RELATIVE RESISTANCE OF SAFFLOWER CULTIVARS AGAINST BLACK APHID, UROLEUCON COMPOSITAE (THEOBALD)

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ABSTRACT

Black aphid, Uroleucon compositae (Theobold) is a serious pest of the safflower crop. It attacks on the tender shoots of the plants and due to its drainage, the plants fade and dry up and heavy damage is caused to the crop. The study was carried out to observe the relative resistance of 5 safflower cultivars against black aphid, Uroleucon compositae. It was observed that the population of aphid differed significantly among the cultivars PI-40/477, PI-292000 and PI-405994, while no significant difference in population of aphid was observed in case of cultivars PI-26993 and Thori-78. Cultivar PI-40/477 proved relatively resistant against aphid with low population of pest (25.47 ± 5.95 per 6 plants), while PI-405994 found to be highly susceptible with high population of pest (100.04 ± 26.11 per 6 plants). Cultivars PI-26993 (63.35 ± 14.51 per 6 plants), PI-292000 (52.87 ± 11.81 per 6 plants) and Thori-78 (50.84 ± 12.36 per 6 plants) were susceptible to aphids.

Key Words: Black Aphid, Safflower, Varietals Resistance.


INTRODUCTION

Safflower belongs to family compositae and is an important traditional crop of semi-arid areas of India, Iran, Egypt and other Mediterranean countries. Safflower was one of the first crops to be grown for oil in the near East, India, China and Japan. It is an important oil seed crop of rabi season (Khoso, 1990). In parts of California, as well as in Pakistan safflower is grown frequently after a rice crop, when the soil does not dry out sufficiently to permit early winter sowing of cereals. Safflower can produce a good crop on such soils with no additional water, and its ability to dry the soil to considerable depth is actually an advantage, as the drying has beneficial effects (Anonymous, 2001). Safflower crop has tremendous scope for its cultivation in Sindh province of Pakistan, but at the same time it is attacked by a large number of insect pests which cause heavy losses to the yield of this crop (Salim, 1977). Safflower is attacked by a number of insect pests such as aphids, thrips, whitefly, jassids, shoot fly and lepidopterous larvae which cause heavy losses to the crop. Among them, black aphid is a serious pest of the tender shoots of the plants and due to its drainage, the plants fade and dry up and heavy damage is caused to the crop (Abassi, 1976). Aphid can develop high populations on leaves and terminals of plants. Small to medium-sized groups of plants generally become infested near the margins of fields. As many as 1,200 or more aphids can develop on one plant and severely stunt or completely destroy it. More moderate infestations, with less than 50 to 60 aphids per plant, can still cause appreciable stunting. Light infestations, with less than 50 to 60 aphids per plant, can be tolerated. The nymphs have sub-ovate body with blackish brown colour. Both adults and nymphs suck the cell sap from the leaves, stem, inflorescence or developing pods. It appears on the crop in the month of February and remains active till first week of March. Cloudy weather helps in built up of aphid population (Bhatti and Soomro, 1996). During present investigations, the preference of different cultivars of safflower by black aphid was observed.

MATERIALS AND METHODS

The studies on relative resistance of safflower cultivars against black aphid were carried out at oilseeds section, Agriculture Research Institute, Tandojam, Pakistan. The crop was sown in a randomized complete block design with four replications during 3rd week of December, 2005. Five cultivars of safflower, viz PI-40/477, PI-292000, PI-405994, PI-26993 and Thori-78 were sown with a distance of 60 cm between row to row. Each cultivar was grown in four rows. All recommended agronomic practices were carried out as usual. Thinning was done on the experimental field to maintain plant to plant spacing 12 cm. The observations started with the incidence of attack and continued till harvesting. Six plants per treatment were randomly observed. For recording the data each plant was thoroughly observed and number of black aphids present on leaves and shoots were recorded. The data were recorded at weekly intervals. The data thus collected were subjected to analysis of variance, to discriminate the superiority of mean values, LSD test was applied.
RESULTS AND DISCUSSION

The results on relative population fluctuation of safflower aphid, Uroleucon compositae recorded on five safflower varieties from Feb. 03 to March 17, 2005 are presented in the Table-1. The results revealed that the pattern of population fluctuation of aphid was not similar on cultivars evaluated. PI-40/477 proved resistant with comparatively low population of aphid (25.47 ± 5.95/6 plants), while PI-26993 (63.35 ± 14.51/6 plants), PI-292000 (52.87 ± 11.91/6 plants) and Thori-78 (50.84 ± 12.36/6 plants) were susceptible against black aphid. However, variety PI-405994 was highly susceptible (100.04 ± 26.11/6 plants) against safflower aphid.

The results further indicated that population of aphid was generally low on all varieties during the early phase of crop then it increased significantly as crop age increased, only one variety i.e. PI-40/477 showed low aphid population during third week of March 17, 2005, while other varieties showed peak population of aphid on same observation date. The analysis of variance carried out demonstrated that the difference in the population of aphid between observation dates was significant for varieties PI-40/477, PI-292000 and PI-405994. Whereas, there was no significant difference in the population of aphid between observation dates in case of varieties PI-26993 and Thori-78, indicating that the population of aphid was more or less similar throughout the season as compared to rest of the safflower varieties tested. Kadam and Thakur (2002) conducted experiment to determine the relative resistance of safflower cultivars against safflower aphid, Uroleucon compositae. The mechanisms of resistance were also studied. Safflower cultivars GMU-1251, PI-306983, JLSF-213, JLSF-217, JLSF-291, A-1 and Bhima showed resistance to Uroleucon compositae, while Co-1 was highly susceptible.

<table>
<thead>
<tr>
<th>Observation date (2005)</th>
<th>PI-40/477</th>
<th>PI-292000</th>
<th>PI-405994</th>
<th>PI-26993</th>
<th>Thori-78</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb, 03</td>
<td>5.42cd</td>
<td>4.75 d</td>
<td>7.46b</td>
<td>6.00a</td>
<td>3.13a</td>
<td>5.35 ± 0.53</td>
</tr>
<tr>
<td>Feb, 10</td>
<td>8.21 cd</td>
<td>7.67 d</td>
<td>11.79 b</td>
<td>9.92 a</td>
<td>6.08 a</td>
<td>8.73 ± 0.73</td>
</tr>
<tr>
<td>Feb, 17</td>
<td>15.59 cd</td>
<td>16.00 bc</td>
<td>23.50 b</td>
<td>19.34 a</td>
<td>13.83 a</td>
<td>17.65 ± 1.28</td>
</tr>
<tr>
<td>Feb, 24</td>
<td>26.79 cd</td>
<td>30.21 bc</td>
<td>35.04 b</td>
<td>28.71 a</td>
<td>24.79 a</td>
<td>29.11 ± 2.23</td>
</tr>
<tr>
<td>March, 03</td>
<td>33.54 bc</td>
<td>47.54 bc</td>
<td>49.42 b</td>
<td>44.50 a</td>
<td>37.87 a</td>
<td>42.57 ± 2.23</td>
</tr>
<tr>
<td>March, 10</td>
<td>87.59 a</td>
<td>99.21 ab</td>
<td>242.63 a</td>
<td>156.09 a</td>
<td>168.30 a</td>
<td>180.76 ± 20.70</td>
</tr>
<tr>
<td>March, 17</td>
<td>1.17 d</td>
<td>164.74 a</td>
<td>330.15a</td>
<td>178.88 a</td>
<td>101.88 a</td>
<td>155.36 ± 40.80</td>
</tr>
<tr>
<td>Mean</td>
<td>25.47 ± 5.95</td>
<td>52.87 ± 11.81</td>
<td>100.04 ± 26.11</td>
<td>63.35 ± 14.51</td>
<td>50.84 ± 12.36</td>
<td></td>
</tr>
<tr>
<td>S.E ±</td>
<td>15.333</td>
<td>42.020</td>
<td>75.290</td>
<td>75.715</td>
<td>78.092</td>
<td></td>
</tr>
<tr>
<td>LSDAT P ≤ 0.05</td>
<td>32.199</td>
<td>88.243</td>
<td>158.108</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>LSDAT P ≤ 0.05</td>
<td>44.159</td>
<td>-</td>
<td>216.835</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CV %</td>
<td>85.13</td>
<td>112.39</td>
<td>106.45</td>
<td>169.04</td>
<td>217.23</td>
<td></td>
</tr>
</tbody>
</table>

Values followed by similar letters within columns are not significantly different at 5 % level.

The results indicated that the population of aphid varied between varieties and observation dates. The population of aphid increased and reached their peak during the end of observation (March 17, 2005). Only one variety (PI-40/477) was comparatively resistant with lesser population of aphid (25.47 ± 5.95/6 plants), while PI-26993 (63.35 ± 14.51/6 plant), PI-292000 (52.87 ± 11.81/6 plants) and Thori-78 (50.84 ± 12.36/6 plants) were susceptible against black aphid; however, PI-405994 was highly susceptible against aphid (100.04 ± 26.11/6 plant). These differences in the population buildup of aphid were attributed due to change in the morphological characters of cultivars evaluated. It was observed that PI-40/477 has different morphological characters such as spines on leaves which may prevent/ resists the accumulation of aphids on cultivar as a result the cultivar PI-40/477 were less infested by the aphid attack as compare to other cultivars.

Research conducted earlier by Painkara and Yadu (2003) found that the peak population of aphid was observed on 72 days old safflower crop. While Neharkar et al. (2003) screened 21 safflower cultivars for resistance to aphid and found that cultivars LATS-2, GMU-1251, GMU-4609, GM-4625, GMU-7191 and A-I were resistant while Co-1 was highly susceptible, the remaining 14 cultivars were moderately resistant. Mane et al. (2002) reported that aphids were first noted in the last week of December, when the average temperature and relative humidity were 17.85°C and 53%, respectively. The aphid activity increased gradually and heavy incidence (190.60 aphids/plants) was recorded in the first week of February and it decreased subsequently.

Kamath and Hugar (2001) observed that the aphid made its first appearance in the seventh week when the crop was in elongation phase of growth. Later the population gradually increased and reached the peak (11.84 aphids per plant) in the third standard week when the crop was 11 weeks old. Bade and Kadam (2001) reported the first aphid incidence commenced during the last week of November and continued until January. Cold

Temperature and moderate relative humidity favoured the pest development. There was a significant and negative correlation between the aphid population per leaf or plant and minimum temperature.

REFERENCES


