Volume-4, Issue-7, July-2015 • ISSN No 2277 - 8160

Research Paper | Agricultural Sciences

Efficasy of Fungicides Against *Alternaria Alternata* Infecting *Jatropha Curcas*

*Yashoda R. Hegde	Department of Plant Pathology, University of Agricultural Sciences, Dharwad. * Corresponding Author
Rajalaxmi S. Keshgond	Department of Plant Pathology, University of Agricultural Sciences, Dharwad
Tippeshi L. Chavhan	Department of Plant Pathology, University of Agricultural Sciences, Dharwad

ABSTRACT

Jatropha curcas is drawing attention as a biodiesel crop owing to its seeds with high oil content and excellent properties. Among the different diseases affecting jatropha, leaf blight caused by Alternaria alternata is an important one. Very little information is available on the management aspects of this disease. Therefore, fourteen fungicides of three different categories, viz. contact, systemic and combi product formulations at three different concentrations were evaluated against A. alternata. Among the different fungicides tested, mancozeb and propineb were effective at all the concentrations, vitavax power (carboxin + thiram) and saaf (carbendazim + mancozeb) at 0.1 and 0.2 per cent and avatar (zineb + hexaconazole) and merger (tricyclazole + mancozeb) at 0.2 per cent completely inhibited the mycelial growth of A. alternata

KEYWORDS : Jatropha curcas, Leaf blight, Fungicides, Management

INTRODUCTION

Physic nut (Jatropha curcas L.) globally known as jatropha belongs to the family Euphorbiaceae. It is a large shrub or small tropical tree widely distributed in arid and semiarid areas. It is a multipurpose crop of significant economic importance as a biofuel. Moreover, parts of the shrub are used in traditional medicine and as raw material for pharmaceutical and cosmetic industries (Paramathma et al., 2006). Many studies have described jatropha as resistant to pests and disease. However, in recent years, the expansion of areas under cultivation has been accompanied by the appearance of various diseases. Leaf blight caused by Alternaria alternata is one such important disease affecting jatropha. Symptoms include appearance of small black necrotic spots on the leaves which later enlarge to cover larger area resulting in the drying of the leaves. Spots are usually surrounded by yellow halo (Ginting and Maryono, 2009; Hudge and Datar, 2010). There is a need to identify efficient management strategies of this disease. In vitro evaluation of fungicides helps to identify effective fungicide for application in fields. In the present investigation an attempt was made to identify effective fungicides to manage A. alternata.

MATERIALS AND METHODS:

In vitro evaluation of fungicides against Alternaria alternata

Contact, systemic and combi product fungicides were evaluated against A. alternata by employing poisoned technique (Nene and Thapliyal, 1982) at three concentrations. The calculated quantity of fungicide was added to potato dextrose agar (PDA), mixed thoroughly and poured into sterilized Petri plates and allowed to solidify. After solidification each plate was inoculated with a 5 mm diameter disc obtained from an actively growing margin of A. alternata colony on PDA. There were 3 replications for each treatment. The Petri dishes were incubated at 27±1° C in BOD incubator. The observations on colony diameter were recorded when control plate was completely covered with the test fungus. Per cent inhibition of mycelial growth of test fungus was calculated by using the formula given by Vincent (1947). The results were analysed statistically.

$$I = \frac{C - T}{C} \times 100$$

Where, I: Percent inhibition
C: Radial growth in control
T: Radial growth in treatment

RESULTS AND DISCUSSION:

In vitro evaluation of contact fungicides against Alternaria alternata

Results from table 1 depict that mancozeb and propineb completely inhibited the mycelial growth of Alternaria alternata at all three concentrations. Mancozeb has been reported to be effective fungicide against A. alternata (Singh and Milne, 1974; Amaresh, 1997; Desai, 1998 and Sood and Sharma, 2002). Singh and Singh (2006) reported mancozeb and propineb as effective fungicides against Alternaria alternata. Next best was Captan (80.71%) followed by copper oxychloride (COC) (73.81%). Chlorothalonil was found to be least effective (24.86%). Efficacy of captan against A. alternata causing brown spot in citrus has been reported by Miles et al. (2005) and that of COC by Katiyar et al. (2001) against Alternaria leaf spot of bottle gourd.

In vitro evaluation of systemic fungicides against Alternaria alternata

The results indicate that there was significant difference among the systemic fungicides in inhibiting the mycelial growth of Alternaria alternata. None of the fungicides used completely inhibited its mycelial growth. Propiconazole was found to be the best (76.91%) followed by carbendazim (72.59%) which was on par with difenconazole (72.35%). Triadimefon was found to be least effective (48.39%) (Table 2). Gorawar and Hegde(2005), Gorawar et al. (2006), reported the efficacy of propiconazole against A. alternata causing leaf blight of turmeric. Thippeswamy et al. (2006) reported carbendazim as a good fungicide against brinjal Alternaria leaf spot caused by A. solani and efficacy of difenconazole against Alternaria spot of loquat was reported by Batta (2005).

In vitro evaluation of combiproducts against Alternaria alternata

The data from table 3 indicate that there was a significant difference among the combiproducts in inhibiting the growth of Alternaria alternata. Among the four combiproducts evaluated, Vitavax power (carboxin + thiram) and Saaf (carbendazim + mancozeb) inhibited the mycelial growth completely at 0.1 and 0.2 per cent concentrations. Singh et al. (2013) have reported the efficacy of Vitavax power and Saaf against Alternaria blight of linseed. Least inhibition of mycelial growth of pathogen was observed in all the four combi products at 0.05 per cent concentration. Avatar was less effective at 0.05 per cent and inhibited mycelial growth completely at 0.2 per cent concentration. Among fungicides, Vitavax power was highly effective and was

significantly superior to all other treatments. Next best treatment was Avatar. Merger was least effective against A. alternata.

ACKNOWLEDGEMENTS

We are grateful to National Oil seeds and Vegetables Oils Development board (NOVOD), Gurgaon, Haryana, for providing financial assistance during investigation.

Table 1. In vitro evaluation of contact fungicides against Alternaria alternata

Fungicide	Per cent inhibition over control			Mean
	0.1%	0.2%	0.3%	
Mancozeb	100.00 (90.00)*	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)
Propineb	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)
Copperoxychloride (COC)	69.27 (56.38)	73.33 (58.91)	78.82 (62.62)	73.81 (59.22)
Captan	42.13 (40.47)	100.00 (90.00)	100.00 (90.00)	80.71 (63.95)
Zineb	21.66 (27.73)	35.29 (36.43)	43.53 (41.28)	33.49 (35.36)
Chlorothalonil	20.08 (26.62)	25.49 (30.32)	29.02 (32.59)	24.86 (29.91)
	Fungicides (F)	Concentration (C)	F X C	
SEm±	0.36	0.26	0.63	
CD @ 1%	1.38	1.00	2.42	

*Figures in parentheses are arc sine transformed values

Table 2. In vitro evaluation of systemic fungicides against Alternaria alternata

Treatment	Per cent inhibition over control			Mean
	0.025%	0.05%	0.1%	
Triadimefon	42.96 (40.95)*	52.22 (46.27)	59.26 (50.34)	48.39 (44.08)
Carbendazim	59.26 (50.34)	72.59 (58.44)	85.93 (67.98)	72.59 (58.43)
Difenconazole	65.93 (54.29)	70.37 (57.03)	80.74 (63.97)	72.35 (58.28)
Propiconazole	72.59 (58.44)	77.41 (61.63)	80.74 (63.97)	76.91 (61.28)
	Fungicides (F)	Concentration (C)	F X C	
SEm±	0.28	0.24	0.49	
CD @ 1%	1.11	0.95	1.94	

*Figures in parentheses are arc sine transformed values

Table 3. Effect of combiproducts on mycelial growth of Alternaria alternata

Treatment	Per cent inhibition over control			Mean
	0.05%	0.10%	0.20%	
Vitavax power (Carboxin + Thiram)	83.10 (65.76)*	100.00 (89.97)	100.00 (89.97)	94.36 (81.89)
Saaf (Carbendazim + Mancozeb)	56.66 (48.81)	100.00 (89.97)	100.00 (89.97)	85.55 (76.25)
Avatar (Zineb + Hexaconazole)	87.77 (69.51)	94.44 (76.33)	100.00 (89.97)	94.07 (78.60)
Merger (Tricyclazole + Mancozeb)	61.66 (51.77)	84.44 (66.83)	100.00 (89.97)	82.03 (69.53)
	Fungicides (F)	Concentration (C)	F X C	
SEm±	0.48	0.40	0.82	
CD @ 1%	1.87	1.44	3.18	

*Figures in parentheses are arc sine transformed values

REFERENCES

Amaresh Y S. 1997. Studies on foliar diseases of sunflower (Helianthus annuus L.) with special reference to Alternaria leaf blight caused by Alternaria helianthi (Hansf.) Tubaki and Nishihara. M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka, India. | Batta Y. 2005. Control of Alternaria Spot Disease on Loquat (Eriobotrya japonica Lindl.) using Detached Fruits and Leaf-disk Assay. An-Najah Univ. J. Res. (N.Sc.) 19: 69-82. | Desai S A. 1998. Chemical control of Alternaria blight and rust of sunflower in Northern Karnataka. Karnataka J. Agric. Sci 11: 674 – 678. | Ginting C, Maryono T. Physic nut (Jatropha curcas L.) 2009. Diseases in Lampung Province. Biotropia 16(1): 45 – 54. | Gorawar M M. and Hegde Y R., 2005, Management of leaf blight of turmeric caused by Alternaria alternata. Indian Phytopath.,58(3): 357. | Gorawar M M, Hegde Y R and Kulkarni S. 2006. Screening of genotypes and effect of fungicides against leaf blight of turmeric. Indian J. Crop Science 1(1-2): 158-160. | Hudge B V and Datar V V. 2010. Study of incidence and severity of leaf spot disease in Jatropha curcas L. Int. J. Agric. Sci 6(1): 355-356. | Katiyar A, Kant S, Chauhan S S and Alka. 2001. Chemical control of Alternaria leaf spot of bottle gourd. Ann. Pl. Protec. Sci 9(2): 339-341. | Miles A K, Willingham S L and Cooke A W. 2005. Field evaluation of a plant activator, captan, chlorothalonil, copper hydroxide, iprodione, mancozeb and strobilurins for the control of citrus brown spot of mandarin. Australasian Plant Pathology 34:63-71. | Nene V L and Thapliyal P N. 1982. Fungicides in plant disease control. Oxford and IBH pub Co.Pvt.Ltd. NewDelhi. Pp.212-349. | Paramathma M, Venkatachalam P, Sampathrajan A, Vairavan K, Sudhagar J R, Parthiban K T, Subramanian P, Kulanthaisamy P. 2006. In: Cultivation of Jatropha and biodiesel production". Sri Sakthi Promotional Litho Process. pp 40. | Singh G and Milne, K S. 1974. Laboratory evaluation of fungicides against fungi causing flower blight of chrysanthemums. New-Zealand J. Exp. Agri 2(2): 181- 183. | Singh P C, Singh D. 2006. In vitro evaluation of fungicides against Alternaria alternata. Ann. Pl. Protec. Sci. 14 (2): 500-502. | Singh R B, Singh H K and Parmar A. 2013. Yield Loss Assessment Due to Alternaria Blight and its Management in Linseed. Pak. J. Biol.Sci., 1-6. | Sood R and Sharma R L. 2002. Efficacy of pre harvest application of fungicides against black rot (Alternaria alternata) of tomato in storage. Pl. Dis. Res 17: 347-348. | Thippeswamy B, Krishnappa M, Chakravarthy C N, Sathisha A M, Jyothi S U and Kumar K V. 2006. Pathogenicity and management of Phomopsis blight and leaf spot in brinjal caused by Phomopsis vexans and Alternaria solani. Ind. Phytopathol 59(4): 475-481. | Vincent, J.M. 1947. Distortion of fungal hyphae in the presence of certain inhibitors. Nature. 159:850. |