENSE* BRITT. EX BRITT. AND ROSE, ON SAN SALVADOR ISLAND, THE BAHAMAS

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ABSTRACT

We made observations on individuals of *Pithecellobium keyense* (ram's horn) in flower on San Salvador during the following periods: late December 2002 to early January 2003, October 2007 and December 2010. Most of the visitors we saw belonged to the insect orders Hymenoptera and Lepidoptera. We observed nine species of visitors from seven families of Hymenoptera and sixteen species from seven families of Lepidoptera. Three species of bees were among the most common hymenopteran visitors; the megachilid *Megachile poeyi alleni* was the most commonly observed in 2002-3 (13 sightings), and was also seen in Dec. 2010; the anthophorid *Xylocopa cubaecola* was seen during all three observation periods, and the halictid *Agapostemon columbi* visited plants in 2002-3 and 2010. The scoliid wasp, *Campsomeris t. trifasciata* was the most common hymenopteran visitor in 2010. In most cases, only one individual of each lepidopteran species was observed. However, the arctiid moth *Empyreuma heros* was the insect most commonly observed in December 2010, visiting the plants in at least 22 of our observations. A second arctiid, *Composia fidelissima*, was also observed visiting the plants several times in December 2010. Two butterfly species, the lycaenid *Leptotes cassius*

and the pierid *Phoebis agarithe* were seen more than once. One dipteran, *Callitrega macellaria*, and two nectivorous birds, the bananaquit, *Coereba flaveola*, and the Bahama woodstar, *Calliphlox evelynae*, were occasional visitors.

INTRODUCTION

Pithecellobium keyense Britt. ex Britt. & Rose (Fabaceae) is a shrubby legume with white to pink floral heads and bipinnately compound leaves with two-four leaflets (Correll and Correll 1982). The species was reported to occur throughout The Bahamas by Correll and Correll (1982), except for the Cay Sal Bank and Mayaguana, Acklins and Crooked Island in the southern Bahamas, although they did report its occurrence on Great and Little Inagua. Elliott and Smith (2003) later reported the species from Acklins and Mayaguana. Correll and Correll (1982) also reported the species flowering throughout the year, although exact flowering time may vary between populations and years depending on local weather conditions (personal observations). The plants are animal-pollinated, and when in flower, they attract a number of insects and nectivorous birds. Here we report our observations on visitors to flowers of *P. keyense* on San Salvador Island, and compare these observations

with those made in the southern Bahamas (Elliott & Smith, 2003).

METHODS

We made observations on flowering *P. keyense* as follows: at two sites near the Gerace Research Centre, along the Queen's Highway above Graham's Harbour and at the top of the Centre's catchment basin between 28 December 2002 and 8 January 2003, along Jake Jones Road on 6 October 2007, and along the Queen's Highway opposite the Gerace Research Centre above Graham's Harbour on 10 December 2010. In each case observations were made between late morning and late afternoon. In the first study, all visits other than those by Lepidoptera were quantified; in the second, visitors to the plants were recorded but not quantified, and in the last, we attempted to record the species of visitors and quantify all their visits to the plants.

RESULTS

There were at least 79 visits to the plants during the three observation periods (Table 1). At least 35 visits were made by Hymenoptera and 42 by Lepidoptera; the counts also included at least one visit each by a dipteran, *Callitrega macellaria*, and by two different species of nectar-feeding birds, the bananaquit (*Coereba flaveola*) and the Bahama woodstar (*Calliphlox evelynae*). The most frequent hymenopteran visitor was the leaf-cutter bee, *Megachile poeyi alleni*, with 13 visits during the December/January study in 2002-3; the large carpenter bee, *Xylocopa cubaecola*, was seen during each set of observations, and the scoliid wasp, *Campsomeris trifasciata trifasciata*, was the most commonly seen hymenopteran during the December 2010 observations. The most commonly observed lepidopteran was the diurnal arctiid moth, *Empyreuma heros* (Fig. 1), which made at least 22 visits to the plants in December 2010.



Figure 1. *Empyreuma heros* Bates (Lepidoptera: Arctiidae) on *P. keyensis*. The species was a frequent visitor in December 2010.

DISCUSSION

Most of the visitors to *Pithecellobium keyense* were insects in either the orders Hymenoptera or Lepidoptera. Visits to flowering plants by insects might serve several functions. Feeding is frequently the major function of these visits; nectar, a concentrated solution of nutrients, mostly sugars, is a primary food source for many floral visitors, including most of the Lepidoptera and Hymenoptera (Michener, 1974; Smith, Miller & Miller, 1994) as well as nectivorous birds, such as the bananaquit and Bahama woodstar (Raffaele, *et al.*, 1998). While pollen may sometimes be a food for adult insects, it is often stored by nesting bees as a nutrient source for the larvae (Michener, 1974). Insects may visit flowers for other reasons as well. Adults of parasitic and predatory species may be searching for prey or hosts that feed on the flowers (Elliott & Elliott, 1991). Adults may be searching on the flowers for potential mates, or they may also be searching for egg-laying sites on the host plant. *Pithecellobium keyense* is listed by Smith *et al.* (1994) as a larval food plant for *Phoebis agarithe*; this butterfly visited the plants on San Salvador in Dec 2010 and on all three southern islands studied (Elliott & Smith 2003). No matter the purpose of the visit, as insect visitors move among flowers and among plants of the same species, they may inadvertently transfer pollen.

Relatively little is known about the reproductive biology of most Bahamian plants, including *P. keyense*, so it is important to compare floral visitors to plants on San Salvador with those observed visiting the species on other islands of the Archipelago. Species marked with an asterisk in Table 1 were also found visiting *P. keyense* on Acklins, Mayaguana and/or Great Inagua during observations in 2000 (Elliott and Smith, 2003). The large carpenter bee *Xylocopa cubaecola* was seen during all observation periods on San Salvador and the southern islands. The halictid bee *Agapostemon columbi* was also an important floral visitor to *Corchorus hirsutus* L. in plant communities on San Salvador and Great Inagua (Rathcke *et al.*, 2005). While we observed relatively few visits to *P. keyense* by this species on San Salvador, Elliott & Smith (2003) reported that on Acklins, individuals were too numerous to count continuously, and they reported a mean of sixteen individuals in 30-second sweeps. The arctiid moth, *Empyreuma heros*, which was the most common visitor to *P. keyense* in Dec 2010, was also relatively common on *P. keyense* on Acklins in 2000 (Elliott & Smith, 2003). This moth, described from Mayaguana (Mariguana) by Bates (1934), may be doubly protected from predators; it appears to be the mimic of a spider wasp, probably *Pepsis* (Weller *et al.*, 2004), and the highly toxic *Nerium oleander* is its larval food plant.

Several other species seen on *P. keyense* in the southern islands are congeneric with those visiting the plants on San Salvador. *Campsomeris bahamensis*, which occurred frequently on *P. keyense* on Acklins, was described from the southern Bahamas and is closely related to *C. trifasciata* (Bradley, 1964; Beaty, *et al.*, 2009). Two species of *Pachodynerus*, *P. scrupeus* and *P. cubensis bahamensis* occur on San Salvador. They are considered to be closely related, and Bequaert and Salt (1931) originally described *P. c. bahamensis* as a subspecies of *P. scrupeus*; it is now considered a subspecies of *P. cubensis* (Menke, 1986). These taxa are not so closely related to the two species that are common on the southern islands. *Pachodynerus linda*, which is endemic to Mayaguana (Menke, 1986), was seen

on *P. keyense* there, and *P. tibialis barbouri*, a Bahamian subspecies of *P. tibialis* which also occurs on Hispaniola, visited the plant on Great Inagua.

In conclusion, *Pithecellobium keyeynse* appears to be an important food source for a diverse group of insects on San Salvador Island, as well as other islands in the Bahamas. Additional work is needed to determine the pollination efficiency of floral visitors.

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Table 1. Visits to *Pithecellobium keyense* on San Salvador.

| Taxa | Observation Periods | | |
|---|---------------------|----------|----------|
| | Dec/Jan 2002-3 | Oct 2007 | Dec 2010 |
| Order: Hymenoptera (bees and wasps) | | | |
| F: Megachilidae | | | |
| <i>Megachile poeyi alleni</i> | 13 | - | 1 |
| F: Anthophoridae | | | |
| <i>Xylocopa cubaecola</i> * | 1 | x | 3 |
| F: Halictidae | | | |
| <i>Agapostemon columbi</i> * | 3 | - | 1 |
| <i>Dialictus sp.</i> | - | - | 1 |
| F: Vespidae | | | |
| <i>Polistes bahamensis picturatus</i> | - | x | - |
| <i>Mischocyttarus mexicanus</i> | - | x | - |
| F: Eumenidae | | | |
| <i>Pachodynerus cubensis bahamensis</i> | - | x | - |
| F: Scoliidae | | | |
| <i>Campsomeris trifasciata trifasciata</i> | - | - | 6 |
| F: Sphecidae | | | |
| <i>Stictia signata</i> | - | - | 2 |
| Order: Lepidoptera (butterflies and moths) | | | |
| F: Arctiidae | | | |
| <i>Eunomia latenigra</i> | x | - | - |
| <i>Empyreuma heros</i> * | - | - | 22 |
| <i>Composia fidelissima</i> * | - | - | 2 |
| F: Hesperidae | | | |
| <i>Phocides pigmalion batabanoides</i> | x | - | - |
| <i>Ephyriades brunnea</i> * | x | - | - |
| <i>Epargyreus zestos</i> | - | x | - |
| <i>Polygonus leo</i> | - | x | - |
| F: Lycaenidae | | | |
| <i>Leptotes cassius</i> | - | - | 4 |
| <i>Strymon acis</i> * | - | - | 1 |
| <i>Chlorostrymon maesites</i> | - | - | 1 |
| <i>Brephidium exilis isophthalamia</i> | x | - | - |
| F: Satyridae | | | |
| <i>Calisto herephile</i> | - | x | - |
| F: Papilionidae | | | |
| <i>Heraclides andraemon bonhotei</i> | - | x | - |
| F: Pieridae | | | |
| <i>Phoebis agarithe</i> * | - | - | 2 |
| F: Nymphalidae | | | |
| <i>Memphis intermedea</i> | - | - | 1 |
| <i>Junonia genoveva</i> | - | - | 1 |

Table 1, continued.

| Taxa | Observation Periods | | |
|---|---------------------|----------|----------|
| | Dec/Jan 2002-3 | Oct 2007 | Dec 2010 |
| Order: Diptera (flies) | | | |
| F: Calliphoridae | | | |
| <i>Callitrega macellaria</i> | 1 | - | - |
| Order: Passeriformes (passerine birds) | | | |
| F: Emberizidae | | | |
| <i>Coereba flaviola</i> * | 1 | - | - |
| Order: Apodiformes (hummingbirds) | | | |
| F: Trochilidae | | | |
| <i>Calliphlox evelynae</i> * | 1 | - | - |

* Indicates species that also visited *P. keyense* on the southern islands (Elliott & Smith, 2003); X indicates the species was seen on the plants during the observation period, but the number of visits was not quantified.