The Pharma Innovation Journal 2022; 11(2): 901-904

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(2): 901-904

www.thepharmajournal.com
Received: 11-11-2021
Accepted: 21-01-2022

Dinesh Kumar
Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

SL Godara
Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

AK Meena
Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

DR Kumhar
Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

Corresponding Author:
SL Godara
Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

Evaluation of different fungicides in the control of purple blotch [*Alternaria porri* (Ellis) Cif] of onion

Dinesh Kumar, SL Godara, AK Meena and DR Kumhar

Abstract
A field experiment was carried out to evaluate the effect of different fungicides on purple blotch [*Alternaria porri* (Ellis) Cif] of onion (*Allium cepa* L.) experimental farm during *Rabi* 2015-16 and 2016-17 in the Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner. The experiment was laid-out in randomized block design with three replications during *Rabi* 2015-16 and 2016-17. The effective management of purple blotch of onion through application of different fungicides was appraised under field conditions. Among the nine treatments evaluated, the seed treatment with Tebuconazole @ 1g/kg + two spray Tebuconazole @ 0.1% was found significantly minimum per cent disease index of 17.75% and bulb yield 26.83 t/ha which was superior over other treatments and control. However, the result shows that the application of Tebuconazole was found superior and maximum inhibited the mycelial growth of *Alternaria porri* at 100 and 200 ppm concentrations and *Azadirachta indica* (Neem leaf extract) was found least effective at all concentrations against *Alternaria porri*. Moreover, the seed treatment with Difenoconazole @ 1g/kg + two spray of Difenoconazole @ 0.1% was recorded second best (PDI 29.03% and bulb yield 22.60 t/ha) but it was found statistically significant with the application of seed treatment with Tebuconazole + Trifloxystrobin @ 0.5g/kg + two spray Tebuconazole + Trifloxystrobin @ 0.05% (PDI 32.87% and Bulb yield 22.33 t/ha) followed by seed treatment with Propiconazole @ 1g/kg + two spray of Propiconazole @ 0.1% (PDI 33.83% and bulb yield 21.97 t/ha) in pooled analysis, respectively. The maximum PDI (74.00%) and minimum bulb yield (5.03 t/ha) was observed in control. Field observations of the different fungicides are very useful to effective control of purple blotch disease of onion as well as *in-vitro* technique for efficiently inhibit the mycelial growth of the test fungi.

Keywords: Onion, *Alternaria porri*, *Azadirachta indica*, fungicide, tebuconazole, difenoconazole, purple blotch

Introduction
Onion (*Allium cepa* L.), the "queen of kitchen" is considered as the poor man's staple spice. It is one of the five most important fresh market vegetable crops grown worldwide belonging to the family alliaceae (Cramer, 2000) [2]. The primary centre of origin lies in central Asia and the major onion growing countries in the world are China, India, United States, Turkey, Iran and Pakistan (Javadzadeh *et al.*, 2009) [6]. Onion is an important temperate crop grown in the world. The vegetative growth of the crop is supported by lower temperature and short photoperiod whereas bulb development requires high temperature with longer photoperiod. Onion is grown in all types of the soil. The bulb of onion consists of swollen bases of green foliage leaves and fleshy scales. The major onion producing states are Maharashtra, Tamil Nadu, Andhra Pradesh, Bihar and Punjab. The crop is attacked by many fungal, bacterial pathogens, viruses and nematodes. The prevalence of pathogens depends on seasons, variety and region. Many fungal pathogens have been reported causing foliar and bulb diseases of onion. Management of purple blotch is essential to provide increased and stable onion yields throughout the onion growing regions. Control of purple blotch is primarily accomplished by the application by the application of fungicides and resistant cultivars. In India, many fungicides have been tested to manage this disease (Rangaswami, 1993, Patel *et al.*, 2001, Vijay and Rahman, 2004) [10, 9, 12].

Materials and Methods
The experiment was carried out at experimental farm in the Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner during *Rabi* 2015-16 and 2016-17. Bikaner is situated at latitude 28^0 01ºN, longitude 73^0 22'E and an elevation of 234.7M above mean sea level. According to "Agro ecological region map" brought out by National Bureau of Soil Survey and Land Use Planning (NBSS& LUP),

Bikaner falls in agro ecological region No. 2 (M9E1) under arid ecosystem (Hot Arid Eco-region with desert and saline soil). The field experiment was laid out according to a randomized block design with three replications.

The experiment comprised of 9 treatments consisting (i) ST with Mancozeb @ 2g/kg + two spray of Mancozeb @ 0.3%, (ii) ST with Chlorothalonil @ 2g/kg + two spray of Chlorothalonil @ 0.2%, (iii) ST with Carbendazim + Mancozeb @ 3g/kg + two spray of Mancozeb @ 0.3%, (iv) ST with Propiconazole @ 1g/kg + two spray of Propiconazole @ 0.1%, (v) ST with Difenoconazole @ 1g/kg + two spray of Difenoconazole @ 0.1%, (vi) ST with Tebuconazole @ 1g/kg + two spray Tebuconazole @ 0.1%, (vii) ST with Tebuconazole + Trifloxystrobin @ 0.5g/kg + two spray Tebuconazole + Trifloxystrobin @ 0.05%, (viii) ST with Tebuconazole + Trifloxystrobin @ 0.5g/kg + two spray Tebuconazole + Trifloxystrobin @ 0.05% and (ix) Control (without any treatment). However, the efficacy of fungicides was evaluated *in vitro* at four concentrations *viz.*, 1, 50, 100, and 200 ppm concentration against *Alternaria porri* on PDA by poisoned food technique. The crop was transplanted on Nov, 2015 and Nov, 2016 with 30 cm distance between the rows and 15 cm spacing within the plants. Different fungicides and plant extracts were sprayed 5 days after the inoculation, coinciding with the time of first appearance of the symptoms. Two subsequent sprays of chemicals and plant extracts were applied at 10 days interval. Disease intensity was recorded after 15-20 days of second spray. Per cent disease control was calculated by following formula:

The data of per cent disease intensity in all the experiments were transformed to their Arcsine values (Fisher and Yates, 1963). The statistical analysis of the data of all the laboratory and green house experiments were done following Completely Randomized Design. The data of field experiments were analyzed following Randomized Block Design (Cochran and Cox, 1957) [1].

Results and Discussion

The efficacy of fungicides was evaluated *in vitro* at four concentrations *viz.*, 1, 50, 100, and 200 ppm concentration against *Alternaria porri* on PDA by poisoned food technique. The data suggested (Table 1 and Plate 1) that increase in concentration of fungicides caused increased inhibition of mycelial growth of the fungus. Among these treatments, Tebuconazole was found better and completely inhibited the mycelial growth of *Alternaria porri* at 100 and 200 ppm concentrations, respectively. This was followed by Difenoconazole in with inhibition of 51.64, 89.01, and 91.18% at 50,100 and 200 ppm, respectively. *Azadirachta indica* (Neem leaf extract) was found least effective at all concentrations against *Alternaria porri.* Similar results were observed by Vijaya and Rahman (2004) [12], Madhavi *et al.*, (2012) [8], Kumar *et al.*, (2017) [7], Roopa *et al*., (2014) [11] and Jakatimath *et al*., (2017) [10].

Eight different fungicides were evaluated for management of purple blotch of onion by seedling treatment at the time of transplanting with two spray of same fungicide after 45 and 60 days, respectively, under artificial inoculated field conditions. Two years pooled results on per cent disease intensity revealed that all the fungicides were significantly effective in reducing purple blotch of onion over control (Table 2 and Fig. 1). The minimum disease intensity (17.75%) was recorded with the application of Tebuconazole with 76.10 per cent reduction over control which the yield about 433.11 per cent. However, Difenoconazole were observed to be second best with 29.03 per cent disease intensity with 60.54 per cent decreased intensity which inhance the bulb yield and increases about 349.01 per cent. Chlorothalonil was found least effective with 54.83 per cent disease intensity and 25.92 per cent decreased intensity (Plate 10). Pooled analysis of two years yield data (Table 1) of onion was found statistically significant over control. Results showed that maximum yield (26.83 t/ha) was recorded in Tebuconazole with 433.11 per cent increased yield followed by Difenoconazole with 22.60 t/ha and 349.01 per cent, respectively. Least bulb yield was obtained with Chlorothalonil (14.08t/ha). Similar observations were also observed by Ginoya and Gohel (2015) [4] against *Alternaria alternata* causing fruit rot of chilli. Our results corroborate with the result of Yadav *et al.* (2017) [13] revealed that all the fungicidal treatments were significantly superior to the untreated check in reducing the disease severity and increasing the bulb and seed yield of onion. Systemic Triazole and Strobilurin fungicides were found more effective as compared to non-systemic fungicides.

Table 1: Efficacy of different fungicides on mycelial growth inhibition against *A. porri in vitro*

S.N.	Fungicides	Per cent growth inhibition at			
		1 ppm	**50 ppm**	**100 ppm**	**200 ppm**
1.	Mancozeb 75% WP	6.30 (14.54)	41.76 (40.26)	65.66 (54.13)	68.70 (55.98)
2.	Chlorothalonil 75% WP	4.23 (11.87)	38.62 (38.42)	62.88 (52.46)	66.10 (54.39)
3.	Carbendazim 12% + Mancozeb 63%	10.44 (18.85)	44.28 (41.72)	71.88 (57.98)	76.33 (60.89)
4.	Propiconazole 25% EC	13.86 (21.86)	47.12 (43.35)	79.77 (63.27)	84.10 (66.50)
5.	Difenoconazole 25% EC	27.45 (31.60)	51.64 (45.94)	89.01 (70.64)	91.18 (72.72)
6.	Tebuconazole 25% EC	29.16 (32.68)	54.35 (47.50)	90.00 (71.57)	92.14 (73.72)
7.	Tebuconazole 50% + Trifloxystrobin 25%	25.23 (30.15)	50.16 (45.09)	88.86 (70.50)	90.66 (72.20)
8.	*Azadirachta indica* (Neem leaf extract)	1.02 (5.80)	35.26 (36.43)	55.10 (47.93)	58.26 (49.75)
9.	Control	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	Mean	13.08 (21.20)	40.35 (39.44)	67.02 (54.95)	69.72 (56.61)
		S.Em (±)		CD (P=0.05)	
	Fungicides	1.80		4.99	
	Concentrations	1.20		3.33	
	Fungicides X Concentrations	3.61		9.98	

Table 2: Effect of various treatments on per cent disease intensity of purple blotch and bulb yield of onion

S.N.	Treatments	Mean PDI			Per cent reduction over control	Bulb yield (t/ha)			Yield Increase (%)
		2015-16	2016-17	Pooled mean		2015-16	2016-17	Pooled mean	
1	ST with Mancozeb @ 2g/kg + two spray of Mancozeb @ 0.3%	49.67 (44.81)	52.00 (46.15)	50.83 (45.48)	31.10	16.07	15.50	15.78	213.58
2	ST with Chlorothalonil @ 2g/kg + two spray of Chlorothalonil @ 0.2%	54.67 (47.68)	55.00 (47.87)	54.83 (47.77)	25.92	14.57	13.60	14.08	179.80
3	ST with Carbendazim + Mancozeb @ 3g/kg + two spray of Mancozeb @ 0.3%	43.33 (41.16)	44.40 (41.78)	43.87 (41.47)	40.56	18.27	17.50	17.88	255.30
4	ST with Propiconazole @ 1g/kg + two spray of Propiconazole @ 0.1%	33.67 (35.46)	34.00 (35.65)	33.83 (35.55)	54.22	22.63	21.30	21.97	336.42
5	ST with Difenoconazole @ 1g/kg + two spray of Difenoconazole @ 0.1%	29.73 (33.04)	28.33 (32.16)	29.03 (32.60)	60.54	24.00	21.20	22.60	349.01
6	ST with Tebuconazole @ 1g/kg + two spray Tebuconazole @ 0.1%	18.33 (25.34)	17.17 (24.44)	17.75 (24.89)	76.10	26.67	27.00	26.83	433.11
7	ST with Tebuconazole + Trifloxystrobin @ 0.5g/kg + two spray Tebuconazole + Trifloxystrobin @ 0.05%	32.00 (34.42)	33.73 (35.50)	32.87 (34.96)	55.22	22.50	22.17	22.33	343.71
8	Foliar spray of Fluopicolide 6.25% + Propamocarb hydrochloride 62.5% SC (W/V)	43.00 (40.97)	44.73 (41.97)	43.87 (41.47)	40.32	18.00	17.00	17.50	247.68
9	Control (without any treatment)	73.67 (59.17)	74.33 (59.61)	74.00 (59.39)	-	4.90	5.17	5.03	-
	S.Em (±)	1.89	2.35	1.74		1.24	0.73	0.80	
	CD (P=0.05)	5.51	6.85	5.07		3.63	2.13	2.34	
	CV (%)	8.14	10.03	7.46		11.56	7.08	7.62	

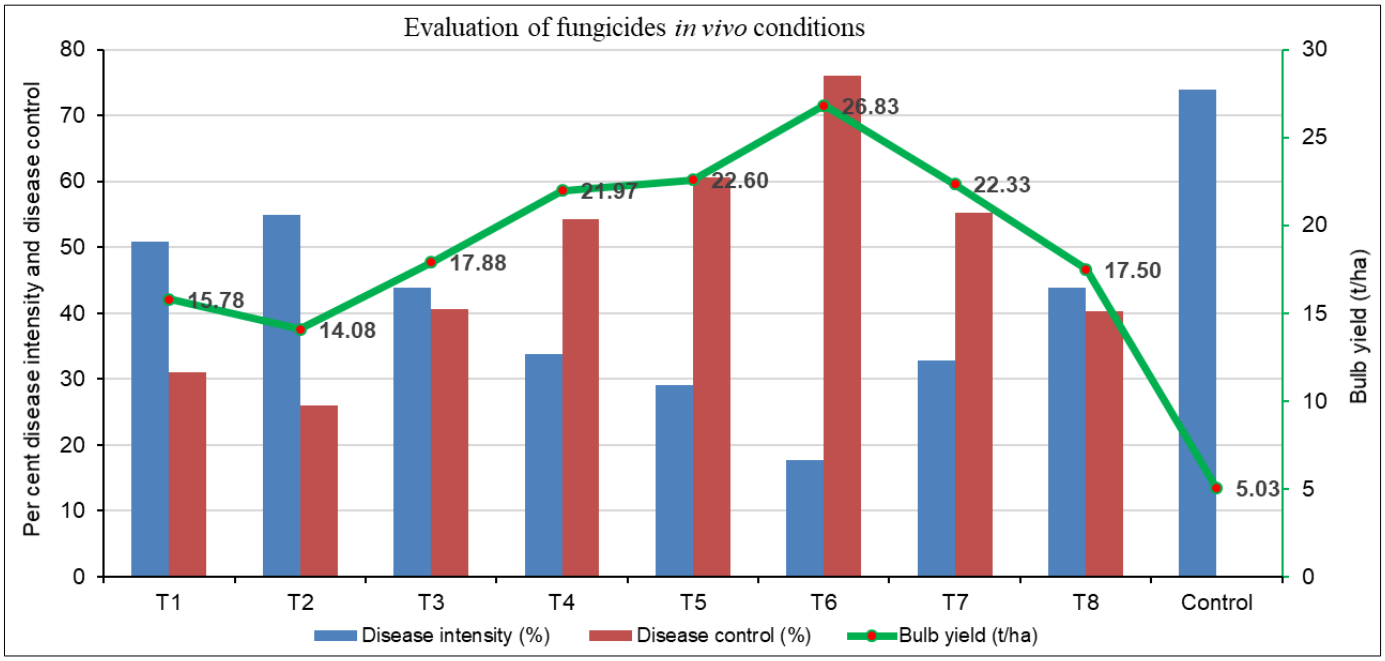

Fig 1: Effect of various treatments on per cent disease intensity, disease control of purple blotch and bulb yield of onion

Acknowledgement
Authors are heartily thankful to Head, Department of Plant Pathology and Dean, College of Agriculture, Bikaner for providing necessary facility for completed this task. I (Dinesh Kumar) feel great pleasure and privilege in expressing my profound sense of gratitude and indebtedness to Dr. S.L Godara, Professor, Department of Plant Pathology for his valuable guidance.

References

1. Cochran WG, Cox GM. Experimental Designs, II Ed, New York: John Wiley & Sons, Inc. 1957.
2. Cramer CS. Breeding and genetics of Fusarium basal rot resistance in onion. Euphytica, 2000;115:159-166.
3. Fisher RA, Yates F. Statistical tables for biological, agricultural and medical research. Oliver and Boyd, Edinburgh, London. 1963, 146.
4. Ginoya CM, Gohel NM. Evaluation of newer fungicides against *Alternaria alternata* (Fr.) Keissler causing fruit rot disease of chilli. International Journal of Plant Protection. 2015;8(1):169-173.
5. Jakatimath SP, Mesta RK, Biradar IB, Mushrif SK, Ajjappalavar PS. *In vitro* evaluation of fungicides, botanicals and bio-agents against *Alternaria alternata* causal agent of fruit rot of brinjal. Intl. J Curr. Microbiol. Appl. Sci. 2017;6(5):495-504.
6. Javadzadeh A, Ghorbanihaghjo A, Bonyadi S, Rashidi MR, Mesgari M, Rashtchizadeh N, *et al*. Preventive effect of onion juice on selenite-induced experimental cataract. Indian Journal of Ophthalmology. 2009;87:185-

189.
7. Kumar V, Singh G, Tyagi A. Evaluation of different fungicides against Alternaria leaf blight of tomato (*Alternaria solani*). Intl. J Curr. Microbiol. Appl. Sci. 2017;6(5):2343-2750.
8. Madhavi MA, Kavitha M, Vijayalakshmi. Studies on *Alternaria porri* (Ellis) Ciferri pathogenic to onion (*Allium cepa* L.). Archives of App. Sci. Res. 2012;4(1):1-9.
9. Patel MJ, Joshi KR, Vala DG. *In vitro* screening of fungicides and bioagents against onion leaf blight pathogen *Alternaria alternata*. Journal of Mycology and Plant Pathology. 2001;31(1):116.
10. Rangaswami G. Disease of crop plants in India. Prentice Hall of India, New Delhi. 1993, 498.
11. Roopa P, Fugro PA, Kadam JJ. Symptomatology, host range study and management by botanicals against *Alternaria alternata of Canna indica* (Fr.) Keissler. International Journal of Life Sciences Biotechnology and Pharma Research. 2014;3(2):116.
12. Vijaya M, Rahman MA. Efficacy of fungicide in the control of leaf blight disease of onion (*Allium cepa*). Journal of Mycology and Plant Pathology. 2004;34(2):654-655.
13. Yadav RK. Management of Purple Blotch Complex of Onion in Indian Punjab. Int. J Appl. Sci. Biotechnol. 2017;5(3):454-465.