Root-knot nematode damage to bell pepper

Introduction

Background
Southern root-knot nematode (*Meloidogyne incognita*) has been reported to cause serious damage to bell peppers. The Coachella Valley of Southern California has approximately 5,000 acres of bell pepper production with a reported gross value of $90,000,000. Root-knot nematodes (RKN) are widespread throughout the Coachella Valley. To control nematodes growers commonly apply fumigants such as metam-sodium (Vapam) or 1,3-dichloro-propene as a post-harvest and or as a pre-plant soil treatment.

There are a few studies from Europe that describe the interaction between nematodes and bell peppers. Nematode damage threshold, nematode populations/species, and tolerance limits for Coachella Valley bell peppers are unknown.

It is the second-stage nematodes (J2) that are able to move through the soil and enter plant roots.

Method

Sampling

- Eight different bell pepper fields in the Coachella Valley with a history of nematode problems were sampled at flowering and at harvesting.
- Early field sampling of bell pepper plants at flowering stage detected only one J2 RKN in these fields.
- Fields were sampled again at harvesting when yellowing, whitening of new growth was obvious. These plants showed obvious RKN galling of the roots.
- Field was sampled after a low rate of Vapam (15 gallons/acre) applied through the drip system.
- Five varieties of bell peppers were inoculated in the greenhouse with nematodes collected from Coachella Valley fields.

Results

*Meloidogyne incognita* race 3 identified

RKN soil populations in Coachella Valley bell pepper fields increased in one month from almost non-detectable to >30,000 J2/100g soil.

The more severe the root galling the more severe the level of plant leaf yellowing and younger leaf whitening.

RKN females from field-grown bell peppers were identified morphologically and on indicator plants of pepper, tomato, cotton, corn, tobacco, peanut and watermelon as *M. incognita* race 3.

Greenhouse experiments with increasing RKN inoculum levels showed significant differences in plant tolerance and host status between five bell pepper cultivars.

<table>
<thead>
<tr>
<th>Inoculum (J2 per pot)</th>
<th>CW</th>
<th>CB</th>
<th>CR</th>
<th>MB</th>
<th>BA</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,500</td>
<td>0.1</td>
<td>1.4</td>
<td>4.2</td>
<td>6.8</td>
<td>6.6</td>
<td>3.8 b</td>
</tr>
<tr>
<td>4,500</td>
<td>0.0</td>
<td>2.6</td>
<td>6.5</td>
<td>7.6</td>
<td>7.2</td>
<td>4.7 ab</td>
</tr>
<tr>
<td>15,000</td>
<td>0.5</td>
<td>3.0</td>
<td>6.2</td>
<td>7.8</td>
<td>8.4</td>
<td>5.4 a</td>
</tr>
</tbody>
</table>

Average 3.0 d 2.3 c 5.6 b 7.4 a 7.4 a

Pepper cultivars: CW=Carolina Wonder (R), CB=Charleston Bells (R), CR=Chouder (S), MB=MiniBells (S), BA=Baron (S). Different letters within this column indicate significant differences at the 95% confidence level. Different letters within this row indicate significant differences at the 95% confidence level.