Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.8215

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2020) *8*(4), 330-334

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Research Article

Triazole Fungicide Triadimefon 25 WP for Its Bio-efficacy and Phytotoxicity of against Powdery Mildew of Chillies

P. Ahila Devi*, Vasumathi S. and Prakasam V.

National Pulses Research Centre, Vamban, Pudukottai District- 622 303

Kalasingam University, Krishnankovil, Virudhunagar District -626001

Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore- 3

*Corresponding Author E-mail: ahila.devi1@gmail.com

Received: 3.06.2020 | Revised: 16.07.2020 | Accepted: 20.07.2020

ABSTRACT

The new triazole fungicide Triadimefon 25 WP a.i./ha (or 500 ml/ha) dose can effectively control powdery mildew diseases of chillies. This dose was at par with higher dose and resulted better yield than other treatments. No phytotoxicity was observed up to the dosage of Triadimefon 25 WP @ 250 g a.i /ha i.e. double of the effective dose.

Keywords: *chilli- Triadimefon 25 WP-Powdery mildew*

INTRODUCTION

Chilli (*Capsicum annum*) is the fourth most important vegetable crops in the world and first in Asia, with world production approximately 122.34 million tonnes of fresh chilli and 2.8 tonnes of dry chilli in 2010 (Indian Horticultural Database). The most important producers and exporters of chilli include China, India, Mexico, Morocco, Pakistan, Thailand and Turkey. Demand for chilli in the world is increasing every year (FAO, 2004). Chilli is a very remunerative spice crop of the Indian subcontinent (Sharma et al., 2005) and occupies an area of about 0.81 million ha (Suthin Raj & Christopher, 2009) which accounts for 25% of the world production (Chandra Nayaka et al., 2009). In Tamil Nadu, chilli is cultivated on 49.0 thousand hectares with 31.8 thousand tonnes of production. Chilli not only meets domestic consumption but also helps in earning foreign exchange. One of the great challenge facing the world is to produce adequate food for the growing population. Under these circumstances, one third of the global food production is estimated to be destroyed annually by over 20,000 species of insects, diseases, weeds, mites, nematodes, rodents and other field storage fungi and pests (McEven,1978). Besides insect and weeds, plant diseases caused by fungi lead to yield loss to most the crops in the field as well as under storage. Unlike other chilli-producing countries, about 90 per cent of the production (estimated over 10 lakh tonnes of chilli) in India is absorbed by the huge domestic market.

Cite this article: Ahila Devi, P., Vasumathi, S., & Prakasam, V. (2020). Triazole Fungicide Triadimefon 25 WP for Its Bio-efficacy and Phytotoxicity of against Powdery Mildew of Chillies, *Ind. J. Pure App. Biosci. 8*(4), 330-334. doi: http://dx.doi.org/10.18782/2582-2845.8215

India exports only about 1.5 lakh tonnes of chilli out of the total production of 7.5 lakh tonnes (Anon, 2008). The powdery mildew caused by *Leveillula taurica* (Lev.) Arn. is also one of the major constraint in chilli production in India causing heavy yield loss ranging from 14 to 20 per cent, due to severe defoliation and reduction in size and number of fruits per plant (Mathur et al., 1972, Sivaprakasam et al., 1976 and Gohokar & Peshney, 1981). Of the various methods adopted for disease management, fungicides are undoubtedly the major and most practical means of effective and reliable control. Recently several fungicides *viz.*, propicanozole, fenarimol, bupirimate, penconozole, dimethomorph, triademeton, pyrazophos, hexaconazole, chlorothalonil and flusilazole were introduced in India for control of anthracnose and powdery mildew of chilli. Another important triazole fungicide, from a toxicological point of view, is the triadimefon [1-(4-chlorophenoxy)-3,3-dimethyl-1-(1H-1,2,4-triazole-1-yl)-2-butanone], a broad spectrum, systemic triazole fungicide registered for use on fruits and grains. Triadimefon is remarkable for the neurobehavioral effects. It is known that changes in motor activity may occur as a result of neurochemical changes, specifically in the dopaminergic neurotransmission in the nigro-striatal pathway in plant pathogenic fungi. So, to verify the hypothesis that the triadimefon-induced behavioral effects can be due to an action on dopaminergic system, Crofton et al. (1989) evaluated the effects of combined treatment of triadimefon with either an inhibitor of dopamine synthesis or a dopamine vesicle depletor (reserpine). The reserpine partially blocked the increases in motor activity produced by triadimefon, confirming that the fungicide produces its effects acting on the dopaminergic terminal. With this background the management study was conducted to reduce the powdery mildew incidence of chilli under field condition

MATERIALS AND METHODS

Planting and seed materials:

The field trial was conducted during August – January, 2010-11 at Tamil Nadu Agricultural University (TNAU) to evaluate the bio-efficacy of Triadimefon 25 WP against powdery mildew diseases of Chillies. The chilli variety is used for the trial is Co-1 with the spacing of 50 cm x 50 cm giving 80 plants and the date of transplanting interval after 20 days for main field .

The evaluation of the test fungicide was done along with standard checks and untreated control against the incidences of powdery disease of chillies on leaves. Three rounds of sprays with 500 litres of water were given at 10-days intervals to control the diseases starting from the appearance of diseases, 42-days after transplanting. The observations were recorded on 10^{th} day after each spray. After 10 days of 3^{rd} spray the final scoring of the disease incidence was recorded as terminal disease index (TDI). 15-leaves randomly selected on 5-chilli plants/plot were assessed for scoring the incidence of diseases. The disease severities on leaves were recorded at random on 10 leaves/plots at the first harvest/plucking and scoring was done

Phytotoxicity:

Triadimefon 25 WP at treatments at 100, 125, 150 and 250 g a.i./ha doses were assessed for the phyto-toxicity along with std checks The observation on different parameters revealed that all the doses of Triadimefon 25 WP didn't show any phytotoxicity sign or symptoms in comparison to other treatments. The crop stand and the crop growth were normal at every stage of observations (3, 7 and 10 days after each spray) (Table-2)

Statistical Analysis:

The PDIs were suitably transformed into arcsine values, analyzed and presented with Duncan Multiple Range Text symbols. For phytotoxicity evaluations, the leaves of all the treatments including higher dose treatment of Triadimefon 25 WP @ 250 g a.i./ha were visually examined and assessed for any sign or symptoms. The weights of chillies-fruits harvested/plucked at each interval were summed up for calculating total yield-plot-wise and converted into t/ha and statistically analyzed.

RESULTS AND DISCUSSION

All the treatments were more effective in comparison to untreated control. However, the foliar spraying of Triadimefon 25 WP @ 150 g a.i/ha provided the maximum control (PDI 0.39) of the powdery mildew disease with the 96.00% reduction in disease over control, which was on par with Triadimefon 25 WP @ 125 g a.i./ha (PDI 0.83) and Triadimefon 25 WP @150 g a i (PDI 3.09) before 2nd application. The spraying of the same chemical @ 100 g a.i/ha recorded PDI 3.06 and proved next best effective treatment. Triazole compounds induce a variety of morphological and biochemical responses in plants including the retardation of shoot growth, stimulation of rooting, inhibition of gibberellin biosynthesis and increases in cytokinin and abscisic acid there by decreasing the disease intensity in plants (Jaleel et al., 2007).

The disease incidence on fruit bunches revealed the similar results with maximum control of powdery mildew by the treatment of Triadimefon 25 WP @ 150 g a.i./ha (PDI 2.61) with the 92.45% reduction in disease over control, which was on par with Triadimefon 25 WP @ 125 g a.i/ha (PDI 3.50) and Triadimefon 25 WP @ 150 g a.i./ha (PDI 7.94) but significantly superior to treatments of Triadimefon 25 WP @ 100g a i /ha (PDI 7.5) . Triazole compounds have been shown to improve the yields of many root crops such as yam, carrot, tapioca, and Chinese potato (Kishorekumar et al., 2006, 2007; Gopi et al., 2007; Manivannan et al., 2007). Triazoles inhibit cytochrome P-450 mediated oxidative demethylation reaction, which is necessary for the synthesis of ergosterol and the conversion of kaurene to kaurenoic acid in the gibberellin biosynthetic pathway .Trifloxystrobin and azoxystrobin inhibited mycelia growth and sporulation of *A.alternata* under invitro and field condition (Reuveni, 2001: Reuveni & Sheglov, 2002)

Triadimefon 25 WP at the rate of 150 g a.i/ha recorded the maximum yield of 38.88 t/ha which was on par with the treatment of Triadimefon 25 WP @125 g a.i/ha (37.42 t/ha) and Triadimefon 25 WP @ 150 g a.i /ha (25.40 t/ha), the spraying of the same chemical at 100 g a.i/ha recorded 27.83 t/ha and provided the next best effective treatment which given identical result.

Table 1: Effect of Triadimefon 25 WP on powdery mildew of Chilli

Treatment	Dose (g a.i /ha or conc.)	PDI (Leaves)	Percent decrease over control	PDI (Fruits)	Percent decrease over control	Yield (t/ha)	Percent increase over control
Triadimefon 25 WP	100	3.06 (9.97)[b]	64.8	7.5 (15.89)[b]	78.32	27.83[b]	73.9
Triadimefon 25 WP	125	0.83 (5.23)[a]	91.8	3.5 (10.78)[a]	89.88	37.42[a]	88.8
Triadimefon 25 WP	150	0.39 (3.58)[a]	96.00	2.61 (9.28)[a]	92.45	38.88[a]	96.3
Tebuconazole 25 EC	500	4.28 (11.83)	57.91	8.94 (17.36)	74.16	24.25	51.6
Flusilazole 40 EC	100	6.61[c] (14.89)	35.00	15.5[c] (23.18)	55.21	19.75[c]	23.1
Triadimefon 25 WP (Bayleton 25 WP Existing Formulation)	150(b)	3.06[b] (9.97)	69.91	7.94[b] (16.32)	77.05	25.40[b]	58.8
Untreated control		10.17[d] (18.53)		34.61[d] (36.03)		16.00[d]	
CD (At 5% P)		**2.94**		**4.95**		**7.26**	

Values are means of three replications Figures in the parentheses represent arcsine transformed values PDI; Percent disease index

The common letters show non- significant differences among the treatments based on DMRT

Table 2: Effect of Triadimefon 25 WP – phytotoxicity observation on chilli– Season I & II

Treatments	Dose (g a.i./ha)	Leaf tip/surface injury*	Wilting	Vein clearing	Necrosis	Epinasty	Hyponasty	Fruit injury
Triadimefon 25 WP	100	1	Nil	Nil	Nil	Nil	Nil	Nil
Triadimefon 25 WP	125	1	Nil	Nil	Nil	Nil	Nil	Nil
Triadimefon 25 WP	150	1	Nil	Nil	Nil	Nil	Nil	Nil
Tebuconazole 25 EC	500	1	Nil	Nil	Nil	Nil	Nil	Nil
Flusilazole 40 EC	100	1	Nil	Nil	Nil	Nil	Nil	Nil
Triadimefon 25 WP (Bayleton 25 WP Existing Formulation)	150	1	Nil	Nil	Nil	Nil	Nil	Nil
Untreated control		1	Nil	Nil	Nil	Nil	Nil	Nil
Triadimefon 25 WP	250(b)	1	Nil	Nil	Nil	Nil	Nil	Nil

Note:

*; Leaf injury considered on visual rating from 1-10 such as, 1= 0-10 %, 2 = 11 – 20 %, 3 = 21-30 %, 4= 31-40 %, 5 = 41 – 50 %, 6 = 51 – 60 %, 7 = 61 – 70 %, 8 = 71 – 80 %, 9 = 81 – 90 % and 10 = 91 – 100 %.Values are mean of three replications recorded 3, 7 and 10 days after each spray

CONCLUSION

Triadimefon 25 WP @ 125 g a.i./ha (or 500 ml/ha) dose can effectively control powdery mildew disease of chillies. As it is a new fungicide it provide an effective management strategy. The new fungicide molecule with novel mode of action is needed to replace the older fungicide compounds As the fungicide has novel biochemical mode of action.

REFERENCES

Anon, (2008). Spices export in 2007-08. http: //www.Indianspices.com/admin/content files/review 2007-08-R.pdf.

Chandra Nayaka, S., Udaya, A.C., Shankar, Niranjana, S.R., Prakash, H.S., & Mortensen, C.N. (2009). Anthracnose disease of chilli pepper.*Asian Seed Health Centre Technical Bulletin.* pp. 1-13.

Gohokar, R.T., & Peshney, N.L. (1981). Chemical control of powdery mildew of chilli.*Indian J. Agric. Sci.*, 51: 663-665.

Gopi R., Jaleel C.A., Sairam R., Lakshmanan G.M. A., Gomathinayagam M., & Panneerselvam R. (2007). Differential effects of hexaconazole and paclobutrazol on biomass, electrolyte leakage, lipid peroxidation and antioxidant potential of *Daucus carota* L. Colloids and Surfaces B: Biointerfaces, *60*, 180–186.

Indian Horticultural Database, 2011-2012.

Jaleel, C.A., Gopi, R., Manivannan, P., & Panneerselvam, R. (2007d). Responses of antioxidant defense system of *Catharanthus roseus* (L.) G. Don. to paclobutrazol treatment under salinity. *Acta Physiologiae Plantarum*, *29*, 205–209.

Jeyalakshmi, C. (1996). Studies on fruit rot and die-back disease of chilli (*Capsicum annuum* L.) incited by *Colletotrichum capsici* (syd.) Butler and Bisby.M.Sc. (Ag.) Thesis.Tamil Nadu Agric. Univ., Madurai. India. 216p.

Kishorekumar A., Jaleel C.A., Manivannan P., Sankar B., Sridharan R., Somasundaram R., & Panneerselvam R. (2006): Differential effects of hexaconazole and paclobutrazol on the foliage characteristics of Chinese potato (Solenostemon rotundifolius

Poir., J.K. Morton). *Acta Biologica Szegediensis, 50*,127– 129.

Kishorekumar A., Jaleel C.A., Manivannan P., Sankar B., Sridharan R., & Panneerselvam R. (2007). Comparative effects of different triazole compounds on growth, photosynthetic pigments and carbohydrate metabolism of Solenostemon rotundifolius. Colloids and Surfaces B: *Biointerfaces*, *60*, 207–212.

Mathur, R.I., Singh, G., & Gupta, R.B.L. 1972. Chemical control of powdery mildew of chilli (*Capsicum annum*) caused *by Leveillula taurica*. *Indian J. Myco.Pl. Path., 2*, 182-183.

Mc Even, F.L. (1978). In: *Food Production-The challenges of pesticides*. *Bioscience, 28*, 773.

Reuveni, M. (2001). Activity of trifloxystrobin against powdery and downey mildew diseases of grapevines. *Can. J. Pl. Pathol., 23*, 52-59.

Reuveni, M., & Sheglov, D. (2002). Effect of azoxystrobin, polyoxin B (polar) and trioxystrobin on germination and growth of *Alternaria alternata* and decay in red delicious apple fruit. *Crop Prot., 21*, 951-955.

Sharma, P.N., Kaur. M., Sharma, O.P., Sharma, P., & Pathania, A. (2005). Morphological, pathological and molecular variability in *Colletotrichum capsici*, the cause of fruit rot of chillies in the subtropical region of north-western India. *J. Phytopathol*., *153*, 232–237.

Sivaprakasam, K., Jaganathan, R., Pillayarsamy, K., & Anavaradham. (1976). Control of powdery mildew of chillies. *Madras Agric. J., 63*, 52-54.

Suthin Raj, T., & Christopher, D. (2009). Effect of Bio-control agents and Fungicides against *Colletotrichum capsici* causing Fruit Rot of Chilli. *Annu. Rev. Pl. Prot. Sci., 17*, 143-145.