

## THE YIELD DETERIORATION OF RICE AFTER ARTIFICIAL INOCULATION WITH COLLAR ROT FUNGI

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Rice is a staple food for about half the population of the globe. Such important crop is often damaged by different varieties of micro organisms. Collar rot fungi, *Ascochyta oryzae*, *Pestalotiopsis versicolor* (Spec) *Chaetomium globosum* etc. are the few microorganisms which bring about considerable damages to this crop. When artificial inoculation was made with *P. versicolor* and *C. globosum* to three varieties of rice considerable reduction in yield was recorded.

**Keywords :** *Chaetomium globosum*; Collar rot of rice; *Pestalotiopsis versicolor*.

The works on collar rot disease of rice are mostly confined to Japan, Thailand, Malay and South East Asia. The organisms actively involved in this type of rice disease were well recorded in the scientific literature contributed by several oriental scientists and researchers. Only four species of *Ascochyta* belonging to the family *Spaeropsidaceae* are identified by these researchers. Two new types of fungi, viz. *Pestalotiopsis versicolor* (Speg) and *Chaetomium globosum* belonging to the family *Melanconiaceae* and *Chaetomiaceae* respectively, were discovered by the author for the first time in Manipur, India<sup>1</sup>. The authors made investigation on fungi associated with collar rot of rice in different parts of Manipur, Hills and Valleys.

Three rice cultivars, viz. K D 2-6-3, Taichung and China dwarf were selected for the work since, the 3 rice cultivars are susceptible to the collar rot disease and important high yielding varieties. During October-November, 2001 and 2002 critical disease surveys were conducted at several rice growing areas in the 5 districts of Manipur. Young or old rice leaves showing typical collar rot symptoms were collected from these districts and brought to the laboratory of the Plant Pathology, CAU, for isolation. Isolation was made by cutting into small bits from the diseased areas. The bits were surface sterilized with 1 percent sodium hypochlorite solution for 2-3 minutes, rinsed in sterile distilled water once, and planted on Potato Dextrose Agar. The inoculated dishes were incubated at 25± 1°C. The fungal culture was purified by hyphal tip culture and maintained on PDA slants by subculturing from time to time<sup>2,3</sup>. The three rice cultivars grown in pots were inoculated with a single fungal plug of *P. versicolor* and *C. globosum* separately by placing the mycelial plug on the collar region of rice plant. In the first category the mycelial fragments were prepared following the methods of Singh<sup>1</sup>. The mycelial suspension was placed on the collar region with the help of sterilized

plastic dropper bottle. In the second category the mycelial plug was inoculated on the first collar, on the first and second collar and on the first, second and third collar of the rice cultivar. Each of the entire inoculated collar was wrapped with a perforated polythene bag to maintain higher humidity inside for 24 hours. Each treatment was replicated 3 times. The uninoculated rice plant, KD 2-6-3 was taken as control in the two types of experiments. In the second category of the experiment the booting stage of the rice, the KD 2-6-3, only was taken into consideration, while in the 1<sup>st</sup> category of the experiment two stages like, tillering and booting of the 3 rice cultivars mentioned above were taken into consideration.

In the experiment of the 1<sup>st</sup> category it was observed that the inoculation made in the tillering stage of the KD 2-6-3, the severity of the disease was found to be 100% in the case of the collar rot fungus, *P. versicolor* and 75% in the case of *C. globosum*. In case of inoculation made in the booting stage of the rice cultivar KD 2-6-3 the severity of the disease was found 97% in *P. versicolor* infected plant and 60% in *C. globosum*. Whereas in the case of rice cultivar Taichung the severity of disease inoculated in the tillering stage is 100% with *P. versicolor* and 80% with *C. globosum*. In the booting stage inoculation the severity of the disease infected with *P. versicolor* was 90% and 32% with *C. globosum*.

The severity of the disease caused by the *P. versicolor* when inoculated in the tillering stage of rice cultivar, China dwarf, was found to be 100% and 81% with *C. globosum*. However, the severity of the disease inoculated with *P. versicolor* in the booting stage was found to be 95% and 36% with *C. globosum* (Table 1). The grain yield in gram in the case of rice cultivar, KD 2-6-3, inoculated with *P. versicolor* during tillering stage was found to be zero, while in the case of *C. globosum* it was 22.2. The findings are very much fluctuated when the same rice cultivar was inoculated with *P. versicolor* during



**Table 1.** Effect of artificial inoculation of Collar Rot fungi on rice yield.

S.No	Variety	Stage of inoculation				Severity of disease (%)				Yield			
		Tillering Stage		Boot Stage		A		B		1000 grains (g)			
		Pv	Cg	Pv	Cg	Pv	Cg	Pv	Cg	Pv	Cg	Pv	Cg
1.	K D 2-6-3	25	25	25	25	100	75	97	60	0	22.2	20.43	21.69
	Control	25	25	25	25	0	0	0	0	28.5	28.5	30.50	30.50
2.	Taichung	25	25	25	25	100	80	90	32	0	15.6	13.30	16.00
	Control	25	25	25	25	0	0	0	0	23.7	23.7	24.00	24.00
3.	China dwarf	25	25	25	25	100	81	95	36	0	20.1	17.00	19.4
	Control	25	25	25	25	0	0	0	0	25.5	25.5	27.50	27.50

Pv = *Pestalotiopsis versicolor*Cg = *Chaetomium globosum***Table 2.** Effect of First Collar, First and Second and First, Second and Third Affected Collars when inoculated with either *P. versicolor* or *C. globosum* on rice yield.

S.No.	Pathogen	Rice variety	Stage	Inoculation No. of collar	Weight 1000 grains (g <sup>o</sup> )	Yield Kg/ha	Yield Reduction (%)
1.	<i>P. versicolor</i>	K D 2-6-3	Booting	1 collar affected	21.74	5286.2	24.82
				2 collar affected	20.65	4901.5	30.00
				3 collar affected	19.95	4635.0	34.07
2.	<i>C. globosum</i>	KD 2-6-3	Booting	1 collar affected	22.54	5396.3	23.25
				2 collar affected	21.98	4985.0	29.00
				3 collar affected	21.00	4701.5	33.13
3.		KD 2-6-3		Control		7031.0	

o Average of 3 replications.

the booting stage of the plant. It was observed that the grain yield when inoculated at tillering stage in the rice cultivar, Taichung, with *P. versicolor* it was found to be zero, while in the case of *C. globosum* it was 15.6. When inoculated in the booting stage of the same rice cultivar with *P. versicolor* the grain yield was 13.3 while in *C. globosum* it was 16.00. In the case of rice cultivar, China dwarf, the grain yield in gram inoculated at tillering stage with *P. versicolor* was zero and 20.1 inoculated with *C. globosum*. When inoculated with *P. versicolor* at booting stage the grain yield was 17.00 while in the case of *C. globosum* the grain yield was found to be 19.4. The grain yield in terms of kg/ha in the rice cultivar, KD 2-6-3, when inoculated with *P. versicolor* at booting stage with 3

different methods of inoculation viz, 1<sup>st</sup> collar, 1<sup>st</sup> & 2<sup>nd</sup> collar and 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> collar, are respectively 5286.2 kg, 4901.5 kg and 4635 kg. While the grain weights per 1000 were 21.74 gm, 20.65 gm and 19.95 gm respectively.

The grain yields in terms of kg/ha when inoculated to the same rice cultivar with *C. globosum* at the booting stage were 5396.3 kg, 4985.0 kg and 4701.5 kg respectively while the grain weights per 1000 with the same treatment were 22.54 g, 21.98g and 21.00g respectively (Table 2).

From the findings indicated above it is very clear that the yield of the rice cultivars, treated with the collar fungi under different inoculation treatments, reduced considerably. Similar findings are observed in the earlier works<sup>4-6</sup>. From these findings it may be inferred that the collar rot disease caused by *P. versicolor* and *C. globosum*

may bring considerable damage to the rice plant by disturbing the physiological processes thereby bringing reduction in yield. Hence, certain measures are to be taken up to eradicate these pathogens from the paddy fields.

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