Agriculture for Sustainable Development 1(1):35-38, 2013/ Article *ISSN 2347-5358 (Print)*

Agriculture for Sustainable Development

http://www.sustainableagriculture.in

EFFICACY OF CHEMICALS AND BIOAGENTS AGAINST FOLIAR AND ROOT ROT DISEASE OF SAFED MUSALI (*CHLOROPHYTUM BORIVILIANUM*) *IN VITRO*

R. W. INGLE, SAKET SHENDE, V. V. DESHMUKH* AND M. S. JOSHI

Department of Plant Pathology, Dr. PDKV, Akola Maharashtra- 44 4104, India

Received: 29.09.2013 **Received accepted: 05.10.2013**

ABSTRACT

Chlorophytum borivilianum is herbaceous belongs to the family Liliaceae. It is distributed mainly in the Southern Rajasthan, North Gujarat and Western Madhya Pradesh and some part of Vidrabha region. The Experiment on efficacy of chemicals and bioagents were carried out against foliar and root rot diseases of *Chlorophytum borivilianum in vitro.* The result revealed that Tebuconazole found most effective in controlling (100 per cent) of foliar and soil borne diseases. Carbendazim, Propineb, Mancozeb, Tebuconazole gave 100 per cent growth inhibition against *Phoma* sp. and *Rhizoctonia bataticola*. *Trichoderma viride* showed maximum 61.86 per cent growth inhibition of pathogen than *Pseudomonas flourescens* (52.66%). The present study indicated that Propineb is most effective against *Sclerotium rolfsii* followed by Carbendazium and Mancozeb. In biocontrol agent *Trichderma viride* was effective than *Pseudomonas fluorescens.*

Keywords:
Chlorophytum borivilianum, bioagents, chemicals

INTRODUCTION

Safed Musli is originally grown in thick forest in natural form and is a traditional medicinal plant. Mainly its tuberous roots are used in ayurvedic medicines. Roots are used as chief ingredient for the preparation of over hundred Ayurvedic formations, (Gutierrez and Cundom, 2006). *Chlorophytum borivilianum* is herbaceous belongs to the family Liliaceae. It is distributed mainly in the Southern Rajasthan, North Gujarat and Western Madhya Pradesh and some part of Vidrabha region. Now this crop has been brought under commercial cultivation in Gujarat, Rajasthan, Maharashtra, Karnataka, Madhya Pradesh, and Tamilnadu etc. (Bordia *et al.*, 1990).

Nowadays commercial cultivation of medicinal aromatic plants and because of monocroping the disease intensity and incidence may increase in recent future. The Safed Musli crop which is affected by the various foliar diseases cause huge damage to crop as root , collar , tuber root, leaf and sheath blight, anthracnose , leaf spot and rust. The damage recorded was about 52% (Mandal *et al.*, 2004.). The root rot (*Sclerotium rolfsii* Sacc.) caused losses when it serves about 10-15% in the field (Singh *et al.*, 2007). The blight disease (*Colletotrichum dematium*) caused losses up to 30% in severely affected fields. These devastating diseases could be managed by use of biological agents/ chemicals which could reduce the disease and increase the yield.

MATERIAL AND METHODS

Poison food technique was used to evaluate the above mentioned fungicides *in vitro* against pathogens (Table 1). PDA media was prepared and distributed at the rate of 100 ml in 250 ml conical flask, autoclaved at 1.05 kg/cm^2 for 20 min. Before the solidification of media different fungicides with desired concentration were incorporated aseptically in different flask. These flasks were shaken thoroughly and poured in Petriplates at the rate of 20 ml/plate likewise four plates for each treatment were poured. One set of four plates was poured without any fungicide to serve as control. After solidification of medium, plates were inoculated with 8 day old pathogen separately. 5 mm mycelial disc selected from peripheral growth was cut by cork borer. The inoculated plates were incubated at room temperature for seven days.

Table 1 *In vitro* efficacy of fungicides

Treatment	Trade name	Active ingredient	Concentration (%)
T_1	Bavistin	Carbendazim 50 WP	0.1 (1 g/liter)
T_2	Antrocol	Propineb 70 WP	0.25 (2.50 g/liter)
T_3	Dithane M-45	Mancozeb 75 WP	0.25 (2.50 g/liter)
T_4	Folicur	Tebuconazole 250EC	0.1 (1 ml/liter)

The colony diameter of fungal pathogens on medium was recorded on 3rd, 5th and 7th day and per cent inhibition was calculated

**Corresponding author email: yashdeva.751@rediffmail.com*

Table 2. *In vitro* efficacy of biocontrol agents against fungal organism

Treatment	Antagonist
T_1	*Pseudomonas fluorescens*
T_2	*Trichoderma viride*

Autoclaved medium was poured into sterilized glass petriplates and allowed to solidity. The 5 mm diameter disc of above bioagent was cut from peripheral growth by using a sterilized cork borer in aseptic condition and placed four discs at equidistance from centre in the petriplates of solidified media and disc of pathogen separately were kept at the centre (Table 2). Control plates, containing only pathogen were also maintained. Each treatment was replicated four times. The radical mycelial growth of pathogen was measured on 3rd, 5th and 7th day and inhibition per cent was calculated.

RESULTS AND DISCUSSION

Efficacy of foliar fungus Colletotrichum dematium (Pers.ex Fr.) (In vitro)

Efficacy of different fungicides and biological agents was assessed by poisonous food technique against *Colletotrichum dematium* (Pers.ex Fr.). The observations were taken on 3rd, 5th and 7th day for mean colony diameter and per cent growth inhibition (Table 3).

The results revealed that, hundred per cent growth inhibition observed in treatment with Tebuconazole, and maximum growth inhibition observed in Carbendazim (81.55%) followed by Mancozeb75WP (80.00%) Propineb 70WP (72.66%) *Trichoderma viride* (61.55%) and *Pseudomonas fluorescens* (5.22%)with mean colony diameter 16.6 mm, 18 mm, 24.6 mm, 34.6 mm and 85.3 mm, respectively as compared to control 90 mm diameter. Among chemical fungicide tested Tebuconazoleis most effective against *Colletotrichum dematium*. It may be, because of it is trizole group fungicide. Propineb found least effective in controlling organism *In Vitro* condition. In biocontrol agent *Trichderma viride* found effective than *Pseudomonas fluorescens* Similar result found to Patil *et al.* (2004) that the fungicides tested in vitro Diathane M-45 0.3% , Thiram 0.3% , Carbendazim 0.1% and combination of Carbendazim + Thiram (1:1) were found effective against *Colletotrichum dematium* .

Efficacy of of foliar fungus Phoma sp.

Efficacy of different fungicides and biological agents was assessed by poisonous food technique against *Phoma sp*. The observations were taken on 7th day for mean colony diameter and per cent growth inhibition.

Table 3 Efficacy of fungicides and biological agents against *Colletotrichum dematium and Phoma sp*. (*In vitro*)

Treatment		*Phoma* sp.		*Colletotrichum dematium*	
	Conc. (%)	Mean colony diameter after 7th day(mm)	Percent Growth inhibition	Mean colony diameter after 7th day(mm)	Percent Growth inhibition
T_1-Carbendazim	0.1	0	100	16.6	81.55
T_2-Propineb 70 WP	0.25	0	100	24.6	72.66
T_3-Mancozeb	0.25	0	100	18	80
T_4-Tebuconazole	0.1	0	100	0	100
T_5-*T.viride*		28.60	61.86	34.6	61.55
T_6-*P. fluorescens*		35.50	52.66	85.3	5.22
T_7-control		75		90	
'F' test		SIG.		SIG.	
SE(m)±		0.30		0.60	
CD (*P*=0.01)		0.90		1.80	

Hundred per cent growth inhibition observed in treatment with Carbendazim, Propineb 70WP,Mancozeb 75WP, Tebuconazole and among the bioagents maximum growth inhibition observed in *Trichoderma viride* (61.85%) and *Pseudomonas fluorescens* (52.66%) with mean colony diameter 28.66 mm and 35.50 mm respectively as compared to control 75 mm diameter at 7th day of incubation. The present study revealed that all chemical fungicide Tebuconazoleis Carbendazim, Mancozeb and Propineb found most effective against organism *In Vitro* condition. In biocontrol agent *Trichderma viride* found effective than *Pseudomonas fluorescens.*

The present study revealed that all chemical fungicide Tebuconazoleis Carbendazim, Mancozeb and Propineb found most effective against organism *In Vitro* condition. In biocontrol agent *Trichderma viride* found effective than *Pseudomonas fluorescens.*

Efficacy against root rot fungus Sclerotium rolfsii Sacc. (In vitro)

Efficacy of different fungicides and biological agents was assessed by poisonous food technique against *Sclerotium*

rolfsii Sacc. The observations were taken on 3rd, 5th and 7th day for mean colony diameter and per cent growth inhibition.

At 7th day hundred per cent growth inhibition observed in treatment with Propineb 70WP , and maximum growth inhibition observed in Propineb (100%) followed by Mancozeb (77.11%) Carbendazim (74.11%). Among the bioagnets *Trichoderma viride (*48.77%*)* found effective than *Pseudomonas fluorescens* (00.00%). The present study revealed that Propineb was found most effective against *Sclerotium rolfsii* followed by Carbendazium and Mancozeb. In biocontrol agent *Trichderma viride* found effective than *Pseudomonas fluorescens.* Similar results found to Thakur (2002) selected six fungicides viz., bavistin, thiram, benomyl, captan, prochloraz and mancozeb were selected for studying the effect on growth of *S. rolfsii* and Mancozeb showed 22.67% mycelia growth inhibition. Patel *et al*. found similar results. Patel and Ahahosur (2001) *Trichoderma viride* was effective in controlling root rot diseases. Sindhan *et al.* (2002) found that the *Pseudomonas fluorescens* was effective than the *Trichoderma viride*. Bhatia *et al.* (2005), Banyal *et al.* (2008) and Saher *et al*. (2008) also found similar result.

Efficacy of different fungicides and biological agents was assessed by poisonous food technique against *Rhizoctonia bataticola* (Tale 4.) Butler. The observations were taken on 3rd, 5th and 7th day for mean colony diameter and per cent growth inhibition.

Table 4. Efficacy of fungicides and biological agents against *Rhizoctonia bataticola* (Taub.) Butler and *Sclerotium rolfsii* (*In vitro*)

Treatment	*Rhizoctonia bataticola*			*Sclerotium rolfsii*	
	Conc. (%)	Mean colony diameter after 7th day(mm)	Percent Growth inhibition	Mean colony diameter after 7th day(mm)	Percent Growth inhibition
T_1-Carbendazim	0.1	0	100	23.30	74.11
T_2-Propineb 70 WP	0.25	0	100	0	100
T_3-Mancozeb	0.25	0	100	20.6	77.11
T_4-Tebuconazole	0.1	0	100	88.49	1.67
T_5-*T. viride*		90	0	46.10	48.77
T_6-*P.fluorescens*		90	0	90	0
T_7-control		90		90	
'F' test		Sig.		Sig.	
SE(m)±		1.71		0.4	
CD (*P*=0.01)		5.11		1.23	

In case of *Rhizoctonia bataticola* hundred per cent growth inhibition observed in treatment with Carbendazim , Propineb 70WP , Mancozeb 75WP and Tebuconazole. Among bioagents *Trichoderma viride* and *Pseudomonas fluorescens* were found unable to restrict the growth of *R.bataticola*. The present study revealed that all chemical fungicide Tebuconazoleis Carbendazim, Mancozeb and Propineb found most effective against organism *In Vitro* condition. In biocontrol agent *Trichderma viride* and *Pseudomonas fluorescens* were not found effective. Similar results found by Khan and Gangaopadhyay (2007) reported that Carbendizm followed by Captan were highly inhibitory to *M. phaseolina* under laboratory condition. *P. fluorescens* reduced the mycelial growth of *M. phaseolina*. Biswas and Sen (2000) and Patel and Ahahosur (2001) also found the similar result.

REFERENCES

Banyal, D.K., Mankotia, V. and Sugha, S.K. 2008. Integrated management of tomato collar rot caused by *Sclerotium rolfsii. Journal of Mycology and Plant Pathology*, 38(2): 164-167.

Bhatia, S., Dubey, R.C. and Maheswari, D.K. 2005. Enhancement of plant growth and suppression of colloar rot of sunflower caused by *Sclerotium rolfsii* Sacc. through fluorescent Pseudomonas. *Indian Phytopathology*, 58(1): 17-24.

Biswas, K.K.and Sen, C. 2000. Identification of effective isolates of *Trichoderma harzianum* Rifai for biocontrol of *Macrophomina phaseolina* (Tassi) Goid. *Journal of Mycology and Plant Pathology*, 30(3):408-410.

Bordia, P.C., Seth, P. and Simlot, M.M. 1990. Safed Musli (*Chlorophytum borivillianum*) in the Arawali region and preliminary observations. Paper presented in the National Symposium on Conservation and Management

of living Resources. University of Agricultural Sciences, G.K.V.K., Banglore. 10-12 January. Abstract. 4.

Gutierrez, S.A. and Cundom, M.A. 2006. Frist record of *Sclerotium rolfsii* Sacc. on *Chlorophytum comosum* in Argentina. *Australian Plant Disease Notes*, 1:11-12.

Khan, M.A. and Gangaopadhyay, S. 2007. Efficacy of *Pseudomonas fluorescencs* in controlling root rot of chickpea caused by *M. Phaseolina*. *Journal of Mycology and Plant Pathology*, 37(1): 200-201.

Mandal, Kunal, Maiti, S., Saxena, D.R. and Saxena, M. 2004. A new leaf spot of disease of Safed Musli. *Journal of Mycology and Plant Pathology*, 34 (1): 163.

Patel, S.T. and Ahahosur, K.H. 2001. Potential Antagonism of *Trichoderma harzianum*, *Macrophomina phaseolina* and *Sclerotium rolfsii* Sacc. *Journal of Mycology and Plant Pathology*, 31(1): 365.

Patil, M.J., Raut, B.T., Ukey, S.P. and Saoji, B.V. 2004. Management of dieback and fruit rot of Chilli caused by *Colletotrichum dematium* (Pers.ex Fr.) and Bish. *PKV Research Journal*, 28 (2):

Sahare, H.N., Pachkhade, A.U. and Kannerkar, S.H. 2008. Evaluation of fungal antagonists and plant extracts against causing collar rot of soyabean. *Journal of Plant Disease Sciences*, 3(1): 122 - 124.

Sindhan, G.S., Hooda, I. and Karwasra, S.S. 2002. Biological control of dry root rot of chick pea caused by *Rhizoctonia bataticola* (Taub.) Butler. *Plant Disease Research*, 17(1): 68-71.

Singh, H.B., Singh, A., Tripati, A., Tiwari, S.K. and Johri, J.K. 2007. Collar rot of *Chlorophytum borivilianum* caused by *Corticum rolfsii*. National Botanical Research, Lucknow. Bulletin OEEP/EPPO Bulletin, 31: 111-117.