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Short Note

Comparative efficacy of different formulations of metalaxyl + mancozeb in the management of downy mildew of cucumber

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Downy mildew caused by *Pseudoperonospora cubensis* (Berket. & Curt) Rostov. of cucumber (*Cucumis sativus* L.) - a polycyclic disease causes serious epidemics with in a short period of favourable weather conditions and may wipe out the entire crop (Mahrishi and Siradhana, 1988). Conventional fungicides like Bordeaux mixture, copper oxychloride and mancozeb failed to provide adequate protection to the crops even when sprayed repeatedly at shorter intervals of time (Gupta and Thind 2006). Discovery of metalaxyl (Phenylalanine), a systemic fungicide effective against Oomyceteous group of fungi was a boon to cucumber growers for the effective control of disease but its repeated use led to the development of a resistance problem (Reuveni *et al.*, 1980). It is now available in combination with a few protectants especially the mancozeb. Many such formulations are available in the market which were evaluated in the present study to test their comparative efficacy against the disease.

The experiment was conducted at farmers' fields in Randomized Block Design with three replications at three different locations namely Jeahan, Mantareri and Bharmoti in district Hamirpur of Himachal Pradesh. The polytube raised plants of 'hybrid Malni' were planted in the month of June with plant to plant and row to row distance of 60 cm and 150 cm, respectively (Anon.,2002). Each treatment plot of 9 m^2 consisted of 10 cucumber vines. Fungicides, metalaxyl 35 WS (Krilaxyl), three brands of metalaxyl 8 per cent + mancozeb 64 per cent (Unilax, Ridomil MZ and Matco 72 WP) along with mancozeb 75 WP (Indofil M-45) as check were evaluated against the disease. Three fortnightly sprays of test fungicides were given on plant parts, starting with the appearance of disease.

Data on disease were scored on 0-9 scale (Mayee and Datar, 1986) before each spray and 15 days after the last spray and per cent infection index was calculated using the following formula.

$$\text{Per cent Infection Index} = \frac{\text{Sum of all disease rating}}{\text{Total no. of ratings x Max. disease grade}} \times 100$$

The data on yield (kg/plot and expressed in q/ha) were recorded after each picking. Infection index (per cent) and yield data for each treatment were averaged at the end to determine the comparative effectiveness of each treatment.

Average analysis of data on disease severity from three locations revealed that all the formulations of metalaxyl + mancozeb provided significantly superior control of the disease and increased the yield over the unprotected plots at all the locations (Table 1). Among the different fungicides tested, Krilaxyl resulted in maximum i.e. 69.7 per cent control of disease with 35.2 per cent increase in yield over control followed by Unilax with 65.3 per cent disease control.

Ridomil MZ and Matco resulted in 62.6 per cent and 62.0 per cent control of disease with 27.4 per cent and 26.9 per cent increase in the yield, respectively. Indofil M-45 with 38.1 per cent disease control and 17.1 per cent increase in the yield over check was found to be least effective against the disease. Krilaxyl though highly effective against the disease but has a problem of development of resistance by the pathogen.

Better control of disease with different formulations of metalaxyl + mancozeb corroborates the findings of Gupta and Shyam (1998) who have reported the antisporulant activity of Ridomil MZ for longer periods. The results on the efficacy of these formulations against the disease are in conformity with Ahmad *et al.* (2000), Thind and Mohan (2001) and Sharma *et al.* (2003) who have reported effective control of the disease with one or other brand of metalaxyl + mancozeb. Since all the three brands of metalaxyl +mancozeb were equally effective against the disease and gave good control of the disease with significant increase in yield over unprotected plots, may be recommended for effective control of the disease especially under Himachal Pradesh conditions (Zone-I).

Table 1. Efficacy of different formulations of metalaxyl 8 % + mancozeb 64 % against downy mildew of cucumber at three locations in district Hamirpur of Himachal Pradesh

Fungicide	Conc. (%)	Disease severity (%)*				Disease control (%)				Yield (q/ha)				Increase in yield (%)			
		L-1	L-2	L-3	Av.	L-1	L-2	L-3	Av.	L-1	L-2	L-3	Av.	L-1	L-2	L-3	Av.
Krilaxyl	0.10	15.3 (23.0)	18.0 (24.9)	21.5 (27.8)	18.3	72.6	69.6	66.9	69.7	346.7	329.7	335.7	337.4	29.8	36.6	33.1	35.2
Ridomil- MZ	0.20	18.5 (25.4)	23.7 (29.7)	25.5 (30.3)	22.6	67.0	60.0	60.8	62.6	340.7	319.7	307.7	322.7	27.5	32.5	22.1	27.4
Unilax	0.20	19.5 (26.1)	21.5 (27.4)	21.5 (27.7)	20.8	65.2	63.7	66.9	65.3	334.3	317.3	319.7	323.8	25.2	31.5	26.8	29.8
Matco -72 WP	0.20	18.7 (25.6)	23.8 (29.2)	26.3 (30.9)	22.9	66.6	59.9	59.5	62.0	340.0	316.7	310.0	322.2	27.3	31.2	22.3	26.9
Dithane M-45	0.25	32.7 (34.9)	37.0 (37.4)	42.0 (40.3)	37.2	41.6	37.4	35.4	38.1	297.7	301.3	289.3	296.1	11.6	24.9	14.7	17.1
Control		56.0 (48.4)	59.3 (50.3)	65.0 (53.8)	60.1	-	-	-	-	267.1	241.3	252.3	252.3	-	-	-	-
CD (P=0.05)		1.8	1.5	1.9			--			9.4	12.8	13.9	-			--	

* Figures in parentheses are angular transformed (arc sine) values; L-1, L-2, L-3 denote three different localities

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