SCIENTIFIC NOTE

Outbreaks of *Trialeurodes vaporariorum* (West.) (Hemiptera: Aleyrodidae) Under Field Conditions in the State of São Paulo, Brazil

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Surtos de *Trialeurodes vaporariorum* (West.) (Hemiptera: Aleyrodidae) no Campo, no Estado de São Paulo

RESUMO - *Trialeurodes vaporariorum* (West.) é praga de hortaliças e ornamentais em cultivo protegido e infesta diversas culturas na Europa e nas Américas. No Brasil, as informações sobre sua ocorrência restringem-se a estudos em casa de vegetação. Em 2003, em Itatiba e cidades adjacentes (SP), observaram-se infestações de *T. vaporariorum* em hortaliças e ornamentais em campo, com maiores níveis populacionais em tomateiro e feijão-vagem. Nos anos seguintes, as infestações se mantiveram, atingindo cultivos de couve e de aboboreiras. São necessários estudos em campo para conhecer as interações dessa mosca-branca com plantas e inimigos naturais, níveis de dano e avaliação de métodos de controle.

PALAVRAS-CHAVE: Insecta, mosca-branca, casa de vegetação, ocorrência

ABSTRACT - *Trialeurodes vaporariorum* (West.) is a pest of greenhouse vegetables and ornamentals and infests crops in Europe and in the American continent. In Brazil, just a few cases are known on economic crops, being all restricted to greenhouse crops. In 2003, in Itatiba and neighboring localities of State of São Paulo, Brazil, field infestations of *T. vaporariorum* were observed, mainly on tomato and green bean. So far, whitefly infestation in this area expanded to squash and kale also. Field studies are needed for determining interactions of *T. vaporariorum* with plants and natural enemies, injury levels, and methods of control.

KEY WORDS: Insecta, greenhouse whitefly, occurrence

The greenhouse whitefly or glasshouse whitefly, *Trialeurodes vaporariorum*, was described by Westwood in 1856 as *Aleyrodes vaporariorum* (Mound & Halsey 1978). According to these authors, it is a cosmopolitan species, with records in every zoogeographic region of the world. In South America, it has been noted in Argentina, Chile, Colombia, Ecuador, Guiana, Peru, and Brazil (Russell 1963). Within Brazil's national boundaries, references about its presence exist for São Paulo, Minas Gerais, and Brasília (Silva *et al.* 1968, Oliveira 1995), although its distribution is likely much broader than that. It is a polyphagous insect, and plants belonging to 82 plant families serve as hosts (Mound & Halsey 1978). In Brazil, 162 plant species in 40 families have been identified as hosts in the greenhouse (Oliveira *et al.* 2003).

Considered a key pest in ornamentals and vegetable crops under protected cultivation (Lenteren & Noldus 1990), *T. vaporariorum* also occurs under field conditions, infesting several crops in countries of the American Continent and in Europe. There is limited information in Brazil on its occurrence and damages in crops of economic expression, and the few available studies have mostly dealt with greenhouse cultivations (Oliveira 1995, Campos *et al.* 2003, Oliveira *et al.* 2003). The objective of this work was to report the occurrence of this whitefly species at high populations in the field, infesting vegetable and ornamental crops in the State of São Paulo.

In September 2003, at Syngenta Seeds Ltda. - Rogers' experiment station, located in the city of Itatiba, SP, a high infestation of *T. vaporariorum* was detected in a field used for the selection of tomato lines (*Lycopersicon esculentum* Mill.). Adults, eggs, and nymphs covered the lower surface of the leaves throughout the entire experiment area of approximately 1800 m^2. After this observation, infestations of the pest remained steady in that field and in adjacent areas, damaging the subsequent crops of collard greens (*Brassica oleracea* L. *acephala* DC) and especially green beans (*Phaseolus vulgaris* L.).

In September of the following year, in the same experiment area, a field of tomato plants measuring approximately 2000 m^2 was infested by the insect, and the leaves had their abaxial surfaces heavily colonized. There were green pepper (*Capsicum annuum* L.) and collard greens plantations next to that field; adults and eggs were observed on collard greens,

but none of the insect's stages were detected on green pepper, which is an indication that green pepper is not a suitable plant for the development of this insect, although it was listed as a host (Mound & Halsey 1978). Pumpkin plants (*Cucurbita* spp.) transplanted later in an adjacent area were also infested by the whitefly, and more than 100 adults were observed per leaf in some hybrids, indicating differences in attractiveness, as demonstrated by Alves *et al.* (2006). Among the invasive plants in that area, sow thistle (*Sonchus oleraceus* L.) was the most infested, with eggs, nymphs, and adults covering the lower surface of the leaves.

Ornamental crops were inspected in the field, in a shade house, and in greenhouses at Syngenta's experiment station. Gerbera daisy (*Gerbera jamesonii* Bolus ex J.D. Hook) was a preferred host, with infestation levels similar to those observed in tomato plants. German primrose (*Primula obconica* Hance) and zinnia plants (*Zinnia elegans* Jacq.) were colonized at lower levels than gerbera daisy, while other ornamentals present in the area, like begonia (*Begonia* sp.), garden geranium [*Pelargonium zonale* (L.)], English ivy (*Hedera helix* L.), cyclamen (*Cyclamen* sp.), chrysanthemum (*Chrysanthemum morifolium* Ramat), garden balsam (*Impatiens balsamina* L.), and *Alyssum* sp. were not colonized and did not contain adults.

In October 2004, again in the city of Itatiba (two properties), tomato and green bean crops were heavily infested by *T. vaporariorum*. In crops at the end of the cycle, the leaves in the lower third of the plants had their lower surfaces completely colonized by nymphs and particularly by puparia, while the upper leaves had great numbers of adults, in a typical distribution of this species of whitefly (Lenteren & Noldus 1990).

Among the invasive plants present in this area, tropical soda apple (*Solanum viarum* Dun.) and Siberian motherwort (*Leonurus sibiricus* L.) were colonized, thus being characterized as hosts. Neither adults nor young forms were observed in leaves of the American nightshade (*Solanum americanum* Mill.), which was present in large numbers over the area; this is an indication that the plant is not a host, according to Mound & Halsey (1978).

It must be pointed out that no plants with virus symptoms were observed in the whitefly-infested areas where inspections were conducted.

In the years 2005 and 2006, *T. vaporariorum* infestations at the same locality remained constant in the field, also reaching neighboring localities, such as Jarinu and Atibaia, especially in tomato and green bean crops. Records of this whitefly species at high infestations in the field are unknown for Brazil, although there are reports under these conditions for countries of Central America (Hilje & Arboleda 1992, Smith *et al*. 2001) and for USA (Johnson *et al*. 1992, Omer *et al*. 1992, Bi *et al*. 2002a). In the USA, the pest is mentioned as an increasingly important problem in the field, in crops such as strawberry, raspberry, green pepper, cucumber, tomato, lettuce, citrus, bean, and cotton, and is also an important pest of vegetables under protected cultivation (Bi *et al.* 2002b). In Europe, infestations of *T. vaporariorum* in the field were also reported in recent years, in crops such as pumpkin and tomato, the pest being considered a threat to agriculture (Anonymous 2004). In this communication, we formulate hypotheses of the occurrence of environmental conditions favorable to the insect or of the appearance of a new biotype to explain this new situation. So far, no information was obtained that could either confirm or rule out any of the hypotheses. It is known that in Central America *T. vaporariorum* tends to be more common in regions with elevations above 1000 m, while *Bemisia tabaci* (Genn.) is predominant in areas below 1000 m (Caballero 1994). In the localities of the State of São Paulo where infestations of *T. vaporariorum* were observed, the mean elevation values ranged between 750 m (Itatiba) and 800 m (Jarinu and Atibaia), being therefore lower than the value presented by Caballero (1994). However, considering the latitude of this tropical region of the State of São Paulo, elevations from 750 m to 800 m determine lower mean temperatures than in other regions where *B. tabaci* biotype B is prevalent, with the annual mean in the three localities ranging from 19.9°C to 20.3°C. Therefore, it is suggested that in tropical regions, differently from equatorial regions, *T. vaporariorum* may occur and even be predominant in the field at elevations lower than 1000 m, whose mean temperatures are lower than those observed in other agrosystems.

As an insect vector *T. vaporariorum* is not as important as *B. tabaci*, which is an effective vector for more than 100 different viruses (Brown 1994, Morales 2001). However, it transmits closteroviruses (Duffus 1996). *T. vaporariorum* is known to transmit *Beet pseudo yellow virus* (BPYV), *Tomato infectious chlorosis virus* (TICV), and *Tomato chlorosis virus* (ToCV) (Wisler *et al.* 1997). At high infestations, the most important damage is caused when the insect sucks sap from the plant, extracting water, carbohydrates, and amino acids (Hendrix *et al.* 1996), consequently reducing yield (Johnson *et al.* 1992). In addition, large amounts of honeydew produced and deposited on the leaves provide conditions for fungal colonizations (sooty mold), affects photosynthesis and respiration, and commercially depreciates plant products (Liu *et al.* 1993).

Under this new condition, i.e., at high infestations in the field, basic studies involving *T. vaporariorum* are required to generate knowledge about its interactions with plants and natural enemies, damage levels, and to evaluate different control methods in order to devise a rational management program against the pest.

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