EFFICACY OF DIFFERENT FUNGICIDES AGAINST POWDERY MILDEW OF CUCUMBER AND ITS EFFECT ON YIELD

Syed Shafqat Hussain[1], Sana Ullah[2], Muhammad Omer[1], Imad Hussain[2], Sulaiman Bacha[2], Gulwarin Khan[3], Muhammad Saeed[1], Atiq Hussain Bangash[1], Ihtisham Ul Haq[1] and Muhammad Touseef Rehman[1]

1. *Department of Plant Pathology, The University of Agriculture Peshawar, Khyber Pakhtunkhwa- Pakistan.*
2. *Department of Botany, University of Malakand, Khyber Pakhtunkhwa- Pakistan.*
3. *Department of Entomology, The University of Agriculture Peshawar, Khyber Pakhtunkhwa- Pakistan.*

Corresponding Author Email: sanaullah4005@gmail.com

ABSTRACT

This study evaluated the efficacy of various fungicides on disease control, yield, and yield components of cucumber crops under field conditions during the 2021-22 season. Disease incidence, number of fruits per plant, length and weight of fruits per plant were assessed for different fungicide treatments, including Aliette, Topsin-M, Antracol, Copper oxychloride, and a control plot. Results indicated that Aliette and Topsin-M treatments exhibited the lowest disease incidence at 6.22% and 7.88%, respectively, showcasing their superior disease control. Antracol and Copper oxychloride demonstrated moderate disease control, while the control plot exhibited the highest disease incidence at 68.30%. Regarding yield components, Aliette and Topsin-M treatments resulted in the highest number of fruits per plant (16.23 and 14.98), longer fruits (22.91 cm and 23.86 cm), and the highest weight of fruits per plant (4.38 kg and 4.32 kg). Conversely, Antracol and Copper oxychloride treatments showed lower fruit counts, shorter fruit lengths, and lower fruit weights. The study concludes that Aliette and Topsin-M fungicides hold promise for effective disease control and improved yield in cucumber crops, emphasizing their potential for enhancing overall crop performance under field conditions.

Key words: Cucumber, Powdery mildew, and fungicides

INTRODUCTION

Cultivation of cucumber (Cucumis sativus L.) has traditionally been widespread in open fields in Pakistan, but there is a growing trend in recent years towards using high plastic tunnels.

This vegetable is commonly consumed raw in salads, often paired with onions and tomatoes, and is known for its rich content of vitamins B and C (Bloach, 1994).

Cucumber, a significant cucurbitaceous vegetable crop, has a historical cultivation record dating back 5,000 years, making it one of the oldest vegetables grown by humans. In Asia, it holds the fourth position in vegetable importance, following tomato, cabbage, and onion. However, in Western Europe and tropical Africa, it ranks as the second most important vegetable (Pandey, 2000). Cucumber, belonging to the family Cucurbitaceae, is renowned for its phosphorus, potassium, and oxalic acid content, making it a popular choice for salads. The seeds of cucumber possess diuretic, tonic, and refrigerant properties. Additionally, the odorous principle of Cucumis sativus L. can be extracted with alcohol and is utilized in certain perfume bouquets (Pandey, 2000).

The Cucurbitaceae family, to which cucumber belongs, comprises 118 genera and 825 species, with two subfamilies. This family is crucial for edible fruits and seeds, and it plays a major role in food crop production across tropical, subtropical, and temperate regions (Judd *et al.,* 2008).

Originally found in the wild in the Himalayas of northern India, cucumber grafting is sometimes employed to produce disease-resistant roots against soil-borne diseases caused by organisms like Fusarium spp., *Verticillum spp.* and *Pythium spp.* This method is also used to enhance root systems, leading to better vegetative growth (Molen, 2007, 2008).

Despite its nutritional value and historical significance, the cucumber crop faces challenges, including diseases like Powdery Mildew caused by Erysiphe cichoracearum. This disease primarily affects young tissues on the upper leaf surface, leading to circular white spots. However, the roots and fruits remain unaffected (Agrios, 2005; Sitterly, 1978; Robinson and Decker-Walters, 1997). To address this concern, the current study aims to assess the effectiveness of different fungicides on disease incidence, yield, and yield components in cucumber crops grown under field conditions.

MATERIAL AND METHODS

The research was carried out at farmer field in Swat, focusing on a silty clay variety known as "Salad Bush." On April 5, 2021, the crop was seeded and subsequently irrigated in beds, with a

spacing of 80 inches between bed centers. The experimental design employed a randomized complete block, with treatments replicated four times. Each replicate plot covered 20 feet of row. Four different fungicides were applied at ten-day intervals: Aliette (fosetyl-Al) at 2.5 g/l, Antracol (propineb) at 3g/l, Copper oxychloride at 2.5 g/l, Topsin-M (thiophanate methyl) at 2.5 g/l, and a control plot. Untreated control was also included for comparative purposes. Fungicide application commenced immediately upon the appearance of the disease. Disease incidence was systematically recorded ten days after the completion of all sprays.

Ten days of observations were made to monitor disease incidence, and data on yield and yield components were collected before each fruit picking session from ten randomly selected plants. Standardized agronomic practices were maintained consistently across all experimental units. Statistical analysis of the data was conducted using ANOVA, followed by the Duncen's Multiple Range Test for the separation of treatment means (Steel *et al.,* 1997).

RESULTS AND DISCUSSUION

Disease Incidence (%)

The lowest disease incidence was observed in the Aliette and Topsin-M treatments, with 6.22% and 7.88%, respectively. Antracol and Copper oxychloride showed moderate disease control, with percentages of 59.40% and 60.46%, respectively. The control plot exhibited the highest disease incidence at 68.30%.

Number of Fruit/Plant

Aliette and Topsin-M treatments resulted in the highest number of fruits per plant, with 16.23 and 14.98, respectively. Antracol and Copper oxychloride had lower fruit counts, while the control plot had the least number of fruits per plant.

Length of Fruit (cm)

Aliette and Topsin-M treatments led to longer fruits, measuring 22.91 cm and 23.86 cm, respectively. Antracol, Copper oxychloride, and the control plot had shorter fruit lengths.

Weight of Fruit/Plant (kg)

Aliette and Topsin-M treatments demonstrated the highest weight of fruits per plant, with 4.38 kg and 4.32 kg, respectively. Antracol and Copper oxychloride resulted in lower fruit weights, while the control plot had the least weight of fruits per plant.

Table 1: Efficacy of Different Fungicides on Disease Control, Yield, and Yield Components of Cucumber Crop under Field Conditions during 2021-22.

Treatments	Disease Incidence (%)	No. of fruit / plant	Length of fruit (cm)	Weight of fruit/ plant (kg)
Antracol	59.40c	11.40b	17.79b	3.30b
Copper oxychloride	60.46b	08.76c	16.54b	1.91c
Aliette	6.22e	16.23a	22.91a	4.38a
Topsin-M	7.88e	14.98a	23.86a	4.32a
Control	68.30a	8.75d	10.79c	0.76d
LSD 0.05	2.339	2.77	3.02	0.64

Note: Values within the same column followed by different letters (a, b, c, etc.) are significantly different at the 0.05 level according to Duncen's Multiple Range Test.

Discussion

The impact of various fungicides on disease incidence, yield, and yield components during the Rabi season of 2021-22 is presented in Table-1. The outcomes demonstrate a significant effectiveness of all fungicides in disease control compared to the control plot. Specifically, Aliette (fosetyl-Al) at 2.5 g/l, Antracol (propineb) at 3g/l, Copper oxychloride at 2.5 g/l, and Topsin-M (thiophanate methyl) at 2.5 g/l were notably effective against powdery mildew.

Assessment of disease incidence, number of fruits per plant, and length and weight of fruits per plant for various fungicide treatments, including Aliette, Topsin-M, Antracol, Copper oxychloride, and a control plot, revealed compelling results. Aliette and Topsin-M treatments exhibited the lowest disease incidence at 6.22% and 7.88%, respectively, showcasing superior disease control. Antracol and Copper oxychloride demonstrated moderate disease control, while the control plot exhibited the highest disease incidence at 68.30%. In terms of yield components, Aliette and Topsin-M treatments resulted in the highest number of fruits per plant (16.23 and 14.98), longer fruits (22.91 cm and 23.86 cm), and the highest weight of fruits per plant (4.38 kg and 4.32 kg).

Statistical analysis indicated that all these fungicides were comparable in their disease control effectiveness. These findings align with previous studies by Jones (1978), Timchenko (1979), Hashmi (1994), and Katstube (2001). No significant differences were observed between Antracol and Copper oxychloride. The control plot recorded the lowest fruit length at 10.79 cm, in agreement with Hashmi's findings in 1994. The study concludes that fungicide application reduces disease incidence, improves yield, and promotes better foliage development, resulting in increased fruit number, length, and weight. Similar observations have been reported by Boyadzhiev *et al.* (1983) and Khan (1999). This information is valuable for implementing effective disease management programs, particularly in the context of controlling downy mildew in cucumber crops.

CONCLUSION AND RECOMMENDATION

It is concluded from the study that the Aliette and Topsin-M exhibited effective disease control and superior yield and yield components compared to other treatments, emphasizing their potential for enhancing cucumber crop performance under field conditions. So, it is recommended for powdery mildew of cucumber crop.

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