Blackcurrant breeding at I.V. Michurin All-Russia Research Institute for Horticulture and performance of some cultivars

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RYAZAN
REGION
Morshansk
TAMBOV REGION
LIPETSK REGION
Michurinsk
Tambov
Rasskazovo
Kirsanov
Kotovsk
Uvarovo
Zherdevka
SARATOV
REGION
VORONEZH REGION

Blackcurrant breeding at the I.V. Michurin All-Russia Research Institute for Horticulture (VNIIS im. I.V. Michurina)

- Blackcurrant breeding at the I.V. Michurin All-Russia Research Institute for Horticulture (VNIIS im. I.V. Michurina) was started in 1948.
- In the first period (1948-1970) the breeding was based on crossings of blackcurrant cultivars from European subspecies.
- Winterhardiness, high yield, large fruit size, different ripening time, high content of vitamin C were the main goals of breeding.
- It was stated that progeny of European subspecies blackcurrant has susceptibility to gall mite (*Cecidophyopsis spp*.), reversion disease (*Blackcurrant reversion virus*) and anthracnose (*Drepanopeziza ribis* (Kleb.) Höhnel). By this reason other breeding forms from *R. nigrum ssp. sibiricum* E. Wolf. and *R. dikuscha* Fisch. were involved in the breeding.

- In 1969 the infection by powdery mildew (*Sphaerotheca mors-uwae* (Schw.) Berk. et Curt.) was firstly stated in Michurinsk.
- By this reason the enrichment of initial material for breeding by genetically diverse forms was started from 1970. Progeny from *R. procumbens* Pall., *R. pauciflorum* Turcz., *R. fontaneum* Boczkarn., *R. ussuriensis* Jancz., *R. petiolare* Dougl., *R. canadensis* Jancz., *R. bracteosum* Dougl., *R. glutinosum* Benth. were widely used in breeding programs.
- The involving of such genetically and geographically diverse initial material allowed to get progeny with enriched inherited traits.

- Nowadays Breeding programme in VNIIS im. I.V. Michurina is performed on the base of interspecific hybridizations with the usage of cultivars and hybrid clones with the different genetic origin.
- 25-30 crossing combinations are done every year and about 20 000 flowers are pollinated.
- 10-15 thousand seedlings are produced usually per year.
- 1500-5000 seedlings are selected for further evaluation after first screening on resistance to powdery mildew and leaf spot diseases.

Main breeding goals today are:

- Adaptability to growing conditions
- High, stable yield
- Adaptability to mechanical harvesting
- Resistance to main diseases and pests
- Increasing of photosynthetical potential of new cultivars

New cultivars

From the beginning of the 21st century 11 new blackcurrant cultivars were released in the VNIIS im. I.V. Michurina :

‘Divo Zvyaginoy’,
‘Karmelita’,
‘Malenkii Princ’,
‘Sensey’,
‘Talisman’,
‘Tamerlan’,
‘Charovnica’,
‘Chernavka’,
‘Shalun`a’
‘Elevesta’- with black colored fruits
‘Izumrudnoye Ozherel`e’- with green colored fruits.

‘Shalun`a’

‘Divo Zvyaginoy’

‘Izumrudnoye Ozherel`e’

‘Charovnica’

With medium ripening time and early beginning of production.

It has high hardiness to winter damage and drought, field resistance to fungal diseases.

Productivity 10.2-11.0 t ha^{-1} (3.0– 3.3 kg $bush^{-1}$).

‘Elevesta’

With medium ripening time. It has high hardiness to winter damage and drought, resistant to bud mite. Productivity 11.0-12.0 t ha^{-1} (3.5– 3.8 kg $bush^{-1}$).

‘Lebeduscha’

With medium ripening time. Selffertile. It has high hardiness to winter damage, drought and heat. Productivity 10.0-11.7 t ha^{-1} (3.0– 3.5 kg $bush^{-1}$).

‘Malenkii Princ’

With early ripening time and early beginning of production. Selffertile.

It has high hardiness to winter damage and drought, medium resistance to heat.

Resistant to powdery mildew, tolerant to leaf spots.

Productivity 11.5-13.6 t ha^{-1} (3.5– 4.0 kg $bush^{-1}$).

‘Talisman’

With medium late ripening time and with early beginning of production. Selffertile.

It has high hardiness to winter damage and drought, medium resistant to pests and diseases.

Productivity 10.0-13.0 t ha^{-1} (3.0– 4.0 kg $bush^{-1}$).

‘Tamerlan’

With medium ripening time and with early beginning of production. Selffertile.

It has high hardiness to winter damage and drought, sensitive to heat.

It is resistant to diseases and tolerant to pests.

Productivity 12.9-14.0 t ha^{-1} (3.9– 4.3 kg $bush^{-1}$).

Evaluation of cultivars

- **Cultivar evaluation at VNIIS im. I.V. Michurina :**
- Cultivars included- ‘Lebeduscha’, ‘Lyubava`, ‘Malenkii Princ’, ‘Talisman’, ‘Tamerlan’, ‘Charovnica’, ‘Elevesta’ from VNIIS im. I.V. Michurina; ‘Mulgi Must’ and ‘Moka’ from Estonia; ‘Laimiai’, ‘Joniniai’, ‘Vyciai’, ‘Kriviai’ and ‘Kupoliniai’ from Lithiuania.
- Plants were planted in 2005, with planting distances 3 m between rows and 1 m between plants.
- No chemical plant protection and irrigation were used.
- 1-5 plants of every cultivar were used for evaluation.
- The evaluation of cultivars was done according to research methodology for fruit plant cultivar testing (Мичуринск, 1973; Орел, 1999).
- The yield was harvested in 2010-2012. Average fruit weight was evaluated in 2011 and 2012. Plant resistance to pests and diseases was evaluated in 2009-2011.

Results of blackcurrant cultivar evaluation at VNIIS im. I.V. Michurina in average of all testing years (mean ± SD)

Cultivar	Average fruit weight (g)	Yield (kg bush^{-1})	Severity*		
			Anthracnose	Gall mite	Spider mite
Joniniai	0.88 ±0.03	2.4 ±0.55	1.8 ±0.76	0.3 ±0.58	0.5 ±0.50
Kriviai	0.79 ±0.16	1.9 ±0.11	2.8 ±0.76	0.3 ±0.29	1.3 ±0.58
Kupoliniai	0.98 ±0.42	2.6 ±0.50	2.0 ±0.35	1.5 ±0.50	2.1 ±0.23
Laimiai	1.56 ±0.17	1.7 ±0.55	1.9 ±0.90	0.3 ±0.58	1.3 ±0.58
Mulgi Must	0.90 ±0.03	3.2 ±0.62	1.7 ±1.16	0.0 ±0.00	0.3 ±0.58
Moka	0.89 ±0.09	2.6 ±0.25	2.1 ±1.01	0.2 ±0.29	1.4 ±0.75
Vyciai	1.08 ±0.03	0.8 ±0.20	1.7 ±1.53	1.0 ±0.00	2.0 ±1.00
Charovnica	1.01 ±0.08	2.4 ±0.80	1.6 ±0.71	1.3 ±0.58	1.3 ±0.64
Elevesta	1.11 ±0.12	2.2 ±0.84	1.8 ±0.29	0.0 ±0.00	1.3 ±0.58
Lebeduscha	1.00 ±0.00	2.5 ±1.00	1.8 ±0.40	0.0 ±0.00	1.1 ±0.11
Lyubava	0.97 ±0.20	2.0 ±1.10	1.7 ±0.58	0.0 ±0.00	1.2 ±0.91
Malenkii Princ	1.40 ±0.31	2.4 ±0.81	1.2 ±0.20	0.7 ±0.58	1.1 ±0.11
Talisman	1.31 ±0.10	1.9 ±1.55	1.6 ±0.06	1.0 ±0.15	1.3 ±0.81
Tamerlan	1.42 ±0.12	2.2 ±1.10	1.3 ±0.46	1.0 ±0.00	1.1 ±0.29

* Evaluation is given in scores 0-5, where 0- healthy plants, 5- all plants fully infected

Cultivar evaluation at Pūre Horticultural Research Centre (Pūre HRC)

- Cultivars included- ‘Charovnica’, ‘Elevesta’, ‘Malenkii Princ’, ‘Tamerlan’ and ‘Talisman’ from VNIIS im. I.V. Michurina and cultivar ‘Zagadka’ as control.
- Plants planted with planting distances 2.5 m between rows and 1.0 m between plants in 2004.
- 1-3 plants of every cultivar were used for evaluation.
- No chemical plant protection and irrigation were used.
- The yield was harvested in 2007, 2008 and 2011, average fruit weight was evaluated in 2007-2009 and 2011. Plant resistance to pests and diseases was evaluated in years 2007-2011.

Blackcurrant ripening time, yield, fruit size and organoleptic evaluation at Pūre HRC in average of all testing years (mean ± SD)

Cultivar	Fruit ripening time (date, month)	Yield (kg bush^{-1})	Average fruit weight (g)	Fruit evaluation *	
				Taste	Skin thickness
Malenkii Princ	13.07.	0.35 ±0.01	1.07 ±0.20	7.3 ±0.51	4.3 ±0.18
Zagadka	14.07.	1.07 ±0.61	1.05 ±0.05	6.8 ±0.42	4.6 ±0.38
Tamerlan	17.07.	0.38 ±0.17	1.24 ±0.18	6.3 ±0.52	5.1 ±0.33
Talisman	19.07.	1.01 ±1.06	1.07 ±0.22	7.3 ±0.33	4.6 ±0.25
Charovnica	21.07.	0.61 ±0.13	1.02 ±0.16	7.8 ±0.29	4.2 ±0.42
Elevesta	21.07.	1.30 ±0.37	1.08 ±0.22	6.8 ±0.46	5.0 ±0.65
Lebeduscha	24.07.	0.79 ±0.57	0.84 ±0.11	5.7 ±0.31	4.6 ±1.12

* Evaluation is given in scores 1-9, where 1- the lowest evaluation, 9- the highest evaluation

Winter, bud mite and disease damage on blackcurrant cultivars at Pūre HRC in average all testing years (mean ± SD)*

Cultivar	Winter damage	Gall mite	Leaf spots	Powdery mildew
Malenkii Princ	3.0 ±1.17	4.1 ±1.52	4.0 ±1.58	1.0 ±0.00
Zagadka	1.4 ±0.89	1.1 ±0.27	5.6 ±1.34	1.8 ±1.10
Tamerlan	3.2 ±1.79	2.2 ±0.84	5.2 ±1.79	1.0 ±0.00
Talisman	1.4 ±0.89	1.6 ±0.89	4.6 ±0.55	1.0 ±0.00
Charovnica	2.5 ±0.71	3.6 ±1.82	3.9 ±1.34	1.2 ±0.45
Elevesta	1.7 ±0.45	2.6 ±1.56	4.2 ±1.10	1.0 ±0.00
Lebeduscha	2.6 ±1.47	2.2 ±0.84	5.0 ±1.41	1.0 ±0.00

* Evaluation is given in scores 1-9, where 1- healthy plants, 9- all plants fully infected or damaged

CONCLUSIONS

- Lithuanian and Estonian cultivars showed good adaptability for growing in Michurinsk conditions, except ‘Vyciai’ that had weak growth and productivity. Cultivar ‘Mulgi Must’ showed the best results.
- In the Pūre Horticultural Research Centre, Latvia cultivars ‘Elevesta’ and ‘Talisman’ showed the best results between the tested cultivars from VNIIS im. I.V. Michurina breeding programme. However further testing in larger plantings is necessary.

Thank you for your attention!