Control of powdery mildew and rust of pea by fungicide

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ABSTRACT: Efficacy of six new fungicides, viz., triadimefon, hexaconazole, difenconazole, flusilazole, fenarimol and penconazole along with mancozeb and chlorothalonil was tested for the control of pea powdery mildew and rust. Triadimefon (0.05%) sprays were found highly effective in reducing the severity of powdery mildew while hexaconazole (0.10%) and difenconazole (0.015%) were best against rust beside exhibiting an appreciable increase in green pod yield.

Key words: Powdery mildew, pea, control, fungicide

Pea (Pisum sativum L.) is an important off-season vegetable cash crop which is grown round the year in one or the other area of Himachal Pradesh. Due to its continuous cultivation, powdery mildew (Erysiphe polygoi D.C.) and rust (Uromyces fabae (Pers.) de Bary) have assumed serious proportion (Bhardwaj and Sharma, 1984; Chauhan et al., 1991). These diseases usually appear late in the season, reaching maximum intensity during the pod formation stage. In a hundred per cent powdery mildew infected crop, the reduction in number of pods/plant is estimated to be 28.6 per cent (Rathi and Tripathi, 1994). All the commercial varieties grown in the State were found susceptible to powdery mildew (Jindal et al., 1995). As many as five protectant sprays of fungicides including Baycor and Bayleton at seven days interval were required to obtain satisfactory yield (Bhardwaj and Sharma, 1984). Limited reports on the chemical control of pea rust are available from North India (Singh et al., 1981). Hence, the present investigations were undertaken to evaluate some new fungicides to control these diseases.

MATERIALS AND METHODS

A field experiment with nine treatments was laid out in randomized block design at experimental Farm, Nauni, during the rabi season of 1992-93 and 1994-95, and each treatment was replicated thrice. A highly susceptible variety of pea, 'Lincoln' was sown in 2 x 2 m plots maintaining 60 x 7.5 cm (row to row and plant to plant) distance in the last week of October in both seasons. The treatments consisted of 8 fungicides, viz., mancozeb (Indofil M-45 75 WP, 0.25%), chlorothalonil (Kavach 75 WP, 0.2%), triadimefon (Bayleton 25 WP, 0.2%), hexaconazole (Contaf 5 EC, 0.1%), difenconazole (Score 25 EC, 0.015%), flusilazole (Punch 40 EC, 0.04%), fenarimol (Rubigan 12 EC, 0.04%), penconazole (Topas 10 EC, 0.05%) and a control (only water spray). The first spray was given in the last week of February at flowering stage. In total, three sprays were applied at fortnightly intervals. The data on disease severity of powdery mildew (Munjal et al., 1963) and rust (Sokhi et al., 1984) were recorded seven days after the last spray and the percentage of disease severity index was calculated (Singh, 1988). The data showed that error variances for powdery mildew and rust severities were heterogenous while that of yield was homogenous. Further, they were pooled according to the standard procedures followed by Gupta and Nigam (1979), and Gomez and Gomez (1984).

RESULTS AND DISCUSSION

The pooled analysis of the data (Table I) showed the presence of interaction between treatments and season for rust and powdery mildew severities and yield of green pods. Thus, it may be inferred that severity of rust and powdery mildew, and yield were season dependent. However, yield did not vary greatly for both crop seasons.

All the fungicides significantly reduced the disease severity of both diseases during both the seasons compared with the control (Table 1). Triadimefon spray was found highly effective as the plots remained free from powdery mildew as compared to 75.83 per cent disease in untreated check followed by hexaconazole, difenconazole, flusilazole, fenarimol and penconazole, which were statistically at par with each other while
Table 1. Effect of fungicide spray application of powdery mildew, rust and pod yield of pea

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<tbody>
<tr>
<td>Mancozeb</td>
<td>0.25</td>
<td>63.33 (52.86)</td>
<td>32.50</td>
<td>47.91</td>
<td>51.67 (45.94)</td>
<td>24.00</td>
<td>37.83</td>
<td>2.60 (2.071)</td>
<td>1.733</td>
<td>2.16</td>
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<tr>
<td>Chlorothalonil</td>
<td>0.20</td>
<td>55.00 (47.91)</td>
<td>29.16</td>
<td>42.08</td>
<td>45.03 (42.53)</td>
<td>18.33</td>
<td>32.08</td>
<td>2.52 (2.071)</td>
<td>2.07</td>
<td>2.29</td>
</tr>
<tr>
<td>Triadimefon</td>
<td>0.05</td>
<td>0.00 (0.00)</td>
<td>0.00</td>
<td>23.33</td>
<td>6.00 (28.87)</td>
<td>14.67</td>
<td>3.53</td>
<td>3.03 (2.82)</td>
<td>3.28</td>
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<tr>
<td>Hexaconazole</td>
<td>0.10</td>
<td>0.00 (0.00)</td>
<td>4.16</td>
<td>2.08</td>
<td>2.08 (4.80)</td>
<td>6.67</td>
<td>4.37</td>
<td>3.88 (3.43)</td>
<td>3.65</td>
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<tr>
<td>Difenoconazole</td>
<td>0.015</td>
<td>0.00 (0.00)</td>
<td>4.16</td>
<td>2.08</td>
<td>8.33 (16.41)</td>
<td>7.33</td>
<td>7.83</td>
<td>3.50 (3.13)</td>
<td>3.32</td>
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<tr>
<td>Flusilazole</td>
<td>0.04</td>
<td>0.00 (0.00)</td>
<td>4.16</td>
<td>2.08</td>
<td>14.44 (21.74)</td>
<td>8.00</td>
<td>11.22</td>
<td>3.92 (3.82)</td>
<td>2.82</td>
<td>3.36</td>
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<tr>
<td>Fenarimol</td>
<td>0.04</td>
<td>0.00 (0.00)</td>
<td>5.83</td>
<td>2.91</td>
<td>41.52 (40.02)</td>
<td>13.67</td>
<td>27.59</td>
<td>3.33 (2.80)</td>
<td>3.06</td>
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<tr>
<td>Penconazole</td>
<td>0.05</td>
<td>0.00 (0.00)</td>
<td>6.66</td>
<td>3.33</td>
<td>36.67 (37.09)</td>
<td>9.67</td>
<td>23.17</td>
<td>3.48 (2.70)</td>
<td>3.09</td>
<td></td>
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<tr>
<td>Control</td>
<td>-</td>
<td>81.66 (74.81)</td>
<td>70.00</td>
<td>75.83</td>
<td>73.50 (55.48)</td>
<td>73.00</td>
<td>73.25</td>
<td>2.10 (1.57)</td>
<td>1.57</td>
<td>1.83</td>
</tr>
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CD 0.05

7.01  9.07  0.70

Figures in parentheses are arc sine transformed values.

Indofil M-45 and Kavach were the least effective. Hexaconazole were found highly effective in reducing the severity of rust to 4.37 and 7.83 per cent, respectively, as compared to 73.25 per cent in control, followed by flusilazole, triadimefon and penconazole which were statistically at par with each other while Indofil M-45 was least effective. Pooled analysis of yield data showed that maximum green pod yield was obtained in hexaconazole sprayed plots followed by flusilazole, difenoconazole, triadimefon, penconazole and fenarimol which were statistically at par with each other, while the minimum yield was obtained in the plots sprayed with Indofil M-45 and Kavach. The lesser variation in yield may be attributed to erratic proportions of rust and powdery mildew for both crop seasons.

Triadimefon, hexaconazole, difenoconazole, flusilazole, fenarimol and penconazole were found highly effective in reducing the severity of both diseases and increasing the pod yield. The efficacy of triadimefon has already been reported against both diseases (Singh et al., 1981; Bhardwaj and Sharma, 1984; Pancaldi and Brumelli, 1988; Rana et al., 1991; Ranson et al., 1991). The reduction in the severity of powdery mildew by fenarimol and penconazole also corroborate the findings of Rana et al. (1991), Cafe Filho et al. (1988), and Follas and Welsh (1989). Similarly, these results also confirm the activity of flusilazole against powdery mildews and rust (Al-Ayoubi and Shephard, 1990; Pancaldi and Brunelli, 1988). However, difenoconazole is apparently used for the first time against these diseases.

Three sprays of either hexaconazole (0.015%) or flusilazole (0.04%) were found highly effective in reducing the severity of powdery mildew and rust besides exhibiting an appreciable increase in green pod yield.

REFERENCES


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