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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: Sheat 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 (Ezuka&Kaku, 2000). Approximately 90% of the world's rice is grown in the Asian continent and constitutes a staple food for 2.7 billion people worldwide (Salim*et al*., 2003). In Pakistan it is the second most important staple food after wheat 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 (Anon.,2006). 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 *Rhizoctoniasolani*Kühn, is one of the most destructive rice (*Oryzasativar*L.) diseases worldwide (Willocquet et al., 2000). 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 (Xiao et al., 2008;Huang et al., 2004; Tan and Hao, 2007; Yang et al., 2005; He et al., 2010; Shi et al., 2007). This fungus is responsible for the root rot, stem-foot rot as well as seedling blight. (Hu et al., 2010; Achmadi et al., 2001).

In occurrence fields, rice yield usually reduced by 10–30%, even up to 50%, owing to this disease (Slaton et al., 2003). 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 (Li et al., 2009).

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

1. **Identification of infected field**
   A field of rice variety KSK-133 was identified as infected with sheath blight at Tatlly 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.
2. **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^{o}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.
3. **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.

4. Pre treatment data

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

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

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

a. Average number of tillers per hill
b. Average number of grains per spike
c. 1000 grains weight
d. Disease incidence

5. 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).

6. 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 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 3, Fig 1)

Yield of crop

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

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Table 1: Pretreatment data in each of the selected blocks

Sr #	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	1OO	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 2: Treatment details of each infected plot

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

Sr #	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

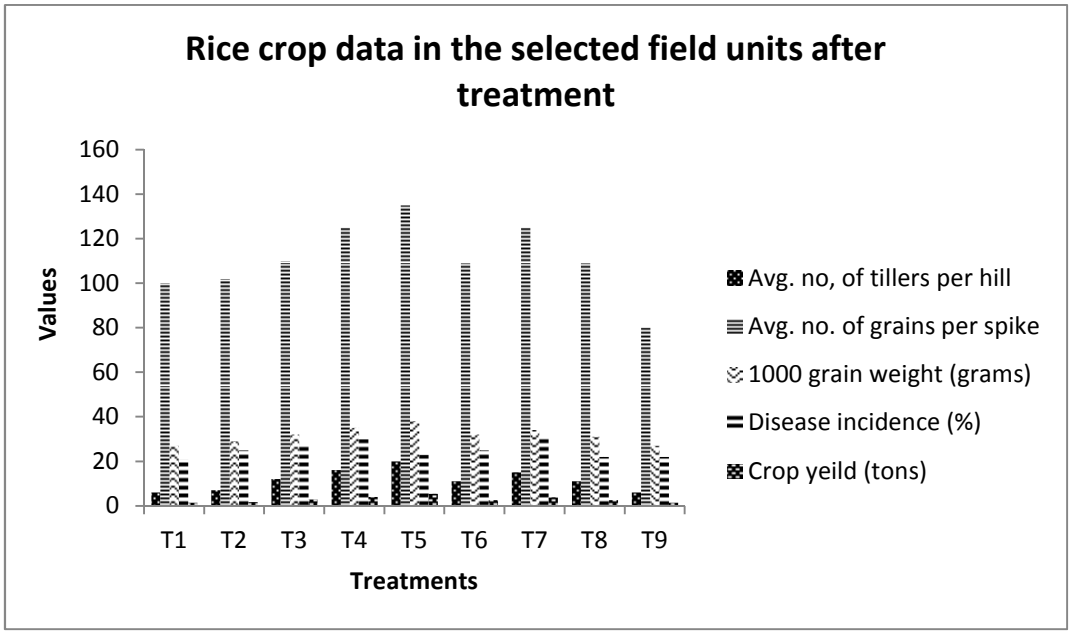
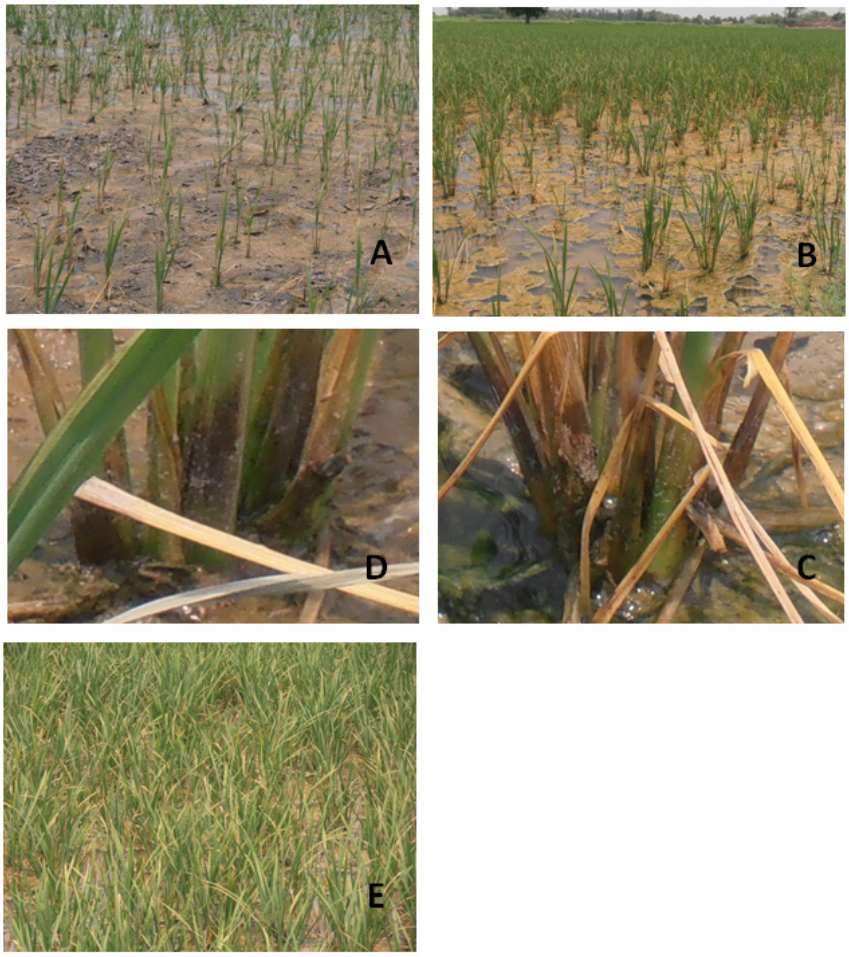


Plate 1: Pictorial presentation of the experiment



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

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