RESEARCH NOTES

Technique for Quantifying Injury to Seedling Soybeans by Pratylenchus penetrans Without Sacrificing the Plant

P. L. TAYLOR, J. M. FERRIS and V. R. FERRIS

Lesion nematodes (Pratylenchus spp.) are abundant in soybean fields in Illinois and Indiana (2, 3) and are capable of causing damage to soybeans (1, 5). Use of nematicides to protect soybeans is not economical. Breeding resistant varieties may be a more logical approach, but a technique which might prove adequate for fast and effective screening of soybean lines has not been available. A technique is described herein which might be satisfactory.

Seeds of soybean (Glycine max L. 'Clark 63') were soaked 30 min in 10% commercial bleach solution (0.5% NaOCl) and rinsed in sterile water, and four seeds placed hilum down in a diSPo® growth pouch over holes punched in the trough of the paper wick (diSPo pouches are made of clear plastic, 16.5 × 17.5 cm, and contain a paper wick folded at the top to form a trough). Preliminary tests showed that it was not necessary to sterilize the pouches (5). The charged pouches were placed at 25-27 C until the germinating tap root was 0.5-3 cm long (18-36 hr). Seeds that failed to germinate were replaced with a supplemental supply of seedlings.

Pratylenchus penetrans, obtained from callus culture, were used as inoculum. From 1000 to 40,000 total specimens in water suspension were added/pouch in 3, 5, or 10 inoculations with an interval of 12 or 24 hr. The level of nematodes per inoculation was held constant in some trials and varied with time in others (Table 1). A maximum of 2 ml of fluid/inoculation was found to diminish loss of inoculum to the bottom of the pouch. Pouches without inoculum served as controls.

<table>
<thead>
<tr>
<th>Length of test (days)</th>
<th>Total nemas/seedling</th>
<th>No. inoculations</th>
<th>Interval between inoculations</th>
<th>Vol. fluid/inoculation</th>
<th>Growth parameters b exhibiting significant differences (t-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RW</td>
</tr>
<tr>
<td>14</td>
<td>250</td>
<td>5</td>
<td>24</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>4000</td>
<td>5</td>
<td>24</td>
<td>4</td>
<td>***</td>
</tr>
<tr>
<td>10</td>
<td>8500</td>
<td>3</td>
<td>24</td>
<td>3d</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>6500</td>
<td>5</td>
<td>24</td>
<td>4</td>
<td>***</td>
</tr>
<tr>
<td>9</td>
<td>6500</td>
<td>10</td>
<td>12</td>
<td>4</td>
<td>***</td>
</tr>
<tr>
<td>9</td>
<td>8000</td>
<td>5</td>
<td>24</td>
<td>2</td>
<td>**</td>
</tr>
<tr>
<td>9</td>
<td>8000</td>
<td>5</td>
<td>24</td>
<td>2</td>
<td>**</td>
</tr>
<tr>
<td>11</td>
<td>10,000</td>
<td>5</td>
<td>24</td>
<td>2</td>
<td>**</td>
</tr>
</tbody>
</table>

a An uninoculated control treatment was included in each test.
bRW = root weight; TRL = tap root length; LLL = length of longest lateral root; TNL = total number of lateral roots; ** differences between inoculated and control significant at 1% level; * 5% level.
cDivided equally among inoculations, except as noted.
dThe first inoculation was 1 ml/pouch.
eNumber applied per pouch of four seedlings at each of the five inoculations was 16,000; 4000; 4000; 4000; and 4000; respectively.
fNumber applied per pouch of four seedlings at each of the five inoculations was 10,000; 8000; 6000; 4000; and 4000; respectively.

Received for publication 13 September 1971.

1 Journal Paper No. 4392, Purdue University Agricultural Experiment Station, Lafayette, Indiana. This study was supported in part by Agriculture Contract 12-14-100-8151 (34) and Purdue Research Foundation David Ross Grant 5061.
2 Department of Entomology, Purdue University, Lafayette, Indiana 47907.
All pouches were placed in a growth chamber at 21 ± 1 C with a 16-hr photoperiod for 9-14 days. Duration of a test was from start of seed preparation to termination.

Seedling growth was determined by fresh weight of roots (blotted to remove moisture), length of tap root, length of longest lateral root, and total number of lateral roots. An estimate of nematode penetration was made by determining the number of specimens which emerged from root systems incubated individually for 1 week in 100 ml of continuously aerated deionized water. In eight tests, an average of 7% of the inoculum was recovered.

Growth reduction of the inoculated root system (when compared to the uninoculated system) was taken as the criterion for a successful test system. Consistent responses to lesion nematodes for all four root measurements could be obtained using a total of 8000 or 10,000 nematodes/seedling applied over 5 days in five inoculations. Since significant reductions in growth were apparent using all four parameters (Table 1), sacrifice of the plant to obtain root weight data is not necessary.

Although large numbers of nematodes are required for this test, it is still practical in terms of inoculum and time required. According to Riedel and Foster (4), very large numbers (30,000 to 40,000/test tube) of *P. penetrans* are easily produced.

**LITERATURE CITED**


**Economics of Root-knot Nematode Control on Cotton by DBCP Fumigant on the Texas High Plains**

CALVIN C. ORR

Present estimates of total U.S. nematicide costs average $86/hectare ($35/acre) (8). Nematode control on cotton with DBCP (1,2-dibromo-3-chloropropane) following label recommendations is about 20% of this amount.

Costs of nematicidal treatments are especially important on lower profit crops and in areas where wind, hail and rain frequently cause replanting of the crop which results in the loss of the fumigant. The use of the lowest effective rates is a method of minimizing costs (1, 3, 4, 5). The main purpose of the tests reported here was to explore the feasibility of reducing costs of nematode control on cotton by row-placement of low rates of DBCP using one chisel/row rather than two chisels/row, which is a common practice in this area.

Experimental plots were located in seven West Texas counties on Amarillo or Brownfield loamy fine sand soils that had light-to-moderate infestations of the cotton root-knot nematode,