Mango Varietal Susceptibility to Malformation and its Control

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Abstract: These studies were carried out in six mango cultivars to assess the intensity of malformation and evaluate the control measure of the malady through removal of the infected shoots during 1999-2000 and 2000-2001. The malformation was found highest in cv., Anwar Rataul (56.63%), Mango cv., Chaunsa and Malda borne medium percentage of malformation i.e., 44.06 and 43.08%, respectively. The intensity was moderately low in Dusehri and Langra with values of 38.73 and 34.48%. The malformation susceptibility was found lowest in Sensation (16.61%). The removal of the malformed shoots at pea size stage of fruit development, resulted in reduction of the malady on an average of 60.79% in the subsequent year. However, the response of different varieties to removal of affected shoots for the control of the disease was variable.

Key words: Mango, malformation, cultivars

Introduction

Mango malformation is a serious threat to this crop in most of the countries and is of increasing significance because of great demand in the international market and world wide expansion of mango production for export. Malformation is of two types, vegetative and floral. Normally, floral malformation is more prevalent in bearing trees than vegetative malformation. Flowers in a malformed panicle are much enlarged and crowded with hypertrophied axis of the panicle. Generally malformed inflorescence produce no fruit, or abort at early stage (Schloesser, 1971) and is directly responsible for reduction in yield (Sing et al., 1999). The fungus Fusarium moniliforme var. Subglutinans was isolated from malformed parts of the mango and its pathogenicity was also unequivocally proved (Chakrabarti and Ghoshal, 1989; Freeman, 1999). The fungal mycelial infection was observed through electron microscopy at the base of the malformed bud, during bud inception stages (Usaha et al., 1997). Application of different fungicides failed in controlling malformation (Usaha et al., 1994). Removal of affected shoot tissue and have been reported effective for control of malformation (Sing et al., 1983). The present investigations were undertaken to evaluate the varietal behavior to malformation and its control through removal of malformed shoots in different mango cultivars, grown in Faisalabad ecological conditions.

Materials and Methods

The studies were carried out in six mango varieties i.e., Dusehri, Langra, Malda, Anwar Rataul, Chaunsa and Sensation. Four trees of each cv with uniform age (15 year old) and vigor, growing under similar soil and climatic conditions were selected for this purpose. For assessing the incidence of disease on a particular mango tree, a rectangle of 2 x 1 m² made of PVC pipe was improvised. The each tree under study was divided into four parts i.e., north, south, east, and west sides. For recording data, on the healthy and malformed inflorescence a random sample of the rectangle size, from each direction, out of four sides, at the middle height of the tree canopy was taken. The intensity of the disease was calculated by counting the healthy and malformed inflorescence and applying the following formula as described by Khan and Khan (1963).

\[ I = \frac{M}{T} \times 100 \]

M = Malformed inflorescence
T = Total inflorescence in the sampler
I = Intensity, percentage of the diseased inflorescence.

Results and Discussion

During last year, data (Table 1) were recorded prior to removal of malformed shoots from four trees of each variety with the help of aforesaid rectangle from four sides of the plants. The observations recorded showed that malformation was highest in cv. Anwar Rataul (56.63%), Chaunsa and Malda borne medium percentage of malformation 44.06 and 43.08%, respectively. The intensity was moderately low in Dusehri and Langra with values of 38.73 and 34.48%. The malformation susceptibility was lowest in Sensation (16.61%).

The disease intensity varied considerably in the trees of the same variety growing at the same site. The damage per affected tree in case of Anwar Rataul ranged from 31.57 to 76.72 % followed by Malda (20.00 to 64.28) and Chaunsa (29.09 to 51.56 %), respectively. The incidence was moderately low in case of Dusehri (18.9 to 45.00 %) and Langra (27.71 to 41.07 %). The disorder of malformation was lowest in case of Sensation with a minimum value of 9.00 % and maximum 20.93%. The intensity of malformation in different mango cultivars varied significantly. The Sensation was found to be comparatively more tolerant to the disorder. The Sensation cultivar can be exploited for plantation in the areas where severe malformation exists. These results are in line with the previous studies (Badilya and Lakanpal, 1990; Singh et al., 1999).

It was noted that there was not a single plant of the variety free from the malady. However the incidence of disease was sporadic. One or two sites of the canopy of a tree were found free from malformed inflorescence. Those may be tagged and used for scion wood in multiplication of mango nursery. From the data (Table 1) it is obvious that the malformation intensity on cumulative average basis is 38.57% for the six varieties. These varieties except Sensation are the leading and major cultivars grown in the Punjab. Sensation is a new introduction and during recent years the area under this variety is increasing particularly in Muzaffar Ghar district. The range of malformation intensity in this var. was found from 8.00 to 20.93%.

The orchards with poor management, diseased parts are left on the trees and malady remains unchecked are bearing losses within range from 20 to 64.28 % every year. The mango growers should pay attention to control this disease. The malformed inflorescence were excised along with three contiguous nodes (approximately one foot behind the affected terminals) at pea stage of fruit development, during April. After harvesting of fruit, in the autumn any left over affected parts were removed. In the subsequent year all the trees again showed the same symptoms. The intensity R1, R2, R3 and R4 denote tree Ist, 2nd, 3rd and 4th of the variety that remained under study of the malady on the trees, under observation.

The results recorded during 2000-2001 indicated that effect of removal of malformed parts was significantly variable in reducing the disease intensity among different varieties. Highest reduction was recorded in Anwar Rataul (80.80%) followed by Dusehri (65.58%), Sensation (63.84%) and Langra (60.25%). Lowest reduction in disease incidence was observed in Chaunsa (36.88 %) and Malda (41.16%).

The variation in reduction of the disease intensity among varieties must be attributed to the interaction of the host variety to pathogen depending upon factors like growth habit, physiology, cellular structure and defense system of thevariety or interaction with climatic parameter extremes. A defensive metabolite viz mangiferin of the host plant in relation to floral malformation was reported (Chakrabarti et al., 1997). The varieties under studies might have produced different levels of mangiferin. The area needs detailed investigation to find out the factors contributing for degree of susceptibility and behavior of the pathogen in a variety.

The epidemiology of the disease is a complex mechanism. However the detailed studies to note the effect of monsoon rains/high humidity during growth/flushing period on the disease development and spread is unknown. In the last two years there have been very small amount of rainfall in summer season. The climatic condition of the preceding year may affect the infection intensity in the subsequent year. This area needs attention of the scientists.
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Table 1: Malformation intensity in different mango varieties

<table>
<thead>
<tr>
<th>Name of varieties</th>
<th>Intensity in percentage</th>
<th>Range of Intensity</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year</td>
<td>R1</td>
<td>R2</td>
</tr>
<tr>
<td>Dusehri</td>
<td>1999-2000</td>
<td>45.60</td>
<td>43.75</td>
</tr>
<tr>
<td></td>
<td>2000-2001</td>
<td>27.08</td>
<td>11.44</td>
</tr>
<tr>
<td>Anyvar</td>
<td>1999-2000</td>
<td>61.11</td>
<td>57.14</td>
</tr>
<tr>
<td></td>
<td>2000-2001</td>
<td>4.86</td>
<td>5.00</td>
</tr>
<tr>
<td>Retaul</td>
<td>1999-2000</td>
<td>41.07</td>
<td>27.71</td>
</tr>
<tr>
<td>Langra</td>
<td>1999-2000</td>
<td>51.56</td>
<td>29.09</td>
</tr>
<tr>
<td></td>
<td>2000-2001</td>
<td>26.75</td>
<td>32.24</td>
</tr>
<tr>
<td>Chaunsia</td>
<td>1999-2000</td>
<td>20.83</td>
<td>20.00</td>
</tr>
<tr>
<td></td>
<td>2000-2001</td>
<td>5.87</td>
<td>7.87</td>
</tr>
<tr>
<td>Malda</td>
<td>1999-2000</td>
<td>64.28</td>
<td>36.21</td>
</tr>
<tr>
<td></td>
<td>2000-2001</td>
<td>38.79</td>
<td>24.19</td>
</tr>
</tbody>
</table>

Average intensity of malformation in six varieties during 1999-2000: 38.57%
Average intensity of malformation in six varieties during 2000-2001: 15.12%
Reduction of malformation in six varieties (Average): 60.79%

R1, R2, R3 and R4 represent tree 1st, 2nd, 3rd and 4th of the variety that remained under study

The results of the trial proceeding conclude that removal of infected shoots along with three consecutive nodes (one ft.) was quite effective to reduce and control the malady (Sant et al., 1999). However, regular adoption of this practice is essential. The results obtained so far, are presented in the report and the project will continue.

References


