Progressive Research 9 (1) : 120-122 (2014) *Society for Sci. Dev. in Agric. and Tech.*

EFFICACY OF FUNGICIDES FOR MANAGEMENT OF WILT (*Lens esculenta* MEDDICK.) DISEASE OF LENTIL CAUSED BY *Fusarium Oxysporum* F. SP. LENTIS.

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ABSTRACT

Out of six fungitoxicants were tested against *Fusarium oxysporum* f. sp. lentis on three different ways i.e. laboratory bioassay, pot culture method under glass house condition. In bioassay ,Bavistin and Vitavax are 100% checked the growth of *Fusarium oxysporum* f. sp.lentis as compared to Thiram, captofal and control etc. (87.5, 83.12 %and 0%).In case of paper towel method, Bavistin and Vitavax were given best result in seed germination of lentil (720 and 71.36%), growth of root length (10.1 cm and 10.0 cm.), shoot length (4.8 cm. and 4.8 cm), vigour index (13.42 and 13.17) and wilt incidence (0.0% both) as compared to rest of the fungicides and control. In case of pot culture under glass house condition Bavistin and Vitavax were given best response in seed germination (67.37 and 64.61%) and wilt incidence 12.74 and 12.88 % as compared to rest (Thiram Captafal, Indofil M-45, Blitox-50) and control

Key words : *Lentil, fungicides, fusarium oxysporum lentis.*

Lentil (*Lens esculenta* meddick.) is grown as major Rabi Pulse crop in India. The annual production of the lentil is 0.99 million tonnes 1.47 million hectare of land (1). The production and productivity of crop is low because of disease infection at various stage. Lentil crop is attacked by a large number of Bacterial and fungal pathogens. Fusarium wilt is the most economically devastating disease of lentil causing yield losses up to 50% in India (2) and 12% North-west Syria (3). The management of the disease is very difficult due to long saprophytic survival ability of the pathogen in soil. The management of the disease can be done through cultural, chemical and biological use of resistant but none of them have proved successfully to control the wilt of lentil. However chemical methods are some how more effective than others. Keeping in view, the present investigation was undertaken to evaluate different fungicides against lentil wilt.

MATERIALS AND METHODS

Bio-assay of fungicides

Six fungicides viz. Bavistin, Vitavax, Thiram, Captafol, Indofil M-45 and Blitox-50 were assessed for their efficacy against *Fusarium oxysporum* f. sp. lentis.

In-vitro test :

Evaluation of mycelial growth inhibition through poison–food technique : Requisite quantity of fungicides were incorporated in 2 percent potato dextrose agar medium which was shaken well to make it homogenous. The medium was then poured in to 90mm Petridish. A disc of 5mm diameter was taken from 7 day old culture of F. oxysporum. F. sp. lentis by cutting with sterilized cork borer and place at the centre of each petri-plates containing solidified fungicides mixed medium. A petriplate without adding any fungicides serve as control. Three replication were kept for each treatment. All the Petriplates were then indicated at 25 ± 1°C for 7 days are also recorded by (4). The radial growth of the colony diameter in mm and interpreted in percent inhibition over control was calculated by following formula.

Evaluation of fungicides through seed treatment by Paper Towel method : The efficacy of fungicides viz. Bavistin, Vitavax, Thiram, Coptafol, Indofil M-45 and Blitox – 50 were tested by seed treatment .The seeds of lentil were treated with different fungicides separately. The paper wet method was employed for germination and growth of seedling. For this purpose, petridish of 90 mm were used. The bottom and side walls half way up and the underside of cover were laid down with thick sterilized blotting papers which were moistened with sterilized water. The 100 seeds treated with fungicides were placed on blotting paper, maintaining equal distance to each other. One plate without any seed treatment to serve as control. Observations were recorded on seed germination after 7 days where as,

root length, shoot length and wilt incidence after 10 day of sowing are also reported by (5). The vigour index was calculated according to (6).

In-Vivo Test

Evaluation of fungicides in seed treatment in glass house condition : The experiment was also conducted in pots under glass house condition with same sets of treatments for two crop seasons of 2011-12 and 2012-13. Twenty five treated seeds were sown in per pots which filled with previously *Fusarium oxysporum* f.sp. lentis inoculated soil @ 2% weight of the soil. The experiment was laid out in completely Randomized block design (RBD) with four replications. Two pots without any treatment were kept as control. The observations on the seed germination seedling emergence and wilt incidence were recorded after 15 days of sowing.

RESULTS AND DISCUSSION

In-Vitro Test

Evaluation of mycelial growth inhibition of *F. oxysporum* f. sp. lentis : The result presented in the table-1 showed that all the fungicides were found effectively in reducing the mycelial growth of *F. oxysporum*. f sp. lentis . Out of six only two fungicides viz., Bavistin and Vitavax proved to be the most effective as they have inhibited the fungal growth completely, where as, Blitox-50 was the least effective fungicides. Thiram, captofal and Indofil M-45 were found to be next superior in inhibiting the growth of the pathogen. (7) reported that the out of eight fungicides, carbendazim (0.10%), Mancozeb (0.25%) and Chlorothonil (0.20%) completely inhibited the growth and sporulation of Fusarium moniliformae, causing fruit rot of Chilli. (8) also reported that the growth of *Fusarium oxysporum* f. sp. pisi was completely inhibited (100%) by Bavistin (200ppm) followed by Dithane M – 45 (mancozeb) at 2000 ppm in-vitro using the poisoned food technique.

Table-1 : Effect of fungicides on the colony growth of *Fasarium.*

Fungicides	Doses (ppm)	Average diameter of fungal colony (mm)	Percent inhibition
Bavistin	2000	0.0	100.00
Vitavax	2000	0.0	100.00
Thiram	2000	10.0	87.50
Captafol	2000	13.5	83.12
Indofil M – 45	2000	28.0	66.00
Blitox – 50	2000	34.0	57.50
Control	2000	80.0	—
SE ± C.D. at 5%	—	0.967 2.36	

Evaluation of fungicides through seed treatment (paper towel method) : It was evidence from the table-2 showed that all the treatments were found significantly superior over control to increase seed germination, vigour index and reducing wilt incidence. Among all the treatment, Bavistin was found most effective in giving maximum seed germination (90%), followed by Vitavax (89%) and Thiram (83%). Maximum root lengths (10.1cm), Shoot length (4.8cm) and Vigour index (1342.0) was also found in Bavistin treated plant followed by vitavax, Thiram captafol, Indofil M-45, Blitox-50. (9) also reported that

Table-2 : Effect of seed treatment with fungicide on seed germination, root length, shoot length, Vigour index and wilt incidence by paper Towel method.

Fungicides	Doses gs/kg	Seed germination (%)	Root length (cm)	Shoot length (cm)	Vigour index	wilt incidence (%)
Bavistin	2.5	90 (72.00)*	10.1	4.8	1342.0	0.00
Vitavax	2.5	89 (71.36)	10.0	4.8	1317.2	0.00
Thiram	3.0	83 (65.64)	9.4	4.2	1128.8	2.50
Captafol	3.0	81 (61.15)	9.2	4.0	1069.2	3.65
Indofilm-45	3.0	78 (62.02)	8.9	3.8	990.2	5.41
Blitox-50	3.0	76 (60.66)	8.5	3.6	919.6	6.80
Contral	—	70 (55.84)	7.8	3.2	700.0	10.00
SE+ C.D. at 5%		1.99 4.86	.026 .065	.021 .053	21.55 52.59	0.59 1.45

Table-3 : Effect of seed treatment with fungicides on seed germination, seedling emergence and wilt incidence in pods under glass house condition.

Fungicides	Doses g/kg seed	Seed emergence %		Seedling emergence %		Wilt incidence (%)		
		2005-06	2006-07	2005-06	2006-07	2005-06	2006-07	Average
Bavistin	2.5	90 (72.256)	87 (69.24)	85 (69.26)	82 (65.46)	5 (12.78	5 (12.70)	5 (12.74)
Vitavax	2.5	88 (70.04)	85 (97.35)	83 (65.70)	80 (63.52)	5 (12.88)	5 (12.88)	5 (12.88)
Thiram	3.0	85 (67.21)	81 (64.15)	80 (63.43)	76 (60.66)	10 (18.33)	10 (18.33)	10 (18.33)
Captafol	3.0	85 (67.21)	80 (63.43)	80 (60.00)	75 (60.00)	15 (22.78)	10 (18.33)	12.5 (20.56)
Indofil M–45	3.0	80 (93.56)	78 (62.17)	75 (56.78)	73 (58.69)	20 (26.36)	15 (22.78)	17.5 (24.57)
Blitox–50	3.0	75 (60.00)	78 (62.02)	70 (50.78)	73 (58.69)	25 (30.00)	20 (25.66)	22.5 (27.83)
Control	—	65 (53.72)	60 (50.79)	60 (50.78)	60 (50.80)	40 (39.21)	35 (36.24)	37.5 (37.72)
SE ±	—	1.86	1.77	18.69	18.75	0.946	1.032	
C.D. at 5%		4.56	4.39	45.69	45.76	2.31	2.52	

Figure in Parenthesis indicated transformed value.

carbendazim and captafal @ 10 g/ml were most effective inhibiting the growth of *Fusarium oxysporum* f. sp. lentis in-vitro.

In-Vivo Test

Evaluation of fungicides in seed treatment in glass house experiment : Data presents in table–3 showed that fungicides Bavistin and Vitavax were found most effective in reducing the wilt incidence with the value 5% both the year and improved seed germination ,showing 88.5% and 86.5%) germination respectively. The seedling emergence was also found maximum with 85 and 82% in both the year in the case of seed treatment with Bavistin while thiram, captafol, Indofil M-45, Blitox – 50 and controls were gave less effective in seed germination, seedling emergence and wilt incidence.(10) also reported that the seed treatment with Bavistin @ 2gm/kg controlled *F. oxysporum* f sp. lentis in field.

ACKNOWLEDGEMENT

The authors are grateful for the financial support granted by the Indian Council of Agriculture Research (ICAR) Govt. of India under the Niche Area of Excellence on “Exploration and Exploitation of Trichoderma as an antagonist against soil borne pathogens” running in the Bio-control laboratory, Department of Plant Pathology, C. S. A. University of Agriculture and Technology, Kanpur, U.P. India.

REFERENCES

1. Anonymous, (2006). Statistical survey of India, *Directorate of Economic and Statistics, Ministry of Agriculture,* New Delhi, India.
2. Khare, M. N. (1980). Wilt of Lentil, *J. NKVV*, Jabalpur, Madhya Pradesh India pp. 1-155.
3. Bayaa, B., Erskine, W. and Khoury, L. (1986). Survey of wilt damage on lentils on north west syria, *Arab J. Pl. Proted. 4 (2) :* 118-119.
4. Kumar Vipul, Shahid M Srivastava, Mukesh, Bansal Anuj (2013). Influence and Effect of Temperature pH and media for growth and sporulation of Trichoderma koningii and its shelf life study in different carrier based formulation, *Progressive Research 8: (special) :* 452-454.
5. Singh, Anuradha; Shahid, M.; Sachan, C.P.; Srivastava, Mukesh, and Biswas S.K. (2013) Effect of Seed Treatment on germination and vigour in lentil. *Journal of Plant Disease sciences. 8(1):* 124-125.
6. Abdul Baksi, A. A. and Anderson, J. D. (1973). Vigour determination in soybean by multiple criteria. *crop. sci. 13 :* 630-633.
7. Suryawanshi, A.V. and Deokar, C.D. (2001). Effect of fungicides on growth and sporulation of fungal pathogen causing paitrot of chilli. *Madras Agricultural Journal 88 (1-2) :* 181-182.
8. Verma Shalini, Dohroo, N. P. and Verma, S. (2002). Evaluation of fungicides against *Fusarium oxysporum* f. sp. pisi causing wilt of autumn pea in Himanchal Pradesh. *Plant Disease Research, 17 (2) :* 261-268.
9. De, R.K.; Dwivedi, R. P. and Udit Narain (2003). Biological control of lentil wilt caused by *Fusarium oxysporum f. sp. lentis Ann. Pl. Protec. Sci. 11 (1) :* 46-52.
10. Khan, R. U. and Mehnaz, M. (2003). Management of wilt of lentil in integration with Inchoderma haizianum and fungicidal seed treatment. *National symposium of pulses for crop diversification and Natural Resources Management,* 20-22 December 2003, IIPR, Kanpur Abstracts. PP. 215.