ATLANTIS PRESS

Advances in Biological Sciences Research, volume 7

1st International Symposium Innovations in Life Sciences (ISILS 2019)

Certification of Collections of Syringa L. Varieties and It's Significance for their Identification

Irina Okuneva
Tsitsin Main Botanical Garden of Russian Academy of Sciences
Moscow, Russia

Julia Khokhlacheva*
Tsitsin Main Botanical Garden of Russian Academy of Sciences
Moscow, Russia
jusic-la@yandex.ru

***Abstract*—Authentication of Syringa varieties is required in all major collections. The initial information left by the originators does not make it possible to uniquely identify the varietal affiliation of the samples. In most existing descriptions of varieties, even detailed ones, subjective categories are largely used. The most interesting for the study of intraspecific and intragenital variability, molecular genetic studies, introduction and selection work, as well as for practical gardening are varieties belonging to the *S. vulgaris* and *S.* × *hyacinthiflora*.**

The aim of the study was to identify a set of constant morphological features that allow us to reliably distinguish and identify varieties of *S. vulgaris* and *S.* ×*hyacinthiflora*. On the basis of long-term observations of the collection of lilacs MBG RAS compiled a sample passport varieties of lilacs, which is an expanded detailed unified description. Of the selected features, 44 were the basis for "Methods of testing for distinctiveness, homogeneity and stability *SYRINGA* L.» № 12-06/32 from 02.08.2010, FSI State Commission of the Russian Federation for testing and protection of breeding achievements (RTG/1086/1).

Keywords – MBG RAS, collection fund, Syringa, varieties

I. INTRODUCTION

The genus *Syringa* L. includes more than 2300 ornamental intraspecific and interspecific cultivars, the diversity of which is very large. Lilac is in demand not only in horticulture, but also as an object for molecular genetic studies, which have both applied and theoretical significance [1-3]. It is important to study the possibilities of reproduction of lilacs by tissue culture [4]. It is obvious that the solution of these problems is possible only if the objects of research are genuine varieties.

Authentication of *Syringa* L. varietals is required in all major collections. For long-lasting tree crops, such as lilac, whose age is estimated in tens and hundreds of years, the exact definition of varietal belonging of samples is especially important, especially since the variety can be preserved as a single specimen. The initial information left by the originators does not make it possible to uniquely identify the varietal affiliation of the samples. In most existing descriptions of varieties, even detailed ones, subjective categories are largely used. At the same time, attention is paid mainly to the generative sphere, while vegetative signs are described in General words. Many varieties do not have detailed descriptions at all, but only a brief indication of the type of color and structure of the flower. Conventional photographs do not give a complete picture of the characteristics of varieties, because they do not carry sufficient information about the variations of individual characteristics over the years and during one growing season [5]. The method of identification of S. _vulgaris varieties by the complex of morphological features of the Corolla structure developed in the SBU RAS [6] is the beginning of work on the preparation of a detailed unified description.

The most interesting for the study of intraspecific and intragenital variability, molecular genetic studies, introduction and selection work, as well as for practical gardening are varieties belonging to the common lilac (*S. vulgaris* L.) and related to it *S.* × *hyacinthiflora* Rehder. The latter is an interspecific hybrid *S. oblata* × *S. vulgaris*. Expressed morphological differences in General terms of the structure of the varieties of these species do not have.

It is not always enough to rely on the morphology of the flower to distinguish varieties. It is also necessary to take into account other features that are not key to assess the decorative variety.

The purpose of the research was to identify a set of constant morphological features that allow to reliably distinguish and identify varieties *S. vulgaris* and *S.* × *hyacinthiflora*.

II. EXPERIMENTAL

The research was carried out on the basis of the lilac collection of GBS RAS from 1999 to 2018. A comparative morphological analysis of 160 varieties of *S. vulgaris* and 13 varieties of *S.* × *hyacinthiflora* were carried out. With the help of a digital camera and a scanner, identification images were obtained, which show flowers and buds in 10 main positions (repetitions from 6 to 30 depending on the characteristics of the variety); inflorescences in 4-5 main positions; shoots with leaves; shoots without leaves: leaves in 2 main positions (by the number of nodes on the shoot). Also, General (on vegetating plants) images of inflorescences and their fragments, bushes and their fragments in the amount necessary for adequate generalized visual perception of the variety/species were obtained.

III. RESULTS AND DISCUSSION

On the basis of long-term observations of the collection of lilacs MBG RAS compiled a sample passport varieties of lilacs, which is an expanded detailed unified description (tables I-V). The description must be accompanied by special identification images-photos reflecting the essential features of the variety.

TABLE I. VARIETY DESCRIPTION (PLANT AND SHOOT)

Indication	Degree of manifestation	Indication	Degree of manifestation
Plant: habitus	oblong	**Shoot**: strength	flexible
	obovate		average strength
	rounded		durable
	branchy		
Plant: bush height	stunted (less than 2 m)	**Shoot**: the length of the internodes	shortened
	average height (2-3 m)		normal (average)
	high (more than 3 м)		extended
Plant: density of crown	rare	**Shoot**: the color of bark	gray
	medium density		green
	thick		yellow
Shoot: shape	straight or slightly curved		brown
	arcuate		purplish brown
	winding		

TABLE II. VARIETY DESCRIPTION (BUD AND LEAF)

Indication	Degree of manifestation	Indication	Degree of manifestation
Bud (top pair): shape	rounded	**Leaf**: the nature of the departure of the petiole from the escape	at an acute angle to the axis
	pointed		perpendicular to the axis
Bud (top pair): color	green		bent down
	brown	**Leaf**: pubescence	is
	purplish brown		absents
Leaf: type	simple		
	complex	**Leaf**: color	yellow
Leaf: length	small (length without petiole less than 6 cm)		yellow-green
			light green
	medium (6-9 cm)		green
	large (over 9 cm)		dark green
Leaf: form of the leaf blade	lanceolate	**Leaf**: the character of color	evenly colored
	pointed-elliptical		motley
	pointy-egg-shaped	**Leaf**: anthocyanin color	missing or very weak
	ovate		presents
	cordate		present only on young leaf
Leaf: surface	smooth	**Leaf**: shine	matt
	wrinkled		brilliant
	wavy	**Leaf**: autumn coloring	green
Leaf: density	soft		yellow
	dense		purple
	rigid		brown
Leaf: venation	unobtrusive		other
	noticeable		
	strongly expressed		
Leaf: petiole length (relative to the length of the plate)	short	**Leaf**: the nature of autumn color	evenly colored spotted
	average		
	long		

TABLE III. VARIETY DESCRIPTION (INFLORESCENCE)

Indication	Degree of manifestation	Indication	Degree of manifestation
Inflorescence: location on the bush	open	**Inflorescence**: shape	cylindrical
	hidden in the leaves		pyramidal
Inflorescence: number of pairs of panicles on the shoot	one		ovate
	two	**Inflorescence**: branching	compact
	three or more		branched
	the maximum (number)		highly branched
Inflorescence: the presence of leaves	absent	**Inflorescence**: length of branches	short
	are		average length
Inflorescence: size (length)	short (less than 15 cm)		long
	average (15-25 cm)	**Inflorescence**: divergence angle of branches	very sharp
	long (over 25 cm)		about 45˚
Inflorescence: position in space (strength)	erect		about 90˚
	drooping	**Inflorescence**: number of flowers in the final brush	(number)
	hanging		
Inflorescence: density	openwork		
	loose		
	average density		
	dense		
	very dense		

TABLE IV. VARIETY DESCRIPTION (FLOWER)

Indication	Degree of manifestation	Indication	Degree of manifestation
Flower: size (diameter)	small (up to 1 cm)	**Flower**: the main color in the period of full flowering	white
	medium (1-2 cm)		purple
	large (2-3 cm)		bluish
	very large (over 3 cm)		lilac
Flower: the size of the Bud (diameter) to the beginning of the opening of the Corolla tube	small (less than 0.5 cm)		pinkish
	medium (0.5 cm)		reddish-purple
	large (more than 0.5 cm)		purple
Flower: the shape of a Bud	oblate		yellow
	rounded		cream
	oval	**Flower**: color Bud to the beginning of the opening of the Corolla tube	RHS Colour Chart (number)
	long		verbal description
Flower: type	simple (1 whisk with 4 LP)	**Flower**: the nature of the color of the Corolla tube bend	homogeneous
	polypetalous (1 whisk with the number of LP more than 4)		changing to the center of the Corolla
			varying in radius (striping)
			with a border on the edge
	half-double (1 full and 1 incomplete Corolla)	**Flower**: coloring of the upper side of the Corolla bend (only varieties with simple flowers)	RHS Colour Chart (number)
			verbal description
	terry (2-3 Corolla)	**Flower**: coloring of the lower side of the Corolla bend (only varieties with simple flowers)	RHS Colour Chart (number)
	strongly terry (more than 3 crowns)		verbal description
		Flower: the color of the center and/or borders of the upper side, different from the main (only varieties with heterogeneously colored flowers)	RHS Colour Chart (number)
Flower: tube curvature	absents		verbal description
	is	**Flower:** coloring of the upper side of the bend of the full Corolla (only varieties with semi-double flowers)	RHS Colour Chart (number)
Flower: length of Corolla tube to bend	short (less than the diameter of the Corolla)		verbal description
		Flower: coloring of the lower side of the bend of the full Corolla (only varieties with semi-double flowers)	RHS Colour Chart (number)
	average (equal to the diameter of the Corolla)		verbal description
		Flower: painting the upper side of the bend of the last full inner Corolla (only varieties with double flowers)	RHS Colour Chart (number)
	long (larger than the diameter of the rim		verbal description
		Flower: coloring of the upper side of the bend of the last full inner Corolla (only varieties with double flowers)	RHS Colour Chart (number)
Flower: the shape of the Corolla limb	lanceolate		verbal descriptio
	elliptic	**Flower:** coloring of the lower side of the bend of the last full inner Corolla (only varieties with double flowers)	RHS Colour Chart (number)
	ovate		verbal description
	obovate	**Flower:** color of the visible side of the incomplete inner Corolla (only varieties with semi-double and double flowers)	RHS Colour Chart (number)
Flower: shape of the tip of the Corolla bend	rounded		verbal description
	squeezed	**Flower:** change of color when fading	lightens
	pointed		does not change
	with a beak-like tip		darkens
Flower: position of Corolla bends	flat	**Flower:** stamens-location of anthers relative to the throat of the Corolla	inside the Corolla tube
	concave		at the level of the throat of the Corolla
	refused		noticeably above the throat of the Corolla
	deflected	**Flower:** stamens, color of anthers	purple
	asymmetric		yellow
Only semi-double and double flowers: **Flower**: the mutual arrangement of the Corolla	closely spaced		other (specify which)
	slightly parted	**Flower**: fragrance	missing or very weak
	move apart		weak
	very spread		average
Only semi-double and double flowers: **Flower**: he location of the bends of the inner Corolla	the center is closed		strong
	the center is open	**Flower**: type of fragrance	characteristic of S. vulgaris
			specific
			verbal description

TABLE V. VARIETY DESCRIPTION (FLOWERING AND FRUCTIFICATION)

Indication	Degree of manifestation
Flowering: start time	early
	average
	later
	start date (average)
Flowering: duration	short
	average duration
	long
	number of days (average)
Flowering: profusion	weak
	average
	abundant
Flowering: the frequency (abundance)	not annual
	annual
Fructification	absents
	weak
	normal

Of the selected features, 44 were the basis for "Methods of testing for distinctiveness, homogeneity and stability SYRINGA L.» № 12-06/32 from 02.08.2010, FSI State Commission of the Russian Federation for testing and protection of breeding achievements (RTG/1086/1).

IV. CONCLUSION

The proposed scheme of morphological description contains a sufficient number of positions that allow with a certain degree of reliability to distinguish varieties of lilac even in the non-flowering state, which is important for its reproduction, including microclonal. Classical morphological analysis should precede the study of lilac varieties at the molecular level in order to minimize the probability of erroneous determination of the variety sample taken for the study. It is also important in the selection of samples for mass reproduction of tissue culture.

A comprehensive approach to certification of lilac varieties, including morphological and molecular genetic methods, is able to provide reliable identification of varieties. Certification of varieties in lilac collections will increase the reliability of preserving the genetic diversity of the genus in vivo and in vitro, increase the efficiency of research and breeding work.

ACKNOWLEDGMENT

The work was carried out in accordance to Institutional research project № 18-118021490111-5

REFERENCES

[1] E.Z. Kochieva, N.N. Ryzhova, O.I.Molkanova, A.M. Kudryavcev, V.P. Upelniek, I.B. Okuneva, “The Genius Syringa: molecular labeling of species and varieties”, Genetika, vol. 40, №1, pp. 37-41, 2004 (in Russian).

[2] N.V. Mel'nikova, E.V. Borhert, S.P. Martynov, I.B. Okuneva, O.I. Molkanova, V.P. Upelniek, A. M. Kudryavcev, “Use of molecular genetic markers for verification of in vitro collections of common lilac (Syringa vulgaris L.)”, Genetika, vol. 40, №1, pp. 37-41, 2004 (in Russian).

[3] E.M. Lyah, “Adaptation of molecular methods for identification of varieties *Syringa vulgaris* L.”, Hortus botanicus, vol. 12, pp. 361-366, 2017, Available at: http://hb.karelia.ru/journal/article.php?id=4942 (in Russian) DOI: 10.15393/j4.art.2017.4942 (Accessed 28 September 2019).

[4] O.I. Molkanova, O.A. CHurikova, L.N. Konovalova, I.B. Okuneva, “Features of microclonal reproduction of Syringa vulgaris L.”, Bulletin of MSU, №4, pp. 8-14, 2002.

[5] I.B. Okuneva, “From the history of the creation and study of the collection of lilacs MBG RAS”, Materials of the International scientific and practical conference «INTERNATIONAL SYRINGA 2018», Moscow, Saint-Petersburg, OOO «KLUB PECHATI» Publ., 2018, pp. 267-272 (in Russian).

[6] K.N. Shuvaeva, Principles of identification and classification of varieties Syringa vulgaris L. on the basis of the structure of the Corolla Cand. Diss. Moscow, 2012. 135 p.