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

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Abstract. A tarsonemid mite Steneotarsonemus furcatus
De Leon may render Maranta sp. and Calathea sp. plants un
saleable. 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 (Uni
versity 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 con
fines 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
research (Fig. 3). Mites abandon the leaf as it fully
opens, as the mouthparts are unsuitable for effective pene
tration 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.

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 se
lected due to their systemic activity against mites and be
cause they were labeled for similar uses. Pentac 50% WP
was applied at the rate of 3 kg/500 liters (5 lb/100 gal) of

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 166 /a and 76 /a wide at coxae III; capitulum 22 /a
long (including palpi) and 23 /a wide, widest at basal third,
base not emarginate; genital papilla cordate in outline, 24 /a
long and 23 /a wide. Leg IV femur 22 /a 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 7 /a, ventral seta of femur 10 /a long, dorsal
seta 4 /a long; tibia 11 /a long and 6 /a wide with a ventral
seta 27 /a long and a dorsal rod-like sensilla anterior to it;
tarsus 3 /a long and 5 /a wide; claw 7 /a long.

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

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

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

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

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

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 applied.

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.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Pretreatment</th>
<th>12</th>
<th>20</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentac 50% WP</td>
<td>7.0</td>
<td>3.2a</td>
<td>1.4a</td>
<td>0.4a</td>
</tr>
<tr>
<td>Vydate Ly</td>
<td>5.8</td>
<td>4.8b</td>
<td>3.6b</td>
<td>4.2b</td>
</tr>
<tr>
<td>Temik 10Gx</td>
<td>9.6</td>
<td>2.8a</td>
<td>1.8a</td>
<td>0.2a</td>
</tr>
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<td>Control</td>
<td>8.4</td>
<td>7.2b</td>
<td>5.4b</td>
<td>6.4b</td>
</tr>
</tbody>
</table>

*pMeans followed by the same letter are not significantly different.
*z3 applications at 4-day intervals.

Literature Cited


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

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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 (heterogeneous nucleators) may supercool to -38°C (7). Water molecules act as nucleators at relatively warm temperatures (heterogeneous nucleators) 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