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CULTIVAR RESISTANCE AS AN IMPORTANT MEAN FOR REDUCTION OF THE POLLUTIONS OF PESTICIDES ON UNDERGROUND WATER

Përmbledhje: Gjatë viteve 2008–2009 u krye një eksperiment në fushat e QTTB në Shkodër. Qëllimi i tij ishte krahasimi i sjelljes së disa kultivarëve të grurit për rezistencë ndaj sëmundjeve gjethore. Tetë kultivarë gruri u testuan veçanërisht për rezistencën e tyre ndaj njollosjes së gjetheve nga septorioza (Septoria tritici). Të dhënat e fituara nga eksperimenti, treguan që disa prej këtyre kultivarëve, si Bullgar 3 x KB 703 dhe Regina x L–776 u paraqitën të jenë rezistentë ndaj septoriozës. Efekti negativ i fungicideve në mjedis dhe mbi shëndetin e njeriut, dikton fuqimisht kërkimin e mënyrave të tjera për luftimin e sëmundjes, siç është përdorimi i kultivarëve rezistentë.

Fjalë kyçe: *rezistent, kultivar, septoria, gjethe, sëmundje*

Abstract: An experiment regarding the comparision of the behavior of some wheat cultivars about their resístance towards foliage diseases was carried out in the fields of the Center for Agricultural Technology Transfer, Shkodra, covering the years 2008–2009. Eight wheat cultivars were tested especially for their resistance to the septoria leaf blotch. The results obtained indicated that some of these cultivars such as Bullgar 3 x KB 703 and Regina x L–776 were resistant to septoria leaf blotch. The negative effect of fungicides on the environment and human health strongly necessitates searches on other means for the disease control like the using of resistant cultivars.

Key words: *resistant, variety, septoria, leaf, wheat, cultivar, disease*

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INTRODUCTION

The main leaf diseases effecting wheat crop are leaf rust (*Puccinia recondita*), yellow rust (*Puccinia striiformis*), septoria (*Septoria tritici* and *Stagonospora nodorum*), powdery mildew (*Blumeria graminis f. spp. tritici*), *Pyrenophora tritici-repentis* and white mould (*Fusarium nivale*) (Hasani & Ruci, 2002). The studies for disease control in durum wheat *(Triticum turgidum* L. ssp. *durum)* and bread wheat crops (*Triticum aestivum* L.) emphasize the importance of having detailed knowledge about crop planting and growth. These diseases have been favored in recent years by the fact that large areas have been dedicated to few, often genetically related varieties, short crop rotations and a high seed density. In Albania, large economic losses are mainly due to the rust epidemics, generally *Puccinia recondita* and particularly *Septoria tritici* (Vrapi & Ruci, 2006). Conditions favoring the development of these diseases usually coincide with conditions favoring crop growth reducing the yield and quality in years with the highest productive potential (Eyal *et al*., 1987). Genetic resistance is the most profitable control method for all leaf diseases for both economical and ecological perspectives (Ruci *et al*., 2007). Diseases control results in higher yields and helps to reduce yield oscillations from one to the other year. Winters characterized by dry periods after the first rains usually favor diseases development in susceptible varieties, giving rise to early epidemics that can be very severe. Management of these diseases should be based on the use of resistant cultivars, since the persistence of available fungicides is not sufficient and in the same time controlling by means of fungicides raises more the cost of the wheat yield. In Shkodër district has almost 26% of the cultivated surface area of durum wheat in Albania (MBUBK, 2009). Climatically conditions of this zone are very favorable to septoria leaf blotch spreading. Because of different factors the losing of the wheat yield some times, could be about 15–20% (Varaku, 1998). The control of septoria leaf blotch usually in this area is realized by means of the using of the fungicides starting from the heading of the wheat and later. The water pollution of pesticides depends on the water transport on the service on the ground or the by the vertical sheared and also by other intensive factor. The main risk of the water pollution is the result of the chlor organic pesticides, slowly decomposed and accumulated in underground. By no using the pesticides in these cultivars it is evident that there is contamination in underground water source, the main supply for lakes and rivers. The results of the experiment provided for the implementation of sustainable agriculture basal elements in reducing pollution in groundwater.

MATERIALS AND METHODS

During the period covering the years 2008–2009, the behavior of wheat against *Septoria tritici* blotch has been administered in Center for Agricultural Technology Transfer, Shkodër (Photo 1 a, b).

In the parcels of National Office of Seeds Test were planted 8 promising cultivars for production for the two years study period. Wheat cultivars are planted in randomized blocks with four replications. Each plot was 10 m^2. Agro-technical prac-

Photo 1. a) View of an experimental field in Shkodra. b) View of Dajti (X controls) Variety

tices have been the same based on type protocol established previously for the distance of planting, seed rate, doses of fertilizers, hoeing, etc. Assessments of diseases were made on the upper three leaves every week from the start of stem elongation (GS 31) to dough stage (GS 85). Incidence and severity of diseases were determined (expressed in %). Causal agents of diseases were determined in a laboratory by the symptoms and investigation of pycnidias (Photo 2 a, b, c). Average disease incidence and the severity were calculated to analyze the economic importance of diseases. Observations for determining leaf-related diseases are conducted in early April un-

Photo 2. a) Septoria leaf spot (Septoria tritici) on winter wheat in the heading stage. b) A magnified view of a spot produced on a wheat leaf by (Septoria tritici). The spot was about 1 cm in length and is speckled with black fungal bodies called pycnidia c) Pycnidia and pycnidiospores of Septoria tritici blotch (Septoria tritici)

til end of May to June, which has corresponded with intensive incidence of infection in the „Dajti" control wheat cultivar.

Assessment of Septoria tritici infections has been based on the percent of covered leaves surface occuped by the disease. Disease assessment has been based on an empirical scale adopted with six-point scale for *S. tritici* (Rosielle, 1972) as follows:

0 – Immune (Imm) – No pycnidial formation, no symptoms or occasional hypersensitive fleck.

1 – Highly Resistant (HR) – No or only occasional isolated pycnidia formed, particularly in older leaf tissue, hypersensitive flecking in younger leaf tissue.

2 – Resistant (R) – Very light pycnidial formation. Some coalescing of lesions mainly toward the leaf tip and in older leaf tissue.

3 – Intermediate (Int.) – Light pycnidial formation. Coalescing of lesions normally noticeable towards the leaf tip and elsewhere on the leaf.

4 – Susceptible (S) –Moderate pycnidial formation lesions coalescing considerably.

5 – Very Susceptible (VS) – Large, abundant pycnidia, lesions coalescing extensively

The medium Mckinney index, has been used for the severity of the diseases $I = \Sigma\{(ni^*xi)/N \bullet X\} \bullet 100$ *where:* I= Mckinney index Σ= Total of productions ni.*xi, ni= frequency or number of plants observed for each class, xi = value of each class, N = total number of plants assessed, X = value of the highest class. In order to have a clear behavior the for each genotype of cultivars, a categorization of modificated Mckinney Index (*IMc*) from (Vrapi & Ruci, 2006) has been made as follows:

I – No pycnidial formation, *(IMc <1%),*

VR – Average pycnidial density (*IMc = 1–5%).*

R – Resistant – Average pycnidial density, *(IMc = 5–15%).*

MR – Moderately Resistant- Average pycnidial density coverage *(IMc = 15–30%).*

MS – Moderately Susceptible – Average pycnidial density coverage, *(IMc = 30–40%).*

S – Susceptible – Pycnidial density greater, *(IMc > 40%).*

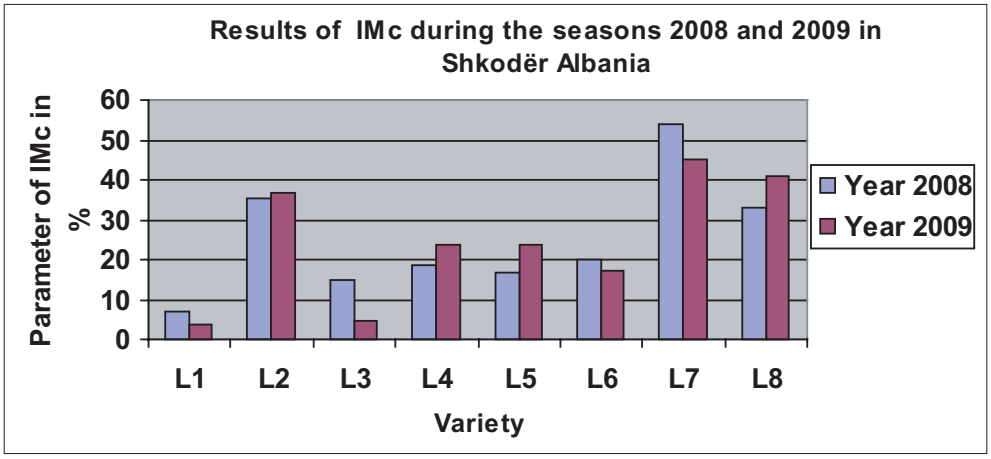
RESULTS AND DISCUSSIONS

Based on the data received during the study period there were some cultivars resistant on Septoria tritici blotch. During the year 2008 the wheat cultivar Bullgar 3 xKB 703 was resistant on Septoria leaf blotch disease, while during 2009 it was very resistance. The same behavior had also the Regina x L.-776 (Table 1 and Graph. 1).

At the plots where were tested two wheat cultivars, Bullgar 3 x KB 703 and Regina x L–776, the average yield was respectively 50 kv/ha and 48.5 kv/ha higher than the yield which is received at the control (Dajti), 40.5 kv/ha. The yield was higher at the plot planted with Salgema cultivar, 46.5 kv/ha, comparing with the control (Dajti) (Table 2 and Graph. 2)

Table 1. Results of *Septoria tritici (IMc)* on durum wheat during the seasons 2008 and 2009 in Shkodër, Albania.

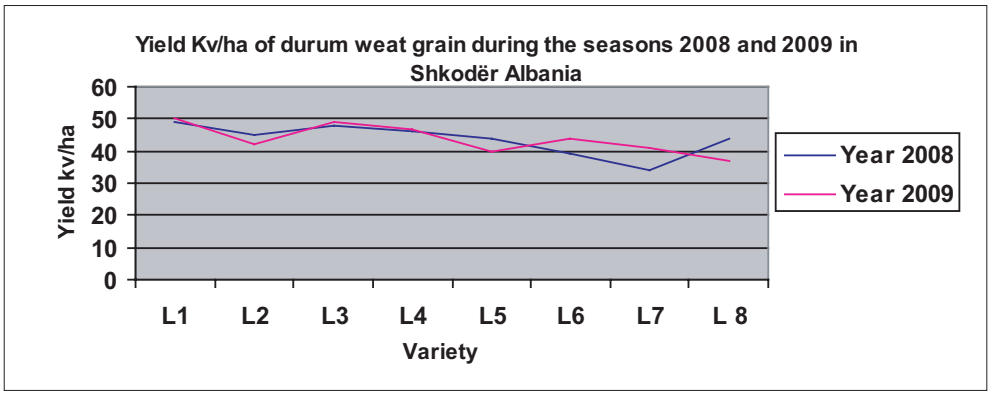
Nr	Varieties	2008		2009	
		IMc	Categorizing	IMc	Categorizing
1	Bullgar 3 x KB 703	7.14	R	3.54	VR
2	IKB-P 6	35.23	MS	36.65	MS
3	Regina x L–776	14.72	R	4.78	VR
4	Salgema	18.75	MR	23.8	MR
5	L V S -93	16.82	MR	23.6	MR
6	Ni 792	20.21	MR	17.21	MR
7	Progresi	53.75	S	45.17	S
8	Dajti (X controls)	33.18	MS	40.85	S



Graphic 1. Results of parameter IMc (Septoria tritici) on durum wheat during the seasons 2008 and 2009 in Shkodër, Albania.

Table 2. Yield (kv/ha) of durum wheat grain during the seasons 2008 and 2009 in Shkodër, Albania.

Nr	Varieties	2008	2009	Yield Average Kv/ha	% of X controls
		Yield Kv/ha	Yield Kv/ha		
1	Bullgar 3 x KB 703	49	51	50	123.4
2	IKB-P 6	45	39	42	103.7
3	Regina x L–776	48	49	48.5	119.7
4	Salgema	46	47	46.5	114.8
5	L V S -93	44	40	42	103.7
6	Ni 792	39	44	41.5	102.4
7	Progresi	34	41	37.5	92.6
8	Dajti (X controls)	44	37	40.5	100



Graphic 2. Yield (kg/ha) of durum wheat grain during the seasons 2008 and 2009 in Shkodër, Albania

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the surveys carried out during the period of study, may be reached on the conclusion that *Septoria* diseases of wheat do not appear the same every year from the euphytic standpoint.

In all of the zonal tests only numbers 1 and 3, respectively Bullgar 3 x KB 703 and Regina x L–776 have proved to be with high resistance against the Septoria leaf blotch. It can be judged that these numbers, being more resistant, can multiply and recommend for using by the farmers, as long as they will be favored from the agronomic and other features.

Based on these results it can be concluded that as long as the above cultivars justify costs as well as being resistant to septoria leaf blotch it is not necessary controlling by means of fungicides. In this manner the cost of the wheat production can be lower as well as the toxicity on the environment.

The hazardous effect of fungicides and insecticides, or their degradation products, on the environment and human health strongly necessitates the search for new harmless means of disease control and i. e. development of resistant varieties.

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