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INCIDENCE OF BACTERIAL LEAF BLIGHT ON RICE YIELD IN NATURAL CONDITION IN BIHAR

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ABSTRACT:

To study the effect of bacterial leaf blight on rice (*Xanthomonas oryzae* pv *oryzae*) yield in natural condition were conducted at the Agriculture Research Institute, Patna during the two consecutive years 2013 and 2014. Results were analyzed in both constitutive years with respect of four different plantation dates i.e., 9th June, 19th June, 29th June and 9th July. The response of earliest date of sowing, i.e., T1 (Control) and the corresponding date of disease confirmed (30th June) was found most effective, having least disease development (score 4.1) and highest grain yield (28.8 Q/ha), which was followed by the T2 having confirmed BLB (10th July) with slight higher disease intensity (score 5.4) and less grain yield (26.8 Q/ha). The most harmful condition was observed in T4 with heavy intensity of disease (score 8.0) and least grain production (22.4 Q/ha). It was revealed from the experimental findings that delay in sowing and the development of BLB disease and considerable reduction in yield. The intensity of the disease increased gradually in field as the plant grows older. Maximum disease development was favored on matured crop plants having the range of temperature 30.1°C to 33.1°C, relative humidity 79.1-91.2 % without rainfall. Disease intensity was observed in almost linear relation with the increase in temperature in both the years of experimentation.

Key words: Xanthomonas oryzae pv oryzae, Rice (Oryza sativa), Disease, Agriculture Research Institute (ARI) and Bacterial Leaf Blight (BLB)

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INTRODUCTION:

Rice is the most important food crop of India covering about one-fourth of the to-

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tal cropped area and providing food to about half of the Indian population. Rice occupies about 24 per cent of gross cropped area of the country. It contributes 42 per cent of total food grain production and 45 per cent of total cereal production of the country. This is the staple food of the people living in the eastern and the southern parts of the country, particularly in the areas having over 150 cm annual rainfall. There are about 10,000 varieties of rice in the world out of which about 4,000 are grown in India.

Bacteria is a common inhabitant of normal crop soil and its diversity and population fluctuates with different seasons (Shrivastava et.al., 2014). Bacterial leaf blight (BLB) caused by Xanthomonas oryzae pv. Oryzae is one of the most destructive diseases of rice. It is a systemic disease and may cause an average of 20-30% yield loss (Ou, 1985). In the tropics, depending on the severity of infection, the loss may be as high as 60-70% (Ou, 1973). Srivasta and Kapoor reported 6-37% yield loss against 1-9 infection grades in India. It is a wide spread disease in the tropics and sub-tropics (Mew 1989, Ezuka, 2000). It is found in most irrigated, rainfed and tropical rice growing areas, including all Asian countries, West Africa, Australia, South America and the Caribbean (Mew *et al.*, 1982, Mew 1987). Bacterial blight appears on leaves of young plants, as pale-green to grey-green water-soak streaks near the leaf tip and margins. These lesions coalesce and become yellowish-white with wavy edges. Eventually, the whole leaf may become whitish or grayish and then dies. Leaf 3+sheaths and culms of highly susceptible cultivars may also be attacked. Systemic infection, known as kresek (Reddy, 1984), results in desiccation of leaves and death, particularly of young transplanted plants. In older plants, the leaves become yellow and then die. Blight of rice affect filling of the grains and emergence of panicles, about 28-30% yield reduction was observed in susceptible cultivars (Shahjahan *et al.*, 1991).

There are several reports that indicate that delayed sowing has altered qualitative as well as quantitative traits of a crop. The present study was, therefore, undertaken to study the effect of date of sowing & transplanting on the intensity of bacterial leaf blight disease and grain yield of rice.

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MATERIALS AND METHODS:

To know the effect on rice yield in development of Bacterial leaf blight disease as day progress under natural condition. Field trials were conducted at the Agriculture Research Institute farm, Patna for two consecutive years 2012 and 2013 with the test variety Nata Mahsuri (MTU 7029) in five replications, in a Randomized Block Design System having Net plot size 9m2 with the row to row space of 23cms. The field was seeded @ 30 kg/ha. Fertilizers applied @ 120:60:30 kg/ha NPK. The experiment was designed in four different sets of different plantation batches as T1 (Control), T2, T3, T4 were different plant groups sown in four different dates including the months of June and July. Normal agronomical practices, recommended for irrigated conditions were followed. Final disease severity was recorded at grain setting stage of the crop using 0-9 scale and the yield after the harvest. In order to ascertain the influence of weather factors on disease development, necessary observations were taken and the data was recorded at weekly intervals till maturity of the crop.

RESULTS AND DISCUSSION:

An experiment was conducted for two consecutive years (2012 and 2013) and data were summarized in Table 1 and depicted in Figure 1. In Table 1 it was observed that the different dates of sowing had significant effect on the disease severity in the first year as well as the second year of experimentation. The pooled analysis of the two years data indicates that dates of sowing had significant effect on the disease development which increased gradually with the delay in sowing. The different dates of sowing having change in climatic conditions has impact on bacterial leaf blight incidence and rice yield (Rafi *et. al.,* 2013). The minimum disease intensity & maximum yield was obtained in plot sown on the 9th June, closely followed by 19th June sowing. The maximum disease and minimum yield was obtained in the plots soned in the plots sown on 9th July.

Observations in respect to disease development in affected plots were recorded during 2012-13 and 2013-14 rice crop season to find out the effects of weather factors viz; temperature, relative humidity and rainfall on the disease development and

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Table 1: Incidence of Bacterial Leaf Blight on rice yield in natural condition

Test Group	BLB establized	*Average disease intensity (Scale 0-9)			*Grain yield (Q/ha)		
		2012-2013	2013-2014	Mean	2012-2013	2013-2014	Mean
T1	30 June	3.9	4.2	4.1	29.8	27.7	28.8
T2	10 July	5.7	5.0	5.4	26.5	27.1	26.8
T3	20 July	7.4	6.7	7.1	25.0	25.6	25.3
T4	30 July	8.2	7.8	8.0	21.7	23.2	22.4
SEm(±)		0.2	0.2	0.2	0.8	0.9	0.8
CD at 5%		0.7	0.5	0.6	2.4	2.7	2.6

* Average of five replications

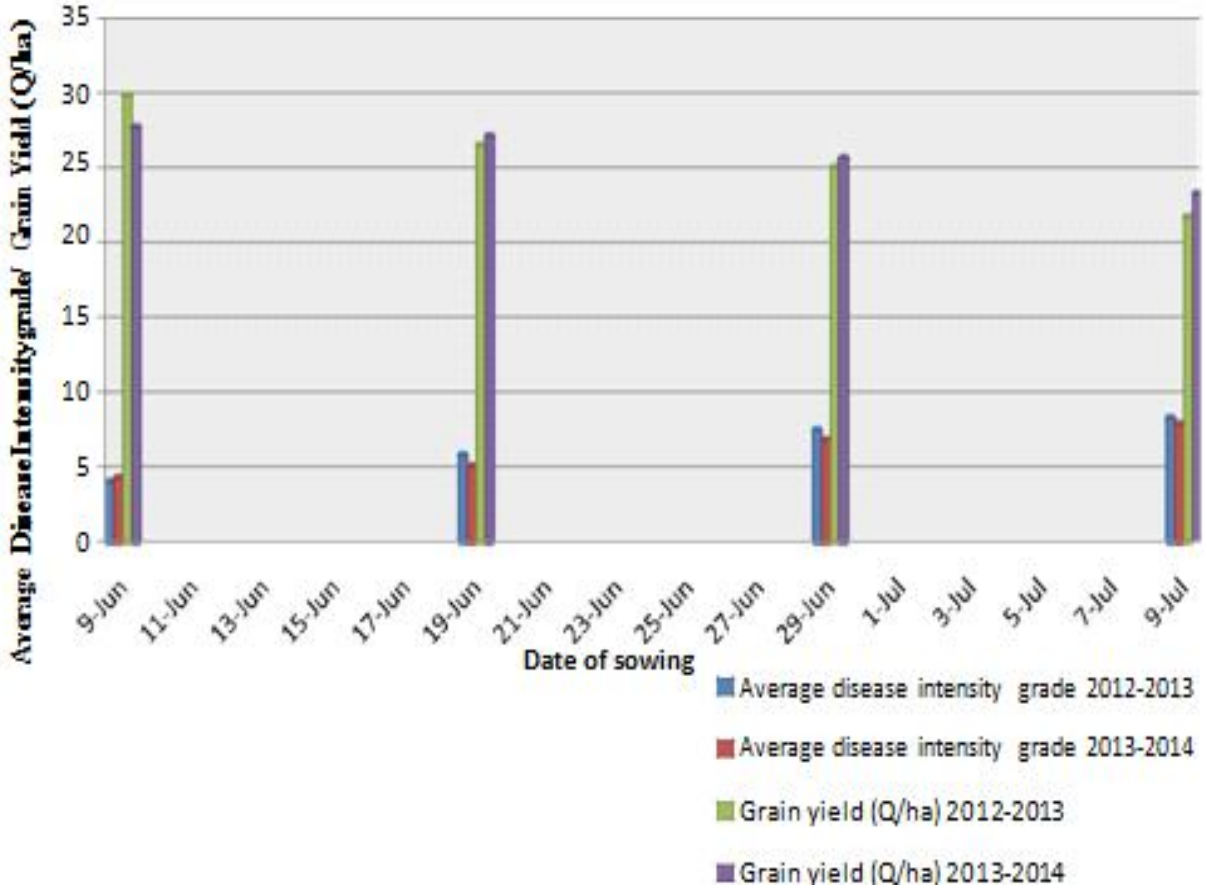

Figure 1: Effect of date of sowing & transplanting on the intensity of BLB disease & grain yield of rice

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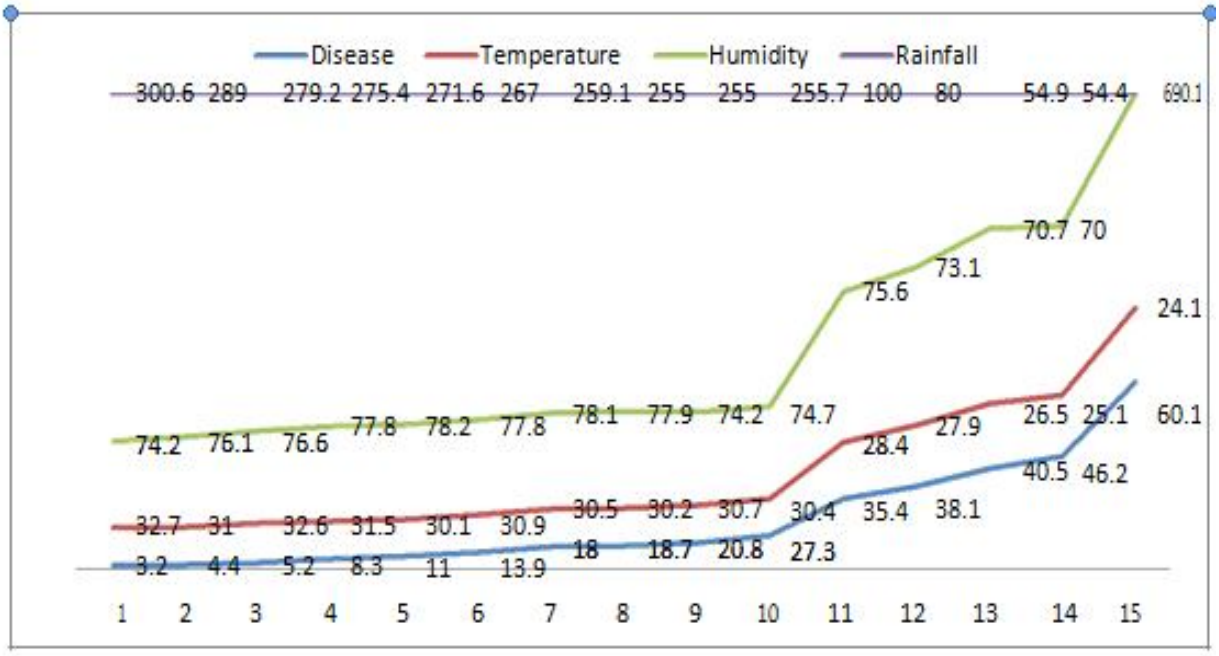

Figure 2: Studies of correlation of weather parameters to BLB disease development (2012-2013)

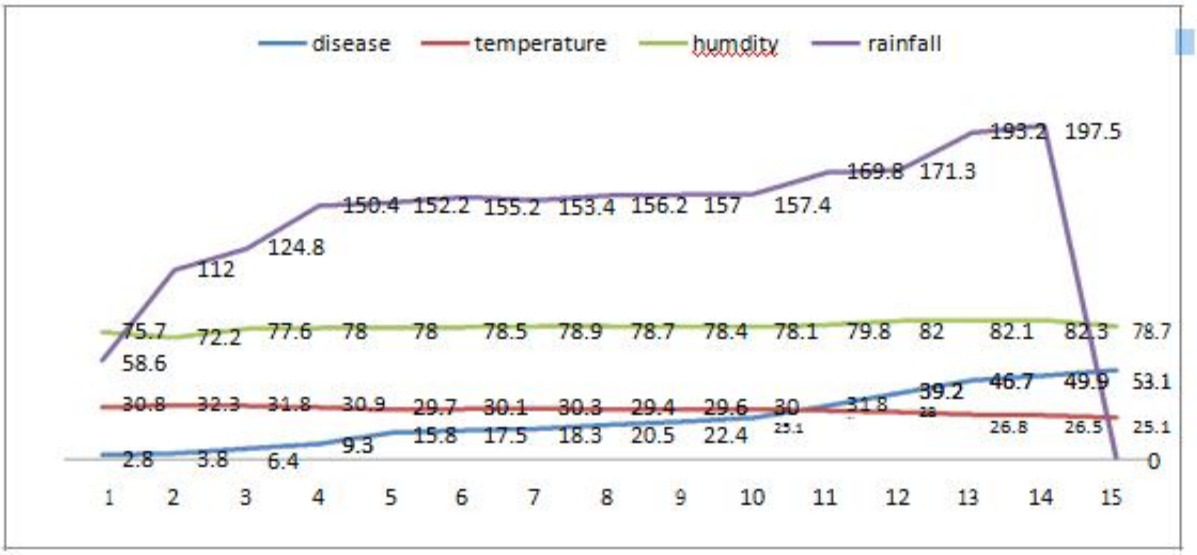

Figure 3: Studies of correlation of weather parameters to BLB disease development (2013-2014)

the results are shown in Figure 2 and figure 3. The gradual increase in bacterial leaf blight disease hampers the production of rice grains.

Initially the disease intensity was low and it gradually increased as the plants became matured. The result of correlation between disease intensity and weather factors clearly indicated that disease intensity was increased with the increase in temperature in both the years of experimentation. In the experimental year 2012-13, relative humidity also affected the disease intensity in same way as the temperature affected. Whereas, relative humidity did not observe the significant correlation with disease development.

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