

Taxonomic composition of the genus *Philadelphus* sp. in the Mlyňany Arboretum SAS and its presentation

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Abstract: The article deals with the taxonomic composition of the genus *Philadelphus* sp. in the Mlyňany Arboretum SAS. Information from the last inventory in 2010 showed considerable variability in the external characteristics of each introduced species. The results showed that in some species there were re-introduced the interesting provenances and varieties, which increased the taxonomic richness of the collections and the possibility of the presentation of taxa in this genus.

Keywords: *Philadelphus*, Mlyňany Arboretum

Introduction

Mock orange shrubs belong to the most decorative and at the same time to the least demanding woody plants. Though, from coloration viewpoint, they show only white flowers sometimes with yellow tint or purple spot at the base of perianth leaves and their assimilation leaves never change their color, their non neglectable attribute is flowering richness and minimal cultivation requirements.

In most botanical gardens with at least minimal care for their collecting and cultivation, the extensive collections of taxa of various provenances can occur there. With regard to often complicated identification and relatively wide variability of morphological signs of individual taxa, some names can be eliminated from lists after time and it can result to losses in evidence of taxonomic richness of this genus in collections. But observations and selections or eventually directed crossbreeding with selection could result into obtaining

very valuable phenotypes. The genus *Philadelphus* sp. today contains approximately 75 species originated from South Europe to Caucasus, from East Asia and Himalayas and also from North and Central America (KRÜSSMANN 1977), compared with the first half of 20th century with estimated number of species of approximately 40 (REHDER 1949).

Material and methods

During spring and summer 2010 the stands of *Philadelphus* sp. were evaluated in the park subject of the Mlyňany Arboretum in the areas where the plantings were realized using plant material either from expeditions or from the sources of Index seminum, namely in the former Ambrózy semper vireo park (mark P), in the Area of East Asian dendroflora (mark A), in the Area of North American dendroflora (mark S) and in the Area of Korean dendroflora (mark K). This physical inventory control helped to specify and supplemented the data from the inventory published in 1992 (TÁBOR & TOMAŠKO 1992) and from the unpublished inventory in 2001 and 2002.

Identification of taxa was done particularly according to the classification of REHDER (1949), their descriptions were done also with the use of the supplemented classification of HU (1955) which had been, next to other sources, used by KRÜSSMANN (1977). The supplementary but important source were also the descriptions published in 'eFloras (2008). Process of identification took into consideration the following signs:

- bark colour of last year shoots (tints of brown, grey),
- bark flaking of last year shoots,
- size and shape of leaves,
- characteristics of leaf blade margin,
- pubescence of leaves (hairless, aggregation of hairs in vein axils, densely haired to pubescent),
- inflorescence type (individual flowers, racemes, panicles),
- number of flowers in inflorescences,,
- size of flowers (diameter in cm),
- colour and pubescence of calyx (hairless, poorly pubescent, densely haired),
- size and shape of sepals (triangular to lanceolate),
- shape of petals (rounded, elliptical to narrowly elongated),
- parameters of style (connate or free, glabrous or pilose at base),
- number of stamens,
- scent of flowers (scentless, fragrant),

Taxa from the genus *Philadelphus* sp. identified during the physical inventory of stands in 2010 were compared with the data on introduction („Seed book“) and with planted introduced material in the area of the Arboretum („Outplanting cards“).

Every outplanted (introduced) item has its own original double digit number – evidence number composed from serial number of a woody plant in Seed book of the respective year. For example 99/66 in Seed book presents *Philadelphus*

caucasicus Koehne introduced in the form of seeds from Chisinau (Moldova). In the case it is not possible to find out the origin of plant material, the taxon is presented in the table only with information on its location in collections of the Mlyňany Arboretum SAS.

Results

In total, 21 botanical species, 10 varieties, 7 interspecific hybrids (including hybrids of unknown origin) and 6 cultivars of *Philadelphus* sp. not presented in Tabs. 1 and 2 grew in collections of the Mlyňany Arboretum SAS in 2010.

Among the identified botanical species, most of them were East Asian ones (15 species), 5 identified species were from North America (*Ph. californicus*, *Ph. inodorus*, *Ph. lewisii*, *Ph. microphyllus* a *Ph. pubescens*) and 1 species from Europe (*Ph. coronarius*). Regarding varieties in collections, there were found out little known varieties of North American species *Ph. inodorus* (var. *grandiflorus* and var. *laxus*) and *Ph. lewisii* (var. *gordonianus*).

Presentation of the cultivated taxa is based on the approach of systematics (taxonomy) which takes into account both the morphological differences of botanical species and their lower systematic units – varieties (Tab. 3) and the flowering dynamics of this genus in the Mlyňany Arboretum SAS (Tab. 4).

Interesting morphological curiosities are, for example, shrubs with leaves with entire margin (*Ph. x splendens*), arrangement of flowers in panicles (*Ph. californicus*) or presence of only one flower (*Ph. inodorus*), hairless and conspicuously purple coloured calyx (*Ph. delavayi* var. *melanocalyx*), conspicuously hairy calyx (*Ph. incanus*), sompletely sterile stamens (*Ph. x falconeri*), petaloid stamens (*Ph. x cymosus*), flowers with purple spot on its basis (*Ph. x purpureo-maculatus*) or rich-in-blossom varieties (varieties of *Ph. x virginalis*).

Flowering of taxa of this genus takes place in period from the last decade of May to the last decade of June. The earliest flowering varieties in the Mlyňany Arboretum SAS are *Ph. delavayi* and *Ph. schrenkii*, the latest flowering taxa are *Ph. californicus* and the varieties of *Ph. x virginalis* (Tab. 4). Among the species with the strongest smell in the Mlyňany Arboretum, the following species can be mentioned: *Ph. coronarius*, *Ph. microphyllus* and *Ph. x purpureo-maculatus*.

Discussion

According to older sources, the following taxa (with number of individuals in parentheses) from original introductions done by Ambrózy-Migazzi, the founder of the Mlyňany Arboretum, survived the period of subsequent stagnation: *Ph. coronarius* L. (20), *Ph. x virginalis* 'Virginal' (5), *Ph. microphyllus* Gray (3), *Ph. x lemoinei* Lem. 'Madame Blanche' (2), *Ph. x falconeri* Sarg. (2), *Ph. grandiflorus* Willd. (1) and *Ph. x lemoinei* Lem. (1). Later, to 1965, they were supplemented with the taxa *Ph. satsumanus* Miq. (21), *Ph. x lemoinei* Lem. (10), *Ph. delavayi* L.Henry (5), *Ph. x virginalis* 'Glacier' (5), *Ph. x virginalis* 'Virginal' (5) and *Ph. x lemoinei* 'Manteau d'Hermine' (2) (BENČAĚ 1967).

From the sources of the outplanting cards, it can be supposed that a large assortment, especially of Asian species, was assembled in collections of the Mlyňany Arboretum after the year 1959, from when the next items had been intentionally ordered through Index seminum. On the basis of the worked out data and last inventories, there was found out that in time of massive development of collections, within the years of 1953-1986, altogether 3228 individuals of the genus *Philadelphus* sp. were planted only in the Area of East Asian dendroflora of the Arboretum. In percentage terms, within the whole area of the Arboretum, the most planted individuals belonged to the species *Ph. tenuifolius* (21,41%), *Ph. henryi* (14,67%), *Ph. sericanthus* (13,27%), *Ph. satumanus* (11,1%), *Ph. pekinensis* (10,30%), *Ph. tomentosus* (9,5%) and *Ph. schrenkii* (6,54%) (HOŤKA & FOGADOVÁ 2008).

The results of the last physical inventory of collections published in 1992 recorded altogether 11 species, 2 interspecific hybrids and 4 varieties (TÁBOR & TOMAŠKO 1992). The selected approach probably included very similar varieties under a higher systematic unit – species, also hardly identifiable interspecific hybrids were missed out from the list.

The inventory of mock orange shrubs in time of their flowering in the collections of the Mlyňany Arboretum SAS in 2010 showed the need of their more detailed study and evaluation because of the possibility of selection of perspective phenotypes (aesthetic qualities) for autovegetative reproduction or potential breeding.

Actual number of taxa of the genus *Philadelphus* sp. in collections of the Mlyňany Arboretum SAS is a good possibility to present the species taxonomic variability of this genus to visitors. It also shows its aesthetic merits and as a consequence it can support the intensity of its use in garden architecture.

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References

- BENČAĽ F. (1967): Dendroflóra Arboréta Mlyňany. In : Problémy dendrobiológie a sadovníctva. Bratislava : Vydavateľstvo Slovenskej akadémie vied. p. 7-122.
- eFloras (2008). Published on the Internet <http://www.efloras.org> [accessed 04 August 2010] Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA.
- HOŤKA P. & FOGADOVÁ K. (2008): Výsledky a zhodnotenie expedície do Číny realizovanej pracovníkmi Arboréta Mlyňany SAV v roku 1960. - Dendrologické dni v Arboréte Mlyňany SAV 2008. Autochtónne alochtónne dreviny v zmenených podmienkach prostredia. Vieska nad Žitavou : Arborétum Mlyňany SAV, 2008. p. 44-56 ISBN 978-80-970028-9-3.

- HU S. (1955): A monograph of the genus *Philadelphus*. In : KRÜSSMANN G. (1977): Handbuch der Laubgehölze. – 2. Auflage. Band II. E-PRO. Berlin : Verlag Paul Parey. 466 pp. ISBN 3-489-62122-0
- KRÜSSMANN G. (1977): Handbuch der Laubgehölze. – 2. Auflage. Band II. E-PRO. Berlin : Verlag Paul Parey. 466 pp. ISBN 3-489-62122-0
- REHDER A. (1949): Manual of cultivated trees and shrubs. New York : The MacMillan Company. 2–nd Edition. 996 pp.
- TÁBOR I.& TOMAŠKO I. (1992): Genofond a dendroexpozície Arboréta Mlýňany. Arborétum Mlýňany, 118 pp.

Tab. 1. Botanical species of the genus *Philadelphus* L. and their lower systematic units identified in sections of the Mlyňany Arboretum SAS in 2010.

Species	Lower syst. unit	Sections
<i>Ph. brachybotrys</i> Koehne	-	A9, A11 (506/75 Petrohrad), A13, A15, A20
<i>Ph. californicus</i> Benth.	-	P16 (1731/82)
<i>Ph. caucasicus</i> Koehne	-	P11, A3 (1162/64 Kišinev; 99/66 Wageningen)
<i>Ph. coronarius</i> L.		P28, P29, A2, A3
	'Zeyheri'	P30
<i>Ph. delavayi</i> L.Henry	-	A12
	var. <i>calvescens</i> Rehd.	A12
	var. <i>melanocalyx</i> Lemoine	A22 (497/64 Boyce)
<i>Ph. floridus</i> Beadle	'Faxonii'	A6
<i>Ph. henryi</i> Koehne	-	A6 (1332/66 Peking)
<i>Ph. incanus</i> Koehne	-	A12, A20, A22
<i>Ph. inodorus</i> L.	-	A12
	var. <i>grandiflorus</i> Willd./Gray	A7, A13
	var. <i>laxus</i> /Schrad./Sh.-Y. Hu	A20
<i>Ph. kansuensis</i> /Rehd./Sh.-Y. Hu	-	A13, A14, A20
<i>Ph. lewisii</i> Pursh	-	A13
	var. <i>gordonianus</i> /Lindl./ Koehne	P5, A12
<i>Ph. microphyllus</i> Gray	-	P45
<i>Ph. nepalensis</i> Koehne	-	A18, A21
<i>Ph. pekinensis</i> Rupr.	-	P20, A4, A5 (269/64 Petrohrad), A13, A14, A18, A20
<i>Ph. pubescens</i> Loisel.	-	P52, P54
<i>Ph. purpurascens</i> /Koehne/Rehd.	-	A20
<i>Ph. satsumanus</i> Miq.	-	A5, A7 (270/64 Petrohrad), A9
	var. <i>nikoensis</i> Rehd.	P49, A9 (1126/61 Ženeva)

Tab.1 – cont.

Species	Lower syst. unit	Divisions
<i>Ph. schrenkii</i> Rupr.	- var. <i>jackii</i> Koehne var. <i>mandshuricus</i> / Maxim./Kitagawa	P29, P48, A5 (464/67 Dubrava; 91/67 Moskva), A9, A16 (699/67 Bila Cerkva) P34 (1129/80 Minsk), A16 A4
<i>Ph. sericanthus</i> Koehne	-	P56 (1488/61 Cluj), A5, A12 (1052/64 Čina exp.; 981/66 Krakov), A20, K6 (1694/86)
<i>Ph. subcanus</i> Koehne	- var. <i>magdalenae</i> Sh.-Y.Hu var. <i>wilsonii</i> /Koehne/Rehd.	P5, P18, P43, A12 P26 (1130/80 Minsk) A12 (2245/64 Madison)
<i>Ph. tenuifolius</i> Rupr. & Maxim.	-	A5 (2354/66 Peking), A6, A9, A15, K3
<i>Ph. tomentosus</i> Wall.	-	A6, A21 (272/64 Petrohrad)

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Tab. 2. Interspecific hybrids of the genus *Philadelphus* L. and hybrids of unknown origin identified in divisions of the Mlyňany Arboretum SAS in 2010.

Hybrid	Lower syst. unit	Origin	Location
<i>Ph. x cymosus</i> Rehd.	-	?	A5, A12, A13
<i>Ph. x falconeri</i> Rehd..	-	?	P3, A2 (421/64 Ženeva), A20
<i>Ph. x lemoinei</i> Lemoine	-	(<i>Ph. coronarius</i> x <i>Ph. microphyllus</i>)	A17
<i>Ph. x maximus</i> Rehd.	-	(<i>Ph. pubescens</i> x <i>Ph. tomentosus</i>)	A6
<i>Ph. x purpureo-maculatus</i> Lemoine	-	?	A12 (652/62 Petrohrad)
<i>Ph. x splendens</i> Rehd.	-	?	A13
<i>Ph. x virginalis</i> Rehd.	-	(<i>Ph. x lemoinei</i> x ? <i>Ph. nivalis</i> 'Plenus')	
	'Komsomolec'		A22
	'Z.Kosmodemjanskaja'		A22
	'Minnesota Snowflake'		P26
	'Virginal'		P5

Tab. 3. Botanical classification of identified species of the genus *Philadelphus* L. in the Mlyňany Arboretum SAS in 2010 according to their positions in sections and series according to HU (1955) in KRÜSSMANN (1977).

Subgenus	Section	Series	Species
II. <i>Euphiladelphus</i> Sh.-Y. Hu	3. <i>Pauciflorus</i> / Koehne /Sh.-Y. Hu		<i>Ph. floridus</i> Beadle, <i>Ph. inodorus</i> L., <i>Ph. lewisii</i> Pursh <i>Ph. tomentosus</i> Wall. <i>Ph. pekinensis</i> Rupr., <i>Ph. brachybotrys</i> Koehne <i>Ph. coronarius</i> L., <i>Ph. caucasicus</i> Koehne <i>Ph. delavayi</i> L.Henry <i>Ph. pubescens</i> Loisel <i>Ph. incanus</i> Koehne, <i>Ph. sericanthus</i> Koehne, <i>Ph. tenuifolius</i> Rupr. & Maxim., <i>Ph. subcanus</i> Koehne, <i>Ph. kansuensis</i> /Rehd./Sh.-Y.Hu, <i>Ph. schrenkii</i> Rupr., <i>Ph. henryi</i> Koehne <i>Ph. satsumanus</i> Miq. <i>Ph. microphyllus</i> Gray <i>Ph. californicus</i> Benth.
	4. <i>Stenostigma</i> Koehne	1. <i>Gordoniani</i> / Koehne / Rehd. 2. <i>Tomentosi</i> SH.-Y. HU 3. <i>Pekinenses</i> 4. <i>Coronarii</i> / Koehne /Rehd. 5. <i>Delavayani</i> SH.-Y. HU 6. <i>Pubescentes</i> SH.-Y. HU 7. <i>Sericanthi</i> Rehd.	
		8. <i>Satsumani</i> / Koehne / SH.-Y. HU	
	5. <i>Microphyllus</i> / Koehne /Sh.-Y. Hu	-	
III. <i>Macrothyrsus</i> Sh.-Y. Hu	6. <i>Californicus</i> Rydb.		

Tab. 4. Overview of flowering periods of inventoried species and interspecific hybrids of the genus *Philadelphus* L. in the Mlyňany Arboretum SAS according to decades (I., II. a III.) in months May (V.), June (VI.) and July (VII.).

Species	V.			VI.			VII.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.
<i>Ph. brachybotrys</i>			*	*	*				
<i>Ph. californicus</i>				*	*	*	*		
<i>Ph. caucasicus</i>			*	*	*				
<i>Ph. coronarius</i>				*	*	*			
<i>Ph. x cymosus</i>		*	*	*					
<i>Ph. delavayi</i>	*	*	*						
<i>Ph. x falconeri</i>			*	*	*				
<i>Ph. floridus</i> Faxonii			*	*	*				
<i>Ph. henryi</i>		*	*	*					
<i>Ph. incanus</i>		*	*	*					
<i>Ph. inodorus</i>				*	*	*			
<i>Ph. kansuensis</i>		*	*	*	*				
<i>Ph. x lemoinei</i>			*	*	*				
<i>Ph. lewisii</i>			*	*	*				
<i>Ph. x maximus</i>			*	*	*				
<i>Ph. microphyllus</i>			*	*					
<i>Ph. nepalensis</i>		*	*	*					
<i>Ph. pekinensis</i>		*	*	*					
<i>Ph. pubescens</i>				*	*	*			
<i>Ph. purpurascens</i>		*	*	*					
<i>Ph. x purpureo-maculatus</i>			*	*	*				
<i>Ph. satsumanus</i>		*	*	*					
<i>Ph. schrenkii</i>	*	*	*						
<i>Ph. sericanthus</i>			*	*	*				
<i>Ph. x splendens</i>			*	*					
<i>Ph. subcanus</i>		*	*	*					
<i>Ph. tenuifolius</i>		*	*	*					
<i>Ph. tomentosus</i>			*	*	*				
<i>Ph. x virginialis</i>					*	*	*		

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