

Ornamental Section

Proc. Fla. State Hort. Soc. 94:70-72. 1981.

A TARSONEMID MITE, *STENEOTARSONEMUS FURCATUS* DE LEON, A SERIOUS PEST ON *MARANTA* SP. AND *CALATHEA* SP. (ACARINA:TARSONEMIDAE)¹

H. A. DENMARK

Bureau of Entomology,
Division of Plant Industry,
Florida Department of Agriculture and Consumer Services,
P.O. Box 1269,
Gainesville, FL 32602

E. NICKERSON

Bureau of Methods Development,
Division of Plant Industry,
Florida Department of Agriculture and Consumer Services,
P.O. Box 1269,
Gainesville, FL 32602

Abstract. A tarsonemid mite *Steneotarsonemus furcatus* De Leon may render *Maranta* sp. and *Calathea* sp. plants unsaleable. High populations may kill the plant, but can be controlled by properly timing 3 applications of Pentac or single treatment of Temik.

The Tarsonemidae is a large diverse family that has phytophagous species in at least two genera. The broad mite, *Polyphagotarsonemus latus* (Banks) and the cyclamen mite, *Steneotarsonemus pallidus* (Banks) are the 2 mites of primary importance with a wide host range. Recently a tarsonemid *Steneotarsonemus furcatus* De Leon was found at Apopka causing considerable damage to *Maranta* sp. and some damage to *Calathea* sp. *S. furcatus* was described by De Leon (2) on *Paspalum* sp. from Coral Gables, Florida. Beer (1) received specimens from A. E. Pritchard (University of California, Berkeley) with a notation that a severe infestation had been discovered in greenhouse-grown maranta plants, causing leaf distortion which imparts a stunted appearance to infested plants (Fig. 1).

Species in the genus *Steneotarsonemus* have apparently undergone much modification in respect to general body contour which is no doubt related to adaptations for their particular feeding habits. Females are quite elongate and posterior pairs of legs are widely separated. Both sexes are depressed dorsoventrally which permits activity in the confines of space between the sheaths and stems of grass and other monocotyledonous hosts.

Steneotarsonemus furcatus can be found under the leaf sheaths of *Paspalum* sp., *Maranta* sp., *Calathea* sp., and probably other grasses. Mites move from the leaf sheath to unfurled leaves, and begin at the tip end (Fig. 2) and feed toward the base. Several mites are usually found feeding together (Fig. 3). Mites abandon the leaf as it fully opens, as the mouthparts are unsuitable for effective penetration of mature leaf tissue. The early feeding symptoms on the leaf have a water-soaked appearance (Fig. 4). The cells die and soon turn brown (Fig. 5). Severe infestations may severely stunt or kill the plant.



Fig. 1. *Maranta* infested with *Steneotarsonemus furcatus* De Leon. DPI Photo #702064-8.

Description

Male—body brownish; length from anterior end of capitulum (including palpi) to posterior end of genital papilla 166μ and 76μ wide at coxae III; capitulum 22μ long (including palpi) and 23μ wide, widest at basal third, base not emarginate; genital papilla cordate in outline, 24μ long and 23μ wide. Leg IV femur 22μ long with a coarse bifurcate seta or process at about mid-length of posterior face (Fig. 6). The posterior ramus is longer and thicker, length of process 7μ ; ventral seta of femur 10μ long, dorsal seta 4μ long; tibia 11μ long and 6μ wide with a ventral seta 27μ long and a dorsal rod-like sensilla anterior to it; tarsus 3μ long and 5μ wide; claw 7μ long.

Female—body somewhat lighter than male; length from anterior end of capitulum (including palpi) to end of body 235μ , width 112μ . Eggs are off-white, elliptical and are usually laid along the midvein and also on unfolded leaves.

Materials and Methods

Maranta sp. plants were obtained from a mite-infested stock bed in an established nursery. The plants were potted in 4-inch pots and held for ca. 1 month. These potted *Maranta* were separated into 4 groups of 12 plants, 3 of which were chemically treated and 1 designated as a control.

Pentac 50% WP, Vydate L, and Temik 10G were selected due to their systemic activity against mites and because they were labeled for similar uses. Pentac 50% WP was applied at the rate of 3kg/500 liters (5 lb/100 gal) of

¹Contribution No. 538, Bureau of Entomology, FDACS, Division of Plant Industry.

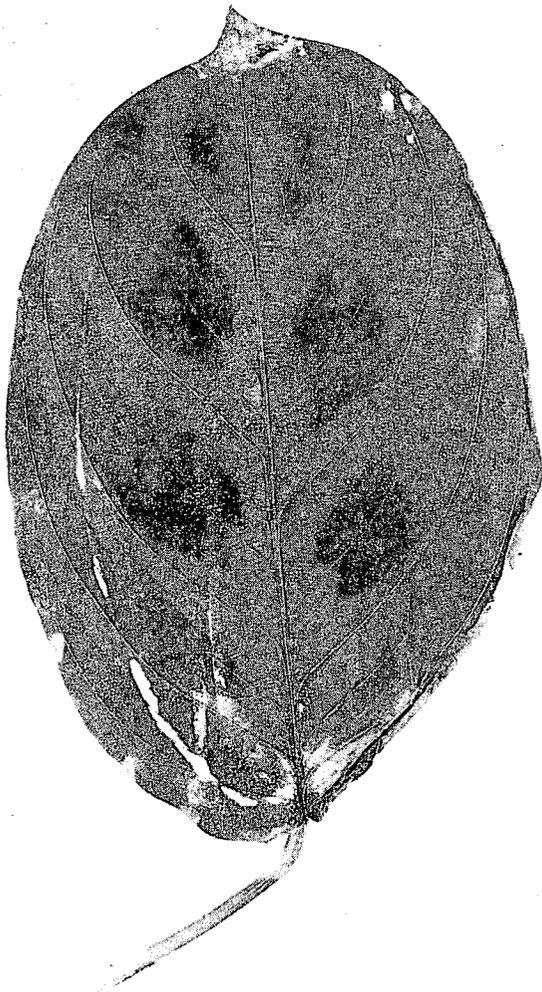


Fig. 2. Maranta showing tip and lateral injury by *Steneotarsonemus furcatus* De Leon. DPI Photo #702064-2.

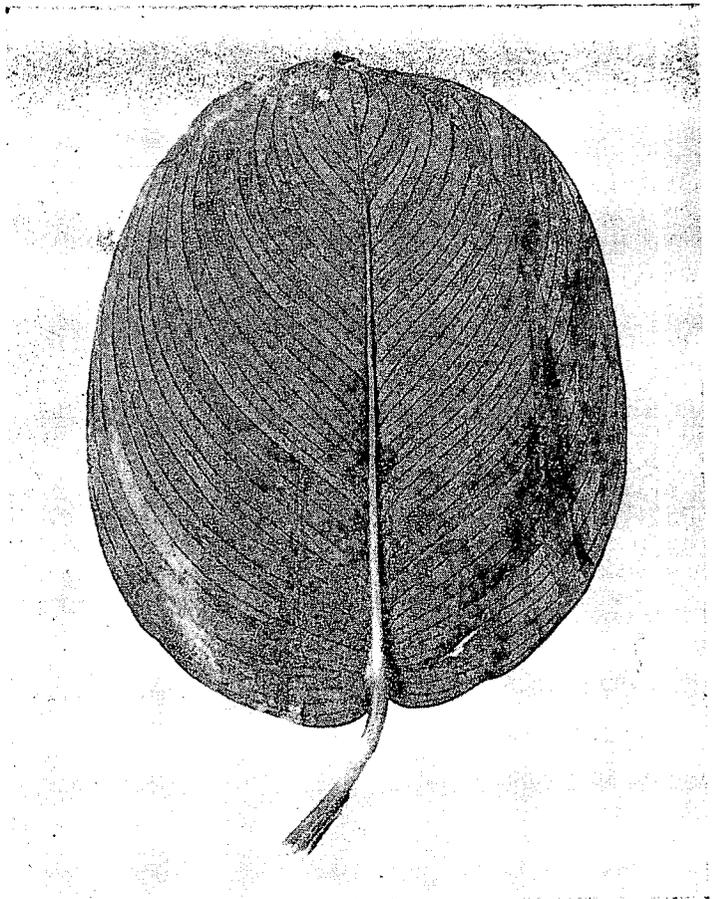


Fig. 4. Maranta leaf soon after it has unfurled showing water soaked area. DPI Photo #702064-1.

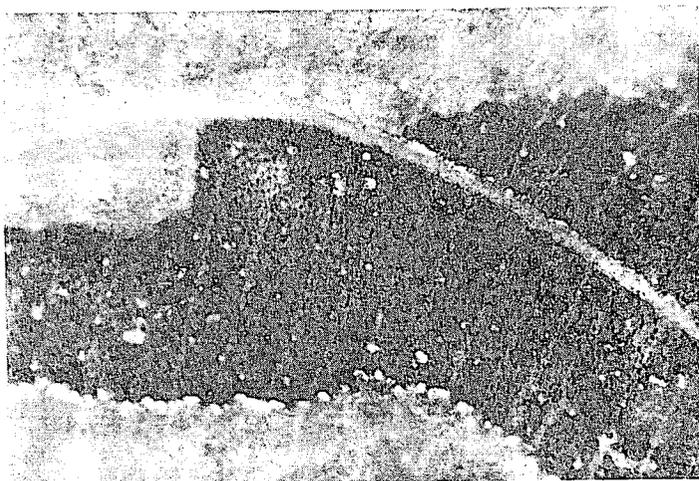


Fig. 3. *Steneotarsonemus furcatus* damage to maranta before the leaf unfurls. DPI Photo #702133-16.

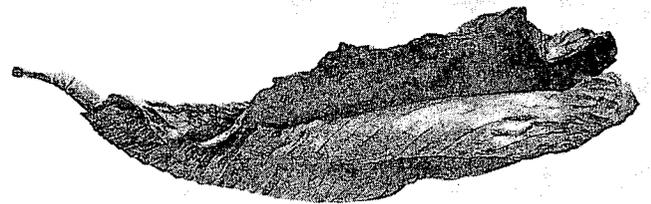


Fig. 5. Dead maranta leaf. DPI Photo #702064-4.

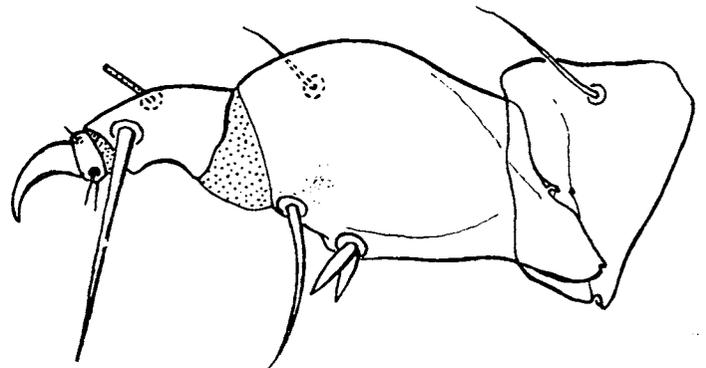


Fig. 6. Leg IV of male *Steneotarsonemus furcatus* De Leon. DPI Photo #702071.

water and Vydate L at the rate of 1.25 liters/500 liters (2 pints/100 gal) of water. Applications of Pentac and Vidate were made with a CO₂-powered hand sprayer set at 40 psi. on 0, 4 and 8 days. A single pot application of Temik was
Proc. Fla. State Hort. Soc. 94: 1981.

made at 0 days at the rate of 1.25kg/100m² (40 oz/1000 sq. ft.).

A pretreatment count of mites in unfurled leaves was made, and all plants were examined at 12, 20 and 28 days of posttreatment. All counts were necessarily made by destructive sampling, i.e., an unfurled leaf was clipped, unrolled, and examined for mites. About 5 unfurled leaves were selected from each pot for examination; thus, ca. 80 leaves were examined for each treatment series and the control.

Results and Discussion

Results are presented in Table 1. A reduction in the number of mites was obtained with Pentac and Temik; however, no significant reduction was obtained with Vydate.

Since these mites are usually found in the leaf sheath or in an unfurled leaf, controls are difficult even when applications are made under the best of circumstances. Indications are that a systemic acaricide must be applied for good control.

Table 1. Efficacy of Pentac, Vydate, and Temik on *Steneotarsonemus furcatus* on *Maranta* sp.

Treatment	Average no. of live mites per unfurled leaf			
	Pretreatment	No. days Posttreatment ^z		
		12	20	28
Pentac 50% WP ^y	7.0	3.2a	1.4a	0.4a
Vydate L ^y	5.8	4.8b	3.6b	4.2b
Temik 10G ^x	9.6	2.8a	1.8a	0.2a
Control	8.4	7.2b	5.4b	6.4b

^zMeans followed by the same letter are not significantly different. Duncan multiple range test. $p=0.05$ (95% level).

^y3 applications at 4-day intervals.

^xSingle pot treatment.

Literature Cited

1. Beer, R. E. 1958. A new species of *Steneotarsonemus* and additional information on the plant-feeding habits of *Steneotarsonemus furcatus* De Leon (Acarina). J. New York Ent. Soc. 56:153-159.
2. De Leon, D. 1956. Four new acarina in the family Tarsonemidae. Florida Ent. 39(3):105-112.

Proc. Fla. State Hort. Soc. 94:72-74. 1981.

THE ROLE OF PSEUDOMONAS SYRINGAE, AN ICE NUCLEATION ACTIVE BACTERIA, IN FROST DAMAGE OF TENDER ANNUAL PLANTS¹

J. A. ANDERSON, D. W. BUCHANAN
University of Florida, IFAS,
Fruit Crops Department, HS/PP Bldg.,
Gainesville, Florida 32611

D. L. INGRAM
University of Florida, IFAS,
Ornamental Horticulture Department, HS/PP Bldg.,
Gainesville, Florida 32611

Abstract. Tender plants survive low temperature stress through avoidance of ice formation in the tissue. These plants remain unfrozen below 0°C only because there is an absence of ice initiators or nucleators in the plants. Experiments were conducted to determine if greenhouse-grown annuals have a greater capacity to supercool (remain unfrozen below 0°C) than is observed in the field. Field grown plants were found to harbor bacterial populations containing *Pseudomonas syringae*. *Pseudomonas syringae* was sprayed on plants of coleus, zinnia, calendula, begonia and marigold prior to controlled freezing to determine its role in limiting supercooling. Greenhouse-grown plants will supercool to low temperatures. Plants containing *Pseudomonas syringae* were frozen and were killed 2 to 4°C warmer than control plants without bacteria.

Actively growing plants are killed when ice forms in the plant cell. In contrast many acclimated evergreen and deciduous plants tolerate ice formation in tissue without damage. These plants survive by undergoing a change in autumn which is called cold acclimation. As autumn approaches endogenous growth inhibiting substances increase and growth slows. Hardiness increases slowly over a period as the days shorten and temperatures decrease.

Survival of tender plants in freezing temperatures is due to supercooling or avoiding ice in their tissues. This occurs because the freezing point depression of the cell is limited by high osmotic potential. Pure water will supercool to well below 0°C (32°F) before it freezes if divided into small samples (6). Water free of impurities that cause freezing at relatively warm temperatures (heterogeneous nucleators) may supercool to -38°C (7). Water molecules act as nucleators (homogeneous nucleation) at the above temperature.

The group of frost sensitive plants that are killed by early fall and late spring freezes include such warm season crops as foliage plants, tomato, pepper, peach, apple and citrus flowers. Survival of this group of plants and plant parts is dependent on the avoidance of ice forming in their tissues.

Tomato, corn, and wheat plants have been cooled to -10°C (14°F) without freezing (1, 2, 5). A new and exciting body of research has demonstrated that certain bacteria prevalent in nature cause water to freeze at much higher temperatures than expected.

Pseudomonas syringae and *Erwinia herbicola* are two ice nucleation active (INA) bacteria that are widely distributed. *Erwinia herbicola* is slightly less efficient as an ice nucleator than *Pseudomonas syringae*.

Lindow (4) reported 74 of 95 plant species surveyed harbored INA bacteria. These bacteria may be present as residents on plants without causing pathological symptoms (3).

It appears that INA bacteria are important incitants of frost injury to plants at relatively warm temperatures.

The objectives of this study were to determine if these annual plants supercool and if INA bacteria *Pseudomonas syringae* prevent supercooling.

Materials and Methods

Begonia (*Begonia semperflorum* L. 'Vodka'), coleus

Proc. Fla. State Hort. Soc. 94: 1981.

¹Experiment Station Journal Series No. 3385.