Leaf Spot on Hybrid Varieties of Asteraceae Causes 12% loss in Productivity in Nepal & India

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ABSTRACT


1. Introduction

Dwarf Varities of Helianthus annuus, Tagetes erecta & T. patula belonging to Asteraceae are cultivated as ornamental garden plants in Nepal & India. Such Plants are available in May month in Nursery of Biratnagar, where imported from Silligau or kolkata( west Bengal) India. White leaf spots, showing plants of Asteraceae selected for study. 6 plants at Jogbani (India) on Date 26/05/2019 and 5 plant at Biratnagar (Nepal) Dwarf varities of H.annuus – red, pink, brown thin ray floret and brown thick ray floret, all had white leaf spots, while T. erecta & T. patula showed later the presence of leaf spot on date 28/06/2019 were Planted in pots and garden respectively.

2. Review of Literature


3. Morphological symptoms

Plants of Hybrid – Asteraceae potted in eastern direction (p1 p2p3&p4) While 2 plants (P5&P6) in western direction at Jogbani, Bihar, India on Date 26/05/2019 (P7P8P10P11) in eastern direction while P9 – one plant in western direction were grown at Biratnagar, province NO.1, Nepal. All plants showed the white leaf spots being several in no. were present on Date: 30/05/2019

Leaf spots(+) On dorsal & ventral surfaces, elongated well developed on margin also, white transparent mycelia visible under sun light, shape of leaf spot is oval, circular, elongated, rectangular surrounded by dead tissues. Further detail of study was done on Date 05/06/2019 at 8.45-10.20 A.M

Size of leaves-36cm² lost area of productivity due to pathogens - 4.53 cm² i.e loss of productivity = 12.6% Maximum leaves in P9 -90 leaves

i.e loss of Productivity = 11.34% =12%
i.e Forecasting-12% Loss in productivity due to leaf spots. Again variations of symptoms appeared on plants & their parts was studied on Date.13-06-2019 at 10.05-11.0 A.M given in the following table 2

Leaves- shrinkage, dried, white powdery mass leaf spots. Stem- towards apex was yellowish, hollow-ridged, shrinkage & dried in P7&P8 but P9 green in colour, in P4 especially presence of white dots( Several in no.) aggregated giving cottony appearance.
R. D. Singh, of Indian phytopathological society, IARI, New Delhi and Prof. Dr. P.K. Jha, Prof. S.N. Jha and Prof. Dr. P.R. Mishra & Shri B.R. Timilsina, Tribhuvan University, Nepal.

Table No.1

<table>
<thead>
<tr>
<th>INDIAN</th>
<th>EASTERN</th>
<th>NEPAL EASTERN</th>
<th>WESTERN</th>
<th>Plants</th>
<th>Height</th>
<th>Nature</th>
<th>Leaf spots</th>
<th>Bud</th>
<th>Flower</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>P&lt;sub&gt;1&lt;/sub&gt;</td>
<td>50 cm</td>
<td>Dry</td>
<td>(+)</td>
<td>(-)</td>
<td>dry 1 (+)</td>
<td>dry 1 flower felt down or soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;2&lt;/sub&gt;</td>
<td>54 cm</td>
<td>Dry</td>
<td>(+)</td>
<td>(-)</td>
<td>dry 2 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;3&lt;/sub&gt;</td>
<td>54 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>green 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;4&lt;/sub&gt;</td>
<td>56 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>green 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;5&lt;/sub&gt;</td>
<td>67.5 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>Green 2 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;6&lt;/sub&gt;</td>
<td>52.5 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>Green 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;7&lt;/sub&gt;</td>
<td>69 cm</td>
<td>Dry</td>
<td>(+)</td>
<td>(-)</td>
<td>dry 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;8&lt;/sub&gt;</td>
<td>78.7 cm</td>
<td>Dry</td>
<td>(+)</td>
<td>(-)</td>
<td>dry 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;10&lt;/sub&gt;</td>
<td>68.5 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>dry 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;11&lt;/sub&gt;</td>
<td>36 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>dry 1 (+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;9&lt;/sub&gt;</td>
<td>39 cm</td>
<td>Green</td>
<td>(+)</td>
<td>(+)</td>
<td>(-)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table No.2

<table>
<thead>
<tr>
<th>EASTERN</th>
<th>PLANT</th>
<th>Height</th>
<th>Stem above soil showing symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>P&lt;sub&gt;1&lt;/sub&gt;</td>
<td>49.6 cm</td>
<td>3 cm broken black &amp; 11 cm White Powdry mass.</td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;2&lt;/sub&gt;</td>
<td>49.2 cm</td>
<td>4.2 cm broken, 4.2 cm. white powdry mass &amp; 6 cm. black.</td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;3&lt;/sub&gt;</td>
<td>52.0 cm</td>
<td>8 cm black &amp; a little white powdry mass</td>
<td></td>
</tr>
<tr>
<td>P&lt;sub&gt;4&lt;/sub&gt;</td>
<td>46.6 cm</td>
<td>5.5 cm black &amp; white</td>
<td></td>
</tr>
<tr>
<td>WESTERN</td>
<td>P&lt;sub&gt;5&lt;/sub&gt;</td>
<td>64.0 cm</td>
<td>5.5 cm black &amp; white</td>
</tr>
<tr>
<td>P&lt;sub&gt;6&lt;/sub&gt;</td>
<td>63.0 cm</td>
<td>1.4 cm black &amp; Green</td>
<td></td>
</tr>
</tbody>
</table>

Leaves in P<sub>4</sub> were same ( as in P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>& P<sub>4</sub> ) but 3
Leaves were very minute-
1 largest – 1.3 cm. white & enrolled.
1 Intermediate – 0.8 cm white.
1 smaller – 0.3 white.
These leaves were collected to microscopic study.
In P<sub>8</sub> plant, leaves- green & with white spots.
Date: 17/06/2019 at 7.42 P.M.
1. Symptoms showing a flower was broken from P6 Plant & 12 ray florets were studied.
ii. Length – 1.8 cm ( lower portion was 0.8cm)
iii. White leaf spots- elongated, oval a dots(+)
iv. Dorsal side of ray florets- 8 in no, contain raised, oval or deposition of tissues – (+).
v. Central side in all 12 ray florets showed white raised tissue – (+)
vi. Lower portion of central side showed white mycelia – (+)

Date. 17/06/2019 at 4.45-6.21 P.M.
I. Dry root- length 11.3 cm, elongated taproot- 9.5 cm, sec. root-2.9, tertiary- 1.2 cm. Total no. of roots-32 i.e. 32+1=53
II. Colour – white, diameter – 0.5 cm & area – 0.196 cm2
III. Diameter of vascular region – 0.2 cm& area – 0.785 cm2, in which 0.059 cm2 is black & 0.0196 cm2 is white.
Date: 02/07/2019 at 11.30-12.45 PM
Place–Dept.of Botany, M.M.A.M CAMPUS, BIRATNAGAR, T.U. NEPAL.

Microscopic observation –
a. Root- dry, hard, white hairs with tap root.

- taproot under t.s- vascular degeneration and filled with blackmass and white structure. i.e Presence of Macrophomina spp. , Suryawanshi et.al (2015)16 and some portion of soil.
b. Leaf spot- White, internal yellowish tissue (infected portion)
  - Mycelia (+), conidia – numerous (+)
  - oogonium (+)

f. Leaves of P7&P8- White spot (+), very minute but visible.
  - Conidia (+), Germinating Conidium (+)
  - Aggregation of several conidia in a membranous ball attached with mycelium (+).

4. Conclusion
The dwarf variety of Helianthus annuus comprises white leaf spot, which results 12% loss in productivity due to Albugo spp. and other fungi especially responsible to vascular disintegration and causes of dryness or death of the plant.

5. Acknowledgement
I am heartly obeliged to Dr. A.K. Mishra, Dr.P. Sharma, Dr.R.K Sharma & Dr. D. Singh, of Indian phytopathological society, IARI, New Delhi and Prof. Dr. P.K. Jha, Prof. S.N. Jha and Prof. Dr.P.R. Mishra & Shri B.R. Timilsina, Tribhuvan University, Nepal.
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