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of Toxin Occurrence in Food Webs**

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Oral Presentations

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Contribution of non-specific leaf rust resistance in Yugoslav wheat production and breeding

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Abstract

The term of the non-specific resistance is based on interactions between different aviable virulences of pathogen and host genotype without significant differences in expression. The numerous genotypes which show the resistance characters were crossed (in the Institute of field and vegetable crops). The result are varieties with satisfactory level of the resistance to *Puccinia recondita tritici* (some of them occupied 20% of in the Yugoslavia by wheat covered area), for eight or more years, without cases of predictable and proved overcoming in particular region. Varieties Renesansa, Prima, Lasta and according to investigated character similar new genotypes possess the relative (in comparison with before or nowadays widespread varieties Novosadska Rana 2 or Evropa 90) higher level of the partial resistance in the seedling (greenhouse) and adult stage in the field, without influence of pseudoresistance increasing factors (bad growing conditions, short green leaf area period etc). By the genealogies it is expectable that they possess known genes for the resistance effective to some virulence of the pathogen before or out of the region. Mostly, they are not originated from relative species (only wheat/rye translocation is common). Variety Lasta is most stable in expresion of non-specific resistance characters.

Introduction

The breeding for the resistance to leaf rust cause started in Yugoslavia more than forty years ago. It was based on introducing the wide efficient genes for the resistance mostly from wheat relatives originated, in the appropriate genotypes across the backcross and later incomplete backcross method. The sources of the resistance carried Lr 9, Lr 19 and Lr 24 or were some Purdue selections. Variety Gabo 56, Purdue selections or Selkirk derivatives were also often in use. The another parent for the backcrossing at the beginning was Bezostaia 1 (Momčilović, V. 1967, 1969). That material was crossed with some Italian varieties or Yugoslav selections mostly originated from Italian Russian or American genotypes hybrids. The genetic analyses showed that many of resistant genotypes by many characters fit to our condition, do not possess only one gene for the resistance than two or three of them complementary effective trough similar low reaction type to mentioned single ones (Momčilović, 1969, Momcilovic and Jerkovic, 1985). Next phase in late seventies and early eighties was their accumulation and recombination mostly by successive crosses on, or combining inside F1 (Momcilovic and Jerkovic, 1986). After that, by estimating the LP 50 length, infection efficiency or AUDPC values the sources of the resistance either were chosen (Jerkovic, 1992, 1993). The result was sometimes improving the uncomplete resistance level or rarely complete resistance. The aim was the durability of the character expression. Genes like Lr 1, Lr 2a, Lr 3, Lr 10, Lr 13, Lr 14a, Lr 16, Lr 26 by the genealogies could be involved. Lr 1 and Lr 26 nowadays single give hypersensitive reaction to the majority of leaf rust carrier population in northern Yugoslavia. Lr 1 and Lr 13 combination was also find successful (Jerkovic et al, 1996). Single mentioned gene Lr 1 was effective to the part of the population in southern part, Bulgaria (Todorova and Jerkovic, 1996; Todorova, 2000) and Hungary (Manninger, 2000). According to Csoz et al. (2000) Lr 1 and Lr 26 are in the ineffective group. Gulyaeva et al. (2000) presented virulence to Lr 26 as changeable in the last five years without trend in European part of Russia.

The combination between hypersensitively and partially resistant genotypes is also often, beside the covering problem in the progenies (Jerkovic and Jevtic, 2001). Next step is in combinations of the relatively more tolerant and incompletely resistant high yielding genotypes.

The aim of the study was to find the possible non-specific resistance to *Puccinia recondita tritici* in the winter wheat material widespread in the production during the last fifteen years.

Material and methods

The widespread winter wheat varieties in Yugoslavia (Misić et al., 1995), different according to the type and level of leaf rust resistance were grown in microtrials at the Institutes of field and vegetable crops experimental fields near Novi Sad, with a wish to reach the optimal growing conditions. The artificial infection with water suspension of races 77 and from 2000. 57 virulence type *Puccinia recondita tritici* uredospore was performed in the first decade of May. The maximal intensity of the attack was estimated in the last decade of June from 1994-1996 and 2000 and 2001 using the version of modified Cobb scale. The reaction type and the incomplete resistance characters values were investigated in the greenhouse at the seedling stage on temperatures 18-22 and 15 °C (Jerković et al., 1992, 1993). For the new perspective varieties data are presented for only two years also approximately two years after start of spreading.

Results

According to the results of the investigations of reaction types in 1994 and 2001 and severity of the *Puccinia recondita tritici* attack in the field, the varieties are separated into four groups (Tab. 1). In the first one are varieties that did not express low reaction type at the seedling stage and the infection severity in the field conditions was stable high. That is the logical consequence of the short latency period (LP 50) and high infection efficiency (IF) (8,5-9,2 days and more than 6 at 15 °C). In the second group are the varieties that expressed the low reaction types in 1994. Most of them still kept the hypersensitive reaction to parasitic population in 2001. The resistance of the old variety Balkan widely spread in former Yugoslavia was overcome by changes in parasitic population in the last decade. The resistance of another similar varieties is still acceptable but of different level in the field. That gives the hope in differences in genetic bases of their resistance correlated with prolonged period of parasite adaptation probability.

Discussion

It is obvious that the variability according to disease severity during the years on particular varieties in the field conditions is present in all groups but evidently highest in the third one. The hypothesis for the explanation of such appearance is in the relatively short green leaf area duration, which gives the poor conditions for parasite development and the relatively low yielding potential in comparison with varieties from the other groups. Similar appearances were noticed before in such conditions beside presented data. In second group nonstability in the year range according to resistance level in field could be connected with relatively strong attack of *Puccinia striiformis* (Zlatka), rather than to changes in frequency of virulent parasite genotypes. The non-specific character of the resistance of the variety Lasta is more expectable than those of Prima, because of several reasons. Prima is very early variety, appeared eight years later and never was so widespread. In the sublines from which Prima was chosen there was specific resistance (Jerković et al., 1995). The varieties that show characters of non-specific resistance are present about 40% in actual Yugoslav wheat acreage's.

Tab. 1

Variety	Approved:	Intensity of <i>P. recondita</i> attack				Max. int.	RT seedlings	
		1994-1996		2000	2001		1994-1996	1994
		25-03.06.	20-26.06					

1.

Novosadska rana 2	1975	32	65	70	80	80	4	4
Evropa 90	1990	22	53	50	50	70	4	4
Jarebica	1993	27	47	50	50	70	4	4

2.

Balkan	1979	8	43	50	40	60	;23	4
Rana niska	1990	2	8	30	25	20	;1	;
Kremna	1995	0	15	40	30	30	;23	;N3
Pesma	1996	3	22	t	20	30	;1	;34
Zlatka	1997	0	12	30	5	20	;1	;N

3.

Partizanka	1973	1	3	40	25	15	4	4
Rodna	1988	0	8	40	50	15	4	4

4.

Lasta	1987	2	12	30	30	20	4	4
Pobeda	1990	7	35	30	40	50	4	4
Renesansa	1994	1	35	40	40	50	4	4
Prima	1995	2	12	30	20	20	4	4
Sonata	2000			10	25		4	4
Ljiljana	2000			30	25	4	4	

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