

SCIENTIFIC NOTE

**Identification and Rearing of Four Thrips Species Vectors
of *Tospovirus* in the Federal District, Brazil**TATSUYA NAGATA¹, LAURENCE A. MOUND², FELIX H. FRANÇA¹ AND ANTONIO C. DE ÁVILA¹¹EMBRAPA, Centro Nacional de Pesquisa de Hortalicças (CNPH),
Caixa postal 218, 70359-970, Brasília, DF.²CSIRO Entomology, G.P.O. Box 1700, Canberra ACT 2601, Australia

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Identificação e Criação de Quatro Espécies de Tripes Vetores
de *Tospovirus* no Distrito Federal, Brasil

RESUMO - Doenças causadas pelos vírus do gênero *Tospovirus* são de grande importância em culturas de hortaliças e ornamentais no Brasil. No entanto, são escassos os estudos dos insetos que transmitem estes vírus no campo, os tripes. Pouco se sabe sobre as espécies de tripes que ocorrem no Brasil e quais as responsáveis pela ampla disseminação destas doenças. Com objetivo de estudar os aspectos epidemiológicos dos vírus, diferentes populações de tripes, potenciais vetores de tospovírus, foram coletadas no DF. Quatro espécies foram identificadas, *Frankliniella occidentalis* Pergande, *F. schultzei* Trybom, *Thrips palmi* Karny e *T. tabaci* Lindeman. Este é o primeiro relato da presença de *F. occidentalis* e *T. palmi* no DF. A metodologia de criação das quatro espécies de tripes é descrita.

PALAVRAS-CHAVE: Insecta, Thysanoptera, vira-cabeça, TSWV.

ABSTRACT - The disease caused by the viruses belonging to the genus *Tospovirus* is a serious problem in horticultural and ornamental crops in Brazil. In the field, this virus group is transmitted by the insect vector, thrips. Little is known about the thrips species occurring in Brazil, and which species are important for the dissemination of these diseases. For the study of epidemiology of this virus group, different thrips populations, which may have the capacity to be vectors of tospoviruses, were collected in the Federal District. Four species were identified: *Frankliniella occidentalis* Pergande, *F. schultzei* Trybom, *Thrips palmi* Karny and *T. tabaci* Lindeman. This is the first report of the occurrence of *F. occidentalis* and *T. palmi* in the Federal District. A methodology for the rearing of these four thrips is described in this report.

KEY WORDS: Insecta, Thysanoptera, spotted wilt, TSWV, western flower thrips.

In Brazil, the diseases caused by *Tospovirus* (Type species: *Tomato spotted wilt virus*, TSWV) result in large losses in several vegetable and floral crops. However, the distribution and epidemiological aspects of these pathogens have been little studied (Nagata *et al.* 1995, De Ávila *et al.* 1996). The distinct tospovirus species show similar symptoms in infected plants, causing problems for the reliable diagnosis of the virus species in the field. The occurrence and recognition of the thrips vector species in Brazil are also largely unknown despite the importance of these diseases.

Currently, 10 species of thrips have been confirmed as being able to act as vectors of one or more tospoviruses. Mound (1996) listed seven of these, although in the same issue Chen & Chiu (1996) added a further species (*Scirtothrips dorsalis* Hood) from Taiwan. Recently, Webb *et al.* (1998) demonstrated that *Frankliniella bispinosa* Morgan can act as a vector under laboratory conditions in Florida, and Nakahara & Monteiro (in press) describe a new species of *Frankliniella* that is considered to be the vector of the zucchini tospovirus reported from southern Brazil (De Ávila *et al.* 1998). Of these ten thrips species, five are known from Brazil including the new *Frankliniella* species mentioned above. The other four species are: *Frankliniella schultzei* Trybom (De Santis 1970, Monteiro *et al.* 1998), *F. occidentalis* Pergande (Monteiro *et al.* 1995a), *Thrips tabaci* Lindeman (Costa & Medeiros 1950) and *T. palmi* Karny (Monteiro *et al.* 1995b). The first of these four species is native to South America although now widespread in tropical countries. The second is originally from California but is now widespread particularly in greenhouses. The third species is probably from the eastern Mediterranean and is widespread except in the wet tropics, whereas the fourth species is from the wet tropics of South East Asia.

As a preliminary to studies on the interactions between thrips and tospoviruses, several thrips species were isolated in the Federal District that were potential tospovirus vectors.

These were identified and established as laboratory colonies to be used in future experimental studies.

The adult females of one species, collected mainly from flowers of green pepper, melon, tomato and gloxinia plants, were approximately 1.4 mm in length and dark brown or black in colour, with the males lighter in colour and smaller (1.0-1.2 mm). Examination of slide mounted specimens under a light microscope (Oetting *et al.* 1993, Mound & Kibby 1998) indicated that this species was *F. schultzei*. A distinctive characteristic of this species is that the ocellar setae III arises close to each other between the hind ocelli (Fig 1-A, arrow). This thrips was reported as the major thrips species on tomato in São Paulo State (Pavan *et al.* 1993). Nowadays it is possibly the most devastating thrips species in vegetable and floral crops in many regions of Brazil. Monteiro *et al.* (1998) indicated that *F. schultzei* was the most common species found on cotton in Brazil, although it was commonly misidentified as *Thrips tabaci* in the published literature.

The second thrips species was isolated from garden roses. Adult females were about 1.4 mm in length and smaller the male (1.0-1.2 mm). Both sexes were light brown in colour. The major postocular setae were as long as the interocellar setae (Fig. 1-B, arrows), and the comb of microtrichia on the posterior margin of abdominal tergite VIII was complete. This isolate was identified as *F. occidentalis*. In Brazil, this species was first reported from Brazil in São Paulo state in 1995 (Monteiro *et al.* 1995a), but our survey indicates that it is now common in the Federal District, about one thousand kilometres from São Paulo State.

The third thrips species, isolated from greenhouse melon, cucumber and green pepper, was the smallest one with females ranging from 1.0 to 1.2 mm in length and males about 0.8 mm. The colour was light brown to yellow. The forewing first vein had three distal setae and the abdominal tergite II had four lateral setae. This species was identified as *Thrips palmi* (Fig. C). Among the thrips col-

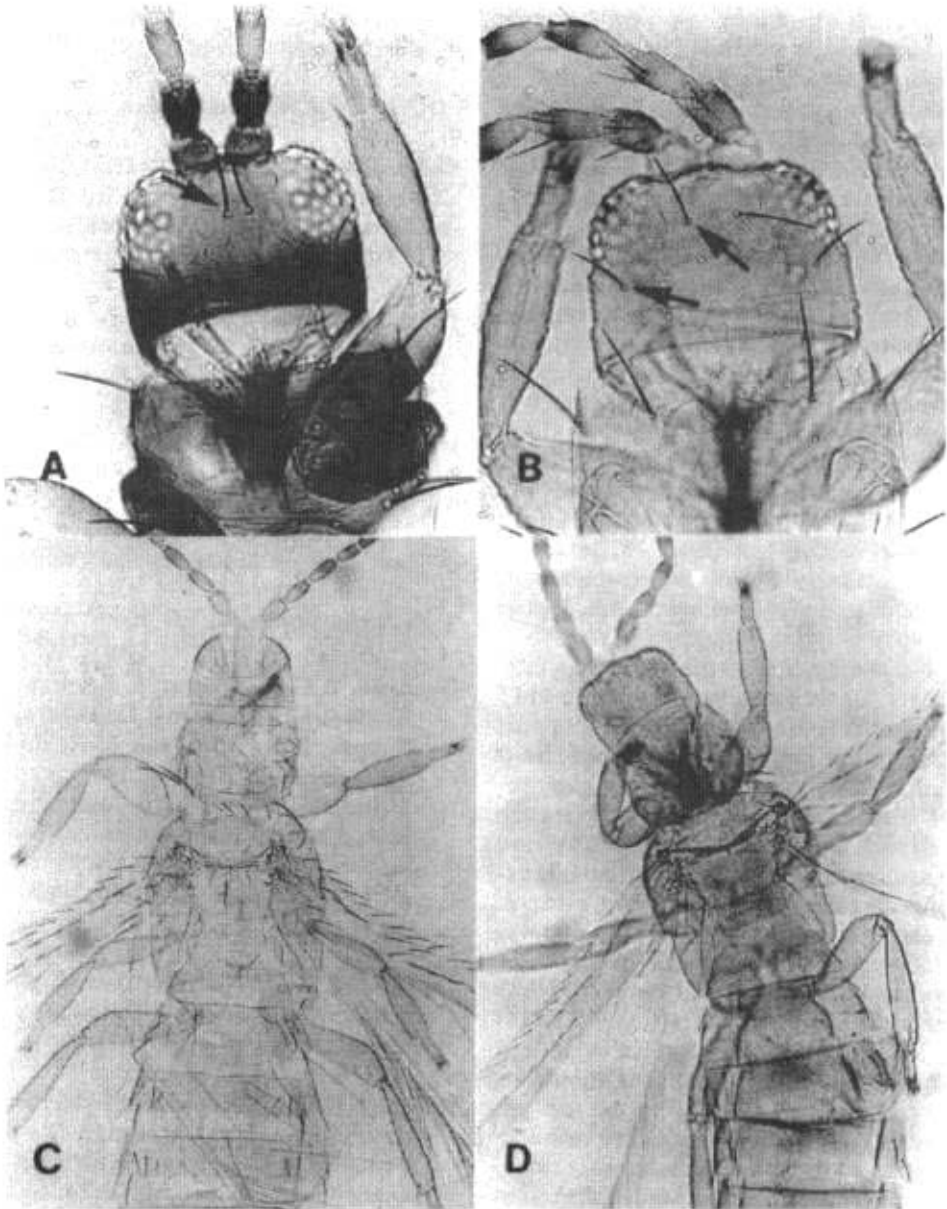


Figure 1. Light micrographs of four thrips species. A) *F. schultzei*, Arrow shows the oceller setae III between the hind ocelli which is close each other. B) *F. occidentalis*. Arrows show that resemble length of major postocular setae and the interocellar setae. C) *T. palmi* and D) *T. tabaci*.

lected in this survey, *T. palmi* appears to be the greatest threat as a crop pest. It caused total crop loss in a 20 ha field of green peppers in Goiás State, and severe losses of green house melons and cucumbers in the Federal District in 1998. This species was first reported in Brasil in 1995 in São Paulo State (Monteiro *et al.* 1995b), but is now established in Central Brazil.

The fourth species was collected from spring onion. Only females were found, their body length being 1.2 to 1.3 mm, and their colour light brown. The forewing first vein had four distal setae and the abdominal tergite II had three lateral setae. This species was identified as *Thrips tabaci* (Fig. D). It is an important pest of onion crops in Brazil, and has been reported as damaging pea crops in the Federal District (França & Giordano 1984). However, records of *Thrips tabaci* from cotton in Brasil are probably all misidentifications of *F. schultzei* (Monteiro *et al.* 1998).

For rearing, 500 ml glass jars were used as cages. On the top of the screw cap, a 4 to 5 cm diameter hole covered with anti-thrips net was made for ventilation. The jars were incubated at 25 °C constant and 16 h photoperiod. Young fresh bean pods (cv. Macarrão Paulista) were added as feeding and ovipositing material with a 2-day interval exchange. For the genus *Frankliniella*, pine pollen and/or 10% sucrose solution in water was added once every two weeks. *T. tabaci* could grow well only with fresh bean pods. However, small cucumber fruits (CNPq 83-914) are good as a food source for *T. palmi* instead of bean pods. Fresh cucumber should be changed once each week. Using this method, approximately 500 thrips could be reared in one glass jar for all four species.

It is intended to use these established colonies for tospovirus transmission studies, in order to investigate the epidemics of *Tospovirus* diseases in Brazil.

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