Chemical Control of Lentil Wilt caused by *Fusarium oxysporum* f. sp. *lentis*

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ABSTRACT

Seven fungitoxicants were tested against *Fusarium oxysporum* f. sp. *lentis*. All these significantly checked the growth of the pathogen as compared to control. Carbendazim proved most effective fungitoxicant for checking the fungal growth (5.6 mm) followed by captan (9.9 mm) and hexaconazole and diniconazole. Seed treatment + soil drenching with carbendazim was most effective to minimize the wilt incidence (10.6%), plant mortality (4.5%) and gave highest grain yield (7.48q/ha) followed by captan (15.9%, 6.3% & 6.10 q/ha). Hexaconazole and diniconazole were the next best fungitoxicants in order of superiority in case of disease incidence, plant mortality and grain yield.

Key words: Fungicides, *Fusarium oxysporum* f. sp. *lentis*, *Lens culinaris*, Wilt

Lentil (*Lens culinaris* Medik) is an important pulse crop in vegetarian diet being a rich source of proteins and essential amino acids. This crop is grown as a *rabi* pulse crop in India on 1.51 million ha annually with 0.95 million tones annual production during 2005-2006 (Anon., 2006). Wilt caused by *Fusarium oxysporum* f. sp. *lentis* is economically the most devastating disease causing yield loss up to 50% in India. Bhat *et al.* (2006) earlier reported the disease from Jammu and Kashmir and have screened the available germplasm for resistance against this disease but literature did not reveal any work done on chemical control of the disease under Kashmir conditions. An attempt was, therefore, made to test relative efficacy of different fungitoxicants against the disease *in vitro* and under temperate climatic conditions of Kashmir.

Materials and Methods

Seven fungitoxicants at recommended concentrations (Table 1), were tested *in vitro* by assessing mycelial growth inhibition through poison food technique. The dia. of the fungal growth on fungitoxicants impregnated medium in comparison to the growth on PDA medium without fungitoxicant (control) was recorded after incubation period of 7 days at 25 ± 2°C, replicated thrice. Radial growth of the fungal colonies was measured and inhibition % of the fungus was also calculated.

Field trials were conducted during 2005-2006 and 2006-2007 at Faculty of Agri., Wadura, Sopore (J&K) in R. B. D. with 3.0 x 2.0 m plot size using highly susceptible lentil cv. SKL- 6. Lentil seeds were sown on 15th November in both the years, replicated thrice. Seed treatment before sowing followed by soil drenching with fungitoxicants *viz.*, carbendazim (Bavistin), captan, hexaconazole (Contaf), diniconazole, mancozeb (Indofil M-45), zineb (Indofil-Z-78) and copper oxychloride (Blitox- 50) were done at the doses mentioned in Table 2. Observations were taken on wilt incidence, plant mortality and seed yield. Wilt incidence and plant mortality were calculated on the basis of % plants wilted at flowering time and completely dried at harvesting time, respectively.

Results and Discussion

It was inferred that all 7 fungitoxicants tested *in vitro*, significantly checked the fungal growth to varying extents as compared to the control (Table 1). Carbendazim proved most effective fungitoxicant for checking the mycelial growth (5.6 mm) followed by captan (9.9 mm), hexaconazole (12.5 mm) and diniconazole (16.4 mm), which statistically differed with one another. Mancozeb (25.8 mm) and zineb (28.3 mm) were statistically inferior to these fungitoxicants in their efficacies against the pathogen. Highest inhibition of fungal growth was recorded in case of carbendazim (93.4%) followed by captan (88.3%). (Kasyap *et al.*, 2008). Amongst the partially effective fungitoxicants, copper oxychloride caused the lowest inhibition of growth (63.0%) and was statistically inferior to the rest of the fungitoxicants but superior over control (85.0 mm). Karande *et al.* (2007) reported carbendazim (0.1%) as most effective fungitoxicant *in vitro* against mycelial growth of *Fusarium oxysporum* isolated from cashew. Sharma *et al.* (2002) reported that there was no mycelial growth of *Fusarium oxysporum* f. sp. *lini* causing linseed wilt at 500, 1000 and 1500 ppm concentrations of bavistin and benomyl.

Table 1. Effect of different fungitoxicants on mycelial growth of *Fusarium oxysporum* f. sp. *lentis in vitro*.

Treatments	Concentration (%)	Average diameter of fungal colony growth (mm)	Inhibition over control (%)
Carbendazim	0.1	5.6	93.4
Captan	0.3	9.9	88.3
Hexaconazole	0.03	12.5	85.2
Diniconazole	0.03	16.4	80.7
Mancozeb	0.3	25.8	69.6
Zineb (Indofil-Z-78)	0.2	28.3	66.7
Copper oxychloride	0.25	31.4	63.0
Control	-	85.0	-
CD		2.47	

It is evident from the data (Table 2) that all the fungitoxicants were significantly superior over control in reducing wilt incidence, plant mortality and increasing grain yield under field conditions. Carbendazim proved most effective fungitoxicant as it gave minimum wilt incidence (10.6%) and maximum grain yield (7.48 q/ha) and was followed by captan, inferior to it giving 15.9% wilt incidence and 6.10 q/ha grain yield. Hexaconazole and diniconazole were the next best fungitoxicants in order of superiority in controlling disease incidence (18.0% & 19.4%) and enhancing grain yield (5.65 & 5.05 q/ha). Captan and hexaconazole as well as hexaconazole and diniconazole were statistically on par with each other in case of disease incidence and grain yield. Carbendazim (4.5%) and captan (6.3%) were superior over rest of the fungitoxicants tested in restraining plant mortality. These were followed by hexaconazole (9.0%) and diniconazole (10.2%), which were statistically on par with each other. Zineb and mancozeb were on par in case of disease incidence (20.2% & 22.2%), plant mortality (11.5% & 12.0%) and grain yield (5.10 q/ha & 4.87q/ha). De *et al.* (2003) reported that seed treatment with carbendazim was highly effective against lentil wilt caused by *Fusarium oxysporum* f. sp. *lentis*. Similar results were also reported by Sinha and Sinha (2004).

Present study can serve as a handy recommendation for the farmers of Kashmir valley, who can use carbendazim @ 0.1% for seed treatment and soil drenching against lentil wilt. This recommendation can also be incorporated as an essential component in Integrated Disease Management of lentil wilt alongwith other ecofriendly methods.

References

Anonymous (2006). Agricultural Statistics at a Glance, FICCI, Agribusiness Information Centre, New Delhi.

Bhat, N.A., M.A. Beig, S.K. Maheshwari and S.D. Masoodi (2006). Screening and yield of lentil

...6.2. Effect of different fungitoxicants on wilt incidence, plant mortality and seed yield of lentil under ...d conditions (pooled data of 2005-06 and 2006-07).

...atments	Concentration (%)	Average wilt incidence (%)	Reduction in incidence over control (%)	Plant mortality (%)	Seed Yield (q ha^{-1})
...endazim	0.1	10.6 (18.98)*	75.1 (60.08)	4.5 (12.33)	7.48
...in	0.3	15.9 (23.53)	62.5 (52.28)	6.3 (14.56)	6.10
...conazole	0.03	18.0 (25.12)	57.7 (49.44)	9.0 (17.49)	5.65
...conazole	0.03	19.4 (26.20)	54.2 (47.46)	10.2 (18.69)	5.05
...	0.2	20.2 (26.75)	52.4 (46.39)	11.5 (19.82)	5.10
...ncozeb	0.3	22.2 (28.16)	47.7 (43.72)	12.0 (20.28)	4.87
...per oxychloride	0.25	24.7 (29.79)	42.0 (40.44)	13.7 (21.79)	4.35
...trol	-	42.6 (40.77)	-	20.8 (27.14)	2.90
... (P=0.05)		(1.73)		(1.33)	0.97

...igures were angular transformed for analysis

...lermplasms as influenced by *Fusarium* wilt. *Ann. Pl. Protec. Sci.* **14**: 139-141.

...R.K., R.P. Dwivedi and Udit Narain (2003). Biological control of lentil wilt caused by *Fusarium oxysporum* f. sp. *lentis*. *Ann. Pl. Protec. Sci.* **11** : 46-52.

...ande, M.G., S.P. Raut and A.D. Gawande (2007). Efficacy of fungicides, bio-organics and plant extracts against *Colletotrichum gloeosporioides* and *Fusarium oxysporum*. *Ann. Pl. Protec. Sci.* **15** : 267-268.

Sharma, R.L., B.P. Singh, M.P. Thakur and K.P. Verma (2002). Chemical management of linseed wilt caused by *Fusarium oxysporum* f. sp. *lini*. *Ann. Pl. Protec. Sci.* **10** : 390- 391.

Sinha, R.K.P. and B.B.P. Sinha (2004). Effect of potash, botanicals and fungicides against wilt disease complex in lentil. *Ann. Pl. Protec. Sci.* **12** : 454-455.

Kasyap, Anil, P.K., Tiwari, C.P. Khare and V.S. Thrimurthy (2008). Evaluation of varieties and fungicides against anthracnose and fruit of chilli. *Ann. Pl. Protec. Sci.*, **16**: 159-161.