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## Management of leaf spot and flower blight of marigold caused by *Alternaria tagetica* (Shome and Mustafee) under field condition

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**Abstract**

Leaf spot and flower blight caused by *Alternaria tagetica* (Shome and Mustafee) is one of the important diseases of marigold, which causes upto 50 to 60% losses in yield. In this present investigation, different fungicides, botanicals and bio-agents were evaluated under field condition. The results revealed that, Hexaconazole (0.1%) was found effective in reducing the percent disease index (32.15) on leaves and (33.76) on flower in all three sprays and getting higher yields (6.96 t/ha) followed by Mancozeb (0.2%) with PDI of (34.53) on leaves and (35.45) on flower with yield of (6.81 t/ha) as compared to control with (85.02 and 86.11 PDI) on leaves and flower respectively with yield of (4.26 t/ha). Among botanicals, Nimbicidin (0.5%) was effective in minimizing the percent disease index (14.80) on leaves and (16.81) on flowers and yield (4.81 t/ha). *Trichoderma harzianum* (5g/l) was effective in minimizing the percent disease index (17.07) on leaves and (17.37) on flowers and recorded yield (5.26 t/ha).

**Keywords:** *Alternaria tagetica*, Marigold, leaf spot and flower blight and fungicides and concentrations

**Introduction**

Marigold (*Tagetes* spp. L.) is a flowering plant belonging to the family *Asteraceae*. Marigold flowers are widely used in religious and social functions especially for internal decoration, bedding, in hanging baskets as well as loose flower for garlands. Marigold flowers are rich source of carotenoids and pigment of flowers is used in food colorings and textile industries. Marigold is susceptible to a number of fungal, bacterial and viral diseases *viz.*, *Alternaria* leaf spot and flower blight, collar rot and root rot, wilt, *Cercospora* leaf spot, *Septoria* leaf spot powdery mildew, bacterial wilt, flower bud rot, damping off, *Botrytis* Flower Blight, cucumber mosaic virus (CMV) and Aster yellow virus are important. Among the fungal diseases, leaf spot and flower blight caused by *Alternaria tagetica* (Shome and Mustafee) is one of the major destructive and economically important disease and cause upto 50-60 % losses in flower yield. In this view the present study was carried out using different fungicides, botanicals and bioagents against *A.tagetica* under field condition.

**Materials and Methods**

The experiment was laid out at AHRS, Bavikere during *Kharif* 2016 with ten treatments, *viz.*, Hexaconazole at 0.1%, Carbendazim 12% + Mancozeb 63% at 0.2%, Propineb at 0.2%, Chlorothalonil at 0.2%, Mancozeb at 0.2% and Carbendazim 25% + Iprodione 25% at 0.2%, *Trichoderma harzianum* at 5g/l, Nimbicidin at 0.5%, Garlic clove extract at 5% and untreated control. Totally three sprays were given at 15 days interval starting from the initiation of the disease (30 days after planting). The experiment was laid in Randomized Block Design (RBD) with three replications. The susceptible Marigold variety yellow maxima was used in present investigation. The observations on leaf spot and flower blight severity was recorded before spray and after spray using 0-5 scale suggested by Narayanappa and Chandra (1984) [6] was used for recording disease intensity on leaves and 0-4 scale suggested by Dhiman and Arora (1990) [2] for disease severity on flowers. Flower yield was also recorded in all plots.

Rating scale	PDI	
	On leaves	On flowers
0	No disease symptom	Healthy (disease free flowers)
1	1 – 5 % leaf area covered	up to 25 % flower area covered by the disease
2	6 – 10% leaf area covered by the disease	26-50% flower area covered by the disease
3	11 – 25 % leaf area covered by the spot	51-75 % flower area covered by the disease
4	26 – 50% leaf area covered by the disease	whole of flower area covered by the disease symptom
5	>50% leaf area covered by disease	

After the recording the disease severity on leaves and flowers, the per cent disease index (PDI) was calculated using the

formula (Wheeler, 1969):

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of all numerical rating}}{\text{Number of leaves/flowers} \times \text{Maximum disease rating observed}} \times 100$$

## Results and Discussion

The results from table 1 indicated that, at 30, 45, 60 days after spray (DAS) all the treatments were found significantly superior over untreated control. PDI was in the range from 19.07 to 22.86 on leaves and 14.07 to 17.86 on flowers in the plots before spray which do not differed significantly over other treatments.

After first spray, lowest PDI of 29.45 and 29.07 was recorded on leaves and flowers with Hexaconazole at 0.1% spray found significantly superior over all other treatments and remains on par with Mancozeb at 0.2% (31.68 and 30.17 PDI) on leaves and flowers respectively. The highest PDI was recorded in untreated control (43.57 and 46.89).

After second spray lowest PDI of 30.46 and 31.40 was recorded on leaves and flowers with Hexaconazole at 0.1% spray followed by Mancozeb at 0.2% (32.67 and 32.51 PDI) on leaves and flowers, which were on par with each other and significantly superior over other treatments. The highest PDI was recorded in untreated control (68.51 and 70.45) on leaves and flowers respectively.

After third spray lowest PDI of 32.15 and 33.76 was recorded on leaves and flowers with Hexaconazole at 0.1% and found significantly superior over other treatments, but on par with

Mancozeb at 0.2 % (34.53 and 35.45 PDI) on leaves and flowers respectively. next best treatments were Chlorothalonil at 0.2 % (39.27 and 38.87 PDI), Carbendazim 12%+ Mancozeb 63% at 0.2 % ( 47.14 and 44.7 PDI) on leaves and flowers respectively. The highest PDI was recorded in untreated control 85.02 and 86.11.

The data also showed that, there was increase in disease severity form 30 DAS to 60 DAS and the rate of increase in disease severity was reduced in case of fungicides treatments compared to bio agents and botanical treated plots. With respect to flower yield there was significant increase in fungicides treated plots compared to bioagents and botanicals. The maximum yield of 6.96 and 6.81 t/ha was obtained in plots sprayed with 0.1% Hexaconazole 5EC and 0.2% Mancozeb which were significantly superior over other treatments followed by 0.2% chlorothalonil (6.63 t/ha), at 0.2% carbendazim 12%+ Mancozeb 63% (6.33 t/ha), 0.2% of propineb (6.22t/ha) respectively. Whereas 5% Garlic clove extract (5.78t/ha), *Trichoderma harzianum* at 5g/l was (5.56t/ha) and Carbendazim 25% + Iprodione 25% at 0.2% (4.81t/ha) were recorded less yield. The least flower yield 4.26 t/ha was recorded in untreated control.

**Table 1:** Management of leaf spot and flower blight of marigold with fungicides, botanicals and bioagents under field condition during *Kharif* 2016.

Treatments	Per cent Disease Index (PDI)								Per cent disease Reduction over control		Yield (t/ha)
	Before spray		After 1 <sup>st</sup> spray		After 2 <sup>nd</sup> spray		After 3 <sup>rd</sup> spray		Leaves	Flowers	
	Leaves	Flowers	Leaves	Flowers	Leaves	Flowers	Leaves	Flowers			
Nimbecidin @ 0.5%	21.28 (27.49)*	16.28 (23.81)	35.33 (36.49)	45.31 (42.33)	47.57 (43.63)	53.29 (46.91)	72.44 (58.36)	71.57 (57.81)	14.80	16.88	4.81
Garlic clove extract @ 5%	20.26 (26.76)	15.26 (23)	38.76 (38.52)	41.7 (40.24)	56.21 (48.59)	48.75 (44.31)	68.86 (56.11)	59.39 (50.44)	19.01	31.03	5.56
<i>Trichoderma harzianum</i> @ 5g/l	19.07 (25.9)	14.07 (22.04)	40.08 (39.3)	44.94 (42.12)	59.57 (50.54)	51.14 (45.68)	70.56 (57.17)	71.15 (57.54)	17.01	17.37	5.26
Hexaconazole 5 % EC@ 0.1%	21.69 (27.77)	16.69 (24.14)	29.45 (32.88)	29.07 (32.64)	30.46 (33.51)	31.40 (34.1)	32.15 (34.56)	33.76 (35.54)	62.19	60.79	6.96
Chlorothalonil 75 % WP @ 0.2%	21.10 (27.29)	16.00 (23.59)	33.96 (35.66)	34.87 (36.21)	35.65 (36.68)	35.11 (36.35)	39.27 (38.83)	38.87 (38.59)	53.80	54.86	6.63
Mancozeb 75 % WP @ 0.2%	20.17 (26.7)	15.17 (22.93)	31.68 (34.27)	30.17 (33.33)	32.67 (34.88)	32.51 (34.78)	34.53 (36)	35.45 (36.56)	59.39	58.83	6.81
Propineb 70 % WP @ 0.2%	22.86 (28.57)	17.86 (25.01)	38.29 (38.25)	35.03 (36.31)	43.91 (41.52)	43.70 (41.4)	52.32 (46.35)	46.31 (42.9)	38.46	46.22	6.22
Carbendazim 12%+Mancozeb 63 % @ 0.2%	21.37 (27.55)	16.37 (23.88)	34.15 (35.78)	34.91 (36.23)	42.34 (40.61)	41.95 (40.39)	47.14 (43.38)	44.70 (41.98)	44.56	48.09	6.33
Carbendazim 25%+Iprodione 25% @ 0.2%	19.48 (26.2)	14.48 (22.38)	39.13 (38.74)	40.34 (39.45)	44.80 (42.04)	45.78 (42.6)	59.33 (50.4)	54.95 (47.86)	30.21	36.18	5.78
Control	21.67 (27.76)	16.67 (24.11)	43.57 (41.33)	46.89 (43.24)	68.51 (55.89)	70.45 (57.1)	85.02 (67.27)	86.11 (68.15)			4.26
S. Em.±	0.89	0.99	1.27	1.33	1.76	1.88	2.18	1.97			0.63
C. D. at 5 %	NS	NS	3.78	3.95	5.22	5.60	6.47	5.86			1.88

The values in the parenthesis are arc sine transformed

These results are confirmed with Mesta *et al.* (2003)<sup>[5]</sup> and Mesta (2006)<sup>[4]</sup> who reported the triazoles as effective fungicides against *Alternaria* blight of sunflower. chlorothalonil (0.2%) and Mancozeb (0.2%) were next to Hexaconazole in terms of efficacy. Mancozeb has been reported to be effective fungicide against *A. Alternata* (Singh and Milne, 1974; Desai, 1998, Sood and Sharma, 2002 and Narayanappa and Chandra, 1984)<sup>[6]</sup>. Singh *et al.* (2006) also obtained highest disease control and flower yield with the application of Difenconazole and penconazole. Mazumdar, (2000) also found that Mancozeb 75% WP (Indofil M-45) was significantly superior followed by Captan 50%WP and copper oxychloride 50%WP (Blitox) in management of *Alternaria zinnia*.

## References

1. Desai SA. Chemical control of *Alternaria* blight and rust of sunflower in Northern Karnataka. Karnataka J. Agric. Sci. 1998; 11:674-678.
2. DHIMAN JS, ARORA JS. Occurrences of leaf spot and flower blight of marigold in Punjab. Journal of Research Punjab Agricultural University. 1990; 27(2):231-236.
3. Mazumder N. Epidemiological factors in relation to development of *Alternaria* leaf blight of marigold and fungicidal control. Pl. Dis. Res. 2000; 15(1):23-28.
4. Mesta RK. Epidemiology and management of *Alternaria* blight of sunflower caused by *Alternaria helianthi* (Hansf.) Tubaki and Nishihara. Ph. D. Thesis, Univ. Agric. Sci., Dharwad, India, 2006.
5. Mesta RK, Sunkad G, Katti P. Chemical control of *Alternaria* blight of sunflower. Extended Summaries of National Seminar on Stress Management in Oil seeds for attaining self reliance in vegetable oils, January 28-30, held at DOR, Hyderabad. 2003, 149-151.
6. Narayanappa M, Chandra JK. Fungicidal control of leaf spot of marigold caused by *Alternaria tagetica*. Indian J. Agri. Sci. 1984; 54(5):691-692.
7. Shome SK, Mustafee TP. *Alternaria tagetica* sp. nov causing blight of marigold. Current Science. 1966; 14:370.
8. Singh G, Milne KS. Laboratory evaluation of fungicides against fungi causing flower blight of chrysanthemums. New-Zealand J. Exp. Agri. 1974; 2(2):181-183.
9. Singh PJ, Singh P, Dhindsa GS, Kumar R. Efficacy of systemic and non-systemic fungicides against leaf spot (*Alternaria tagetica*) of marigold. Indian Phytopathol. 2006; 59(1):118-119.
10. Sood R, Sharma RL. Efficacy of pre harvest application of fungicides against black rot (*Alternaria alternata*) of tomato in storage. Pl. Dis. Res. 2002; 17:347-348.
11. Wheeler BEJ. An introduction to plant diseases. John Wiley and Sons Ltd., London, 1969.