

CHARACTERIZATION DESCRIPTORS FOR *PAEONIA LACTIFLORA* CULTIVARS

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Abstract

Chinese peony and their first cultivars were introduced in Lithuania from Western Europe. Lithuanian flower breeders S. Eicher-Lorka, O. Skeivienė, E. Tarvidienė and J. E. Tarvidas developed Lithuanian peony cultivars. 48 Lithuanian peony cultivars: 4 *Paeonia suffruticosa* Andrews, 44 cultivars of *Paeonia lactiflora* Pall. attributed to National Plant Genetic Resources. The descriptors are not prepared for the evaluation of morphological and ornamental traits of herbaceous peonies. This article discusses the descriptor of morphological and decorative traits of herbaceous peonies (*Paeonia lactiflora* Pall.). The description of vegetative and generative parts of peony plants was prepared according to methodological materials of M. Vasiljeva, J. Vaidelys, S. Dapkūniene following the manual – a teaching aid prepared by S. Dapkūniene, BI advice for developers of descriptors and referring the UPOV guidelines. The observations were performed when the plants were completely developed, at the beginning of flowering (unless specified otherwise). 10 plants or their parts were evaluated. When evaluating the peony, vegetative and generative parts of the plant were described.

Key words: herbaceous peony, *Paeonia lactiflora*, characterization descriptor.

INTRODUCTION

The genus *Paeonia* involves about 40 species spread mainly in Central and Eastern Asia, less in North America, Southern Europe and one cultivar in South Africa. Over five thousand peony cultivars are known. European herbaceous peony cultivars were created from the native species. About 70% of the cultivars belong to *Paeonia*

lactiflora hort, 30% belong to the *P. hybrida hort.*, and only about 1% of the cultivars belong to *P. officinalis* L. Many new cultivars with various flower shapes were then derived mostly from *P. lactiflora*, although some hybrid cultivars between it and *P. officinalis* were created (Hosoki et al., 1991). Species and their first cultivars were introduced in Lithuania from Western Europe, and they were described in Lithuanian literature by J. Strazdas from 1930. Lithuanian flower breeders S. Eicher-Lorka, O. Skeivienė, E. Tarvidienė and J. E. Tarvidas developed Lithuanian peony cultivars (Dapkūnienė et al., 2007; Stukeniene et al., 2010). 48 Lithuanian peony cultivars (4 by S. Eicher-Lorka (*P. suffruticosa* Andrews), 19 by Ona Skeivienė (*P. lactiflora* Pall.) and 25 cultivars of the same peony by E. Tarvidienė and J. E. Tarvidas) were attributed to national plant genetic resources. When a plant is granted the status of national plant genetic resources, the documents (Passport, Descriptors of Management, Environment and Site, Characterization and Evaluation) of the set form and meeting the BI (*Bioversity International*) requirements are prepared, and the data are entered into the central database. Characterization descriptors help to distinguish among different phenotypes easily and quickly. They indicate the features that are easily visible to the naked eye and occur equally under different environmental conditions (Developing..., 2007). The prepared descriptors of agricultural (field, garden, vegetable garden) technical crops (in English or other languages) are available and can be downloaded free of charge online at data basis of Bioversity International. As regards ornamental plants, a complete descriptor is prepared for the plants of *Allium* genus only (IPGRI..., 2001). International Union for the Protection of New Varieties of Plants UPOV (*Union pour la Protection des Obtentions Végétales*), uniting the states in which newly developed cultivars of plants (and flowers) are investigated, has prepared the criteria for description of plant cultivars, including some ornamental plants UPOV (List..., 2011). The Guidelines for the conduct of tests for distinctness uniformity and stability for trees peony (*Paeonia suffruticosa*, *P. jishanensis*, *P. ostii*, *P. rockii* and *P. delavayi*) are prepared by UPOV in 2011 (Draft..., 2011). There are no prepared descriptors for the evaluation of morphological

and ornamental traits of herbaceous peonies; therefore, we expect that the peony characterization descriptor presented in the article will help to distinguish among different peony phenotypes that are easily visible to the naked eye and occur equally under different environmental conditions.

MATERIALS AND METHODS

The description of vegetative and generative parts of peony plants was prepared according to methodological materials of M. Vasiljeva (Vasiljeva, 1972), J. Vaidelys (Vaidelys, 2005), S. Dapkūnienė (Dapkunienė et al., 2012) following the manual – a teaching aid prepared by S. Dapkūnienė (Dapkunienė, 2007), BI advice for developers of descriptors (Bioversity..., 2007) and referring the UPOV guidelines. The observations were performed when the plants were completely developed, at the beginning of flowering (unless specified otherwise). 10 plants or their parts were evaluated.

RESULTS

When evaluating the peony, vegetative and generative parts of the plant were described. In the description of a vegetative part of the plant the following were distinguished: the height of the plant bush, the appearance of the bush, a number of stems in the bush, the diameter of the flowering stems, the size of the compound leaf lamina and the colour of the leaf. In the description of the generative part of the plant, special attention was given to the morphology, colour and form of the peony blossom and its components.

Vegetative Part of the Plant. Annually, directly from root grown stems form a bush (herbaceous peonies), the height of the bush is measured in centimetres from the ground surface to its highest point. Five groups are defined: very low (under 0.4 m), low (0.41-0.60 m), medium (0.61-0.80 m), high (0.81-1 m) and very high (over 1 m) peonies. A peony bush may be compact, half-sticking and sticking out. A stem is the axial part of the over ground part of the plant composed

of nodes and internodes, with leaves, buds and blossoms. The overall number of flowering and non-flowering stems in the peony bush is evaluated. Vegetative stems do not form blossoms and do not mature seeds. On the contrary, buds, blossoms and maturing seeds are found in generative stems. Most of such peony stems end in one blossom. In less frequent cases, side blossoms may be formed. The total number of stems indicates exuberance and density of the peony bush. The ratio between the stems forming blossoms and all the stems is the indicator of flowering abundance. The thicker the stems, the better it will blossom. There are three groups of flowering stems diameter (m): thin (0.007 to 0.009), medium (0.01 to 0.012), and thick (0.013 to 0.015) stems. Length and width of the compound (pinnate) leaf lamina indicate the size of the leaf: small leaves (a lamina is 0.15 m long and 0.10 m wide), medium leaves (0.15-0.20 m long and 0.10-0.20 m wide) and large leaves (over 0.20 m long and 0.20 m wide). According to the colour, peony leaves may be matte green with a glossy upper side or bright green and glossy.

Generative Part of the Plant. Blossom is a reproductive organ of flowering plants. All parts of the blossom derive from leaves. A peony blossom reflects the transitional forms between the terminal leaves and sepals, between sepals and petals. Full double peony blossoms form when stamens turn into petals. All of the stamens of one blossom are called androecium. There are some stamens that do not produce pollen. Such sterile stamens are called *Stamen sterilis*. *Stamen sterilis* in peonies are often of the same colour as petals. Carpels of one blossom are called gynoecium. Carpels, growing together with edges, make pistils. A stem or a twig on which the blossom grows is called a pedicel. The enlarged (thickening) apex is called the receptacle. The receptacle of the peony is flat.

Peonies differ in their blossom form. The blossom form can be maintained over the entire flowering period of the peony or not. The blossom form depends on the genealogy of the peony and may vary (Fig. 1, 2). Accordingly, peonies are divided into five groups: single, Japanese, anemone form, semi-double and full double. There are four subgroups of full double blossom form peonies: A – crown-like full

double, B – half-spherical full double, C – rose pink full double and D – half rose pink full double. Single blossoms have one or two rows of broad petals around a number of stamens with viable pollen and normally developed pistils. Japanese type peony (first developed in Japan) is a transitional form from single to a semi-double blossom form. Petals are located in one or two rows around the *Stamen sterilis* of the stamens colour including the normally developed pistils. Anemone form blossoms are one-row blossoms with a five or more outer petals and *Stamen sterilis* in the centre. *Stamen sterilis* are broader and taller than the Japanese peonies, of the petal colour, forming a decorative prominent centre of the blossom. Normally developed pistils are hidden among *Stamen sterilis*. Semi-double blossoms are composed of 3-5 rows of broad petals, interchanging with a number of stamens. Stamens may be normally developed or having turned into *Stamen sterilis*. Pistils may be normally developed or having turned into petals. The centre of the blossom of this form is open or semi-closed (Fig. 1).

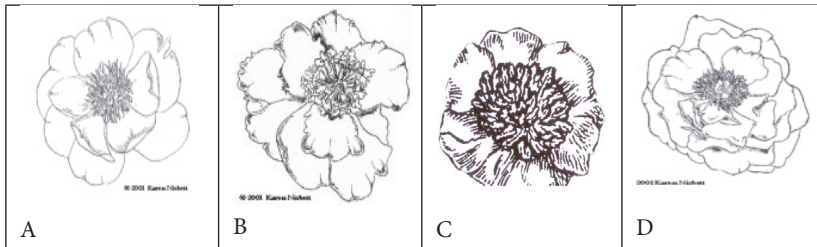


Fig. 1. Forms of blossoms (according to Jakubovski, 2002): A – single form, B – Japanese form, C – anemone form, D – semi-double form

1 pav. Žiedų formos (*remiantis* Jakubovski, 2002): A – tuščiavidurio bijūno žiedo schema, B – japoninio bijūno žiedo schema, C – plukės formos bijūno žiedo schema, D – pusiau pilnavidurio bijūno žiedo schema

Full double blossoms are composed of many petals: outer – wide, inner – long, and narrow and different ones in the centre. Most stamens and pistils are reduced. There occur sporadic stamens with

viable pollen stamens and viable pistils which are able to produce seeds. Crown-like full double form peonies are the ones whose outer petals of the blossom are broad and located in a row. Next to them there is a row of narrow collar of *Stamen sterilis*, and in the centre there is a “crown” from sufficiently broad petals. The colour of outer petals and the “crown” is the same, but the colour of the *Stamen sterilis* circle is different. Half-spherical full double (round) peony blossoms are distinguished for their wide, large outer and narrower, cut or jagged – edged inner petals, gathered into a half-circle. Outer petals of fully flowering blossoms flag, inner petals become broader and longer, and the blossom becomes circular.

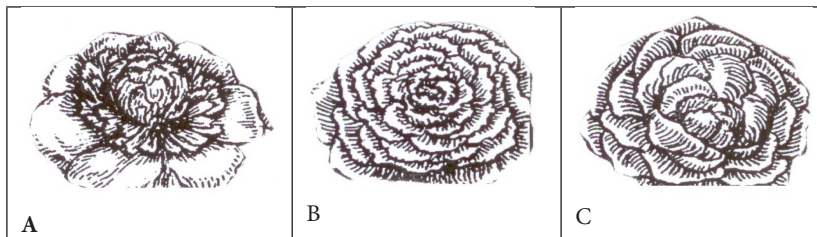


Fig. 2. Full double forms of blossoms (according to Jakubovski, 2002): A – crown-like full double form, B – half-spherical full double form, C – rose pink full double form

2 pav. Pilnavidurių bijūnų žiedų formos (remiantis Jakubovski, 2002): A – pilnavidurio-karūninio žiedo schema, B – pilnavidurio pusiau rutulinio žiedo schema, C – pilnavidurio rožiško žiedo schema

Rose pink full double peony blossoms are the most decorative ones. All petals of the blossom are large, broad, similar (a little smaller towards the centre of the blossom), closely gathered. There are no stamens in the blossom or they are negligible. It is possible to distinguish peonies with half rose pink full double blossoms. They are similar to full double peonies with rose pink blossoms; however, in the former numerous stamens are visible among the petals (Fig. 2). The blossoms of all forms according to the size of their diameter (in m) are: small (under 0.1), medium (0.11-0.16), large (0.16-0.20), and giant (over 0.20). They

differ in the form of petals. Outer petals may be conversely egg-shaped or elliptical, and the inner petals are of the linearly elongated or other form. Colour derivatives on the petals may be expressed in strokes, dashes, spots, stains or none at all. The blossoms of peony cultivars differ in the length of stamens (short – 0.01-0.02 m, long – 0.03-0.04 m and very long – more than 0.04 m) and colour (white, yellow, cream, orange, pink, raspberry, red or other). There may be blossoms without *Stamen sterilis*, or with sporadic or many *Stamen sterilis*. A number of pistils are 3.3-4.5-6 units or other. All the above-mentioned blossom colours are white (snow white, greenish white, creamy white, yellowish-white), yellow (light yellow, deep yellow), pink (white pink, light pink, creamy pink, dark pink, light lilac pink, lilac pink, dark lilac pink), raspberry (light raspberry, raspberry, dark raspberry), red (flame red, blood red, carmine red) or other. Peony blossoms may be odourless, of light odour and of very strong odour. We expect that the prepared characterization descriptor of morphological-decorative traits of herbaceous peonies will help to describe the properties of peony cultivars.

CONCLUSIONS

The peony cultivars characterization descriptor consists of the evaluation of vegetative and generative parts of the plant. The most suitable parameters to describe a vegetative part of the plant are the height of the plant bush, the appearance of the bush, a number of stems in the bush, the diameter of the flowering stems, the size of the compound leaf lamina and the colour of the leaves. The most suitable parameters for the evaluation of a generative part of the plant are the following ones: a blossom form, blossom size, the form of outer and inner petals and colour derivatives on the petals, length and colour of stamens, presence of *Stamen sterilis*, a number of pistils and the blossom, and the colour and odour of the peony itself. The prepared (*Paeonia* L.) characterization descriptor of peony cultivars is suitable for the use for description of morphological and ornamental traits of peony cultivars.

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PAEONIA LACTIFLORA VEISLIŲ APIBŪDINIMO APRAŠAS

S a n t r a u k a

Bijūnų veislių apibūdinimo aprašą sudaro augalo vegetatyvinės ir generatyvinės dalių vertinimas. Vegetatyvinei augalo daliai aprašyti tinkamiausi parametrai yra augalo kero aukštis, kero išvaizda, stiebų skaičius kere, žydinčių stiebų skersmuo, sudėtinio lapo lapalakščio dydis ir lapų spalva. Generatyvinei augalo daliai vertinti tinkamiausi šie parametrai: žiedo forma, formos atitiktis sodinei formai, žiedų dydis, išorinių ir vidinių vainiklapių forma ir spalviniai dariniai ant vainiklapių, kuokelių ilgis ir spalva, staminodžių buvimas, piestelių skaičius žiede ir paties bijūno žiedo spalva bei kvapas. Buvo parengtas bijūnų (*Paeonia L.*) veislių apibūdinimo aprašas, tinkamas naudoti aprašant šalies bijūnų veislių morfologines-dekoratyviasias savybes.

Reikšminiai žodžiai: žoliniai bijūnai, *Paeonia lactiflora*, apibūdinimo aprašas.