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Leaf Spot on Hybird Varaties of Asteraceae Causes 12% loss in Productivity in Nepal & India

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ABSTRACT

Dwarf varieties of *Helianthus annuus, Tagetes erecta, T.Patula* and other plants belonging to Asteraceae are cultivated as ornamental garden plants in Nepal and India. Leaf spots and blight, downy mildew, mycoflora of floral parts, collar rot, Necrosis, charcoal rot and other of Asteraceae already reported. Leaf spots caused by the pathogen *Albugo spp*. bring 12% loss in productively. Akoijam & chandel (2010), Bhatia et.al (2005), Biga(1955), chander (2003), Dube (1985), chavhan et.al (2008), kumar & Dewivedi (1981), Kulkarni et.al (2007), Lakhmod et.al (2007&2007), Mayee & Datur (1986), Pandey & Tewari (2017), Singh et.al (1999), Kulkarni et.al(2007), Singh et.al (1999), Singh (1980) , Sinha (2011), Suryawanshi et.al (2015) & Thirumalachar et.al (1949) have well studied Asteraceae and possible pathogens in their own ways.

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 Silligauri 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

Akoijam & chandel (2010)[1] reported resistance against leaf spot and flower blight caused by Alternaria zenniae Pape, while Bhatia et.al (2005)[2] mentioned enhancement of plant growth and suppression of collar rot of sun flower caused by *Sclerotium rolfsii* through fluorescent *Pseudomonas*. Biga (1995) [3] described key- identification of *Albugo spp*. chander Rao (2003) [4] mentioned hybrid seed – production technology in sunflower. Dube (1985) [5] wrote the book ' An introduction to Fungi ' following Ainsworth-classification. chavhan et.al (2008) [6] reported association of new fungal species with leaf spot and blight of Sunflower. Kumar & Dwivedi (1981) [7] mentioned mycoflora association with floral parts of sunflower. Kulkarni et.al (2007) [8] described molecular variability in *Plasmopara halstedii* causing dowry mildew of sunflower. Lakhmod et.al (2007) [9] reported sunflower Necrosis - Transmission & host range studies & again Lakhmod et.al (2007)[10] reported epidemiology of sunflower Necrosis disease. Mayee & Datur (1986) [11] mentioned host and disesase assement scale-sunflower in Phytopathometry. Pandey & Tewari (2017) [12] described selection of host differentials for the identification of *Albugo candida* phenotypes. Singh et.al (1999) [13] reported a stain of cucumber mosaic cucumo-virus, causing mosaic in marigold in India. singh (1980) [14] wrote the book 'Introduction to principles of plant pathology' related the relationship of pathogen and host in different conditions. Sinha(2001) [15] described fungi- assoctated with infected pollen gains 0f marigold *(T.erecta)* suryawanshi (2015) [16] mentioned , managing *Macrophomina Phaseolina* causing charcoal rot of sunflower *(Helianthus annuus)* by soil-amendment. Thirumalachar et.al (1949) [17] reported gametogenesis and oospore formation in *cystopus (Albugo) evolvuli.*

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-36cm^2

lost area of productivity due to pathogens – 4.53 cm^2

i.e loss of productivity = 12.6% Maximum leaves in P_6 -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 powdry mass leaf spots.

Stem- towards apex was yellowish, hollow-ridged, shrinkage & dried in P_1&P_2 but P_3- green in colour, in P_4 especially presence of white dots(Several in no.) aggregated giving cottony appearance.

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Table No.1

INDIA	EASTERN	Plants	Height	Nature	Leaf spots	Bud	flower	Remark
		P_1	50cm.	Dry	**(+)**	**(–)**	dry 1(+)	dry 1 flower felt down or soil
		P_2	54cm.	Dry	**(+)**	**(–)**	do	
		P_3	54cm.	Green	**(+)**	**(–)**	dry 2(+)	
		P_4	56cm.	Green	**(+)**	**(+)**	green 1(+)	
	WESTERN	P_5	67.5cm.	Dry green	**(+)**	**Green 2(+)**	dry2 (+)	
				green	**(+)**	**Green 1(+)**	1(+)	
		P_6	52.5cm.					
NEPAL	EASTERN	P_7	69cm.	Dry	**(+)**	**(+)**	dry 1(+)	
		P_8	78.7cm.	Dry	**(+)**	**(–)**	dry 1(+)	
		P_{10}	68.5cm.	Green	**(–)**	**(–)**	**(–)**	
		P_{11}	36cm.	Green	**(–)**	**(–)**	**(–)**	
	Western	P_9	39cm.	Green	**(+)**	**(+)**	**(–)**	
	(+) presence & (–) absent							

Table No.2

	PLANT	Height	**Stem above soil showing symptoms**
EASTERN	P_1	49.6 cm.	3cm. broken black & 11 cm White Powdry mass.
	P_2	49.2 cm.	4.2cm. broken, 4.2cm. white powdry mass & 6 cm. black .
			8cm black & a little white powdry mass
	P_3	52.0 cm.	5.5cm. black& white
	P_4	46.6 cm.	
WESTERN	P_5	64.0 cm.	5.5cm. black & white
	P_6	**63.0 cm.**	14cm. black & Green

Leaves in P_4 were same (as in P_1, P_2,P_3&P_5) 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_6 plant, leaves- green & with white spots.
Date: 17-06-2019 at 7.42-8.03AM
i. 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 11.3cm, elongated taproot- 9.5 cm, sec. root-2.9, tertiary- 1.2cm. Total no. of roots-32 i.e.32+1=53
II. Colour – white, diameter – 0.5cm & area – 0.196cm2
III. Diameter of vascular region – 0.2cm& area – 0.785cm2, in which 0.059cm2 is black & 0.0196cm2 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 (+)

c. Flower – Dry & white spot (+)
d. Ray-floret– numerous mycelia at periphery with white spot (+)
-Mycelia (+), Conidia (+) & chamydospores (+).
e. Disc-floret – White spot (+) bunch of mycelia (+), Conidia (+).
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* comprise white leaf spot, which results 12% loss in Productivity due to *Albugo spp*. and other fungi especially responsible to vascular disintegration and becomes causes of dryness or death of the plant.

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