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BREEDING RESEARCH AND ACHIEVEMENTS IN THE SOUTH-URAL BOTANICAL GARDEN-INSTITUTE OF UFRC RAS

Research article

Abstract

The article summarizes the results of long-term selection work with flower and ornamental plants (*Hippeastrum x hortorum*, *Iris x hybrida*, *Paeonia x hybrida*, *Chrysanthemum coreanum*) in the South-Ural Botanical Garden-Institute of Ufa Federal Research Centre of Russian Academy of Sciences. The history of breeding development is presented. The main research methods (free pollination and artificial hybridization, interspecific and intervarietal) are described. The main task of selection is formulated: the study of introduced domestic and foreign cultivars, the selection of the best of them to create their own varieties with high winter hardiness, not susceptible to diseases and pests, with different flowering periods that fit into the growing season of the Republic of Bashkortostan. The characteristics of new varieties of *Hippeastrum* (Akademiya, Akbuzat, Bashkiriya, Velikiy Motsart, Galina Shipayeva, etc.), *Iris* (Akmulla, Amina, Zigalga, Inzer, Irendyk, etc.), *Paeonia* (Avrora, Arkaim, Iremel, Lyudmila Mironova, etc.) and *Chrysanthemum* (Direktor Z.Kh. Shigapov, Zagir Ismagilov, Pamyati E.V. Kucherova, Professor L.M. Abramova, etc.) are given. All new varieties of ornamental crops selected by SUBGI UFRC RAS are included in the State register of breeding achievements allowed for use. They have received patents and author's certificates. New varieties of flower and ornamental plants are recommended to supplement the zonal assortment of cultivated plants of the Republic of Bashkortostan. High decorative and economically valuable characteristics of the obtained cultivars make it possible to use them in urban gardening for the design of flowerbeds, group plantings, arrays, borders, rabatok, alpine slides, as well as to use them for cutting.

Keywords: *Hippeastrum, Iris, Paeonia, Chrysanthemum,* free pollination, hybridization, selection, new varieties, Republic of Bashkortostan.

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СЕЛЕКЦИОННЫЕ ИССЛЕДОВАНИЯ И ДОСТИЖЕНИЯ В ЮЖНО-УРАЛЬСКОМ БОТАНИЧЕСКОМ САДУ-ИНСТИТУТЕ УФИЦ РАН

Научная статья

Аннотация

В статье приводятся краткие итоги многолетней селекционной работы с цветочно-декоративными растениями (гиппеаструм садовый, ирис садовый, пион гибридный хризантема корейская) в Южно-Уральском ботаническом саду-институте – обособленном структурном подразделении Федерального государственного бюджетного научного учреждения Уфимского федерального исследовательского центра Российской академии наук. Представлена история развития селекции. Описываются основные методы исследований (свободное опыление и искусственная гибридизация межвидовая и межсортовая). Сформулирована основная задача селекции: изучение интродуцированных отечественных и зарубежных культиваров, отбор лучших из них для создания собственных сортов, с высокой зимостойкостью, не восприимчивых к болезням и вредителям, с различными сроками цветения, укладывающимися в вегетационный период Республики Башкортостан. Даются характеристики новых сортов гиппеаструма (Академия, Акбузат, Башкирия, Великий Моцарт, Галина Шипаева и др.), ириса (Акмулла, Амина, Зигальга, Инзер, Ирендык и др.), пиона (Аврора, Аркаим, Иремель, Людмила Миронова и др.) и хризантемы (Директор З.Х. Шигапов, Загир Исмагилов, Памяти Е.В. Кучерова, Профессор Л.М. Абрамова и др.). Все новые сорта декоративных культур селекции

ЮУБСИ УФИЦ РАН включены в Государственный реестр селекционных достижений, допущенных к использованию. На них получены патенты и авторские свидетельства. Новые сорта цветочно-декоративных растений рекомендованы для пополнения зонального ассортимента культивируемых растений Республики Башкортостан. Высокие декоративные и хозяйственно-ценные признаки полученных культиваров дают возможность использовать их в городском озеленении для оформления клумб, групповых посадок, массивов, бордюров, рабаток, альпийских горок, а также использовать для срезки.

Ключевые слова: гиппеаструм, ирис, пион, хризантема, свободное опыление, гибридизация, селекция, новые сорта, Республика Башкортостан.

1. Introduction

Until the 1940s, herbaceous perennial flowers were not common in the Republic of Bashkortostan. Only a few species of perennials grew in individual private estates in the cities of Ufa, Birsk, Belebey, but they were absent in parks, gardens, squares. For the first time, employees of the Ufa Botanical Garden began to carry out extensive testing work with them. The seeds for the first collection sites were subscribed to at the All-Union Institute of Plant Industry from the famous collections of N.I. Vavilov, copies of the reports were sent there. The planting material began to enter the Garden in 1939-1940 - varieties of paeonia, dahlia and canna were obtained from Michurinsk, Kiev and Adler [6].

The first breeding work on the creation of new varieties of herbaceous ornamental plants was begun in the 50s of the XX century on the basis of the Garden. The first breeder was Olga Antonovna Kravchenko. As a result of studying the collection fund of tulipa and phlox, O.A. Kravchenko identified the most decorative and early flowering plants, from which hybrid seedlings were obtained by free pollination. In 1961, promising forms were identified - candidates for varieties [1]. A special place among the studied ornamental plants was occupied by hybrid and wild peonies, with which selection work was carried out.

The purpose of her breeding work was to create domestic varieties adapted to the conditions of the Republic of Bashkortostan, with large double flowers of the original shape and color. Using the methods of free pollination and artificial hybridization (interspecific and intervarietal), a large hybrid fund of paeonia (more than 800 seedlings) was created, of which 25 hybrids were selected by the republican expert commission in 1965 - candidates for new varieties. In 1969, another 25 promising hybrid seedlings were identified. In 1970, 1971 and 1972 some of the hybrids have been submitted for state variety testing. O.A. Kravchenko studied some features of the inheritance of the main traits of species and varieties. It was revealed that the crossing of the best varieties of hybrid paeonia or their seedlings of the first generation with wild species is of the greatest interest for further breeding work.

In 1970, in connection with the departure of O.A. Kravchenko retired, the collection was transferred to Lyudmila Semyonovna Novikova. She continued to work on replenishing and studying the hybrid fund of paeonies, as well as on reproduction and transfer of hybrid seedlings for variety testing - candidates for varieties. In 1974, eleven hybrid seedlings were presented to the State Expert Commission of the USSR Exhibition of Economic Achievements, of which four were highly appreciated and submitted for state variety testing. The seedlings ‘Appassionata’ and ‘Yubiley Revolyutsii’ were given the status of a variety, and since 1986 they have been zoned according to the RSFSR. In 1988, five more paeonia hybrids received a high primary assessment at the USSR Exhibition of Economic Achievements, and in 1992 they were submitted for state testing. In 1998, the variety status was assigned to the seedlings ‘Yuzhnyy Ural’, ‘Utro Rodiny’, ‘Nadezhda’, ‘Veteran’ [8]. All new varieties were in great demand among the population of the Republic of Bashkortostan and beyond. Selection work for other crops was not carried out.

The purpose of this study is to analyze and summarize the results of many years of breeding work with ornamental plants in the South-Ural Botanical Garden-Institute of the UFRC RAS.

2. Methods

The objects of the study were collections of ornamental plants studied for a long time, numbering more than 3 thousand species and varieties of domestic and foreign selection, which were studied in the open field in the South-Ural Botanical Garden-Institute of Ufa Federal Research Centre of Russian Academy of Sciences (hereinafter referred to as SUBGI UFRC RAS). A study of about 5000 selection seedlings obtained by various methods was carried out: individual selection of seedlings from free pollination within the collection, interspecific and intervarietal hybridization.

The initial material for the introduction of new flowering plants into the SUBGI UFRC RAS was the seeds obtained from domestic and foreign exchange gardens; seeds and live plants collected during expeditions in places of their natural growth and brought from other botanical gardens and institutions.

New species (and varieties) from the generic complexes already presented in the collection fund were involved in the introduction for the purpose of their further replenishment and study (the method of generic complexes). In addition, highly decorative species and varieties were involved in the study under new conditions, which were successfully tested in other regions with similar climatic conditions (methods of climatic analogues and studying the experience of introduction). And, finally, the method of the so-called ‘direct experiment’ was used - testing of introduced species with subsequent selection of resistant forms of completely new plants previously unknown in the culture of the region, first of all, rare species from the natural flora [6].

The assessment of promising seedlings was carried out in accordance with the package of documents of the State Commission of the Russian Federation for the testing and protection of breeding achievements. Ornamental traits were evaluated on a 100-point scale according to the Methodology of State Variety Testing of Ornamental Crops [5]. Flower color was determined according to the color chart of the Royal Horticultural Society [18].

3. Results

The collection of garden hippeastrum currently numbers 23 taxa, 16 of which are varieties of the SUBGI UFRC RAS (authors G.V. Shipaeva, L.N. Mironova, Z.Kh. Shigapov). For this, in 2001, a researcher Galina Vladimirovna Shipaeva carried out an intercrossing of the dutch varieties 'Beautiful Lady' (red simple flower) and 'Jewel' (white double). In 2004-2005, the first flowering of hybrid seedlings grown from seeds was observed [7]. In 2008-2009, 14 candidates for varieties successfully passed the state variety testing and were included in the State Register of Plants Approved for Use. In 2016, Lyudmila Nikolaevna Mironova, Candidate of Agricultural Sciences, Head of the Laboratory for the Introduction and Selection of Floral Plants, two more candidates for varieties were submitted for testing, which also passed successfully. All varieties are moderately resistant to diseases and pests, they have high heat resistance, and the keeping quality of the bulbs is good. They are recommended as a pot culture (table 1).

Table 1 – Varieties of *Hippeastrum x hortorum* selection of the South-Ural Botanical Garden-Institute of UFRC RAS

Variety	Height of plant / Height of stems, cm	Diameter of the inflorescence / Diameter of the flower, cm	Flower shape	The color of the flower	Flowering period, day
'Akademiya'	36 / 28	13x26 / 13	SF	pinkish-white with red smears	28
'Akbuzat'	38 / 25	13x26 / 13	SF	white with red stripes	28
'Bashkiriya'	47 / 35	14x26 / 14,5	DF	pink and white with crimson streaks	25
'Velikiy Motsart'	44 / 28	16x30 / 16	SF	white with dark red stripes	28
'Galina Shipayeva'	37 / 26	18x32 / 18	SF	red with white stripes	24
'Inna'	47 / 30	17x32 / 13	SF	white with red smears	27
'Karmen'	52 / 35	17x28 / 17	DF	bright red with white smears	28
'Kryl'ya Zakata'	45 / 29	18x32 / 18	SF	pinkish-red with red stripes	28
'Laskovyy May'	40 / 35	15,5x25 / 15,5	DF	red with white narrow rays	25
'Magiya Vesny'	50 / 35	17x32 / 17	DF	red with white rays	27
'Pamyati S.T. Aksakova'	50 / 35	14x27 / 14	SF	orange-red with white stripes	28
'Pioner'	52 / 36	15x28 / 15	SF	bright red with a white base	26
'Rafkat'	74 / 54	18x34 / 19,5	DF	red with dark red stripes	25
'Rumyanyye Shchechki'	52 / 46	16x28 / 16	SF	white with pinkish-red strokes	25
'Fedor Shalyapin'	44 / 26	16x33 / 16	DF	dark red	29
'Shul'gan-Tash'	55 / 45	13x24 / 13	SF	red with white rays	27

Note: flower shape: SF - simple funnel-shaped, DF - double funnel-shaped

Currently, the collection of garden iris SUBGI UFRC RAS is represented by 200 varieties. Modern breeding of irises abroad is focused on obtaining new highly decorative varieties, which in areas with a cool climate are susceptible to fungal infections, which leads to the death of plants [4], [15]. In this regard, the results of the introduction study made it possible to identify the varieties that are the most decorative and adapted to the conditions of the region. They are recommended for inclusion in the zonal assortment, and are also used in breeding practice as donors of economically valuable traits. Breeding studies were carried out in 1995-2018 by junior researcher Azat Flyurovich Shaybakov and L.N. Mironova. In hybridization works, 39 best varieties of garden iris from the collection of SUBGI UFRC RAS were used as components for crosses. Crossings were carried out according to a reciprocal scheme with preliminary castration of flowers [12]. A total of 162 combinations of crossing varietal irises were carried out, in 98 - seeds were obtained.

In most cases, the resulting hybrid seeds did not contain either endosperm or embryos. Sometimes the endosperm was present in the seed as a film. Some of the seeds had a well-developed embryo, but without endosperm. The percentage of completed seeds varied by year and by individual combinations from 3 to 100%. As a result of the work carried out, varieties have emerged that are quite easy to cross with each other. For example, 'Fenaya' x 'Indra', 'Beethoven' x 'Happy Wonderer', 'Hector' x 'Sable', 'Fatum' x 'Sandia', 'Beethoven' x 'Sable Night', 'Snow Tenum' x 'Happy Wonderer', 'Blue Shimmer' x 'Christmas Angel', 'Sable Night' x 'Happy Wonderer'. The percentage of full-value seeds formed in these combinations reached 35-100%.

In addition, seeds were collected from free pollination of 21 varieties of garden iris. It was noted that with free pollination of varieties, the number of seeds in a capsule is 2-3 times higher than with forced pollination [16]. Therefore, the largest number of hybrid plants with a wide variation in traits was obtained from free intervarietal pollination [2].

A total of 2589 hybrid seeds were collected, of which germinating: 401 from forced pollination, 513 from free. Currently, the fund of hybrid iris seedlings is 1008 plants. All of them reached a generative age state and were assessed for decorative and economically valuable characteristics.

As a result of a comprehensive assessment of all hybrid plants, hybrids obtained from crosses of varieties 'Coronation' x 'Mystic' and 'Salonique' x 'Coronation' were recognized as promising for breeding work (by the originality of the color of the perianth lobes, the shape and aroma of the flower, the size of the peduncle and flower, resistance to adverse factors). Of the hybrids from free pollination, 25 samples are recognized as the most decorative (according to the brightness of the color of the perianth lobes, the size of the flower, etc.).

In 2008-2009, 12 promising hybrid seedlings obtained from free pollination were transferred to the State Commission of the Russian Federation for testing and protecting breeding achievements. In 2010, they received the status of a variety (authors L.N. Mironova, A.F. Shaibakov, Z.Kh. Shigapov). In 2016, another seedling received the status of a variety (table 2).

Table 2 – Varieties of *Iris x hybrida* selection of the South-Ural Botanical Garden-Institute of UFRC RAS

Variety	Height of stems, cm	Number of flowers on the peduncle, pieces	Diameter of the flower, cm	The color of the flower	Flowering period, day
'Akmulla'	90	4-5	14	white with a lemon-yellow beard	12
'Aleksandr Matrosov'	42	4-5	13,5	grayish-yellow	12
'Amina'	60	3-5	12	white with purple spots	14
'Zigal'ga'	95	5-6	14	brownish-purple	15
'Inzer'	85	4-5	15	purple with brown veins	15
'Irendyk'	90	4-5	12	orange with purple smears	15
'Kashkadan'	70	4-5	11	purple-purple	12
'Nugush'	75	4	13	maroon, with a yellow-maroon beard	12
'Sagit Agish'	70	3-5	12	white, with yellowish-brown veins	11
'Salavat-Chempion'	80	3-5	14	purple-blue	11
'Salyam'	30	3-5	11	dark purple, with white veins	12
'Urgun'	65	3-4	11	yellow, with dark yellow veins	15
'Yuryuzan'	75	4	14	light blue, with a yellow beard	13

The most important biological features of the new iris varieties are high resistance to a complex of unfavorable environmental factors characteristic of the South Ural region, good indicators of decorativeness and economic value. They are not affected by pests and are moderately disease resistant. The above indicators of new varieties make it possible to use them in urban landscaping for decorating flower beds, group plantings, massifs, borders, alpine slides, and also use them for cutting.

At the end of the 90s of the XX century, a new historical round begins in the work with the collection of paeonies. Directly with the participation and under the personal control of L.N. Myronova collection was replenished with new species and varieties, introduction and breeding work was resumed [11].

In 1997-2004, the collection of paeonies was supervised by the candidate of biological sciences Lenvera Akhnafovna Tukhvatullina. To replenish the fund of hybrid seedlings L.A. Tukhvatullina collected and sown seeds in open ground from free pollination of 12 varieties: 'Adolphe Rousseau', 'Atrosamgiomea', 'Mary Woodbury Shaylor', 'Rosea Elegans', 'Karl Rosenfield', 'Mons. Jules Elie', 'Felix Crousse', 'Duchesse de Nemours', 'Festiva Maxima', 'Nigricans', 'Jeanne d'Arc', 'Yubiley Revolyutsii', as well as from forced pollination of 8 varieties: 'Mary Woodbury Shaylor', 'Francis Ortega', 'Appassionata', 'Avalanche', 'Jeanne d'Arc', 'Felix Crousse', 'Yubiley Revolyutsii', 'Mons. Jules Elie'. As a result, 507 seedlings were grown from forced pollination and 586 - from free pollination [8].

Since 2003, together with L.A. Tukhvatullina, and since august 2004 she has been working independently as a curator of the collection of peonies, Candidate of Biological Sciences Antonina Anatolyevna Reut. She continued her breeding work. In 2005-2007, hybrid seedlings reached the generative phase of development and were evaluated for 57 characteristics, according to the test methodology for distinctness, uniformity and stability, developed by the State Commission of the Russian Federation for testing and protecting breeding achievements.

In total, 219 promising hybrids were identified with large and medium-sized flowers of pink, crown, spherical, anemone and japanese forms; red, pink, cream and white, as well as intermediate tones. Seventeen particularly interesting seedlings, distinguished by their decorative characteristics, were transferred for further evaluation to the State Commission of the Russian Federation for the Testing and Protection of Breeding Achievements. In 2008, they received the status of a variety and were entered into the State Register of Breeding Achievements Permitted for Use. In 2011, 8 more varieties were transferred to the state test. In 2013, they received copyright certificates and patents (authors L.N. Mironova, O.A. Kravchenko, O.S. Novikova, Tukhvatullina, L.A. Reut A.A., Z.Kh. Shigapov) (table 3). All new varieties are resistant to unfavorable weather conditions, diseases and pests, winter-hardy, drought-resistant and heat-tolerant. Recommended for growing in central Russia.

Table 3 – Varieties of *Paeonia x hybrida* selection of the South-Ural Botanical Garden-Institute of UFRC RAS

Variety	Height of the bush, cm	Number of flowers on the peduncle, pieces	Diameter of the flower, cm	Flower shape	The color of the flower	Flowering period, day
'Avrora'	60	1-4	15	DHS	light pink	10
'Appassionata'	65	1-3	15	DR	vermilion	12
'Arkaim'	65	1-4	15	DHS	pink	10
'Bashkirskiy'	70	1-4	17	DR	pink	14
'Veteran'	90	1-2	14	DR	pink	10
'Iremel''	75	1-4	17	DS	bright pink	13
'Iyun''	45	1-2	18	DC	white	14
'Lyudmila Mironova'	75	1-4	16	DS	purple-pink	13
'Mechta S.P. Koroleva'	80	1-2	15	A	bright red	10
'Mustay Karim'	85	1-2	16	DS	purple-pink	14
'Nadezhda'	60	1-4	15	DR	light pink	10
'Ogni Ufy'	60	1-4	18	DHS	lilac-pink	14
'Ol'ga Kravchenko'	65	1-3	16	DHS	pale pink	13
'Pesnya Kuraya'	55	1-3	13	DR	pink	11
'Polyarnik-8'	70	1-2	16	DR	white	10
'Rozovaya Dymka'	50	1-3	16	DC	white	15
'Rudol'f Nureyev'	75	1-2	17	DS	rich pink	13
'Sabantuy'	80	1-3	14	J	pink with a yellow center	11
'Salavat'	60	1-3	17	DB	white and pink	14
'Sashen'ka'	85	1-2	15	DS	pale pink	10
'Serezha'	65	1-3	18	DR	white and pink	12
'Tornado'	80	1-2	13	SD	crimson	12
'Ural Batyr'	70	1-2	14	DC	dark pink	11
'Uralets'	50	1-2	16	DHS	silver-pink	14
'Utro Rodiny'	65	1-3	14	DR	light pink	12
'Utro Tumannoye'	55	1-4	17	DS	white and pink	12
'Ufimets'	60	1-2	20	SD	pink	13
'Chak-Chak'	80	1-2	16	J	pale pink	10
'Chingiz Khan'	90	1-2	14	DR	dark crimson	12
'Yubiley Revolyutsii'	70	1-2	14	DS	dark cherry	12
'Yuzhnyy Ural'	80	1-3	13	DR	pink	10

Note: flower shape: DR - double rose, DS - double spherical, DHS - double hemispherical, DC - double crown-shaped, DB - double bomb-shaped, SD - semi-double, A - anemonoid, J - japanese

For Republic of Bashkortostan, chrysanthemums are a relatively new culture. Despite the wide variety of modern chrysanthemums, work on the breeding of new varieties is ongoing in many countries of the world [14]. This is due to the fact that at present there are few universal cultivars suitable for cultivation in different geographical zones [9], [10]. The work on the creation of the *Chrysanthemum coreanum* collection at the SUBGI UFRC RAS began in 2000 [17].

The breeders were faced with the task of studying the introduced domestic and foreign cultivars, selecting the best of them for use in landscaping and obtaining cuttings, as well as creating their own varieties, with good vegetative reproduction, high winter hardiness, not susceptible to diseases and pests, with different flowering periods that fit during the growing season of Bashkortostan [11]. The founders of the Bashkir school of selection of decorative herbaceous crops were L.N. Mironova and L.A. Tukhvatullina.

To solve the problem in 2005-2006, from free pollination of the best varieties of *Chrysanthemum coreanum* ('Amethyst', 'Koreanochka', 'Syaivo', 'Svemba Kars', 'Isabel', 'Pervyy Sneg', 'Vecherniye Ogni') the first batch of hybrid seedlings. Promising seedlings were evaluated according to the method of state variety testing. In 2011-2012, 42 candidates for varieties successfully passed the state test and were included in the State Register of Plants Permitted for Use. In 2012-2013, the second batch was selected - 13 hybrid chrysanthemum seedlings. The starting material was the seeds collected from the varieties: 'Lipstick', 'Yunost'', 'Sestritsa Alenushka'.

As a result of their work for the period from 2005 to 2019, 82 varieties were created (authors L.N. Mironova, L.A. Tukhvatullina, G.V. Shipaeva, Z.Kh. Shigapov) (table 4). All of them have successfully passed the state variety testing and are adequately represented at the exposition site [3].

Table 4 – Brief information about some varieties of *Chrysanthemum coreanum* selection of the South-Ural Botanical Garden-Institute of UFRC RAS

Variety	Authors	Year of inclusion in the register of selection achievements	Patent number	Variety	Authors	Year of inclusion in the register of selection achievements	Patent number
Aktanysh’	3	2016	№ 8719	‘Leysan’	2	2012	№ 6743
Altyn Ay’	1	2011	№ 5972	‘Lenvera’	1	2011	№ 5975
Altyn Solok’	3	2016	№ 8715	‘Mazhit Gafuri’	2	2012	№ 6738
Al’fira’	1	2012	№ 6726	‘Nasima’	1	2012	№ 6728
Anisa’	1	2015	№ 8096	‘Nerkes’	2	2012	№ 6736
Atysh’	2	2012	№ 6739	‘Ogni Ufy’	1	2012	№ 6734
Afarin’	2	2012	№ 6740	‘Osenniye Grezy’	1	2011	№ 5967
Bayram’	1	2011	№5986	‘Pamyati A.K. Mubaryakova’	1	2011	№ 5970
Bashkirochka’	1	2015	№ 8093	‘Pamyati E.V.Kucherova’	1	2011	№ 5973
Belaya Reka’	1	2012	№ 6731	‘Pamyati N.V.Starovoy’	1	2011	№ 5985
Vatan’	1	2012	№ 6725	‘Pamyati S.A. Mamayeva’	1	2011	№ 5988
Vechnyy Ogon’’	3	2016	№ 8711	‘Polyanka’	2	2012	№ 6742
Vivat Botaniku’	1	2011	№ 5980	‘Professor L.M. Abramova’	1	2011	№ 5977
Volny Agideli’	1	2011	№ 5987	‘Radik Gareyev’	2	2012	№ 6735
Gul’fiya’	1	2012	№ 6727	‘Ramziya’	1	2015	№ 8094
Gul’shat’	1	2015	№ 8090	‘Regina’	1	2011	№ 5976
Gyuzel’’	2	2012	№ 6744	‘Rima Bayburina’	2	2012	№ 6737
Dina’	1	2011	№ 5971	‘Rozovoye Izobiliye’	3	2016	№ 8712
Direktor Z.Kh. Shigapov’	1	2011	№ 5974	‘Sakmara’	1	2012	№ 6733
Doktor V.P.Putenikhin’	1	2011	№ 5978	‘Salyut Pobedy’	3	2016	№ 8720
Duslyk 450’	1	2011	№ 5983	‘Sestrichka El’vira’	3.	2016	№ 8713
Zhuravlinaya Pesn’’	1	2012	№ 6729	‘Sirenevoye Chudo’	3	2016	№ 8721
Zagir Ismagilov’	1	2011	№ 5979	‘Solnechnaya Bashkiriya’	3	2016	№ 8718
Zemfira’	1	2011	№ 5984	‘Strana Aygul’’	1	2011	№ 5981
Zolotaya Yurta’	1	2011	№ 5982	‘Tagzima’	3	2016	№ 8717
Zul’fiya’	1	2015	№ 8091	‘Ufimskaya Yubileynaya’	1	2015	№ 8097
Zukhra’	1	2012	№ 6730	‘Fakhaniya’	1	2015	№ 8092
Kandry-Kul’’	1	2012	№ 6732	‘Khadiya Davletshina’	1	2011	№ 5965
Karaidel’’	2	2012	№ 6741	‘Chudnoye Mgnoveniye’	3	2016	№ 8716
Karima’	1	2015	№ 8095	‘Shikhany Bashkirii’	1	2011	№ 5966
‘Krasa Oseni’	3	2015	№ 8714	‘Yubiley Pobedy’	3	2016	№ 8722

Note: 1 - Mironova L.N., Tukhvatullina L.A.; 2 - Mironova L.N., Shipaeva G.V., 3 - Mironova L.N., Tukhvatullina L.A., Shigapov Z.H.

According to other authors, the assessment of the adaptive potential of the *Chrysanthemum coreanum* varieties of the SUBGI UFRC RAS, created for the moderate continental climate of the Republic of Bashkortostan, is promising in the framework of an ecological-geographical test under the conditions of the continental climate of the forest-steppe Ob region, as well as the forest-steppe forest of the Altai Territory [13].

4. Conclusion

Thus, over the 75-year history of the South-Ural Botanical Garden-Institute of Ufa Federal Research Centre of Russian Academy of Sciences, the methods of individual selection of seedlings from sowing seeds of free pollination and hybridization (interspecific and intervarietal) have been created 120 new varieties of decorative crops, including 31 paeonies (‘Avrora’, ‘Arkaim’, ‘Iremel’’, ‘Lyudmila Mironova’, etc.), irises - 13 (‘Amina’, ‘Kashkadan’, ‘Salavat Chempion’, ‘Salyam’, etc.), chrysanthemums - 82 (‘Direktor Z.Kh. Shigapov’, ‘Zagir Ismagilov’, ‘Pamyati E.V. Kucherova’, ‘Professor L.M. Abramova’, etc.), hippeastrums - 16 (‘Akademiya’, ‘Bashkiriya’, ‘Karmen’, ‘Pamyati S.T. Aksakova’, etc.). New varieties of ornamental crops are resistant to a complex of adverse environmental factors. They are heat- and drought-resistant, successfully winter in the conditions of the Republic of Bashkortostan, and are not affected by diseases and pests. All new varieties of ornamental

crops bred by SUBGI UFRC RAS are included in the State Register of Breeding Achievements Admitted to Use. They received patents and copyright certificates.

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Conflict of Interest **Конфликт интересов**

None declared. Не указан.

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