

# Current state and prospects of breeding in genus *Ribes* L. in the Asian part of Russia

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**Abstract.** This article shows the current state of black currant breeding in Asian Russia on the basis of scientific research of scientists from Siberia and the Far East in historical terms is shown in the present contribution. A comprehensive description of new winter-hardy and high-yielding varieties with high adaptation to biotic and abiotic stresses, for cultivation in the harsh climatic conditions of the Asian part of Russia, is presented. The prospects of using endemic black currant species *R. procumbens* Pall. and *R. pauciflorum* Turcz. ex Pojark, which give new traits and properties during adaptation, in breeding were created and are studied and identified in this article.

## 1 Introduction

This article shows the current state of black currant breeding in Asian Russia on the basis of scientific research of scientists from Siberia and the Far East in historical terms is shown in the present contribution. A comprehensive description of new winter-hardy and high-yielding varieties with high adaptation to biotic and abiotic stresses, for cultivation in the harsh climatic conditions of the Asian part of Russia, is presented. The prospects of using endemic black currant species *R. procumbens* Pall. and *R. pauciflorum* Turcz. ex Pojark, which give new traits and properties during adaptation, in breeding were created and are studied and identified in this article.

## 2 Results of investigations

Over the years of breeding work, more than a hundred varieties of black currant have been bred at M. A. Lisavenko Research Institute. This was achieved by using the method of geographically distant multistage interspecific hybridization. The requirements for varieties are constantly growing. The need to improve the assortment obliges breeders to constantly search for new sources and donors of economically valuable traits, including those for the main diseases (powdery mildew) and pests (gallic aphid, kidney mite). Since 1990, black

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currant varieties have been transferred to the GSI, including those bred: in the low-mountain zone – Altayskaya Pozdniaya (Altayskaya late), Hercules, Zhuravushka, Mirror, Kapel, Lika, Lucia, Ozherelye, Ruslan, Sadko, Sokrovishche (Treasure), Spas, Cherny Aist (Black Stork), Extreme, Yadrenaya (Vigorous), Yadrenaya 2; in the forest-steppe zone - Agata, Altayanka, Baritone, Galinka, Garmonia (Harmony), Groniss, Dachnitsa, Zabava (Fun,) Kanahama, Ksyusha, Mila, Natasha, Nika, Pamyati Kukharskogo (Memory of Kuharsky), Pamyati kalininoy (Memory to Kalinina), Podarok Kusioru (Gift to Kusior), G podarok Sankina (Gift of Sankin), Poklon Borisovoy (Bow to Borisova), Prestige, Rita, Sharovidnaya (Spherical), Egzotika (Exotic), Yubileynaya Lisavenko (Jubilee by Lisavenko) and in the subtaiga zone – Lyubimitsa Bakchchara (Bakchar's Favorite), Nyursinka, Pamyati Gvozdeva (Gvozdev's Memory), Pchelkinskaya, Seyanets Sophyi (Sophia's Seedling), Sobolinka, Suiga and Tikzo.

A special role in the creation of the Siberian black currant assortment belongs to the Novosibirsk Zonal Fruit and Berry Experimental Station breeders who have created more than 30 varieties. The black currant varieties of Zarnitsa, Berdskaya, Danko, Kolkhoznaya, Rus (1949), Agrolesovskaya, Iskitimskaya, Berdchanka (1982), Belated (1990), Early Potapenko (1991), Kalinovka (1991), Shadrikha, Aleander (1992), Zonalnaya (Zonal), Pamyati Potapenko (Potapenko's Memory) (1993), Karachinskaya, Obskaya Chernaya (Ob Black), Berdskaya Chernaya (Berdskaya Black), Degtyarevskaya, Podarok Kumonovu (Gift to Kuminov), Rachel, Glariosa were transferred to the State Cultivar Testing (SCT) (1994), Maryushka (1999), Augusta, Chernysh, Solomon, Irmen, Quail (2001) were subject to the State Cultivar Testing. The first regionalized cultivars of black currant breeding by D. A. Andreichenko were Berdskaya (1961), Danko (1952), Kolkhoznaya (1951), Ob (1952), Rus (1952). In recent years, such black currant varieties as Iskitimsky Dar (2010), Goncharovskaya (2014), Egorovskaya (2016) have been transferred to the SCT from the hybrid gene pool created by V. N. Sorokopudov. Since 2004, since the establishment of LLC Siberian Garden, we have been working together with Doctor of Agricultural Sciences A. E. Solovyova on the breeding of black currant varieties. During this time, unique black currant varieties Isolde, Nanny, Darina (2018), which are leaders in Siberian horticulture quite quickly due to large-fruited, yield and especially in taste qualities [4-6], were subjected to the SCT.

As a result of many-year breeding work of scientists from the Krasnoyarsk and Minusinsk experimental horticulture stations, 33 black currant varieties were created. The black currant varieties Dumushka (1989), Krasnoyarsk Dessert, Lana (1983), Radost' (Joy) (2001), Sovkhoznaya, Seyanets Druzhnoy (Druzhnoy Seedling) (1994) were previously transferred to the SCT. The black currant varieties Buraya (Brown) (1947), Druzhnaya (1976), Krasnoyarsk (1947), Krasnoyarsky Velkan (Krasnoyarsk Giant) (1947), Lenskaya (1947), Minusinka (1947), Nadyozhnaya (Reliable) (1947), Nochka (Night) (1957), Early (1947), Ruby (1947), Severyanka (1947), Sinyaya (Blue) (1966), Harvest (1947), Khakaska (1947) were previously transferred for the SCT. Seven black currant varieties - Asiatica (2012), Vassa (2014), Memory of Kuminov (2004), Sayan Souvenir (2006), Svetlana (2010), Taina (Mystery) (2009) - were transferred to the SCT. Included in the State Register of the Russian Federation are 8 black currant varieties of Worthy (1993), Doch Druzhnoi (Daughter of Druzhnaya) (2008), Minusinskaya Sladkaya (Minusinskaya Sweet) (1996), Minusinskaya Stepnaya (Minusinskaya steppe) (2009), Otradnaya (1990), Memory of Kuminov (2017), Sumrak (Twilight) (1998) and Cherkashinskaya (2013).

Breeders of the Buryat Fruit and Berry Experimental station have created 15 black currant varieties. Seven black currant varieties of Baikal Pearl (2015), Nadinka (2011), Kalinina's Gift (2013), Speranta (2009), Tona (2006), Baikalskaya Zhemchuzhina (Baikal Pearl) (2014), Yubilei Nadezhdy (Jubilee of Hope) (2017), Yanzhai (2008) were transferred to the GSI. Eight black currant cultivars were included in the State Register of the Russian

Federation: Berezovka (2000), Velur (1997), Voroninskaya (2006), Gaikhal (1998), Gorkhon (1994), Zabaikalochka (1987), Selenga (1987) and Tamir (2004).

In the severe conditions of Yakutia, it is possible to cultivate only highly adapted black currant cultivars that tolerate severe frosts up to 60°C, in the autumn and spring periods - frosts, in October and November - sharp temperature fluctuations, high solar insolation and which are resistant to pests and diseases and other abiotic factors. Currently, 6 varieties have been bred. Their economic and biological characteristics are presented below (Table 1).

**Table 1.** Economic-biological characteristics of the black current cultivars bred in the Yakutsk Research Institute of Agriculture (2000-2020)

Name of cv., genetic origin	Yield, kg/bush	Terms		Content		
		flowering	ripening	Vitamin C, mg/100g	Sugars, %	Acids, %
<b>Yakutskaya</b> ( <i>R. dikuscha</i> Fisch. ex Turcz.) × Mokhovka ( <i>R. procumbens</i> Pall.)	5.0-9.0	29.05 – 8.06	16- 26.07	207.1	4.29	3.66.
<b>Hara Kytalyk</b> <i>R. pauciflorum</i> Turcz. ex Pojark).	3.0-5.0	3.06- 12.06	20.07- 1.08	283.0	14.6	3.7
<b>Erkeeni</b> Altaiskaya buraya × ( <i>R. pauciflorum</i> × Chitinskaya).	1.5-2.0	8-17.06	28.07- 14.08	257.6	5.37	3.78
<b>Myuryuchaana</b> Rubin × Clon 16 ( <i>R. procumbens</i> ).	1.5-2.3	10.06- 20.06	27.07 – 7.08	326.9	3.96- 7.35	2.9
<b>Lyucia</b> (Koksa × Hara Katylyk) × (Nadezhda × <i>R. pauciflorum</i> )	3.0-4.4	1.06- 10.06	18.07- 1.08	153.3	9.6	3.2
<b>Pamyati Kyndyla</b> Vystavochnaya × Yakutskaya	1.2-1.5	2.06- 11.06	19.07- 2.08	120.6	13.2	3.5

The black currant cultivars bred in Yakutia have a weak resistance to the American powdery mildew of gooseberries. The variety of Muryuchaan is more susceptible; the varieties of Khara Kytalyk and Erkeeni are less susceptible. One of the important tasks of breeding is the breeding of black currant varieties that are resistant to this disease. In addition, at present, productive varieties with high indicators of bio-chemical composition, taste qualities of berries and resistant to the harsh conditions of Yakutia are necessary for cultivation [6-7].

In recent years, a series of new varieties has been bred at M. A. Lisavenko Research Institute of Agriculture (Table 2).

**Table 2.** Economic-biological characteristics of the black current cultivars bred in the Yakutsk

Name of cvs. and ripening terms	Genetic origin	Yield, kg/bush- berry mass, g	Content			
			Pectins, %	Vitamin C, mg/100 g	Sugars, %	Acids, %
Bariton (early)	Poklon Borisovoy x Triton	3.0-4.0 / 2.3-4.2	1.0-3.4	137.1	9.8	2.4-4.2

Kanahama (mid)	Poklon Borisovoy x Lama	2.0-3.5 / 1.8-3.5	1.1-2.5	104.7	12.4	1.9-2.8
Pamyati Kukharskogo (mid)	Poklon Borisovoy x Lama	2.7-4.1 / 1.6-2.5	1.0-2.2	143.0	10.7	2.6-3.1
Pamyati Kalininoy (early)	Seyanets Golubki × Fertodi	4.8-5.3 / 1.4-2.8	1.7-3.2	144.0	11.8	1.8-2.4
Yubileinaya Lisavenko (mid)	Form 744-7-54 × Seyanets Golubki	4.7-5.3 / 1.6-2.7	1.5-2,6	210.0	9.2	1.7-2.8

All cultivars bred in M. A. Lisavenko Research Institute of Agriculture are highly resistant, as they have well endured the temperature minimum of -46.0 °C without damage, have sufficient drought resistance and are heat-tolerant (8). They are characterized by good self-fertility and early fruitfulness. They have a high resistance to powdery mildew, gallic aphid, anthracnose and are practically not affected by the kidney mite. They have a good sweet-and-sour delicate taste. The cultivars are of universal purpose.

### 3 Conclusions

The current state of black currant breeding in Asian Russia is shown on the basis of scientific research of scientists from Siberia and the Far East in historical terms.

The characteristics of new winter-hardy, high-yielding cultivars with high adaptation to biotic and abiotic stresses, for the cultivation in the harsh climatic conditions of the Asian part of Russia, are presented.

The prospects of using endemic black currant species, such as *R. procumbens* Pall., *R. pauciflorum* Turcz.ex Pojark, which give new traits and properties during adaptation, in breeding were revealed.

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