

New records of thrips species on mango and natural enemies associated

Sidnéia Terezinha Soares de Matos¹, Daniel Júnior de Andrade²,
Renan Moisés Paneghini Zanata³, Emiliano Brandão de Azevedo¹, Élisson Fabrício Bezerra Lima⁴

Abstract - The mango tree (*Mangifera indica* L.), native to Asia, is expanding in Brazil. However, research related to phytophagous organisms and natural enemies associated with this fruit are scarce in the country. The aim of this work was to report new species of thrips-pest and natural enemies associated with mango tree inflorescence. The work was carried out in a Tommy Atkins mango orchard located in the municipality of Jardinópolis, São Paulo, Brazil. The arthropods found in malformed inflorescences were collected and identified. *Frankliniella gemina* Bagnall, *Frankliniella distinguenda* Bagnall (Thysanoptera: Thripidae) and *Haplothrips gowdeyi* (Franklin) (Thysanoptera: Phlaeothripidae) thrips-pest species were recorded for the first time associated with inflorescence in mango orchards. The predators were collected in association with the phytophagous thrips.

Index terms: Thysanoptera, pest, predators.

Novos registros de espécies de tripes em mangueira e inimigos naturais associados

Resumo - A mangueira (*Mangifera indica* L.), planta nativa da Ásia, encontra-se em expansão no Brasil. Entretanto, pesquisas relacionadas aos organismos fitófagos e aos inimigos naturais associados a essa frutífera são escassos no país. O objetivo deste trabalho foi relatar novas espécies de tripes e inimigos naturais associados às inflorescências de mangueira. O trabalho foi realizado em um pomar de mangueiras Tommy Atkins localizado no município de Jardinópolis, São Paulo, Brasil. Os artrópodes encontrados nas inflorescências malformadas foram coletados e identificados. As espécies *Frankliniella gemina* Bagnall, *Frankliniella distinguenda* Bagnall (Thysanoptera: Thripidae) e *Haplothrips gowdeyi* (Franklin) (Thysanoptera: Phlaeothripidae) foram registradas pela primeira vez associadas à inflorescência de mangueira. Os predadores foram coletados em associação com os tripes fitófagos.

Termos para indexação: Thysanoptera, praga, predadores.

Corresponding author:

sidimatos@yahoo.com.br

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¹PhD students in agricultural entomology, Universidade Estadual Paulista, Faculdade de Ciências Agrárias e Veterinárias – Jaboticabal-SP, Brasil. E-mails: sidimatos@yahoo.com.br ORCID 0000-0002-0223-9504, emilianogpi@yahoo.com.br ORCID 0000-0002-9037-2742

²Professor, Universidade Estadual Paulista, Faculdade de Ciências Agrárias e Veterinárias – Jaboticabal-SP, Brasil. E-mail: danieldwv@yahoo.com.br ORCID 0000-0003-0054-879X

³Graduate student in agronomy, Universidade Estadual Paulista, Faculdade de Ciências Agrárias e Veterinárias – Jaboticabal-SP, Brasil. E-mail: renanzanata20@gmail.com ORCID 0000-0002-3448-0335

⁴Professor, Universidade Federal do Piauí, Campus Amílcar Ferreira Sobral, Floriano-Piauí, Brasil. E-mail: elissonfabricio@hotmail.com ORCID 0000-0002-6361-0928

Mango tree (*Mangifera indica* L.) (Anarcadiaceae) is native to Asia. Of pleasant aroma and flavor, fruits are consumed in natura or processed in the manufacture of sweets, juices or ice creams (PITCHAON, 2011). Brazil was the first country in the Americas to grow this plant, firstly introduced by the Portuguese in Rio de Janeiro in the 16th century, expanding to the whole country. Brazil currently stands out as the seventh largest mango producers, and most of the production is concentrated in the states of Bahia (23%), Pernambuco (23%) and São Paulo (18%) (MAIA et al., 2016; IBGE, 2016).

In recent years, there has been a great increase in the consumption of mango in the domestic and foreign markets, which has contributed to an increase in the world fruit production. Thus, mango cultivation has gradually assumed a prominent position in the country, considerably increasing the number of planted trees (OLIVEIRA et al., 2002; IBGE, 2016).

During their development, mango trees can be attacked by various pests, which can affect growth, development and productivity. Among pests, thrips (Thysanoptera) stand out among the most important pests associated with mango trees, attacking leaves, inflorescences and fruits (BARBOSA; PARANHOS, 2005). The tissues of plants with injuries caused by these organisms have silver coloration that can evolve to ferruginous appearance (PEÑA, 2004). According to BRANDÃO and BOARETTO (2002), both immatures and adults are “scraper-suckers” and can feed on pollen, sap of petals and ovaries of flowers, which cause the wilt of inflorescences and decrease fructification.

Several thrips species have been recorded in mango culture worldwide. In Malaysia, *Thrips hawaiiensis* (Morgan), *Scirtothrips dorsalis* (Capuz), *Frankliniella schultzei* (Trybom) and *Megalurothrips usitatus* (Bagnall) have been reported (ALIAKBARPOR.; RAWI, 2012); in Israel, *Frankliniella occidentalis* (Pergande) (WYSOKI et al., 1993); in India, *Thrips palmi* Karny, *Thrips hawaiiensis* (Morgan) and *Thrips subnudula* (Karny) (KRISHNAMOORTHY; VISALAKSHI, 2012); *Frankliniella bispinosa* (Morgan) and *Frankliniella kelliiae* Sakimura, in the United States (PEÑA, 1998) and, in Australia, *Selenothrips rubrocinctus* Giard (PENG; KRISTIAN, 2004). In Brazil, *S. rubrocinctus*, *F. schultzei*, *Frankliniella gardeniae* Moulton and *Frankliniella brevicaulis* Hood species have been reported (BARBOSA et al., 2005).

In Brazil, information about thrips and natural enemies associated with this plant is still scarce (BARBOSA et al., 2005). The knowledge about the organisms that occur in the mango culture is of fundamental importance for the establishment of integrated pest management programs, as it enables the identification of pest insects and natural enemies, and contributes to the understanding of the relationships among species in the agroecosystem (DUARTE et al., 2013). Therefore, this study aimed to report the occurrence of thrips species associated with

inflorescence malformation in mango trees and their natural enemies.

The study was carried out in a mango orchard (Tommy Atkins cultivar) located at the municipality of Jardinópolis, São Paulo, Brazil (20°55'28"S, 47°55'45"W) in September 2017. The experimental area 1,552 mm annual average length and Dark Red Latosol soil. The climate of the region, according to classification of Köeppen, is of type Cwa, subtropical, relatively dry in the winter, with rains in the summer. The orchard plants were 30 years old, approximately seven meters high and planted in 14 m x 12 m spacing. Sampling was performed by means of the collection of inflorescences in 30 randomly selected plants. Inflorescences were packed in paper bags and sent to laboratory belonging to the São Paulo State University - Faculty of Agrarian and Veterinary Sciences, Jaboticabal Campus (UNESP / FCAV).

The presence of thrips and natural enemies (mites and insects) in inflorescences was verified using a stereomicroscope. The organisms observed were collected with a single-wire brush. After this initial screening, inflorescences were shaken on white paper to verify the presence of other arthropods. Subsequently, the counting of thrips and other arthropods collected was carried out. Specimens were later packed in vials containing 70% alcohol.

Thrips and mites found were slide-mounted for identification (MOUND; MARULLO, 1996; KRANTZ; WALTER, 2009). The other insects were mounted on entomological pins and identified under stereomicroscope.

Our work reports new records of three thrips species for mango in Brazil, namely *Frankliniella gemina* Bagnall, *Frankliniella distinguenda* Bagnall and *Haplothrips gowdeyi* (Franklin) (figure 1). In addition, *F. gardeniae* species (Table 1) was also found. The average of thrips found per inflorescence was 20 adults and 40 nymphs. In relation to natural enemies, *Harmonia axyridis* (Pallas), *Cycloneda sanguinea* (Linnaeus), *Hippodamia convergens* Guérin-Meneville (Coleoptera: Coccinellidae), *Orius insidiosus* (Say) (Hemiptera: Anthocoridae), *Proctolaelaps bickleyi* Bram and *Iphiseiodes zuluagai* Denmark & Muma (Acari: Phytoseiidae) were found in inflorescences (Table 1).

The occurrence of *F. gardeniae* was reported in citrus, guava, soybean, grape and avocado (HODDLE et al., 2002; CAVALLERI et al., 2006; LIMA et al., 2013a; MOREIRA et al., 2014). *Haplothrips gowdeyi* was recorded in nectarine flower, bean, soybean, fava, rice, coffee and watermelon (HICKEL; DUCROQUET 1998; LIMA et al., 2013b; COSTA et al., 2015). *Frankliniella gemina* has already been reported in rose bush, grape and various ornamental plants (MOREIRA et al., 2014). On the other hand, the species *F. distinguenda* is little reported in the literature.

In this mango orchard approximately 88.9% of the inflorescences presented malformation and high density of thrips (Figure 1). This resulted in a strong loss of production. Therefore, our study reports new records of

three species of thrips for the mango tree, *F. gemina*, *F. distinguenda* and *H. gowdeyi*, and gathers information for future research, as damage potential and control measures, as well as their interactions with natural enemies.

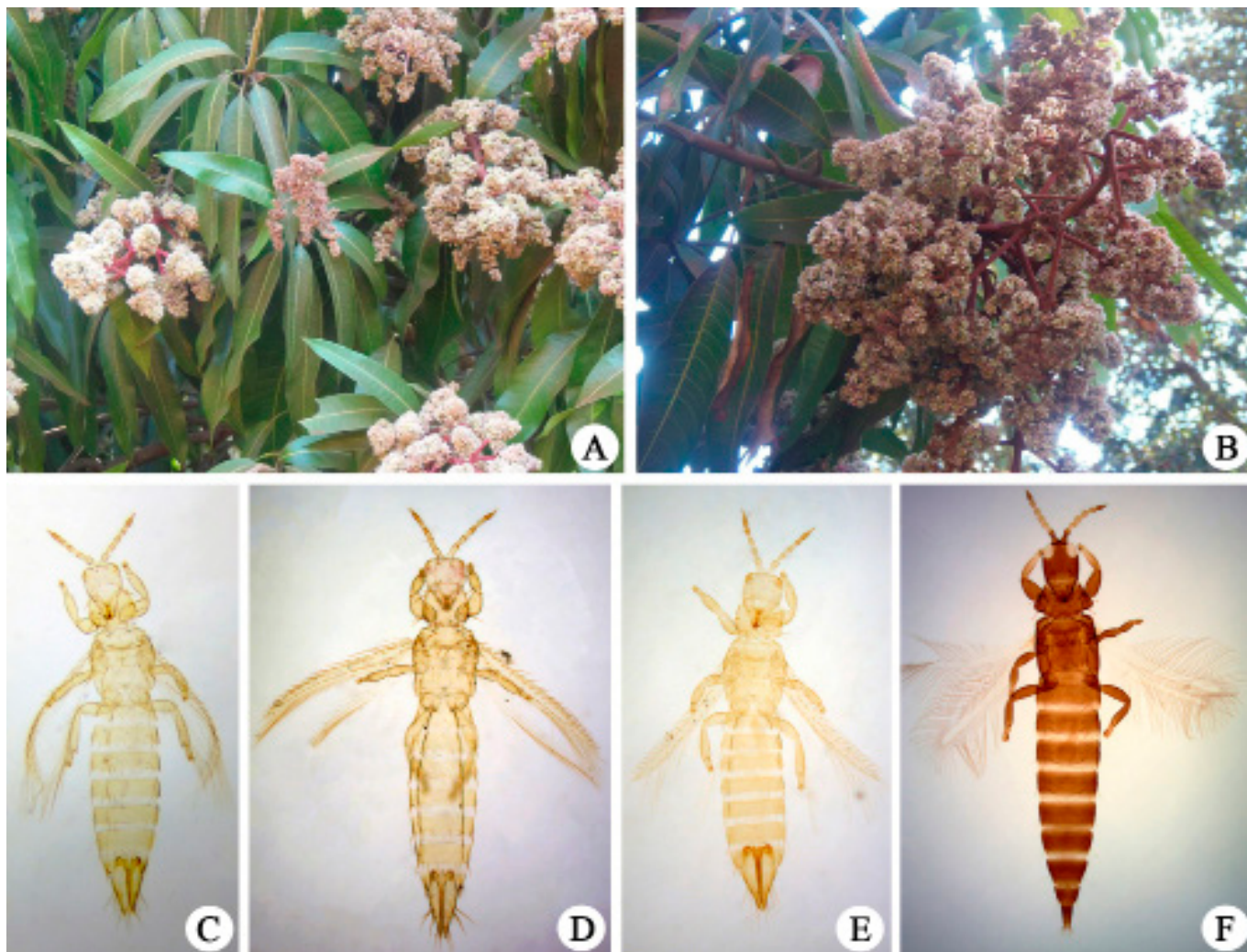


Figure 1. Thrips species and injuries on Tommy Atkins mango (*Mangifera indica*) trees in Jardinópolis, São Paulo state, Brazil. A. mango tree inflorescences with initial symptoms of floral malformation; B. highly infested by thrips and black color (advanced symptom) in the same mango orchard; C. *Frankliniella distinguenda*; D. *Frankliniella gardeniae*; E. *Frankliniella gemina*; F. *Haplothrips gowdeyi*.

Table 1. Thrips and natural enemies associated with floral malformation on Tommy Atkins mango trees. Jardinópolis-SP, Brazil, 2017.

Identified species	Feeding habit
Thysanoptera	
Thripidae	
<i>Frankliniella distinguenda</i> Bagnall	Phytophagous
<i>Frankliniella gardeniae</i> Moulton	Phytophagous
<i>Frankliniella gemina</i> Bagnall	Phytophagous
Phlaeothripidae	
<i>Haplothrips gowdeyi</i> Franklin	Phytophagous
Coleoptera	
Coccinellidae	
<i>Harmonia axyridis</i> (Pallas)	Predator
<i>Cycloneda sanguinea</i> (Linnaeus)	Predator
<i>Hippodamia convergens</i> Guérin-Meneville	Predator
Hemiptera	
Anthocoridae	
<i>Orius insidiosus</i> (Say)	Predator
Acari	
Melicharidae	
<i>Proctolaelaps bickleyi</i> Bram	Predator
Phytoseiidae	
<i>Iphiseiodes zuluagai</i> Denmark & Muma	Predator

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