

Transmissibility of Leprosis Symptoms by *Brevipalpus phoenicis* to Young Citrus Plants Under Laboratory Conditions

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ABSTRACT. Potted Valencia orange plants were infested by *Brevipalpus phoenicis* in an attempt to reproduce and associate leprosis symptoms with the presence of the pest. Treatments consisted of plant infestation for periods of 2, 4, 8 and 16 days with 20 female mites obtained from orchards with and without symptoms of leprosis. Mites were killed with bromopropilate after each period. Three blocks were established at each location with five treatments including a check and five replications. Uninoculated plants and treatments infested with mites from symptomless plants did not show any symptoms of leprosis. Symptoms started to appear 17 days after mite infestation and continued for about two months on all other treatments. Intensity of symptoms was dependent on the period of infestation.

Leprosis of citrus was considered a fungal disease by Fawcett in 1911 (4). It is now known that leprosis is intimately associated with the mite *Brevipalpus phoenicis* Geijskes. Rossetti *et al.* (5) showed that the presence of mites can induce leprosis symptoms in Pera and Lima sweet orange when they are transferred from infected trees or when first allowed to feed on leprosis lesions. Chagas (1) confirmed the transmissibility of coffee ringspot symptoms by this mite and Chagas *et al.* (2) made reference to a possible influence of the different phases of its biological cycle on the transmission of leprosis symptoms. Chiavegato *et al.* (3) verified under field conditions the spread of leprosis and the losses in citrus fruits. They concluded that transmission only occurs when mites move from contaminated orchards. The first symptoms were observed in fruit about 36 days after infestation.

In the present paper we report results of transmission trials to small Valencia orange seedlings. The objective was to determine the minimum and maximum time needed for appearance of symptoms, and other possible effects of leprosis on plant development.

MATERIALS AND METHODS

Brevipalpus phoenicis collected from three different Brazilian orchards were used. The orchard at the Presidente Medici Experiment Station in Botucatu (Lageado area) was free from leprosis. The two other orchards were contaminated by leprosis. One was at the same Station (Edgardia area) and the other in Taquarituba county, in the State of São Paulo.

Test plants used in the experiment were young seedlings of Valencia orange planted in pots. The experiment was established in randomized blocks, with 5 treatments and 5 replications. Experimental treatments in block 1 were T₀, T₁, T₂, T₃ and T₄. Each (except T₀) received twenty female mites from the leprosis-free orchard. Block 2 and 3 were treated with the same number of female mites collected from the leprosis affected orchards. Plants remained infested for 2 (T₁), 4 (T₂), 8 (T₃) and 16 (T₄) days respectively and after each one of these periods they were sprayed with bromopropilate, 2 ml per litre. Following the miticide treatment, the test plants were allowed to dry and were kept under laboratory conditions (27° ± 2°C

TABLE 1
CHANGE IN NUMBER OF LEAVES ON SWEET ORANGE SEEDLINGS
BETWEEN OCT. 26, 1982 AND JAN. 12, 1983 AFTER EXPOSURE TO
BREVIPALPUS PHOENICIS

Treatment	Block 1*			Block 2*			Block 3*		
	Initial average	Final average	Increase (%)	Initial average	Final average	Increase (%)	Initial average	Final average	Increase (%)
T ₀ †	9.2	14.8	60.8	6.60	11.80	78.7	6.60	8.80	33.3
T ₁	8.2	12.0	46.3	6.20	9.20	48.3	7.20	8.80	22.2
T ₂	6.8	9.60	41.1	7.20	10.80	50.0	7.20	8.80	22.2
T ₃	7.8	10.60	35.8	6.00	9.20	53.3	7.60	8.60	13.1
T ₄	8.4	12.60	50.0	5.20	6.0	15.3	6.20	7.40	19.3

*Leprosis-free (Block 1) and leprosis-infected (Blocks 2 and 3) orchards were chosen as a source of mites.

†The numerical subscripts indicates the period mites remained on plants. T₀ = 0 days, T₁ = 2 days, T₂ = 4 days, T₃ = 8 days and T₄ = 16 days.

TABLE 2
AVERAGE NUMBER AND PERCENTAGE OF LEAVES WITH LEPROSIS
SPOTS ON PLANTS EXPOSED TO *BREVIPALPUS PHOENICUS*

Treatment	Block 1*		Block 2*		Block 3*	
	Average	%	Average	%	Average	%
T ₀ †	0	—	0	—	0	—
T ₁	0	—	1.20	13.0	1.40	15.9
T ₂	0	—	1.20	11.1	2.60	29.5
T ₃	0	—	1.80	19.5	4.60	53.4
T ₄	0	—	3.0	50.0	5.60	75.6

*Leprosis-free (Block 1) and leprosis-infected (Blocks 2 and 3) orchards were chosen as a source of mites.

†The numerical subscripts indicates the period mites remained on plants. T₀ = 0 days, T₁ = 2 days, T₂ = 4 days, T₃ = 8 days and T₄ = 16 days.

and relative humidity of 60±10%). Test plants were inspected daily for appearance of leaf symptoms of leprosis.

RESULTS AND DISCUSSION

Table 1 shows the initial and final number of leaves, and the percentage of growth of plants in each treatment. A greater percentage of growth and a larger number of leaves occurred in treatment T₀ (control plants not infested with mites). This demonstrates that *B. phoenicis*, even when not from a leprosis source, causes damage to sweet orange seedlings. The poor growth of plants in Block 2 treatment T₄, and Block 3 treatments T₄ and T₅ indicated that mites obtained from a leprosis source induced early leaf drop. When mites are collected from leprosis-free orchards, they do not transmit leprosis symptom (table 2). This agrees with the findings of Rossetti *et al.* (5) and also indicates that leprosis does not result from a toxin produced by the mite. The symptoms increased when the period the mites remained on the leaves was increased (table 2).

Leprosis symptoms appeared within 17-20 days following mite

infestation (dpi), were at a maximum about 21-30 dpi and were still present up to 61 dpi (table 3). The conditions under which the vector transmission experiment was conducted were less than ideal. The following conclusions are suggested by the results.

1. The mite *B. phoenicis* is a vector of leprosis.
2. Leaf drop is directly associated with leprosis.
3. Two days of feeding on an infested plant is enough time for the mite to transmit leprosis.
4. Leprosis symptoms can appear in plants within 17-20 days following infestation.
5. Leprosis symptoms continue to appear for 2 months after the control of the mite.

TABLE 3
FREQUENCY OF APPEARANCE OF
LEPROSIS SYMPTOMS IN THE
LEAVES

Days after infestation	Number of leaves with symptoms
17-20	3
21-30	31
31-40	17
41-50	14
51-60	4

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