Calcium Deficiency Symptoms of Epipremnum aureum

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Dickey and Joiner (1966) reported Ca deficiency symptoms occurring first on old leaves of heartleaf philodendron (Philodendron scandens ssp. oxycardium C. Koch & H. Sell.) and pothos (Epipremnum aureum (Linden & Andre) Bunt.), with youngest leaves of heartleaf philodendron and pothos remaining symptomless. After 4 months, upper, middle, and lower leaf samples were collected from five of the + Ca plants. Upper leaves with Ca deficiency symptoms and lower leaves with no symptoms were collected from five of the – Ca plants. Leaf samples were oven-dried at 65°C, ground, ashed in a muffle furnace for 3 h at 550°C, and analyzed for Ca with a Perkin-Elmer (Norwalk, Conn.) atomic absorption spectrophotometer model 2380.

The – Ca plants developed symptoms similar to those reported for heartleaf philodendron (Hershey and Merritt, 1987) and other higher plants (Epstein, 1972). The earliest symptom was necrosis of root tips followed 2 to 6 weeks later by chlorotic spots located randomly on the uppermost leaf and by leaf distortion of expanding leaves. Soon after these symptoms appeared, the shoot tip became necrotic and the uppermost leaf became completely chlorotic. These symptoms were followed by necrotic spotting, marginal necrosis, and total necrosis of the uppermost leaf. This pattern of symptom development then progressed down the stem. Basal leaves remained symptomless.

Leaf Ca concentration in deficient (upper) leaves was only 11% or less of the concentration in normal leaves (Table 1). In + Ca plants, Ca concentrations were highest in the lower and middle leaves. Lower, healthy leaves on severely deficient plants had 44% of the Ca concentration in leaves on + Ca plants. The very low Ca concentration in the upper, deficient leaves of the – Ca plants supports the hypothesis that the symptoms were caused by a Ca deficiency and indicates that no major translocation of Ca from lower to upper leaves occurred.

The – Ca-deficient plants placed in fresh + Ca solution were not injured, but the Ca-depleted plants placed in fresh + Ca – Ca solution recovered completely, developing a healthy new root system and several vigorous lateral shoots. The – Ca plants placed in new – Ca solution did not change significantly; thus, Ca deficiency was confirmed as the cause of the symptoms. Even after 9 months in – Ca solution, one or two basal leaves remained healthy on – Ca pothos, although the root system appeared totally necrotic.

Although the – Ca solution contained only one-third the N concentration as the + Ca solution, as recommended by Hoagland and Arnon (1950), no symptoms of N deficiency appeared on the – Ca plants.

Pothos, like heartleaf philodendron (Hershey and Merritt, 1987), does not develop Ca deficiency symptoms on old leaves, contrary to Dickey and Joiner (1966), and apparently does not translocate enough Ca from old to young leaves to prevent Ca deficiency symptoms on young leaves (Joiner et al., 1983). Rather, pothos has Ca deficiency symptoms like those of other higher plants, with chlorosis and necrosis of root tips, shoot tips, and young leaves (Epstein, 1972).

Table 1. Calcium concentration in pothos leaf blade, with petiole, from plants grown with and without Ca in the nutrient solution.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Leaf position</th>
<th>Ca (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Ca</td>
<td>Upper</td>
<td>1.71 ± 0.19</td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>2.69 ± 0.07</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>2.91 ± 0.09</td>
</tr>
<tr>
<td>– Ca</td>
<td>Upper</td>
<td>0.19 ± 0.018</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>1.29 ± 0.067</td>
</tr>
</tbody>
</table>

Data represent means ± se; n = 5 for – Ca, but n = 4 for + Ca because of the loss of one set of tissue samples before analysis.

Literature Cited


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