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SHORT NOTE

SCREENING OF GARLIC LINES AGAINST PURPLE BLOTCH AND STEMPHYLIUM BLIGHT

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Garlic (*Allium sativum* L.) is one of the important bulb crops grown and used as a spice or a condiment throughout India. It is attacked by a number of diseases of which, purple blotch and stemphylium blight are two economically important diseases. The causal organism of purple blotch infection is *Alternaria porri* while stemphylium blight is caused by *Stemphylium vesicarium*. Often both the diseases appear together and exhibit a complex of symptoms. However, at early stages of infection the diseases can be easily differentiated. The severity of disease is much more where crop is predisposed by thrips injury (Fournier *et al.*, 1995). In favourable conditions, epidemic may cause total failure of the crop. Severe loses were recorded due to purple blotch disease in Maharashtra during *kharif* (Gupta and Srivastava, 1993). Stemphylium blight caused losses up to 90% in the seed crop in northern parts of India (Anonymous, 1983). Singh and Sharma (1977) reported that *Stemphylium botryosum* causes leaf blight in garlic in kullu valley. Purple blotch alone causes 20-60% loss in Punjab, Haryana and Maharashtra (Sonona *et al.*, 1981; Thind and Jhooty, 1982). Management of disease through chemicals is not always effective and desirable. Selection of resistant / tolerant variety is a viable option for managing these diseases. Hence the present studies were conducted to find the resistance source of these two diseases.

Twenty one promising lines of garlic including three checks (G-1, G-323 and G-41) were planted in a randomized block design (RBD) at National Horticultural Research and Development Foundation, Regional Research Station, Karnal (29^{O} 42^{I} N Latitude and 77^{O} 02^{I} E longitude) Haryana during *rabi* season of 2005-06, 2006-07 and 2008-09 with three replication. Different genotypes were planted in the second week of October in 3.6 x 1.8 m plot size with 15 x 10 cm spacing. Recommended doses of NPK were applied @ 150:50:80 kg/ha. Vermicompost was applied at the time of field preparation @ 20q/ha. Hand weeding was carried out in all the plots. Screening was done on 0-9 point rating scale based on leaf area covered by the pustules (Mayee and Datar, 1986). Ten plants at bulb developmental stage were randomly selected for scoring the disease at fortnightly intervals. Percent disease index (PDI) was calculated on the basis of rating scale and the total number of plants observed as given below.

$$\text{P.D.I. (\%)} = \frac{\text{Sum of rating (0-9 scale)}}{\text{Maximum possible score x No. of leaves examined}} \times 100$$

The rating of the following significance:

0 : Absolutely free from infection

1 : Small sized lesions on the leaf covering <1% area

Table 1. Incidence of Purple blotch and Stemphylium blight on different garlic accessions

S.N.	Germplasm/ Line	PDI (%)				Bulb size (cm)	Yield (q/ha)
		Purple Blotch	Reaction	Stemphylium blight	Reaction		
1	G-294	5.0^{g}	R	10.0^{ijk}	R	4.35	161.50^{dc}
2	G-222	19.0^{c}	MR	49.0^{e}	S	4.25	164.23^{cd}
3.	G-299	10.0^{c}	R	16.5^{h}	MR	4.50	174.00^{ab}
4.	G-266	10.0^{c}	R	84.3^{a}	HS	4.44	159.50^{de}
5.	G-24	58.0^{b}	S	54.0^{a}	S	4.00	145.50^{f}
6.	G-52	7.8^{def}	R	41.82^{f}	MS	4.00	140.50^{f}
7.	G-324	5.4^{fg}	R	7.9^{jk}	R	4.55	172.40^{ab}
8.	G-351	5.1^{g}	R	8.5^{ijk}	R	4.45	169.16^{abc}
9.	G-213	8.6^{de}	R	70.0^{b}	S	4.15	161.83^{de}
10.	G-366	9.8^{d}	R	64.34^{c}	S	4.45	158.60^{de}
11.	G-368	6.9^{efg}	R	9.0^{ijk}	R	4.50	157.83^{e}
12.	G-369	5.5^{fg}	R	7.5^{k}	R	4.50	175.16^{ab}
13.	G-264	9.8^{d}	R	52.0^{d}	S	4.40	173.00^{ab}
14.	G-304	10.0^{d}	R	24.0^{g}	MS	4.25	157.33^{e}
15.	G-176	6.8^{efg}	R	10.0^{ijk}	R	4.50	169.33^{abc}
16.	G-189	8.9^{de}	R	8.5^{ijk}	R	4.50	175.50^{ab}
17.	G-92	8.3^{de}	R	16.0^{h}	MR	4.35	157.33^{e}
18.	G-4	6.5^{fg}	R	11.00^{ij}	MR	4.25	155.50^{e}
19.	G-323 (check)	10.0^{fg}	R	11.11	MR	4.55	169.06^{bc}
20.	G-1 (check)	9.5^{g}	R	25.5^{g}	MS	4.60	157.96^{de}
21.	G-41 (check)	95.6^{a}	HS	23.97^{g}	MR	4.00	156.50^{e}

R = Resistant MR = Moderately Resistant
MS = Moderately Susceptible S = Susceptible
HS = Highly Susceptible

Table 2. Correlation matrix for diseases and morphological parameters

	Purple blotch	Stemphylium blight
Bulb size	-0.188	-0.148
Yield	-0.296*	-0.344**

2 : Small sized lesions on the leaf covering <2-5% area

3 : Small sized lesions on the leaf covering < 6-10% area

4 : Small sized lesions on the leaf covering <11-15% area

5 : Small sized lesions on the leaf covering < 16-25% area

6 : 26-40% area covering

7 : 41-60% area covering

8 : 61-75% area covering

9 : >75% area covered with spot, most of the leaves dried.

All the screened genotypes were categorized for their reaction on the basis of PDI values. Those with 10% DI value were considered as resistant, while those with 11-25% as moderately resistant, 26-50% as moderately susceptible, 51-75 as susceptible and more than 75% as highly susceptible. Other morphological characters like bulb size and total yield (q/ha) were recorded after harvesting the crop. The disease resistance with desirable traits was tested under artificial conditions. Statistically significant difference was observed among genotypes for considered characters except bulb size. Genotypes were further classified into significant groups by applying Duncan Multiple Range Test in Table-1 for traits.

Observations revealed that out of twenty-one promising lines, Line G-54 was found moderately susceptible, line G-222 was moderately resistant and rest of lines were found to be resistant against purple blotch. Lines G-294, G-324, G-351, G-368, G-369, G-176 and G-189 were found resistant against stemphylium blight, lines G-299, G-192, G-4 and G-323 were found moderately resistant, lines G-222, G-54, G-213, G-366 and G-264 were found susceptible, lines G-52 moderate susceptible and G-266 were found highly susceptible. The highly susceptible lines can be used as check in future studies. This area may be considered as hot spot for the disease screening because of the natural incidence being very high under field conditions (90 to 100%) causing complete burning of the plants. No correlation between disease incidence and bulb size (diameter) was observed. However, there was a significant negative correlation with bulb yield. Bulb size (diameter) of resistant line was slightly higher than that of susceptible lines. Expectedly, purple blotch and stemphylium blight exhibited a significant negative correlation with yield. Our findings suggest that there is a scope for host plant resistance againt these diseases in garlic.

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