

UDC 582.573.76:631.527.5:[712.253:58](477-25)

## Creation of a collection fund and study of cultivars of daylilies in the M. M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine

T. O. Shcherbakova

*M. M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine, 1 Sadovo-Botanichna St., Kyiv, 01014, Ukraine, e-mail: shcherbakova@ukr.net*

**Purpose.** Analysis and comparative study of daylily cultivars from the collection fund of the M. M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine (NBG), selection of assortment for decorative horticulture and landscaping. **Methods.** Cultivars from the NBG daylily collection were studied. The cultivars were evaluated in terms of their aesthetic and economic attributes, and were classified according to their coloration and the timing of their flowering. The author of the cultivar, country of origin, year of creation and introduction into the NBG were also identified. The cultivars were also grouped according to these parameters. **Results.** The NBG daylily collection is the result of 40 years of introduction and 20 years of breeding work with this crop at the NBG. It includes 174 world cultivars, 26 cultivars of Ukrainian breeding and more than 1000 hybrid seedlings. Most of the cultivars (79) were introduced in 2000–2009. The main part of the current structure of the daylily collection consists of cultivars bred in the 1960–1970s. Most of these are hybrids from American breeders: David F. Hall (20 cultivars) and Allen Wild (46 cultivars). A total of 15 new cultivars were developed based on the original collection. These new cultivars feature double flowers, a valuable trait for hybrids in Ukraine. For effective use in ornamental horticulture and landscaping, the cultivars were grouped according to flower colour and flowering time. The yellow-flowered group is the most widely represented. A large number of cultivars with red flowers are inherent in hybrids bred between 1980 and 1999. Cultivars from modern breeding are mostly represented by the purple and pink colour group. Most of the cultivars in the collection are early and medium early. The smallest part is made up of medium-late and late hybrids. **Conclusions.** The modern daylily collection is representative. The cultivars introduced into the NBG illustrate the main stages of breeding work with the crop and the achievements of breeders from different countries of the world. The collection includes early and medium early, medium, medium late and late flowering cultivars. Varying in colour and flowering time, the collection can be effectively used to extend the flowering period of daylilies by three months (from the second decade of May to the second decade of August) in ornamental gardening in Ukraine and in various landscape compositions.

**Keywords:** hybridisation; ornamental horticulture; assortment.

### Introduction

The M. M. Gryshko Botanical Garden of the National Academy of Sciences of Ukraine (NBG) is a research centre for the conservation and study of plant diversity, ornamental horticulture and landscape architecture. The NBG has unique collections of introduced plants from different botanical and geographical regions of the world and significant varietal resources of economically valuable crops. In particular, floricultural and ornamental plants, which are the result of work on mobilisation, conservation

and varietal studies of cultivated flora, as well as the basis for breeding work.

The members of the genus *Hemerocallis* L. are economically important floricultural and ornamental plants. The widespread introduction of species of the genus into culture and their successful use in ornamental horticulture has greatly stimulated breeding work with the crop, resulting in more than 100,000 cultivars being produced in different countries around the world from the 1930s to the present. The history of global daylily breeding can be divided into four stages. The first stage – early breeding (1930–1959) – covers the period of creation of cultivars based on forms selected from natural populations, hybridisation of introduced species and their natu-

*Tetiana Shcherbakova*  
<http://orcid.org/0000-0003-1763-6841>

ral forms. The second stage (1960–1979) was the development of diploid cultivars with floral characteristics that clearly distinguished them from the wild species and early interspecific hybrids. The third stage (1980–1999) includes the creation of the first tetraploid cultivars which, in addition to high decorative parameters, have increased resistance compared to diploid cultivars. The fourth stage dates back to the beginning of the XXI century and is characterised by the creation of complex tetraploid hybrids with so-called modern characteristics ('sculptural' and 'spider-like' flower shapes; combination of bright yellow, blue-lavender or wide maroon 'eyes' and 'picotee' on the perianth lobes; 'jagged' and 'super-wavy' edges of the perianth lobes) [1–3].

Research on daylily cultivars focuses on the analysis of the decorative and adaptive parameters of plants and the peculiarities of the use of cultivars [4–7]. The genotypic and phenotypic characteristics of hybrid material, its origin and classification are studied [8–11]. The mechanisms of drought and salinity tolerance of species and cultivars [12–15] and their resistance to diseases and pests [16] are considered.

The center of daylily breeding is the United States of America, with a large number of private collections and nurseries united by the American Daylily Society [3]. In Ukraine daylilies are represented in the collections of botanical gardens and arboretums and in the nurseries of private collectors [17].

The NBG has a collection of daylilies that currently includes 200 cultivars of world and domestic breeding and more than 1000 hybrid seedlings obtained as a result of its own breeding work. The first daylily cultivars were introduced to the NBG in the early 1980s by the curator of the collection Nesterenko N. I. In the 1990s, Pereboichuk O. P. made an inventory of the introduced cultivars and identified some of them due to loss of names in previous years. From 2005 to the present, the curator of the collection, T. O. Shcherbakova, has expanded the collection with new cultivars of world breeding, studied the origin of cultivars, researched morphological features and rhythms of plant development. Together with O. P. Pereboichuk she started breeding work with this crop [18].

The generalization of the results of the introductory work with daylilies in the NBG, the comparative study of the collection cultivars according to their origin and main decorative characteristics will provide a clear understanding of the current structure and representativeness of the collection. The analysis of the composition of the collection will allow the selection of a range of daylilies for ornamental horticulture and landscaping.

*Objective.* Analysis and comparative study of daylily cultivars in the NBG collection, selection of cultivars for ornamental horticulture and landscaping.

### Materials and Methods

The object of research was the cultivars of the NBG daylily collection. The source material was replenished through the exchange and delectus of plants and their parts with other botanical institutions and specialized nurseries.

Plants were grown in sunny open experimental and exposure plots of the NBG. The plots are located in the southeastern part of Kyiv on the border of two physical-geographical zones: the Polissia forest zone and the Forest-Steppe zone. The climate is temperate continental. The average annual air temperature is +9.5 °C [19].

Material from the Index of Garden Plant and the American Daylily Society Register was used to describe the cultivars [1, 2]. The results of the introductory studies were analysed according to the methods proposed by P. E. Bulakh [20].

The cultivars were described according to their decorative and economic characteristics, in accordance with the methodology proposed by I. I. Krokmal [21]. The author of the cultivar, the year of its creation and the country of origin were also identified.

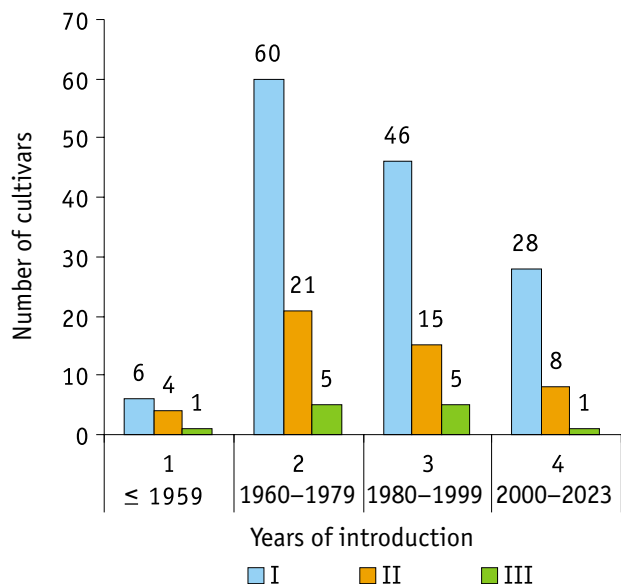
The cultivars were grouped according to the main colour of the flower. The red, purple, pink, yellow and nearly white groups of cultivars were distinguished.

Phenological observations of the plants were carried out during 2005–2023. According to the beginning of flowering, cultivars with early and medium early (I decade of June – I decade of July), medium (II decade of July), medium late and late (III decade of July – III decade of August) flowering were distinguished.

### Results and Discussion

The development of the daylily collection at the NBG began in 1982–1984. During this period, the first varieties from American breeding were obtained from the variety testing station for floricultural and ornamental plants in Salaspils (Latvia). These cultivars belonged to the first stage of world daylily selection, which covered the 1930s to 1950s of the last century. They differed from the parental forms by flowers of larger diameter, wide perianth lobes, more intense flower colour and higher flowering frequency and productivity. The NBG daylily collection includes 11 cultivars of early selection (Fig. 1). These include 'Sammy Russell' (Russell, 1951), 'Black Plush' (Connell, 1955), 'Frans Hals' (Flory, 1955), 'Full Reward' (McVicker-Murphey,

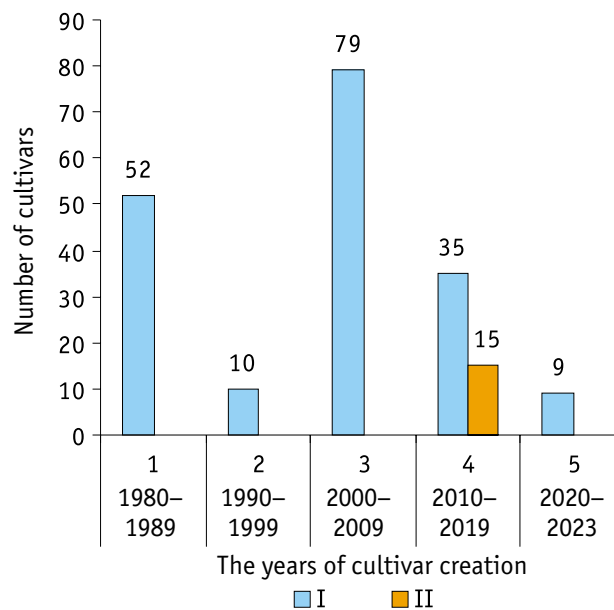
1957), 'Memory Lane' (Hall-D.F., 1955) (Table). It should be noted that 'Radiant', created in Britain by the founder of daylily breeding, George Yeld (Yeld, 1931), as a result of interspecific hybridisation of *H. thunbergii* Barr. is the oldest cultivar in the collection.



**Fig. 1. The number of daylily cultivars introduced into the NBG at different stages of world breeding:** I – early and medium early, II – medium, III – medium late and late flowering

A total of 52 daylily cultivars were introduced into the NBG between 1980 and 1989 (Fig. 2). Most of these are cultivars from the second phase of daylily breeding, which lasted from 1960 to 1979. The cultivars created at that time were characterised by flowers in various shades of pink, purple and red. They have become classics in the history of daylily breeding and have received numerous awards and wide recognition. Among them are 'American Revolution' (Wild, 1972), 'Carey Quinn' (Hall-D.F., 1960), 'Catherine Woodbery' (Childs-F., 1967), 'Grape Velvet' (Wild, 1978), 'Little Wine Cup' (Carter-Powell, 1966), 'Luxury lace' (Spalding, 1959), 'Prairie Blue Eyes' (Marsh, 1970), 'Red Rum' (Pittard-R, 1974), 'Summer Wine' (Wild, 1973).

In general, the cultivars bred in the 1960–1970s form the main part of the modern structure of the daylily collection, as they were the most accessible and have been included in the collection from the beginning to the present. Among them are 60 cultivars of early and medium early flowering, 21 cultivars of medium flowering and 5 cultivars of medium late and late flowering. Most of them are hybrids from American breeders: David F. Hall (20 cultivars) and Allen Wild (46 cultivars).



**Fig. 2. The number of daylily cultivars introduced into the NBG from around the world (I) and from domestic breeding (II)**

D. Hall's cultivars have larger flowers, pink and red in colour, with a 'midline' pattern on the perianth lobes. Morphological descriptions of the plants of the Wilds firm indicate the emergence of novel characteristics, including the presence of an "eye" pattern on the perianth lobes and the development of purple and dark red hues in the flowers. It should be noted that Wild's 'American Revolution' (Wild, 1972) is still one of the darkest red cultivars.

In order to introduce daylily cultivars with new morphological and biological characteristics (wide and wavy perianth lobes, patterned perianth lobes, full flower type, rounded, spider-like forms), 79 cultivars were added to the collection between 2000 and 2009. The majority of the cultivars were bred between 1980 and 1999. Tetraploid cultivars from Virginia Peck (6 cultivars), Steve Moldovan (3 cultivars) and R. Munson 'Kensington Manor' (1988) were tested in the collection. These cultivars exhibit enhanced drought resistance relative to their diploid counterparts. During 2010–2019 and the last 4 years, the collection has included daylilies of the IV modern stage of breeding. It is worth mentioning promising cultivars with a high level of decoration: 'Sink Into Your Eyes' (Lambertson, 2003), 'Fame' (Grace-Smith, 2005), 'Goldenzelle' (Smith-FR, 2006). The perianth lobes of these cultivars have a combined 'eye' and 'picotee' pattern of lavender, bright yellow and chestnut brown respectively. The flowers of 'All His Life' (Pikalova, 2011) and 'Solar Wind' (Pikalova, 2012) are characterised by 'super wavy' petal edges. The petals of 'Storm of the Century' (Carr, 2000) have a jagged edge.

Table

**Daylily cultivars of the NBG collection promising for ornamental gardening**

Years of cultivar registration	Groups of cultivars by flower color (color group)				Yellow	Nearly white
	Red	Purple	Pink	Yellow		
		Early and medium early < 10 July ±5 days				
Before 1959	'Solid Scarlet' (Marx)				'Apricot Beauty', 'Frans Hals' (Flory); 'Full Reward' (McVicker-Murphey); 'Memory Lane' (Hall-D.F.); 'Radiant' (Yeld)	
1960–1979	'American Revolution', 'Christopher Columbus', 'Minstrel Boy', 'Seattle Slew', 'Spirit of Freedom' (Wild); 'Balls of Red' (Miles-J.); 'Buzz Bomb', 'Carey Quinn' (Hall-D.F.); 'Ed Murray' (Grovvatt); 'Jan Pawel' (Franczak); 'Red Rum' (Pittard-R)	'Amazon Amethyst', 'Carnival Flair', 'Grape Velvet', 'Sugar Candy', 'Summer Wine' (Wild); 'Little Missy' (Cruse); 'Little Wine Cup' (Carter-Powell); 'Meran', 'Prairie Blue Eyes' (Marsh)	'Anna Warner' (Peck); 'Annie Welch' (Claar-Parry); 'Bambi Doll', 'Candy Counter', 'Cherry Lace', 'Date Book', 'George Caleb Bingham', 'Missouri Miss', 'George Caleb Bingham', 'Haidee', 'Pink Embers', 'Precious Accent', 'School Girl' (Wild); 'Buffys Doll' (Williamson); 'Patio', 'Precious One', 'Step Forward' (Hall-D.F.); 'Siloam Cinderella' (Henry-P.)		'Angel of Light', 'Beloved Country', 'Blushing Angel', 'Christopher Robin', 'Cimarron Pass', 'Golden Gift', 'Grand Ways', 'Little Men', 'Stagecoach', 'Tiny Toy', 'Touch of Mink', 'Winning Ways' (Wild); 'By Myself' (Peck); 'Commandment' (Reckamp); 'Dacquiri', 'Emerald Joy', 'George Cunningham', 'Master Touch' (Hall-D.F.); 'Little Cadet' (Durio-D); 'Mary Todd' (Fay); 'Ruffled Apricot' (Baker-S.H.); 'Stella de Oro' (Jablonski)	'Joan Senior' (Durio)
1980–1999	'Ada Sari', 'Andrzej Bobola', 'Wspominienie Mamy' (Franczak); 'Caviar' (Moldovan); 'Fantasy Dancer' (Harris-Benz); 'Jovial' (Gates-L.); 'Liberator' (Wild); 'Little Red Warbler' (Crochet); 'Prince Redbird', 'Radio City' (Sellers); 'Rose Corsage' (Stamile)	'Border Music', 'David Kirchoff' (Salter); 'Cosmopolitan' (Stamile-G.); 'Demerie Doll' (Jessup); 'Destined to See' (Grace-L.); 'Friar's Lantern' (Moldovan); 'Oolay' (Blyth); 'Purple Beacon' (Brazell); 'Satinique' (Wild)	'Barbara Mitchell', 'Fairy Tale Pink' (Pierce-C.); 'El Rosario' (Peck-Savage); 'Instant Friendship' (Wild); 'Mariska' (Moldovan); 'Pookie Bear' (Durio-D.); 'Siloam Double Classic', 'Siloam Rose Queen' (Henry-P.); 'Strawberry Fields Forever' (Stamile)		'Awakening Dream', 'Custard Candy', 'Tigger' (Stamile); 'Cherry Eyed Pumpkin' (Kirchoff-D.); 'Double River Wye' (Kropf); 'Femme Fatale' (Talbot); 'Fooled Me' (Reilly-Hein); 'Jamaican Me Crazy' (Trimmer); 'Leonidas' (Harris-Benz); 'Leprechaun's Lace' (Hudson); 'Moonlit Masquerade', 'Something Wonderful', 'Summer Dragon' (Salter); 'Smuggler's Gold' (Branch)	Antarctica, 'White Tie Affair' (Pec); 'Gentle Shepherd' (Yancey)
2000–2023	'Afrikanская Noč' (Pikalova); 'Zamfir' (Manole)	'Kreolka', 'Peryskaya Deva', 'Strana Delfinia' (Pikalova); 'Margaritar', 'Melancolie' (Manole); 'Sink Into Your Eyes' (Lambertson)	'Fame' (Grace-Smith); 'Hadalka' (Vynohradka); 'Letniy Zvezdopad' (Pikalova); 'Lelia' (Shcherbakova, Pereboichuk); 'Longfields Twins' (Heemskerck); 'Marharyta' (Shcherbakova, Yakovenko); 'Modnyy Vyrok', 'Ranok Elifa', 'Rodzynka' (Shcherbakova)		'All His Life', 'Solar Wind', 'Stozhary', 'Tavrida' (Pikalova); 'Exploded Pumpkin' (Heemskerck); 'Goldenzelle' (Smith-FR); 'Karfahen', 'Peryskiy Samotsvit', 'Tsarivna', 'Veselyi Hnom' (Shcherbakova, Pereboichuk); 'Putevodnaya zvezda' (Vynohradka)	
			Medium = 10–20 July ±5 days			
Before 1959	'Black Plush' (Connell)		'Luxury lace' (Spalding)		'Golden Orchid' (Dennett); 'Late Summer' (Hall-D.F.)	
1960–1979	'Arriba' (Griesbach-Hardy); 'Grandfather Time' (Wild)		'Abstract Art', 'Family Party', 'Varsity' (Hall-D.F.); 'American Style', 'Something' (Wild); 'Brygida' (Franczak)		'Alice in Wonderland', 'I'fra Flora', 'Chartreuse Queen', 'Lace Fan', 'Radiant Greetings', 'Win-nie the Pooh' (Wild); 'Apache Tears', 'Kind Ways', 'New Love', 'Nob Hill', 'Pastoral Symphony' (Hall-D.F.); 'Batter Up' (Warner); 'Double Dream' (Brown-B.)	





**Fig. 3. Double flower cultivars of the NBG breeding:**

1. 'Tsarivna' (Shcherbakova, Pereboichuk, 2013), 2. 'Lelia' (Shcherbakova, Pereboichuk, 2015), 3. 'Pisnia Khorsa' (Shcherbakova, Pereboichuk, 2015), 4. 'Ranok Elfa' (Shcherbakova, 2016), 5. 'Rodzynka' (Shcherbakova, Pereboichuk, 2017), 6. 'Marmelad' (Shcherbakova, 2018), 7. 'Modnyi Vyrok' (Shcherbakova, 2018), 8. 'Kvitka Molfara' (Shcherbakova, Yakovenko, 2019)

1960–1979. A large number of cultivars with red flowers are in hybrids from 1980–1999. Cultivars of modern breeding are mostly represented by the purple and pink colour group.

In terms of flowering time, the daylily cultivars are divided into three groups (early and medium early, medium, medium late and late), which makes it possible to use them to extend the flowering range by three months from the second decade of May to the second decade of August. Most of the cultivars in the collection are early and medium early. Medium late and late hybrids are the least represented.

### Conclusions

The NBG daylily collection is the result of 40 years of introduction and 20 years of breeding work with this crop at the NBG. It includes 174 cultivars of international, 26 cultivars of domestic breeding and more than 1000 hybrid seedlings. The largest number of cultivars – 79 – were introduced in 2000–2009. The current daylily collection is representative. The cultivars introduced to the NBG illustrate the main stages of breeding

work with the crop and the achievements of breeders from around the world. The collection includes early and medium early, medium, medium late and late flowering cultivars. The cultivar of the collection, which is diverse in color and flowering time, can be effectively used to extend the flowering period of daylilies by three months (from the second decade of May to the second decade of August) in ornamental gardening in Ukraine and in various landscape compositions.

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УДК 582.573.76:631.527.5:[712.253:58](477-25)

**Щербакова Т. О.** Формування колекційного фонду та сортовивчення лілійника в Національному ботанічному саду імені М. М. Гришка НАН України. *Plant Varieties Studying and Protection*. 2024. Т. 20, № 3. С. 140–146. <https://doi.org/10.21498/2518-1017.20.3.2024.311793>

Національний ботанічний сад імені М. М. Гришка НАН України, вул. Садово-Ботанічна, 1, м. Київ, 01014, Україна, e-mail: Shcherbacova@ukr.net

**Мета.** Аналіз та порівняльне вивчення сортів лілійника з колекційного фонду Національного ботанічного саду імені М. М. Гришка НАН України (НБС), добір сортименту для декоративного садівництва та озеленення. **Методи.** Об'єктом досліджень були сорти колекції лілійника НБС. Їх аналізували за декоративними й господарськими властивостями, а також об'єднували у групи за забарвленням квітки та початком цвітіння. Групування відбувалося й за такими параметрами, як автор сорту, країна походження, рік створення та інтродукції в НБС, встановленими у процесі досліджень. **Результати.** Колекція лілійника НБС – це результат 40-річної інтродукційної та 20-річної селекційної роботи з цією культурою. Вона налічує 174 сорти світової та 26 української селекції й понад 1000 отриманих гібридних сіянців. Найбільше сортів (79) інтродуковано у 2000–2009 рр. Основну частку в сучасній колекційній структурі становлять представники селекції 1960–1970 рр. Більшість з них – гібриди американських селекціонерів Девіда Холла (D. F. Hall) (20 сортів) та Алена Вайлда (A. Wild) (46 сортів). На базі колекції створено 15 власних сортів зі стабільною повною квіткою, що є цінною ознакою для поширених в Україні гібридів.

З метою ефективного застосування в декоративному садівництві та озелененні сорти об'єднали у групи за забарвленням квітки та початком цвітіння. Найповніше представлено групу із жовтою квіткою; її червоне забарвлення притаманне гібридам селекції 1980–1999 рр. А от сучасні сорти переважно належать до пурпурової та рожевої кольорової групи. Найбільше в колекції представників раннього та середньораннього термінів квітування; найменше – середньопізніх і пізніх гібридів. **Висновки.** Сучасна колекція лілійника є репрезентативною. Інтродуковані в НБС сорти ілюструють основні етапи селекційної роботи з культурою та досягнення селекціонерів різних країн світу. У колекційному фонді є представники раннього та середньораннього, середнього, середньопізнього та пізнього термінів цвітіння. Різноманітний за колірною гамою й строками квітування сортимент можна ефективно використовувати для розширення діапазону цвітіння лілійників протягом трьох місяців (з другої декади травня до другої декади серпня) у декоративному садівництві України й різних композиціях озеленення.

**Ключові слова:** гібридизація; декоративне садівництво; сортимент.

Надійшла / Received 06.08.2024  
Погоджено до друку / Accepted 29.08.2024