

було зафіксовано у ґрунті на якому зростало грабове насадження. Дещо нижче – у ґрунті мову покриві із модриною та ще нижче ґрунтового покриві із дубом та буком. Найнижчий вміст фосфору виявлено у ґрунтовому покриві на якому зростало ялинове насадження. Вміст фосфору у ґрунті під грабовим насадженням становив 240 мг/кг. Майже у десять разів нижчий вміст фосфору у ґрунті де зростало ялинове насадження – 28 мг/кг. Високим залишається вміст фосфору у ґрунті із модриновим насадженням – 80 мг/кг. У дубовому та буковому насадженнях вміст фосфору становив 54 мг/кг. Схожі тенденції зберігаються по вмісту калію у ґрунтах із різною деревною рослинністю. Найвищий вміст калію залишався у ґрунті із грабовим насадженням – 137 мг/кг. Дещо нижчий вміст калію був характерний для ґрунтового покриву дубового та модринового насадження – по 75 мг/кг. У ґрунті де зростало букове насадження вміст калію становив 35 мг/кг. Найнижчий вміст калію був відмічений у ялиновому насадженні – 30 мг/кг.

**Висновки.** Склад та продуктивність лісових асоціацій у значній мірі впливають на формування ґрунтового покриву. Найбільш позитивні тенденції щодо накопичення гумусу (2,56%), азоту (73-78 мг/кг), фосфору (240 мг/кг) та калію (137 мг/кг) у верхньому (до 30 см) шарі ґрунту були відмічені у листяних деревостанах, зокрема, дубових, грабових та букових. Значно нижчим вмістом цих елементів у верхніх гумусових горизонтах характеризувалися хвойні, зокрема, ялинові деревостани.

Найвища кислотність ґрунтів характерна для ґрунтів, на яких зростали ялинові та модринові деревостани. Зокрема, для ґрунтів ялинових та модринових деревостанів кислотність  $pH = 3,9$ . Значно нижча кислотність характерна для грабових, букових та дубових деревостанів ( $pH = 4,1-5,22$ ) що вказує на необхідність більш

широкого використання листяних порід при лісовідновленні та лісорозведенні.

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## INTRODUCTION HISTORY OF SPECIES AND VARIETIES OF GENUS *IRIS* L. IN UKRAINE AGAINST THE BACKGROUND OF GLOBAL TRENDS

**Abstract.** The article presents adapted literary materials, starting with the first references (I century) and up to now, concerning the introduction and use of species and varieties of Genus *Iris* L., both in Ukraine and throughout the world.

The literary history of the Ukrainian name "pivnyky" has been analyzed for the very first time. It is shown that iris study has been formed on the basis of the first educational establishments, botanical gardens as well as the Main School of Horticulture (Uman National University of Horticulture nowadays) and Tsarina's Garden (now it is known as Sofiyivsky Park) which existed as a unit up to 30th XX century.

The history of foundation of major global iris societies, the important role of national and foreign scientists as well as amateur irisarians in the development of the culture of iris have been established.

**Keywords:** *Iris* L., species and varieties, history, introduction.

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### ІСТОРІЯ ІНТРОДУКЦІЇ ВИДІВ І СОРТІВ РОДУ *IRIS* L. В УКРАЇНІ НА ФОНІ СВІТОВИХ ТЕНДЕНЦІЙ

**Анотація.** У статті наведено опрацьований літературний матеріал, починаючи з перших згадок (1 століття) й донині, стосовно уведення в культуру та використання видів і сортів роду *Iris* L. як в Україні, так і в світі. Вперше досліджено літературне закріплення української назви ірису – «півники». Показано, що в Україні ірисівництво формувалося на базі перших навчальних закладів та ботанічних садів, зокрема – Головного училища садівництва (нині – Уманський національний університет садівництва) та Царициного саду (нині – Софіївка), які існували як єдине ціле до 30-х років минулого століття. З'ясовано історію заснування основних світових спілок ірисівництва, значення в розвитку культури ірису видатних вітчизняних та зарубіжних учених, а також – ірисівників-аматорів.

**Ключові слова:** *Iris* L., види й сорти, історія, інтродукція.

The history of the genus *Iris* L. dates back to the high antiquity. Thus, a Soviet paleobotanist and geologist of Ukrainian origin Mykolaiovych Khrystofovych distinguishes the existence of rhizomes and leaves of irises in tertiary deposits of Europe and North America etc. in his paper «Paleobotany» [1].

Ukraine belongs to European and Asian North America zone formation and species differentiation of rhizomatous irises, in particular Euro-Mediterranean Centre of morpho- and species formation. According to the description of H. I. Rodionenko [2] the ancestors of modern irises can be described as heliophilous perennial plants that used to have monopodial branched stem with internodes which took roots while lodging. Independent plantlets could be formed in the axils of the stem. Root system consisted of perennial roots. Leaves were sessile and alternately placed. Flowers were small and pale, with equal lobes that had not coalesced at the base. The ovary was superior. The style was solid with trilobite stigma. Nectar didn't produce. Pollen grains were egg-shaped and the pollination was cross. Flower bunches were placed in the axils of the leaves on the leading and side shoots. The iris fruit was a capsule which used to open in three parts to reveal the numerous seeds within. Certainly



Fig. 1. The image of *Iris* in Dioscorides' scientific work (left)  
(Electronic photograph of the original, published by the National Library of Naples)

for many thousands of years intraspecific, interspecific and remote hybridization played an important role in the speciation of irises.

The first reference to irises in botanical and medical literature appeared in the 1st century in Codex (Codex ex Vindobonensis Graecus, Figure 1), written by a Greek physician Dioscorides [3]. Since then the literary history of the genus *Iris* L. has started: 1549 – Leonhart Fuchs, 1551 – William Turner, 1554 – an unknown author described the medicinal properties of iris, 1576, 1601 – Karl Clusius described decorative properties of almost 28 varieties of irises (Figure 2).

G. C. Oeder presented the picture of *Iris Pseudacorus* L., in a comprehensive atlas of botany «Flora Danica» (1770). In 1782 O. F. Muller presented the image of *Iris spuria* L. in the same edition (Figure 3).

In 1781 P. S. Pallas (a German scholar and lexicographer) described 17 species of genus *Iris* L.

The first monograph on irises was published in 1782 (Figure 4). By the end of 18th century the descriptions of more than 40 species of irises could be found in the literature [2, 4].

Its name derives from the Greek goddess, Iris, who



Fig. 3. *Iris spuria* L.  
(A picture from Flora Danica // MDCCLXX (1782). – Tab. CDXCIV; MDCCLXXXII. – Tab. DCCXXXIV, that is saved in funds of Scientific Library of UNUH)



Fig. 2. Images of species *Iris* L. in books\*:

A – by German physician and botanist Leonhart Fuchs (Den nieuwen Herbarius, dat is, dboeck vanden cruyden / Leonhart Fuchs. – 1549. – CXIX);

B – by unknown botanist (Bloemen en Cruydeboek, Manuscript / Anonymous. – 1554. – P. 380);

C – franco-dutch botanist Carl Klusius (Rariorum plantarum historia / Charles de L' Ecluse. – 1601. – 771p.).

(Note – \* images from the original sources published on www.biolib.de)



Fig. 4. The first world monograph about irises, written by Swedish naturalist Carol. P. Thunberg. (Carol P. Thunberg. *Iris. Upsaliae*, 1782. – 36p.).

(Note – \* the image of the original, published by the library [www.archive.org](http://www.archive.org))

carried messages from Olympus to earth along a rainbow. Greek doctor and naturalist Hippocrates (approximately IV c. BC – 450-377) [5] named a flower in honour of the goddess. C. Linnaeus consolidated the antique name for the irises in 1753. He described and divided 18 species of Iris he knew in two groups – Bearded (Barbatae) and Beardless (Imberbis) Irises [6].

Carl Linnaeus had been collecting herbarium for 71 years (1707-1778) in which he presented a significant amount of preserved species of the genus *Iris* L., including *Iris biflora*, *Iris dichotoma*, *Iris edulis*, *Iris flavissima*, *Iris foetidissima*, *Iris germanica*, *Iris graminea*, *Iris halophila*, *Iris ochroleuca*, *Iris persica*, *Iris pseudoacorus*, *Iris pumila*, *Iris pygmaea*, *Iris sibirica*, *Iris spuria*, *Iris susiana*, *Iris tenuifolia*, *Iris variegata*, *Iris ventricosa*, *Iris verna*, *Iris virginica* (Figure 5).

Irises have been cultivated in Ukraine since ancient times. Primarily they were planted in monastery gardens. At that time monasteries served as centers of culture and distributors of planting material for fruit, berries, vegetables and ornamental plants. Obviously, the plant got its common name «pivnyky» when it appeared in farmsteads of ordinary people.

There are a lot of opinions as for the origin of the name «pivnyky». It is most likely that the name is linked to the similarity of flowers with a rooster tail [7]. According to

legends, «pivnyky» protect people from evil forces. A rooster is a savior as all evil spirits disappear when it sings [8].

The creation of the first botanical gardens promoted the introduction of species of *Iris* into Ukrainian horticulture. At the turn of 18-19 centuries Botanical Garden of the Kharkiv National University and Nikitsky Botanical Garden in Crimea were founded. Most of the *Iris* representatives appeared in the gardens collections of already existing at the time.

Moscow botanical garden was founded by P. Demidov in 1756. There were more than 70 species and varieties of *Iris* in its collection in 1786. Another botanical garden was founded by Earl Rozumovsky in 1798. Catalogues made by F. Fisher in 1804, 1805, 1808, 1812 contained 36 species of *Iris*. Several species of irises were introduced, such as: bearded irises, beardless irises, bulbous irises – *I. tenuifolia*, *I. flavissima* (*I. Humilis* Georgi), *I. dichotoma* Pall., *I. humilis* M. Bieb. (– *I. Pontica* Zapal.), *I. plicata* Lam., *I. pallida* Lam.).

The creation of Imperial Botanical Garden began in 1822 with the elimination of Rozumovsky's Botanical Garden. In 1856 the collection included 72 species of irises (*I. aequiloba* Ledeb., *I. aphylla* L., *I. biglumis* Vahl., *I. bloudowii* Ledeb., *I. gueldenstadtiana* Lepech., *I. halophila* Pall., *I. laevigata* Fisch. et C. A. Mey., *I. notha* M. Bieb., *I. orientalis* Thunb., *I. setosa* Pall., *I. tigridia* Bunge, etc.).



Fig. 5. *Iris* Herbarium specimens from the collection of Carl Linnaeus (left – *Iris sambucina* L., right – *Iris germanica* L.), stored in the herbarium of the Swedish Museum of Natural History (<http://linnaeus.nrm.se/botany/fbo/welcome.html.se>)

Botanical gardens actively exchanged planting material with each other and foreign ones, as well as supplied plants for parks and private gardens. At that time Kiev Botanical Garden had rather small collection of irises [4]. Uman park «Sofievka», founded by earl Pototsky in 1795, could probably have irises in its collection at that time. As there are some facts concerning their delivery from many European and Asian countries in order to be planted in the park [9].

Odessa Botanical Garden was founded in 1820 and there evidently were irises in its collection. The only Main School of Horticulture was established on the basis of the botanical garden. According to the decree of the king (9 February 1842) its main task was to spread «correct gardening». A prominent naturalist and zoologist A. D. Nordman played a great role in the development of the botanical garden as well as the Main School of Horticulture. He went on a number of expeditions in order to study plants of Southern Ukraine, Balkans, Crimea, Caucasus etc. Those studies undoubtedly influenced the formation of the botanical garden collection fund. Thus, in his book «The description of Odessa Imperial Garden...» [10] A. Nordman noted that 500 species of perennial plants, as well as rare ones were collected in the parterre of the botanical garden. Bulbs and rhizomes from the parterre used to be exchanged with other gardens. They were also sent to Kiev, Petersburg, Berlin and Paris. It was also mentioned that students would also be sent to Caucasus coastal area in order to collect new and rare plants and seeds. Unfortunately there is no full description of the parterre plants in his scientific project. The author focused his attention on the rare plants only, though it didn't mean that irises were not cultivated in the collection.

The Main School of Horticulture was transferred from Odessa arid zones to Tsarina's Garden which was a better place for gardening. Nowadays it is known as Sofiyivsky Park. According to another king's decree the school was entrusted to provide government agencies and some people with the best breeds and varieties of fruit, berry and forest crops and other reproductive organs of vegetable and garden plants. In addition to this the Main School of Horticulture had to conduct research on acclimatization as well as an extensive research for further development of horticulture, forestry and gardening. Some facts prove that carts full of seedling, seeds, rhizomes, tubers and bulbs of ornamental

plants were sent from Odessa to Uman. Rich experimental basis contributed to the development of natural science areas in the Main School of Horticulture. Being a director of the Main School of Horticulture, Mykola Ivanovych Anenkov made a special contribution to the development of botany. Studying the flora of Uman and using the collections of plants from Tsarina's Garden (Sofivka) and the Main School of Horticulture (two institutions functioned as a unit in the 30s XX cen.) he managed to complete his book «Demotic names of Russian plants» (the original name, 1858). Later the name was changed to «Botanical Dictionary» [12, 13]. For the very first time the name «pivnyky» was used in this dictionary. The use of 17 species of irises were described there as well (Fig. 6).

The description of the genus *Iris* L. and its species starts there. In 1840 a French gardener Jean-Nicolas Lemon published a catalogue of irises which included 100 varieties. The publication was «Annales de Flore et de Pomone». Owing to the catalogue a significant impetus to the development of iris study was given [14]. He updated the name of one of the varieties «Jacquesiana» in this catalogue. It was named in honour of Antonio Henri-Jacques, who was the main gardener of Royal Neuilly Domain. In 1841-1842 he extended the preliminary list of irises and presented from his own selection in this publication – *Iris de Boismilon*, *Iris Madame Rousselon*, *Iris Madame Lémon*, *Iris Jacquesiana*, *Iris Conqueror* (Fig. 7).

Since that time foreign companies offered not planting material of specific irises only but some of their varieties too. For example in The Scientific Laboratory of Uman National University of Horticulture there is a survived catalogue where the firm of brothers Zonneveld and Filippo (Holland) offers to purchase irises: *Iris Florentina*, *Iris Germanica*, *Japanese Iris*, *Iris Kaempferi*, *Iris Pumila*, *Siberian Iris* (the names are used according to the original) [16].

A German firm of Gus (Goose) and Kennerman released the first batch of dwarf irises [17]. Such catalogues made it possible to replenish the collection with new types and varieties of irises. In 1885 y. in the catalogue of Tsarina's Garden *Iris fimbriata* Vent. was offered for realization. Then in early XX century different varieties and colours of irises appeared [18-20].

In the second half of the XIX century the culture of iris



Fig. 6. The ectype of one of the three pages of Botanical Dictionary by M. Anenkov (1878)



Fig. 7. The image of the varieties of irises described by Jean-Nicolas Lemon in the publication «Annales de Flore et de Pomone» by 1841-42 in the close row from left to right – *Iris Jacquesiana*, *Iris Madame Lémon*, *Iris Conqueror*; then – on the left – *Iris de Boismilon*, on the right – *Iris Madame Rousselon*.

was gradually introduced to the study of educational establishments of horticultural profile. Curricula for schools (probably typical) were approved by the Ministry and issued. Educational institutions developed their (working) programmes on the basis of them (curricula). Thus in «Program of flower open field, greenhouse floriculture, flower forcing, dendrology garden, ornamental and landscape horticulture», developed by O.M. Chelintsev (the teacher of Uman School of Horticulture and Agriculture). The most common cultures including plant genus *Iris* L., were obligatory for studying in the chapter «Perennial flowering plants, methods of vegetative reproduction and seed conservation and protection in winter» [21–22].

The active classification of irises began in the second half of XIX century. *Iris florentina* is used for getting essential oil. New varieties of *Iris* were created and the herbarization of some varieties of *Iris* is prolonged (Fig. 8) etc. [23–26]. Famous scientific gardeners and L. T. Luchinski in particular (the teacher of horticulture in Uman School of Horticulture and the main gardener of Tsarina's Garden) used the culture of iris for the park landscaping [27].

In 1892 John Gilbert Baker published his project dedicated to iris. 161 varieties of iris are described in the monograph [28]. An English professor Michael Foster presented his publication «Bulbous Irises» the same year. It was framed as a lecture where he described different varieties of irises: *Iris Sisyrrinchium*, *Eeticulata* Group, *Xiphium* Group, *Iris tuberosa*, *Juno* Group, *Iris nepalensis* etc. [29]. Professor meteorologist V. A. Poggenpohl monitored the beginning of the flowering phase of *Iris germanica* L., *Iris variegata* L. in the publication «The results of phyto-phonological observations of the development phases of wild and cultivated plants in Tsarina's Garden and in the fields of Agriculatural School in Uman, Kiev province» within 1886–1990 yy. [30].

At the end of XIX century the culture of *Iris* took a prominent place in horticulture as the «Encyclopedic Dictionary» (1895) by Kordenakhi-Kero proves [31]. It was for the second time when the Ukrainian name «pivnyky»

was used among other names in the literature. At the same time the description of new varieties appeared in specialized editions. Thus in 1900 a magazine «Gardening» published the description of the varieties *Darius* and *Madam Chereau* (*Madam Chereau* has been grown up to now) [32].

At the beginning of XX century a number of publications indicated the increased use of the species of the genus *Iris* L. [33, 34]. The growing of irises in specially designated places is described in the scientific project of L. Lipsky, named «Botanical gardens of Madrid, Lisbon and Kew» [35]. In particular there were 28 varieties of iris in the collection of Madrid Botanical garden and 52 varieties in the Royal Botanical Garden, Kew.

The First world War, Revolution, World War II stopped the development of the culture of iris in Ukraine for many years. Moreover of lot of steps were made in the selection work, discovering new species and the classification of the culture of iris. In particular the most prominent iris expert the English botanist William Dykes published his monograph «The Genus *Iris*» in 1913 [36]. He studied the species of *Iris* L. from his own collection as well as herbariums in England and other countries. W. Dykes managed to describe 138 representatives of the genus *Iris* L. This scientific work is still significant nowadays.

At the beginning of XX century irises gained popularity in North America. As a result «American Iris Society» was founded in 1920.

XIV Horticultural Congress (1995) made the association register all the varieties of iris. That's why there were 12000 registered varieties, 19000 in 1939 and nearly 25000 in 1949 [2].

The British Iris Society was founded in 1922. The First International Conference on Irises was convened the same year in Paris. Using the conference materials a book was published. The book included the list of members of the committee with their photos (Figure 9). A lot of prominent scientists were the members of the committee.

A powerful global genetic base of the varieties of iris was

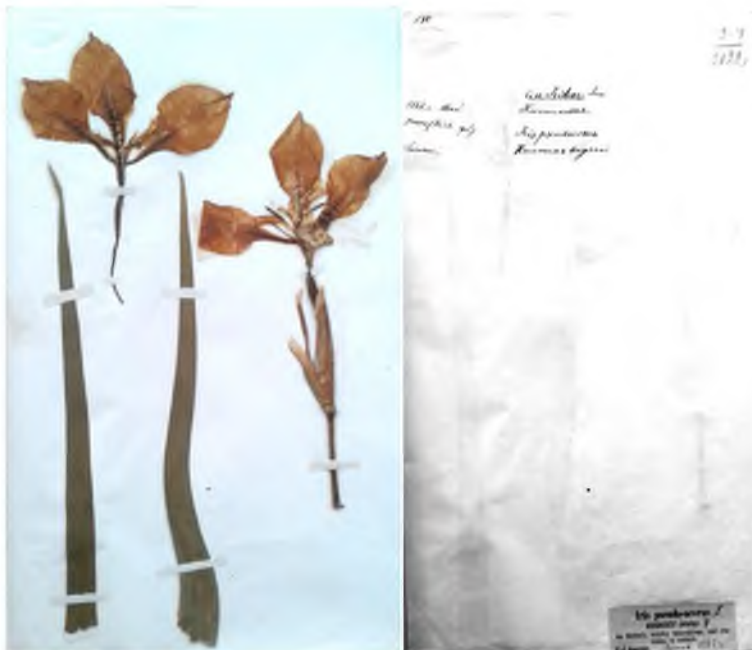


Fig. 8. *Iris pseudocorus* L. from the herbarium stock of Uman National University of Horticulture, collected by Ukrainian and Polish botanist J.K. Pachosky «na błotach, między tatarakiem, nad stawami, w rowach, Mai, Czerwiec, Human» (in Polish), 1882 y.

Note –\* there are 8 examples of genus *Iris* L., in the herbarium of Uman National University of Horticulture, dated XIX century.



Fig. 9. The Commission members on the iris, the National Union of Gardeners of France, Paris, 1922

created in the prewar period. After the reconstruction and restoration of national botanical gardens, irises significantly enriched their collections. In such a way national stock-breeders were enabled to include irises into the selection process. As a result new national varieties of irises were created in 1950 CRBG AS USSR (nowadays M. M. Gryshko Botanical Garden). The following varieties were created: Bohdan Khmelnytsky, Ivan Susanin (author K.D. Kharchenko) [38] and also Kievlianin, Metro, Velvet, Present, North Pole [39].

Since 1959 selection work on irises was started in Uman Agricultural Institute (now Uman National University of Horticulture). It became possible because of the construction of the breeding nursery in 50<sup>th</sup>, which included 120 sorts of irises [40].

During 1968-1984 a collection was created in Donetsk Botanical garden. 300 sorts of introduced irises were tested there [41]. An extensive work on the culture of iris promotion was conducted as well as implementation of its best varieties into green building.

O. Amekhin started work on the introduction of Japanese Irises in 1969 in Lviv. As a result 45 decorative forms and varieties of iris have been selected in 15 years [42].

The Italian Iris Society was formed in 1959. The International Symposium on Irises was held in Florence in 1963. Next meetings on Iris were held in Warburg (Germany, 1970 y.), Prague (1974). In May 1978 an International Congress and Contest of the varieties of Iris were organized by French florists in Orlean [43].

The publication of the national monograph in 1961 «Rod (Genus) *Iris*. L» by the scientist H. I. Rodionenko became a significant event in the history of iris study. The phylogenetic system of the species of Iris was justified in the monograph for the very first time. This titanic scientific work still serves as a major reference book for many scientists not from former USSR but from near and far abroad countries.

In 1968 H. I. Rodionenko was elected the honorary member with the highest award – the Medal in commemoration of Michael Foster, he was also elected the honorary member of the Italian Iris society. In 1987 the monograph was published in London. In 1999 he was elected the honorary member of the American Iris Society and awarded Beatrice Varburton' medal. H. I. Rodionenko was the first botanist who received such a honourable award.

A Dutch selectionist Frederik Willem van Eeden introduced a hybrid iridictium «George» and the new variety of the genus Juno (Juno Rodionenko) and named them after H. I. Rodionenko [44].

Amateur iris breeders have played a significant role in the process of making the culture of iris popular in Ukraine. V. Y. Mitsakh from Illovaik Donets'k region had a great collection of iris (300 sorts) which served as a source of planting material and innovation for many connoisseurs of this culture [45]. He also carried out the selection work and long-term seeding were obtained [46].

An amateur florist N. O. Miroshnychenko has been engaged in the purposeful iris breeding since 1967. In 1967 her first cultivar Fata Morgana appeared, followed by Oda vesne in 1972. In 1967 she sent four varieties of iris to the state variety testing (Mednyi vsadnik, Zolotoi Orfei, Zimnee utro and Serenada). At the beginning of 80<sup>th</sup> long-term seeding were selected: Purga, Sedmoe nebo, Rozovoe kruzhevo, Olimpiiskaia snezhynka, A.Viatkin. Some new varieties of iris were introduced in 2000 – Belyi sphinx, Bronzovyi vek, Gimn zhenschine, Moi gimnei, Prazdnichnyi, Slavianskyi bazar, Solnechnyi veter, Veter pustyni, Zamriyani vals, etc. In 2007 the cultivar Solovina nich (introduced by N. O. Miroshnychenko) was declared the winner of the International Contest Fransiris-2007 [47, 48]. In general N. O. Miroshnychenko has introduced 225 varieties of iris. The best of them have been planted in the Royal Garden of England [49]. In fact, Nina Opanasivna Miroshnychenko was the founder of the Ukrainian School of Iris study.

In the middle of the last century a lot of national symposiums were dedicated to the culture of iris. The first symposium was held at the Main Botanical Garden of the USSR in 1970. The second one was held in Lviv in 1981. The symposiums were addressed to the questions of hybridization, accelerated reproduction, protection from pests, etc. [50]. All this helped to popularize the culture of iris, supported the search and study of new species. Thus in USSR 58 species of wild and cultivated irises were known in 1961 [2]. In 1977 the amount of the species of iris increased to 60, 16 species among them were in Ukraine as of 1999 [52] which equals nearly 30% of wild iris flora. According to the international register the number of the varieties of Iris has increased since 1975 (1975 – 30.000 varieties of Iris [53], 1980 – 35.000 [41], 2000 – 40.000 [54], 2014 – 80.000 [55]).

Nowadays there are no botanical gardens in Ukraine as well as in the world without iridariums and collections of irises. In particular there are more than 250 varieties of bearded irises in M. M. Gryshko National Botanical garden [54], 30 species of genus *Iris* L. and 50 varieties in the National Dendrological Park Sofiyivka [52], 114 varieties of bearded irises only in the collection of the Botanical Garden of Tavria National University [56].

Much attention in the botanical gardens of Ukraine is paid to the preservation of rare species of wild irises. There are five species of rare irises in Ukraine, that are included in the Red Book of Ukraine (2009): *I. furcata* M. Bieb., *I. pineticola* Klokov, *I. pontica* Zapał, *I. pseudocyperus* Schur, *I. sibirica* L. *Iris pineticola* is an endemic species which grows in the Right bank and left Bank Forest-Steppe of Ukraine, rarely occurs in the northern part of steppe and in the valley of The Siverskyi Donets [57].

The foundation of the Ukrainian Iris society in 2010 was an important event of the 21 century. The main task of which is the popularization and promotion of the culture of iris and the development of national iris study. So it can be said for sure that the culture of iris is as actual, as centuries ago and is gaining popularity nowadays. Therefore the history of introduction of species of genus *Iris* L. and their varieties continues in Ukraine and new pages will be inscribed soon.

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