Int.J.Curr.Microbiol.App.Sci (2020) *9*(5): 1402-1408

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 9 Number 5 (2020)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2020.905.159

Combi fungicide Trifloxystrobin 25%+Tebuconazole 50% WG against Early Blight Disease of Tomato

Gurudatt M. Hegde* and B. T. Nagaraj

Department of Plant pathology, University of Agricultural Sciences, Dharwad 580 005, India

**Corresponding author*

Keywords

Trifloxystrobin, Tebuconazole, Early blight disease, Tomato

Article Info

Accepted:
10 April 2020
Available Online:
10 May 2020

A B S T R A C T

The experiment on management of early blight of tomato with the new combi molecule was conducted during *Kharif* 2018 in the bio-resource farm of Institute of organic farming, University of Agricultural Sciences, Dharwad. The new molecule and market sample of Trifloxystrobin 25%+Tebuconazole 50% WG, Azoxystrobin 23% SC, Copper Oxychloride 50% WP were evaluated against early blight incidence. The above chemicals sprayed two times at 15 days interval. The "new combi fungicide Trifloxystrobin 25%+Tebuconazole 50% WG at 350g and 400g are found promising in reducing the early blight disease and increasing the fruit yields as compared to the other treatments.

Introduction

The Tomato crop is grown for its edible fruits, which can be consumed either fresh or it can be processed to several products like puree, paste, soup, juices, ketchup, whole canned fruits etc. Early blight is caused by *Alternaria solani* which survive between crops on infected crop residues and on solanaceous host weeds. Early blight is common on tomatoes and potatoes, and it occasionally infects eggplants and peppers. Alternaria blight has been considered as the most common disease of tomato and other plants and causes heavy losses in quality of the fruits, thus rendering large quantity of tomato fruits unfit for consumption (Singh *et al.*, 1997). It causes direct losses by the infection of fruits and indirect losses through leaf lesions, which reduce plant vigor. The disease is favored by warm temperatures and extended periods of leaf wetness from frequent rain, overhead irrigation, or dew. The fungal spores can be spread by wind and rain, irrigation, insects, workers, and on tools and equipment. Once the primary infections have occurred, they become the most important source of new spore production and are

responsible for rapid disease spread. Early blight can develop quickly mid- to late season and is more severe when plants are stressed by poor nutrition, drought, other diseases, or pests. Early blight is the most threatening disease (El-Abyad *et al.,* 1993) of tomato, which causes great reduction in the quantity and quality of fruit yield. It is an important disease of tropical and sub-tropical areas. It is now found on all continents of the world. It is a serious disease in warm and humid regions (Sherf and MacNab, 1986). This disease, which in severe cases can lead to complete defoliation, is most damaging on tomato (Peralta *et al.*, 2005).

In the absence of resistant cultivars, use of fungicides to manage the disease is an age-old practice. When there is outbreak of epidemic for any reason perhaps use of fungicides is one of the best options available. These fungicides have to be used judiciously according to the need and kind of organism involved. The evaluation of new chemical molecule for any disease management is the continuous process. If we use the same chemicals continuously the pathogen will develop resistance to the chemical and may not be able to give satisfactory control measures. Hence, an attempt has been made to evaluate new combi fungicide, against tomato early blight.

Materials and Methods

The experiment was conducted during *Kharif* 2018 in the bio-resource farm of Institute of organic farming, University of Agricultural Sciences, Dharwad. The bio-efficacy evaluation of Trifloxystrobin 25% + Tebuconazole 50% WG on tomato crop was carried out in randomized block design with seven treatments and three replications. The crop transplanting was done in well prepared field. All standard and recommended packages of agronomy practices such as spacing, fertilizers, irrigation, weeding was followed for cultivation of crop. The test fungicide was applied twice as foliar spray with knapsack sprayer at the interval of 15 days. The different treatments of the experiment are detailed in Table 1a and 1b.

Fruit yield also recorded after each picking. Data were analyzed adopting appropriate statistical design

Results and Discussion

Per cent disease incidence of early blight

The results of the experiment revealed that, the Trifloxystrobin 25%+Tebuconazole 50% WG market sample, Azoxystrobin 23% SC, Copper Oxychloride 50% WP were found to be significantly superior in reducing the early blight incidence (PDI) at both first and second sprays compared to untreated control. The disease progress was very rapid at 3 and 7 days after first spray, while after second spray the disease severity has reduced in all the treatments. The new molecule Trifloxystrobin 25%+Tebuconazole 50% WG was used at various concentrations 300g, 350g and 400g per hectare. After first spray the observations recorded at 3, 7 and 14 days are presented in Table 2. Among the different treatments Trifloxystrobin 25%+Tebuconazole 50% WG (350g), Trifloxystrobin 25%+Tebuconazole 50% WG (400g), Trifloxystrobin 25%+Tebuconazole 50% WG (Market Sample) and Azoxystrobin 23% SC have recorded 32.40%, 26.18%, 29.15% and 31.61% respectively and they were found on par with each other. The highest incidence of early blight was recorded in untreated control plots (54.21%). The mean disease incidence ranged from 20.20 per cent to 35.21percent. After second spray the observations reordered are presented in Table 3. The results revealed that, Trifloxystrobin 25%+Tebuconazole 50% WG at 400g/ha has considerably reduced the

disease incidence (34.70%) after 14days and found significantly superior to all the treatments. This is followed by Trifloxystrobin 25%+Tebuconazole 50% WG(300g), Trifloxystrobin 25% + Tebuconazole 50% WG(350g) and Trifloxystrobin 25%+Tebuconazole 50% WG (Market Sample) at 350g/ha. The maximum disease severity was recorded in untreated control (68.82%) plots. The mean disease severity varied between 31.33% and 62.28%.

Fruit Yields (t/ha)

The influence of new combi molecule Trifloxystrobin 25%+Tebuconazole 50% WG has reflected on yields and are presented in the Figure 1. The maximum yields (20.64 t/ha) are recorded in Trifloxystrobin 25%+Tebuconazole 50% WG (400g) which is followed by Trifloxystrobin 25%+ Tebuconazole 50% WG (350g). However, Trifloxystrobin 25%+Tebuconazole 50% WG (350g) and Trifloxystrobin 25%+ Tebuconazole 50% WG (300g) are found to be on par with each other. The treatments sprayed with Azoxystrobin 23% SC (500ml/ha) and Copper Oxychloride 50% WP (2500g/ha) were the next effective molecules. The lowest fruit yields (8.12t/ha) of was recorded in the untreated control plots.

Fig.1 Symptoms of early blight on foliage of tomato crop

Table.1a Treatments details

S. No.	Treatments	Dosage Formulation (g/ha)
1	Trifloxystrobin 25%+Tebuconazole 50% WG	300 g
2	Trifloxystrobin 25%+Tebuconazole 50% WG	350 g
3	Trifloxystrobin 25%+Tebuconazole 50% WG	400 g
4	Trifloxystrobin 25%+Tebuconazole 50% WG	350 g
5	Azoxystrobin 23% SC	500 ml
6	Copper Oxychloride 50% WP	2500 g
7	Untreated control (water only)	-

Table.1b The Disease severity was recorded by using the following scale (Mayee and Datar, 1986)

Score	Symptoms
0	No symptom on the leaf
1	Small irregular brown spots covering 1% or less of the leaf area
3	Small, irregular, brown spots with concentric rings covering 1 – 10% of the leaf area
5	Lesions enlarging, irregular, brown with concentric rings, cover 11 – 25% of leaf area
7	Lesions coalesce to form irregular, dark brown patches with concentric rings covering 26 – 50% of leaf area. Lesions on stems and petioles
9	Lesions coalesce to form irregular, dark brown patches with concentric rings covering more than 51% of leaf area. Lesions on stems and petioles

Table.2 Bio-efficacy of Trifloxystrobin 25%+Tebuconazole 50% WG against early blight disease of tomato (After first Spray)

S. No.	Treatment	Dose Formulation (g/ha)	Early blight disease severity (%)				
			Before spray	3 days after 1st spray	7 days after 1st spray	14 days after 1st spray	Mean
1	Trifloxystrobin 25%+Tebuconazole 50% WG	300 g	16.28 (23.79)*	18.51 (25.47)	25.32 (30.20)	37.30 (37.63)	27.04
2	Trifloxystrobin 25%+Tebuconazole 50% WG	350 g	14.06 (22.01)	16.33 (23.83)	21.10 (27.33)	32.40 (34.68)	23.28
3	Trifloxystrobin 25%+Tebuconazole 50% WG	400 g	15.54 (23.21)	17.11 (24.42)	21.33 (27.50)	26.18 (30.76)	21.54
4	Trifloxystrobin 25%+Tebuconazole 50% WG (Market Sample)	350 g	11.10 (19.45)	13.24 (21.33)	18.21 (25.25)	29.15 (32.66)	20.20
5	Azoxystrobin 23% SC	500 ml	15.54 (23.21)	18.23 (25.27)	24.51 (29.66)	31.61 (34.20)	24.78
6	Copper Oxychloride 50% WP	2500 g	11.84 (20.12)	12.54 (20.73)	20.15 (26.66)	35.08 (36.30)	22.59
7	Untreated Control (water spray only)	-	16.28 (23.79)	19.21 (25.98)	32.20 (34.56)	54.21 (47.40)	35.21
		S.Em.±	1.59	1.15	0.98	2.50	
		C.D. at 5%	4.76	3.38	2.67	7.52	
		C.V. %	12.40	8.80	9.10	5.77	

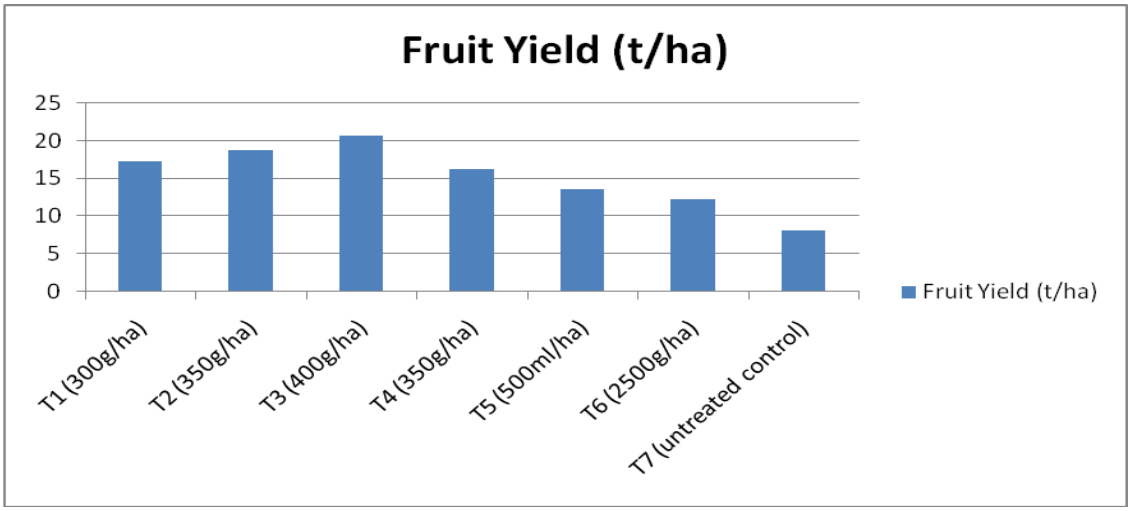
Values in parentheses are angular transformed value

Table.3 Bio-efficacy of Trifloxystrobin 25%+Tebuconazole 50% WG against early blight disease of tomato (After second Spray)

S. No.	Treatment	Dose Formulation (g/ha)	Early blight disease severity (%)			
			3 days after 2nd spray	7 days after 2nd spray	14 days after 2nd spray	Mean
1	Trifloxystrobin 25%+Tebuconazole 50% WG (GSP Sample)	300 g	37.98 (38.03)	40.88 (39.73)	42.18 (40.48)	40.35
2	Trifloxystrobin 25%+Tebuconazole 50% WG	350 g	36.72 (37.28)	38.24 (38.18)	40.70 (39.62)	38.55
3	Trifloxystrobin 25%+Tebuconazole 50% WG	400 g	28.10 (32.00)	31.20 (33.94)	34.70 (36.08)	31.33
4	Trifloxystrobin 25%+Tebuconazole 50% WG (Market Sample)	350 g	32.10 (34.50)	38.47 (38.32)	43.66 (41.34)	38.08
5	Azoxystrobin 23% SC	500 ml	34.23 (35.79)	46.64 (43.06)	54.02 (47.29)	44.96
6	Copper Oxychloride 50% WP	2500 g	39.22 (38.76)	45.21 (42.23)	57.72 (49.42)	47.38
7	Untreated Control (water spray only)	-	56.34 (48.62)	61.68 (51.73)	68.82 (56.03)	62.28
		S.Em.±	0.91	1.19	1.44	
		C.D. at 5%	2.53	3.52	4.31	
		C.V. %	8.20	8.61	9.35	

Values in parentheses are angular transformed value

Figure.1 Effect of Trifloxystrobin 25%+Tebuconazole 50% WG on Fruit yield of Tomato



The "new combi fungicide Trifloxystrobin 25%+Tebuconazole 50% WG at 350g and 400g are found promising in reducing the early blight disease of tomato as well as fruit yields. Although satisfactory control of the early blight disease by using various chemicals has been documented (Choulwar and Datar, 1988; Maheshwari *et al.*, 1991; Abdul-Mallek *et al.*, 1995), continuous use of agrochemicals for controlling the disease may

pose several problems like toxicity to non-target organisms, development of resistance in the populations of the pathogen and environmental pollution. Earlier workers reported application of fungicides is the most effective method of Alternaria blight control and found that Tetra methyl thiramdisulphide (TMTD), Dithane M-45, Bavistin, Dithane Z-78, Difoltan, Blitox, Captafol and Bordeaux mixture effectively manage the disease fungicides (Verma and Verma, 2010). Roopa *et al.*, (2014) revealed that, among the five combi-fungicides evaluated, Hexazconazole 4% + Zineb 68% 72WP at 0.2 per cent (88.88%) was superior in inhibiting the mycelial growth over other treatments, which is on par with Carbendazim 12% +Mancozeb 63%) 75WP and Carbendazim 25%+ Iprodione 25% 50WP at 0.2 per cent. Least inhibition was observed in Captan 70% + Hexaconazole 5%) 75WP (54.81%) at 0.5 %.

The combination of trifloxystrobin and tebuconazole proved to be in synergy as the individual components have different modes of action. Tebuconazole, a triazole acts as demethylation inhibitor (DMI) in fungal sterol biosynthesis and is highly prone to cross resistance but it has an excellent broad spectrum activity to control the disease. The risk of cross resistance is regulated by using a component having a different mode of action. Trifloxystrobin, a Quinone outside Inhibitor (QoI) affects the mitochondrial respiration of the fungi (Pasche *et al*., 2004 and Ziegler *et al.*, 2003). As trifloxystrobin decreased the transpiration rate, it was endowed with Chemical Science. The results of the research data conducted by Sharma *et al.*, (2018) revealed that, Difenoconazole 25 EC @ 0.025 % (20.59) and Propiconazole were also found superior in managing the *A. Solani* of tomato. Saha *et al.*, (2018), experimented Trifloxystrobin 25% + Tebuconazole 50%-75 WG molecule on Leaf Spot of Cabbage and found promising results.

Sreenivasulu *et al.*, (2019), in their studies opined that the Tebuconazole 25.9 % EC @ 0.1% was most effective followed by propiconazole 25%EC @ 0.1% and copper oxychloride 50 % WP @ 0.30% less in found fairly economical for the management of early blight disease along with significantly highest fruit yield.

Thus, based on the above experimental results it is concluded that a new combi fungicide molecule Trifloxystrobin 25%+Tebuconazole 50% WG at 350g/h and 400g/h can be used as an alternate molecule as spray to successfully manage early blight disease and increasing the yields of tomato.

Acknowledgement

The authors are grateful to the M/S GSP Crop Science Private Limited, Ahmadabad, Gujarat for providing Financial assistance through Testing trial project of University of Agricultural Sciences, Dharwad 580 005.

References

Abdul Mallek, A. Y., Hemida, S. K. and Bagy, M. K., 1995, Studies on fungi associated with tomato fruits and effectiveness of some commercial fungicides against three pathogens. *Mycopathologia*, 130: 109116.

Choulwar, A. B. and Datar, V. V., 1988, Cost linked spray scheduling for the management of tomato early blight. *Indian Phytopathology*, 41: 603-606.

Datar, V. V. and Mayee, C. D., 1981, Assessment of loss in tomato yields due to early blight. *Indian Phytopathology*, 3: 191-195.

Datar, V. V. and Mayee, C. D., 1985, Chemical management of early blight of tomato. J. Maharashtra Agric. Univ. 10(3): 278-280.

El-Abyad, M. S., El-Sayed, M. A., El-

Shanshoury, A. R. and El-Abbagh, S. M., 1993, Towards the biocontrol of fungal and bacterial diseases of tomato using antagonistic Streptomyces spp. Plant and Soil. 149(2): 185-195.

Maheshwari, S. K., Gupta, P. C. and Gandhi, S. K., 1991, Evaluation of different fungitoxicants against early blight of tomato. *Agricultural Science Digest* (Kamal), 11: 201-202.

Mayee, C. D. and Datar, V. V., 1986, Phytopathometry, Technical Bulletin (Special Bulletin-3). Marathwada Agric. Univ., Parbhani, p. 95.

Pasche, J.S., Wharam, C.M., Gudmestad, N.C. 2004. Shift in Sensitivity of *Alternaria solani* in response to QoI fungicides. *Plant Dis*. 88: 181-187.

Peralta, I. E., Knapp, S. and Spooner, D. M. 2005. New species of wild tomatoes (Solanum section Lycopersicon: Solanaceae) from Northern Peru. Sys Bot. 30: 424-4.

Roopa, R. S., Yadahalli, K. B. and Kavyashree, M. C. 2014. Evaluation of natural plant extracts, antagonists and fungicides against early blight caused by *A. Solani in vitro*. *The Bioscan*, 9(3): 1309-1312.

Saha S., Hingmire,S., T.P., Shabeer , A., Banerjee, K , Ashtekar, N., Patil, A., and Rai, A. B. 2018. Assessment of Trifloxystrobin 25% + Tebuconazole 50%-75 WG. Bioefficacy, Safety and Residue Dynamics against Leaf Spot of Cabbage. *Chem Sci Rev Lett*, 7(28), 867-874.

Sharma, R.K., Patel, D.R., Chaudhari, D.R., Kumar V and Patel, M.M. 2018. Effect of Some Fungicides against Early Blight of Tomato (*Lycopersicon esculentum* Mill.) Caused by Alternaria solani (Ell. and Mart.) Jones and Grout and their Impact on Yield. *International Journal of Current Microbiology and Applied Sciences* 7(07): 1395-1401.

Sherf, A. F. and Macnab, A. A., 1986, Vegetable diseases and their control. J. Wiley and Sons, New York, pp. 634-640.

Singh, S. N., Yadav, B. P., Sinha, S. K and Ojha, K. L. 1997. Efficacy of plant extract in inhibition of radial growth of *Colletotrichum capsici*. J. Applied Biology. 51: 180-183.

Sreenivasulu, R. M. Reddy,S.P., Tomar, D. S., Subhash, M. and Reddy, B.B. Managing of Early Blight of Tomato Caused by *Alternaria solani* through Fungicides and Bioagents. Int.J.Curr.Microbiol.App.Sci (2019) 8(6): 1442-1452.

Verma, N. and Verma, S., 2010, Alternaria disease of vegetable crops and new approach for its control. *Asian J. Exp. Biol. Sci*. 1(3): 681692.

Wheeler, B. E. J., 1969, An Introduction to Plant Diseases. J. Wiley and Sons Limited, London. p. 301.

Ziegler, H., Benet-Buchholz, J., Etzel, W., Gayer, H. 2003. Trifloxystrobin–a new strobilurin fungicide with an outstanding biological activity. *Pflanzenschutz-Nachrichten Bayer*. 2: 213-230.

How to cite this article:

Gurudatt M. Hegde and Nagaraj, B. T. 2020. Combi fungicide Trifloxystrobin 25%+Tebuconazole 50% WG against Early Blight Disease of Tomato. *Int.J.Curr.Microbiol.App.Sci.* 9(05): 1402-1408. doi: https://doi.org/10.20546/ijcmas.2020.905.159