Nodulation of legumes on new light land. 3. The effect of Rogor seed treatment on legume nodulation

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SEED treatment with systemic insecticides is widely used for the control of insect pests. However, when seed inoculation is necessary for pasture establishment, seed treatment with insecticide is not advisable. A field experiment conducted at Badgingarra Research Station in 1964 showed that the systemic insecticide Rogor was very damaging to the applied rhizobia even when the treated seed was held for a month before inoculation.

Materials, Experimental Site and Procedures

Site and Fertiliser

The experiment was conducted on newly cleared light land where inoculation was necessary for legume establishment. Fertiliser treatments were the same as described in previous articles in this series.

Legumes tested: Geraldton subterranean clover, Kondinin rose clover, Cyprus barrel medic, lucerne, field peas, vetch.

Seed Treatments

For each of the above legumes, seed samples were prepared as follows:

1. Seed Rogor-treated at commercially recommended rates, held one month, then inoculated and lime pelleted.
2. Seed Rogor-treated, held one week, then inoculated and lime pelleted.
3. Seed Rogor-treated, held one day, then inoculated and lime pelleted.
4. Seed Rogor-treated, then inoculated and lime pelleted immediately.
5. No Rogor treatment, but seed inoculated and lime pelleted.
6. No Rogor treatment and no inoculation, but seed lime pelleted.

Standard commercial peat cultures were used at the rates recommended to farmers. All the inoculation and lime pelleting treatments were done on the same day.

Sowing

The seed was sown at a depth of 1 in. to 1½ in. through a combine drill. The soil was dry at sowing and rain did not fall until three weeks later. The experiment was sown in a randomised design, there being two replications for each treatment.

Nodulation Assessment

Nodulation assessments were made as described in the previous articles. The maximum nodulation value per plot was 200.

Results

The nodulation assessments are shown in the Table. Typical growth differences are illustrated in the photograph of the subterranean clover plots.
The effect of Rogor treatment on nodulation

The effect of Rogor seed treatment on the nodulation of various legumes. The seed was held for periods of up to one month, after being treated with Rogor, before being inoculated and lime pelleted. All seed lots were lime pelleted and all except the control were inoculated.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Geraldton Subterranean Clover</th>
<th>Kondinin Rose Clover</th>
<th>Lucerne</th>
<th>Cyprus Barrel Medic</th>
<th>Field Pea</th>
<th>Vetch</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Rogor. Inoculated and pelleted (Standard)</td>
<td>194.0</td>
<td>160.0</td>
<td>140.0</td>
<td>152.5</td>
<td>200.0</td>
<td>197.0</td>
</tr>
<tr>
<td>Seed Rogor—treated, held 1 month. Inoculated and pelleted</td>
<td>102.0</td>
<td>20.0</td>
<td>48.5</td>
<td>19.5</td>
<td>127.5</td>
<td>80.0</td>
</tr>
<tr>
<td>Seed Rogor—treated, held 1 week. Inoculated and pelleted</td>
<td>105.5</td>
<td>8.0</td>
<td>21.5</td>
<td>16.0</td>
<td>86.0</td>
<td>73.5</td>
</tr>
<tr>
<td>Seed Rogor—treated, held 1 day, Inoculated and pelleted</td>
<td>109.5</td>
<td>15.0</td>
<td>20.5</td>
<td>17.5</td>
<td>109.5</td>
<td>92.0</td>
</tr>
<tr>
<td>Seed Rogor—treated, inoculated and pelleted at the same time</td>
<td>16.0</td>
<td>4.5</td>
<td>0.5</td>
<td>7.0</td>
<td>49.5</td>
<td>17.5</td>
</tr>
<tr>
<td>Control: No Rogor, no inoculation but pelleted</td>
<td>39.0</td>
<td>13.0</td>
<td>0.0</td>
<td>3.5</td>
<td>36.5</td>
<td>16.0</td>
</tr>
</tbody>
</table>

Figures linked by the unbroken lines are not significantly different from one another at the 0.01 probability level.

Nodulation differences for significance.  

- $P < 0.05 = 33.6$.
- $P < 0.01 = 45.3$.
- $P < 0.001 = 60.1$.

Poor establishment of subterranean clover where Rogor was used in conjunction with inoculation and lime pelleting in an area where inoculation is essential.

Even where Rogor-treated seed was held for one month (left) and one week (right) before inoculation, nodulation was very poor. The centre plot received no Rogor treatment.
The data indicate the following points:

1. Rogor applied as a seed treatment prior to or at the same time as inoculation and lime pelleting is very damaging to the applied rhizobia.
2. Poor establishment was obtained even when the Rogor treated seed was held for one month before inoculation and lime pelleting was carried out.
3. Legume-Rhizobium combinations vary to some extent in their tolerance to Rogor seed treatment. Geraldton subterranean clover, peas and vetches showed the best nodulation after Rogor treatment.

Discussion

The results of this experiment show that in areas where inoculation is essential for establishment, use of Rogor seed treatment will result in very poor stands. A similar experiment conducted in an area where inoculation was not essential (that is, the un-inoculated controls became satisfactorily nodulated) gave somewhat different results. Although early in growth, treatment 5 appeared best, the differences between treatments evened out towards the end of the growing season.

The deleterious effect of Rogor on rhizobia was also demonstrated by Vincent (personal communication) in laboratory tests. A number of other insecticides have been shown to be harmful to bacteria, including Aldrin, Dieldrin, Chlordane, D.D.T., B.H.C., lindane, and parathion (Braithwaite et al, 1958; Brakel, 1963).

Fungicides in common use are similar to insecticides in their effect on nodulation (Brinkerhoff et al, 1954; Williams et al 1960).

RECOMMENDATION

The systemic insecticide Rogor should not be used as a seed treatment for legumes when seed inoculation is essential for establishment.

REFERENCES

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