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Discovery of *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in blueberry fields of Michoacan, Mexico

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Blueberries are a group of several species of shrubs in the genus *Vaccinium* (Ericaceae) with dark-purple berries that are native to North America (Song & Hancock 2011). These fruits have received increasing attention in recent yr, because they have remarkable antioxidant capacity and essential nutrients (Huang et al. 2012). As a consequence, human consumption has increased and blueberry production has expanded, and it is at present an important crop worldwide (Rodríguez-Saona et al. 2019). The USA is the main consumer and, therefore, an attractive market for blueberry producing countries (FAOSTAT 2018).

Several regions of Mexico have ideal edaphic and climatic conditions to produce blueberries. Because it is near the main consumer, this provides Mexico with competitive advantages over other countries (Rivera & Blanco 2013). This has caused rapid growth of blueberry planting areas in the last decade in Mexico, growing from 402 ha in 2010 to 3,786 ha in 2018, with the states of Jalisco, Michoacan, and Sinaloa the main producers (SIAP 2019).

Compared with other perennial fruits, blueberries have relatively few insect pests. However, any damage inflicted by insects is so important that their management is a challenge for this prosperous industry, because many species feed on all parts of the plant, and some also are vectors of diseases (Rodríguez-Saona et al. 2019). A complex of several species of thrips is among the most important pests of this crop. Phytophagous thrips of blueberries are considered important because they feed on flowers, fruits, and leaves, causing important economic losses (Langille & Forsythe 1972; Haviland et al. 2009; Rhodes & Liburd 2011). Because the cultivation of blueberries in Mexico is relatively recent, there are no studies on thysanopterans of this crop.

In a first attempt to gather information on thrips associated with blueberries in Mexico, we performed a preliminary sampling in response to farmers' concerns after noticing the presence of thrips on damaged leaves. Samplings were conducted in Michoacan State in Jun 2019 on 10 selected commercial blueberry plots in 3 municipalities (Jacona, Tangancicuaro, and Zamora). Thrips were collected at random for 30 min per plot, covering approximately one-half ha. Blueberry leaves were shaken against a plastic tray to separate insects from leaves. Thrips were handled with a camelhair brush, and placed in vials with 70% ethyl alcohol. Once in the laboratory, specimens were processed and mounted on slides using Hoyer's medium and dried in an oven at 45 °C for 1 wk. In addition, to determine if thrips were ovipositing in blueberry leaves, we collected 50 fresh leaves and placed them in ven-

tilated plastic containers. They were kept in bioclimatic chambers at 24 °C, a photoperiod of 12:12 h (L:D), and 75% RH to observe the eventual emergence of larvae. The larvae were then fed until the adult stage was reached. Adult thrips were identified using specialized taxonomic keys. Voucher specimens of thrips were deposited at the entomological collection of El Colegio de la Frontera Sur in Tapachula, Chiapas, Mexico.

Samplings of blueberry leaves resulted in 2,400 collected specimens (1,028 adults and 1,372 larvae). Surprisingly, the most abundant species was the chilli thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) with 975 individuals, followed by *Frankliniella occidentalis* (Pergrande) (Thysanoptera: Thripidae) (49), and *Frankliniella cephalica* (Crawford) (Thysanoptera: Thripidae) (1). *Scirtothrips dorsalis* was present on all farms sampled, and was the predominant species (Table 1). It was observed that plants infested with thrips exhibited severe leaf damage (Fig. 1). Blueberry leaves infested with thrips that were kept in the laboratory for adult emergence yielded *S. dorsalis* only, which confirmed that this species is using blueberries for feeding and reproduction. We noticed also the infestation of raspberry and blackberry plants (both *Rubus* sp.; Rosaceae) by *S. dorsalis* in the same localities.

The main contribution of this paper is to report for the first time the presence of the chilli thrips, *S. dorsalis* in Mexico. This thysanopteran is native to South Asia, but in recent yr its distribution has expanded globally. At present it has been recorded in numerous countries across 5 continents (Kumar et al. 2013). *Scirtothrips dorsalis* is a pest of great economic importance worldwide that is recorded from more than 225 species of plants in 72 families (Kumar et al. 2013; EFSA 2014), and is one of the 14 species of Thysanoptera known to transmit tospoviruses to cultivated plants (Riley et al. 2011; Rotenberg et al. 2015). Although *S. dorsalis* had been reported in countries of the Caribbean, and North and South America (Kumar et al. 2013; Dias-Pini et al. 2018, Ravelo et al. 2018), there were no records of its presence in Mexico. It is unknown how or from where this pest has been introduced into this country, but after being present in neighboring countries, such as the US or the Caribbean islands, the invasion into Mexico was expected. Usually, infested materials, such as propagules, flowers, fruits, and vegetables have been the main means of transport of *S. dorsalis* (Kumar et al. 2013).

Our findings are in agreement with Kumar et al. (2013), who reported blueberries as *S. dorsalis* hosts in Florida. The feeding of *S. dorsalis* on raspberry and blackberry plants confirms that this species is

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Table 1. Total number of thrips collected from blueberry leaves in ten farms located in Michoacan, Mexico.

Farm	Locality	<i>S. dorsalis</i>	<i>F. occidentalis</i>	<i>F. cephalica</i>	Immatures	Unidentified ¹
1	Tangancicuaro	78	0	0	0	0
2	Tangancicuaro	26	5	0	295	1
3	Zamora	5	0	0	123	0
4	Zamora	189	1	1	536	1
5	Zamora	70	40	0	28	1
6	Zamora	8	0	0	28	0
7	Jacona	105	0	0	11	0
8	Jacona	436	3	0	184	0
9	Jacona	48	0	0	164	0
10	Jacona	10	0	0	3	0
Total		975	49	1	1372	3

¹Taxonomic identification was not possible because thrips were damaged.

highly polyphagous, and it could be an indication that this pest is now widespread on several crops in Michoacan. Additionally, the presence of *F. occidentalis* in blueberry plots should be taken with care, considering that is a species of great economic importance in many crops and is a vector of tospovirus (He et al. 2019).

In summary, preliminary samplings of thrips in blueberry plots of Michoacan has uncovered an important worldwide pest that was not known to be present in Mexico. Further and specific studies on *Scirtothrips dorsalis* and *Frankliniella occidentalis* are needed to estimate their damage on blueberries, and the best options to control them.

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Summary

Blueberries are a group of several species of shrubs in the genus *Vaccinium*. It is an important crop worldwide, and its production has been expanded in Mexico in recent yr. Preliminary samplings of thrips

in blueberry plots in Michoacan, Mexico, have uncovered an important global pest that was not known to be present in this country, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae). This invasive pest is well known to be highly polyphagous and represents a serious threat to blueberries and many other crops in Mexico.

Key Words: chilli thrips; invasive species; berries; thrips

Sumario

Los arándanos son un grupo de varias especies de arbustos dentro del género *Vaccinium*. Ellos constituyen un importante cultivo en el mundo, y su producción se ha expandido en México en los últimos años. Muestreos preliminares de trips en parcelas sembradas con arándanos en Michoacán, México, han descubierto una importante plaga distribuida mundialmente, de la cual no se tenía registro, el trips del chile, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae). Esta plaga invasiva es muy conocida por ser altamente polífaga y representa una seria amenaza en México para el cultivo de arándanos y muchas otras plantas cultivadas.

Palabras Clave: trips del chile; especies invasivas; arándanos; trips



Fig. 1. Leaves of blueberries colonized by *Scirtothrips dorsalis* in the field (tunnel farming): (a) plant seriously damaged by thrips, (b) adult thrips feeding on blueberry leaves, (c) egg-eclosion from the epidermis of a blueberry leaf.

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