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DIRECTOR OF RESEARCH
ASSESSMENT OF YIELD LOSS FROM BUD NECROSIS DISEASE OF GROUNDNUT IN ANDHRA PRADESH, INDIA, IN THE RABI 1981-82 SEASON

P.W. AMIN and D.V.R. REDDY*

Summary

Bud necrosis disease (BND), caused by tomato spotted wilt virus, is one of the most important virus diseases of groundnut in India. In order to ascertain the distribution and severity of BND in rabi (postrainy season) groundnut crops in the state of Andhra Pradesh, surveys were undertaken in 10 major groundnut growing districts. BND incidence and severity, crop age, and plant density were recorded. The yield loss assessments were based on the area and production, incidence and severity of BND, and on the expected yield from the crop. The crop loss due to BND in Andhra Pradesh has been estimated to be 1500 tonnes of groundnut valued at about Rs.4.5 crores (45 million). We are currently testing another procedure for estimating yield loss which would also take into account compensation of yield in healthy plants adjacent to infected plants. This is expected to be a simple and more realistic method of crop loss estimation for BND.

Introduction

Bud necrosis disease (BND) of groundnut is an economically important disease in the state of Andhra Pradesh, India (Amin and Mohammad, 1980). The disease is caused by tomato spotted wilt virus (Ghanekar et al., 1979) and transmitted by thrips, mainly Frankliniella schultzei (Amin et al., 1981).

A survey of rabi (postrainy season) groundnut growing areas in 10 districts of Andhra Pradesh was conducted between the end of March and the first week of April 1982, to record the incidence and severity.

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of BND. The period for survey was chosen because in the rabi (postrainy) season the thrips population declines after February and therefore very little disease spread occurs after March. The thrips migration does not depend upon the age of crop and therefore even in young crops further disease spread after March is not likely to occur.

**Methodology**

In all the areas surveyed, a local variety of Spanish type groundnut referred to as TMV-2 was cultivated. In each district a minimum of six fields of 1 ha or more, located in major groundnut growing areas, were chosen. An area of 10 sq.m. at 3-5 locations per field was chosen in a diagonal fashion and observations on the numbers of healthy and infected plants, and on the approximate age of crop were recorded. Infected plants were grouped into two categories: those showing early infection (symptoms including stunting; axillary shoot proliferation, leaf deformity and death of the plant) or late infection (symptoms including ring spots on young leaves, and necrosis of the terminal bud).

For estimating yield loss all early infected plants were regarded as contributing 90% of the yield loss and the late infected plants 50% of the yield loss (Prasad Rao *et al.*, 1980) (Table 1).

The information on the area of groundnut production was obtained from the officials of the Department of Agriculture. The yield was determined on the basis of 5 years' average from the data supplied by the Directorate of Oilseeds Research, Indian Council of Agriculture Research, Hyderabad.

**Results**

Losses from BND for each district surveyed are given in Table 2. The disease was present in all the surveyed districts and the majority of
plants appeared to be infected when they were 60-70 days old, with the exception of some late sown crops in Khammam district where a higher number of plants with early infection were observed. The highest crop loss was estimated from Nalgonda district followed by Kurnool and Mahboobnagar districts. The low incidence of BND in Guntur district was mainly due to good plant stands resulting from a high seeding rate, the use of seed dressings, and good crop management. In the same district the fields with sparse plant populations had over 50% BND incidence. The disease incidence in Nellore and Chittoor districts was very low irrespective of plant stand and sowing date, so that yield losses were negligible. In Nizamabad district, crops sown in the month of December had a higher disease incidence than those sown in the third week of January. The total yield loss from BND in seven districts was estimated to be worth Rs.45 million (US $4.5 million). Estimates were not made for Anantapur district because only three locations were visited which were not considered representative of the district.

Discussion
It is evident from our surveys and calculations that BND causes substantial yield losses to the postrainy groundnut crop in Andhra Pradesh. Fields that were managed properly, seeded at the optimum rate, and where appropriate seed treatment was used resulting in good plant stands, were least affected by the disease and had lower yield losses. Such groundnut fields were observed in parts of Guntur district. In Nellore and Chittoor districts, the disease incidence was low, probably because of low vector population or low virus inoculum or both.
One of the major disadvantages of calculating yield loss on the basis of incidence and severity of disease, and the age of the crop, as was done in this survey, is that compensation, if any, derived from healthy plants adjacent to disease plants is not taken into consideration. We are currently preparing a field scale for scoring BND which would take into consideration the severity of symptoms, the age of plants at the time of infection, and the incidence of disease. We are also currently conducting experiments to estimate the amount of yield compensation in healthy plants adjacent to infected plants in relation to sowing dates, spacing and soil fertility. We expect that this information would provide a more realistic estimate of yield loss caused by BND.

References


The effect of tomato spotted wilt virus on yield of groundnut.

Table 1. Effect of bud necrosis disease on yield of plants infected at different ages under field conditions (Rabi 1980-81)

<table>
<thead>
<tr>
<th>Crop age in days when symptoms were first noticed</th>
<th>Yield (g)/plant</th>
<th>% Loss</th>
<th>Pods</th>
<th>Kernels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pods</td>
<td>kernels</td>
<td>Pods</td>
<td>Kernels</td>
</tr>
<tr>
<td>35</td>
<td>0.0</td>
<td>0.0</td>
<td>100.0</td>
<td>100.0</td>
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<tr>
<td>41</td>
<td>0.0</td>
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<tr>
<td>48</td>
<td>0.1</td>
<td>0.0</td>
<td>99.7</td>
<td>100.0</td>
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<tr>
<td>55</td>
<td>4.2</td>
<td>2.3</td>
<td>89.0</td>
<td>90.8</td>
</tr>
<tr>
<td>62</td>
<td>10.6</td>
<td>6.0</td>
<td>72.0</td>
<td>76.0</td>
</tr>
<tr>
<td>71</td>
<td>19.2</td>
<td>11.5</td>
<td>49.1</td>
<td>53.5</td>
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<tr>
<td>78</td>
<td>24.0</td>
<td>14.8</td>
<td>36.5</td>
<td>40.4</td>
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<tr>
<td>85</td>
<td>26.5</td>
<td>17.1</td>
<td>30.0</td>
<td>31.0</td>
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<tr>
<td>97</td>
<td>32.8</td>
<td>21.8</td>
<td>13.2</td>
<td>12.7</td>
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<tr>
<td>No symptoms</td>
<td>37.8</td>
<td>24.8</td>
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</table>

1/ Average for 600 plants in each age group. Experiments were conducted at ICRISAT Center in the 1980-81 rabi (postrainy) season. Row-to-row spacing was 75 cm and plant to plant spacing was 15 cm. The crop was raised in alfisols in high fertility precision fields.
Table 2. Districtwise estimate of yield loss from bud necrosis disease of groundnut in Andhra Pradesh in Rabi 1981-82 season.

<table>
<thead>
<tr>
<th>District</th>
<th>Yield Value (kg)</th>
<th>Early Yield Loss %</th>
<th>Expected Incidence</th>
<th>Late Yield Loss %</th>
<th>Expected Incidence</th>
<th>Early Yield Value (1000000/ha)</th>
<th>Late Yield Value (1000000/ha)</th>
<th>Early Yield (kg/ha)</th>
<th>Late Yield (kg/ha)</th>
<th>Early Population (1000000)</th>
<th>Late Population (1000000)</th>
<th>Area (ha)</th>
<th>Production (tonnes)</th>
</tr>
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<tbody>
<tr>
<td>Guntur</td>
<td>3.6</td>
<td>3.6</td>
<td>6.3</td>
<td>6.3</td>
<td>3.5</td>
<td>4.0</td>
<td>4.0</td>
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<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
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<tr>
<td>Prakasamn</td>
<td>600</td>
<td>6.2</td>
<td>16.0</td>
<td>3.0</td>
<td>2.5</td>
<td>4.0</td>
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<tr>
<td>Khammam</td>
<td>850</td>
<td>2.5</td>
<td>3.0</td>
<td>4.0</td>
<td>2.5</td>
<td>4.0</td>
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<td>3.0</td>
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<tr>
<td>Nizamabad</td>
<td>1000</td>
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<td>3.0</td>
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<td>3.0</td>
<td>3.0</td>
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<td>3.0</td>
<td>3.0</td>
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<tr>
<td>Total</td>
<td>7.000</td>
<td>7.000</td>
<td>7.000</td>
<td>7.000</td>
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<td>7.000</td>
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