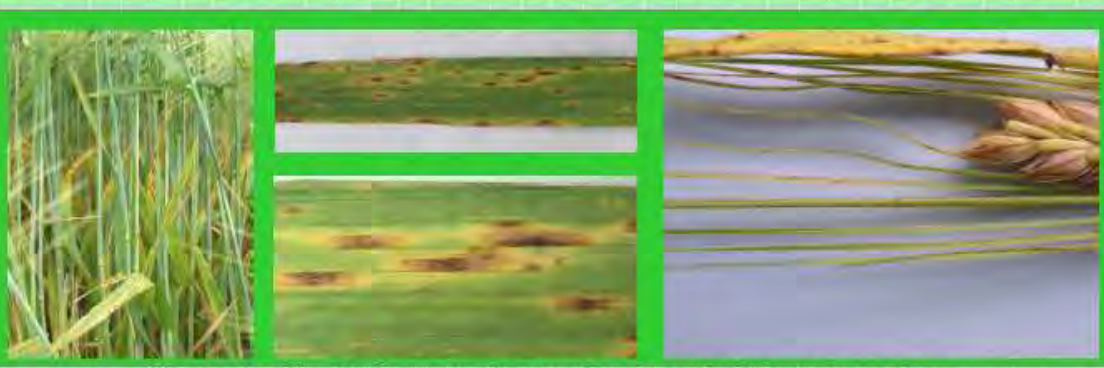
Variation in response of winter barley cultivars to Ramularia leaf spot

P Marik[1], P Matusinsky[2], L Stemberkova[1], M Hanusova[1]

[1]Research centre SELTON, s.r.o., Stupice 24, 250 84 Sibrina, Czech Republic
[2]Agricultural Research Institute Kromeriz, Ltd., Havlickova 2787/121, 767 01 Kromeriz, Czech Republic

The fungus *Ramularia collo-cygni* (RCC) is increasingly important as the causal agent of Ramularia leaf spot (RLS). The work aimed to identify resources suitable for developing new breeding lines of winter barley with improved resistance. During the first experimental period (2001–2005), RLS incidence was monitored in 711 cultivars and advanced breeding lines. Differences were detected in the intensity of symptomatic expression, but no material showed high resistance. During the second experimental period (2006–2009), response to natural RLS infection was evaluated in 19 winter barley cultivars (12 six-row and 7 two-row) registered in the Czech Republic (Tab. 1). Cultivars exhibiting weaker symptomatic expression of infection at milk-waxy to waxy maturity stand mostly among the late cultivars. Only three cultivars with significantly weaker infection symptoms from the current collection of registered cultivars in the Czech Republic can be recommended for growing in regions with strong RCC occurrence: 2-row medium-early cv. Breunskylie, 6-row late cv. Merlot, and 6-row medium-late cv. Highlight. Nevertheless, none of the cultivars or breeding lines tested so far has proven to be resistant to RLS on such a level that it could be recommended as a donor of resistance to this disease.



Typical symptoms of Ramularia leaf spots on barley leaves, sporulation on the lower side of the leaves and spots on the awns

Cultures of *R. collo-cygni* on PDA agar

Spores and conidiophores of *R. collo-cygni* on barley leaf

Disease severity was measured at the milk-waxy growth stage (BBCH 75) using a 9–1 scoring scale where:

9.0 = no infection
8.0 = maximum 5% of leaf area of flag leaf and upper leaf layers infected on sporadic plants
7.0 = up to 15% of leaf area of flag leaf and upper leaf layers infected on sporadic plants
6.0 = up to 25% of leaf area of upper leaf layers infected
5.0 = up to 50% of leaf area of upper leaf layers infected, first symptoms also occur on leaf sheath
4.0 = infection spreads to lower leaf layers, tips of infected leaves begin to wither away on the most infected plants
3.0 = nearly the whole stand area is infected, up to 15% of the most infected leaves are entirely dead and first symptoms occur in the ear
2.0 = up to 50% of the most infected leaves die on most plants, ear and awn infection is visible
1.0 = more than 50% of leaves on plants are dead, total withering of the stand

Table 1. RLS infection severity in registered winter barley cultivars evaluated during 2006–2009

Cultivar	Country of origin	Registered in the Czech Republic	Ear No. of rows	Time of ear emergence	RLS scoring (1–9) 9 = no symptoms	Tukey test at $P < 0.05$
Lovan	CZE	1998	6	early	3.08	a
Lavanda (SUR 01/3128)	DEU	2007	6	early	3.25	ab
Wendy (NORD 02611/33)	DEU	2009	6	early	3.50	abc
Amazone	FRA	2006	6	late	3.67	abcd
Gilberta	BEL	2006	6	early	3.67	abcd
Reni	DEU	2001	2	medium-early	3.67	abcd
Lomerit	DEU	2002	6	medium-early	3.75	abcd
Carevan (NSL 99-6738)	FRA	2009	2	medium-early	3.92	abcde
Scorpia (RE 141601)	DEU	2008	6	medium-early	3.92	abcde
Campanile (NSL 99-8088)	GBR	2007	2	medium-late	3.92	abcde
Alright (LP 6-225)	DEU	2007	6	late	4.08	abcde
Fridericus (LP 6-234)	DEU	2007	6	medium-early	4.08	abcde
Heike (SZD 3109W)	AUT	2009	6	medium-early	4.17	abcde
Florian (KM 999/04)	CZE	2008	2	medium-late	4.25	bcde
Wintmalt (LP 2-545)	DEU	2009	2	late	4.42	cde
Saffron	GBR	2009	2	medium-early	4.50	cde
Breunskylie (Re 45971)	DEU	2008	2	medium-early	4.75	de
Merlot	DEU	2002	6	late	4.75	de
Highlight (LEU 3034-1)	DEU	2008	6	medium-late	5.00	e

This work was supported by the Ministry of Agriculture of the Czech Republic, project No. QH01064.