Acta Biologica Sibirica
Journal of Biology
Founded in 2015

Altai State University

www.asu.ru

ISSN 2412-1908

Acta Biologica Sibirica, 2019, 5(1), 141–146

RESEARCH ARTICLE

Ecological and biological evaluation of varietal resources *Paeonia* L. in Ukraine

V.A. Mazur, H.V. Pantsyreva*, K.V. Mazur, V.V. Monarkh

Vinnytsia National Agrarian University, Vinnytsia, Soniaczna St. 3., Ukraine.
**E-mail: apantsyreva@ukr.net; https://orcid.org/0000-0002-0539-5211*

The present state of the trends of the use of herbaceous species of *Paeonia* L. was studied and their prospects for greening the Podillya area were determined. The cultivars and hybrids of peony culture are investigated, entered in the State Register of Ukraine and analyzed the dynamics of their creation over the years. The analysis of researches and publications of cultivars of milky-flowered breeding breeding in our country was carried out. The decorative properties of the herbaceous peony varieties (*Paeonia lactiflora* Pall.) Were analyzed and the characteristics of the varieties represented by the originator of the varieties represented by all indicators were studied. According to the results of the research, *Paeonia* L. varieties, which are entered in the State Register on a set of indicators that determine their decorative and economic and biological qualities, are recommended as objects for the enrichment of the plant variety for planting the Ukraine. The analysis of species and grade composition of *Paeonia* L.
Key words: *Paeonia* L.; growing zone; direction of use; color of flower; flowering period; aroma; variety.

Introduction

An enrichment and renewal of the range of ornamental plants is relevant to any country in the world, including Ukraine. Introduction of a wide production practice of new promising varieties, selected as a result of many years of research, remains one of the main objectives of breeding. The modern direction in landscaping is the study and introduction of new flower and ornamental plants with a sufficient raw material base (Bessonova, 2010). Promising in this respect are plants of peonies, in particular decorative species, which have long been used in traditional medicine, due to healing properties. The peonies occupy a leading place among perennials, which are capable of overeating in the open ground. High decorative, durability and the possibility of wide use in ornamental horticulture, ecological plasticity of not only species but also of most varieties makes it possible to grow these plants in different climatic zones of Ukraine (Vdovenko, Pantsyreva, Palamarchuk, & Lytvyniuk, 2018; Talibov, 2008).

Creating new varieties and their systematics will significantly expand the use of peony culture in landscaping and enrich the cultivated flora of the Podillya region and Ukraine as a whole (Bruks, 2009).

For the first time, breeding work for the discovery of new varieties was conducted in China in the seventeenth century, but special attention was paid to the selection of peonies in Japan, where the first "Japanese" group was withdrawn. From the beginning of the nineteenth century, a turbulent history of peony breeding begins. The pion is especially popular among French and English breeders. After the First World War, the breeding of the peonus moved to the United States, along with interspecific hybridization (Mazur, 2018).

The most common in the world of ornamental horticulture is Paeonia lactiflora Pall (Milk Quince Peony) - these are perennial grasses of the family belonging to the family of peony (*Paeoniaceae*). In the world there are about 5000 varieties (Mazur, 2018; Pantsyreva, 2016a; Markovskyi, 2002).

Both white and red forms are *Paeonia lactiflora* Pall. grown in the gardens of China since 536 years. Here also appear the first varieties, because the breeding and cultivation of the peon was considered a godly thing. To the outstanding scientists of the breeders of the world scale are N. Lemon, J. Calot, F. Crousse, V. Lemoine, Ch. Verdier, A. Dessert, A. Miellez. Until now, such varieties have not lost their popularity: 'Festiva Maxima', 'Edulis Superba', 'Philomele', 'Mons. Jules Elie', 'Felix Crousse', 'Albatre', 'Le Cygne', 'Mont Blanc', 'Sarah Bernhard', 'Solange' and others that have been

introduced in different countries of the world, including they are valuable components of the collection fund of the National Botanic Garden of them M. M. Grishka of the National Academy of Sciences of Ukraine (NAS) (Mazur & Pantsyreva, 2017; Pantsyreva, 2016b).

The withdrawal of new varieties of peonies was carried out within the same species - *P. lactiflora* until the XX century. In the years 1880-1890, for the first time, attempts were made to obtain interspecific hybrids in Europe. The French breeder V. Lemoine has successfully crossed two species - *P. lactiflora* and *P. witmanniana* Hartw. At the same time in Germany G. Arends received hybrids crossing *P. peregrina* Mill. and *P. witmanniana* Hartw, and the English breeder *P. Barr* crossed *P. officinalis* L. and *P. arietina* Anderson. An important contribution to the interspecific hybridization of the peony was made by American breeders M. Glasscok, M. Auten, W. Mains, W. Bockstoce, W. Krekler, M. Freeborn and especially Professor A. Saunders (Sydoruk, 2007; Mazur, Mazur, Pantsyreva, & Alekseev, 2018).

The formation and development of breeding research in the NBS is associated with academician N.N. Grishko, since the assortment of floral and ornamental plants at that time was very poor. Unique collections of flower and ornamental plants collected in the department of floriculture from various botanical and geographical regions of the world have become the basis for the creation of new varieties and hybrids (Pantsyreva, 2017; Mazur, Didur, Pantsyreva, & Telekalo, 2018).

In Ukraine, the breeding of the pion was begun in the 50's of the last century by the scientists of the florist A.A. Sosnowiec and I.S. Krasnov. In Ukraine, a large selection work is conducted by the Kiev Botanical Garden. Grishka Scientist-breeder V.F. Gorobets created many varieties: Khokhloma, Irokes, Chervonyy Oksamyt, Chervoni Vitryla, Ophelia, Uvilei Kyiva, Perlova Rosyp, Skarbnutsia and many others that are the basis for folk selection (Laptiev, 2001; Vdovenko, Pantsyreva, Palamarchuk, & Lytvyniuk, 2018).

The use of interspecific hybridization allowed the formation of varieties with very early flowering dates and varied coloration (red, coral, cherry, lavender). Depending on the use of peonies are divided into park, cutting, universal. In the family of the Pioneer families there is only one species of Peony, in which there are three groups - tree-like, herbaceous and Ito-pions, representing the hybrid of the first and others. Tree peonies are mostly grown in the East. Herbaceous peonies are widespread in the Mediterranean, Asia, Europe, North America. The high frost resistance of these plants makes it possible to grow them practically throughout the territory of Ukraine. In nature, grassy peonies grow on any open sunshine ground - in the forest lawns, in the steppes, on meadows and mountain slopes. They are not only where there is too much moisture (Sowling, 1994; Sakhatska, 2012, Vdovenko, Prokopchuk, Palamarchuk, & Pantsyreva, 2018).

Material and methods

Materials for researches were varieties and hybrids of *Paeonia* L., entered in the register of plant varieties in Ukraine and recommended for distribution. The research was conducted during 2016-2018 on the basis of the expositional area of the Botanical Garden «Podillya» of the Vinnytsia National Agrarian University. Soil-climatic conditions of the study zone are favorable for the cultivation of the investigated species *Paeonia* L.

Results

It has been established that in the State Register of Varieties *Paeonia* L. breeding work on the creation of new varieties of pionne in Ukraine is still insufficient. Numerical composition of the species *Paeonia* L. in Ukraine is, today, 42 varieties and hybrids, (Figure 1). Most varieties were created at the expense of the hybrid fund on the basis of varieties *P. lactiflora*, as well as the starting material for the breeding process served as varieties *P. lactiflora* and *P. officinalis.* The registration of the studied species of peony in Ukraine was conducted for 25 years. It has been established that from 2003 to 2012, Varieties not eligible for distribution in the State Register of Varieties of *Paeonia* L. were not registered. Selection work on the creation of new varieties of peonies resumed in 2013.

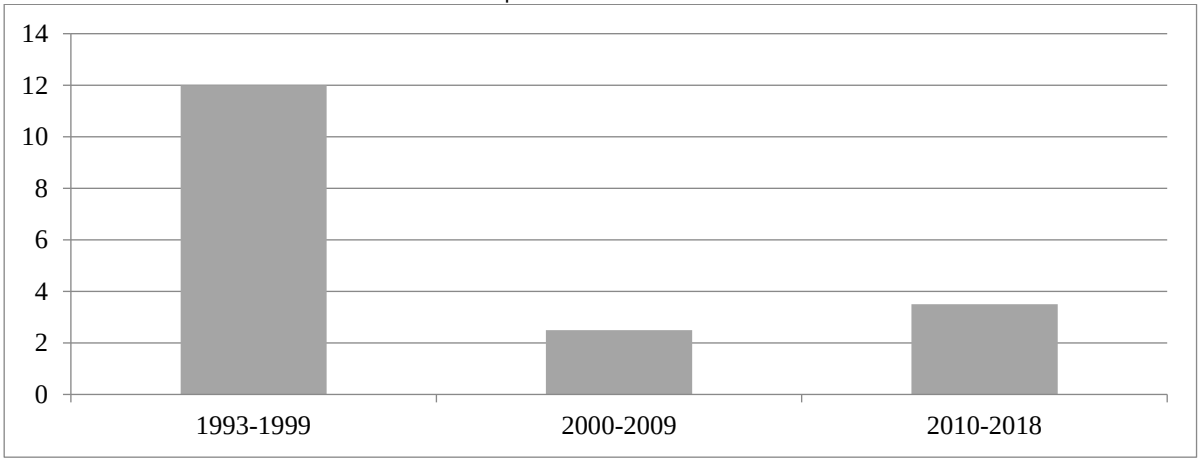

Fig. 1. Registration of pion varieties in the State Register of Plant Varieties, suitable for distribution in Ukraine in 2018 over the years in Ukraine (1993-2018)

The following are included in the State Register of Plant Varieties of Ukraine varieties of pions: Yasochka, Uvilei Kieva, Chumatskyy Shlyach, Chervona Veza, Champion, Charivnyk, Chaklunka, Chervoni vitryla, Chervonyi oksamyt, Chochloma, Favorit, Svitlana, Svitoch, Scarbnytsia, Pysanka Kolomyi, Ofeliya, Metelyk, Malynova Varta, Mriya, Lichtaryc, Lybid, Kobzar, Koryfei, Kvazimodo, Irocez, Zemchuzna rozsyp, Ducat, Gercules, Vesilna, Benefis, Beregynya, Antey, Vesnyane defile, Svitancova Poema, Zoryana, Cheburachka, Cocetca, Geroyam nebesnoi sotni, Travnevi rosy, Blondyn, Chornomor, Svitlyachok (Table 1) (Horobets, 2017).

Table 1. Varieties of *Paeonia* L.*,* entered in the State Register of Plant Varieties, suitable for distribution in Ukraine in 2018

№	Varieties (hybrid)	Recommended zone for growing in Ukraine	Exploitation	Year of registration
1	Vesilna	Forest-steppe, Polissya	Ornamental and Healing	1997
2	Benefis		Ornamental and Healing	2003
3	Beregynya	Forest-steppe, Polissya	Ornamental and Healing	1997
4	Antey	Forest-steppe, Polissya	Ornamental and Healing	1999
5	Vesnyane defile	Forest-steppe, Polissya	Ornamental	2016
6	Svitancova Poema	Forest-steppe, Polissya	Ornamental	2013
7	Zoryana	Forest-steppe, Polissya	Ornamental	2013
8	Cheburachka	Forest-steppe, Polissya	Ornamental	2013
9	Cocetca	Forest-steppe, Polissya	Ornamental	2013
10	Geroyam nebesnoi sotni	Forest-steppe, Polissya	Ornamental	2016
11	Travnevi rosy	Forest-steppe, Polissya	Ornamental	2016
12	Chornomor	Forest-steppe, Polissya	Ornamental	2016
13	Blondyn	Forest-steppe, Polissya	Ornamental	2016
14	Svitlyachok	Forest-steppe, Polissya	Ornamental	2016
15	Yasochka	Forest-steppe, Polissya	Ornamental and Healing	1997
16	Uvilei Kieva		Ornamental and Healing	2003
17	Chumatskyy Shlyach		Ornamental and Healing	2009
18	Chervona Veza		Ornamental and Healing	2008
19	Chempion		Ornamental and Healing	2008
20	Charivnyk	Forest-steppe, Polissya, Steppe	Ornamental and Healing	2008
21	Chaclunca		Ornamental and Healing	2003
22	Chervoni vitryla	Forest-steppe, Polissya	Ornamental and Healing	2000
23	Chervonyi oksamyt	Forest-steppe, Polissya	Ornamental and Healing	1993
24	Hochloma	Forest-steppe, Polissya	Ornamental and Healing	1993
25	Favoryt		Ornamental and Healing	2008
26	Svitlana	Forest-steppe, Polissya, Steppe	Ornamental and Healing	2008
27	Svitoch	Forest-steppe, Polissya	Ornamental and Healing	1994
28	Scarbnytsia	Forest-steppe, Polissya	Ornamental and Healing	1998
29	Pysanka Kolomyi	Forest-steppe, Polissya	Ornamental and Healing	2009
30	Ofeliya		Ornamental and Healing	2000
31	Metelyk		Ornamental and Healing	2008
32	Malynova Varta		Ornamental and Healing	2009
33	Mriya	Forest steppe, Polissya	Ornamental and Healing	1997
34	Lichtaryc	Forest-steppe, Polissya, Steppe	Ornamental and Healing	2008
35	Lybid	Forest-steppe, Polissya	Ornamental and Healing	1997
36	Kobzar	Forest-steppe, Polissya, Steppe	Ornamental and Healing	2008
37	Koryfei		Ornamental and Healing	2003
38	Kvazimodo		Ornamental and Healing	2009
39	Irocez	Forest-steppe, Polissya, Steppe	Ornamental and Healing	2008
40	Zemchuzna rozsyp	Forest-steppe, Polissya	Ornamental and Healing	1994
41	Ducat	Forest-steppe, Polissya	Ornamental and Healing	1997
42	Gercules		Ornamental and Healing	2009

The main areas of use of varieties and hybrids *Paeonia* L. are decorative (planting, cutting) and medicinal. The plant is cultivated, as a rule, in gardens and orchards as decorative, and in folk medicine is used in addition to flowers and rhizome of peonies (Pantsyreva, 2018).

According to the results of the research, the main morphometric indices (height of plants, diameter and color of the flower, terms of flowering) of the decorative-valuable varieties of *Paeonia* L. are given (Figure 2).

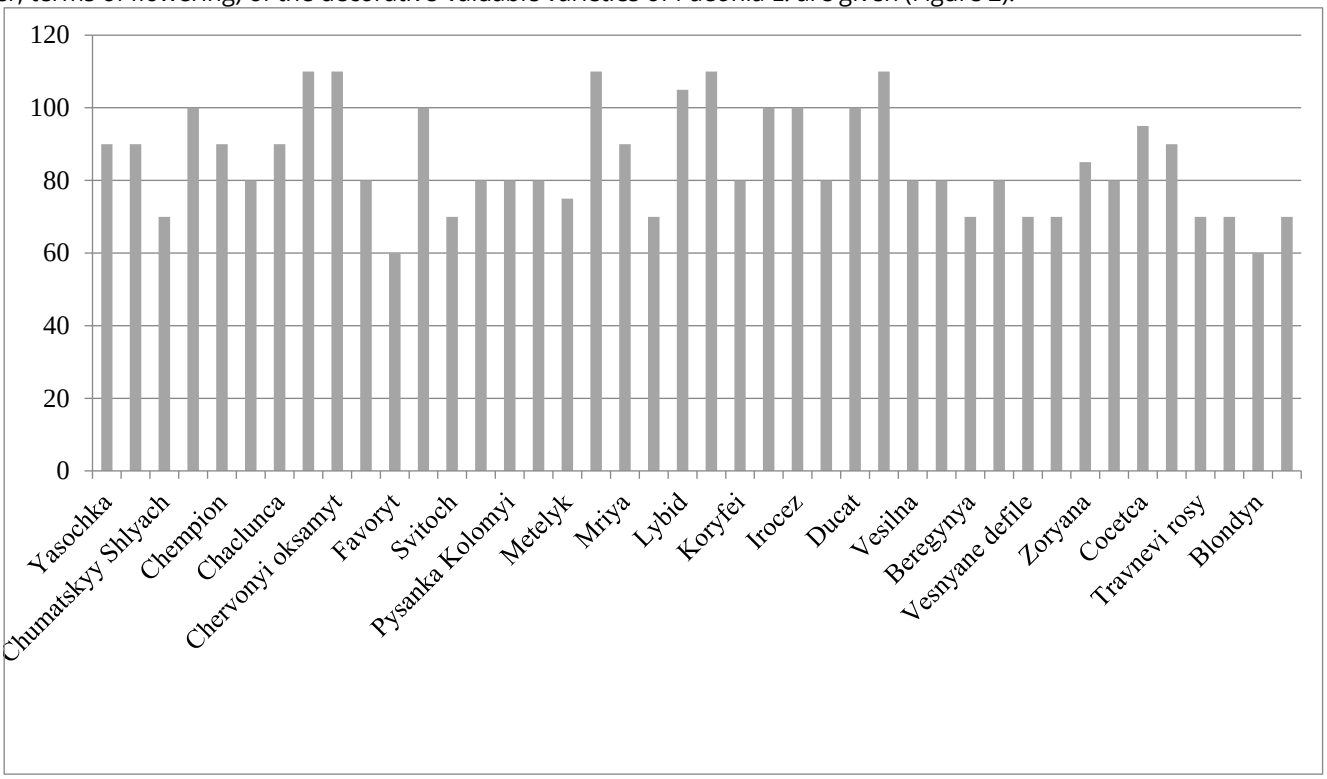

Fig. 2. Height of plants of the peonies, entered into the state registry of Ukraine, cm

Growth processes in plants are always accompanied by an increase in their size and mass and diameter of the flower (Figure 3).

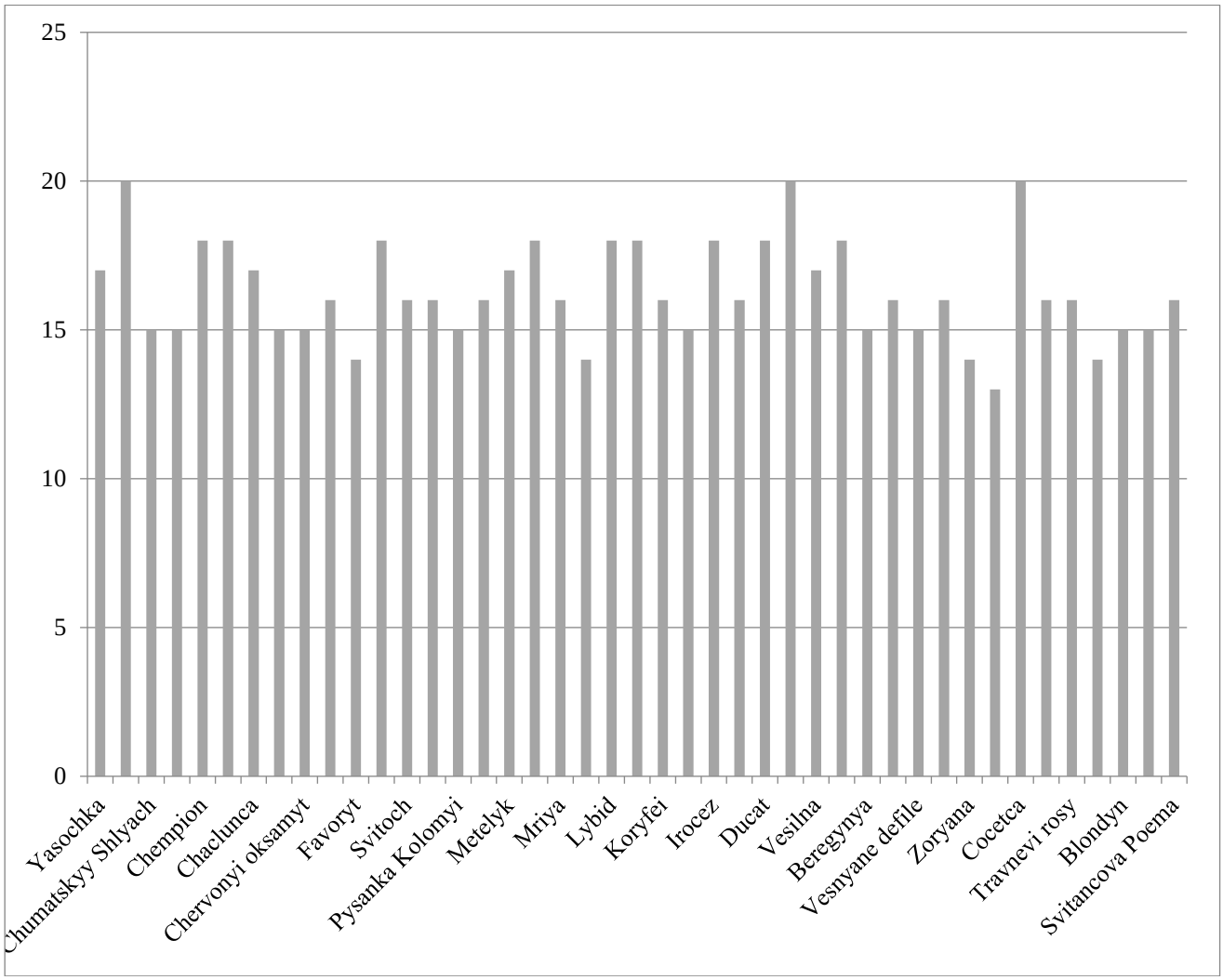

Fig. 3. Flower diameter of the peonies, entered into the state registry of Ukraine, cm

Growth, like all other processes in a plant, is a function of time, which is outwardly expressed in periodic and rhythmic fluctuations of its intensity and can be expressed by a mathematically positive magnitude.

Natural features of the species *Paeonia lactiflora* Pall, plasticity to change their vital form, high quality by a combination of features that determine their extraordinary decorative characterizes these varieties as a source for enriching the range of ornamental cultures in Ukraine (Table 2).

Table 2. Decorative value of varieties *Paeonia* L.

№	Varieties (hybrid)	The lines of flowering	Color of the flower	Aroma	Flower shape
1	Yasochka	average	pink	weak	terry
2	Uvilei Kieva	medium late	white	fragrant	terry, rosy
3	Chumatskyy Shlyach	very early	red	weak	not terry
4	Chervona Veza	early	red	fragrant	not terry
5	Chempion	average	white	fragrant	terry, rosy
6	Charivnyk	average	white	fragrant	terry
7	Chaclunca	early	red	fragrant	terry
8	Chervoni vitryla	early	red	weak	not terry
9	Chervonyi oksamyt	early middle	red	weak	terry, half terry
10	Hochloma	early	red	weak	simple
11	Favoryt	average	red	weak	terry, rosy
12	Svitlana	late	pink	weak	terry, rosy
13	Svitoch	medium late	red, pink	weak	terry
14	Scarbnytsia	average	pink	weak	terry, rosy
15	Pysanka Kolomyi	very early	red	weak	simple
16	Ofeliya	very early	red	weak	terry, rosy
17	Metelyk	very early	pink	fragrant	terry
18	Malynova Varta	average	red	fragrant	terry
19	Mriya	average	white	weak	terry, rosy

20	Lichtaryc	average	pink	fragrant	terry
21	Lybid	very late	pink	weak	terry
22	Kobzar	medium late	pink	fragrant	terry
23	Koryfei	average	red	weak	terry, rosy
24	Kvazimodo	average	pink	weak	terry
25	Irocez	very early	pink	weak	terry
26	Zemchuzna rozsyp	early	pink, yellow	fragrant	japanese
27	Ducat	average	red	weak	terry
28	Gercules	early	red	weak	terry, rosy
29	Vesilna	early	white	fragrant	terry, rosy
30	Benefis	very early	red	weak	terry, rosy
31	Beregynya	early	pink	weak	terry
32	Antey	average	red	weak	terry, rosy
33	Vesnyane defile	early	pink	weak	not terry
33	Svitancova Poema	very early	pink	weak	not terry
34	Zoryana	early	pink	fragrant	anemo
35	Cheburachka	early	red	fragrant	japanese
36	Cocetca	very early	pink	fragrant	not terry
37	Geroyam nebesnoi sotni	early	pinkish-purple	weak	not terry
38	Travnevi rosy	very early	pink	weak	not terry
39	Chornomor	early	red	fragrant	terry
40	Blondyn	very early	white	weak	not terry
41	Svitoch	very early	pink	fragrant	half terry
42	Svitancova Poema	very early	pink	weak	not terry

All varieties of *Paeonia lactiflora* Pall of Ukrainian breeding are perennials, but they vary in size and shape, color, color scheme, flowering duration, etc. (Kataloh sortiv roslyn, 2018).

It is the enrichment of the varietal variety of the decorative species *Paeonia* L. breeding, expansion of variants of simple and complex garden compositions with their participation, more even distribution within the settlements, will considerably approximate the design of the inhabited cities of Ukraine to the level of the best world examples.

Conclusions

Established in the field of horticulture, the species *Paeonia* L. is represented by a significant number of species (40) and rich varietal assortment of more than 5,000 varieties. At the same time, it was revealed that the range of decorative cultures of Ukraine includes 5 species, that is, less.

From the practical point of view, all the studied varieties and hydrides of Ukrainian selection are of interest as potentially valuable objects for enriching the range of ornamental plants in Ukraine and are promising for the creation of a monosade based on the Vinnytsia National Agrarian University.

References

Bessonova, V.P. (2010). Roslyny kvitnykiv. Dovidnyk, Dnipropetrovsk: Vyd-vo «Svidler A.L.» (in Ukraine).

Bruks, Dzh (2009). Kratkaia entsyklopedyia sadovoho dyzaina. ZAO «BMM» (in Poland).

Horobets, V.F. (2017). Stvorennia vitchyznianykh sortiv pivonii z vykorystanniam metodu viddalenoi hibrydyzatsii. Faktory eksperymentalnoi evoliutsii orhanizmiv, 2, 128-132 (in Ukraine).

Kataloh sortiv roslyn, prydatnykh dlia poshyrennia v Ukraini na 2018 rik (vytiah), (2018), 412-414 (in Ukraine).

Laptiev, O.O. (2001). Introduktsiia ta aklimatyzatsiia roslyn z osnovamy ozelenennia. Kyiv, Fitosotsiotsentr. (in Ukraine).

Markovskyi, Yu. (2002). Dekoratyvnue mnoholetnyky. SPb., Myr y semia, (in Russian).

Mazur, V.A. (2018). Primary introduction assessment of decorative species of the lupinus generation in Podillya. Scientific Bulletin of UNFU, 28(7), 40–43. https://doi.org/10.15421/40280708 (in Ukraine).

Mazur, V. A., Didur, I. M., Pantsyreva, H. V., & Telekalo, N. V. (2018). Energy-economic efficiency of grain-crop cultures in the conditions of the right-bank Forest-Steppe of Ukraine. Ukrainian Journal of Ecology, 8(4), 26-33 (in Ukraine).

Mazur, V.A., Mazur, K.V., Pantsyreva, H.V., & Alekseev, O.O. (2018). Ecological and economic evaluation of varietal resources Lupinus albus L. in Ukraine. Ukrainian Journal of Ecology, 8(4), 148-153 (in Ukraine).

Mazur, V.A., & Pantsyreva, H.V. (2017). Vplyv tekhnolohichnykh pryiomiv vyroshchuvannia na urozhainist i yakist zerna liupynu biloho v umovakh Pravoberezhnoho Lisostepu. Silske hospodarstvo i lisivnytstvo. Vinnytsia, VNAU, 7(1), 27-36 (in Ukrainian).

Pantsyreva, H.V. (2016a). Vplyv elementiv tekhnolohii vyroshchuvannia na indyvidualnu produktyvnist roslyn liupynu biloho. Visnyk DDAEU, Silskohospodarska ekolohiia. Dnipro, Ahronomichni nauky, 2. (in Ukrainian).

Pantsyreva, H.V. (2016b). Doslidzhennya sortovyx resursiv lyupynu bilogo (Lupinus albus L.) v Ukrayini, (Vol. 4, pp. 88–93). Vinnycya (in Ukraine).

Pantsyreva, H.V. (2017). Formuvannia zernovoi produktyvnosti liupynu biloho zalezhno vid tekhnolohichnykh pryiomiv v umovakh pravoberezhnoho Lisostepu. Dys. na zd. nauk. st. k. s.-h. n. Kam'ianets-Podilskyi, 100-101 (in Ukrainian).

Pantsyreva, H.V. (2018). Research of sortal resources of grape species of Paeonia L. in Ukraine. Scientific Bulletin of UNFU, 28(8), 74–78. https://doi.org/10.15421/40280815 (in Ukrainian).

Sakhatska, I.M. (2012). Vstanovlennia zhyrnokyslotnoho skladu korenevyshch z koreniamy pivonii likarskoi sortiv «ALBA PLENA» ta «ROSEA PLENA». Ukrainskyi medychnyi almanakh, 15(1), 139-140 (in Ukraine).

Sowling, W.A. (1994). Plant breeding for stable agriculture: Presidential Address. Western Australia, 183-184 (in Australia).

Sydoruk, T.M. (2007). Travianysti bahatorichni roslyny vidkrytoho gruntu Natsionalnoho dendroparku «Sofiivka». Uman: UVPP, 115-122 (in Ukraine).

Talibov, T.H., & Ibrahimov, A.Sh., (2008). Taxonomic spectre of the flora of Nakhchivan Autonomous Republic. Nakhchivan: Ajamy, (in Azerbaijan).

Vdovenko, S.A., Prokopchuk, V.M., Palamarchuk, I.I., & Pantsyreva, H.V. (2018). Effectiveness of the application of soil milling in the growing of the squash (Cucurbita pepo var. giraumontia) in the right-benk forest stepp of Ukraine. Ukrainian Journal of Ecology, 8(4), 1-5 (in Ukraine).

Vdovenko, S.A., Pantsyreva, G.V., Palamarchuk, I.I., & Lytvyniuk, H.V. (2018). Symbiotic potential of snap beans (Phaseolus vulgaris L.) depending on biological products in agrocoenosis of the right-bank forest-steppe of Ukraine. Ukrainian Journal of Ecology, 8(3), 309-314.

Citation:
Mazur, V.A., Pantsyreva, H.V., Mazur, K.V., Monarkh, V.V. (2019). Ecological and biological evaluation of varietal resources *Paeonia* L. in Ukraine. *Acta Biologica Sibirica, 5* (1), 141-146.
Submitted: 15.01.2019. **Accepted:** 01.03.2019
crossref http://dx.doi.org/10.14258/abs.v5.i1.5350

© 2019 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).