

**Original Research Article**

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## **Efficacy of Fungicides and Herbicides against *Sclerotium oryzae* Catt. Incitant of Stem Rot Disease in Rice**

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Efficacy of fungicides and herbicides was tested using poison food technique against *Sclerotium oryzae*. Out of eight fungicides tested against *S. oryzae*, the stem rot pathogen propiconazole @ 100 ppm and hexaconazole @ 200 ppm were found effective in inhibiting the mycelial growth of *S. oryzae* by 100 per cent followed by Carbendazim (97.98%), Tebuconazole (97.77%) and Mancozeb (97.76%) which were found on par with each other in inhibiting the mycelial growth of the test pathogen. Among the herbicides tested, Bispyribac sodium at 50 ppm was found effective and significantly superior over other herbicides in inhibiting the mycelial growth of *S. oryzae* by 53.29 per cent followed by 2-4 D Sodium salt (29%) and Pretilachlor (29.3%) which were found on par with each other in checking the mycelia growth of the pathogen.

### **Introduction**

Rice is an important cereal food crop grown under wide ecological conditions including less rain fall situation to inundated condition and submerged conditions. The crop is prone to be affected by a number of fungal, bacterial and viral diseases. Among these, stem rot incited by *Sclerotium oryzae* Catt. is one of the major constraint in Telangana and Andhra Pradesh states. The disease is reported from major rice growing areas of Mahboobnagar, Nalgonda, Warangal, Khammam, Nellore,

East Godavari and West Godavari districts in Telangana and Andhra Pradesh states (Gopika *et al.*, 2011). Yield losses up to an extent of 80 per cent have been reported by several workers from varied agroclimatic regions in India and abroad (Li *et al.*, 1984; Ou, 1985; Cother and Nicol, 1999). Continuous cultivation of rice during different seasons under high dosages of nitrogenous fertilizers and prevalence of many graminaceous weed flora (Chen, 1971 and 1973) and lack of proper irrigation and drainage facilities progressively aggravated

the stem rot disease in recent years. Rice diseases can be managed by cultivating resistant cultivars, cultural practices and chemical application. Of all these, the chemical control is being one of the viable proposition to control the disease and to protect the crop (Kumbhar, 2005). Chemical control offers great potential and plays an important role in reducing the losses caused by the diseases (Gill, 1999). The present investigation has been taken up to test the efficacy of fungicides and herbicides against stem rot pathogen under *in vitro* conditions.

## Materials and Methods

### Isolation and Identification of the pathogen

Rice samples comprising of different cultivars viz., MTU-3626, MTU-1010, MTU-1001, JGL- 18047, NLR-34242, WGL-3962 and RNR-15048 exhibiting stem rot symptoms were collected. The affected samples were cut into bits of 2-3 mm in size and 0.1% sodium hypochlorite surface sterilized stem bits were transferred aseptically into the Petri plates containing potato dextrose agar medium and incubated at  $25 \pm 1^{\circ}\text{C}$  in BOD incubator for 7 days. The pathogen associated with the diseased samples was identified based on morphological and colony characteristics as described by Barnett and Hunter (1972). *In vitro* evaluation of the efficacy of eight fungicides viz., Carbendazim (Bavistin), Validamycin, Propiconazole (Tilt), Azoxystrobin (Amister), Hexaconazole (Contaf), Tebuconazole (Raxil), Copperoxy chloride (Blitox), Mancozeb (Maneb) and five herbicides viz., 2-4 D Sodium salt (Barrage, Formula 40), Bispyribac sodium (Nominee gold), Oxadiargyl (Topstar), Cyhalofop-p-butyl (Clinture) and Pretilachlor (chek) at recommended concentrations along with suitable check was tested against stem rot pathogen. The efficacy of fungicides and herbicides against the test pathogen was

evaluated by poisoned food technique (Nene and Thapliyal, 1993). Fifty ml of double strength PDA was mixed with 50 ml of double concentrated fungicide solution to obtain the final concentration of fungicides and herbicides, respectively. Twenty ml of this medium was plated in 9 cm Petri plates. A five mm mycelial disc of five days old culture was inoculated at the centre of the petriplate and then incubated at  $28 \pm 2^{\circ}\text{C}$  for 7 days along with control without fungicide. Three replications were maintained for each treatment. Per cent reduction in radial growth over control was calculated by using the following formulae given below

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

Where,

I: Per cent reduction in growth of the test pathogen

C: Radial growth (mm) in control

T: Radial growth (mm) in treatment

## Results and Discussion

Out of eight fungicides tested (Table-1), Propiconazole @ 100 ppm and hexaconazole @ 200 ppm were significantly superior over all other treatments in inhibiting the mycelial growth of *S. oryzae* by 100 per cent, while Carbendazim (97.9%), Tebuconazole (97.7%) and Mancozeb (97.76%) which were found on par with each other in their efficacy against the test pathogen. Superiority of triazoles (Propiconazole and hexaconazole) over other fungitoxicants (mancozeb, chlorothalonil, thifluzamide) in managing stem rot has been reported by Kumar *et al.*, (2003), Gopika *et al.*, (2011) and Bhuvaneswari *et al.*, (2014) in testing different fungicides against stem rot pathogen under *in vitro* conditions.

**Table.1** Efficacy of the fungicides against *S. oryzae* inciting stem rot of rice

S. No.	Fungicides	Concentration of Fungicide (ppm)	Per cent inhibition of Radial growth of <i>S. oryzae</i> *
1	Carbendazim (Bavistin)	100	97.98 (81.98)
2	Validamycin (Sheathmar)	200	56.56 (48.75)
3	Propiconazole (Tilt)	100	100.00 (90.00)
4	Azoxystrobin (Amister)	100	47.86 (43.3)
5	Tebuconazole (Raxil)	100	97.77 (81.49)
6	Hexaconazole (Contaf)	200	100.00 (90.00)
7	Copperoxy chloride (Blitox)	300	78.37 (62.52)
8	Mancozeb (Maneb)	300	97.76 (81.59)
9	Control	-	0.00 (0.00)
CD @ 5%			4.81
SE(m)			1.67
CV			5.80

All the figures are means of three replications. \*Figures in parenthesis are angular transformed values

**Table.2** Efficacy of herbicides against *S. oryzae* inciting stem rot of rice

S. No.	Herbicides	Concentration of herbicide (ppm)	Per cent inhibition of Radial growth of <i>S. oryzae</i> *
1	2-4 D Sodium salt (Barrage, Formula 40)	200	29.00 (35.68)
2	Bispyribac sodium (Nominee gold)	50	53.29 (49.29)
3	Cyhalofop-p-butyl (Clinture)	200	7.91 (14.37)
4	Pretilachlor (Chek)	200	29.30 (31.43)
5	Oxadiargyl (Topstar)	150	15.31 (23.27)
6	Control	-	0.00 (0.00)
CD @ 5%			1.29
SE(m)			0.44
CV			3.84

All the figures are means of three replications. \*Figures in parenthesis are angular transformed values

The present findings differed with the findings of Hemanthu (2006) who reported that Propiconazole and hexaconazole at comparatively higher doses (500ppm and 1000 ppm) were found effective against rice stem rot pathogen. *In vitro* evaluation of fungicides showed that systemic fungicides like penconazole and hexaconazole completely inhibited the growth of *S. rolfsii* of French bean even at @ 50 ppm concentration (Gupta and Sharma, 2004).

Among the five herbicides tested, Bispyribac sodium @ 50 ppm concentration was significantly superior over other herbicides in inhibiting the mycelial growth of *S. oryzae* by 53.29 per cent followed by 2-4 D Sodium salt (29%) and Pretilachlor (29.3 %) which were found on par with each other. Similarly Gupta and Sharma (2004) reported that Benthiocarb (Saturn 50 EC) showed the inhibitory effect on growth and sclerotial formation of *S. oryzae*.

The present study indicated that fungicides viz., propiconazole and hexaconazole and herbicide bispyribac sodium were found effective against *S. oryzae* under *in vitro* conditions.

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