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Short Note

Status, distribution and symptomatology of Stemphylium blight of garlic in Himachal Pradesh

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Abstract

Systematic surveys in garlic growing areas of HP *viz.*, Bilaspur, Chamba, Una, Solan, Sirmour, Shimla, Mandi, Kullu, Kangra and Hamirpur districts were conducted during cropping season 2013-15 to assess the prevalence and distribution of Stemphylium blight of garlic under field conditions. The incidence of Stemphylium blight was found in almost all the districts surveyed. The average disease severity ranged between 31.2-70.0 per cent, maximum being at Kullu district (70.0%) and minimum at Shimla district (31.2%). The disease initially appears as a small spindle shaped white lesions on leaves, which later become sunken with a purple colour surrounded by a yellowish margin.

Key words: Garlic, *Stemphylium vesicarium*, survey, prevalence, status.

Garlic (*Allium sativum* L.) is the second most widely used/cultivated *Allium* after onion and is grown throughout the world but China is by far the largest producer of garlic followed by India. The major garlic growing states in India are Madhya Pradesh, Gujarat, Rajasthan, Orissa, Uttar Pradesh, Maharashtra, Punjab and Haryana whereas in other parts of the country, it is mostly grown in kitchen garden. Although, the production and productivity is quite low in Himachal Pradesh (HP) as compared to other states but in the past one decade, HP has emerged as a potential garlic producing state with acreage of about 4.13 thousand ha with annual production of 6.14 thousand MT (Anonymous 2013).

Garlic is prone to several diseases and amongst fungal diseases affecting the crop, stemphylium blight (*Stemphylium vesicarium*) is most important disease in lower and mid hill areas of the State. The disease was observed to occur in low profile (PDI <5%) till 2000-01 crop season but appeared in an epidemic form during 2003 and completely destroyed the crop in some pockets (Sugha and Kumar, 2005). The survey was planned to study the distribution pattern of this disease in HP conditions.

To assess the status of Stemphylium blight of garlic in Himachal Pradesh, systematic surveys were carried out in different districts of HP *viz.*, Bilaspur, Chamba, Una, Solan, Sirmour, Shimla, Mandi, Kullu, Kangra and Hamirpur during the cropping season 2013-15. The disease incidence and severity was recorded in all the 21 locations of various districts and leaves with promising characteristic symptoms were collected and observed microscopically for their association with the pathogen. The data of different areas within a district were pooled and average was taken to depict disease. The disease intensity was calculated as:

$$\text{Disease intensity (\%)} = \frac{\text{Sum of all disease rating}}{\text{Total no. of ratings X maximum disease score}} \times 100$$

The disease severity was assessed using 0–9 disease scale (Zheng *et al.* 2010). The scale used is given as:

Disease score/ rating	Description of symptoms
0	No disease
1	Minute white spots
2	Less than 5% leaf Diseased
3	Small white to reddish purple lesions
4	5–25% diseased
5	Dark purple necrotic lesions with Chlorosis
6	26–50% diseased
7	Necrotic lesions >10 cm Long
8	50–75% diseased
9	Lesions coalescing, 76–100% Diseased

Symptomatology: The characteristic symptoms appeared on leaves were recorded and described based upon the size, color of lesions with or without the desiccation of plants, apical necrosis and withering of leaves.

Results on the occurrence and severity of Stemphylium blight of garlic revealed variable occurrence and distribution in all the ten districts surveyed (Table 1). The mean severity of disease infecting garlic in different districts ranged from 31.0 to 70.0 per cent. The disease was observed in all the districts surveyed with maximum mean severity of 70.0 per cent in Kullu district followed by Mandi 60.0 per cent and least 31.2 per cent in Shimla district. Data presented in Table 1 revealed that the disease was location specific and its occurrence depends upon climatic conditions. In Kullu district the disease was recorded in severe form at all the fifteen locations where it ranged from 65.0 to 80.0 per cent followed by twelve locations of Mandi district where it ranged from 50.0 to 75.0 per cent, Kangra 25.0 to 75.0 per cent, Hamirpur 30.0 to 75 per cent, Una 30.0 to 60.0 per cent, Sirmour 35.0 to 75.0 per cent, Solan 20.0 to 68.0 per cent, Bilaspur 20.0 to 70.0 per cent, Chamba 30.0 to 60.0 per cent and Shimla 25.0 to 45.0 per cent.

Table 1. Prevalence and distribution of Stemphylium blight of garlic in HP during 2013-15

S. No.	Districts	Number of locations	Disease severity (%)	
			Range	Average
1	Bilaspur	8	20-70	44.0
2	Chamba	6	30-60	38.0
3	Hamirpur	7	30-75	55.0
4	Kangra	10	25-75	58.0
5	Kullu	20	65-80	70.0
6	Mandi	12	50-75	60.0
7	Shimla	3	25-45	31.2
8	Sirmour	3	35-75	49.0
9	Solan	6	20-68	47.0
10	Una	8	30-60	55.0
	Overall average			**50.72**

Thus, it is evident from the table that the disease was prevalent in all the districts from mild to severe form.

During the survey, it was observed that the severity of disease was very high in localities situated at lower elevations with warm humid climate and decreased correspondingly with an increase in the elevation of the locality with cool humid climate. Thus, unusual rise in temperature during cropping season from normal, coupled with intermittent rains led to the epidemic development of disease especially in Kullu and Mandi districts of HP. In Himachal Pradesh, the disease was first reported from Kullu valley (Singh and Sharma 1977), however the pathogen has been reported from India on several hosts including onion (Rao and Pavgi 1975).

Symptomatology: The characteristic symptoms exhibited as white small oval lesions which later become sunken with a purple colour surrounded by a whitish margin and ultimately extensive necrosis followed by pre-mature desiccation of the plants. Leaves turned yellow, several spots coalesced and blighted. Under natural conditions, disease started as apical necrosis, followed by small white spots which ultimately turned into black or brown and at the end withering of leaves occurred (Plate 1).

The symptoms of Stemphylium blight observed in present investigations are in conformity with Basallote-Ureba *et al.* (1999) who reported that the disease initially appears as small elongated spindle shaped white lesions on leaves, which later become sunken with a purple colour surrounded by a yellowish margin. Initial symptoms of disease were white flecks that enlarged and produced sunken purple lesions sometimes surrounded by a yellow to pale brown border (Polat *et al.* 2012).

Conclusion

The incidence of Stemphylium blight was found in almost all the ten districts surveyed. Although, the disease was prevalent in all the districts from mild to severe form but the average disease severity ranged between 31.2-70.0 per cent, maximum being at Kullu district (70.0%) and minimum at Shimla district (31.2%). In the field, disease initially appears as a small spindle shaped white lesions on leaves, which later become sunken with a purple colour surrounded by a yellowish margin. In later stages, these lesions enlarge and results in the withering of all the leaves.



Plate 1. Symptomatology of Stemphylium blight of garlic under natural conditions

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