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Source: Florida Entomologist, 99(3) : 580-582

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.099.0345

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Conotelus sp. (Coleoptera: Nitidulidae), a new insect pest of passion fruit in the Amazon Biome

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Passion fruit (*Passiflora* spp.; Passifloraceae) is native to the tropical Americas, and Brazil is the largest producer and consumer of this fruit. Brazil has numerous passion fruit species (Faleiro et al. 2005), and the area planted with this crop has been expanded widely (Gonçalves & Souza 2006). Furthermore, a wide variety of insects of economic importance use this plant as a host (Lunz et al. 2006), with lepidopteran larvae being considered the most important (Gallo et al. 2002). However, other insect pests exploit the crop (Benassi et al. 2012; Oliveira et al. 2014), and considering that the Amazon region is home to a wide diversity of *Passiflora* species (Koch et al. 2013), many species of insect in this region could adapt to passion fruit in cultivation and become a pest.

According to agricultural producers, losses due to attack from small beetles in passion fruit flowers can amount to 80%. Therefore, the objectives of this work were to determine what species are responsible for fruit production losses in the region of Zona da Mata of Rondônia, Brazil, to characterize the damage, and to assess what plant and climate factors influence population changes of this pest throughout the year.

Occurrence and population size of the pest were studied from Dec 2013 to Sep 2014 in passion fruit plants in the municipality of Rolim de Moura. The climate of the region is Aw in the Köppen classification, which is defined as an equatorial climate with variations to the tropical heat and humidity, a well-defined dry season (Jun to Sep), an average annual precipitation of 2,250 mm, and a relative humidity of around 85%.

Samples for the population fluctuation study were collected at 3 properties in the rural area of Rolim de Moura: Area 1 (11.7917167°S, 61.8663861°W), of 6,000 m^2; Area 2 (11.7038722°S, 61.7969028°W), of 4,410 m^2; and Area 3 (11.6170944°S, -61.7091167°W), of 2,160 m^2. Each area within the crop was divided into edge, middle, and center of the crop, and 10 flowers were collected in the morning by randomly walking in a straight line through each of the divided parts of the crop, in a collection area of approximately 200 m^2.

Adults were preserved in 70% alcohol. When present, the stigma, style, ovary, anthers, filament, petals, sepals, corolla, receptacle, and developing fruits were evaluated visually during floral development to characterize injuries. Numbers of insects were counted at each sample point, and temperature and relative humidity data were recorded.

The beetles were determined to the genus *Conotelus* (Coleoptera: Nitidulidae). The adult is approximately 4.0 mm in length, has a tapered body, and is black in color (Fig. 1a). The beetles attacked passion fruit flowers and lodged themselves in the sepals, petal, and corona, and perforated the sepals and ovary. They were observed feeding on developing fruits near to the peduncle, although they had a preference for the flowers (Fig. 1b).

Nitidulidae species commonly feed on decomposing fruit and fermenting juices of plants and fungi, but some live in flowers (Arnett Junior et al. 2002). *Conotelus* species are recorded from flowering *Monotagma plurispicatum* (Koern.) K. Schum. (Marantaceae) in the Amazon (Albuquerque 1974), cedrela fruits (*Cedrela odorata* L.; Meliaceae) in Argentina (Velasquez 1984), flowers of *Hibiscus* (Malvaceae) species in Australia (Lachance et al. 2001), and tomato and cloves in Minas Gerais, Brazil (Haro 2011).

The larvae remained in the sheltering bracts but they could move throughout the flower as they grew. Larvae were observed feeding on pollen, ovaries, and developing fruits. Dried flowers also harbored developing larvae and were sufficient to support a complete life cycle. Flowers and young fruit may be aborted. In heavy infestations, the beetles almost entirely destroyed the flower (Fig. 1c,d), and developing fruit became deformed and overly darkened. Wounds from feeding could serve as a gateway to opportunistic pathogens.

Reports from producers indicate that this beetle has been causing serious problems in passion fruit plantations in Rondônia for years. However, only recently has it become a limiting factor for passion fruit production and led some producers to eliminate the crop. The observations reported here, and those by Nishida (1956) concerning *Conotelus mexicanus* Murray in Hawaii, suggest that the use of insecticides for other pests may indirectly have led to an increase over time of the beetle populations due to selection.

Temperatures around 30 °C and high humidity, which are typical of the Amazon region, allowed beetles to develop throughout the entire observation period of 10 mo (Fig. 2). Monitoring of area 3 was discontinued due to low fruit productivity, which led the grower to abandon the crop. The largest populations occured when passion fruit is flowering, which apparently is related to the pollen-feeding habits of this species. Insect populations declined only when the numbers of flowers declined. However, passion fruit in the Amazon region flowers throughout much of the year, which allows the insect to develop throughout most of the year.

We thank "Coord. de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)" for financial support (Periódicos Capes) and Craig Rogers for correcting and editing the English of this manuscript.

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Fig. 1. Adults (a, b) of *Conotelus* sp. (Coleoptera: Nitidulidae) and damage (c, d) caused by this species in passion fruit flowers (*Passiflora edulis* f. *flavicarpa*).

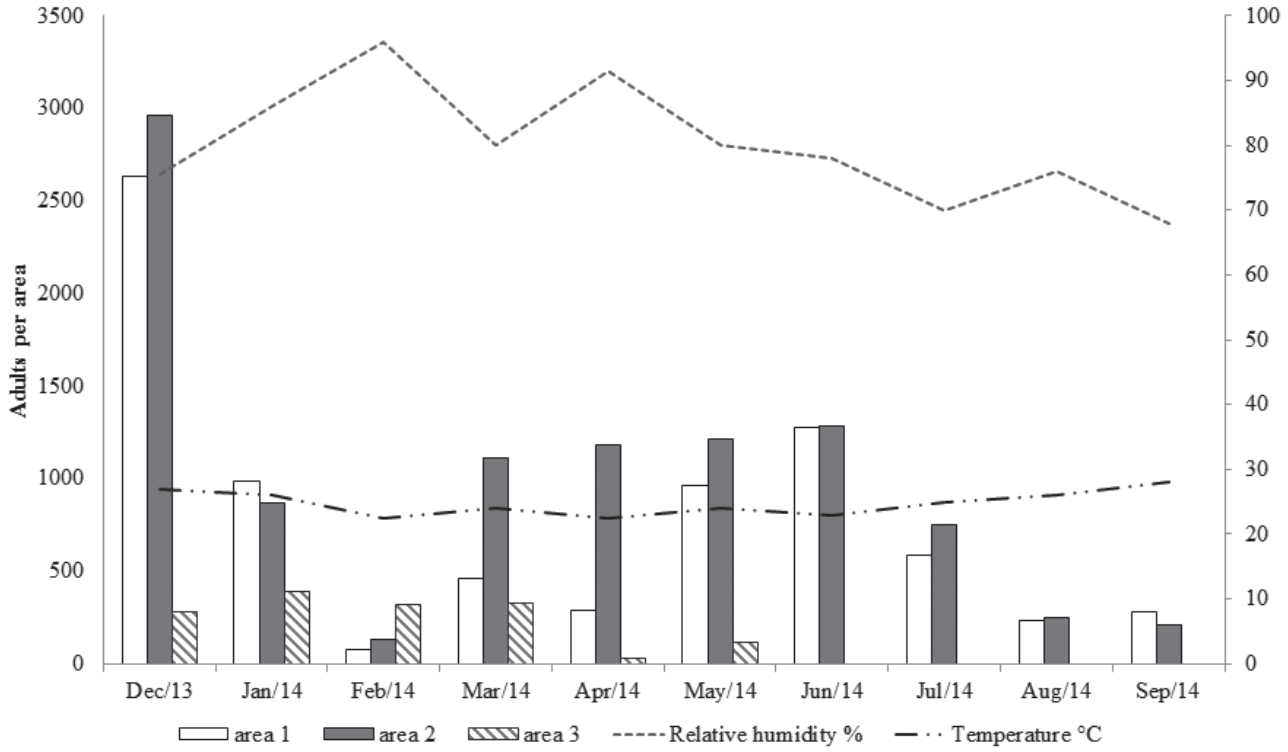


Fig. 2. Population fluctuations of *Conotelus* sp. (Coleoptera: Nitidulidae) adults in passion fruit (*Passiflora edulis* f. *flavicarpa*) plantations. Right Y-axis denotes temperature and relative humidity.

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Summary

Conotelus sp. (Coleoptera: Nitidulidae) is documented in passion fruit plantations in the state of Rondônia, Brazil, where producers have reported losses of approximately 80%. Damage is higher than that caused by traditional passion fruit insect pests, and there are no effective control methods. Flowering phenology is a key factor in insect attraction and recurrence. The beetles attack flowers, and a larval preference for pollen was shown. This insect can complete its life cycle in flowers on the ground. Damage characteristics, the distribution of the insect, changes in population size, and possible causes of outbreaks are reported.

Key Words: *Passiflora edulis*; beetle; population fluctuation

Sumario

Conotelus sp. (Coleoptera: Nitudilidae) está documentado en las plantaciones de maracuyá en el Estado de Rondonia, Brasil, donde los productores han reportado pérdidas de aproximadamente del 80%. El daño es mayor que la causada por las plagas tradicionales de plagas de maracuyá y no existen métodos eficaces de control. La floración fenología es un factor clave en la atracción y la recurrencia de insectos. Los escarabajos atacan las flores y las larvas demuestran una preferencia para el polen. Este insecto puede completar su ciclo de vida en las flores sobre el suelo. Se reportan las características de daño, la distribución del insecto, el cambio del tamaño de la población y las posibles causas de los brotes de infestación.

Palabras Clave: *Passiflora edulis*; escarabajo; fluctuación de población

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