The fluctuation of transmission specificity and efficiency of *Tomato spotted wilt virus* by *Frankliniella schultzei*

Tatsuya Nagata[1], Renato O. Resende[2], Alice K. Inoue-Nagata[3] & Antonio Carlos de Ávila[3]

[1]Ciências Genômicas e Biotecnologia, Universidade Católica de Brasília, CEP 70790-160, Brasília, DF, Brazil; [2]Departamento de Biologia Celular, Universidade de Brasília, CEP 70970-000, Brasília, DF, Brazil; [3]Embrapa Hortaliças, Cx. Postal 218, 70359-970, Brasília, DF, Brazil, e-mail: tatsuya@pos.ucb.br

Author for correspondence: Tatsuya Nagata

RESUMO

A flutuação de especificidade e eficiência na transmissão de *Tomato spotted wilt virus* pelo tripes *Frankliniella schultzei*

A transmissão da espécie TSWV por tripes apresenta alta especificidade e poucas espécies de tripes têm capacidade de transmitir o vírus. Uma colônia originada a partir de um único inseto de *F. schultzei* foi relatada como não-vetora do TSWV. O resultado desse trabalho mostrou a ocorrência de transmissão diferencial de TSWV por *F. schultzei* quando se mudou a população dos tripes e o isolado de TSWV. Este é o primeiro relato que mostra diferenças na capacidade de transmissão entre isolados do TSWV e o tripes vetor.

Tomato spotted wilt virus (TSWV) is a well-known pathogen on horticultural and ornamental crops in Brazil. Although thrips species taxonomy is poorly studied in the country, the correct identification of thrips species is crucial. So far, *Frankliniella schultzei* (Trybom) (Thysanoptera: Thripidae) is thought to be the most important tospovirus vector in the field in Brazil. However, a previous study revealed that the *F. schultzei* population isolated in the Federal District was not able to transmit the Brazilian TSWV isolate, BR-01 (Nagata *et al*., Plant Pathol. 53:136. 2004). To clarify whether this lack of transmission between these two species is a general characteristic or not, a different population of *F. schultzei* and distinct TSWV isolates were tested for their transmissibility. Two isolates of *F. schultzei* were collected from São Paulo State and from the Federal District and two new TSWV isolates (one from SP and another from DF) were also collected and maintained at Embrapa Hortaliças. *F. occidentalis* (DF isolate) and TSWV-type-isolate BR-01 (de Ávila *et al*., J. Gen. Virol. 74:153. 1993) were used as controls. The rearing method and transmission test procedures were previously described by Nagata *et al*. (Plant Pathol. 53:136. 2004). Briefly, the new-born thrips individuals up to 8 hrs old reared on bean pods were collected with an extremely fine paint-brush, transferred to TSWV infected detached leaves of *Datura stramonium* in a Tashiro-cage and kept in an incubator at 25ºC. After the acquisition access period of 16 hrs, the thrips were reared on healthy detached leaves of *D. stramonium*, kept in the incubator until the thrips became adults of one to two days old. They were then individually maintained on leaf discs placed inside a 1.5 mL microcentrifuge tube for two days, and then the leaf discs were incubated by floating onto water in a 24-well plastic dish for two more days. Transmission efficiency was evaluated by ELISA, using antibody against nucleocapsid protein of TSWV and leaf discs ground in phosphate buffer saline prepared by a standard protocol. Again, *F. schultzei* DF isolate did not transmit TSWV BR-01 at all, as previously described (Nagata *et al*., Plant Pathol. 53:136. 2004). However, the same thrips population was able to transmit two other TSWV isolates with high efficiency, one from DF (Vb-12) with an efficiency of 33.9% and another from SP (SP2) with 44.7% (Table 1). When *F. schultzei* from SP was used, even TSWV BR-01 isolate was also poorly transmitted (13.6%). *F. occidentalis* (Pergande), used as control, transmitted all isolates with similar efficiency. These results demonstrated that transmission efficiency and/or specificity may vary according to either TSWV isolates or vector population within the same species. Brazilian *F. schultzei* populations are, most probably, important tospovirus vectors in the field, since high transmission efficiency was found in combination with *Groundnut ringspot virus*. Wijkamp *et al*. (Phytopathology 85:1069. 1995) showed that European *Thrips tabaci* thelytokous populations were not able to transmit TSWV, while the Greek arrhenotokous population of *T. tabaci* could transmit the same TSWV isolate (Chaatzivaassiliou *et al*., Plant Pathol. 48:700. 1999). The previous study reporting the inability of *F. schultzei* to transmit the TSWV isolate BR-01 may have led to an erroneous conclusion that *F. schultzei* would not be a vector species of TSWV in Brazil. Therefore, it has become clear that the "isolate effect" in both vector and virus population does exist and must be carefully considered in future transmission studies.

TABLE 1 - Transmission specificity and efficiency among TSWV and thrips isolates

Tospovirus species	Isolate	*F.occidentalis* (DF isolate)	*F.schultzei* (DF isolate)	*F.schultzei* (SP isolate)
TSWV	BR-01 (DF)	23.5% (8/34)*	0% (0/63)	13.6 % (6/44)
TSWV	Vb-12 (DF)	31.7% (13/41)	33.9 % (20/59)	22.2 % (6/27)
TSWV	SP2 (SP)	25.0% (6/24)	44.7 % (21/47)	23.5 % (8/34)

*The number in brackets indicates the number of transmitter individuals/ total thrips used.
DF = Federal District; SP = São Paulo State

Received 4 June 2007 - Accepted 29 October 2007 - FB 7062