Effect of fungicidal control of Chewing's fescue (*Festuca rubra* L. ssp. *commutata*) and strong creeping red fescue (*F. rubra* L. ssp. *rubra*) on seeds infection with fungi

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INTRODUCTION

During the vegetation period, red fescue can be infected by many fungal species. Some of them are dangerous grass pathogens. Under favourable conditions they can weaken the root system considerably and seriously reduce the green area of the leaf, which disturbs growth and decreases the yield. Besides, the products also get deteriorated. On seed plantations heavy plant infection can result in heavy kernel infection by pathogenic microorganisms which constitute a real threat for young plants growing from infected seeds. Chemical control of the plantation can reduce the threat posed by pathogens; however, such treatments are not always cost-effective. The present research aimed at determining the effect of fungicidal control of the red fescue seed plantation on the infection of kernels by fungi.

METHODS

The research was carried out on Chewing's fescue of the cultivar Mirena and Nimba, and strong creeping red fescue cultivar Nista, grown for seed. The experiment was set in two series, including the sowing year and two years of full use (2004 – 2006, 2005 – 2007). Protection from diseases was performed over the sowing years, in September, by applying Amistar 250 SC fungicide at the rate of 1.0 l ha-1 (azoxystrobine - 250 g l-1). Over the years of full use the first treatment was made in the second decade of May (beginning of panicle emergence) also with Amistar 250 SC fungicide at the dose of 1.0 l ha-1, and the other one – in mid June (end of flowering/ beginning of seed formation) with Bumper Super 490 EC fungicide at the dose of 1 l ha-1 (prochloraz 400 g l-1 + propiconazole 90 g l-1). The insecticide control involved applying, at the beginning of panicle emergence, the treatment with Decis 2.5 EC at the dose of 0.3 l ha-1 (deltamethrine – 25 g l-1). Analysis of the occurrence of diseases on plants and analysis of infection of the collected seeds with fungi were performed. Three samples were collected from each plot, 100 kernels each, disinfected and then placed onto Petri dishes with acidified PDA medium. The dishes were incubated, at 18oC. After 7-14 days the cultures grown were identified based on the available mycological keys. Whenever no sporulation was identified, the cultures were exposed to UV light.

RESULTS

The analyses showed infestation of kernels of the investigated red fescue cultivars by numerous fungi. In total there were isolated 17 fungal species representing 15 genera and non-sporulating colonies. Besides the species given in tables, there were also isolated: *Aspergillus* spp., *Aspergillus niger*, *Acremoniella fusca*, *Acremonium strictum*, *Arthrinium phaeospermum*, *Aureobasidium pullulans*, *Cladosporium herbarum*, *Stemphylium botryosum*. The most frequent fungi included: *A. alternata*, *A. niger*, *Drechslera* spp., *Penicillium* spp. and *T. koningii*. They were isolated from kernels of all the cultivars, in each harvest year, both in the combinations without fungicidal control and in those sprayed with fungicides. Similarly the occurrence of fungi of *Fusarium* genus: *F. culmorum* and *F. equiseti*, *B. sorokiniana* as well as *E. nigrum* were also very frequent. More isolates were obtained in the second year than in the first year (Tab. 1, 2). The statistical analysis showed in those cases a significant effect of fungicide treatments on the decrease in the number of isolated fungi. Pathogens: *B. sorokiniana*, *Drechslera* spp., *F. culmorum* and *F. equiseti* were seriously limited by the fungicides applied, especially in the second year of use (Tab. 2). The analysis of the average values for three cultivars confirmed in almost 89% of the fungi tested a positive effect of fungicide control. *M. nivale* was the only one which demonstrated to be practically insensitive to the preparations applied.

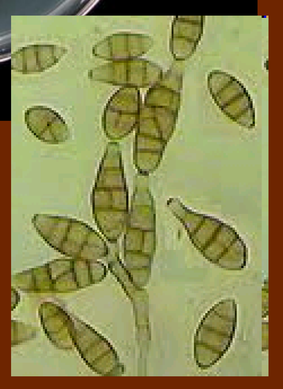

Table 1. Mean number [cfu/100 kernels] of the most often isolated and pathogenic fungi detected on seeds of red fescue cultivars harvested in the first year of full use

Fungi	'Mirena'		'Nista'		'Nimba'		Mean	
	P*	NP	P	NP	P	NP	P	NP
Alternaria alternata (Fr.) Keissler	0,8 a**	2,8 b	0,9 a	2,1 b	0,5 a	3,1 b	0,6 a	2,5 b
Bipolaris sorokiniana (Sacc.) Shoem.	0,0 a	0,9 b	0,1 a	1,1 a	0,3 a	1,6 b	0,1 a	1,4 b
Drechslera spp.	0,1 a	1,1 b	0,1 a	1,5 b	0,4 a	1,9 b	0,3 a	1,7 b
Epicoccum nigrum Ehrenb.ex Schlecht.	0,5 a	3,3 b	0,0 a	0,8 b	0,0 a	0,0 a	0,2 a	1,4 b
Fusarium culmorum (W.G.Smith) Sacc.	0,3 a	1,1 a	0,5 a	1,0 a	0,0 a	0,0 a	0,3 a	1,1 b
Fusarium equiseti (Corda) Sacc	0,1 a	1,0 a	0,0 a	0,0 a	0,4 a	1,0 b	0,2 a	0,7 b
Penicillium spp.	2,4 a	7,3 b	9,3 a	8,5 a	2,9 a	2,6 a	4,9 a	6,4 b
Trichoderma koningii Oudemans aggr.	0,5 a	1,4 a	1,3 a	1,0 a	3,0 a	6,4 b	1,8 a	3,0 b
Microdochium nivale (Fr.) Sam.ex I.C.Hallett	0,0 a	0,0 a	0,0 a	0,9 b	0,3 a	0,4 a	0,1 a	0,5 a

Table 2. Mean number [cfu/100 kernels] of the most often isolated and pathogenic fungi detected on seeds of red fescue cultivars harvested in the second year of full use

Fungi	'Mirena'		'Nista'		'Nimba'		Mean	
	P*	NP	P	NP	P	NP	P	NP
Alternaria alternata (Fr.) Keissler	23,9 a	26,0 b	14,9 a	19,9 b	10,3 a	15,6 b	16,3 a	20,7 b
Bipolaris sorokiniana (Sacc.) Shoem.	0,5 a	2,1 b	0,4 a	2,0 b	0,4 a	2,5 b	0,2 a	2,2 b
Drechslera spp.	0,5 a	4,4 b	0,6 a	3,8 b	0,8 a	4,3 b	0,8 a	4,7 b
Epicoccum nigrum Ehrenb.ex Schlecht.	19,8 a	25,8 b	20,9 a	22,4a	4,3 a	7,0 b	14,8 a	18,7 b
Fusarium culmorum (W.G.Smith) Sacc.	0,0 a	3,3 b	0,4 a	2,3 b	2,3 a	4,8 b	0,8 a	3,7 b
Fusarium equiseti (Corda) Sacc	2,1 a	7,5 b	0,9 a	3,9 b	1,1 a	6,5 b	1,3 a	6,2 b
Penicillium spp.	5,3 a	6,3 a	11,3 a	12,9 a	1,9 a	4,3 b	5,9 a	8,0 b
Trichoderma koningii Oudemans aggr.	6,0 a	8,9 a	1,6 a	7,5 b	1,4 a	3,0 a	2,9 a	6,7 b
Microdochium nivale (Fr.) Sam.ex I.C.Hallett	0,0 a	0,9 a	0,8 a	1,0 a	1,4 a	1,6 a	0,7 a	1,3 a

* Combinations with (P) and without (NP) fungicidal protection

** Mean values within cultivar, or in average for the cultivars, marked with the same letter in rows do not differ significantly at $P < 0.05$

CONCLUSIONS

Fungicide treatment of red fescue plantations considerably limits the infestation of kernels by a vast majority of the fungi isolated. The number of pathogens of genera *Drechslera* and *Fusarium* as well as *Bipolaris sorokiniana* decreases considerably; the pathogens can constitute a potential threat for young seedlings. Fungicide treatments, however, do not affect the occurrence of *M. nivale* on red fescue kernels. The older the plantation, the greater the number and species composition of the fungi isolated from the seeds collected.