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**Ratnakar V**

Krishi Vigyan Kendra,  
Professor Jayashankar  
Telangana State Agricultural  
University, Telangana, India

**Shiva B**

Krishi Vigyan Kendra,  
Professor Jayashankar  
Telangana State Agricultural  
University, Telangana, India

**Veeranna G**

Krishi Vigyan Kendra, Regional  
Agriculture Research Station,  
Professor Jayashankar  
Telangana State Agricultural  
University, Telangana, India

**Jagan Mohan Rao P**

Krishi Vigyan Kendra, Regional  
Agriculture Research Station,  
Professor Jayashankar  
Telangana State Agricultural  
University, Telangana, India

**Raghurami Reddy P**

Agricultural College, Palem,  
Professor Jayashankar  
Telangana State Agricultural  
University, Telangana, India

**Corresponding Author:****Ratnakar V**

Krishi Vigyan Kendra,  
Professor Jayashankar  
Telangana State Agricultural  
University, Telangana, India

## An on-farm trial for management of stem rot, *Sclerotium oryzae* in rice

**Ratnakar V, Shiva B, Veeranna G, Jagan Mohan Rao P and Raghurami Reddy P**

**Abstract**

The study was undertaken to experiment on the management of Stem Rot, *Sclerotium oryzae* in rice by summer deep ploughing, green manure *in situ*, wet seed treatment with carbendazim @ 1g/l of water, nursery protection with carbofuran @ 1 kg, application of cartap hydrochloride @ 8kg per acre, spraying of chlorantraniliprole @ 60 ml/acre 10 days before booting, spraying of propiconazole @ 1ml/lit twice at maximum tillering and panicle initiation was done in 5 locations of Bhadradi Kothagudem district of Telangana during *Kharif* 2018 and 2019. Later in addition technology refinement treatment *i.e.* spraying of validamycin 2ml/l twice at 15 days interval and trifloxystrobin + tebuconazole @ 0.4g/l was done during *Kharif* 2019. The disease incidence was least in technology refinement treatment *i.e.* 5.7 per cent during *Kharif* 2019. The cost benefit ratio (BC Ratio) was higher in technology assessment plots with 2.5:1 and 2.3:1 whereas BC ratio was lower comparatively in farmers practiced plots with 1.8: 1 and 1.9:1 in corresponding *Kharif* 2018 and 2019 respectively.

**Keywords:** *Sclerotium oryzae*, rice and fungicides

**Introduction**

Rice (*Oryza sativa* L.) is a staple food in many countries and food security to millions of population in the world and is one of the major food crops of India. Among the different emerging biotic stresses for rice production, stem rot of rice caused by *Sclerotium oryzae* is becoming a serious problem of rice cultivation in the Indian subcontinent<sup>[5]</sup>. Initially, it infects leaf sheath, followed by rotting of stem tissues and produce new sclerotia which release in soil at harvesting and cause infection to next season rice crop. Infection usually occurred at hollow internodes of stem<sup>[3]</sup>. Black angular lesions are produced just after tillering that causes the death of leaf sheath<sup>[6]</sup>. For management of this disease under field condition many reports are available which describes cultural and biological methods<sup>[11]</sup>.

Although, cultural and biological methods are environmentally safe, their use is limited only as protectants and are cannot be used under epidemic condition. Several fungicides such as Benomyl, Edifenphos, Thiophanate Methyl, Propiconazole have been found to be effective in reducing stem rot disease severity under field condition<sup>[5]</sup>. In this context, the present on farm trail was undertaken to manage the Stem Rot, *Sclerotium oryzae* in rice at Bhadradi Kothagudem district of Telangana.

**Materials and Methods**

The present study was undertaken at five locations in different farmers fields of Bhadradi Kothagudem Districts of Telangana. Treatment by spraying of carbendazim + mancozeb @ 2.5 gm/l after noticing the stem rot incidence (Farmer practice). Treatment by summer deep ploughing, green manure *in situ*, wet seed treatment with carbendazim @ 1g/l of water, nursery protection with carbofuran @ 1 kg, application of cartap hydrochloride @ 8kg per acre, spraying of chlorantraniliprole @ 60 ml/ac 10 days before booting, spraying of propiconazole @ 1ml/l twice at maximum tillering and panicle initiation (Technology Assessment) in paddy variety BPT 5204 during *Kharif* 2018 in plot size of 0.2 ha each in 5 locations of each treatment. Later in addition to the farmers practiced and technology assessment treatments, technology refinement treatment *i.e.* spraying of validamycin 2ml/l twice at 15 days interval and trifloxystrobin + tebuconazole @ 0.4g/l was added during *Kharif* 2019. The per cent disease incidence was calculated by randomly selecting 20 hill/plot and observing the damage symptoms visually. To find out the economic impact of treatments on stem rot incidence and paddy yield the cost benefit ratio was calculated.

## Results and Discussion

Results revealed that the incidence of the stem rot was lower in the fields assessed with summer deep ploughing, green manure *in situ*, wet seed treatment with carbendazim @ 1g/l of water, nursery protection with carbofuran @1 kg, application of cartap hydrochloride @8kg/ac, spraying of chlorantraniliprole @ 60 ml/ac 10 days before booting, spraying of propiconazole @1ml/l twice at maximum tillering and panicle initiation with diseases incidence of 5.9 and 6.4 in panicle stage during *Kharif* 2018 and *Kharif* 2019. The higher per cent of disease incidence was observed in farmer practices with 10.4 and 9.4 per cent in panicle stage during *Kharif* 2018 and *Kharif* 2019, respectively. The disease incidence was least in technology refinement treatment i.e. 5.7 per cent during *Kharif* 2019 (Table 1).

The yield was higher in technology assessment plots with 6617 (kg/ha) and 6993.7 (kg/ha) in *Kharif* 2018 and 2019, respectively whereas lower yield was recorded comparatively in farmers practiced plots with 6015 (kg/ha) and 6375 (kg/ha) in *Kharif* 2018 and 2019 respectively. The per cent of increase in technology assessment plot when compared with the farmers practiced plot was 9.1 and 9.7 in *Kharif* 2018 and 2019 respectively. The highest yield was recorded in technology refinement plot with 7044.3 (kg/ha) with 10.5 per cent increase in yield over farmers practice during *Kharif* 2019.

The net return was higher in technology assessment plots with Rs.64917/- and Rs.71500/- in *Kharif* 2018 and 2019, respectively whereas net return was lower comparatively in farmers practiced plots with Rs. 44793/- and Rs. 62993/- in *Kharif* 2018 and 2019, respectively. The highest net return was recorded in technology refinement plot with Rs. 77105.6 during *Kharif* 2019.

The benefit cost ratio (BC Ratio) was higher in technology assessment plots with 2.5: 1 and 2.3:1 in *Kharif* 2018 and 2019 respectively whereas benefit cost ratio (BC Ratio) was lower comparatively in farmers practiced plots with 1.8: 1 and 1.9:1 in *Kharif* 2018 and 2019 respectively. The BC ratio in technology refinement plot was 2.5:1 during *Kharif* 2019. Therefore it concluded that an on farm trail can be recommended further to Front Line Demonstration (FLD) in rice fields of Bhadradi Kothagudem district (Table 2).

It is evident from Table 3 that disease incidence in term of percentage and correlation coefficient between different weather parameters and per cent of incidence in assessment plots revealed that the maximum and minimum temperatures and rainfall was observed negative correlation in *Kharif* 2018 and *Kharif* 2019

Fungicides are most commonly used to reduce the economic losses caused by soil-borne diseases. Their ease of application and effectiveness has made them the most common mean to combat many fungal diseases [4]. The results are in concurrence with of previous publication where, fungicides application increases the yield of rice [1, 2, 10, 12, 13, 15 & 16]. The increased yield is mainly due to reduced disease severity of stem rot disease of rice. Propiconazole was found most promising and provided 47.5 per cent and 26.5 per cent reduction in disease incidence and severity, respectively along with 7.7 per cent increase in grain yield in [9] which is similar to present study. For successful management of rice stem rot disease under field condition fungicides and also the biological and cultural method are efficient under epidemic condition. Thus, in present situation cultural practices combined with seed treatment and foliar spray of fungicide is the most efficient and economical practice to manage the disease.

**Table 1:** Stem rot incidence in five locations during *Kharif* 2018 and *Kharif* 2019

Locations	1	2	3	4	5	Mean
<i>Kharif</i> 2018 (Farmers practiced plots)	10.2	9.1	11.3	12.5	9.6	10.4
<i>Kharif</i> 2018 (Technology Assessment)	5.2	6.3	7.8	6.4	5.7	5.9
<i>Kharif</i> 2019 (Farmers practiced plots)	9.1	8.2	10.7	11.2	7.9	9.4
<i>Kharif</i> 2019 (Technology Assessment)	6.2	6.3	7.2	6.8	5.5	6.4
<i>Kharif</i> 2019 (Technology Refinement)	5.1	5.9	6.8	5.7	5.2	5.7

**Table 2:** Economic impact of experiment during *Kharif* 2018 and *Kharif* 2019

	<i>Kharif</i> 2018		<i>Kharif</i> 2019		
	Farmers practiced plot	Technology Assessment plot	Farmers practiced plot	Technology Assessment plot	Technology Refinement plot
Yield (Kg/ha)	6015	6617	6375	6993.7	7044.3
Per cent increase over farmers practice	-	9.1	-	9.7	10.5
Net Return (Rs.)	44793	64917	62993	71500	77105.6
B:C ratio	1.8:1	2.5:1	1.9:1	2.3:1	2.5:1

**Table 3:** Correlation of weather parameters with stem rot incidence

Stem rot incidence	Correlation coefficient values (r)		
	Maximum temp. (°C)	Minimum temp. (°C)	Rainfall (mm)
<i>Kharif</i> 2018	-0.915	-0.556	-0.909
<i>Kharif</i> 2019	-0.502	-0.440	-0.748

## Conclusion

The lower per cent of disease incidence was observed in technology assessment plot with 5.9 and 6.4 per cent in panicle stage during *Kharif* 2018 and *Kharif* 2019, respectively. The disease incidence was least in technology refinement treatment i.e. 5.7 per cent during *Kharif* 2019.

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