



Current Situation of Rice Blast Disease in Edirne, Turkey

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Abstract. Rice (*Oryza sativa*) is one of most important cereal crops in Turkey. More intensive rice production areas in Turkey are located in Thrace region. Rice blast disease caused by the fungus *Pyricularia oryzae* is one of the most important pathogens that affect the yield and quality of rice plants. In this study, a total of 22 rice fields were surveyed in Keşan, Meriç, Uzunköprü, İpsala, Enez and Havsa districts of Edirne province of Turkey in 2018 for the presence of rice blast disease. The disease severity and prevalence values of rice blast disease in these districts were recorded. The highest disease severity was observed in Havsa district (48.40%), followed by Uzunköprü (27.68%), Meriç (26.20%), Keşan (19.23%), İpsala (19.12%) and Enez (6.40%) districts. The highest prevalence of the disease was observed in Havsa district (100%), followed by Meriç (71.43%), Uzunköprü (69.15%), Keşan (62.73%), İpsala (33.66) and Enez (13.00%) districts. It appears that rice blast is common in Edirne province of Turkey. Precautions should be taken against this important disease.

Keywords: Rice blast disease · Rice · *Pyricularia oryzae* · *Magnaporthe oryzae* · Edirne · Turkey

1 Introduction

Rice (*Oryza sativa* L.) crop which belongs to *Gramineae* family is a warm season cereal grown in water. In Turkey, rice is grown mainly in Thrace and Black Sea regions. Seventy percent of the rice production in Turkey occurs in Thrace-Marmara regions. Twenty-five percent of the Turkish rice is produced in Black Sea region and the rest is produced in other regions (Sürek 2002). Rice blast disease caused by the fungus *Pyricularia oryzae* Cavara (teleomorph: *Magnaporthe oryzae* B.C. Couch) is an important rice disease in the world (Bonman 1992; Ou 1985). The characteristics of lesions on the leaf blades vary with the environment and host resistance. When lesions first appear, they are often white to gray-green with darker green borders. Older lesions are generally whitish to gray with necrotic borders (Bonman 1992). Their shape show variation but lesions are characteristically diamond-shaped. This disease lowers the quality and quantity of rice plants and it is considered as one of the biggest threats to rice production (Ou 1985). Rice blast disease causes significant crop losses every year

and it is estimated that rice destroyed due this disease could feed more than 60 million people. *P. oryzae* is known to occur in 85 countries worldwide (Scardaci et al. 1997). In India, 60% to 90% crop losses due to this disease have been reported (Rangaswamy and Subramanian 1957; Sing 1987). This disease also caused significant crop losses in China (Shen and Lin 1996). In Turkey, the first studies related to rice diseases were carried out by Bremer and Özkan (1946) and Göbelez (1953). They concluded that rice blast disease was the most important disease in rice cultivation areas. Göbelez (1953) reported yield losses ranging between 25%–75% in rice fields of Black Sea region of Turkey. In Mediterranean region of Turkey, 90% yield loss has been reported (Tekinel et al. 1980). In Edirne province of Turkey, in 1995 and 1997, 20% and 15% yield losses due to rice blast disease occurred. Also in 2002, in İpsala region of Edirne province yield losses due to rice blast disease was observed (Süreç 2007). This study was carried out in order to determine rice blast disease situation in Edirne province of Turkey.

2 Materials and Methods

In 2018, a survey was conducted in Meriç, İpsala, Enez, Uzunköprü, Keşan and Havsa districts of Edirne province of Turkey for determination of rice blast disease ratio, disease severity and prevalence. For disease identification, Ou (1985) and Bonman (1992) were used. Sixty to eighty-five days old rice plants were examined. In survey, systematic sampling method was used (Aktaş 2001). Three, two, five, nine, two and one rice fields in Keşan, Meriç, Uzunköprü, İpsala, Enez and Havsa districts were examined, respectively. Samples were taken at every 20 km. Fields were surveyed diagonally or a zigzag pattern was followed. Area of each surveyed field was also recorded (Table 1).

Table 1. The sizes of fields and number of places sampled (Aktaş 2001).

Field size	Number of places sampled
Up to 10 decares	>5 different places
11–100 decares	>10 different places
101–500 decares	>15 different places
>501 decares	>20 different places

At each location, 100 plants were examined. Plants were counted as diseased and disease free and the diseased plant ratio was calculated by dividing the diseased plant numbers to total plants counted (Aktaş 2001).

$$\text{Disease ratio} = \frac{\text{Plant numbers with the disease}}{\text{Total plant numbers counted}} \times 100$$

Disease severity for each field was calculated using Townsend-Heuberger formula (Townsend and Heuberger 1943).

$$\text{Disease severity} = \frac{\sum \text{infection frequencies} \times \text{number of plants at each class}}{\text{Total of observed plants} \times \text{highest value of the evaluation scale}} \times 100$$

The prevalence of the disease was calculated using the following formula (Bora and Karaca 1970).

$$\text{Prevalence of the disease} = \frac{\sum \text{Disease ratio in field} \times \text{area of the field (decares)}}{\text{Total area examined (decares)}} \times 100$$

Disease assessment was accomplished using a 0–5 scale using diseased leaves (Table 2) (Anonymous 2017).

Table 2. Leaf disease evaluation scale for rice blast (Anonymous 2017)

Scale value	Symptoms on the plants
0	Immune, no disease
1	Very small, brown, slightly elongated necrotic gray lesions, 1–2 mm, covering less than 1% leaf area, resistant
2	Typical scald lesions, 1–2 cm in length, with brown edges, covering 2-10% leaf area, moderately resistant
3	Typical blight lesions covering 11–25% leaf area, moderately susceptible
4	Typical blight lesions covering 26–50% leaf area, susceptible
5	Typical blight lesions covering more than 50% leaf area, plant is dead, very susceptible

3 Results and Discussion

In 2018, a total of 2360 decares of rice fields in Keşan, Meriç, Uzunköprü, İpsala, Enez and Havsa districts of Edirne province of Turkey were examined for the presence of rice blast disease. The disease was common among the fields inspected (Fig. 1). Numbers of rice fields inspected, total area examined, mean disease ratio (%), mean disease severity (%) and mean disease prevalence (%) were presented in Table 3.

Rice blast disease was found in all districts, however, their prevalence and severity values showed variation. The rice blast severity values ranged between 6.40% and 48.40%. The disease prevalence values were between 13.00% and 100%. The highest and lowest severity and prevalence values were observed in Havsa and Enez districts, respectively. However, one and two fields were surveyed in these districts. For more reliable results, more fields should be surveyed in these districts.



Fig. 1. Rice blast disease symptoms on rice leaves

Table 3. Numbers of rice fields inspected, total area examined, mean disease ratio (%), mean disease severity (%) and mean disease prevalence (%) in Edirne province in 2018.

The districts of Edirne province	Numbers of fields examined	Total area examined (decares)	Mean disease ratio (%)	Mean disease severity (%)	Mean disease prevalence (%)
Keşan	3	410	55.33	19.23	62.73
Meriç	2	70	59.00	26.20	71.43
Uzunköprü	5	800	64.40	27.68	69.15
İpsala	9	730	41.33	19.12	33.66
Enez	2	250	15.00	6.40	13.00
Havsa	1	100	100	48.40	100.00
TOTAL	22	2360			

Rice blast is a serious disease of rice in Turkey and in the world (Göbelez 1953, 1956; Oran 1975; Tekinel 1982; Zeigler et al. 1994). This disease was responsible in 75% of yield loss in some rice fields of Black Sea region of Turkey. Also in Central Anatolia region of Turkey rice blast caused yield losses (Göbelez 1953, 1956). Oran (1975) reported 8.33% yield loss in Southeast Anatolia region of Turkey. Tekinel et al. (1982) investigated the rice diseases in the fields of Adana, Ankara, Erenköy and Samsun Research Institutes and concluded that rice blast was the most important disease. Rice blast disease was also reported from Çanakkale, Bursa and Balıkesir provinces of Turkey (Elmacı 2012). Ergün (2017) conducted a survey in Biga district of Çanakkale province of Turkey and found the prevalence of rice blast disease as 75.33%. In our current study we also observed this disease as common in rice fields of Edirne province of Turkey.

4 Conclusions

It appears that rice blast is common in Edirne province of Turkey. The disease was found in every district that surveyed. Rice blast disease has been reported from different regions of Turkey and significant yield losses have been reported (Göbelez 1953, 1956; Oran 1975; Sürek and Beşer 1997). Precautions should be taken against this important disease in Turkey.

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