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BRIEF COMMUNICATION

# Bees visiting squash (*Cucurbita moschata* Duchesne ex Poiret) in southwestern Colombia (Hymenoptera: Apoidea)

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**Abstract.** This note records for the first time 12 bee species belonging to eight genera of Apidae and Halictidae as visitors of cultivated squash (*Cucurbita moschata* Duchesne ex Poiret: Cucurbitaceae) in the municipality of El Patía, Department of Cauca, southwestern Colombia. Two further bee species are also recorded from a crop visited in the Department of Huila.

## INTRODUCTION

Abundant pollinators as well as high numbers of floral visits appear to be essential for successful fruit development in cucurbit crops (Cane *et al*., 2011). Despite the increasing attention regarding the role of native bees as pollinators of squash in the Americas (*e.g*., Meléndez-Ramirez *et al*., 2002; Krug *et al*., 2010), little is known about the diversity of bees that visit or pollinate these crops in many regions. The purpose of this note is to document those species of bees visiting flowers of cultivated squash (*Cucurbita moschata* Duchesne ex Poiret) (Cucurbitaceae) in southwestern Colombia. To our knowledge, this is the first published record for the country. We hope to draw attention towards a better understanding of the bee-pollinated crops in the region.

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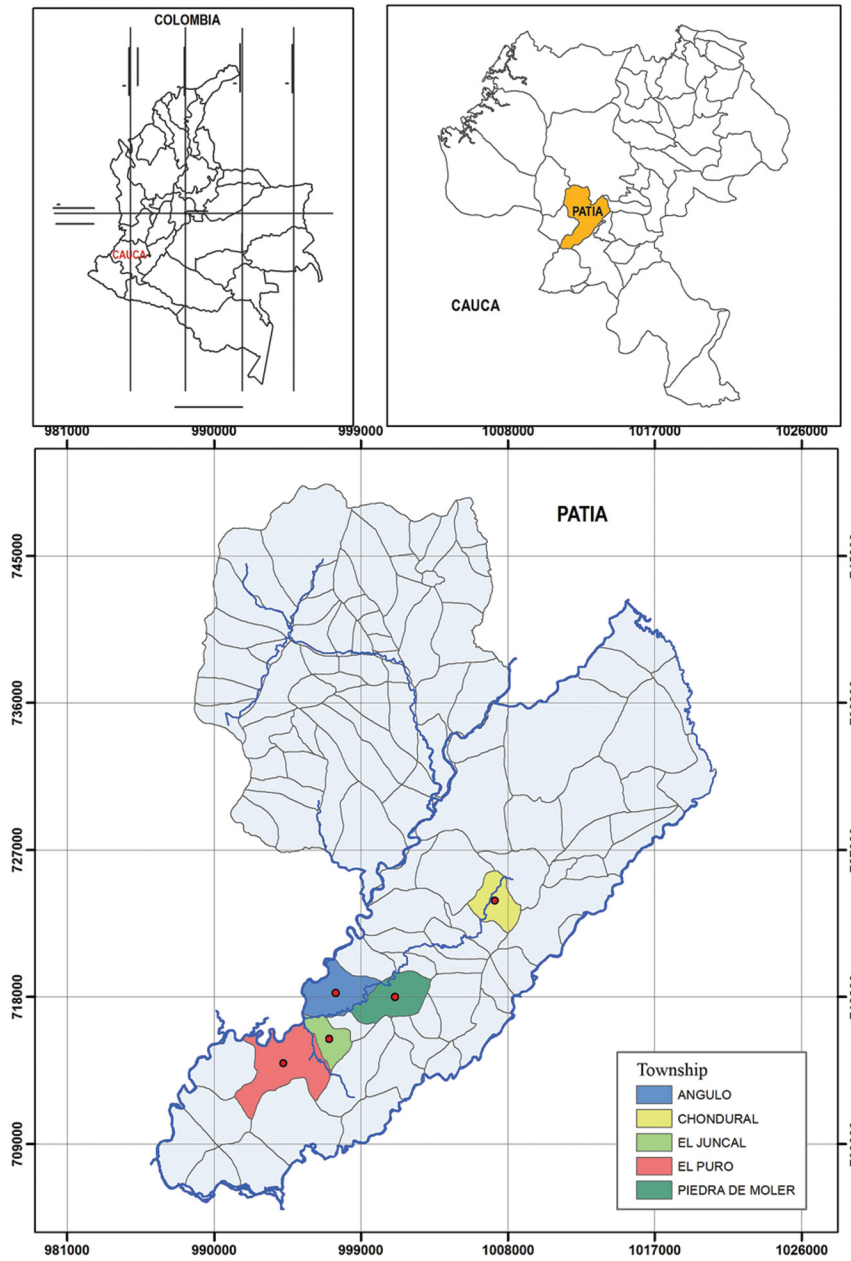


**Figure 1.** Study sites; clockwise from upper left: location of Department of Cauca in Colombia, municipality of El Patía in Cauca, and study areas indicated in red dots within each township.

## MATERIAL AND METHODS

Surveys were carried out on 3 and 4 June 2010 in crops located in five townships (Chondural, Angulo, Piedra de Moler, El Juncal, and El Puro) of the municipality of El Patía (910 m, 2º06'56''N, 76º59'21''W), Department of Cauca (Fig. 1). All collecting sites

**Figure 2.** Squash fields (*Cucurbita moschata* Duchesne ex Poiret) surveyed in the municipality of El Patía, Department del Cauca, southwestern Colombia. Left, study site at El Juncal associated with plantain. Right, study site at Angulo, the largest crop surrounded by grazing pastures and secondary vegetation.

are found within the valley of the Patía River, between the western and central Andean cordilleras. Most of the squash cultivated in Colombia is at a small scale (*e.g*., Tobar *et al*., 2010), and as in other areas of the country, the crops surveyed were part of small farms and were planted primarily for local consumption. The variety cultivated at the study area is the Unapal–Bolo Verde (Vallejo *et al*., 1999). The area of each crop varied among sites, from 100 $m^2$ in Chondural to 4500 $m^2$ in Angulo. Crops were separated from each other by at least 4 km and were located close to the farmers' houses, near paved roads. The surrounding vegetation also varied among sites; crops were either surrounded by grazing pastures or by sparse patches of low secondary vegetation (*i.e*., natural vegetation established after disturbance), except in El Juncal where squash was planted among plantain (Fig. 2). Bees were collected inside all flowers that were found open from 8:00 to 12:00 hours, except for the Western Honey Bee [*Apis* (*Apis*) *mellifera* Linnaeus], which could be easily identified by sight. Voucher specimens are deposited in the Departamento de Biología, Universidad del Cauca, Popayán, Colombia and the Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA.

## RESULTS AND DISCUSSION

In this brief survey, a total of 12 species were found visiting flowers of cultivated squash (Table 1). Some could not be identified at the species level because they belong to species-rich genera that lack modern revisions. Others, as in the case of *Tetragonisca angustula* (Laterille), are presumably composed of several undescribed and cryptic species. Thus, Colombian specimens identify as *T. angustula* are likely to represent new species as the true *T. angustula* might be restricted to Brazil (*cf*., Camargo & Pedro, 2007). Likewise, the specimens of *Eulaema* (*Eulaema*) *flavescens* (Friese) collected during this survey appear to belong to an undescribed species that is not only geographically isolated, but morphologically distinct (Hinojosa-Díaz *et al*., in prep.). Nearly all species reported herein were found at Angulo, the largest crop. *Apis mellifera* and *Peponapis* (*Peponapis*) *citrullina* (Cockerell) were found at all sites. The latter species was primarily recorded on the basis of males, which agrees with prior observations on other crops (Cane *et al*., 2011). Collecting both sexes of large orchid bees of the genus *Eulaema* Lepeletier de Saint Fargeau inside flowers of squash was rather unexpected,

**Table 1.** Bee species captured inside flowers of *Cucurbita moschata* Duchesne ex Poiret in the municipality of El Patía, Department del Cauca, southwestern Colombia. * = Specimens of *Apis* (*Apis*) *mellifera* Linnaeus were recorded but not collected. Localities: A = Angulo, C = Chondural, J = Juncal, Pi = Piedra de Moler, and Pu = Puro.

| Bee species | Sex | | Locality |
|---|---|---|---|
| | ♂ | ♀ | |
| **APIDAE** | | | |
| **Apini** | | | |
| *Apis* (*Apis*) *mellifera* Linnaeus | * | | A, C, J, Pi, Pu |
| **Ceratinini** | | | |
| *Ceratina* (*Calloceratina*) sp. | | 1 | A |
| **Eucerini** | | | |
| *Peponapis* (*Peponapis*) *citrullina* (Cockerell) | 33 | 1 | A, C, J, Pi, Pu |
| *Thygater* (*Thygater*) *analis* (Lepeletier de Saint Fargeau) | 1 | | A |
| **Euglossini** | | | |
| *Eulaema* (*Apeulaema*) *cingulata* (Fabricius) | 2 | 3 | A |
| *Eulaema* (*Eulaema*) nr. *flavescens* (Friese) | 1 | | A |
| *Eulaema* (*Apeulaema*) *nigrita* Lepeletier de Saint Fargeau | 1 | 2 | A |
| *Eulaema* (*Apeulaema*) *polychroma* (Mocsáry) | 2 | | A |
| **Meliponini** | | | |
| *Scaptotrigona* sp. | | 3 | C |
| *Tetragonisca* nr. *angustula* (Latreille) | | 2 | Pi |
| **HALICTIDAE** | | | |
| **Augochlorini** | | | |
| *Augochlora* sp. 1 | 1 | 2 | A, C |
| *Augochlora* sp. 2 | | 3 | C |

particularly because males are typically captured with baits; however, they have been reported visiting watermelon [*Citrullus lanatus* (Thunb.) (Cucurbitaceae)] in Mexico (Meléndez-Ramirez *et al*., 2002). A much higher diversity of bees associated with cultivated squash in Colombia is certainly expected once intensive surveys across the country are carried out. For example, the number of species reported here is half of the diversity of bees documented from a year of intensive surveys on squash in six localities in Brazil (Krug *et al*., 2010). Also, in central Colombia (Suaza, Huila), *Partamona peckolti* (Friese) and *Trigona amalthea* (Olivier) have been collected on squash flowers in addition to *P. citrullina*, and *T. amalthea* regularly visited flowers of squash in home gardens in the city of Popayán, Cauca (V.H. Gonzalez, pers. obs.).

Solitary bees of the genera *Peponapis* Robertson and *Xenoglossa* Smith (Apinae: Eucerini) are oligolectic on flowers of *Cucurbita* L., exhibiting behavioral and morphological adaptations for foraging on these plants (Hurd *et al*., 1971). *Peponapis citrullina* is the only squash bee known to occur in Colombia and has been believed to be widely distributed across the country (Hurd & Linsley, 1967). However, based on the localities listed by these authors, it seems that *P. citrullina* might be restricted to dry areas along the Magdalena and Cauca Rivers in central and western Colombia. If this is the

case, the species might also be found across the Caribbean region following areas with low precipitation and xerophytic vegetation. Such a distribution pattern is also exhibited by other bees such as *Anthidium* (*Anthidium*) *sanguinicaudum* Schwarz, *Melipona favosa* (Fabricius), and *Frieseomelitta pauper* (Provancher) that occur in similar habitats (Gonzalez *et al*., 2012). Unfortunately, except for the distribution records of *P. citrullina* provided by Hurd & Linsley (1967) and in this paper, no other specimen records are available for this species. Despite the limited observations presented here, this note contributes to the efforts of the Squash Pollinators of the Americas Survey (SPAS) in documenting the diversity of bees associated with this crop. We hope to draw more attention to the present species so that local biologists will begin documenting this bee fauna using the protocols suggested by SPAS (Cane, 2004).

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