

**Reactions of winter wheat to *Mycosphaerella graminicola*
(anamorph *Septoria tritici*)**

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Abstract

Reaction of six winter wheat cultivars and lines (Vlasta, Šárka, Charger, 00ST022, SG-U8044C a SG-U2113B) to *Mycosphaerella graminicola* isolate BR-331 and UH-05 on leaf segments of the detached second seedling leaf of cultivars placed on water agar with benzimidazole in clear plastic box were tested. The isolate BR 331 produced high occurrence of the disease in the cultivar Šárka, middle occurrence (the percentage covered by lesions bearing pycnidia) in the cultivar Vlasta and SG-U8044C and low occurrence in the line 00ST0022. The isolate UH-105 produced high occurrence in the cultivar 00ST022 and middle occurrence in the cultivar Vlasta. The cultivar Charger was resistant. The cultivar Šárka was attacked at least. Results show on different virulence of *M. graminicola* isolates to wheat cultivars.

Key words: cultivar, pycnidia, benzimidazole

INTRODUCTION

Septoria tritici leaf blotch, caused by the fungus *Mycosphaerella graminicola* (Fukel) J. Schröt. In Cohn (sexual stage *Septoria tritici* Roberge in Desmaz), is one of the most serious disease of wheat worldwide. However, progress in breeding wheat cultivars resistant to *M. graminicola* is constrained at present because very little is known about genetics of resistance. Kema et al. (1996 a,b) showed that the host-pathogen interactions in *septoria tritici* blotch involve resistances specifically effective against particular isolates, as well as isolate non-specific resistance. Methods of detecting interactions between wheat and *M. graminicola* genotypes are therefore required.

Reaction of winter wheat to *Mycosphaerella graminicola* (anamorph *Septoria tritici*) was tested on detached seedling leaf segments.

MATERIAL AND METHODS

Six or eight winter wheat cultivars and breeding lines were used to finding out of reactions to three isolates of *M. graminicola*, UH105 (Uhřetice,) R116 (Ruzyně) and BR331 (Branišovice) from the Czech Republic. Inoculum was produced from sporulating cultures of the pathogen, grown on potato dextrose agar for 7 days under near-ultraviolet light. Cultures were flooded with sterile distilled water and scraped to release conidia. Concentration of 10^6 spores ml^{-1} was prepared. Wheat seedlings were evenly sprayed with spore suspension (20 ml) per pot by means of hand sprayer. The leaves were left to dry for 30 min. before 3 cm sections were cut from the middle of the primary leaves. Technique of detached seedling leaves placed on water agar according Arraiano et al. (2001) were used. Water agar (10 g l^{-1}) containing 80 mg l^{-1} benzimidazole was dispensed into non-sterile clear polystyrene boxes ($10,5 \times 19,5 \text{ cm}$ with 12 small boxes $3 \times 5 \text{ cm}$). Rectangular sections ($2 \times 5 \text{ cm}$) were cut from the centre of the agar. Leaf segments were lied upper section across the gap so that the cut ends rested on the agar. Strips of agar from the gap were placed over cut ends of the leaf segments so that they were not exposed, thereby delaying senescence. Boxes were closed and covered with aluminium foil. After incubation at 20°C for 48 h in the climate chamber the boxes were uncovered. The percentage leaf area covered by lesions bearing pycnidia was scored five times during period of 19-24 days after inoculation. Experiments were made in four replications.

RESULTS AND DISCUSSION

Several specific interactions, i.e. resistance or susceptibility of cultivars to the isolate UH105 were observed. The breeding line OOST022 (Tab. 1) was susceptible. The line SG-U8044C was middle resistant. The cultivars Charger and F1463 were resistant. The cultivars Šárka, Vlasta, SG-U2113B and SG-U7157A were specific resistance resistant to this isolate. On the contrary the cultivar Šárka and the line SG-U8044C were medium susceptible to the isolate BR331. Specific resistance with low levels of pycnidial lesions covering the leaf had the cultivars Vlasta, Charger and lines OOST022 and SG-U2113B. The isolate R116 showed low levels of pycnidial lesions in tested cultivars and breeding lines. The cultivar Šárka counted among the most susceptible cultivars in field experiments in 1997-2000 to *M. graminicola* (Šíp et al., 2001). The cultivar Vlasta was middle resistant. Means of single isolates to produce the disease in single cultivars indicate different virulence of used isolates. The isolate R116 bring about lower disease severity in all cultivars. Likewise cultivar mean show differences in resistance to *M. graminicola*. Most resistant was Charger and most susceptible was OOST022. Our results indicate different virulence of *M. graminicola* isolates to single cultivars and breeding lines of winter wheat. The detached leaf technique could be a useful component to field trials and an alternative to whole seedling assays in assessing cultivar resistance and investigating the genetics of the host-pathogen interaction (Arraiano et al., 2001).

Table 1. Percentage area of leaves segments of wheat cultivars and breeding lines covered by lesions bearing pycnidia of *Mycosphaerella graminicola* isolates 2003

	UH105	R116	BR331	cultivar mean
Šárka	2,8	4,4	30,2	12,5
Vlasta	11,9	12,5	10,0	11,5
Charger	0,0	6,3	3,2	4,6
OOST022	63,3	–	5,0	34,2
SG-U2113B	2,9	5,0	7,5	5,1
SG-U8044C	21,5	–	30,0	25,8
SG-U7157A	8,2	7,5	–	7,9
F1463	0,0	5,0	–	2,5
isolate mean	13,9	6,8	14,3	13,0

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Streszczenie

Reakcje genotypów pszenicy ozimej na porażenie przez *Mycosphaerella graminicola*

Badano reakcje 6. odmian i linii pszenicy ozimej (Vlasta, Šárka, Charger, OOST022, SG-US8044C, i SG-U2113B) na porażenie przez izolaty RB 331 i UH 105 grzyba *Mycosphaerella graminicola*. Doświadczenia przeprowadzono na fragmentach drugich liści siewek pszenicy umieszczonych w czystych, plastikowych pudełkach z wodnym agarem zawierającym benzimidazol. Stopień porażenia izolatem

BR 331 był najwyższy na liściach odmiany Šárka, średni na odmianie Vlasta i linii SG U8044C oraz niski na roślinach linii 00ST022. W przypadku izolatu UH 105 najsilniejsze objawy odnotowano na liściach linii 00ST022, średnie porażenie stwierdzono na roślinach Vlasta. Na liściach odmiany Charger brak było objawów choroby. Wyniki doświadczenia wskazują na zróżnicowaną wirulencję izolatów *Mycosphaerella graminicola* względem testowanych genotypów pszenicy.