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SUSCEPTIBILITY OF *Festuca rubra* L. SSP. *commutata* AND *rubra* TO INFESTATION BY FUNGAL PATHOGENS UNDER CONDITIONS OF FUNGICIDAL PROTECTION

Dariusz Pańka, Małgorzata Jeske, Małgorzata Szczepanek
University of Technology and Life Sciences in Bydgoszcz

Abstract. The aim of this study was to estimate the susceptibility of a tuft (ssp. *commutata* – cultivar Mirena) and creeping (ssp. *rubra* – cultivar Nista) forms of *Festuca rubra* to infestation by pathogenic fungi and the effect of chemical protection on the health of plants grown for seeds. The study was conducted in 2004-2006 (first series) and in 2005-2007 (second series) at the Experimental Variety Testing Station in Chrząstowo (53°09' N; 17°35' E). Fungicides containing azoxystrobin, prochloraz and propiconazole were applied for protection against fungal pathogens. The assessment of disease symptom intensity was conducted in the summer and autumn periods based on modified scales by Birckenstaedt et al. [1994]. In the establisment and production years we found a moderate infestation of red fescue of the cultivars Mirena and Nista by pathogenic fungi. Highest values of leaf disease index at a level of DI = 16.9% were registered in the case of leaf spots. Occurrence of rust and powdery mildew stayed at a lower level. Presence of *Microdochium nivale* was registered sporadically. Higher susceptibility of the creeping cultivar Nista to infestation by fungi causing leaf spots and powdery mildew was observed. In the vast majority of cases applying chemical protection significantly decreased a degree of plant infestation in the summer period.

Keywords: disease index, *Festuca rubra*, leaf spots, powdery mildew, red fescue, rusts

INTRODUCTION

Theoretically, obtaining a high seed yield of grasses is determined by the proper number of generative shoots per area unit, the number of spikelets per shoot and their filling with properly developed kernels. Unfortunately, in practice we meet with a huge impact of biotic and abiotic environmental factors on plant development during their growing period [Falkowski 1982, Pańka and Szczepanek 2008]. Those factors largely modify potential yield-forming abilities of grasses. This often leads to large variation in

Corresponding author – Adres do korespondencji: dr inż. Dariusz Pańka, Department of Phytopathology of University of Technology and Life Sciences in Bydgoszcz, Ks. A. Kordeckiego 20, 85-225 Bydgoszcz, e-mail: panka@utp.edu.pl

their yield. Pathogens are considered one of the most essential elements that influence the yields obtained. Their development is mainly related to a decrease in plant assimilation area and a reduction of its conditions, and thus resistance to the effect of abiotic stress. Approximately 20 species of pathogens are distinguished in Poland which might contribute to economic loses in grass cultivation [Kućmierz 1977, Kutrzeba 1994, Prończuk 2000]. The range of the most dangerous pathogens varies slightly according to the grass species, yet the substantial part of them are polyphagous organisms adapted for living on particular grasses. Therefore, those considered the most important are mostly uredinales of the genera *Puccinia* and *Uromyces*, pathogens inducing leaf spots of the genera *Drechslera* and *Bipolaris*, those responsible for withering of roots and root crowns, belonging to the genera *Fusarium*, *Microdochium* and *Typhula,* and for powdery mildew – *Blumeria graminis* [Wilkins 1972, Cook 1975, Labruyere 1980, Lewis 1992, 1994, Burhenne et al. 1994, Kutrzeba 1994, Czembor 2003, Prończuk 2005]. The most dangerous pathogens of red fescue mentioned most frequently include *Puccinia graminis*, *P. festucae*, *Microdochium nivale* and *Fusarium* spp. Those fungi thin and weaken plants and limit the formation of generative shoots. Publications concerning the harmfulness of the diseases as well as the need and effectiveness of chemical protection of red fescue seed plantations against pathogens are fragmentary and often ambiguous.

The aim of this study was to estimate the susceptibility of the tuft (ssp. *commutata*) and creeping (ssp. *rubra*) forms of *Festuca rubra* to infestation by pathogenic fungi and the grounds for the chemical protection of plantations against diseases.

MATERIAL AND METHODS

The study was carried out on red fescue of the tuft cultivar Mirena and the creeping cultivar Nista, grown for seeds. Experimental plots were established at the Experimental Variety Testing Station in Chrząstowo (53°09' N; 17°35' E), in two series, including the establishment year and two production years; respectively, the first series in 2004--2006, whereas the other in 2005-2007. Both lawn cultivars were sown in the summer in the middle of July, in the split-plot design in four replications on plots of an area of 15 m^2. The field experiment was located on a medium soil of the defective wheat complex, soil quality class IVa of neutral reaction. The content of phosphorus and potassium in soil stayed at a very high level. Red fescue was sown at an amount of 8 $kg \cdot ha^{-1}$, in a row spacing of 24 cm and at a depth of 1 cm. Presowing fertilization was applied at a level of: N – 40, P – 60 and K – 80 $kg \cdot ha^{-1}$ of pure component. In the first production year, the plants were fertilized with nitrogen at a rate of 80 $kg \cdot ha^{-1}$ in spring before starting of growth, whereas after seed harvesting NPK fertilization was applied in amounts of 40, 60, 80 $kg \cdot ha^{-1}$, respectively. In the second production year, mineral nitrogen was applied in spring at a rate of 60 $kg \cdot ha^{-1}$. Weeds were controled using herbicidal protection and mechanically, by means of harrowing. Additionally, in the variant with full chemical protection, fungicides and insecticides were applied when there was a threat. In the establishment years, in September the fungicide Amistar 250 SC was applied at a rate of 1.0 $dm^3 \cdot ha^{-1}$ (azoxystrobine – 250 $g \cdot dm^{-3}$). In the production years, the first measure was carried out in the middle of May (the beginnig of panicle formation) using the fungicide Amistar 250 SC at a rate of 1.0 $dm^3 \cdot ha^{-1}$ and Decis 2,5 EC at a rate of 0.3 $dm^3 \cdot ha^{-1}$ (deltamethrin – 2.5%), and the other in the middle of June

(the end of flowering/beginning of seed formation) with the fungicide Bumper Super 490 EC at a rate of 1 $dm^3 \cdot ha^{-1}$ (prochloraz 400 $g \cdot dm^{-3}$ + propiconazole 90 $g \cdot dm^{-3}$). In the control treatments, fungicide control was not carried out. Estimation of the intensity of disease symptoms on red fescue was conducted once in the establishment year (in the autumn period), twice in the first production year (in the summer period, during maturing and in the autumn, at the end of the growing period), and once in the second production year (in the summer period). Assessment of plant infection degree was made based on the modified scale by Birckenstaedt et al. [1994], on which 0 − denoted healthy leaves, and 8 – leaves on which disease symptoms were noticeable on more than 69.3% of leaf area for rust and powdery mildew and 64.7% of leaf area for spots. In each replication 50 randomly collected leaves were analysed. The obtained degrees were transformed into disease indexes (DI) according to the formula by Townsend and Heuberger [Wenzel 1948], and then subjected to the analysis of variance for two-factorial experiments in the randomized split-plot design. The significance of differences was determined based on Tukey's confidence half-intervals.

RESULTS AND DISCUSSION

Moderate infestation of red fescue of the cultivars Mirena and Nista by pathogenic fungi was found in the successive years of the study (Tables 1, 2, 3). Pathogens of the genus *Drechslera* causing symptoms in the form of leaf spots occurred at the highest intensity. The most favourable conditions for their development prevailed in the period before seed harvesting in 2007. May and June in that year were characterized by rainfalls higher than average, and the average temperatures were higher than the average from the long-time period (Tables 4, 5). Moreover, due to higher temperatures in March, the growing season started slightly earlier, which additionally prolonged the time of plant exposition to the attack of pathogens. The highest values of the leaf disease index (16.9%) were also registered then, particularly by spots (Table 3). Good conditions for their development, as well as for other diseases, prevailed also in 2006, both at the beginning and the end of growth (Tables 4, 5). This was also caused by relatively high rainfalls and temperatures in April and May, as well as in August and September. Therefore, the values of the disease index, particularly for spots, were also relatively high then (Tables 2, 3). In the other periods the intensity of spot occurrence (DI) stayed at a level of several percent. Application of fungicidal protection statistically significantly limited the occurrence of spots on the cultivars Mirena and Nista in the period before seed harvesting, in both series of the experiment, both in the first and second production years of the plantation (Tables 2, 3). Such effect was not found during the autumn observations in all the experimental combinations, although absolute values of the disease index were in most cases higher on the treatments without chemical protection (Tables 1, 2). Some diversification was observed concerning the susceptibility of the tested cultivars to infestation by fungi causing spots. During the summer observations, in both series and production years the creeping cultivar Nista was infected significantly more intensely (Table 2). This effect was observed only on plots without chemical protection. Application of fungicides considerably limited the level of infestation, which blurred differences in cultivar susceptibility. During the autumn observation, a significantly higher average infestation of Nista was registered only in the first production year of the second series, when relatively the highest

invasion of fungi inducing spots was observed, due to the favourable conditions for their development prevailing in the second half of the growing period 2006 (Tables 4, 5).

Table 1. Occurrence of diseases [DI in %] on red fescue Mirena and Nista protected and unprotected with pesticides in the establishment year (autumn observation)

Tabela 1. Występowanie chorób [IP w %] na chronionej i niechronionej pestycydami kostrzewie czerwonej Mirena i Nista w roku siewu (obserwacja jesienna)

Experimental treatment Kombinacja doświadczalna	Year of observation – Rok obserwacji								
	2004			2005			2004-2005		
	Cultivar – Odmiana								
	Mirena	Nista	mean średnia	Mirena	Nista	średnia	Mirena	Nista	mean średnia
Rdze – Rusts									
With chemical protection Z ochroną chemiczną	1.53a[1] a[2]	1.60a a	1.56 a	2.23a a	2.48a a	2.35 a	1.88a a	2.04a a	1.96 a
Without chemical protection Bez ochrony chemicznej	3.53a a	2.40a a	2.96 a	3.10a a	3.73a a	3.41 a	3.31a a	3.06a a	3.19 a
Mean – Średnia	2.53a	2.00a	x	2.66a	3.10a	x	2.59a	2.55a	x
Spots – Plamistości									
With chemical protection Z ochroną chemiczną	3.68a a	4.10a a	3.89 a	2.68a a	2.65a a	2.66 a	3.18a a	3.38a a	3.28 a
Without chemical protection Bez ochrony chemicznej	4.35a a	4.40a a	4.38 a	3.23a a	3.03a a	3.13 a	3.79a a	3.71a a	3.75 a
Mean – Średnia	4.01a	4.25a	x	2.95a	2.84a	x	3.48a	3.54a	x
Powdery mildew – Mączniak prawdziwy									
With chemical protection Z ochroną chemiczną	0.58a a	0.20a a	0.39 a	0.20a a	0.28a a	0.24 a	0.39a a	0.24a a	0.31 a
Without chemical protection Bez ochrony chemicznej	0.70a a	1.00a a	0.85 a	0.33a a	0.63a a	0.48 a	0.51a a	0.81a a	0.66 a
Mean – Średnia	0.64a	0.60a	x	0.26a	0.45a	x	0.45a	0.53a	x

[1] values denoted with the same letter in lines do not differ significantly at P = 0.05 – wartości oznaczone w wierszach tą samą literą nie różnią się istotnie przy P = 0,05

[2] values denoted with the same letter in columns do not differ significantly at P = 0.05 – wartości oznaczone w kolumnach tą samą literą nie różnią się istotnie przy P = 0,05

Table 2. Occurrence of diseases [DI in %] on red fescue Mirena and Nista protected and unprotected with pesticides in the first production year

Tabela 2. Występowanie chorób [IP w %] na chronionej i niechronionej pestycydami kostrzewie czerwonej Mirena i Nista w pierwszym roku użytkowania

Experimental treatment Kombinacja doświadczalna	Rok obserwacji – Year of observation								
	2005			2006			2005-2006		
	Cultivar – Odmiana								
	Mirena	Nista	mean średnia	Mirena	Nista	średnia	Mirena	Nista	mean średnia
1	2	3	4	5	6	7	8	9	10
Summer observation – Obserwacja letnia									
Rusts – Rdze									
With chemical protection Z ochroną chemiczną	0.00a[1] a[2]	0.00a a	0.00 a	0.20a a	0.30a a	0.25 a	0.10a a	0.15a a	0.13 a
Without chemical protection Bez ochrony chemicznej	0.08a a	0.20a a	0.14 a	4.35a a	5.60a a	4.98 a	2.21a b	2.90a b	2.56 b
Mean – Średnia	0.04a	0.10a	x	2.28a	2.95a	x	1.16a	1.53a	x
Spots – Plamistości									
With chemical protection Z ochroną chemiczną	1.03a a	1.53a a	1.28 a	1.23a a	1.78a a	1.50 a	1.13a a	1.65a a	1.39 a
Without chemical protection Bez ochrony chemicznej	2.93a b	5.43b b	4.18 b	7.15a b	8.43b b	7.79 b	5.04a b	6.93b b	5.98 b
Mean – Średnia	1.98a	3.48b	x	4.19a	5.10b	x	3.08a	4.29b	x
Powdery mildew – Mączniak prawdziwy									
With chemical protection Z ochroną chemiczną	1.20a a	1.08a a	1.14 a	0.00a a	0.00a a	0.00 a	0.60a a	0.54a a	0.57 a
Without chemical protection Bez ochrony chemicznej	10.23a b	16.50b b	13.36 b	0.48a b	0.40a b	0.44 b	5.35a b	8.45b b	6.90 b
Mean – Średnia	5.71a	8.79b	x	0.24a	0.20a	x	2.98a	4.49b	x
Autumn observation – Obserwacja jesienna									
Rusts – Rdze									
With chemical protection Z ochroną chemiczną	3.58a a	3.53a a	3.55 a	4.48a a	4.35a a	4.41 a	4.03a a	3.94a a	3.98 a
Without chemical protection Bez ochrony chemicznej	4.50a a	5.23a a	4.86 a	5.73a a	5.23a a	5.48 a	5.11a a	5.23a a	5.17 a
Mean – Średnia	4.04a	4.38a	x	5.10a	4.79a	x	4.57a	4.58a	x

Table 2 continue – cd. tabeli 2

1	2	3	4	5	6	7	8	9	10
Spots – Plamistości									
With chemical protection Z ochroną chemiczną	4.75a a	3.58a a	4.16 a	11.40a a	15.08a a	13.24 a	8.08a a	9.33a a	8.70 a
Without chemical protection Bez ochrony chemicznej	5.25a a	4.80a a	5.03 a	13.80a a	15.93a a	14.86 a	9.53a a	10.36a a	9.94 a
Mean – Średnia	5.00a	4.19a	x	12.60a	15.50b	x	8.80a	9.84a	x
Powdery mildew – Mączniak prawdziwy									
With chemical protection Z ochroną chemiczną	0.25a a	0.48a a	0.36 a	1.15a a	0.90a a	1.03 a	0.70a a	0.69a a	0.69 a
Without chemical protection Bez ochrony chemicznej	0.83a a	1.50a a	1.16 a	2.70a a	1.98a a	2.34 a	1.76a a	1.74a a	1.75 a
Mean – Średnia	0.54a	0.99a	x	1.93a	1.44a	x	1.23a	1.21a	x

[1, 2] for explanations, see Table 1 – objaśnienia pod tabelą 1

Another pathogen registered at each time of observation was the fungus *Blumeria graminis*. Intensity of its occurrence in the years of the study was not very high; however, the beginning of 2005 clearly appeared favourable for the pathogen development and during the summer observation the disease index in the first series reached a level of 16.5% (Table 2). Similarly to the case of spots, the occurrence of powdery mildew was also significantly limited by the fungicides applied in the spring in all the experimental combinations, irrespective of the production year, series or cultivar (Tables 2, 3). No significant effect of fungicides on the pathogen was registered during the autumn observations. This was probably connected with its low invasion in this period in the years of the study (Tables 1, 2). On the plants in the first series, a significant difference in the cultivar susceptibility to infestation by *B. graminis* occurred in both production years on the treatments without chemical protection. The creeping cultivar Nista was more intensely infected. Such an effect was not found in the second series of the study. Higher susceptibility of this cultivar to the development of powdery mildew and spots might have resulted from the fact of having wider leaf blades as compared with Mirena. The diseases mentioned developed more frequently on wide-blade species.

Uredinales were registered on red fescue in all the years of the study, although the level of intensity was relatively low (Tables 1, 2, 3). The highest values of the disease index for those pathogens, at a level of 6.18%, was observed in 2007 on the plots of the second series in the summer period (Table 3). Significant influence of chemical protection against rusts was registered in the second production year of the first and second series during the summer observation. At the same time of the first production year of both series the significance did not occur, but the analysis of average values indicated its presence. Effect of fungicidal measures on the occurrence of rust

symptoms was not registered in the autumn period (Tables 1, 2). No variation was observed in the susceptibility of the tested cultivars to the disease occurrence.

Table 3. Occurrence of diseases [DI in %] on red fescue Mirena and Nista protected and unprotected with pesticides in the second production years (summer observation)
Tabela 3. Występowanie chorób [IP w %] na chronionej i niechronionej pestycydami kostrzewie czerwonej Mirena i Nista w drugim roku użytkowania (obserwacja letnia)

Experimental treatment Kombinacja Doświadczalna	Year of observation – Rok obserwacji								
	2006			2007			2006-2007		
	Cultivar – Odmiana								
	Mirena	Nista	mean średnia	Mirena	Nista	mean średnia	Mirena	Nista	mean średnia
Rdze – Rusts									
With chemical protection Z ochroną chemiczną	0.08a[1] a[2]	0.20a a	0.14 a	1.28a a	1.23a a	1.25 a	0.68a a	0.71a a	0.69 a
Without chemical protection Bez ochrony chemicznej	2.85a b	3.35a b	3.10 b	5.90a b	6.18a b	6.04 b	4.38a b	4.76a b	4.57 b
Mean – Średnia	1.46a	1.78a	x	3.59a	3.70a	x	2.53a	2.74a	x
Spots – Plamistości									
With chemical protection Z ochroną chemiczną	0.90a a	0.88a a	0.89 a	2.05a a	2.23a a	2.14 a	1.48a a	1.55a a	1.51 a
Without chemical protection Bez ochrony chemicznej	7.35a b	9.48b b	8.41 b	13.58a b	16.9b b	15.24 b	10.46a b	13.19b b	11.83 b
Mean – Średnia	4.13a	5.18b	x	7.81a	9.56b	x	5.97a	7.37a	x
Powdery mildew – Mączniak prawdziwy									
With chemical protection Z ochroną chemiczną	0.00a a	0.00a a	0.00 a	1.65a a	1.78a a	1.71 a	0.83a a	0.89a a	0.86 a
Without chemical protection Bez ochrony chemicznej	0.15a a	0.65b b	0.40 b	4.73a b	5.45a b	5.09 b	2.44a b	3.05a b	2.74 b
Mean – Średnia	0.08a	0.33b	x	3.19a	3.61a	x	1.63a	1.97a	x

[1, 2] for explanations, see Table 1 – objaśnienia pod tabelą 1

Single cases of plant losses on the plots were also observed in the successive years of the study. Mycological analysis of withering plants indicated their infestation mainly by *Microdochium nivale* and fungi of the genus *Fusarium*. Plant withering, however, was most likely a result of a complex, combined effect of many factors, including the weather, which by weakening the plant condition increased their susceptibility to infestation. The tested cultivars are characterized by a relatively small susceptibility to snow mould, which would explain its largely sporadical occurrence on the plots. Older cultivars frequently show a higher susceptibility to infestation by *M. nivale*. Prończuk

[2000] mentions snow mould as one of more dangerous diseases of red fescue. Susceptibility of the tested cultivars by the author cited was very high in many cases, and the average level of resistance did not exceed a value of 7.8 on a 9-degree scale. Moreover, Prończuk [2000] also stresses the effect of conditions prevailing in a given year on the size of losses caused by the disease. Milder winters were more favourable for the pathogen development, thus increasing its limiting effect on yield.

Table 4. The mean air temperature in Chrząstowo (2004-2007)
Tabela 4. Średnia temperatura powietrza w Chrząstowie (2004-2007)

Month – Miesiąc	Air temperature – Temperatura powietrza, °C					
	2004	2005	2006	2007	2004-2007	1980-2007
January – Styczeń	-5.2	1.1	-7.2	3.5	-1.9	-1.5
February – Luty	0.3	-2.9	-2.3	-0.9	-1.4	-0.8
March – Marzec	3.5	0.2	-1.0	5.4	2.0	2.7
April – Kwiecień	8.2	8.0	7.8	9.0	8.3	8.3
May – Maj	12.0	12.6	12.8	14.2	12.9	14.0
June – Czerwiec	15.1	15.4	17.2	18.2	16.5	16.8
July – Lipiec	17.0	19.8	22.6	18.0	19.4	19.1
August – Sierpień	19.0	16.8	17.4	18.1	17.8	18.6
September – Wrzesień	13.4	15.5	15.9	12.7	14.4	13.3
October – Październik	9.4	9.3	10.4	7.2	9.1	8.8
November – Listopad	3.4	2.9	5.5	1.7	3.4	2.5
December – Grudzień	1.5	-0.2	4.0	0.9	1.6	-0.1
Mean – Średnia	8.1	8.2	8.6	9.0	8.5	8.5

Table 5. Precipitation distribution in Chrząstowo (2004-2007)
Tabela 5. Rozkład opadów w Chrząstowie (2004-2007)

Month – Miesiąc	Total precipitation – Suma opadów, mm					
	2004	2005	2006	2007	2004-2007	1980-2007
January – Styczeń	35.3	40.2	3.6	73.0	38.0	30.7
February – Luty	38.5	29.2	15.8	32.8	29.1	25.5
March – Marzec	28.7	18.9	21.9	55.2	31.2	34.3
April – Kwiecień	14.2	28.7	60.4	16.6	30.0	29.3
May – Maj	50.9	78.8	67.4	83.5	70.2	48.6
June – Czerwiec	41.3	37.7	14.6	111.7	51.3	69.3
July – Lipiec	58.2	39.3	28.5	88.9	53.7	70.9
August – Sierpień	85.2	43.2	163.9	29.4	80.4	58.4
September – Wrzesień	33.2	23.8	55.6	39.5	38.0	45.8
October – Październik	58.1	18.6	8.5	22.6	27.0	32.6
November – Listopad	28.9	20.5	32.0	27.3	27.2	31.1
December – Grudzień	40.5	63.8	32.6	35.9	43.2	38.5
Total – Suma	513.0	442.7	504.8	616.4	519.2	515.1

High effectiveness of the fungicides applied in limiting the occurrence of leaf spots, powdery mildew and rust was observed in the present study. Effectiveness of chemical protection against pathogens is confirmed by numerous reports in the literature [Prończuk 2000, Goliński 2003, Pańka and Szczepanek 2009]. Unquestionably, applying fungicides reduces the level of disease occurrence. However, it does not always result in an increase in yield and is profitable. Increase in seed yield was

reported by Pańka and Szczepanek [2009] as well as by Goliński [2003]. Nevertheless, such relation was not observed in the present study. Fungicidal measures did not affect a growth in seed yield of the cultivars Mirena and Nista (unpublished data). This questions the profitability of chemical protection in those cultivars. Similar stand is also expressed by Labruyere [1980] and Kalton et al. [1996] on the basis of the experiments conducted. Lack of the effect of fungicidal measures in the experiments conducted was most likely caused by a relatively high resistance of the tested cultivars to occurring pathogens. Plant infestation level in the combinations without chemical protection was significantly higher, yet it remained at a relatively low level. Such intensity of diseases probably exerted a slight effect on the process of assimilation. Consequently, the lack of a significant effect on seed yield was registered. However, fungicide application is not completely unjustified in such a situation. Strongly reducing fungi of the genera *Drechslera*, *Fusarium*, *Bipolaris* and others, they considerably improve the quality of obtained seeds. These pathogens, developing on kernels, can produce metabolics toxic for animals, as well as decrease their vitality by increasing the percentage of young plants withering [Chełkowski 1985, Kwaśna et al. 1991, Musiał 1996, Wiewióra and Prończuk 2000].

CONCLUSION

Intensity of the occurrence of leaf spots, rust and powdery mildew on red fescue cv Mirena and Nista in all the combinations was relatively low. Highest values of plant disease index were registered in the case of spots. Higher susceptibility of the creeping cultivar Nista to infestation by fungi causing leaf spots and powdery mildew was observed. In the vast majority of cases, the application of chemical protection significantly decreased a degree of plant infestation in the summer period.

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PODATNOŚĆ *Festuca rubra* L. SSP. *commutata* I *rubra* NA PORAŻENIE PRZEZ PATOGENY GRZYBOWE W WARUNKACH STOSOWANIA OCHRONY FUNGICYDOWEJ

Streszczenie. Celem badań było określenie podatności kępowej (ssp. *commutata* – odmiana Mirena) oraz rozłogowej (ssp. *rubra* – odmiana Nista) formy *Festuca rubra* na porażenie przez patogeniczne grzyby oraz wpływu chemicznej ochrony plantacji na zdrowotność roślin uprawianych na nasiona. Badania prowadzono w latach 2004-2006

(pierwsza seria) oraz 2005-2007 (druga seria) w Stacji Doświadczalnej Oceny Odmian w Chrząstowie (53°09' N; 17°35' E). Do ochrony przed patogenami grzybowymi stosowano fungicydy zawierające azoksystrobinę, prochloraz oraz propikonazol. Ocenę nasilenia objawów chorobowych wykonywano w okresie letnim i jesiennym w oparciu o zmodyfikowane skale Birckenstaedt et al. [1994]. W roku siewu i w latach użytkowania stwierdzono umiarkowane porażenie kostrzewy czerwonej odmian Mirena i Nista przez grzyby patogeniczne. Najwyższe wartości indeksu porażenia liści na poziomie IP = 16,9% notowano w przypadku plamistości. Występowanie rdzy i mączniaka prawdziwego kształtowało się na niższym poziomie. Sporadycznie notowano obecność *Microdochium nivale*. Obserwowano wyższą podatność odmiany rozłogowej Nista na porażenie przez grzyby wywołujące plamistość liści i mączniaka prawdziwego. W przeważającej większości przypadków zastosowanie ochrony chemicznej istotnie zmniejszało stopień porażenia roślin w okresie letnim.

Słowa kluczowe: *Festuca rubra*, kostrzewa czerwona, indeks porażenia roślin, mączniak prawdziwy, plamistość liści, rdze

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