SHORT COMMUNICATIONS

Influence of Plant Nitrogen Supply on the Populations of Some Cotton Pests

The use of manure affects sometimes the metabolic patterns of the host plant and consequently improves the living conditions for some pests such as mites and aphids. Peet (1962) reported that if formerly neglected fruit trees were fertilized, the fruit tree red spider mite *Panonychus ulmi* (Koch) increased and this increase was associated with an increase in the nitrogen content of the leaves. Other workers demonstrated that the nitrogen content of leaves of the host plant may influence the reproductive potentiality of the mites (Kuenen, 1949; Rodriguez, 1958; Ramy, 1970; Vrie, 1970).

Potted cotton plants were treated, as side dressing, with two nitrogen levels of ammonium sulfate, 120 and 360 kg/hectare demonstrating shortage and excess levels respectively. Calcium superphosphate and potassium sulfate were added as 240 kg and 120 kg/hectare, respectively, in all treatments to provide the plant with both elements. Each treatment composed of 72 plants, distributed in a complete randomized plot design.

Numbers of mite, aphid and leaf-hopper, of natural populations were counted on August 1st and 15th on entire plants of each treatment. Plant nitrogen was determined in foliar and roots on July 15th, August 1st and 15th. Growth patterns and flower buds were recorded at August 15th. Total nitrogen determination was carried out according to Koch and McMeekin (1924).

Plant received the high level of nitrogen induced a greater increase in the populations of the three pests than on plants grown in nitrogen deficient soil (Table 1). The aphid population extremely responded to the increase in ammonium sulfate level. The differences between the populations of the three pests on the N high plants and the N low plants were significant.

The percentage of total nitrogen was higher in the foliar of plants received the high level of

Table 1. Numbers of the Three Pests per Plant

<table>
<thead>
<tr>
<th>Nitrogen level</th>
<th><em>E. orientalis</em></th>
<th><em>A. gossypii</em></th>
<th><em>E. typica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aug. 1</td>
<td>Aug. 15</td>
<td>Average</td>
</tr>
<tr>
<td>Excessive</td>
<td>37.3</td>
<td>33.5</td>
<td>35.4*</td>
</tr>
<tr>
<td>Low</td>
<td>7.5</td>
<td>5.8</td>
<td>6.7</td>
</tr>
</tbody>
</table>

* Difference significant (P<0.05), F-test.

Table 2. Percentage of Nitrogen (mg/g) in Cotton Plants Supplied with Different Levels of Ammonium Sulfate.

<table>
<thead>
<tr>
<th>Nitrogen level</th>
<th>July 15</th>
<th></th>
<th>August 1</th>
<th></th>
<th>August 15</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Foliar</td>
<td>Root</td>
<td>Foliar</td>
<td>Root</td>
<td>Foliar</td>
<td>Root</td>
</tr>
<tr>
<td>Excessive</td>
<td>2.32</td>
<td>0.42</td>
<td>2.11</td>
<td>0.63</td>
<td>2.00</td>
<td>0.39</td>
</tr>
<tr>
<td>Low</td>
<td>2.04</td>
<td>0.63</td>
<td>1.82</td>
<td>0.73</td>
<td>1.80</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Table 3. Plant Growth Estimations of Cotton Plants Supplied with Different Levels of Ammonium Sulfate

<table>
<thead>
<tr>
<th>Nitrogen level</th>
<th>Height of plant in cm</th>
<th>Stem diameter in cm</th>
<th>Leaves No.</th>
<th>No. of floral buds</th>
<th>Fresh weight in g</th>
<th>Dry weight in g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive</td>
<td>41.66</td>
<td>0.60</td>
<td>13.23</td>
<td>4.0</td>
<td>105.33*</td>
<td>29.8</td>
</tr>
<tr>
<td>Low</td>
<td>38.96</td>
<td>0.60</td>
<td>15.13</td>
<td>3.0</td>
<td>80.47</td>
<td>21.93</td>
</tr>
</tbody>
</table>

* Difference significant (P<0.05), F-test.

ammonium sulfate than those supplied with the low level (Table 2). Analysis of roots showed higher percentage of nitrogen in the plants received the low ammonium sulfate level. These results are in accordance with that of Gallo (1961), Saito and Yamamoto (1964), and Sharples and Hilgeman (1968).

Fresh and dry weights of plants (Table 3) were positively correlated to the level of ammonium sulfate, while the variations in height of plants, stem diameter and number of leaves were not significant. The number of floral buds showed a non significant increase due to increasing the N level.

Thus it can be concluded that excessive nitrogen application, associated with a high increase in the N content of the leaves, increased the populations of the citrus brown mite, Eutetranychus orientalis (Klein), the melon aphid, Aphis gossypii (Glove) and the leaf hopper, Empoasca lycopersica (Bog.) on cotton plants. These findings are in accordance with that of Henneberry (1960, 1962), Boudreaux (1963), and Watson (1964).

REFERENCES


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Effects of Hatching Stimulants Obtained from the Cyst Contents of Heterodera Species (Tylenchida: Heteroderidae) on the Hatching of Other Species

It is known that egg hatching of most Heterodera spp. is stimulated by root exudates from their host plants. For example, Tsutsumi and Sakurai (1966) first reported that root diffusates of soybean, kidney bean and adzuki bean stimulated the eggs of the soybean cyst nematode, Heterodera glycines Ichinose, to hatch. On the other hand, the aqueous extract of ultrasonically broken eggs of H. glycines also caused the hatching of the other eggs of H. glycines (Okada, 1972b). From this fact it is supposed that a hatching stimulant exists in the aqueous extract of the broken eggs. Although the hatching stimulant in the eggs has not been proved to be identical with that in the host root diffusate, it is conceivable that a substance produced by a plant can be found in eggs of the parasites of the plant. If the two hatching stimulants are identical, the hatching stimulant in the eggs will show a species specificity as is evidenced for the root diffusate. The present experiments were conducted to find out the effects of the aqueous extract of the cyst contents of H. glycines, H. rostochiensis Wollenweber and H. oryzae Luc et Berdon Brizuela on the hatching of eggs of the three species.

Firstly the relationship between the concentration of the hatching stimulant obtained from the eggs of H. glycines and the hatching rate of the eggs separated from the cysts was investigated. Cysts of H. glycines were crushed in distilled water and the contents consisting of eggs, larvae and degenerated female organs were thoroughly broken.