

EFFICACY OF DIFFERENT FUNGICIDES FOR THE CONTROL OF DOWNY MILDEW OF CUCUMBER

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ABSTRACT

A field experiment was conducted to evaluate the performance of different fungicides against downy mildew on cucumber (*Cucumis sativus* L.) cultivated in high plastic tunnel at the farm of Ch. Khair Din and Sons, Mandiala Warriach, Gujranwala during Rabi, 2006-2007. Five different fungicides namely Dithane M-45, Copper oxychloride 50 WP, Ridomil Gold 72 WP, Success 72 WP and Alliet 80 WP were used at dose rate 5, 4, 2, 2.5 and 2 g/L⁻¹ of water, respectively. Minimum disease incidence was recorded by spraying Success (9%), Ridomil (9%) and Alliet (11%) compared with control (78%). Number of fruit per plant, length and yield of fruit was significantly higher in treated plots with Ridomil, Success and Alliet as compared to control and other fungicides.

Key words: Cucumber, Downy mildew, Fungicide, Plastic tunnel, Yield.

INTRODUCTION

The cucumber (*Cucumis sativus* L.) is cultivated on large scale in open field but the use of high plastic tunnels has gained popularity in recent years in Pakistan. It is eaten raw as salad along with onion and tomato. The fruit contains vitamins B and C (Bloach, 1994). Several diseases have been reported to attack cucumber crop in field as well as in green house. Downy mildew of cucumber (*Pseudoperonospora cubensis*) causes serious losses under favourable environmental conditions. In many regions and in tunnels with high humidity, disease is the main limiting factor for cucumber production (Wehner and Shetty, 1997). Disease is characterized by pale green spots on the dorsal sides of the leaves giving them a mottled appearance. The spots increase in size, turn yellow and coalesce to cover large areas of the leaves. Then they start turning necrotic brown from the centre. The ventral side of the leaves is covered with light purple mycelium, bearing large lemon shaped sporangia. Downy mildew decreases flower set and fruit development by killing the foliage (Hashmi, 1994).

Downy mildew diseases in cucurbits and onion was successfully controlled by the use of chlorothalonil @ 2.4 lbs. ha⁻¹ (Jones, 1978; Timchenko, 1979). In another study (Boyadzhiev *et al.*, 1983) after four year fungicidal trials, Ridomil was found to be the most effective when used @ 0.1% and applied 3-4 times fortnightly and yield was increased by 36.4-79.3% as compared to the untreated plot. Furthermore, Katsube (2001) reported that strobilurin resistant strains could be controlled by chlorothalonil, mancozeb, oxadixyl and copper which were already registered for downy mildew. Satou (2003) suggested different fungicides for the control of downy mildew of cucumber and other

vegetables. Anonymous (2004) tested eleven fungicides for the control of *Pseudoperonospora cubensis* (downy mildew) in muskmelon and reported that mancozeb -72 WP stood first showing minimum disease severity (3.16%) followed by Dolomite 80 WP and Score 250EC (3.73%) as against in check (32.00%). The present study was planned to evaluate the efficacy of different fungicides on disease incidence, yield and yield components of cucumber crop cultivated in high plastic tunnel.

MATERIALS AND METHODS

During Rabi season 2006 and 2007, five different fungicides (Table-1) were used against downy mildew of cucumber sown in high plastic tunnel. For both 2006 and 2007 trials, the variety Jenifer (hybrid) was sown. Field was selected at Mandiala Warriach, Gujranwala in the farm of Ch. Khair Din and Sons. Plot size was kept 4m x 12m, with rows 100 cm and plants 45 cm apart. The crop was sown on October 22, 2006 and October 17, 2007. Treatments were replicated three times and arranged in Randomized Complete Block Designs. Five different fungicides, Dithane M-45 80 WP, Copper oxychloride 50 WP, Ridomil Gold 72 WP, Success 72WP and Alliet 80WP were used at dose rate 5, 4, 2, 2.5 and 2 gram liter⁻¹ of water (manufacturer's specifications). An untreated control was also included for comparison. The crop was carefully observed at weekly interval to monitor the disease incidence. The application of fungicides was started just after disease appearance. The crop was sprayed ten times with fungicides after seven days interval with sprayer. Disease incidence was recorded after 15 days of completion of all sprays and data of yield and yield

components were recorded before every picking of fruits from randomly selected ten plants. All other agronomic practices for the experimental units were kept uniform. The data were statistically analyzed by ANOVA followed by Duncan's Multiple Range Test to separate treatment means (Steel *et al.*, 1997).

Table-1. Detail of treatments employed in the experiment

Trade name and formulation	Name of Fungicides		Dose per litre of water
		Chemical name	
Control		-	-
Dithane M-45 80 WP		Mancozeb	5.0 gm
Copper Oxychloride 50 WP		Copper oxychloride	4.0 gm
Ridomil gold 72 WP		Metalaxyl+Mancozeb	2.0 gm
Success 72 WP		Metalaxyl+Chlorothalonil	2.5 gm
Alliet 80 WP		Fostyle aluminium	2.0 gm

RESULTS AND DISCUSSION

Disease Incidence: Effect of different fungicides on disease incidence, yield and yield components during Rabi., 2006 and 2007 are presented in the Table-2. The results revealed that all the fungicides significantly controlled the disease as compared to control plot. Minimum disease incidence was observed by the spraying of Success (9.0%), Ridomil Gold (9.0%) and Alliet (11%). All these fungicides were at par statistically as assessed by their effect on disease control. These results agree with those of Jones (1978); Timchenko (1979); Hashmi, (1994); Katstube (2001); and Anonymous (2004). Dithane M-45 gave the disease incidence (49.40%) followed by Copper Oxychloride (62.46%) and these are statistically different from each other. The highest disease incidence (78.20%) was noted in control plot because in tunnel cultivation, high humidity encourages the fungal pathogens. Besides the application of fungicides, proper ventilation must be carried out to lower the humidity for the effective control of disease.

Number of fruit per plant: Number of fruit per plant is an important component of yield and has significant impact on production (Table-2). Number of fruits per plant differed significantly ($P < 0.05$) in various treatments. Ridomil gave highest number of fruits per plant (20.23) followed by Success (19.98) and Alliet (18.95). All these treatments were not significantly different from each other. Dithane M-45 provided 15.40 and Copper oxychloride 12.76 fruits per plants which

were significantly different from other treatments. However, all fungicides gave the significantly higher number of fruits per plants than control (9.45). These results suggested that varying degree competition among disease and cucumber plant by damaging the foliage produced different number of fruits per plants. Similar results have been reported by Hashmi (1994).

Table:2 Effect of fungicides on disease control, yield and yield components of cucumber crop under tunnel cultivation (Ave. of 2 Years, 2006 & 07).

Treatments	Disease Incidence (%)	No. of fruit / plant	Length of fruit (cm)	Weight of fruit/ plant (kg)
Control	78.20a	9.45d	11.89c	0.86d
Dithane- M-45	49.40c	15.40b	16.79b	2.20b
Copper oxychloride	62.46b	12.76c	14.54b	1.51c
Ridomil Gold	9.22e	20.23a	20.91a	3.28a
Success	8.88e	19.98a	19.86a	3.12a
Alliet	10.86d	18.95a	20.34a	2.93a
LSD 0.05	1.069	2.37	2.42	0.54

Values in a column followed by the same letter are not significantly different by LSD at $p < 0.05$.

Length of fruits: Various fungicides treatment produced a significant effect on the length of fruit (Table-2). The length of fruit recorded from the plots treated with Ridomil Gold (20.91cm), Alliet (20.34 cm) and Success (19.86 cm) were at par statistically but significantly higher to those of Dithane M-45 (16.79 cm) and Copper oxychloride (14.54 cm). Dithane M-45 and copper oxychloride were not significantly different with each other. Significantly lowest fruit length (11.89 cm) was recorded in control plot. These results are supported by the findings of Hashmi (1994).

Weight of fruit per plant: The data represented in the Table-2 showed that all fungicides had a significant impact on weight of fruit per plant. The highest weight of fruit per plant was recorded in the plots where spraying of Ridomil Gold (3.28 kg plant⁻¹) followed by Success (3.12kg plant⁻¹) and Alliet (2.93kg plant⁻¹). These findings were statistically higher than that of Dithane M-45 (2.20 kg plant⁻¹) and Copper Oxychloride (1.51 kg plant⁻¹). Whereas control plot gave minimum weight of fruit per plant (0.86 kg plant⁻¹).

Disease control resulted in better development of foliage of crop which led to more number of fruits per plant, longer and heavier fruit with higher yield. Similar results have been reported by Boyadzhiev *et al.* (1983). Khan (1999). Khetmalas and Memane (2003) used six sprays of Bordeaux mixture (@ 0.5%) at seven days interval or three sprays of Alliete (@ 0.2%) at fifteen

days interval, followed by three sprays of Mancozeb (@ 0.3%) at seven days interval starting from thirty days after crop sowing. This was found to be effective in control of cucumber downy mildew disease with increase in yield.

Hence it is concluded from the study that use of fungicide reduces the disease incidence and improves yield. Information can be used in disease management program for controlling downy mildew of cucumber.

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