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Management of purple blotch (*Alternaria porri*) disease of garlic (*Allium sativum* L.)

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Abstract

Field trials were conducted for the management of purple blotch disease of garlic during *Rabi* 2008–11. Six fungicides *viz*., tebuconazole @ 0.1%, azoxystrobin @ 0.1%, hexaconazole @ 0.1%, sectin (fenamidone + mancozeb) @ 0.2%, propineb @ 0.2% and mancozeb @ 0.25% and a control formed the treatments. The pooled data of three years indicated that purple blotch incidence ranged from 10% to 33.33% and intensity from 0.44% to 4.71%. Significantly lower incidence (21.11%) as well as intensity (1.78%) were recorded with spray of mancozeb @ 0.25% followed by tebuconazole @ 0.1% and azoxystrobin @ 0.1%. The highest gross yield (86.49 q ha^{-1}) and marketable yield (86.07 q ha^{-1}) were also recorded with spray of mancozeb @ 0.25% followed by azoxystrobin @ 0.1% and tebuconazole @ 0.1%. It was evident from the data that 1.73% intensity with 21.11% incidence of purple blotch at 45 days after planting (DAP) caused economic yield losses and it is considered as threshold value of purple blotch in garlic. The higher incidence (33.33%) and intensity (4.71%) of the disease as well as lowest gross yield (62.18 q ha^{-1}) and marketable yield (61.87 q ha^{-1}) were recorded in untreated control. The present study revealed that contact fungicide mancozeb and systemic fungicides namely tebuconazole and azoxystrobin spray after 30 DAP and subsequent sprays at fortnightly intervals were ideal for the management of purple blotch disease and increased garlic yield.

Keywords: *Alternaria porri*, fungicides, garlic, purple blotch

Garlic (*Allium sativum* L.) is an important spice crop cultivated in all over the country during *Rabi* season except in Ooty hills of Tamil Nadu where it is grown during rainy season. The total production of garlic is 1061.85 thousand metric tons from an area of 200.70 thousand hectares in India. However, the productivity is quite low in comparison to other countries. Garlic crop is affected by various diseases of which, purple blotch caused by *Alternaria porri* (Ellis) Cif. is a major constraint and causes severe yield loss (Bisht & Thomas 1992; Bisht *et al.* 1993; Boiteux *et al*. 1994; Mishra *et al.* 2009). Keeping this in view, field experiments were conducted to evaluate the efficacy of different contact, systemic and mixed fungicides for management of this disease.

Field trials were conducted in three consecutive years during *Rabi* season, 2008–09, 2009–10 and 2010–11 at Research Farm of National Horticultural Research and Development Foundation, Nashik, Maharashtra using garlic

variety Yamuna Safed-4 (G-323). The seven treatments comprised of T_1- Tebuconazole @ 0.1%, T_2- Azoxystrobin @ 0.1%, T_3- Propineb @ 0.2%, T_4- sectin (fenamidone + mancozeb) @ 0.2%, T_5- hexaconazole @ 0.1%, T_6- mancozeb @ 0.25% and T_7- untreated control laid out in RBD with three replications. The garlic cloves were planted on 12/11/2008, 24/10/2009 and 10/11/2010 at a spacing of 10 cm × 7.5 cm in 3.0 m × 1.2 m beds. All the standard agronomical practices were followed uniformly as per the recommendation. The foliar spray of the fungicides was started after 30 DAP. A total of four sprays were given at 15 days intervals. The irrigation was done at regular intervals and the crop was harvested as per maturity of bulbs on 05/04/2009, 06/04/2010 and 05/04/2011. Data were recorded on disease incidence, intensity, gross and marketable bulb yield. PDI of purple blotch was recorded before each spray at 30, 45, 60 and 75 DAP on randomly selected ten plants following the 0-5 rating scale (Wheeler 1969). Deltamethrin @ 0.1% was sprayed uniformly in all the treatments for the management of thrips. The temperature, relative humidity and rainfall for 2008–09, 2009–10, 2010–11 were 11.29°C to 35.35°C, 23% to 89%, 25.60 mm; 11.85°C to 35.95°C, 29% to 84%, 6.60 mm; 7.36°C to 35.34°C, 54% to 85% with 88.60 mm, respectively. The data of three years were pooled and analyzed statistically.

The pooled data presented in Table 1 revealed that the incidence of purple blotch ranged from 10% to 33.33% and intensity varied from 0.44% to 4.71%. The disease incidence and intensity of purple blotch were recorded before 1st spray of fungicides after 30 DAP and subsequently before each spray at fortnightly intervals. The data recorded before 1st spray indicated that disease incidence as well as intensity of purple blotch did not differ significantly, however, the incidence ranged from 10% to 13.33% and intensity from 0.44% to 0.67%. The pooled data of three years revealed that significantly lowest incidence (11.11%) as well as intensity (0.71%) before 2nd spray at 45 DAP with tebuconazole @ 0.1% and it was found to be at par with other treatments. Further, significantly lowest incidence of 21.11% was recorded before 4th

Table 1. Percent incidence and intensity of purple blotch (*Alternaria porri*) disease of garlic (pooled data of three years)

Treatments	Before 1st spray (30 DAP)		Before 2nd spray (45 DAP)		Before 3rd spray (60 DAP)		Before 4th spray (75 DAP)		Gross yield ($q\ ha^{-1}$)	Marketable yield ($q\ ha^{-1}$)
	Inc. (%)	Int. (%)	Inc. (%)	Int. (%)	Inc. (%)	Int. (%)	Inc. (%)	Int. (%)		
T_1-Tebuconazole @ 0.1%	10.00	0.44	11.11	0.71	18.89	1.20	24.44	2.09	82.15	80.62
T_2- Azoxystrobin @ 0.1%	11.11	0.54	13.33	0.84	18.89	1.38	24.44	2.13	85.85	85.13
T_3- Propineb @ 0.2%	12.22	0.58	14.45	0.84	20.00	1.51	25.56	2.53	77.97	77.06
T_4-Sectin (Fenamidone+ Mancozeb) @ 0.2%	11.11	0.49	14.44	0.94	24.44	1.64	26.67	2.85	77.94	75.08
T_5-Hexaconazole @ 0.1%	10.00	0.49	13.33	0.80	22.22	1.38	25.56	2.22	80.91	79.11
T_6- Mancozeb @ 0.25%	13.33	0.67	13.33	0.76	17.78	1.07	21.11	1.78	86.49	86.07
T_7- Untreated control	13.33	0.66	21.11	1.73	28.89	2.53	33.33	4.71	62.18	61.87
S Em±	1.98	0.09	2.11	0.26	2.96	0.25	2.55	0.31	5.46	4.89
C.D. (P<0.05)	NS	NS	4.61	0.56	6.46	0.55	5.57	0.68	11.89	10.66

P.B.=Purple blotch; Int.=Intensity; Inc.=Incidence; DAP=Days after planting

spray at 75 DAP with mancozeb @ 0.25%. Similarly, the lowest intensity was recorded before 4th spray at 75 DAP, with mancozeb @ 0.25% (1.78%) followed by tebuconazole @ 0.1% (2.09%) and azoxystrobin @ 0.1% (2.13%). The intensity recorded in these three treatments was at par with the intensity recorded with mancozeb spray. The higher incidence (33.33%) and intensity (4.71%) were recorded in untreated control. Earlier workers reported that foliar spray of mancozeb @ 0.3% and @ 0.25% effectively controlled purple blotch and stemphylium blight disease of onion (Borkar & Patil 1995; Gupta *et al.* 1996; Srivastava *et al.* 1999; Gupta *et al.* 2009). The findings of the present study are in conformity with the results obtained by Gupta *et al.* (1996) where they reported that 3 to 4 sprays of 0.25% mancozeb at 10 days intervals reduced the incidence and intensity of foliar diseases of onion. Studies conducted by Wangikar *et al.* (2012) on management of purple blotch of onion in Marathwada region of Maharashtra revealed lowest disease severity of purple blotch with spray of mancozeb @ 0.25%, hexaconazole @ 0.1% and difenconazole @ 0.05%. Gupta *et al* (2012) reported that systemic fungicides tebuconazole @ 0.1% and azoxystrobin @ 0.1% effectively controlled purple blotch disease of garlic.

The highest percent efficacy of disease control (PEDC) of purple blotch (62.21%) with foliar sprays of mancozeb @ 0.25% followed by tebuconazole @ 0.1% (55.63%) and azoxystrobin @ 0.1% (54.78%) in comparison to the untreated control was seen (Fig. 1). Similarly, the maximum reduction in incidence of purple blotch was recorded with spray of mancozeb followed by tebuconazole and azoxystrobin. Significantly highest gross yield (86.49 q ha^{-1}) was also recorded with mancozeb @ 0.25% followed by azoxystrobin @ 0.1% (85.85 q ha^{-1}) and tebuconazole @ 0.1% (82.15 q ha^{-1}) was noted (Table 1) and the lowest gross yield (62.18 q ha^{-1}) was recorded in the control. The data shows that highest increase in marketable yield (39.11%) was also recorded with mancozeb @ 0.25% followed by azoxystrobin @ 0.1% (37.59%) and tebuconazole @ 0.1% (30.31%) over control. The present study revealed that mancozeb, tebuconazole and azoxystrobin effectively minimized purple blotch disease as well as increased the garlic bulb yield.

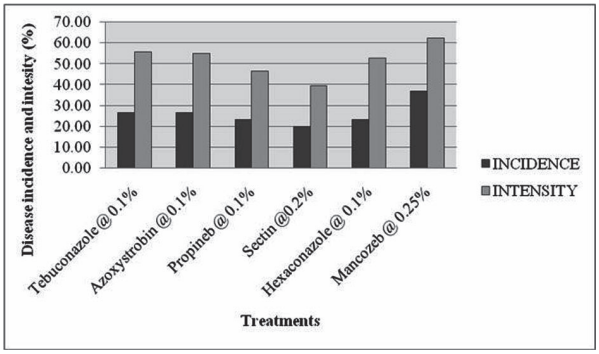

Fig. 1. Percent disease control of purple blotch in different treatments over control

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