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# Effect of Fungicides on Growth of *Ceratocystis fimbriata* ELL. and Halst. Causing Wilt in Pomegranate

**[1]Shreeshail Sonyal, [2]Madhu S. Giri, [3]Mahesha, H. S, [4]K. B. Palanna. [5]Manjunath, S. Hurakadli and [6]Anil Pappachan**

[1, 3, 4, 5 and 6]Department of Plant Pathology, UAS, GKVK, Bangalore,

[2]Department of Plant Pathology, UAS, Dharwad

*Corresponding Author E-mail: shailgkvk2012@gmail.com

**ABSTRACT**

*Seven systemic, five non systemic and two combi-product fungicides were evaluated in vitro against Ceratocystisfimbriata, the causal agent of wilt of pomegranate. Among systemic fungicides tested, complete inhibition was shown by propiconazole, tricyclazole in all concentrations tested. Among non-systemic fungicides tested copper oxychloride was more effective than other fungicides in all concentrations. Among combi product Carboxin 37.5 WP + thiram 37 (vitavax power) was completely effective in all concentrations.*

***Key words:*** *Wilt, Ceratocystisfimbriata, fungicides, pomegranate*

## INTRODUCTION

Pomegranate (*Punica granatum* L.) is an ancient fruit, belonging to the smallest botanical family punicaceae and pomegranate is a native of Iran. It is commercially an important fruit crop of both tropical and subtropical regions. In India, it is regarded as a "vital cash crop", grown in an area of 1, 16,000 ha with a production of 89,000 MT with an average productivity of 7.3 MT. Karnataka state has the distribution of cultivating pomegranate under tropical condition in an area of 12,042 ha with a production of 1, 29, 547 tonnes. Where this crop has spread across different districts *viz*., Bijapur, Bellary, Bagalkot, Koppal, Chitradurga, Belgaum, Davangere, Tumkur, Bangalore and Gulbarga. Pomegranate suffers from ten economically important diseases, among them bacterial blight or spot, fruit rot, anthracnose and wilt complex are severe and cause significant losses in recent years. Wilt caused by *Ceratocystis fimbriata* is the most severe disease in Karnataka which causes yellowing, drooping and death of pomegranate plant leading to loss to the farmers. It is pertinent to generate information on the efficacy of available and new fungicides for managing the disease. Hence, the present study was undertaken to screen various fungicides *in vitro* to manage wilt within the reasonable limit of fungicidal residues permitted by the importing countries.

## MATERIAL AND METHODS

The fungus was isolated following standard tissue isolation technique mentioned below. The brownish discolored root bits along with some healthy portions were surface sterilized in 1:1000 mercuric chloride solutions for 30 seconds and washed thoroughly thrice in sterile distilled water to remove the traces of

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mercuric chloride, if any. Then such bits were aseptically transferred to sterile potato dextrose agar (PDA) Petri dishes. The Petri dishes were incubated at room temperature (25±20C) and observed periodically for fungal growth. Hyphal tip method was followed for maintaining of pure culture. Hyphal tip isolation was done on water plates. Dilute spore suspension of the pathogen was prepared in sterilized distilled water containing eight to ten spores per ml from 15 days old culture. One ml of such suspension was spread uniformly on two per cent solidified water agar plates and observed for spores under the microscope. Single spore was marked with a marker on backside of the Petri plate and it was allowed to germinate. Such plates were periodically observed for spore germination under microscope. The hyphae growing from each cell of the single spore was traced and marked with marker. The tip of the hyphae was cut carefully and transferred to PDA plates and incubated at 25±20C for 15 days. Seven each systemic *viz*., Carbendazim, Difenoconazole, Iprobenfos, Propiconazole, Azoxystrobin, Hexaconazole and Tricyclazole. Five each systemic *viz*., Mancozeb, Chlorothalonil, Propineb, Copper oxy chloride and captan. Two each combi-product *viz*., SAAF 75%WP(Mancozeb 63%+ Carbendazim 12%) and Vitavax power (Carboxin 37.5 WP+ Thiram 37.5) were tested against *Ceratocystis fimbriata* for inhibition of the fungal radial growth on potato dextrose agar by using poisoned food technique *in vitro* condition. The systemic, non-systemic and combi-product were tried at 0.1, 0.2 and 0.3 per cent concentration.Poison food technique was followed to test the efficacy of the above mentioned fungicides. The pathogen C. fimbriata was grown on PDA medium in Petriplates for fifteen days prior to setting the experiment. Fungicide suspension was prepared in PDA by adding required quantity of fungicide to obtain the desired concentration on the basis of active ingredient and whole product present in the chemical. Twenty ml of poisoned medium was poured in each of the sterilized Petriplates. Mycelial disc of 0.5 cm was taken from the periphery of ten day old culture and placed in the centre and incubated at 25±20C till growth of the fungus touched the periphery in control plate. Suitable checks were also maintained without addition of any fungicide, three replications were maintained for each treatment. The diameter of the colony was measured in two directions and average was worked out. The per cent inhibition of growth was worked out. The per cent inhibition of growth was calculated by using the formula given by Vincent[3].

$$I = 100 (C-T) / C$$

Where,

I = Per cent inhibition of mycelium
C = Growth of mycelium in control
T = Growth of mycelium in treatment

## RESULTS

Among systemic fungicides tested (Table 1 and Plate 1), complete inhibition was shown by propiconazole, tricyclazole and Hexaconazole at all concentrations tested. Next best chemical was kitazin with mean inhibition of mycelial growth of 97.77 per cent, followed by Azoxystrobin with 97.34 per cent mycelial growth. Among the different concentration. 0.3 per cent recorded the maximum inhibition (100%) followed by 0.2 per cent (100%), whereas the less inhibition was observed at 0.1 per cent (91.66%). Carbendazim was significantly differing among the different concentrations. However, 0.3 per cent recorded the maximum inhibition (94.22%) of C. fimbriata. Azoxystrobin showed the maximum inhibition *C. fimbriata* at 0.3 per cent (97.77%), while least was recorded at 0.1 per cent (96.66%). Difenoconazole showed maximum inhibition at 0.3 per cent (98.14%) followed by 0.2 per cent (97.77%) and 0.1 per cent (97.77%) while at all concentration were statistically on par with each other.

Among non-systemic fungicides (Table 2 and Plate 2) tested Copper oxy chloride was more effective with mean inhibition of mycelial growth of (97.03%), followed by propineb (90.60%) and Dithen M-45 (75.14%). The least mycelial growth inhibition was observed in case chlorothalonil (38.08%).

Among combi-product (Table 3 and Plate 3) carboxin 37.5 WP + thiram 37 (vitavax power) was completely effective in all concentrations. Saaf 75% WP (carbendazim + mancozeb) was effective only at 0.2 per cent (92.58%) and 0.3 per cent (93.14%).

**Table 1: *In vitro* evaluation of systemic fungicides against the mycelial growth of *Ceratocystis fimbriata***

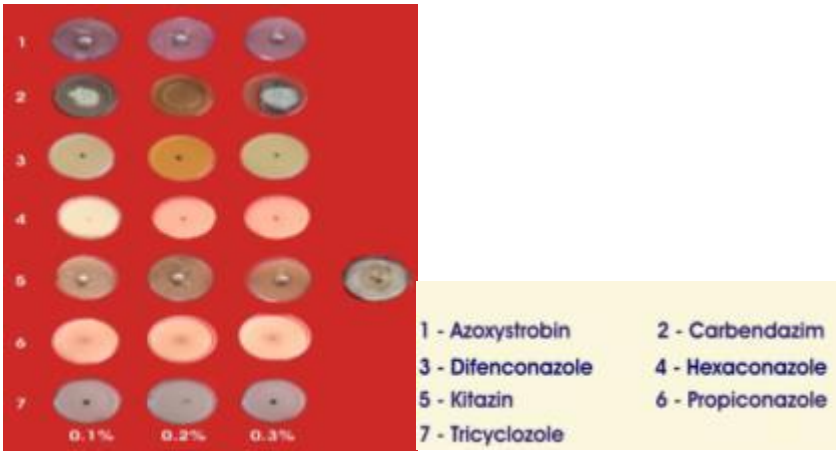
| S. No. | Fungicides | Percent inhibition of mycelial growth (mm) | | | Mean |
|---|---|---|---|---|---|
| | | Concentration | | | |
| | | 0.1% | 0.2% | 0.3% | |
| 1. | Azoxystrobin 5% EC (Amistar) | 96.66 (79.68) | 97.59 (81.09) | 97.77 (81.57) | 97.34 (80.78) |
| 2. | Carbendazim 50%WP (Bavistn) | 57.21 (49.13) | 60.36 (50.96) | 68.32 (55.73) | 61.96 (51.94) |
| 3. | Difenconazole 25%EC (Score) | 97.77 (81.83) | 97.77 (81.83) | 98.14 (82.27) | 97.89 (81.98) |
| 4. | Hexaconazole 5%EC (Contaf) | 100 (90.00) | 100 (90.00) | 100 (90.00) | 100 (90.00) |
| 5. | Kitazin 48%Ec (Iprobenfos) | 96.66 (79.68) | 97.58 (81.29) | 99.07 (85.46) | 97.77 (82.14) |
| 6. | Propiconazole25%EC (Tilt) | 100 (90.00) | 100 (90.00) | 100 (90.00) | 100 (90.00) |
| 7. | Tricyclazole 75% WP (Beem) | 100 (90.00) | 100 (90.00) | 100 (90.00) | 100 (90.00) |
| Mean | | 91.66 (77.89) | 92.56 (78.86) | 94.22 (80.53) | 92.81 (79.09) |
| Source | | | | SE m ± | CD @ 1% |
| Fungicides (F) | | | | 0.65 | 2.49 |
| Concentration (C) | | | | 0.43 | 1.63 |
| F × C | | | | 1.11 | 4.32 |

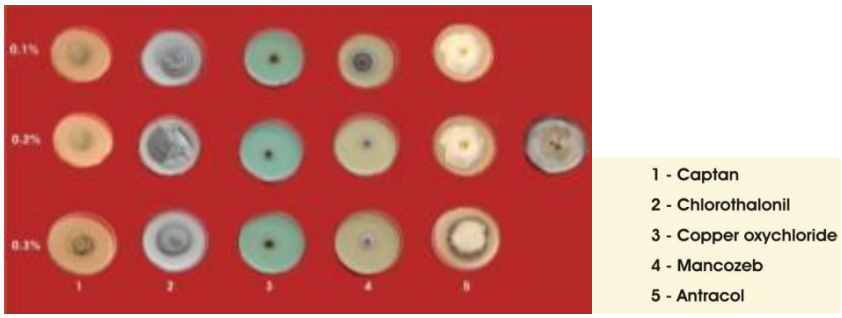
**Table- 2: *In vitro* evaluation of non-systemic fungicides against the mycelial growth of *Ceratocystis fimbriata***

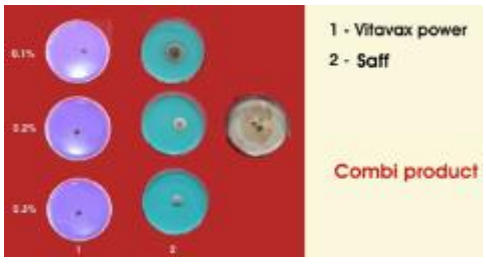
| Sl.No | Fungicides | Percent inhibition of mycelial growth (mm) | | | Mean |
|---|---|---|---|---|---|
| | | Concentration | | | |
| | | 0.1% | 0.2% | 0.3% | |
| 1. | Captan 50%WP(Captan) | 53.30 (46.89) | 53.88 (47.21) | 58.70 (49.99) | 55.29 (48.03) |
| 2. | Chlorothalonil 75%WP (Kavach) | 37.03 (37.46) | 37.22 (39.65) | 39.99 (39.18) | 38.08 (38.77) |
| 3. | Copper oxy chloride 50%WP (Blue copper) | 95.92 (78.49) | 97.03 (80.53) | 98.14 (82.22) | 97.03 (80.41) |
| 4. | Dithane M- 45 75 %WP (Mancozeb) | 57.66 (69.04) | 79.81 (73.38) | 87.95 (74.96) | 75.14 (72.46) |
| 5. | Propineb 70%WP (Antracol) | 87.21 (49.39) | 91.84 (63.38) | 92.77 (70.09) | 90.60 (60.92) |
| Mean | | 66.22 (56.25) | 71.95 (60.81) | 75.51 (63.29) | 71.22 (60.11) |
| Source | | | | SE m ± | C D @1% |
| Fungicides (F) | | | | 0.90 | 3.51 |
| Concentration (C) | | | | 0.70 | 2.72 |
| F × C | | | | 1.50 | 6.07 |

**Table3: *In vitro* evaluation of combi-product against the mycelial growth of *Ceratocystis fimbriata***

| Sl. No. | Fungicides | Percent inhibition of mycelial growth (mm) | | | Mean |
|---|---|---|---|---|---|
| | | Concentration | | | |
| | | 0.1% | 0.2% | 0.3% | |
| 1 | Carboxin 37.5 WP+thiram 37 (Vitavax power) | 100 (90.00) | 100 (90.00) | 100 (90.00) | 100 (90.00) |
| 2 | Saaf 75%WP (Carbendazim+Mancozeb) | 70.36 (73.56) | 92.58 (71.21) | 93.14 (74.79) | 85.36 (67.72) |
| Mean | | 85.18 (73.56) | 96.29 (80.58) | 96.57 (82.37) | 92.68 (78.84) |
| Source | | | | SE m ± | C D @ 1% |
| Fungicides (F) | | | | 1.18 | 5.11 |
| Concentration (C) | | | | 1.45 | 6.26 |
| F × C | | | | 2.05 | 8.85 |



## DISCUSSION

Among all the systemic fungicides tested, propiconazole, Difenoconazole, tricyclazole and Hexaconazole showed complete inhibition of the fungus at all concentrations (0.1%, 0.2% and 0.3%) tested. This shows that all systemic fungicides tested were effective against the fungus. Except carbendazim which was least effective at all concentration. Similar trends were also observed in *C. paradoxa* by Vijaya, *et al*.,[2] and Somasekhara, Y.M[1].

Among the non-systemic fungicides tested, copper oxychloride and propineb were effective in all three concentrations (0.1%, 0.2% and 0.3%) tested and found superior over all other non-systemic fungicides tested. The next best was mancozeb showing 91.84, 92.77 per cent inhibition was found more effective than captan and chlorothalonil at 0.2 per cent and 0.3 per cent concentrations. These results were in accordance with those[1,2]. Among combi-product vitavax power showed complete inhibition. Saaf was effective at 0.2 per cent (92.58%) and 0.3 per cent (93.14%).

## REFERENCES

1. Somasekhara,Y.M., Ravichandran, N.G. and Jain, R.K., Biological management of root knot nematode (Meloidogyne incognita) infesting pomegranate (Punica granatum L.) in Karnataka. Paper Presented In: 2nd*Inter. Symp. Pomegranate and minor including Mediterranean Fruits,* Univ. Agric. Sci., Dharwad, June 23- 27, pp. 143-144, (2009).
2. Vijaya, H.K., Srikant, K. and Yashoda R.H., Evaluation of plant extracts against *Ceratocystis paradoxa* causing sett rot of sugarcane. *Karnataka J. Agric. Sci*., **20(1):** 168-169, (2007).
3. Vincent, J.M., Distortion of fungal hyphae in the presence of certain inhibitors. *Nature*, **159:** 850, (1947).
4. Shah, K.J. and Shekar, A., Effect of Nutritional Status and Life Style Modification on Pre-Diabetic Patient in Mumbai, *Int. J. Pure App. Biosci.* **3 (3):** 81-86 (2015).
5. Ouabbou, A., Saifeddine, El. K., Touhami, A.O., Benkirane R. and Douira, A., Study of some new Lepioteae for the Morocco's fungal flora, *Int. J. Pure App. Biosci.* **3 (3):** 28-34 (2015).
6. Chakraborty, S., Human-Animal Conflicts in Northern West Bengal: Losses on both sides, *Int. J. Pure App. Biosci.* **3 (3):** 35-44 (2015).