Int.J.Curr.Microbiol.App.Sci (2019) Special Issue-9: 437-440

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-9 pp. 437-440**
Journal homepage: http://www.ijcmas.com

Original Research Article

Survey and Morphological Characterization of *Alternaria* spp. Causing Alternaria Blight of Pigeon Pea

Nidhika Rani[1*], H.C. Lal1[1] and Praveen Kumar[2]

[1]Department of Plant Pathology, Birsa Agricultural University, Ranchi-834006, India
[2]Directorate of Plant Protection Quarantine and Storage Faridabad Haryana-121001, India
**Corresponding author*

A B S T R A C T

The systematic investigation revealed that Alternaria leaf blight was found to be infected with *Alternaria* spp. Eleven locations surveyed and maximum disease incidence was recorded in Kanke. It ranged from (0-30%). The pathogen was isolated from infected samples and identified as *Alternaria alternata and Alternaria tenuissima*. *Alternaria alternata* showed grey-brown appressed to velvety sometimes with a cottony centre, size of conidia was 38.02 x 7.12 µ with 2-4 transverse septa and 0-2 longitudinal septa and *Alternaria tenuissima* showed olivaceous to dark green, cottony to velvety, size of conidia was 76.5 x 6.12 µ with 2-6 transverse septa and 0-3 longitudinal septa.

Keywords

Alternaria alternata, *Alternaria tenuissima*, Alternaria, Conidia, Conidiophore

Introduction

Pigeon pea [*Cajanus cajan* (L.) Millsp] commonly known as 'Arhar' or 'Tur' is a major grain legume crop after chickpea of the tropics and subtropics worldwide. Besides being rich source of protein (22.3%), essential amino acids particularly lysine, this crop also help in maintaining the soil fertility through natural biological nitrogen fixation. The ability of pigeon pea to produce economic yields in soils characterized by moisture deficient makes it an important crop of dry land agriculture. Farmers grow it in various production systems as a mixed crop, intercrop and perennial crop using long established traditional practices (Chauhan, 1990). The major factor for low production of pigeon pea in India are ecological factors, lack of appropriate pulse production and protection technologies, poor post harvest technologies, less thrust on basic research, inadequate supply of quality seed to farmers and socio-economic constraints etc. Earlier Alternaria blight was considered as minor disease in Jharkhand but now days, blight symptoms on pigeon pea are being observed in alarming proportion in some of the pockets.

Survey of Alternatia blight of pigeon pea

An intensive survey work was carried out at eleven locations viz., Kanke, Kadma, Sukurhuttu, Boreya, Hochar, Hushir, Gedga, Totambi, Sokarpada, Pithoria and Rahra of Ranchi and Ramgarh district, during kharif 2016-17 to determine the prevalence of Alternaria blight of pigeonpea. Out of 11 locations surveyed the Alternaria blight was prevalent in all locations with low (0-10%) at Boreya to moderate severity (0-30%) at Kanke. In rest of place it ranged from (15 to

20%). The wilt and sterility mosaic disease were found to be moderate in all the location survey. Highest wilt incidence recorded in kanke (0-20%) and lowest in Boreya and Kadma (0-5%). In rest of the places it ranges from 10-20 per cent. Sterility mosaic highest in kanke (0-10%) and lowest in Hochar and Totambi (0-2%). In rest of places it ranged from 3 to 5 per cent. Highest disease survey of all the three disease like Sterility mosaic disease (0-10%), Wilt (0-20%) and Alternaria blight (0-30%) recorded in the research farm of Birsa Agricultural University, Kanke. The results are presented in Table 1.

Symptomatological studies

Leaf blight on leaves occurred at later stage of its development were recorded. The disease symptoms started appearing as small, circular, chlorotic, water-soaked minute spots symptoms appeared first in the field during second or third weeks of November and attending maximum disease severity at the second or third weeks of January onwards. The symptoms with yellow halo on upper surface of leaves followed by development of black spots which increase in size showing purple margin around the black necrotic spots. The spots enlarge and coalesce with each other forming big lesions. Later on, infected leaves defoliated showing blighting symptoms. The whole upper portions of the plants bearing flower buds lost their lustre showing withering and look like sick (Plate 1A, 1B).

Morphological studies of the pathogen

To study the morphology of the fungus, about ten days old culture of the pathogen grown on PDA at 25±1^{o}C under aseptic condition in Petriplate and kept in B.O.D incubator. Seven days old Petriplate were taken out from the B.O.D and its colony characters were observed. And also, from infected host were also used for this purpose. The temporary slides were prepared, observed under microscope and morphological characters were recorded critically, which are described in Table 2.

Table.1 Survey for occurrence of Alternaria blight of pigeonpea in around Ranchi during 2017

Location	Variety grown	Area	Disease incidence (%)		
			Wilt	Alternaria blight	Sterility mosaic disease
Kanke	BA-1, Bahar, Asha	2.0 ha	0-20%	0-30%	0-10%
Kadma	Local, Bahar	1.0 ha	0-5%	0-20%	0-3%
Sukurhuttu	Local, BA-1	0.2 ha	0-10%	0-15%	0-5%
Boreya	Local	0.2 ha	0-5%	0-10%	0-2%
Hochar	Local, BA-1	0.3 ha	0-10%	0-15%	0-5%
Hushir	Local, Bahar	0.5 ha	0-15%	5-20%	0-3%
Gedga	BA-1, NA-1, Bahar and Asha	5.0 ha	0-10%	5-15%	0-3%
Totambi	BA-1, NA-1, Bahar and Asha	5.0 ha	0-10%	5-20%	0-2%
Sokarpada	BA-1, NA-1, Bahar and Asha	3.0ha	0-10%	0-10%	0-5%
Pithoria	Local, NA-1	0.5 ha	0-15%	5-20%	0-5%
Rahra	Local, Bahar	0.5 ha	0-10%	5-15%	0-3%

Table.2 Dimensions of conidia of *Alternaria* spp. isolates

Pathogen	Conidia						
	Shape	Colour	Size		Beak length (µ)	Septation	
			Length (µ)	Breadth (µ)		Horizontal	Vertical
Alternaria alternata	Obclavate or ovate	Grey brown	38.02	7.2	14.91	2-4	0-2
Alternaria tenuissima	Obpyriform or Obclavate	Olivaceous green	76.5	6.12	59.4	2-6	0-3

Table.3 Colony characters of *Alternaria* spp. isolates

Characters	*Alternaria alternata*	*Alternaria tenuissima*
Mycelium	Hyaline to Grey-brown, multicelled, septate spreading.	Thin, Hyaline, olivaceous to greenish black
Conidiophore	Conidiophore are in cluster, chains of 2-6 units long and typically produce branches having long defined primary conidiophores with few terminal and sub terminal branches.	Moderately short to long chains of more than 4 conidia, branching of chains usually was minor.
Conidia	Obpyriform or ovate, yellowish-brown to brown, muriform with 2-4 transverse septa 0-2 longitudinal or oblique septa.	Obclavate, brown to golden brown, muriform, some conidia with minutely verrucose walls. Mature conidia with 2-6 transverse septa and 0-3 longitudinal.
Beak	Thick walled, short tapering end, dark brown in colour.	Narrow with long tapering end.

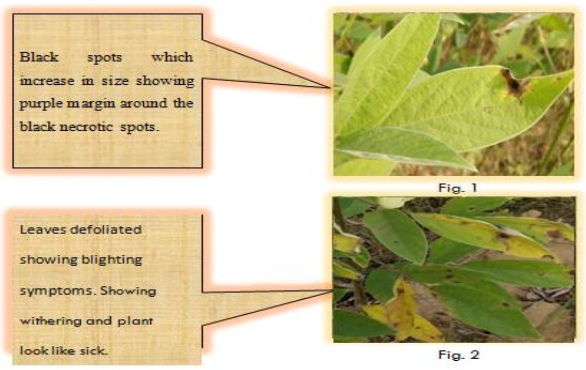
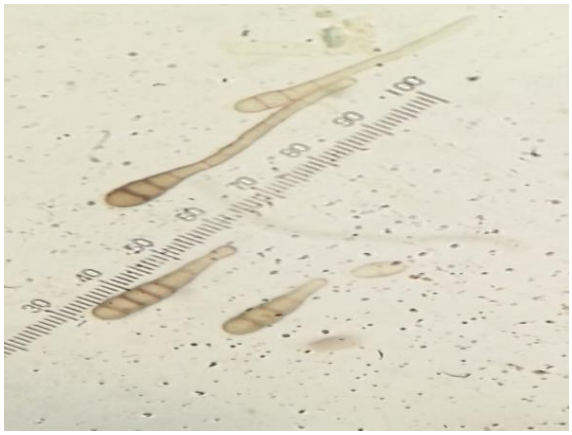


Plate-1A: Fig. 1 Initial symptoms on leaf, Fig. 2 Advanced symptoms on leaf

Plate-1B: Disease scale for Alternaria leaf blight of pigeonpea

Alternaria alternata



Alternaria tenuissima

Colony characters of *Alternaria* spp. Isolates

The Table 3 clearly indicated that colony characters of *Alternaria alternata* was, grey-brown appressed to velvety sometimes with a cottony centre and *Alternaria tenuissima* showed olivaceous to dark green, spreading, cottony to velvety. Mahmood *et al.,* (1984) and Grewal (1984). They described that the first symptom appeared as circular, chlorotic, water-soaked spots on the upper surface of the leaflets followed by development of very minute black spots in the centre. Singh (1971) reported that the mycelium is cottony, smoke grey and tufty on malt agar medium. Mishra and Prakash (1974) reported the similar results in soybean. They reported that the conidial dimension ranged from 12.0- 50.0 x 5.0 - 15.0 µm, pale olivaceous to brown in colour, obclavate, muriform and beak was narrow with long tapering end.

References

Chauhan YS. 1990. Pigeonpea: Optimum agronomic management. In Nene YL, Hall SD and Sheila VK. (eds). The pigeonpea. CAB International, Wallingford, Oxon, UK. Pp. 257-278.

Grewal, J.S. (1984). Major diseases of pulse crops and their management. *Pulse Production Constraints and Opportunity*: 273-284.

Mahmood, M., Sinha, B.K., Kumar, S., Chaudhary, S.K., Singh, C.P. Murtuza, M. (1984). Leaf blight disease of pigeonpea in Bihar. *Jour.res.* 4 (1&2):89-90.

Singh, D.V. and Singh, V.K. (1971). Control of leaf blight of wheat with fungicides. *Indian. Phytopath*, 24: 694-697.

Mishra, B. and Prakash, O. (1974). Alternaria leaf spot of soybean from India. *Indian J. Mycol. Pl. Patho.* 5: 95.