Characterization of macro and micro nutrient deficiency symptoms in asparagus (Asparagus officinalis L.)

The present study describes symptoms of potassium, magnesium, phosphorus, sulfur, calcium, zinc, manganese and boron deficiency on asparagus detailed for phylloclades, root and fruits.

Material & methods

Pot experiments with sand substrate and two-year old plants; Cultivars: 'Gijilim', 'Cumulus' and 'Rapsody'

Treatments:
- Nutrient solution containing all essential nutrients ('control')
- Nutrient solution without (respectively):
  - Phosphorus (-P)
  - Potassium (-K)
  - Magnesium (-Mg)
  - Calcium (-Ca)
  - Sulphur (-S)
  - Boron (-B)
  - Manganese (-Mn)
  - Zinc (-Zn)

Results

Nutrient solution containing all essential nutrients ('control')

- Control

Shoot and root biomass were clearly reduced in treatments -K, -Mg, -S, -B and -Zn compared with the fully fertilised control, but Mn deficiency did not significantly affect root biomass. The particular deficiency symptoms have been categorized by visual means, but they should always be confirmed by a nutrient analysis of the tissue, since similar symptoms could also be caused by other reasons.

### Nutrient content in shoot dry matter

<table>
<thead>
<tr>
<th>Nutrient solution</th>
<th>Root fresh weight [g]</th>
<th>Nitrogen (%)</th>
<th>Potassium (%)</th>
<th>Magnesium (%)</th>
<th>Calcium (%)</th>
<th>Sulfur (%)</th>
<th>Boron (ppm)</th>
<th>Manganese (ppm)</th>
<th>Zinc (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>620</td>
<td>3.4</td>
<td>2.78</td>
<td>0.20</td>
<td>0.87</td>
<td>0.39</td>
<td>163</td>
<td>81</td>
<td>21</td>
</tr>
<tr>
<td>-K</td>
<td>365</td>
<td>3.4</td>
<td>0.42</td>
<td>0.42</td>
<td>1.51</td>
<td>0.34</td>
<td>203</td>
<td>140</td>
<td>31</td>
</tr>
<tr>
<td>-Mg</td>
<td>245</td>
<td>3.4</td>
<td>2.92</td>
<td>0.05</td>
<td>0.62</td>
<td>0.31</td>
<td>140</td>
<td>72</td>
<td>27</td>
</tr>
<tr>
<td>-S</td>
<td>265</td>
<td>3.7</td>
<td>2.69</td>
<td>0.26</td>
<td>1.02</td>
<td>0.20</td>
<td>217</td>
<td>120</td>
<td>25</td>
</tr>
<tr>
<td>-B</td>
<td>490</td>
<td>3.4</td>
<td>2.68</td>
<td>0.20</td>
<td>0.82</td>
<td>0.41</td>
<td>31</td>
<td>83</td>
<td>22</td>
</tr>
<tr>
<td>-Mn</td>
<td>695</td>
<td>3.4</td>
<td>2.45</td>
<td>0.19</td>
<td>0.82</td>
<td>0.36</td>
<td>163</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td>-Zn</td>
<td>420</td>
<td>3.5</td>
<td>2.72</td>
<td>0.21</td>
<td>0.91</td>
<td>0.41</td>
<td>170</td>
<td>77</td>
<td>18</td>
</tr>
</tbody>
</table>

Carmen Feller & Anja Müller; Leibniz-Institute of Vegetable and Ornamental Crops
Theodor-Echtermeyer-Weg 1, D-14979 Großbeeren, Germany
feller@igz-ev.de

Supported by Lebosol Dünger GmbH

Leibniz Gemeinschaft