

# BREEDING OF LITHUANIAN SPECIES OF *PAEONIA LACTIFLORA* PALL. IN KAUNAS BOTANICAL GARDEN

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## Introduction

Since 1923 the Kaunas Botanical Gardens of Vytautas Magnus University (VMU) has been accumulating the *Paeonia lactiflora* plant cultivars [1]. The breeder Dr Ona Skeivienė has created a great number of cultivars and hybrids of peony. Started in 1947 and continued till the 1979 these *Paeonia lactiflora* are distinguished by different morphological, ornamental and biological properties [7]. Collection, preservation, investigation and evaluation of Lithuanian cultivars are original, adapted to the local climate condition and it is an urgent task to conserve, investigate and foster them as a part of our culture [8]. There are cultivars: 'Garbė Motinai', 'Virgilijus', 'Prof. K. Grybauskas', and 16 hybrids: 'Maironis', 'Freda', 'Skeivienės vėlyvasis', 'Darius–Girėnas', 'Kastytis', 'Vakaris' and other.

The breeder Dr Jonas-Evaldas and Emilija Tarvidai have created 25 hybrids of *Paeonia lactiflora*. Started in 1970 these are distinguished by different morphological, ornamental and biological properties, Lithuanian hybrids are original, adapted to the local climate [2]. 25 hybrids: 'Meilutis', 'Klajūnas', 'Labutis', 'Lakūnas', 'Freda', 'Kaunietis', 'Kėdainietis', 'Švyturys', 'Vilnietis' and other.

Lithuanian peony collection in 1998 was added to our educational programme "Genetic Resources Research of Plants" in 2006, the varieties 'Garbė Motinai', 'Prof. K. Grybauskas' and 'Virgilijus', given the national plant genetic resources (ANGIS) status. To Lithuanian peony collection in 2007, Dr Ona Skeivienė contributed with 16 hybrids and 2008 Dr Jonas-Evaldas and Emilija Tarvidai contributed with 25 hybrids of peonies, given to the plant genetic resources in the national status [2-3]. The two set up for the Lithuanian national peony collection.

*The aim of the research:* to evaluate morphological-decorative features of *Paeonia lactiflora* cultivars originated in Lithuania and describe the making of the collection and the purpose in order to save it.

## Materials and Methods

*Research objects.* *Paeonia lactiflora* Pall. Collection 1 (originator Dr Ona Skeivienė) consists of 3 cultivars, 19 hybrids and Collection 2 (originator Dr Jonas-Valdas and Emilija Tarvidai) encompasses 25 hybrids created in Lithuania and constantly

growing in Kaunas Botanical Garden of Vytautas Magnus University.

*Cultivation.* *Paeonia lactiflora* in an open area in rows to the southwest direction. The distance between rows is 1 m and between separate plants – 0.8 m., the layer of acculturated light clay loam soil is in the depth of about 60 cm, pH 6.0–6.5. Groundwater is not higher than 1 m.

*Paeonia lactiflora* are over planted from the middle of August till the middle of September into specially prepared pits. During the vegetation some other caring works are done: weeding out, watering. After plants are over-planted in three-four years, it is necessary to start fertilising, according to J. Varkulevičienė and A. Stankevičienė (2006).

*Research methods.* Phenological observations have been made according to [5] and morphological-decorative features have been investigated and morphometrical measurement was carried out during mass blossoming period according to [9]. Flower colours are described by the Colour Chart the Royal Horticultural Society London, 2007 [6]. The collection-exposition of peonies in Kaunas Botanical Garden was used for this purpose. During phenological observations, four cultivars were evaluated according re-sprouting, blossom and decorativeness. The radial growth of trees was investigated in dendrarium of the Botanical Garden and forests of Kaunas region [4].

## Research Results

The place in Kaunas Botanical Garden for *Paeonia lactiflora* collections-exposition is optimally suitable for these plants to grow. In 2006–2011, continuing the started introduction and acclimatisation research, there morphological-decorative features' research was carried out and the data is summed up in Table 1.

Collection 1 (originator Dr Ona Skeivienė) encompasses 3 cultivars, 19 hybrids *Paeonia lactiflora* Pall. Under our ecological conditions the peonies start growing again in the beginning of April, days 6–13. The species 'Skeivienės vėlyvasis' and 'Žilvinas' start growing later.

While analysing phenological phases of cultivars during the growth and development period it was stated that 'Maironis' was the earliest cultivar and 'Prof. K. Grybauskas' was the latest cultivar. It

was established that the blooming duration of these *Paeonialactiflora* was 12–20 days long. Blooming starts in the second and third decades of June.

‘Virgilijus’, ‘Kastytis’ and ‘Tadas’ have the longest blooming, about 20 days, ‘Skeivienės vėlyvasis’, ‘Vakarīs’, ‘Danutė’ – the shortest, about 12 days.

Table 1. *The morphological and decorative features characteristic of Lithuanian Paeonia lactiflora Pall. cultivars and hybrids in Kaunas Botanical Garden, 2006–2011* (originator O. Skeivienė)

Example No-Origination Years	Cultivars, hybrids	Height of plant, cm	Diameter of a blossom, cm	Stems number, unit	Stems of blossom, unit	Form of blossom	Colour of blossom
G922/v-1958	Garbė Motinai	93.5	17.5	70.2	57.8	H-SD	Light rose with violet shade
G918/v-1958	Virgilijus	93.3	18.2	48.4	37.2	S	Rose red
G923/v-1958	Prof. K. Grybauskas	100.8	14.8	83.2	56.8	SD	Dark red with white edging
G920/h-1964	Maironis	87.0	18.4	42.7	26.9	S	White
G921/h-1964	Freda	94.2	14.7	37.3	23.4	C-LD	Light rose
G910/h-1964	Darius-Girėnas	93.0	14.5	25.1	19.8	H-SD	Rose
G911/h-1964	Skeivienės vėlyvasis	98.9	15.8	19.8	15.7	H-SD	Light rose
G919/h-1964	Žilvinas	73.3	14.3	21.2	18.9	S	Light rose
G908/h-1970	Elena	92.8	19.1	40.3	35.9	S	Light rose
G913/h-1970	Rytas	83.2	18.5	23.6	23.0	S	Light rose
G917/h-1964	Kastytis	99.6	20.0	25.6	24.1	S	Dark rose
G906/h-1970	Ona	80.3	18.7	42.9	38.9	S	Light rose
G905/h-1970	Jadvyga	67.0	16.1	35.6	31.4	S	Light rose
G912/h-1970	Ramunis	101.2	15.2	30.7	24.5	S	Violet rose
G914/h-1964	Vakarīs	111.2	18.3	40.6	36.7	C-LD	Rose
G907/h-1970	Danutė	77.1	18.4	67.4	47.9	S	Light rose
G916/h-1970	Jonas	100.5	18.6	45.7	32.1	S	Light rose lilac
G915/h-1970	Tadas	71.73	15.2	35.6	25.3	S	Red
G909/h-1970	Regina	91.01	18.0	72.2	53.4	S	Violet rose

Note: v – cultivar, h – hybrid, S – single, D – double, H-SD – half-spherical, double, C-LD – crown-like, double. SD – spherical double

The morphological and decorative features of these *Paeonia lactiflora* are of large variety. Evaluating peony blossoming abundance it was stated that dwarf (plant height about 67.0 cm) cultivars ‘Jadvyga’ had sparsely bloomed (averagely 31.4 blooming stems per plant) and cultivars ‘Garbė Motinai’ had plenty of them (about 57.8). The smallest flowers had plants of complete cultivars ‘Prof. K. Grybauskas, in diameter about 14.8 cm, but they had a long blossoming period, 16 days, and high plants, i.e. 100.8 cm. The biggest blossoms in diameter 20.0 cm were of the cultivars ‘Kastytis’.

Collection 2 (originator Dr Jonas-Valdas and Emilija Tarvidai) encompassed 25 hybrids *Paeonialactiflora* Pall. In our ecological conditions the peonies start growing again in the beginning of April, days 11–14. The species ‘Meilutis’, ‘Klajūnas’ and other start growing later.

The morphological and decorative features of these *Paeonialactiflora* are of large variety. Evaluating

peony blossoming abundance it was stated that dwarf (plant height about 70.5 cm) cultivars ‘Vilnietis’ had sparsely bloomed (averagely 38.6 blooming stems per plant) and cultivars ‘Stipruolis’ had plenty of them (about 37.2). The smallest flowers had plants of complete cultivars ‘Kaukutis’, in diameter about 11.7 cm, but they had long blossoming 14 days and high plants – 115 cm. The biggest blossoms in diameter 16.5 cm were of the cultivars ‘Aistis’ (Table 2).

While analysing phenological phases of cultivars during growth and development period, it was stated that ‘Kėdainietis’ and the latest cultivars is ‘Gražuolis’ were the earliest cultivars. It was established that the blooming duration of these *Paeonialactiflora* was 15–18 days long. Blooming starts in the second and third decades of June. ‘Labutis’, ‘Keleivis’, ‘Gražuolis’, ‘Kvieslys’, ‘Našutis’ have the longest blooming, about 18 days, and ‘Vilnietis’, ‘Kaukutis’, ‘Skaistis’ have the shortest, about 11 days.

Table 2. *The morphological and decorative features characteristic of Lithuanian Paeonia lactiflora hybrids in Kaunas Botanical Garden, 2006–2011* (originators J.–V. and E. Tarvidai)

Example No- Origination, Years	Cultivars, hybrids	Height of plant, cm	Diameter of a blossom, cm	Stems number, unit	Stems of blossom, unit	Form of blossom	Colour of blossom
BT-18/1979	Aistis	95.5	16.5	40.2	26.4	S	Dark red with white edging
BT-32/1979	Dainius	90.5	12.9	47.3	32.3	A	Light rose
BT-102/1979	Gražuolis	115.0	13.5	60.1	49.0	D	Rosy
BT-19/1979	Jaunuolis	50.7	14.5	39.4	27.5	S	Dark pink
BT-30/1979	Kaunietis	87.6	15.2	45.2	39.7	S	Dark pink
BT-50/1979	Kaukutis	113.0	11.7	37.1	31.6	S	Light pink
BT-81/1979	Keleivis	100.0	15.7	46.0	37.5	H-SD	Light purple-red
BT-108/1979	Kėdainietis	89.4	14.0	38.4	31.7	D-A	Crimson
BT-144/1979	Klajūnas	110.0	14.6	37.3	30.5	S-D	Light rose
BT-31/1979	Kvieslys	79.8	15.0	29.0	21.6	S	Light rose
BT-116/1979	Labutis	78.9	14.7	28.1	20.2	S-A	Dark pink
BT-111/1979	Laimikis	109.0	14.8	51.2	36.0	H-SD	White-pink
BT-65/1979	Lakūnas	105.0	14.9	60.0	46.2	H-SD	Creamy-pink
BT-152/1979	Meilutis	86.7	15.3	18.7	12.8	H-SD	Purple-red
BT-94/1994	Našutis	110.0	13.7	27.6	21.7	S-D	Dark pink
BT-34/1979	Senolis	79.7	12.7	45.3	38.6	S	Pink
BT-44/1979	Skaistis	88.9	13.5	32.8	29.5	S	White-pink
BT-25/1979	Stipruolis	89.7	15.0	52.1	37.2	H-SD	Dark pink
BT-10/1979	Svečias	87.5	15.0	26.9	19.5	H-SD	Pink-white edges
BT-155/1979	Šaunuolis	88.5	14.8	38.6	27.6	H-SD	Crimson
BT-56/1979	Švyturys	87.5	14.9	39.5	31.5	H-SD	Purple-red
BT-154/1979	Veikėjas	88.6	15.3	35.7	30.6	H-SD	White-pink
BT-60/1979	Vilnietis	70.5	16.0	39.2	32.5	S	Dark pink
BT-153/1979	Žygūnas	97.2	15.8	35.7	30.4	H-SD	Light purple-red
BT-143/1989	Žynys	96.5	15.0	55.0	46.0	H-SD	Dark pink

Note: S – single, S-A – single/anemone form, D – double, D-A – double/anemone form, A – anemone form, H-SD – half-spherical, double, S-D – semi- double.

The flowering productivity mean increases from 35 (in 2006) to 70 units (in 2011). It was increasing with plant aging. Environment conditions could have had influence on the uneven increase. From the 2006 till 2011, the increase was slight (from 35 to 39) and during 2003–2004 flowering productivity had hardly increased, it was about 35 units (Fig. 1).

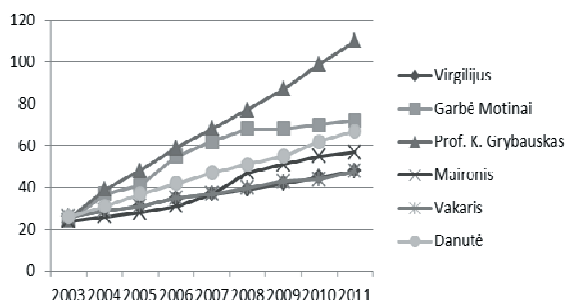


Fig. 1 *Paeonia lactiflora* cultivars flowering productivity dynamic in 2003–2011

According to the literature, the generative buds of the next year are being formed in August–September. During the research period in 2007, throughout these months there was not much rainfall (14 mm in August and 42 mm in September; in 2008 the rainfall in August was heavier – 53 mm, but less in September – 28 mm). Flowering productivity had highly increased in 2009 and 2010. This was influenced by the bigger amount of rainfall during generative bud formation: in 2009 – 97 mm in August and 35 mm in September; in 2010 – 135 mm and 48 mm respectively. The optimal conditions in spring could also make influence (temperature in April–June was higher than the average temperature of the year – 7.5°C, 12.1°C, 15°C).

The radial growth patterns of this species, its dependence on climate factors and links to phenophases of peonies were evaluated. Research has demonstrated that phenophases of peonies depend on climate conditions of several months, especially on the last winter conditions. It was established that the beginning of phenophases of peonies was related

to the radial growth rates of trees. Links between the beginning of phenophases of peonies and tree radial growth enables to forecast the radial growth and peculiarities of the vegetation of peonies. Low winter temperatures and thin snow cover are one of the main factors influencing re-sprouting of peonies, similarly to the radial growth rates of many tree species [9].

For keeping healthy peonies it is necessary to accord to plant's agro-technical requirements and since some injuries emerge cut and eliminate injured plant parts. Peony cultivars and hybrids created in Lithuania are used to our climate ecological conditions and are more resistible to negative biotic factors, that means they are less fragile than these introduced from abroad [5].

It necessary to save the created cultivars and hybrids, evaluate their selective numbers and continue increasing the selection of new cultivars and hybrids constantly spreading and showing them to society.

### Conclusions

1. In 2006–2011, phonological observations, morphological and decorative features of 3 cultivars and 16 hybrids (originator Dr Ona Skeivienė) and 25 hybrids (originator Dr Jonas–Valdas and Emilija Tarvidai) *Paeonia lactiflora* growing in Kaunas Botanical Garden of Vytautas Magnus University were made. It was established that cultivars and hybrids of Lithuanian peony had varied. The morphological-decorative features of these peonies are of large variety: plant blooming duration lasted for 10–20 days, blooming abundance was 12–57 blossoms on one plant, the size of a blossom was 11–20 cm, the height of plants was 67–115 cm, the form of blossoms was hollow, semi-double and double.

2. Links between the beginning of phenophases of peonies and tree radial growth enables to forecast the radial growth and peculiarities of the vegetation of peonies. Low winter temperatures and thin snow cover are one of the main factors influencing re-sprouting of peonies, similarly to the radial growth rates of many tree species.

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### Summary

In 2006–2011, phenological observations, morphological and decorative features of 3 cultivars and 16 hybrids (originator Dr O. Skeivienė) and 25 hybrids (originator Dr Jonas–Valdas and Emilija Tarvidai) *Paeonia lactiflora* Pall. growing in Kaunas Botanical Garden of Vytautas Magnus University were made. It was established that cultivars and hybrids of Lithuanian peony had varied. The morphological-decorative features of these peonies are of large variety: plant blooming duration lasted for 10–20 days, blooming abundance was 12–57 blossoms on one plant, the size of blossom was 11–20 cm, the height of plants was 67–115 cm, the form of blossoms was hollow, semi-double and double. The blossoms productivity increases with plant's age. 41.6% of changeability of bush height, blossom diameter, blossom productivity was influenced by the genotype. Investigations evaluating the link between the radial growth of trees and phenophases of peonies have been carried out.

**Key words:** *Paeonia lactiflora*, Lithuanian cultivars, hybrids, climate, morphological, decorative features.



**LIETUVIŠKŲ *PAEONIA LACTIFLORA* PALL VEISLIŲ AUGINIMAS  
KAUNO BOTANIKOS SODE**

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**Santrauka**

Vytauto Didžiojo universiteto Kauno botanikos sode 2006–2011 m. buvo atlikti lietuviškų *Paeonialactiflora* Pall. 3 veislių, 16 hibridų (originatorė dr. O. Skeivienė) ir 25 hibridų (originatoriai dr. Jonas Valdas ir Emilija Tarvidai) fenologiniai stebėjimai bei įvertintos morfologinės ir dekoratyvinės bijūnų savybės. Nustatyta, kad šių bijūnų morfologinės ir dekoratyvinės savybės yra labai skirtingos: augalų žydėjimo trukmė nuo 10 iki 20 dienų, žydėjimo gausumas nuo 12 iki 57 žiedų viename kere, žiedų dydis nuo 11 iki 20 cm skersmens, augalų aukštis svyravo nuo 67 iki 115 cm, žiedų formos – tuščiaviduriai, pusiau pilnaviduriai ir pilnaviduriai. Augalo produktyvumas didėja su veislės amžiumi, kero aukštį, žiedų skersmenį apie 50 % lemia genotipo kintamumas. Buvo atlikti tyrimai, įvertinantys medžių radialiojo priaugio ir bijūnų fenofazių ryšį. Tyrimai parodė, kad bijūnų fenofazės pradžia susijusi su medžių radialiojo priaugio dydžiu. Bijūnų fenofazių pradžios ir medžių radialiojo priaugio ryšiai leidžia prognozuoti būsimą radialiojo priaugio dydį ir bijūnų vegetacijos kaitą. Ypač neigiamą įtaką bijūnų atžėlimo pradžia, kaip ir daugelio medžio rūšių radialiajam priaugiui, turi žema žiemos temperatūra ir plona sniego danga.

**Prasminiai žodžiai:** *paeonialactiflora*, lietuviškos veislės, klimatas, morfologinės ir dekoratyvinės savybės.

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