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EXPERIMENTAL INFESTATION AND SEASONAL VARIATIONS IN DENSITY OF ERIOPHYES VITIS PGST. (ACARINA : ERIOPHYIDAE) IN TURKEY. CONSEQUENCES ON EARLIEST TREATMENT

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(Accepted January 2003)

SUMMARY : Eriophyes vitis, common on the Kabarcek variety of grapevines was sampled after experimental infestation with 10, 11-30, 30-50 and 50-100 mites/plant, before and after blossoming. The highest number of adults and larvae was recorded in the beginning of August on plant infested by 10-30 mites. When infested after blossoming, 2876 and 3050 mites (1999 and 2000 respectively) were estimated. The yield loss is significant (500-700 g.). The necessary struggle against E. vitis was determined when 11-30 mites are seen by plant before blossoming.

Eriophyes vitis, commonly found in flat grapevines at arbors gives harm to young shoots and flower bunches (ÖNCÜER, 1998). Because of the effect of the secretion substance on the feeding place, on the underside of the leaf, a small and yellow cavity is formed, and there is a swelling on the opposite side of this cavity. The leaves with a high density mites wilt soon and die. Especially, in the vine varieties susceptible to mites, there has been deformation of buds, and distortions of leaves. The bud can’t grow and it wilts (ÖZBEK et al., 1995). It has been reported that E. vitis infected 20 kinds of grapevines and in 1985-1989, there was an increase at the level of density in Hungary (GYORFFY-MOLNAR, 1989), and it has been reported that it caused a yield loss between 30 and 40% in Russia and Azerbaijan (SAGİGOV, 1990). Phytoseiids are the natural enemies.

In Turkey E. vitis is common in all grapevine types in the Mediterranean regions where vine is grown and causes yield loss. In order to improve the struggle methods it was necessary to determine the damaging time of the mites. This study was carried out to identify increasing rate of densities of E. vitis on the local variety “kabarck” in Kahramanmaras (Turkey), to estimate the yield loss and contribute to elaborate the best strategy to struggle against it.

MATERIAL AND METHODS

Land studies were carried out at the village of Kazma, which is 10 km away from Kahramanmaras, in the west between 1999 and 2000. Seven and 8 year-old kabarck grapevines were used in two testing areas. Two experimental places were chosen and divided in 4 lots. 10 types of plants with the same growth were determined to determine the damage of population density of E. vitis depending on infection time on grapevines and the effect of it on the amount of yield.

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The first testing area was divided into four lots. Before the blossoming period, 10, 11-30, 30-40, 50-100 mites were given to each plant in lots 1, 2, 3 and 4 respectively. The number of the eggs, larvae and adults on the leaves was determined, then (replaced) leaves were attached on the sample plants. Three days later dry leaves were collected. Seven or 8 days before the mites were infested or before 3-5 leaves appeared at the vines, leaves were treated with a preparation including 0.2 per cent of endosulfan. The lots cleaned of mites were infected with the mentioned number of mites.

The second testing area was kept clear from mites until after blossoming by using chemicals. Control lots were situated near both experiential lots. The grapes were kept clear from mites until the end of the vegetation period using chemicals. The first treatment with pesticide (including endosulfan) was applied in early spring at the stadium with only 3-5 leaves and the second treat with pesticide was applied in the mid June.

After the mites in the testing lots were infected to the grapevines, 50 leaves were collected from each lot once ten days. The larvae and the adults were counted by using stereoscopic microscope in the laboratory. The numbers mentioned for mites were given for an average plant.

The time from the first infestation to the measuring day is multiplied by the number of the mites, and on the following days, the number of mites was calculated and cumulated according to measuring day. The infestation duration was stated as mites per days until the end of vegetation period. The damage level on the leaves was determined, and the level of damage of the grapevines was characterized from level 0 to level 4 according to the scale: 0: No damage on the leaves; 1: 10% of the leaf surface is damaged; 2: 11-35% of the leaf surface is damaged; 3: 36-65% of the leaf surface is damaged; 4: 66-100% of the leaf surface is damaged.

The infection rate of the leaves through mites was measured monthly. For this purpose, fifty leaves were collected from the grapevines. The following formula (Asriyev et al., 1984) was used:

\[ X = \frac{C \times (A + B)}{D} \times \% \]

\( X \): (damage level),
\( A \): infection rate,
\( B \): number of the days after infection,
\( C \): total number of mites determined each plant
\( D \): number of the leaves counted.

The length of the one-year-old shoots was measured in autumn after the leaves fell, with a measuring tape and on February 17th when the buds start to blossom. The average length, the dry parts and length of the adult shoots not affected by the cold weather were determined.

The mite infection was carried out between April 14, 1999 and April 10, 2000 before the blossoming period. The leaves with mites were collected. As the leaves gradually died, the mites on them went to the testing plants.

Statistics were taken from the lots after the infection once ten days. Meteorological information was taken from the State Meteorology Affairs Observation Station of Kahramanmaras province (Turkey).

**RESULTS**

Infection rate The infection duration of plants with mites was determined to be 88927 mites/days in 1999 and 89527 mites/days in 2000 until the end of the vegetation time in a lot where 11-30 mites were infected to each plant and average yield of 4400-4500 g. per plant was observed. From the testing lot, on average, yield was of 5000-5100 g. per plant.

Damage: A difference was noted between the length and growth of the one-year-old shoots in the plants, depending on the amount of infecting of mites. The next year, the yelds depends on the buds in the one-year-old shoots and they are damaged in the first cold weather of the winter unless these shoots grow and get strong. In 1999, before blossoming the average length was 943 mm, the adult part was 625 mm at the second lot where 11-30 mites were infected. These numbers were 837 mm and 442 mm in 2000 (Table 1). At the end of the vegetation period, the grapes were damaged at the first degree on plants infected with 10 mites with 67080 mites/day and about 90000 mites/day on plants infected by 11-30 mites (Table 1).
On grapevines kept clear with chemical, the density of mites population was seen to increase after May 25th. The highest number of mites was recorded on August (10th in 1999 and 13th in 2000). At the lot I (10 mites infected to the grapes), 2600 mites/plant (1999) and 2745 mites/plant (2000) were counted. In the lot 2, (11-30 mites), 2876 and 3050 mites/plant were recorded. Because of the increase of the amount of infection, the numbers of mites was higher at the subsequent lots (Fig. 1).

Influence of climatic condition: In 1999, spring was cool and damp (average temperature: 18.9 °C, humidity: 18% in April) and the leaves and the branches of the grapevines slowly grew. The density of mites increased slightly. At the beginning of May, the weather got warmer, the number of the mites reached 8-fold. The highest number of larvae and adults in August was 2625, 3457, 3965 and 4109 in lot I, II, III, and IV respectively. During the survey in the next year, testing was repeated and the warmer temperatures positively affected both the growth of grapes and densities of mites. The average temperature from April to July was 25.7 °C. The highest number of mites were reported on August 8th, 2000. 2800, 3842, 4105, 4870 mites were seen in each plant the first, second, third and fourth lots respectively (Fig. 1). The numbers of mites decreased after late August (1999 & 2000).

**DISCUSSION**

The changes in the numbers of mites in two experimental areas, (before and after the blossoming period) showed clearly the influence of climatic conditions on the densities: the number of mites increased in hot and dry weather. In 1999, the increase was prevented by the rainfalls (1-3 days on the 7th and 12th days after infestation). The temperature rose to 19 °C and moist fell to 70 o after 26th April.

In spring 2000 the temperature rose suddenly (19.5 °C) (end of March), the leaves appeared and subsequently causing the mites to leave their winter shelter. After the infestation (April 10th, before blossoming), the number of larvae and adults increased quickly. There was a difference between the number of the mites and yield amount depending on infestation duration.

**Damages**: The damage level increased in accordance with the amount of infection (Table 1). The infection duration was 43450 mites/day, 68326/mites.

**Table 1.** Experimental effect of infection by E. vitis = Yield output and length of one year shoots.

<table>
<thead>
<tr>
<th>Experimental mite infections</th>
<th>1999</th>
<th>2000</th>
<th>The damaged grapevines by mites at the end of the vegetation period (by degree)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yield (kg)</td>
<td>Length of the shoots (mm)</td>
<td>Development of the shoots (mean) (mm)</td>
</tr>
<tr>
<td>I Lot (10 mite/plant)</td>
<td>4.5</td>
<td>960</td>
<td>640</td>
</tr>
<tr>
<td>II Lot (11-30 mite/plant)</td>
<td>4.4</td>
<td>943</td>
<td>625</td>
</tr>
<tr>
<td>III Lot (30-50 mite/plant)</td>
<td>3.3</td>
<td>915</td>
<td>592</td>
</tr>
<tr>
<td>IV Lot (50-100 mite/plant)</td>
<td>2.8</td>
<td>827</td>
<td>527</td>
</tr>
<tr>
<td>V Lot (cleared from mites)</td>
<td>5.0</td>
<td>974</td>
<td>645</td>
</tr>
<tr>
<td>The first testing area (The mite was infected before the blossoming period)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I Lot (10 mite/plant)</td>
<td>4.3</td>
<td>915</td>
<td>606</td>
</tr>
<tr>
<td>II Lot (11-30 mite/plant)</td>
<td>4.1</td>
<td>876</td>
<td>587</td>
</tr>
<tr>
<td>III Lot (30-50 mite/plant)</td>
<td>3.0</td>
<td>813</td>
<td>540</td>
</tr>
<tr>
<td>IV Lot (50-100 mite/plant)</td>
<td>2.6</td>
<td>769</td>
<td>525</td>
</tr>
<tr>
<td>V Lot (cleared from mites)</td>
<td>4.6</td>
<td>933</td>
<td>619</td>
</tr>
</tbody>
</table>

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The population change in mite infested lots before (10.04.2000) and after (18.04.2000) blossoming.

The number of mites determined in a plant (X 1000)

<table>
<thead>
<tr>
<th>April 10, 2000</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

- 10 mites were infected
- 11-30 mites were infected
- 30-40 mites were infected
- 50-100 mites were infected

Fig. 1. — The population change in mite infested lots before (10.04.2000) and after (18.04.2000) blossoming.

day, 85652 mites/day, 108497 mites/day at the first, second, third and the fourth lots respectively. The amount obtained from a lot where 11-30 mites were infected before and after the blossoming period were 4400-4500 g. and 4100-4300 g respectively. If the number of mites is more than 4000 mite per plant, the damage and yield loss are seen to increase. In conclusion, the number of the mites infected to grapes, and the level of density reached (depending on the time) affected the damage level, the infection duration, the yield, and the length and the growth of the shoots. The density of *E. vitis* increased considerably in summer.

Consequences on the earliest treatment: The damage changed depending on infestation duration and amount and the most favourable conditions to start treatment is when 11-30 mites are counted before the blossoming period. Low densities in autumn and winter may low the damages in spring.

*Colomerus vitis* (*E. vitis*) was reported to have died in the coldest winter in France (1986) and it has been proved that there is a certain amount of difference between the ones which enter diapause (winter) and the ones which attack buds and flowers in the next spring (*GALL*, 1992).

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