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RESEARCH ARTICLE

Management of Wilt Disease (*Sclerotium rolfsii* Sacc.) in Jasmine With Fungicides

Muthulakshmi. P

Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore-641003,India.

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ABSTRACT

Sclerotial wilt of jasmine incited by *Sclerotium rolfsii* Sacc.is a serious problem in jasmine growing districts of TamilNadu and caused complete destruction the plant. .Uses of fungicides are one the most promising management method in controlling the *S. rolfsii* infection. Hence the present study was conducted with combination of fungicide molecules to manage the disease. Among the tested fungicides, Tebuconazole 50% + Trifloxystrobin 25 % @ 1000ppm was found effective and recorded maximum percent inhibition of 95.3 percent followed by Azoxystrobin 11% + Tebuconazole 18.3% at 1000ppm which recorded 94.11% as compared to control under *invitro* conditions. The pooled mean field data revealed that among the five treatments tested against wilt disease, soil drenching with Tebuconazole 50% + Trifloxystrobin 25 % at 0.1% at the time of planting + soil application on 30, 60, 90 and 120 days after planting was effective in reducing the wilt incidence to 14.0% with the highest yield of 1312 g/ plant with an estimated yield of 8.4 t/ha with maximum CB ratio of 3.63 as compared to untreated control which recorded 32 %,525 g/ plant , 3.36 t/ha and CB ratio of 1.48 respectively.

Keywords: Jasmine wilt, Fungicide management,Yield

INTRODUCTION

Jasmine (*Jasminum* sp.) is one of the most important and popular traditional flowers of India. A large number of species of Jasminum are centered on the regions comprising India, China and Malaysia (Seema et al., 2021). The major Jasmine cultivating districts of Tamil Nadu are Madurai, Dindigul, Salem, Tirunelveli, Virudhunagar and Trichy. Jasmine flowers are native to India, China and Iran (Ganga et al,2015) Jasmine crop is susceptible to many fungal and phytoplasma diseases among these root rot and collar rot disease or sclerotial wilt incited by *Sclerotium rolfsii*Sacc. (Telomorph: *Atheliarolfsii)* cause serious losses (30-40 %) to jasmine plant. It has caused complete destruction of jasmine fields.

It has caused complete destruction of the jasmine nurseries in the Thangachimatam, Ramanathapuram district and also affected jasmine main field in Sathyamangalam.Erode district and Madurai district. The pathogen *S. rolfsii* causes a variety of diseases such as damping off of seedlings, collar rot or stem rot, foot rot, crown rot, *Sclerotium* wilt and blight (Priyadharcini, et al., 2018).This pathogen is having a wide host rangeand the annual loss to world crops has been estimated at about 30,000 million dollars due to this fungal pathogen *S. rolfsii* (Chaurasia et al., 2014).

Because of its soil-borne nature, vast host range, and sclerotia's ability to survive for prolonged periods of time under harsh conditions, management of *S. rolfsii* is extremely challenging. There are various reports in the literature where fungicides have been proven to best control many destructive soil-borne diseases (Hosen et al., 2016). Uses of fungicides are one the most promising management method in controlling the *S. rolfsii* infection.

There are nosubstantial levels of host plant resistance for collar rot in chickpea but the disease can beminimized by fungicides and appropriate crop rotation (Azhar et al., 2006)

*Corresponding author's e-mail: muthupathology@gmail.com

Keeping the above facts in view, investigations were undertaken with an objective to evaluate the efficacy of various fungicides and bio control agents against *Sclerotium rolfsii* causing wilt of Jasmine.

MATERIALS AND METHODS

Isolation of pathogen Sclerotium rolfsii *from diseased samples*

The infected roots portions of diseased plants collected from farmers field at Sirumugai was cut into small pieces of 1 to1.5 cm separately using sterilized scalped knife and these were surface sterilized with 0.1 % of sodium hypochlorite for one min and then washed in sterile distilled water thrice and then placed in a Petri plate at equidistance onto potato dextrose agar (PDA) medium. The plates were incubated at room temperature (27+20 C) for five days and observed for the growth of the fungus. The pathogen was purified by single hyphal tip method and maintained in PDA slants at 4ºC throughout the study. The pathogen was identified as *Sclerotium rolfsii* based on the mycelial and sclerotial characters.

In vitro evaluation of fungicides against S. rolfsii by Poisoned food technique

The efficacy of different fungicides *viz* .,Difenoc onazoleTebuconazole,Propiconazole,Azoxystrobin, Tebuconazole 50% + Trifloxystrobin 25 % and Azoxystrobin 11% + Tebuconazole 18.3% was evaluated *in vitro* at different concentrations of100, 250,500, 750 and1000 ppm, on the growth of *Sclerotium rolfsii* on Potato dextrose agar (PDA) medium using poisoned food technique (Nene and Thapliyal, 1982) .The pathogen *S. rolfsii* was grown on PDA medium for 7 days prior to setting up the experiment. The PDA medium was prepared and melted. The required quantity of fungicide was added to the melted medium to obtain the required concentrations. Twenty ml of poisoned medium was poured in each sterilized petriplates and suitable check was maintained without addition of fungicides. To avoid bacterial contamination, a pinch of streptomycin sulphate was added to the medium at the time of pouring. A five mm mycelial disc was taken from the periphery of 7 days old colony of *S. rolfsii* and placed in the centre of petriplate. The inoculated plates were incubated at 25 + 2 ^{0}C and four replications were maintained for each treatment. Diameter of the colony was measured when maximum growth of the *S. rolfsii* was reached in any of the treatments and the observations were recorded and percent inhibition was calculated by using the formula

$$I = \frac{C - T}{C} \times 100$$

Where,

I = per cent inhibition

C = growth in control

T = growth in treatment

Evaluation of effective fungicides under field conditions

A field trial was laid out in the farmer's field with local cultivar in Gundumalli (*Jasminum sambac*) Venkataramapuram, Sirumugai during last week of November 2022 with five treatments as per the technical programme against soil borne wilt disease of jasminewith four replications. The treatments were applied at 30, 60, 90 and 120 days after planting .The disease incidence was recorded by using the formula

$$\text{Percent incidence (\%)} = \frac{\text{Number of plants affected}}{\text{Total number of plants observed}} \times 100$$

The yield parameters viz., yield per plant, estimated yield per ha and Cost benefit ratio was recorded.

RESULTS AND DISCUSSION

Among the fungicides tested, at different concentrations against *Sclerotium*wilt disease under *in vitro conditions,* , Tebuconazole 50% + Trifloxystrobin 25 % @ 1000ppm was effective and recorded maximum percent inhibition of 95.3 percent followed by Azoxystrobin 11% + Tebuconazole 18.3% at 1000ppm which recorded 94.11% as compared to control. (Table.1,Plate .1)These results are in agreement with Sangeetha et al., 2022 and Arunasri et al. (2011) who reported that the combi products containing triazoles *viz.*, Avatar, Merger and Nativo were highly inhibitive to the growth of *S. rolfsii.* Similar findings were also reported by Latha and Rajeswari (2019) who observed that trifloxystrobin + tebuconazole (0.05-0.1%) was the most effective compared with other treatments in reducing the mycelial growth (0.00 mm) with 100 percent inhibition over control which was followed by difenoconazole (0.1%) and tebuconazole (0.1%) with 0.05mm and 0.10 mm growth respectively against wilt disease in jasmine.

Manu et al. (2012) reported that systemic fungicides *viz*., hexaconazole, propiconazole, difenconazole and combi products, Avatar (Hexaconazole 4% + Zineb

Table 1. Efficacy of different fungicide molecules against soil borne pathogens of jasmine under *in vitro* conditions

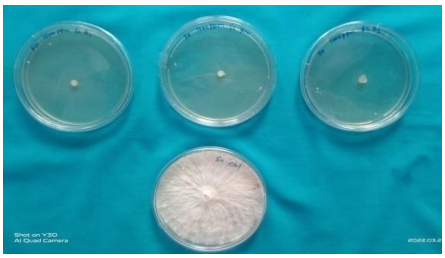
S.No	Fungicides	Concentration (ppm)	*Sclerotiumrolfsii*	
			Radial mycelial growth (cm)	Percent inhibition over control
1	Difenoconazole	100 250 500 750 1000	3.0 1.7 1.4 0.9 0.6	64.7 80.0 83.5 89.4 92.9
2	Tebuconazole	100 250 500 750 1000	3.2 1.4 1.3 0.7 0.7	62.4 83.5 84.7 91.8 91.8
3	Probiconazole	100 250 500 750 1000	5.8 4.4 3.4 1.4 0.8	31.76 51.8 59.6 82.7 90.6
4	Azoxystrobin	100 250 500 750 1000	1.5 1.4 1.0 0.7 0.7	82.4 83.5 88.2 91.8 91.8
5	Tebuconazole 50% + Trifloxystrobin 25 %	100 250 500 750 1000	0.6 0.5 0.5 0.5 0.4	92.9 94.1 94.1 94.1 95.3
6	Azoxystrobin 11% + Tebuconazole 18.3%	100 250 500 750 1000	0.9 0.7 0.7 0.5 0.5	89.4 91.8 91.8 94.1 94.1
7	Control	-	8.5	-
	CD (P=0.05%)	-	-	0.853
	SEd	-	-	0.303

Mean of three replications

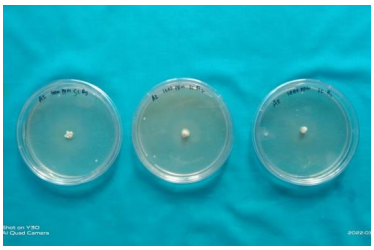
68%), Nativo (Tebuconazole 50% + Trifloxystrobin 25%) and Vitavax power (Thiram 37.5% + Carboxin 37.5%) showed complete inhibition of *S. rolfsii* at all the concentrations tested in finger millet.

The results of field trial conducted from 2022 to 2024 at farmers field was pooled and presented in Table.2. The pooled mean field data revealed that among the five treatments tested against wilt disease, soil drenching with Tebuconazole 50% + Trifloxystrobin 25 % at 0.1% at the time of planting + soil application on 30, 60, 90 and 120 days after planting was effective in reducing the wilt incidence to 14.0% and recorded highest yield of 1312 g/plant and an estimated yield of 8.4 t/ha with maximum CB ratio of 3.63 as compared to untreated control (32 %,525 g/ plant , 3.36 t/ha and CB ratio of

Plate1.Efficacy of different fungicide molecules against soil borne pathogens of jasmine at 1000ppm



Tebuconazole 50% + Trifloxystrobin 25 %



Azoxystrobin 11% + Tebuconazole 18.3%

Control

Fig.1 Untreated field view

Treated field View

1.48 respectively).Similar findings were reported by Arunasri et al. (2021)who reported in ground nut stem rot caused by *S.rolfsii* .Among eight combination fungicides screened for efficacy on viability of sclerotia of *S.rolfsii,* Hexaconazole+Zineb (Avtar) has inhibited the germination of sclerotia to the maximum extent of inhibition (98.88%). At 5 cm and 10 cm depths all the fungicides Azoxystrobin 11%+ Tebuconazole 18.3 %SC; Azoxystrobin 7.1%+ Propiconazole 11.9% SE; Azoxystrobin 18.2% +Difenoconazole11.4 %SC; Tebuconazole 50% + Trifloxystrobin 25% WG,; Mancozeb 63% + Carbendazim 12%WP; Flusilazole 12.5% + Carbendazim 25%WP; Hexaconazole 4% + Zineb 68% WP have inhibited sclerotial germination to 100% , whereas, Captan 70% + Hexaconazole 5% WP has inhibited to 96.66%. at 20 cm depth.

CONCLUSION

For soil borne diseases, soil drenching with Tebuconazole 50% + Trifloxystrobin 25 % at 0.1% at the time of planting + soil application on 30, 60, 90 and 120 days after planting was effective in reducing the wilt incidence to 14.0% with the highest yield of 8.40t/ha and the CB ratio of 3.63.

Table 2. Effect of treatments on soil borne diseases of jasmine under field conditions (Pooled mean analysis of two years)

S.NO	Treatments	Sclerotium wilt incidence (%)	Yield / Plant (g)	Estimated Yield t /ha	CB ratio
T1	Soil drenching with tebuconazole @ 0.1 % at the time of planting + soil application on 30,60,90 and 120 days after planting	17.0	1062	6.79	2.96
T2	Soil drenching with Tebuconazole 50% + Trifloxystrobin 25 % at 0.1% at the time of planting + soil application on 30, 60, 90 and 120 days after planting.	14.0	1312	8.4	3.63
T3	Soil drenching with Bordeaux mixture @ 1 % at the time of planting + soil application @ 1 % on 30,60,90 and 120 days after planting	24.0	973	6.23	2.68
T4	Farmers Practice	28.0	660	4.22	1.86
T5	Untreated control	32.0	525	3.36	1.48
	CD (P=0.05%)	2.80	45.23	0.321	
	SEd	1.47	23.02	0.155	
	CV %	30.51	28.09		

Mean of 5 replications

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