

# A Comparative Study of the Commercially Available Fungicides to Control Sheath Blight of Rice in Lahore

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## Abstract

A comparative study of commercially available fungicides (Cordate, Precurecombi, Curon, Bendict, Nativo, Valedamycin and Tilt) was made to find out the best fungicide against sheath blight fungi (*Rhizoctoniasolani*). Experimental field was divided into nine treatment units (T1, T2, T3, T4, T5, T6, T7, T8 and T9) and each unit was treated with each fungicide and data was collected on the basis of different agronomic traits such as number of tillers per hill, number of grains per spike, 1000 grain weight, disease incidence and yield of crop. As a result fungicides Nativo and Tilt were proved to be best control for sheath blight of rice.

**Keywords:** Sheath blight of rice; *Rhizoctonia solani*; Rice; Chemical control

## Introduction

Rice (*Oryza sativa* L.), a member of the family Graminae is widely grown in tropical and subtropical regions [1]. Approximately 90% of the world's rice is grown in the Asian continent and constitutes a staple food for 2.7 billion people worldwide [2]. In Pakistan it is the second most important staple food after wheat (*Triticum aestivum*) and is also one of the main export items of the country. During 2005-2006 the crop was grown over an area of 2621.4 thousands hectares with 5547.2 thousands tones production [3]. Pakistan is on the fourth number among rice exporting countries. The Punjab province produces 69% of the total rice production of the country. Area under cultivation of rice is getting decreased due to urbanization and now it is requirement of time to improve cultivation practices along with plant protection practices.

Sheath blight, caused by *Rhizoctonia solani* Kühn, is one of the most destructive rice (*Oryza sativa* L.) diseases worldwide [4]. Asexual stage of *R. solani* belonging to Fungi imperfecti, hyphomycetes, Agonomycetales was called *R. solani* while sexual stage belonging to Basidiomycota, hymenomycetes, homobasidiomycetida, Tulasnellale was called *Thanatephorus cucumeris*. Sclerotium stage belongs to *Rhizoctonia*, Tulasnellaceae, and *Thanatephorus*. *R. solani* is one type of filamentous fungi. It is pathogenic to economically important crops such as rice, wheat, maize, cotton, potato, bean, vegetables and grasses [5-10]. This fungus is responsible for the root rot, stem-foot rot as well as seedling blight [11,12].

In occurrence fields, rice yield usually reduced by 10-30%, even up to 50%, owing to this disease [13]. Sheath blight often prevails in rice field with high plant density and high application rate of nitrogen fertilizer. Besides, with the extension of semidwarf, high-yielding, and multitiller cultivars, this disease has been aggravated in recent years, and becomes the most important disease in rice regions [14,15].

Following field trials were made to evaluate the commercially available best fungicide with potential to control sheath blight of rice and later on transfer this information to farmer level in order to get maximum yield of the crop.

## Materials and Methods

### Identification of infected field

A field of rice variety KSK-133 was identified as infected with sheath blight at Tattly Malian, Lahore. Field was identified on the basis of visual symptoms on the standing crop plants. Photography was done in order to keep the records of visual symptoms. Samples of infected plants were also collected for the microscopic authentication of pathogenic fungal organism (Plate 1).

### Pathogen verification

Infected samples were brought to the laboratory of Institute of Agricultural Sciences, University of the Punjab, Lahore. These samples were surface sterilized and inoculated on the Malt Extract Agar (MEA) and Potato Dextrose Agar (PDA) medium containing petriplates. Plates were then incubated at 27°C for four days. After the germination of mycelia growth the slides were prepared and organism was identified by means of several morphological features as well as identification manuals and keys.

### Experimental design

Field trial was conducted during the rice crop of year 2012. Experiment was laid out in randomized complete block design with 4 blocks and 9 treatments. Area under experiment was 2 acre.

### Pretreatment data

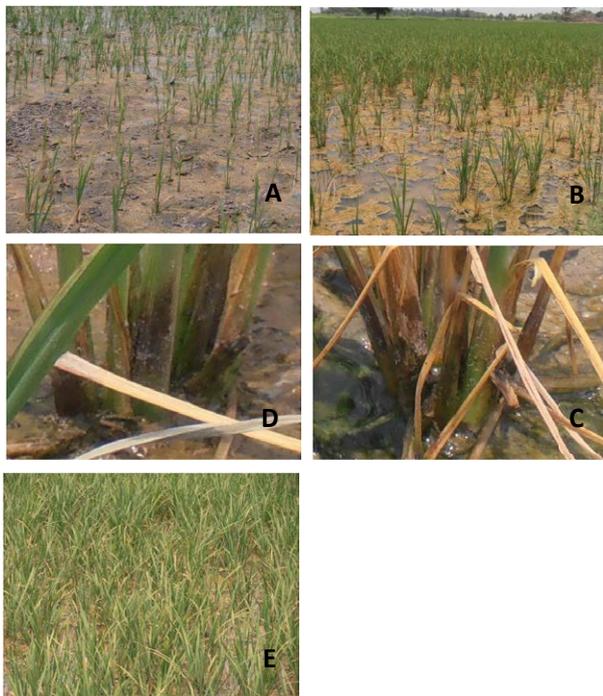
Before treatment of fungicide in the field the disease incidence in the field was scattered and was evaluated by means of following formula (Table 1):

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**A&B:** Rice field infected with sheath blight. **C&D:** Infected root zone of the diseased plants. **E:** Best recovered unit after treatment

**Plate 1:** Pictorial presentation of the experiment.

S. No	Observations	T1	T2	T3	T4	T5	T6	T7	T8	T9
1	Av. No of tillers per hill	4	5	7	9	12	8	11	9	4
2	Av. No of grains	85	95	90	110	126	100	117	100	75
3	1000 grain weight (gm)	22	26	28	33	31	25	29	23	22
4	Disease incidence (%)	65	58	45	40	38	65	62	58	55

**Table 1:** Pretreatment data in each of the selected blocks.

$$\text{Disease incidence} = \frac{\text{Number of infected plants}}{\text{Total Number of plants visited}} \times 100$$

Along with the disease incidence the following crop parameters were also observed and recorded for each plot.

- Average number of tillers per hill
- Average number of grains per spike
- 1000 grains weight
- Disease incidence

### Fungicide treatment

The fungicidal treatment was given to each infected plot in order to evaluate the comparative potential of each fungicide to control the sheath blight (Table 2).

## Results and Discussion

### Pathogen identification

Pathogenic fungi was isolated at the Institute of Agricultural

Sciences, University of the Punjab, Lahore. Pathogen was identified as *Rhizoctoniasolani*.

### Disease incidence

Disease incidence before treatment of fungicide in the field was infested highly with disease. Disease incidence after treatment of fungicides, the observation collected about disease in the field in response to fungicide application was as follows:

The best control against sheath blight was found in T5 and T7, T4 (Figure 1) stood at second number while T3, T6 and T8 results were almost same in controlling the disease and T2 and T1 gave less control along with no control of disease in the experimental unit of T9.

### Number of tillers per hill

The average number of tillers were calculated after treatment of fungicides in the field were as follows: Maximum number of tillers were found in T5 along with T4 and T7 while other treatment gave average number of tillers, minimum number of tillers were found in T9.

### Number of grains per spike

Maximum average number of grains per spike were observed in T5, T4, and T7 respectively. T3, T6 and T2 gave medium number of grains per spike, minimum number of grains were found in T9.

### 1000 grain weight in grams

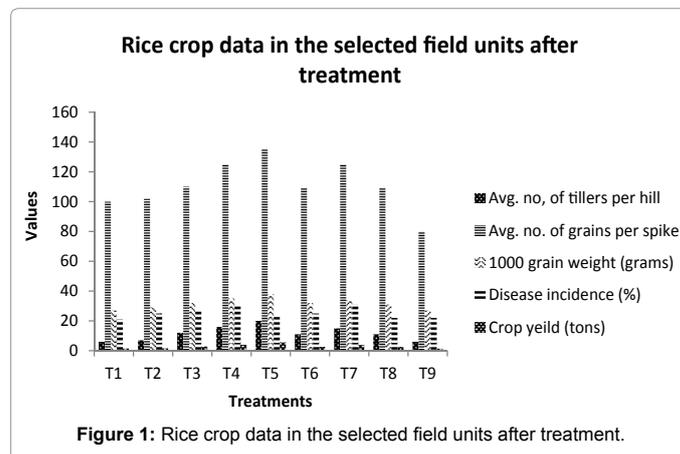
1000 grains were collected from the spikes of each experimental units and their weight was recorded in grams and it is given in table (Table 2 and Figure 1).

### Yield of crop

Yield of rice crop was recorded and explained in table. The best results were found in T5 (Table 3).

Treatments	Name of fungicide	Dose per Acre
T1	Cordate	75 gm
T2	Precurecombi	62.5 gm
T3	Curon	50 ml
T4	Bandict	62.5 ml
T5	Nativo	15 gm
T6	Valedamycin	25 ml
T7	Tilt	50 ml
T8	Curon (Flooding)	100 ml
T9	Control	

**Table 2:** Treatment details of each infected plot.



**Figure 1:** Rice crop data in the selected field units after treatment.

S.no	Observations	T1	T2	T3	T4	T5	T6	T7	T8	T9
1	Av. No of tillers per hill	6	7	12	16	20	11	15	11	6
2	Av. No of grains	100	102	110	125	135	109	125	109	80
3	1000 grain weight (gm)	27	29	32	35	38	32	34	31	27
4	Disease incidence (%)	21	25	27	30	23	25	31	22	22
5	Crop Yield (Kg)	1439	1594	2838	3930	5462	2577	3793	2503	1360

Table 3: Rice crop data in the selected field units after treatment.

## Conclusion

Sheath blight of rice is one of the most devastating diseases of rice. In Punjab, Pakistan the losses due to this infection varies from 30 to 50 %. Nativo was found to be the best fungicide used against sheath blight of rice. Benomyl was reported to be mostly used for this disease but Nativo is another new addition to the group of fungicides used to control sheath blight of rice. In the recent research work Nativo, Bandict and Tilt have shown better result in the field against this disease. These pesticides have improved the agronomic features of the rice crop such as Average number of tillers per hill, Average number of grains, weight of 1000 grains in grams, disease incidence and crop yield. These pesticides was also recommended to local farmers to be applied for sheath blight of rice and the results were quite satisfactory. The economics of the recommended pesticides was also evaluated and found that Nativo require only 350 ml/ha, Bandict 520 ml/ha and Tilt 550 ml/ha. Whereas the required concentration of rest of the pesticides lies in the range of 1000ml/ha. The cost of Nativo, Bandict and tilt is 350, 300, 430 respectively which is very economical for the local farmer. Cordate is an old fungicide which is used in rice canopy and causes resistance in pathogen. Hence it is time to replace the old fungicides with new and alternate fungicides especially in a monocropping system like rice.

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