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SCREENING OF NEWER FUNGICIDES OF DIFFERENT FREQUENCIES AGAINST *CURVULARIA PSEUDOBRACHYSPORA* CAUSING BLIGHT OF *POLIANTHES TUBEROSA* (TUBEROSE)

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ABSTRACT

One of the most significant commercial cut flower and loose flower crops, the tuberose (*Polianthes tuberosa* L.) is a highly regarded favourite flower belonging to the Amaryllidaceae family, which is mostly grown in tropical and subtropical regions of the world. In 2020–2021, research on the *in vitro* assessment of non-systemic, systemic and combo fungicides against *Curvularia pseudobrachyspora* was conducted in the Plant Pathology department of the College of Agriculture, Shivamogga. Out of all the non-systemic fungicides that were tested, mancozeb and propineb showed the highest percentage of inhibition (100%). The lowest percentage of fungal inhibition was seen in chlorothalonil (57.31 %). Among the When systemic fungicides were examined, hexaconazole, propiconazole and tebuconazole showed the highest percentage of inhibition (100%). The lowest percentage of inhibition was found 92.41 % in difenoconazole. All of the combi products that were studied showed the highest percentage of inhibition (100%) against *C. pseudobrachyspora:* propiconazole + difenoconazole, tebuconazole + trifloxystrobin, pyraclostrobin + epoxiconazole, carbendazim + mancozeb, macozeb and metalaxyl-M + mancozeb at all different concentrations.

Key words : Tuberose, *Curvularia pseudobrachyspora*, Blight, Fungicides.

Introduction

One of the most important flower crops that is commercially farmed in various parts of India is tuberose, which also has value as an export. In the nation, West Bengal produces the most tuberoses. In India, 18.12 thousand hectares are used for tuberose production, yielding 109.78 thousand MT of loose flowers and 91.47 thousand (Sahoo, 2015) MT of cut flowers (Anonymous, 2019) and loose flowers produced. Lately, tuberose Severe illnesses impact the crop, lowering its quality and output. The serious illness known as anthracnose is brought on by *Colletotrichum truncatum*. The worth of the market for Blight infections and stem rot in flowers are brought on by microorganisms such as *Curvularia, Botrytis, Fusarium, Alternaria, Sclerotium, Lasiodiplodia, Phoma* etc (Adhikary, 2005).

According to Durgadevi and Sankaralingam (2012), *L. theobromae* is the cause of tuberose peduncle blight. Rahman *et al*. (2012) reported tuberose blossom blight caused by *F. equiseti*, while Mahinpoo *et al.* (2013) found foot and tuber rot of tuberose caused by *F. oxysporum*. Since it is a complex disease incitant of blight i.e *Curvularia* is considered because of its virulence nature. There isn't much information accessible on managing fungal blight of tuberose, although there are a lot of fungicides (Jawaharlal *et al*., 2006) on the market these days. Their compatibility and bio-efficacy need to be confirmed by *in vitro* research before being applied to field situations state (Rahman *et al*., 2012). Given the flower's economic significance and the damaging

qualities. The current study was conducted to determine the efficacy of newer fungicides against *C. pseudobrachyspora*.

Materials and Methods

Using poisoned food technique, the effectiveness of five non-systemic, five systemic and five combi fungicides against *C. pseudobrachyspora* was evaluated for radial growth suppression on the potato dextrose agar medium approach in an *in vitro* setting. The combi, systemic, and non-systemic fungicides were tested at doses of 250, 500, and 1000 ppm (Nene and Thapliyal, 1993). The fungicide calculations showed that there were melted medium is well combined before being poured into Petri plates to ensure the appropriate concentration of each fungicide's active component separately. A 20-milliliter fungicide in each of the 90 mm sterile Petri plates was filled with modified medium, which was then left to harden. The 8 mm disc of a 10-day-old culture was used to inoculate the plates in the center. of *C. pseudobrachyspora*. Additionally, fungicide-free controls were maintained (Bagga, 2007).

Three replications of each treatment were used in the completely randomized design (CRD) experiment. Petri plates that had been infected were incubated at 25 ± 2°C. After ten days, colony diameters were measured when the Fungal growth covered the entire control plate. percentage of inhibition of growth was computed using Vincent's formula.

$$I = [(C - T)/ (C)] \times 100$$

Where, I = Per cent inhibition; C = Colony diameter in control; T = Colony diameter in treatment.

Statistical analysis

The typical statistical approach used for a completely randomized design was used to the acquired experimental data in order to statistically examine the significance of the difference and Data interpretation was completed. The degree of the significance thresholds for the F and T tests were P = 0.05 and whenever the "F" test was used, critical differences were computed. was noteworthy. The percentage of the illness index values was angular transformation as indicated by the table provided by Sundarraj *et al.* (2017).

Results

Fifteen fungicides from three different categories—five systemic, five non-systemic and five combi

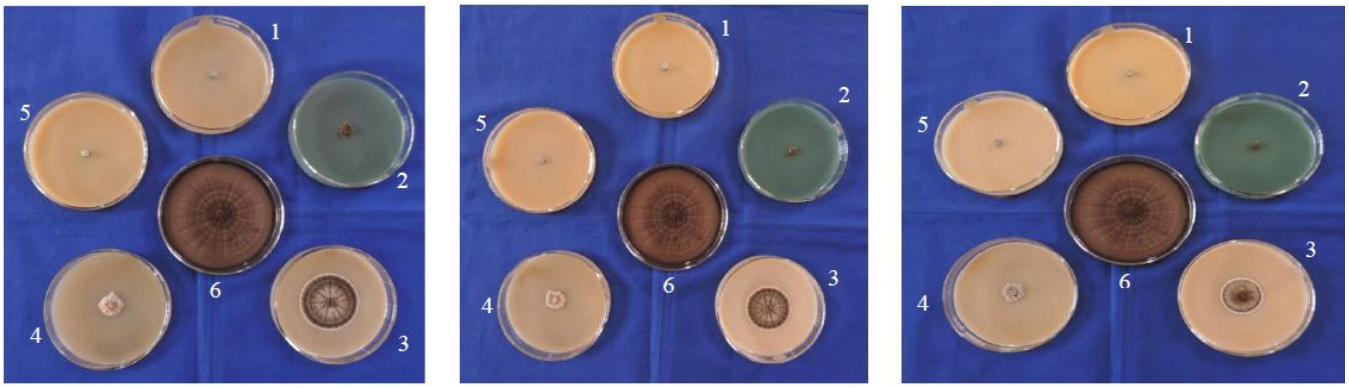

Fig. 1 : *In vitro* evaluation of non-systemic fungicides against *C. pseudobrachyspora* (1. Propineb, 2. Copper oxychloride, 3. Chlorothalonil, 4. Captan, 5. Mancozeb, 6. Control).

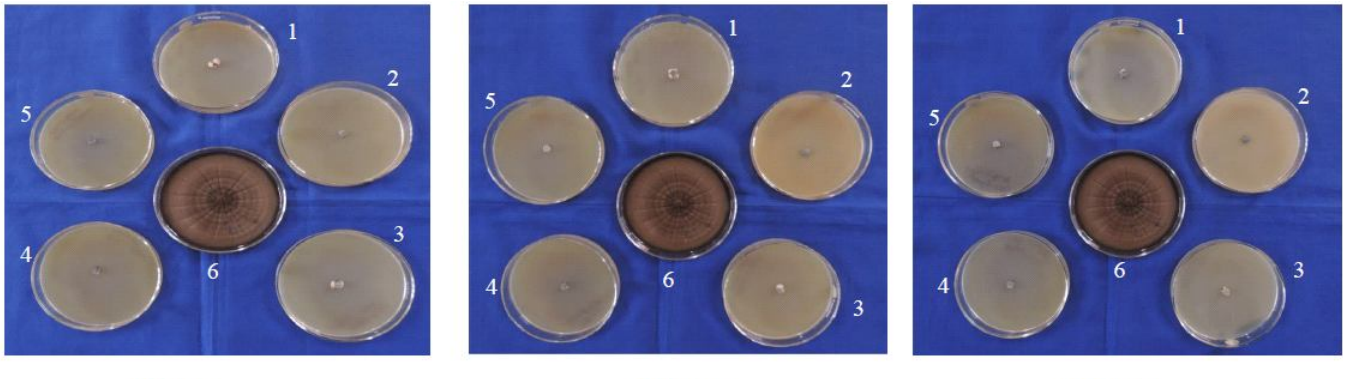

Fig. 2 : *In vitro* evaluation of systemic fungicides against *C. pseudobrachyspora* (1. Pyraclostrobin, 2. Tebuconazole, 3. Difenoconazole, 4. Propiconazole, 5. Hexaconazole, 6. Control).

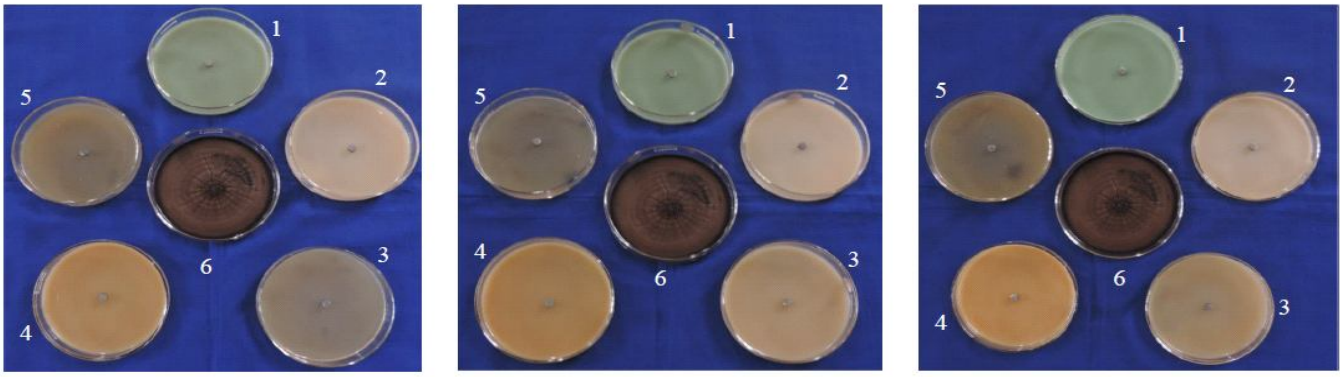

Fig. 3 : *In vitro* evaluation of combi products against *C. pseudobrachyspora* (1. Carbendazim + Mancozeb, 2. Propiconazole + Difenoconazole, 3. Pyraclostrobin + Epoxiconazole, 4. Metalaxyl-M + Mancozeb, 5. Tebuconazole + Trifloxystrobin, 6. Control).

Table 1 : *In vitro* evaluation of non-systemic fungicides against *C. pseudobrachyspora*.

S. no.	Fungicides	Inhibition (%)			
		Concentration (ppm)			
		250	500	1000	Mean
1	Captan 50% WP	77.18# (61.49)*	82.26(65.12)	84.37(66.74)	81.27(64.38)
2	Copper oxychloride 50% WP	86.18(68.21)	90.18(71.78)	92.51(74.15)	89.62(71.24)
3	Chlorothalonil 75% WP	52.00(46.16)	55.77(48.33)	64.16(53.25)	57.31(49.23)
4	Mancozeb 75 %WP	100.00(90.05)	100.00(90.05)	100.00(90.05)	100.00(90.05)
5	Propineb 70 %WP	100.00(90.05)	100.00(90.05)	100.00(90.05)	100.00(90.05)
		Fungicides (F)	Concentration (C)	F × C	
	S.Em. ±	0.43	0.33	0.25	
	CD @ 1%	1.19	0.92	0.69	

products—were tested *in vitro* for their efficacy against *C. pseudobrachyspora* using the poisoned food method. When the growth in the control group was 90 mm, and the radial growth measurements in millimeters were documented in every chemical and the percentage of growth inhibition was computed.

At all three concentrations of 250, 500 and 1000 ppm, contact fungicides such as mancozeb and propineb showed 100% suppression of *C. pseudobrachyspora* mycelial growth, suggesting that there was no discernible difference between these two chemicals. The next-best fungicide for preventing the growth of fungus was copper oxy chloride (89.62%) and captan (81.27%) in that order. The least amount of inhibition was delivered by chlorothalonil with inhibition values of 52, 55.77 and 64.16 percent at 250, 500 and 1000 ppm, respectively. In terms of preventing the growth of fungus, mancozeb and propineb outperformed all other fungicides considered in a considerable way. At all concentrations, there was a discernible difference between the captan, copper oxychloride and chlorothalonil treatments.

At all three concentrations of 250, 500, and 1000 ppm, it was discovered that tebuconazole, hexaconazole, and propiconazole had the maximum percent inhibition (100%) of *C. pseudobrachyspora* growth, suggesting that there was no discernible difference between fungicides. Pyracostrobin ranked second (93.53%) and least in terms of merit. 89.69%, 92.83% and 94.82% percent inhibition was noted in difenoconazole at concentrations of 250, 500 and 1000 ppm, respectively.

Every combi product that was evaluated, including carbendazim + macozeb, metalaxyl-M + mancozeb, pyraclostrobin + epoxiconazole, propiconazole + difenoconazole, tebuconazole + trifloxystrobin and pyraclostrobin + epoxiconazole, shown 100% inhibition against at the three values of 250, 500 and 1000 ppm, *C. pseudobrachyspora* was found, indicating showed the treatments did not significantly differ from one another.

Table 2 : *In vitro* evaluation of systemic fungicides against *C. pseudobrachyspora*.

S. no.	Fungicides	Inhibition (%)			
		Concentration (ppm)			
		250	500	1000	Mean
1	Pyraclostrobin 23.6% EC	91.65#(73.24)*	93.77(75.58)	95.17(77.35)	93.53(75.30)
2	Difenoconazole 25% EC	89.69(71.31)	92.83(74.51)	94.82(76.88)	92.45(74.08)
3	Tebuconazole 25.9% EC	100(90.05)	100(90.05)	100(90.05)	100(90.05)
4	Hexaconazole 5% SC	100(90.05)	100(90.05)	100(90.05)	100(90.05)
5	Propiconazole 25% EC	100(90.05)	100(90.05)	100(90.05)	100(90.05)
		Fungicides (F)	Concentration (C)	F × C	
	S.Em. ±	0.50	0.39	0.29	
	CD @ 1%	1.39	1.08	0.80	

Table 3 : *In vitro* evaluation of combi products against *C. pseudobrachyspora*.

S. no.	Fungicides	Inhibition (%)			
		Concentration (ppm)			
		250	500	1000	Mean
1	Carbendazim 12%+ Mancozeb 63% WP	100#(90.05)*	100(90.05)	100(90.05)	100(90.05)
2	Propiconazole13.9%+ Difenconazole 13.9% EC	100(90.05)	100(90.05)	100(90.05)	100(90.05)
3	Metalaxyl-M 4% + Mancozeb 64% WP	100(90.05)	100(90.05)	100(90.05)	100(90.05)
4	Tebuconazole 50%+ Trifloxystrobin 25% WG	100(90.05)	100(90.05)	100(90.05)	100(90.05)
5	Pyraclostrobin 23.6% EC+ Epoxiconazole 7.5% SE	100(90.05)	100(90.05)	100(90.05)	100(90.05)
		NS	NS	NS	

Discussion

A comparison of five fungicides—non-systemic, systemic, and combi—was made against *C. pseudobrachyspora*. Of the non-systemic fungicides, a hundred percent growth inhibition of of *C. pseudobrachyspora* in fungicides such as propineb and mancozeb at three concentrations that outperformed every other treatment by a substantial margin 89.62 percent and copper oxychloride came next. The lowest percentage of fungal inhibition was reported at 57.31% in chlorothalonil. The outcomes complied with the research of Pawar (2012), Spolti *et al*. (2012) as well as Singh *et al*. (2006) and Nisa *et al*. (2011). Mancozeb was particularly successful in regulating C. *pseudobrachyspora* because of its multi-site actions, which included respiration disruption, lipid metabolism, and the inactivation of sulfhydryl groups of amino acids and enzymes. Propineb prevents germination and growth and fungal growth, or they are hazardous directly.

Of the systemic fungicides tested against *C. pseudobrachyspora*, pyraclostrobin (93.53%) exhibited the highest percentage of growth inhibition (100%) followed by tebuconazole, hexaconazole, and propiconazole. Difenoconazole showed the least amount of inhibition (92.45%). The outcomes are in. similarity to Prahladbhai (2010), Yadav (2016), Zaman (2019) and Vincent (1947). The reason why triazole fungicides, such as tebuconazole and hexaconazole, work so well is that they prevent the ergosterol from being biosynthesised and interfere with the synthesized of fungal sterols. In numerous fungi Ergosterol is necessary for the construction of cell walls in fungus, and its absence results in fungal cell death due to irreversible damage to the cell wall. The fungicide Pyraclostrobin binds to the Qo center of the respiratory system to suppress respiration. cytochrome b. The vast spectrum of activity that these

strobulirins exhibit is balanced.

All of the combi products, including metalaxyl-M + mancozeb, carbendazim + mancozeb, tebuconazole + trifloxystrobin, pyraclostrobin + epoxiconazole, and propiconazole + difenoconazole, showed a 100% inhibition of fungal growth. against the three concentrations of 250, 500 and 1000 ppm of *C. pseudobrachyspora*. The outcomes concur with Bhatt's (2018) research. Combi fungicides prevent fungus from becoming resistant to systemic fungicides by interfering with one or occasionally two functions in the physiology of the fungus, which it can quickly defeat with just one mutation. In non-systemic Protectant fungicides, they have too many effects on the physiology of fungal growth and development and resistance, so the fungus will need to undergo numerous modifications. Thus, the combination of the two fungicides, both systemic and non-systemic, yield superior outcomes.

Conclusion

The tuberose, or *Polyanthes tuberosa* L., is a significant crop for both loose and cut flowers and grown in tropical and subtropical locations, it is a bulbous perennial plant with attractive flowers that is partially hardy. Efficacy of newer fungicides were undertaken against *C. pseudobrachyspora*. Mancozeb and propineb demonstrated the highest percentage of inhibition (100%) against *C. pseudobrachyspora* among the non-systemic fungicides that were studied. The least amount of fungal growth inhibition was found by chlorothalonil (57.31%). Tebuconazole, hexaconazole and propiconazole are all-inclusive systemic fungicides halted *C. pseudobrachyspora* growth. The lowest percentage of inhibition was found (92.45%) in difenoconazole.

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