

SOME WHEAT VARIETIES BEHAVIOR REGARDING THE ATTACK OF MAIN PATHOGENS UNDER CLIMATIC CONDITIONS FROM CENTRAL AREA OF MOLDAVIA, ROMANIA

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Received March 21, 2013

ABSTRACT. Due to the attack of the main pathogens agents in the wheat crop the wheat production is not exploited at the full potential. Powdery mildew, leaf spot and rust brown leaves are considered to be the most widespread and damaging diseases of wheat. In our country, the attack of these pathogens is present every year, with different intensities and it can cause production damages ranging from 3-4% to 20%. Due to this fact, the main attention of the farmers is to cultivate resistant wheat varieties to *Blumeria graminis* (DC.) Speer., *Septoria tritici* Rob. Desm. and *Puccinia recondita* Rob. et Desm. The main objective of this study was to evaluate the phytosanitary condition of 24 wheat varieties cultivated in 2011-2012 at the Ezăreni didactic Farm from University of Agricultural Sciences and Veterinary Medicine of Iași, Romania, localized in the central area of Moldavia. This study contains data regarding the spread and evolution of the main pathogens that were observed at the 24 wheat varieties studied. These varieties showed different reactions to different pathogens observed in the same environmental conditions thus some of them

were resistant to *Blumeria graminis* (DC.) Speer. and *Septoria tritici* Rob. ex. Desm. attack, and some recorded a disease incidence of 18.75% at the *Puccinia recondita* Rob. et Desm. attack.

Key words: Wheat diseases; Resistance; Attack level.

REZUMAT. Comportarea unor soiuri de grâu la atacul principalilor agenți patogeni, în condițiile din zona centrală a Moldovei, România. Atacul agenților fitopatogeni din cultura de grâu reprezintă una dintre cauzele datorită cărora producția de grâu nu se valorifică la întregul potențial. Făinarea, pătarea brună a frunzelor și rugina grâului sunt considerate ca fiind cele mai răspândite și păgubitoare boli ale grâului. În țara noastră, atacul acestor agenți patogeni apare an de an, cu intensități diferite, putând produce pagube cuprinse între 3-4%, până la 20% din producție. Astfel, utilizarea soiurilor rezistente la atacul de *Blumeria graminis* (DC.) Speer., *Septoria tritici* Rob. ex. Desm. și *Puccinia recondita* Rob. et Desm. figurează permanent în preocupările producătorilor de grâu. Acest studiu a fost

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realizat în vederea evaluării stării fitosanitare a 24 soiuri de grâu în condițiile din zona centrală a Moldovei, iar observațiile s-au efectuat în anul agricol 2011-2012, la Ferma didactică Ezăreni, din cadrul U.Ș.A.M.V. Iași. În lucrare sunt cuprinse date referitoare la răspândirea și evoluția principalilor agenți patogeni, întâlniți la cele 24 de soiuri de grâu luate în studiu. Aceste soiuri au manifestat reacții diferite, în aceleași condiții de mediu, concretizate prin faptul că unele au fost rezistente la atacul de *Blumeria graminis* (DC.) Speer. și *Septoria tritici* Rob. ex. Desm., iar altele au înregistrat un grad de atac (GA%) de 18.75%, în cazul atacului de *Puccinia recondita* Rob. et Desm..

Cuvinte cheie: boli la grâu; rezistență; grad de atac.

INTRODUCTION

Wheat is the first cultivated cereal in 2011 with a cultivated area of 220.38 million ha (FAO, 2011). Cereal crop production is often conditioned by the climatic conditions and occurrence of various diseases which can decrease the yield potential of different cereal varieties under the agro-technical conditions provided (Hulea *et al.*, 1963). The conditions of emergence and evolution of the pathogens in cereals crops and also the struggle to avoid yield production losses requires a good knowledge of ecological characteristics of wheat crop (Hatman and Iacob, 1981). Although for the main diseases in the wheat crops are numerous fungicides, considering the extended area production and the expenses for the necessary treatment, an important solution is cultivating resistant or

tolerant varieties (Pretorius *et al.*, 2000). Currently, the varieties from our country have different reactions to the diseases especially in the context of climate change (Hatman and Caia, 1973). For this reason it is necessary to conduct research on permanent wheat varieties against pathogen attack.

MATERIAL AND METHODS

The experience was found in the year 2011-2012 and it is based randomised complete block. The experience was founded after the experimental technique rules and it was applied the specific technology of wheat culture. For the weed control it was applied Lintur 70 WG in the dose of 150g/ha. The experimental plot size was 1.8 m² and the total area of the experience was of 265 m². On the experimental plot the wheat was sown in 10 rows with a distance of 12.5 cm between them.

The biological material studied was 24 wheat varieties originating from our country and imported. The disease incidence (GA%) of the pathogens was determined based on the frequency (F%) and the intensity (I%) of the encountered diseases. For determining the disease incidence of *Blumeria graminis* (DC.) Speer. and *Septoria tritici* Rob. Desm. on the plant, the affected surface was reported to the total surface, using a six classes scale corresponding to intervals percent attack intensity (Pastircak, 2005; Bennett, 1984). In order to determine the level of infection with *Puccinia* Rob. et Desm. we used a standardized grading scale rust on cereals (Severin and Cornea, 2009).

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RESULTS AND DISCUSSION

Based on the observation that were made during the growing season, we could establish the moment of the beginning and the epidemic evolution of the pathogens and also the knowledge of the behavior of wheat to pathogen attack, depending on climatic conditions.

In the 2011-2012 crop year, the presence of pathogens was observed from end of May when most of the studied varieties were in flowering stage or stage 10.5 according to the scale of Feekes (Marsalis and Goldberg, 2006). The observed pathogens during the growing season were *Blumeria graminis* (DC.) Speer., *Septoria tritici* Rob. et Desm. and *Puccinia tritici* Rob et Desm.. The disease incidence of these pathogens was low, except of some varieties that recorded disease incidence with values greater than 10%. Thus, the variety Arlequin recorded the greatest value of disease incidence of 12.75% in case of *Septoria tritici* Rob attack. Desma., and Gruia variety showed a disease incidence 18.75% in the case of *Puccinia tritici* Rob. et Desma attack.

Based on the field observations at each studied variety it had been determined the disease incidence of the *Blumeria graminis* (D.C.) Speer pathogen. This pathogen was observed only at six studied varieties,

with disease incidence values ranging from 0.25 and 6.25%. At 18 varieties the pathogen was not observed. Analyzing the graphic from Fig. 1, it can be observed that the highest value of the disease incidence was recorded at Glosa variety, followed by Boema and Accor with a value of 1.25%.

Regarding the *Septoria tritici* Rob. Desm pathogen, the disease incidence recorded at the studied wheat varieties ranged from 0.25% to Crina, Gruia, Sorial and Kiskun Gold varieties and 12,75% at Arlequin (Fig. 2). Although the Arlequin variety had the highest values of the disease incidence for this pathogen, it is considered to be resistant to *Septoria tritici* Rob. Desm., according to the scale of evaluation of Saari și Prescott (1975). Good resistance to this pathogen attack presented and variety Midas the recording of the attack value of 5.5%.

Regarding the disease incidence of the pathogen *Puccinia recondita* Rob. et Desm., the recorded values ranged between 0.25% and 18.75% at Gruia variety, this variety considered to be tolerant (Fig.3). For this pathogen, the varieties GK Klasz, Bitop, Primmo, Joseph, Capo, Sorrial, Arlequin, Andalou, Kiskun Gold Kiskun Serine, Seconzar proved to be resistant, the disease incidence for this varieties ranging between 1.25% and 9, 5%.

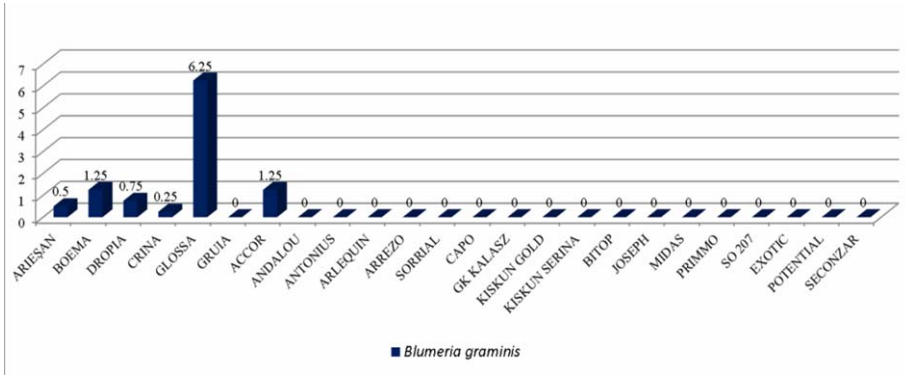


Figure 1 – Disease incidence of *Blumeria graminis* (D.C.) Speer. (2011-2012)

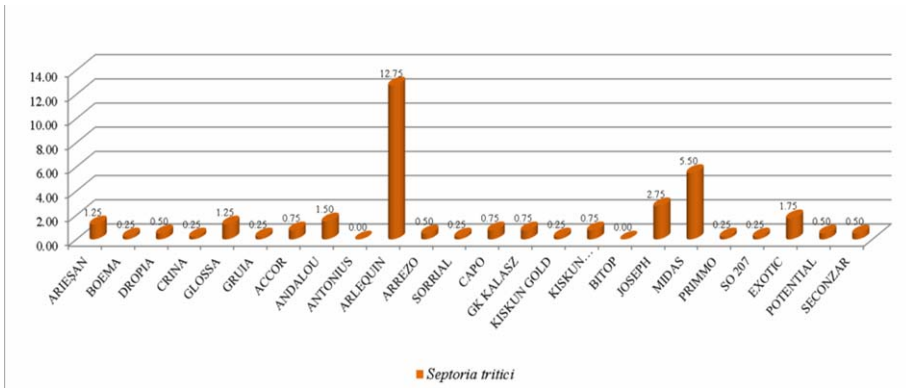


Figure 2 – Disease incidence of *Septoria tritici* Rob. et Desm. (2011-2012)

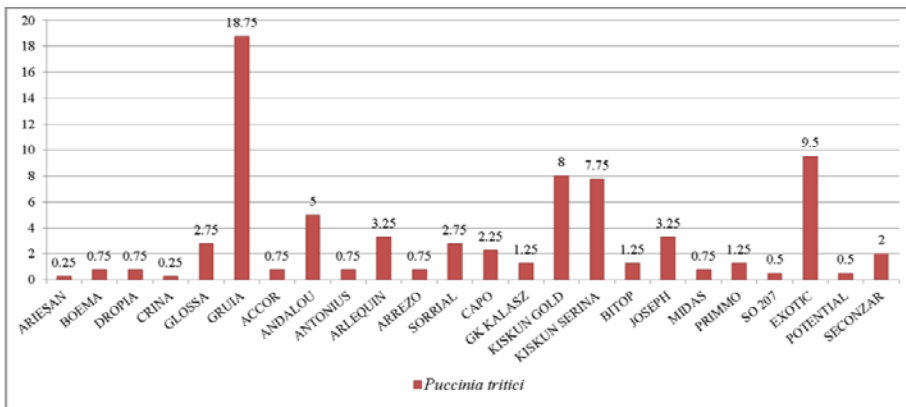


Figure 3 – Disease incidence of *Puccinia tritici* Rob. et Desm. (2011-2012)

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In the case of Andalou, Accor and Capo varieties, during the growing season it were observed small chlorotic blots, appeared as a defense response to attack *Puccinia recondita* Rob. et Desm. - the hypersensitive resistance (Fig. 4).



Figure 4 – The hypersensitive resistance response to *Puccinia recondita* Rob. et Desm. pathogen

Arieșan, Boema, Dropia, Crina, Accor, Antonius, Arrezo, Midas, SO 207 and Potential varieties had a very good resistance to the attack of *Puccinia recondita* Rob. et Desm, that recorded disease incidence values smaller than 1%.

CONCLUSIONS

In the studied conditions the disease incidence of the pathogens *Blumeria graminis* (DC.) Speer., *Septoria tritici* Rob. Desm. și *Puccinia recondita* Rob. et Desm. had low values due to the unfavorable climatic conditions that affected their development and also due to the

resistance that the wheat varieties proved to this pathogens.

The attack of the leaf rust from the year 2011-2012 was generally low, with disease incidence below 10%, except of Gruia variety which record a value of 18.25%.

Considering the values of the disease incidence for the pathogens *Blumeria graminis* (DC.) Speer., *Septoria tritici* Rob. Desm. and *Puccinia recondita* Rob. et Desm. and the fact that during the growing season no fungicides treatment were applied, most of the varieties showed a good and very good resistance to the recorded pathogens.

Acknowledgements. This work was co-financed from the European Social Fund Sectorial Operational Human Resources Development 2007-2013, project number POSDRU/CPP107/DMI1.5/S/77222 Improvement and Human Resource Development Research and Innovation in Doctoral School.

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