

# Yield assessment and evaluation of different fungicides and bio agents on the foliar diseases of tomato under field conditions in Hills

A.C. Jha<sup>1</sup>, J.N. Srivastava<sup>2</sup> and Upma Dutta<sup>3</sup>

<sup>1&3</sup> *Sher-e-kashmir University of Agricultural sciences and technology (SKUAST-J) Jammu, J & K, India*

<sup>2</sup>*Department of Plant Pathology, Bihar Agricultural University, Sabour-813210, Bhagalpur (Bihar)*

(Received 20 May, 2014; accepted 30 June, 2014)

## ABSTRACT

Different fungicides and bio-agents were evaluated as foliar spray against buck eye rot early blight, late blight and Septoria leaf spot of tomato (*Lycopersicon esculentum* Mill.) under sick field conditions. All the fungicides and bio agents gave the significantly reduction in the severity of buck eye rot, early blight and Septoria leaf spot diseases of tomato significantly increase in yield over the control. Among the treatment Mancozeb is most effective in relation to severity of buck eye rot (22.33%) early blight (21.66%) and Saptoria leaf spot (23.29) which gave disease control of buck eye rot 68.17%, early blight 70.12% and Saptoria leaf spot 69.24% over the control (70.16%, 72.50% and 71.65 of the respective diseases) and thereby resulting in 77.20% increase yield as compare to control. *Trichoderma viride* and *Trichoderma harzianum* applied as foliar spray for control of above diseases of Tomato but least effective to control the disease.

*Key words* : Buck eye rot, Early blight, Septoria leaf spots, Fungicides, Bio agents, Foliar spray, Management

## Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most popular vegetable grown all over the world. Tomato is one of the most important protective food crops of India. It is grown in 0.458 M ha area with 7.277 M mt production and 15.9 mt/ha productivity. The major tomato producing states are Bihar, Karnataka, Uttar Pradesh, Orissa, Andhra Pradesh, Maharashtra, Madhya Pradesh and West Bengal. In the Year 10-11, tomato production in Jammu & Kashmir, 136.59 Mt. (Source: National Horticulture Board (NHB))

In India, tomato has wider coverage in comparison to other vegetables. It is adopted in wide range of climatic condition. In hilly region it grown only in

summer and fresh local tomatoes are one of the most popular items during summer (Thamburaj and Singh, 2005). In Jammu & Kashmir specially Regional Horticultural Research Sub-Station (RHRSS), Bhaderwah, district - Doda comes under the hill and temperate region also. This crop is mainly grown in this region for main vegetable next to knol khol. This vegetable is suffering from various diseases. Among the diseases foliar diseases are very important because of decreases the yield in this region. Foliar diseases of tomatoes are an important problem of an important crop. There are several foliar disease affecting tomatoes, including buck eye rot, early blight, Septoria leaf spot, late blight, and powdery mildew. Foliar diseases need to be controlled in tomatoes to maintain yield. These diseases

\*Corresponding author's email: marklouiedlopez@gmail.com

are contagious and can spread from plant to plant in a field, often very rapidly when environmental conditions are favourable (Amy, 2002). Yield is reduced when foliar diseases are not adequately controlled because the pathogen also infects fruit and/or death of infected leaves reduces fruit production and fruit quality, especially flavor. Applications of fungicides are the main way foliar diseases are managed in both conventionally and organically-produced crops. Resistant varieties, unfortunately, are not available for foliar diseases that have been affecting production (Anonymous, 1990). Fungicides are main management tool of plant diseases but bio agents specially *Trichoderma* species also success to control pathogenic activities of plant pathogenic fungi (Taran, 2000).

So, management practice for foliar diseases of tomato is of paramount importance.

## Material and Methods

The present experiment were carried out in kharif 2009 and kharif 2010 at Sartangal farm of Regional Horticultural Research Sub-Station (RHRSS) Bhandarwah, SKUAST-Jammu to assess the losses due to the foliar diseases viz., buck eye rot, early blight and Septoria leaf spot of tomato using a susceptible variety. Eight different treatments were imposed with different fungicides viz., Mancozeb (0.2%), Thiram (0.2%), Copper oxychloride (0.25%), Redomil MZ (0.2%), Dithane Z-78 (0.2%) and bio-control agents viz., *Trichoderma viride* (0.5%), *Trichoderma harzianum* (0.5%). The optimum dose of bio agents was found to be 4-8 g/L and increase yield

were also reported (Khan and Shinha, 2007). Three sprays were given to the crops in the whole experiment one spray was given at 25 DAT (Days After Transplanting), the second spray was given at 40 DAT and third spray was given at 55 DAT. Water spray crop plot treated as control. Observation on the disease severity were recorded after first disease symptoms appears on the leaves and also 10 days of first and second spray of the fungicides by using 0-9 scale (Mayee and Datar 1986) as: 0- no symptom appear, 1- small pin head sized lesions covering 1% or less leaf area, 3- small pin head sized lesions covering 1-10% leaf area, 5- Lesions big but not coalescing, covering 11-25% of the leaf area, 7- Lesions on leaves covering 26-50% of leaf area. Defoliation of leaves, deep cankers on stem and pods, blighting of plant occurs. The per cent disease index (PDI) and per cent disease control (PDC) were calculated as per the standard formula (Mayee and Datar, 1986). Replicated crop yield were recorded and for each treatment 3 replications were maintained. The percentage of foliar disease of tomato was observed visually. The data were pooled and analyzed using Randomized Block Design (RBD).

## Results and Discussion

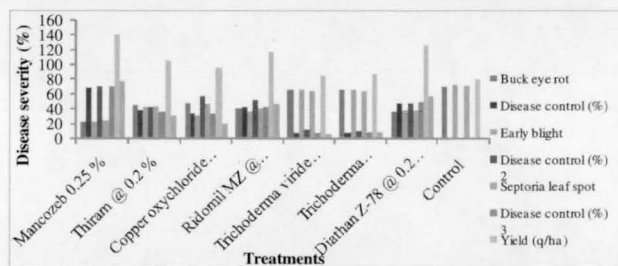
Data presented in Table 1, revealed that all the fungicides and bio agents gave the significant reduction in the severity of buck eye rot and early blight diseases of tomato and also significant increase in yield over the control. The Table also shows that Mancozeb (0.2%) was most efficacious treatment in which the severity of buck eye rot (22.33%) early

**Table 1.** Efficacy of different fungicides and bio agents on the foliar diseases and yield of tomato (Pooled)

S. No.	Treatments with dose	# Disease severity (%)					#Yield (Quintal /ha)	Increase in yield (%)	
		Buck eye rot	Disease control (%)	Early blight	Disease control (%)	Septoria leaf spot			
1	Mancozeb @ 0.2%	22.33	68.17	21.66	70.12	23.29	69.24	141.16	77.20
2	Thiram @ 0.2%	44.00	37.28	42.00	42.06	43.24	36.66	104.33	30.96
3	Copper oxychloride @ 0.3%	46.83	33.25	31.16	57.02	45.61	32.75	95.16	19.45
4	Ridomi MZ @ 0.25%	41.00	41.56	35.50	51.03	40.43	41.64	116.66	46.44
5	<i>Trichoderma viride</i> @ 0.5%	65.50	6.64	64.83	10.57	64.12	7.22	84.33	5.86
6	<i>Trichoderma harzianum</i> @ 0.5%	64.83	7.59	65.66	9.43	64.04	8.15	86.00	7.95
7	Dithan Z-78 @ 0.2%	36.00	48.68	38.16	47.36	37.57	49.12	125.00	56.91
8	Control	70.16	-	72.50	-	71.65	-	79.66	-
	C.D at 5%	0.71		0.70			0.71	1.28	

# Average of three replications

blight (21.66%) and septoria leaf spot (23.29%) which gave disease control of buck eye rot 68.17% and early blight 70.12% over the control (70.16%, 72.50% and 69.24 of the respective diseases) and thereby resulting in 77.20% increase yield as compare to control and this treatment was also found significantly superior than all other treatments. The bio agents *Trichoderma viride* and *Trichoderma harzianum* were found the least effective treatments over the control to manage the buck eye rot and early blight diseases of tomato respectively.



Yadav and Dabbas (2012). found Mancozeb was best among six fungicides viz., Zineb (0.2%) Redomil MZ (0.2%), Saaf (0.5%), Copper Oxychloride (0.2%) and Thiophanate methyl (0.1%) disease of tomato. Sudersana *et al.* (2012). Also reported foliar spray of 0.2% Mancozeb as effective fungicides against early blight of tomato.

The results of the experiments from both the years clearly indicated that three fungicidal sprays of Mancozeb are sufficient to reduce the disease severity. Similar views were put forth by (Desh Mukh and Raut,1992; Pandey *et al.*, 2005; Yadav and Dabbas 2012).

## References

Amy D. Timmerman. 2002. Leaf and fruit diseases of to-

mato. *University of Nebraska, Extension bulletin*, EC 1864.

Anonymous. 1990. *Annual Report Part I*. Project Directorate on Vegetable. ICAR, New Delhi, 267p.

Deshmukh, P. P. and Raut, J. G. 1992. Antagonism by *Trichoderma* species in five Plant Pathogenic fungi. *New Agriculturist*. 3 (2): 127-130.

Elade, Y. 2000. Biological control of foliar pathogens by means of *Trichoderma harzianum* and potential modes of action. *Crop Prot.*, 19: 709-714.

Khan, A. A. and Shinha, A. P. 2005. Comparative antagonistic potential of some bio agents against sheath blight of rice. *Indian phytopathology*. 58 (1): 41-45.

Mayee, C. D. and Datar, V. V. 1986. "*Phytopathometry*". Technical Bulletin - I, Marathwada Agricultural University, Parbhani, India, 146 pp.

Pandey, K.K., Pandey, P.K. and Mishra, K. K. 2005. Development and testing of an integrated disease management package for multiple disease of tomato. *Indian Phytopath.* 58: 294-297.

Singh, R.S. 1995. *Diseases of vegetable crops*. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi. 94-135.

Sudersana, V. R. , Williams, P., Lal, A. A. and Simon Sovita. 2012. Efficacy of fungicides and botanicals against early blight of Tomato. *Ann. Pl. Protec. Sci.*: 245-246.

Taran, N. Ha 2000. Using *Trichoderma* species for biological control of Plant Pathogen in Viet Nam. *J: ISSAAS*. Vol. 16, No1,17-21.

Thamburaj, S. and Singh, Narendra. 2005. Text book of Tuber crops and spices. Directorate of information and publications of Agriculture. Indian Council of Agricultural Research, New Delhi. 10-28.

Ozbay N Newman S.E. and Brown W. M. 2004. The effect of the *Trichoderma harzianum* strains on the growth of tomato seedling. *Proc. XXVI IHC - Managing Soilborne Pathogens, Acta Hort.*, 635: 131-135.

Yadav, Om Prakash and Dabbas, M. R. 2012. Efficacy of fungicides in the management of early blight of tomato (*Alternaria solani*). *International Journal of Plant Protection*. 5(2): 413-416.