NEW VARIETIES

Fabian Two-row Winter Barley

Zdeněk NESVADBA, Jaroslav ŠPUNAR and Michaela KADLÍKOVÁ

Agrotest Fyto, Ltd., Kroměříž, Czech Republic

Abstract

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Fabian is a medium-late two-row feedin barley of winter habit developed at Agrotest Fyto, Ltd., Kroměříž, Czech Republic (breeders' rights holder) and registered in the Czech Republic in 2011. In the Official Variety Trials it showed high grain yields under intensive growing conditions (104.5%) and medium yields under low input conditions (101.1%). Fabian has the highest cold hardiness of the registered two-row winter barleys and regenerates very well in the spring. Its resistance to powdery mildew is very high (score 8.2 on a 1–9 scale). It has medium plant height, moderate resistance to lodging and large yellow kernel. The spike is long and of medium density.

Keywords: cultivar description; *Hordeum vulgare* L.; powdery mildew resistance; winter hardiness

Breeding method – pedigree. Fabian was developed from the cross Ladoga/Vanessa made in 2001. Selection of individual plants was begun in the F_2 generation. Single ear selection was done in F_3, and grain from separately harvested ears was grown from the two-row progeny. Disease resistance to snow mould, powdery mildew (specific resistance), brown rust of barley, net and spot blotch, scald, and Ramularia leaf spot was evaluated under natural field infection. Seed from homogeneous F_4 progeny was harvested and used for sowing the first yield test plots in F_5, followed by yield trials in four replications in F_6. The selected line KM 2348 was tested in company trials in the F_7 generation at three localities with four replications. From generation F_6, selection of progeny from separately harvested ears was carried out continuously in order to achieve the required stand homogeneity and to begin maintenance breeding at the same time. KM 2348 was tested in the Official Variety Trials of the Central Institute for Supervising and Testing in Agriculture (CISTA) during 2009 (F_9)–2011(F_{11}). The new variety was officially registered under the name Fabian on December 21, 2011 and Plant Breeders Rights were granted on June 8, 2012.

Yield performance. Official Variety Trials were conducted using two growing systems differing in their levels of fungicide treatment and fertilization. In System 1, the level of fertilization used was similar to that of conventional farming practice, and thus regeneration and production applications of nitrogen were made while fungicide and plant-growth regulator treatments were not used. In System 2, intensive growing technology was used (containing additional qualitative nitrogen fertilization, two fungicide treatments, and one treatment with plant-growth regulator). The field tests were conducted at various places in the Czech Republic, the number of localities was steadily increased up to 14 in total for 2011. The lines

Small quantities of seeds for research and breeding purposes can be obtained from the variety's breeder and maintainer.

Table 1. Yield results during variety testing under two growing systems in the Official State Trials

Variety	2009		2010		2011		Average	
	(t/ha)	(%)	(t/ha)	(%)	(t/ha)	(%)	(t/ha)	(%)
System 1								
Fabian	7.68	99	6.26	98	7.44	106	7.12	101.1
Breunskylie	7.80	101	6.46	102	6.99	99	7.08	100.6
Wintmalt	7.65	99	6.27	98	7.10	101	7.01	99.5
System 2								
Fabian	9.25	103	7.53	102	8.73	109	8.50	104.5
Wintmalt	9.07	101	7.44	100	8.16	102	8.22	101.1
Breunskylie	8.86	99	7.37	100	8.91	98	8.05	98.9

were planted in plots of 10 m^2 with four replications. The grain yield of Fabian was medium under System 1 in three-year tests (7.12 t/ha on average, i.e. 101.1% of the control varieties Breunskylie and Wintmalt), and high under System 2 (8.50 t/ha, i.e. 104.5% of the control varieties) (Table 1).

Grain quality and resistances. As shown in Table 2, kernels are medium large (52 g), with a high percentage of kernels graded above 2.5 mm (94%). This variety is mainly used for feeding purposes. Fabian is resistant to powdery mildew (*Blumeria graminis* f.sp. *hordei*). Its classification

Table 2. Important agronomic data for the Fabian variety and the check varieties Breunskylie and Wintmalt (according to Central Institute for Supervising and Testing in Agriculture 2009–2011)

	Fabian	Breunskylie	Wintmalt
Quality characteristics*			
1000-kernel weight (g)	52	56	47
Grading of kernels > 2.5 mm (%)	94	95	90
N-substances content (%)	11.8	12.5	11.5
Test weight (kg/m^3)	668	682	666
Starch content (%)	59.7	60.1	61.9
Disease resistance on 9–1 scale (9 – without symptoms)			
Fusarium nivale	7.6	7.5	7.8
Blumeria graminis – leaf (DC 37)	8.3	6.7	6.3
Blumeria graminis – maximum	8.2	6.9	6.0
Puccinia hordei	6.7	6.7	6.8
Rhynchosporium secalis	6.6	6.2	6.8
Fusarium head blight – ear	6.9	7.0	7.3
Pyrenophora teres and *Cochliobolus sativus*	6.0	5.2	6.2
Non-specific leaf spots	7.8	7.0	7.2
Stand characteristics			
Lodging at heading (9–1; 9 – high resistance)	7.0	7.0	5.6
Lodging at harvest (9–1; 9 – high resistance)	7.6	7.6	6.9
State after winter period (9–1; 9 – best performance)	7.6	7.5	7.8
No. of days from 1.1. to heading	140	136	140
No. of days from 1.1. to maturity	192	190	193
No. of spikes per square meter	705	661	830
Plant height (cm)	101	100	86
Straw brittleness (9–1; 9 – high)	6.9	6.3	7.9

*presented averages 2009–2010

Table 3. Average winter survival (in %) of the two-row winter barley varieties in comparison with the six-row winter barley Fridericus, determined by a provocation pot test in the Crop Research Institute during three winter periods (2009/2010, 2010/2011 and 2012/2013)

Variety	Row number	Average winter survival*
Fabian	two	60[a]
Fridericus	six	56[ab]
Florian	two	50[b]
Wintmalt	two	41[cd]
Sandra	two	34[de]
Saffron	two	21[ed]

*means in a column followed by the same letter are not significantly different from each other, as determined by Duncan's multiple range test ($P = 0.05$) (Vítámvás *et al*. 2010)

under conditions of natural infection ranged between 8 and 9 on a 9-point scale. At present, powdery mildew attacks Fabian later in the season and disease severity was relatively lower in most locations. Moreover, Fabian is moderately resistant to a complex of leaf blotches (*Pyrenophora teres*, *Cochliobolus sativus*), scald (*Rhynchosporium secalis*), and barley brown rust (*Puccinia hordei*) (Table 2). Fabian is characterized by the highest level of winter hardiness among the entire assortment of two-row winter barley varieties registered in the Czech Republic, and it has very good resistance to drought during spring regeneration. According to the official results of the Crop Research Institute, Prague, the level of winter survival in Fabian, a two-rowed winter barley, is the same as in the six-row winter barley Fridericus (Table 3). The LT50 value (lethal temperature at which 50% of samples are killed) of Fabian plants taken from a field in the winter 2013/2014 was –14.2°C (determined by a direct freezing test, Prášil *et al*. 2007). The plants survived well during the 2009/2010 and 2010/1011 winters even in difficult conditions (Table 4). This property became especially advantageous under the 2011/2012 winter conditions and subsequent dry vegetation period, when the unfavourable weather conditions significantly damaged winter crops in many areas of the Czech Republic.

Other characteristics. Fabian is a medium-late two-row winter barley similar in appearance to the standard variety Wintmalt. Fabian has medium plant height (101 cm) and moderate resistance to lodging. The ear is long, of prismatic shape with medium density of spikelets. The grain is of yellow colour. The awns are long without anthocyanin coloration.

Table 4. Overwintering in wooden boxes in two winter seasons at three localities in the Czech Republic (in %)

Variety	2009/2010				2010/2011				Total average
	CHR	LU	PJA	average	CHR	LU	PJA	average	
Fabian	89	43	78	70	68	6	92	55	62.5
Breunskylie	84	10	61	51	67	1	76	48	49.5
Wintmalt	74	0	25	31	35	0	67	32	31.5

CHR – Chrlice, LU – Lužany, PJA – Pusté Jakartice

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Corresponding author:

Ing. Michaela Kadlíková, Agrotest Fyto, Ltd., Havlíčkova 2787, 767 01 Kroměříž, Česká republika
e-mail: kadlikova.michaela@vukrom.cz