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PROCEEDING BOOK

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ORAL PRESENTATIONS

The Reactions of Some Quality Wheat Lines Against Yellow Rust And Stem Rust Reactions

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Abstract: Yield potential, abiotic and biotic stress resistances and quality parameters are very important selection criterion for crop improve programme. Breeders use different tests to evaluate wheat good quality. These tests (test weight, mixographe, Zeleny sedimentation gluten rheological parameters) are based on the end-use quality objective of the breeding programmes. On the other hand rust (*Puccinia* spp.) disease resistances are important selection criterion improve programme. 5 bread wheat genotypes (Zeleny sedimentation (57-65 ml)., (Bezostaja-1; 56) in yield trials were developed by the Central Research Institute for Field Crops (CRIFC) Department of Quality Assessment and Food. The aim of this study was to determine the reactions of 5 winter bread wheat lines to yellow rust (YR) and stem rust (SR) disease in adult plant stage. The test materials were sown in a one meter row with 2 replications in İkizce, Ankara (for, YR) and Seydiler, Kastamonu (for SR) locations. The test materials were screened for yellow rust artificial epidemic condition with YR (virulent on *Yr2, 6, 7, 8, 9, 25, 27, Sd, Su* and *Avs* resistance genes in Europe/World differential set) and under natural epidemic condition with SR (virulent on: *Sr5, 6, 7b, 8a, 8b, 9b, 9g, 10, 30, Tmp* and *Mcn* resistance genes). Yellow rust and stem rust developments on each entry were scored using the modified Cobb scale (Susceptible control cv. Little Club 80-100S) in July-August 2015. Coefficients of infections were calculated, and the values below 20 were considered as resistant to disease One material was resistant to YR and SR in adult plant stage. These resistance genotypes can be used in both quality and yellow rust and stem rust resistance breeding programs to stem rust reactions.

Keywords: Bread wheat, rust (*Puccinia* spp.) diseases, reaction test, quality

1.INTRODUCTION

Wheat (*Triticum* sp.) is the most important cereal crop of Turkey where many of its ancestors originated. Although majority of the 20-22 million tonnes of production takes place in the Turkey, it is grown under diverse climatic conditions.

In Turkey, wheat is usually consumed in the form of bread, pasta, noodles, biscuits, bulgur, semolina, flour and bakery products. It is necessary to use different kinds of flour in making different products. For this reason, the quality requirements of different industrial groups are different. In this study, some genotypes that have emerged as part of a quality winter bread wheat development program have been studied.

The selection of early generation material with different and reliable methods in breeding programs enables the breeder to reach its purpose in a short time and more surely. If the wheat breeding studies are thought to last about 16 years, the material that is not suitable is removed in the early generations fast, the more material and detailed work can be done with the other material and the less time, money and labor can be achieved. The quality criteria used in this part of the study; Hectoliter Weight, Zeleny Sedimentation and Mixogram of the important diseases yellow rust (caused by *Puccinia striiformis* f.sp. *tritici*) is the most significant disease that can occur in wet and cool springs growing areas. Other of the important diseases stem rust (caused by *Puccinia graminis* f. sp. *tritici*) is the most significant disease that can occur at higher altitudes and coastal growing areas.

In recent years, some important of yellow and stem rusts epidemics have been experienced in the Turkey, causing significant losses in yield and quality of wheat (Aktaş, 2001). Development of cultivars with resistance to yellow rust and stem rust are among the objectives of these programmes but natural disease development is not always adequate for evaluation of the materials for resistance against the yellow rust and stem rust. Genetic resistance is one of the cheapest and most practical control methods that can protect the natural environment and be used by producers in the control of rust disease (Çetin et al., 2007).

5 bread wheat genotypes (Zeleny sedimentation (57-65 ml)., (Bezostaja-1; 56) in yield trials were developed by the Central Research Institute for Field Crops (CRIFC) Department of Quality Assessment and Food. The aim of this study was to determine the reactions of 5 winter bread wheat lines to yellow rust and stem rust disease in adult plant stage.

2. MATERIALS AND METHODS

Quality Studies

Hectoliter weight test: Refers to the weight of 100 liter of wheat in kg. It is a criterion used in the classification of wheat and it is directly related to flour yield. Grain size, density, shape and homogeneity affect the hectoliter weight.

Zeleny sedimentation test: Zeleny sedimentation test was carried out according to Anonymous (1972). The principle of the zeleny sedimentation test is to swell the flour particles in the suspension prepared with the flour and lactic acid solution according to the gluten quality and measure the amount of these particles at a certain time. In wheat flour, which is high in gluten content and high in quality, the particles are more densely packed and less precipitated in the solution. For this reason, zeleny sedimentation values of high quality wheat flours are higher (Atlı and Koçak, 2004).

Mixograph test: 25 gr flour is mixed with the amount of water calculated according to the moisture contained in the mixer kneader until the maximum dough consistency is obtained. Taking into consideration the peak height and general curve characteristics, a numerical classification is made by comparing with eight reference mixograms. It shows the stronger curve type as the number grows (Anonymous 2018).

Rust Disease Studies

Reactions test: The test materials were sown in a one meter row with 2 replications in İkizce, Ankara (for, yellow rust) and Seydiler, Kastamonu (for stem rust) locations. The test materials were screened for yellow rust artificial epidemic condition with yellow rust and under natural epidemic condition to stem rust in October 2014. Susceptible control (cv. Little Club) and stem rust differential set, sown in the same method and same date.

Disease Assessment: Disease scoring was performed using the Modified Cobb scale. The rust severity and infection type were recorded. Disease evaluations were conducted at least 2 times. The highest score was taken into calculate in the evaluations. The coefficient of infection (CI) was found by multiplying the coefficients determined for rust intensity and type of infection.

3. RESULTS AND DISCUSSION

The test materials used in this study were selected from different early stage materials used in the different breeding program in 2013 growing season. The main criterion for selection is; class; value 5-6, which is widely used by industrialists and researchers in the final product estimate and lines with values above were selected. When the results of the hectoliter, zeleny sedimentation and mixograph analyze of the selected test materials and standards cultivars are evaluated collectively, Hectoliter values range from 76.6 to 78.8 kg/hl. Zeleny sedimentations values range from 57-65 ml. The material often has suitable hectoliter test values. The mixograph classes are to be examined; They variations between 5 and 6. (Table 1).

The test materials were screened for yellow rust artificial epidemic condition with yellow rust (virulent on *Yr2*, 6, 7, 8, 9, 25, 27, *Sd*, *Su* and *Avs* resistance genes in Europe/World differential set) and under natural epidemic condition with stem rust (virulent on: *Sr5*, 6, 7b, 8a, 8b, 9b, 9g, 10, 30, *Tmp* and *Mcn* resistance genes). Yellow rust and stem rust developments on each entry were scored using the modified Cobb scale (Susceptible control cv. Little Club 80-100S) in July-August 2015. Coefficients of infections were calculated, and the values below 20 were considered as resistant to disease. One genotypes was resistant to yellow rust and stem rust (Table 1).

Table 1. Hectoliter, zeleny sedimentation and mixograph characteristics of the materials and stem rust reactions

Origin	No	Hectoliter (kg/hl)	Weight Zeleny Sed. (ml)	Mixogram	Yellow (Reactions)	Rust Stem (Reactions)	Rust
Line	1	78,8	63	6	40 MS	40 S	
Line	2	77,7	62	5	50 MS	70 MS	
Line	3	77,4	65	5	40 MS	10 MS	
Line	4	76,6	57	6	20 MS	60 S	
Line	5	77,5	62	6	60 S	40 MS	
Standard Cultivars							
Bayraktar 2000	Std 1	76, 7	45	5	20 MS	60 MS	
Bezostaja 1	Std 2	77,0	56	5	60 MS	70 MS	
Demir 2000	Std 3	76.8	46	5	40 MS	90 S	
Konya-2002	Std 4	78,5	47	4	70 MS	50 MS	
Tosunbey	Std 5	77,5	53	6	40 MS	40 MS	

Bread wheat will be effectively improved in quality by improving the hectoliter weight, zeleny sedimentation and mixograph tests and resistance to yellow rust and stem rust and implement these materials to the selection in the early generations of breeding.

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