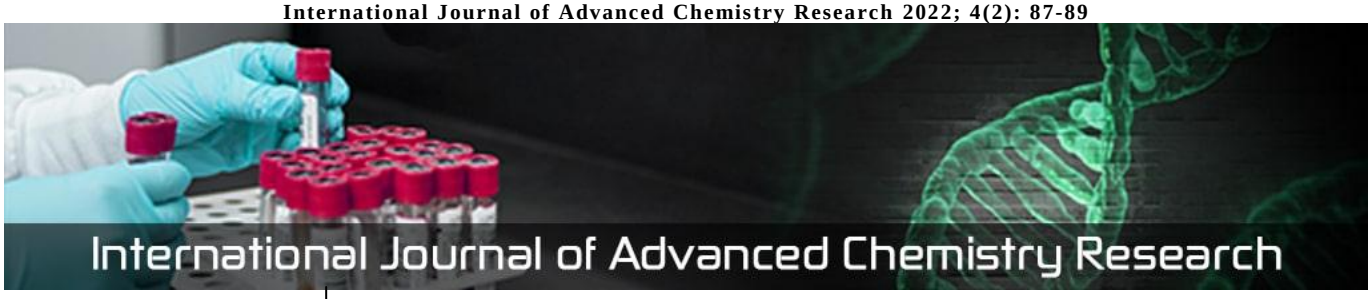

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Field evaluation of new molecules against sheath rot disease of rice caused by *Sarocladium oryzae*

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Abstract
Sheath rot disease of rice caused by *Sarocladium oryzae.* In this study, the 7 fungicides were tested against *S. oryzae*. The efficacy of fungicides on sheath rot was tested under field conditions. The Kresoxim- Methyl 40% + Hexaconazole 8% WG (Ayaan) found superior for reducing sheath rot disease intensity (18.15), gave highest grain yield (8840.00 kg ha^{-1}), highest test weight of grain (19.06 gm), and also increase the healthy grain (84.80%) and reduced the discoloured (9.20 %) and chaffy grain (6 %).

Keywords: Sheath rot, rice, chemical control, *Sarocladium oryzae*, fungicides

Introduction
Rice (*Oryza Sativa* L.) is the most important crop and feeding more than half of the world's population. More than 90% of the world's rice is cultivated and eaten in Asia and more than 60% of the world's populations were depend on rice for their half of the calories intake. Rice is cultivated in over a hundred countries, covering a total area of 167 million hectares land and yielding over 755.47 million tones (FAO 2021) [3]. In India West Bengal, Uttar Pradesh, Punjab, Bihar, Tamil Nadu, Madhya Pradesh and Chhattisgarh are the major rice growing states.

The Chhattisgarh state is known as "Rice bowl of India" because maximum area covered under rice during kharif and contribute major share in national rice production. Rice is widely cultivated as a primary food crop in the plane, hill, and plateau regions of Chhattisgarh. From Chhattisgarh region several diseases have been reported on rice, including bacterial blight, blast, sheath blight, and sheath rot, which are the most serious for this state, resulting in significant economic output losses.

Sheath rot of rice, caused by *sarocladium oryzae*, is becoming a major disease due to its widespread occurrence in almost every rice- growing region of the world, including India (Ready and Gosh, 1985) [9]. The yield reduction ranged from 9.6% to 85% depending on the environmental conditions during the growing season of the crop (Phookan and Hazarika, 1992) [7]. For the first time, Agnihotrudu (1973) [1] reported this sickness for the 1st time in India, and other after, several workers reported this from different section of the country (Ghuffran *et. al*, 1980) [5].

The sheath rot infected plant exhibits a variety of symptoms, i.e. sheath rot, grain discoloration, unfilled grain, sterile or unfilled all grains in the panicles, and even panicle abortion. Among these; grain discoloration is major one. It is resulted in a decrease in 1000 grain weight, and low grain filling, seed germination and causes yield losses hence, the present study was undertaken to find out the effective available against the desease.

Materials and Methods
Field evaluation of new molecules against sheath rot disease of rice caused by *Sarocladium oryzea.*

Field experiment were carried out (during kharif season 2020-21) at the Plant Pathological Experimental Site, IGKV, Raipur (Chhattisgarh), India. Susceptible rice cultivar Swarna was used. There were 8 treatments *i.e* Azoxystrobin 18.2 w/w + Difenoconazole 11.4 w/w SC, Rallis-Ril 243/CF (50% WG), Kresoxim- Methyl 40% + Hexaconazole 8% WG (Ayaan), Tebuconazole 50% + Trifloxystrobin 25% WG (Nativo), Thifluzamide 24% SC, Epic

(Hexaconazole 75% WG), Contof (Hexaconazole 5%) including untreated (Control) for each replication.

At the early booting stage, 20 healthy boots were inoculated with half cooked rice grains covered with spore and vegetative mycelium of the test fungus using the insertion placement method. After six days of inoculation the 1st spray of each treatment was given, on the tenth day after the 1st spray, second spray was applied. The disease severity was recorded at twenty one days after the inoculation of the disease, crop in 0 to 9 scales by following the procedure of Standard Evolution System of International Rice Testing Program (IRRI, 1988). For the observation, 20 panicles were chosen at random from each treatment plot. At crop maturity, observation for disease intensity, percent disease over control, yield kg/ ha, and 1000 seed weight were also recorded for each treatment at maturity of the crop.

The numerical values were further used for calculating the PDI (Percent Disease Index) using the formula:

$$PDI = \frac{\text{Sum of individual rating}}{\text{No. of tiller examiined}} \times \frac{100}{\text{Maximum disease rating}}$$

Result and Discussion

Data revealed (Table no. 4.13) that all fungicidal sprays significantly reduced sheath rot intensity, percent healthy, discolored and chaffy grain and increased yield in comparison to untreated control. At 21th day of inoculation and after second spray, all fungicides significantly reduced the disease intensity over control. Among the tested fungicides, the Kresoxim- Methyl 40% + Hexaconazole 8% WG (Ayaan) treatment was highly effective in reducing the disease intensity of sheath rot (18.15%) and recorded 75.61 percent decrease of the disease over control followed by Rallis-Ril 243/CF (50% WG) treatment was effective in reducing the disease intensity of sheath rot (25.00%) and recorded 66.58 percent decrease of the disease over control, Epic (Hexaconazole 75% WG) treatment was effective in reducing the disease intensity of sheath rot 30.00 and recorded 59.88 percent decrease of the disease over control, Contof (Hexaconazole 5%), Tebuconazole 50% + Trifloxystrobin 25% WG (Nativo) (Azoxystrobin 18.2 w/w + Difenoconazole 11.4 w/w SC, treatment was effective in reducing the disease intensity of sheath rot 30.37, 33.33 and 34.07and recorded 59.16, 55.24 and 54.44 percent decrease of the disease over control). While Thifluzamide 24% SC (Pulsar) was recorded least effective in comparison to other fungicides with 48.89 percent disease intensity and recorded 34.30 percent decrease of the disease over untreated control.

Table 1: Efficacy of new chemicals against sheath rot intensity of rice.

	Treatments	Dosage/ Liter of water	Disease Intensity % # 21 DAI**	Percent decrease over control	Grain yield (kg ha^{-1})	Test weight (gm)
T1	Azoxystrobin 18.2 w/w + Difenoconazole 11.4 w/w SC	1.125 ml/l	34.07 (35.71)	54.44	7810.00	16.71
T2	Rallis-Ril 243/CF (50% WG)	1.5 g	25.00 (30.00)	66.58	8513.33	18.51
T3	Kresoxim- Methyl 40% + Hexaconazole 8% WG (Ayaan)	1.5 g	18.15 (25.22)	75.61	8840.00	19.06
T4	Tebuconazole 50% + Trifloxystrobin 25% WG (Nativo)	0.4 g	33.33 (35.26)	55.24	8146.67	17.21
T5	Thifluzamide 24% SC (Pulsar)	1.125 ml	48.89 (44.36)	34.30	7760.00	18.19
T6	Epic (Hexaconazole 75% WG)	0.22 g	30.00 (33.21)	59.88	8196.67	17.44
T7	Contof (Hexaconazole 5%)	2.0 ml	30.37 (33.44)	59.16	8513.33	18.18
T8	Control (Untreated)	-	75.00 (60.00)	0.00	7202.00	16.06
S.E(m) ±			1.86	2.03	5.86	1.18
CD 5%			5.45	5.94	17.15	3.46
CV			8.76%	6.95%	0.13%	11.58%

Average of three replications.

** Figure in parenthesis show Arcsine transformation

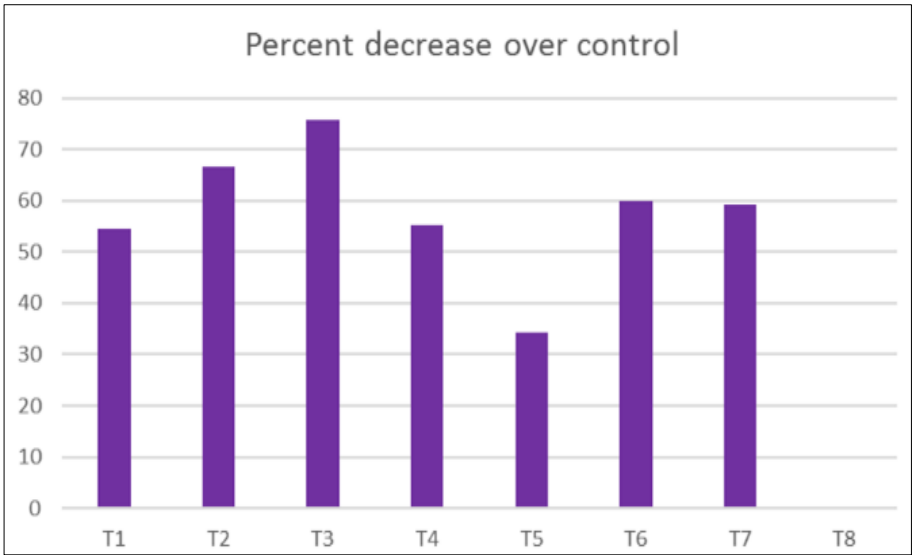

Fig 1: Efficacy of the fungicides for the control of sheath rot of rice

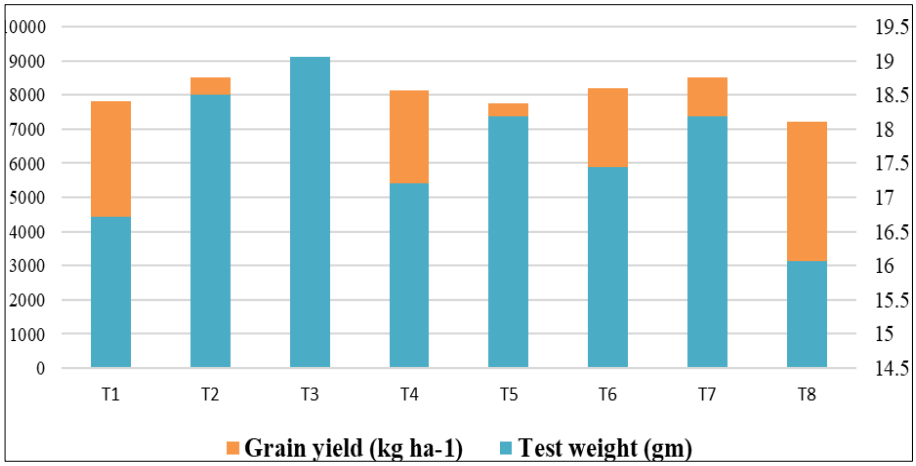

Fig 2: Efficacy of the new fungicides on grain yield and test weigh

Conclusion

In the field, study the evaluation of new molecules for sheath rot and yield of rice. The Kresoxim- Methyl 40% + Hexaconazole 8% WG (Ayaan) found superior for reducing sheath rot disease intensity (18.15), gave highest grain yield (8840.00 kg ha^{-1}) and test weight of grain (19.06 gm) whereas, Thifluzamide 24% SC (Pulsar) was recorded least effective in comparison to other molecules with disease intensity over untreated control.

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