

Symptomatological characterization of Septoria leaf spot of tomato

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Abstract

Septoria leaf spot of tomato is a major curbing factor in tomato cultivation. The disease is caused by *Septoria lycopersici*, which has generally been reported to infect chiefly the leaves and even target the stems but seldom targets the fruits. The disease initially manifested as small, irregular, 2 mm-diameter spots with dark edges and grey cores. These spots gradually grew, merged, and formed uneven necrotic patches. Pycnidia were formed throughout the greyish center and were visible as black dots. The disease ultimately resulted in premature defoliation, culminating fruits to sunscald. Infected stem exhibited light brown elongated spots with grey Centre and dark brown margins. The lesions enlarge followed by splitting of the lesions and browning of the infected stem.

INTRODUCTION

One of the most eye-catching vegetable crops farmed worldwide is the tomato (*Solanum lycopersicum* L.). Due to its expanding dietary and commercial importance, extensive production, and use as a model plant for research, it is a significant vegetable in the world (Kimura and Sinha, 2008). The major restraints in tomato cultivation are diseases that result in both qualitative as well as quantitative losses. Septoria leaf spot of tomato caused by *Septoria lycopersici* is one of the most calamitous diseases among the fungal diseases infecting tomato crop (Delahaut and Stevenson, 2004).

In Kashmir, during conducive environmental conditions coupled with heavy rains, the tomato is attacked from seedling to maturity by Septoria leaf spot disease and is a major constraint in successful cultivation resulting in defoliation, reduction in yield and premature withering of the plant, thereby cur-

tailing the fruiting period of the crop. Leaves are the preeminent portion of the plant affected by the disease followed by stem. However, the fruits are seldom attacked by the disease (Lopes *et al.*, 2005). Older leaves near the ground level represent the arrival of the disease as small water-soaked spots which on augmentation develop dark brown margins and sunken white or grey centers with minute glistening fruiting bodies of the fungus (Singh, 2018). As the disease progresses, severe leaf spots appear resulting in heavy defoliation of the leaves, that hinders the normal fruit production and mature fruits are exposed to sunscald. Temperatures between 20 and 25°C and high relative humidity, as well as prolonged leaf wetness brought on by overhead irrigation, rain, or heavy dews, are conducive to the disease (Sanouber and Barbanti, 2017). The present work aimed at to analyze symptomatological development of the disease throughout the growth period.

Material and methods

For symptomatological study, fifty tomato plants of the cultivar “Roma” were utilized in the field of Division of Vegetable Science at SKUAST-K, Wadura. The plants were kept unsprayed throughout the growing season to study the disease symptoms under natural epiphytotic conditions. The plants were examined on daily basis for initial disease appearance. Periodic observations regarding size, shape and colour of lesions were recorded in tagged leaves.

Results and discussions

Detailed symptomatology of Septoria leaf spot of tomato plants were recorded under natural conditions in the field on tomato leaves and stem and the observations are described as under:

The disease first appeared in the second week of June on lower most leaves as small, irregular, slightly brownish discolored, water-soaked spots measuring 0.5mm in size. As the spots enlarge (0.5-1mm in size) affected tissue becomes slightly raised, circular in shape

with grey center and dark brown margins. The spots enlarge from 0.5-2 mm in diameter. Dark brown to black dot like pycnidia were seen scattered on the grey Centre of matured spots in the first week of July. From the lower leaves the disease gradually spread to the upper leaves, leaving just a few robust leaves on the top of the plant. The spots started coalescing from the apical portion of the older leaves followed by the shriveling and defoliation of the affected leaves (Table 1, Plate 1 & 3). The symptoms on stem were observed in the fourth week of June as light brown elliptical spots. The spots enlarge from 0.5-2 mm in size and develop greyish centre with dark brown margins. The coalescing of spots on stem leads to splitting of the lesions followed by browning of the infected stem (Table 1, Plate 2). The pycnidia observed on stem lesions were quite less than that of observed on leaves. However, the symptoms were not observed on fruits throughout the growing season.

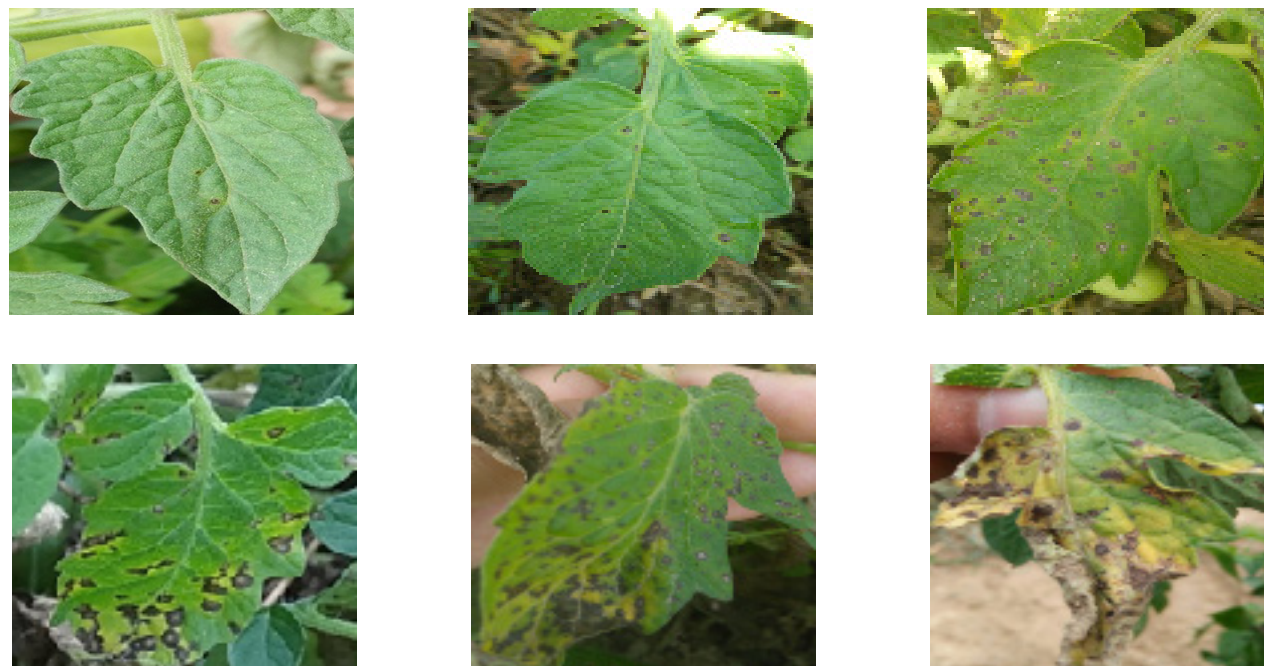


Plate 1: Symptomatological development of Septoria leaf spot on leaves of tomato plant



Plate 2: Symptomatological development of Septoria leaf spot on stem of tomato plant



Plate 3: Defoliated plants

Table 1: Symptomatological development of Septoria leaf spot of Tomato

Time of observation	Symptoms			Lesion size(mm)		
	Month	Week	Leaves	Stem	Leaves	Stem
June	I	No disease	No disease	-	-	-
	II	Small irregular brown spots on upper leaf surface	-do-	<0.5	-	-

	III	Enlargement of spots; affected tissue becomes slightly raised	-do-	0.5-1	-
	IV	Spots enlarge and become circular in shape, develop grey centre and dark brown margins	Initiation of light brown elliptical spots on stems	1-2	0.5-1
July	I	Pycnidia formation throughout the greyish centre	Enlargement of lesions on stem; turning greyish brown in colour	-	1-2
	II	Coalescing of spots resulting in the formation of irregular necrotic patches	-do-	-	>2
	III	Yellowing of leaves	Coalescing of lesions on stem	-	-

	IV	Shrivelling of leaves	Browning of infected stem.	-	-
August	I	Defoliation of leaves	Splitting of the lesions on stems	-	-
Symptoms were not observed on fruits throughout the growing season					

Similar inferences regarding the symptoms of the disease have been drawn by various workers. Tomato Septoria leaf spot induced by *S. Lycopersici* substantially affects the foliage of plant. Small, water-soaked spots that quickly enlarge to a circle 2 to 5 mm in diameter with black rims and a grayish white center are the first signs of the disease. (Rao *et al.*, 2016). Older leaves first demonstrate the disease as small irregular inconspicuous water-soaked spots. As the spots grow, they become circular, with greyish white Centre and brown-coloured margins. Even though causal pathogen does not directly infect the fruits, defoliation exposes fruits to sunscald injury causing fruit maturity

failure and ultimately crop losses (Singh, 2018). The disease may strike the plant at any stage of development, symptoms are mostly noticed on the older leaves after the plant has begun to set fruit (Douglas, 2008). Circular to elliptical lesions with gray centers and a yellow halo surrounding them are the hallmarks of diseased leaves, especially on older leaves (Blum, 2000). At first, the diseased spots are tiny and numerous, but they eventually come together to cover a wider area of leaves. (Agrios, 2005). The tiny black specks in the center of spots are the fungal fruiting bodies. Extensive leaf infection causes yellowing, withering and fall of leaves. Under favorable climatic conditions,

infection that starts at lower leaves spreads upward. Spotting works its way up the plant and can infect stems (Gleason and Edmunds, 2006). Conidia-bearing black, elongated lesions typically appear on the stems (Watt, 2004).

Conclusion

From the above studies it has been inferred that *Septoria* leaf spot of tomato appears at any stage from seedling to maturity and symptoms commonly appear on leaves and stem but not on fruits. The symptoms initially manifest as a tiny, irregular, water-soaked circular spot on the bottom leaves. These spots then grow a dark border and a gray center, reaching a maximum diameter of 2 mm.

On fully developed spots, black pycnidia are found in the greyish centre. The symptoms on stem appear as light brown elliptical spots which later enlarge and develop greyish centre with dark brown margin that on coalescing lead to splitting of lesions followed by

browning of entire stem. However, the symptoms are not observed on fruits throughout the growing season.

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