Control of late blight (*Phytophthora infestans*) disease of tomato in the plains of West Bengal

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ABSTRACT

An experiment was conducted during two consecutive years of 2007-08 and 2008-09 at Instructional Farm of BCKV located at Mohanpur, Nadia with an objective to evaluate the efficacy of newly released systemic fungicides for the control of late blight of Tomato in the plains of West Bengal. Infinito 68.75% SC [Fluopicolide 6.25% @ 93.8 g ai/ha + Propamocarb hydrochloride 62.5% @ 937.5 g ai/ha] @ 1500 g/ha showed lowest late blight disease incidence in tomato which is closely followed by the mixture formulation of Cymoxahil 8% [@ 120 g ai/ha + Mancozeb 64%- 72 WP]@ 960 g ai/ha at 1500 g/ha. Single application of Fluopicolide 48% SC @ 96 g ai/ha at 200 g /ha and Propamocarb hydrochloride 72.2% SL @ 902.5 g ai/ha at 1250 g/ha recorded significantly higher leaf blight incidence. However, disease severity percentage was found lowest in a mixture formulation of Cymoxanil 8% @ 120 g ai/ha + Mancozeb 64% @ 960 g ai/ha which was statistically at per with Infinito 68.75% SC (Fluopicolide 6.25% @ 93.8 g ai/ha + Propamocarb hydrochloride 62.5% @ 937.5 g ai/ha) @ 1500 g/ha. Lower late blight disease incidence and highest fruit yield of tomato was obtained with the application of infinito 68.75 % SC @ 1500 g/ha.

Key words: Incidence, late blight, and severity

Tomato (*Lycopersicon esculentum* Mill) is a predominant winter vegetable crop in the state of West Bengal but with the introduction of hybrid varieties, it is grown in many a parts almost round the year. Like potato, this crop is also severely affected with the late blight (*Phytophthora infestans* Mont) and disease causing havoc yield loss. The symptoms of the disease on the foliage are similar to that of potato and the damage is often as severe as on potato. The main loss in yield is due to defoliation of leaves brought about by the disease. The disease can be reduced to a great extent through the use of fungicides. Potato late blight disease was controlled by different ready mixture fungicides by De and Sengupta (1991). Present evaluation trial was undertaken in order to search efficient and economically profitable new fungicide as compared to others against this disease in tomato.

MATERIALS AND METHODS

The experiment was carried out at Instructional Farm, BCKV Mohanpur,Nadia, during *rabi* season of 2007-08 and 2008-09. The plot size was 4 x 3m. The experimental soil is characterized by pH 7.43, organic carbon 0.78%, total N 0.07%, available P_2O_5 17.5 kg/ha and available K_2O 180.4 kg/ha. The experiment was laid in a randomized block design with eight treatments and each treatment was replicated thrice with the inter and intra row spacing of 60 cm and 40 cm, respectively. The treatment comprised T_1 – untreated water spray, T_2 – Infinito 68.75% SC (Fluopicolide 6.25% @ 62.5 g ai/ha) + Propamocarb Hydrochloride 62.5% @ 625 g ai/ha) @ 1000 g/ha, T_3 – Infinito 68.75% SC (Fluopicolide 6.25% @ 78.1 g ai/ha + Propamocarb Hydrochloride 62.5% @ 781.3 g ai/ha) @ 1250 g/ha, T_4 – Infinito 68.75% SC (Fluopicolide 6.25% @ 93.8 g ai/ha + Propamocarb Hydrochloride 62.5% @ 937.5 g ai/ha) @ 1500 g/ha, T_5 – Fluopicolide 48% SC @ 96 g ai/ha (200 g/ha), T_6 – Propamocarb Hydrochloride 72.2% SL @ 902.5 ml ai/ha (1250 ml/ha), T_7 – Metalaxyl 8% @ 200 g ai/ha + Mancozeb 64% - 72 WP @ 1600 g/ha (2500 g/ha) and T_8- Cymoxanil 8% @ 120 g ai/ha + Mancozeb 64% - 72 WP @ 960 g/ha (1500 g/ha). The mixture sprays were applied as soon as the late blight disease occurred in tomato and subsequent two sprays were applied at 10 days interval with water volume of 500 litre/ha. The tomato cultivar "Patharkuchi" was cultivated. The disease incidence was measured in percentage of infested plants out of total plants observed :

$$\text{Percent disease incidence} = \frac{\text{No. of plants infected}}{\text{Total number of plant}} \times 100$$

Whereas disease severity was estimated by Percent Disease Index (PDI) value in 0 to 9 scale (Malcolmson, 1970).

$$\text{Percent disease incidence} = \frac{\text{Sum of all numerical ratings}}{\text{Total plants (leaves) observed x Maximum ratings scale}} \times 100$$

RESULTS AND DISCUSSION

Disease incidence was influenced significantly due to different mixture spray applications at various stages of growth (Table-1). Disease incidence was increased progressively with advancement of growth and reached their peak values at 75 DAT (days after transplanting). Lowest disease incidence was noticed with application of Infinito 68.75% SC @ 1500 g/ha (T_4) followed by Cymoxanil 8% @ 120 g ai/ha + mancozeb 64% - 72 WP @ 1500 g/ha (T_8) with no significant different among them. When Fluopiclidae 48% SC (T_5) and Propamocarb hydrochloride 72.2% SL (T_6) was sprayed alone significant higher disease incidence was recorded over their mixture formulation @ 1500 g/ha (T_4) was recorded. Late blight disease severity was also influenced significantly with different mixture sprays of fungicides during both the years (Table-2). Lowest disease severity was observed in mixture sprays of Cymoxanil 8% + Mancozeb 64% - 72 WP @ 1500 g/ha (T_8) followed by Infinito 68.75% SC @ 1500 g/ha (T_4)

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Table 1: Effect of different fungicides and their mixtures on leaf blight disease incidence (%) in tomato.

Treatment	Disease incidence (%)											
	45 DAT			55 DAT			65 DAT			75 DAT		
	2007	2008	Pooled	2007	2008	Pooled	2007	2008	Pooled	2007	2008	Pooled
T_1	12.08	8.48	10.28	26.86	23.30	25.08	37.68	39.92	38.80	50.92	50.54	50.73
T_2	9.58	8.54	9.06	21.53	20.67	21.10	30.80	23.88	27.34	31.97	30.20	31.08
T_3	11.04	6.86	8.95	18.28	19.15	18.71	22.30	25.25	23.77	25.17	27.17	26.17
T_4	9.58	9.68	9.63	15.58	15.58	15.58	17.31	19.05	18.18	19.94	19.15	19.54
T_5	10.04	8.54	9.29	22.77	19.57	21.17	27.77	27.33	27.55	31.76	33.41	32.58
T_6	10.63	7.18	8.90	23.21	19.37	21.29	26.26	27.77	27.01	30.20	31.29	30.74
T_7	11.04	7.49	9.26	17.81	18.48	18.14	22.30	23.68	22.99	26.84	29.92	28.38
T_8	11.04	6.86	8.95	17.25	15.58	16.41	18.39	19.05	18.72	20.57	19.15	19.86
SEm (±)	**2.55**	**1.73**	**3.08**	**2.04**	**1.25**	**1.69**	**3.29**	**1.62**	**2.60**	**2.09**	**1.81**	**3.40**
LSD(0.05)	**NS**	**NS**	**NS**	**6.20**	**3.78**	**4.87**	**9.95**	**4.90**	**7.49**	**6.32**	**5.47**	**9.80**

Table-2: Effect of different fungicides and their mixtures on leaf blight disease severity (%) in tomato.

Treatment	Disease severity (%)											
	45 DAT			55 DAT			65 DAT			75 DAT		
	2007	2008	Pooled	2007	2008	Pooled	2007	2008	Pooled	2007	2008	Pooled
T_1	12.16	13.28	12.72	18.14	25.47	21.80	32.88	31.11	31.99	41.26	37.10	39.18
T_2	9.88	11.18	10.53	20.12	18.06	19.09	26.89	21.65	24.27	31.21	29.40	30.30
T_3	9.98	13.25	11.61	20.71	18.66	19.68	24.55	24.01	24.28	26.49	25.48	25.98
T_4	7.40	11.49	9.44	15.68	15.92	15.80	17.32	20.59	18.95	17.92	20.59	19.25
T_5	8.38	13.06	10.72	19.44	20.59	20.01	24.17	24.41	24.29	26.53	22.87	24.70
T_6	11.18	10.47	10.82	18.86	20.07	19.46	23.38	24.69	24.03	25.65	26.20	25.92
T_7	9.52	11.76	10.64	16.98	19.07	18.02	20.27	20.70	20.48	20.27	23.17	21.72
T_8	8.38	11.81	10.09	16.80	16.52	16.66	17.74	19.07	18.40	17.74	20.59	19.16
SEm (±)	**1.59**	**1.65**	**1.62**	**1.89**	**1.50**	**1.71**	**1.24**	**4.26**	**2.36**	**2.19**	**2.14**	**2.16**
LSD(0.05)	**NS**	**NS**	**4.67**	**NS**	**4.53**	**4.93**	**3.75**	**NS**	**6.80**	**6.62**	**6.47**	**6.23**

Table-3: Effect of different fungicides and their mixtures on fruit yield of tomato.

Treatment	Fruit yield (Kg/ha)		
	2007	2008	Pooled
T_1	4365	4165	4265
T_2	5915	6015	5965
T_3	6285	6215	6250
T_4	11500	11835	11667
T_5	8185	8500	8342
T_6	8735	8700	8717
T_7	9900	10100	10000
T_8	11285	11650	11465
SEm (±)	**160**	**125**	**140**
LSD(0.05)	**485**	**380**	**400**

and Metalaxyl 8% and Mancozeb 64%-72 WP @ 2500 g/ha (T_7) with no significant different among themselves. Fruit yield of tomato was also influenced significantly with different mixtures of fungicides (Table-3) during both the years of experimentation. Highest fruit yield of tomato was found with treatment where Infinito 68.75% SC @ 1500 g/ha (T_4) was applied in three times. Spraying of mixture of Cymoxanil 8% and Mancozeb 64% - 72 WP (T_8) produced higher fruit yield which was statistically at par with T_4 during both the year. Hence, application of Infinito 68.75% SC @ 1500 g/ha was found best in respect of lower disease incidence, disease severity and higher fruit yield and can be recommended for control of late blight of tomato in the plains of West Bengal.

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