Reaction of Winter Wheat Cultivars to Common Bunt *Tilletia tritici* (Bjerk.) Wint. **and** *T. laevis* Kühn

Veronika DUMALASOVÁ and Pavel BARTOŠ

Department of Genetics and Plant Breeding Methods, Division of Plant Genetics, Breeding and Product Quality, Crop Research Institute, Prague-Ruzyně

Abstract

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Fifteen registered winter wheat cultivars were tested for reaction to common bunt in 2-years trials. A mixture of seven Czech proveniences of common bunt was used for inoculation. Cvs Globus and Bill were most resistant in both years. The reaction of these two cultivars to 16 Czech and German samples of common bunt of different proveniences was also tested. On cvs Globus and Bill only one sample in one year caused bunt incidence 29.3% and 19.3%, whereas the incidence caused by other bunt samples was below 10% and 15%, respectively.

Keywords: common bunt; wheat; resistance

In the last decades restricted seed treatment and use of uncertified seed led to a higher incidence of common bunt. Cultivars resistant to common bunt are important for organic farming as well as for low input farming. For this reason we have tested commercial cultivars registered in the Czech Republic, foreign commercial cultivars as well as potential sources of resistance for resistance breeding and summarised our results in three papers (Dumalasová & Bartoš 2006a,b, 2007). This paper contains additional data on common bunt resistance of registered winter wheat cultivars not tested earlier, and on the most resistant registered cvs Globus and Bill.

MATERIALS AND METHODS

Seed of wheat cultivars registered in the Czech Republic originated from the Central Institute for Supervising and Testing in Agriculture, Brno, Czech Republic. A mixture of *T. tritici* and *T. laevis* (1:1) was used for inoculation in both years of the trials. The mixture contained samples of *T. tritici* from Červený Újezd, Jičín and Kroměříž and samples of *T. laevis* from Kralovice, Prague-Ruzyně, Úhřetice and Kroměříž. The mixture was tested on *Bt0–Bt13* lines (Goates 1996) with the following results (% infected ears): *Bt0* – 57.2, *Bt1* – 30.6, *Bt2* – 36.6, *Bt3* – 7.3, *Bt4* – 3.6, *Bt5* – 1.6, *Bt6* – 7.5, *Bt7* – 54.6, *Bt8* – 7.8, *Bt9* – 0.0, *Bt10* – 0.0, *Bt11* – 0.0, *Bt12* – 0.0, *Bt13* – 5.4. The collections of bunt inocula of different provenience from the Czech Republic were obtained by courtesy of colleagues from various agricultural institutions. Inocula of different provenience from Germany was obtained by courtesy of Dr. H. Spiess, IBDF-Zweigstelle Dottenfelderhof, Bad Vilbel; they were tested on the resistant cvs Globus and Bill and

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susceptible check cv. Batis in 2006 and 2007 (also on cv. Brea in 2006). Seed was inoculated by shaking 250 seeds with 0.1 g bunt teliospores in a flask for 1 minute.

Seed was inoculated and sown in late October after the usual winter wheat sowing period. Each seed sample was sown in 4–6 replications in rows 1 m long, 0.2 m apart. Healthy and diseased ears were scored in July. Reaction to bunt was expressed as percentage of infected ears. To facilitate the comparison of results with bunt samples from different proveniences (Table 2), the data were related to the disease level on cv. Batis (taken for 100%) that had been tested with the same inoculum; the values were designated as relative bunt incidence. Results of the variety tests were analysed by ANOVA after angular transformation of the data in percents (Table 1). For Figure 1 untransformed data (% of bunted ears) were used.

RESULTS

Of the registered winter wheat cultivars tested in 2006 and 2007 (Table 1) cvs Globus and Bill were most resistant. In 2006, when the average bunt incidence was lower than in 2007, the cvs Etela, Vlasta and Florett also had a bunt incidence below 20%, whereas in 2007 they showed a higher disease

Table 1. Reaction of registered winter wheat cultivars to common bunt

Cultivar	Year registered	Bunt incidence*			
		2006		2007	
Globus	2003	4.70	a	13.65	a
Etela	2006	15.35	ab	41.10	bc
Bill	2002	15.55	ab	18.95	a
Vlasta	1999	15.90	ab	35.70	bc
Florett	2006	17.48	ab	48.58	de
Estica	1995	20.00	abc	54.68	ef
Šárka	1997	23.10	abcd	36.18	bc
Simila	2006	25.55	bcd	57.18	ef
Rialto	1999	26.03	bcd	48.30	de
Ludwig	2000	26.45	bcd	50.08	de
Rheia	2002	26.60	bcd	49.30	de
Record	1999	31.03	bcd	45.25	cd
Eurofit	2006	33.35	bcd	54.40	ef
Dromos	2006	39.05	cd	56.05	ef
Buteo	2006	41.75	cd	59.63	f

*% of bunted ears after angular transformation for ANOVA. Data within columns followed by different letters are statistically different at $P = 0.05$

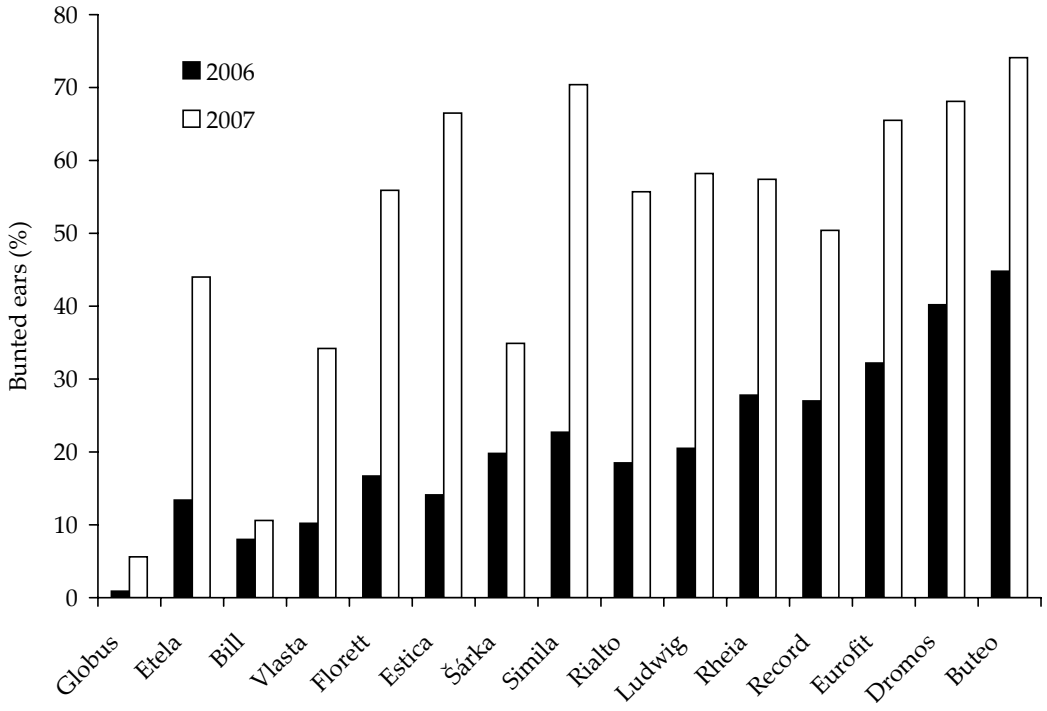

Figure 1. Reaction of registered wheat cultivars to common bunt (% of bunted ears)

Table 2. Reaction of cultivars Brea, Bill and Globus to different proveniences of common bunt

Year	Bunt provenience		Bunt species	Relative bunt incidence[1]/cv.		
				Brea	Bill	Globus
2006	CZ	Beroun	T. tr.	158.1	0.0	0.0
		Červený Újezd	T. l.	104.9	0.0	6.1
		Kroměříž	T. tr.	110.0	6.1	1.0
		Krukanice	T. tr.	177.3	11.3	0.0
		Lovosice 1	T. tr.	78.4	17.1	1.0
	D	Bad Vilbel	T. tr.	94.7	0.0	0.0
		Berlin-Dahlem	T. tr.	78.7	4.0	11.5
		Darzau	T. tr.	55.8	0.0	0.0
		Münster	T. tr.	85.2	0.0	0.0
		Salem	T. tr.	58.0	1.3	0.0
2007	CZ	Praha východ	T. tr.	–	14.4	9.1
		Zlín	T. tr.	–	21.4	15.2
		Lovosice 2	T. tr.	–	25.9	7.8
		Lovosice 3	T. tr.	–	21.7	11.5
		mixture – isolate[2]	T. l.	–	22.9	20.2
	D	Berlin-Dahlem[3]	T. tr.	–	31.9	47.6

[1]bunt incidence (% of infected ears) related to the bunt incidence of cv. Batis tested with the same bunt provenience. Average bunt incidence on cv. Batis was 16.0% in 2006 and 53.2% in 2007

[2]bunt sample from cv. Globus tested in 2006 with the mixed inoculum

[3]bunt sample from cv. Globus tested in 2006 with the bunt sample Berlin-Dahlem

T. tr. = *Tilletia tritici*, T. l. = *T. laevis*

level. To the most susceptible cultivars belonged Eurofit, Dromos, and Buteo. The reaction of other cultivars varied (Figure 1).

In 2006 the cv. Globus showed high resistance to all tested proveniences of bunt from the Czech Republic as well as from Germany with only one exception, a relatively high (11.5%) relative bunt incidence caused in cv. Globus by the bunt sample from Berlin-Dahlem, Germany (Table 2). In 2007 the average bunt incidence was higher than in 2006. The highest relative bunt incidence on cv. Globus was again after inoculation with the bunt sample from Berlin-Dahlem. On cv. Bill the average bunt incidence was higher than on cv. Globus in both years. In 2006 the sample from Berlin-Dahlem caused only an average bunt incidence of 4% on cv. Bill. In 2007 it caused the highest bunt incidence of all tested bunt samples on cv. Bill, although it was lower than on cv. Globus. Whereas in 2006, four of five Czech bunt samples produced a higher bunt incidence on the Czech cv. Brea than on the German cv. Batis, all five German bunt samples caused a higher bunt incidence on cv. Batis than on cv. Brea. The difference was statistically significant at $P = 0.05$.

DISCUSSION

Trials with the registered wheat cultivars confirmed the high resistance of cvs Globus and Bill and considerable variation in the bunt incidence in medium resistant/susceptible cultivars. That was observed also in our previous trials (Dumalasová & Bartoš 2006a, b).

Data obtained with Czech and German bunt proveniences may suggest that bunt in the samples we used is better adapted to the cultivars grown on a larger area in the country where the bunt comes

from, i.e. causes a higher bunt incidence on them, than on cultivars grown in the other country or on a smaller area. However, this suggestion is based on only one year experiment with four (out of five) Czech and five German bunt samples.

Cv. Tommi (of the same origin as cv. Globus) and cv. Batis were also tested in Germany with five proveniences of common bunt. After inoculation with two proveniences cv. Tommi belonged to the group with the lowest bunt incidence (0–0.01%), with three proveniences to the group with a bunt incidence of 0.01–2.0% which indicates than none of the tested bunt samples was virulent on that cultivar (Wächter *et al.* 2007). Cv. Batis was ranked once to the group with a bunt incidence of 8–20%, once to the group with 20–40%, and three times to the group with bunt incidence over 40%. In a trial at Pfaffenwald 1 (Germany) in 2004/2005, cv. Globus remained without bunt incidence (Spiess, personal communication). Our results with different bunt proveniences carried out in 2007 indicate that bunt samples can be found that cause a relatively high bunt incidence even in cvs Globus and Bill, cultivars that showed the highest resistance in previous trials (Dumalasová & Bartoš 2006a,b).

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Corresponding author:

RNDr. Veronika Dumalasová Ph.D., Výzkumný ústav rostlinné výroby, v.v.i., Odbor genetiky, šlechtění a kvality produkce, Oddělení genetiky a šlechtitelských metod, 161 06 Praha-Ruzyně, Česká republika
tel.: + 420 233 022 232, e-mail: dumalasova@vurv.cz