9th International Scientific Conference
RURAL DEVELOPMENT 2019
RESEARCH AND INNOVATION FOR BIOECONOMY
26-28 September 2019, Vytautas Magnus University Agriculture Academy, Lithuania

VYTAUTAS MAGNUS UNIVERSITY AGRICULTURE ACADEMY

Proceedings of the 9th International Scientific Conference Rural Development 2019

Edited by prof. Asta Raupelienė

ISSN 1822-3230 (Print)
ISSN 2345-0916 (Online)

Article DOI: http://doi.org/10.15544/RD.2019.061

COLLECTION OF THE PLANT *SYMPHYOTRICHUM* NEES GENUS IN VYTAUTAS MAGNUS UNIVERSITY BOTANICAL GARDEN

Indrė LUKŠYTĖ, Institute of Biology and Plant Biotechnology, Agriculture Academy, Vytautas Magnus University. K. Donelaičio str. 58, LT-44248, Kaunas, indre.luksyte@vdu.lt
Sonata KAZLAUSKAITĖ, Institute of Biology and Plant Biotechnology, Agriculture Academy, Vytautas Magnus University. K. Donelaičio str. 58, LT-44248, Kaunas, sonata.kazlauskaite@vdu.lt *(corresponding author)*
Arūnas BALSEVIČIUS, Vytautas Magnus University. K. Donelaičio str. 58, LT-44248, Kaunas, Lithuania, arunas.balsevicius@vdu.lt
Ričardas NARIJAUSKAS, Vytautas Magnus University. K. Donelaičio str. 58, LT-44248, Kaunas, Lithuania, ricardas.narijauskas@vdu.lt

The collection of 82 collection numbers of the plant *Symphyotrichum* Nees genus has been accumulated in the period of 1923 - 2018 at Vytautas Magnus University Botanical Garden. The collection consists of *Symphyotrichum cordifolium*, *S. dumosum*, *S. ericoides*, *S. laeve*, *S. lanceolatum*, *S. lateriflorum*, *S. novae-angliae*, *S. novi-belgii*, *S. oblongifolium*, *S. pilosum*, *S.* × *salignum*, *S. tradescantii*, *S. turbinellum*, *S. urophyllum*, and their infraspecific taxa and cultones. The major part of the collection consists of *S. novi-belgii* (32 collection numbers) and *S. novae-angliae* (19 collection numbers) infraspecific taxa and cultones. 57 collection numbers were acquired by sproutings from other botanical gardens, private collections, nurseries, the origin of 21 collection numbers is unknown, 4 collection numbers were acquired by seed exchange with other botanical gardens. Phenological observations and biometric measurements of plants were performed according to methodological manual "Methodology of phenological observations, biometric measurements and assortment formation of ornamental herbaceous plants" prepared by J. Vaidelys in 2005. When assessing the phytopathological status of plants, powdery mildew (*Erysiphe cichoracearum*) was determined as the main disease affecting the plants. *S. dumosum* and *S. novi-belgii* interspecific taxa and cultones were the most susceptible to the disease. Plants grown in the same location for more than 3 years were more susceptible to the disease. The aim of the study was to review the *Symphyotrichum* collection and to evaluate the susceptibility of different groups of cultivars to powdery mildew.

Keywords: *Symphyotrichum, introduction, collection, phytopathological state, powdery mildew.*

INTRODUCTION

Representatives of the *Symphyotrichum* Nees genus are annual and perennial herbaceous plants belonging to the family of Asteraceae Bercht. & J. Presl. According to the Plant List Taxonomic Standardization System (Cayuela, Oksanen, 2016), there are 108 approved species in the genus, which are most widespread in North America, with several species naturally growing in West India, Central and South America, Eurasia. Representatives of *Symphyotrichum* were assigned to the genus Aster L. until 1833. However, a botanist Christian Gottfried Daniel Nees von Esenbeck distinguished the genus *Symphyotrichum* in 1833, when he had observed that some *Aster* species were morphologically distinct from other species. Guy Nesom updated the taxonomic classification of *Symphyotrichum* in 1994 (Nesom, 1994).

All representatives of *Symphyotrichum* are herbaceous plants that bloom in the second half of summer until late autumn. The breeders created more than 300 cultivars with flower colours ranging from white to dark purple. There are even hybrids with yellow flowers, therefore, these are rare cultivars. *Symphyotrichum* plants are appreciated for their easy maintenance, decorativeness, and resistance to adverse weather conditions. Especially since they are one of the few plants that flower during the autumn season. Moreover, *Symphyotrichum* plants are easy to proliferate and therefore are appreciated by flower growers (Hertle et al., 1996). Although *Symphyotrichum* plants are relatively resistant to adverse environmental conditions, powdery mildew (caused by *Erysiphe cichoracearum*) is recognized as one of the main problems causing loss of plant decorativeness (Pirone, 1978; Kazlauskaite, 2012). For this reason, resistance to powdery mildew is one of the most important criteria when developing new *Symphyotrichum* cultivars.

METHODS

The classification and estimation of *Symphyotrichum* grown in Vytautas Magnus University Botanical Garden was performed according to the Plant List Taxonomic Standardization System (Cayuela, Oksanen, 2016). Plant observations were carried out in accordance with "Methodology of phenological observations, biometric measurements and assortment formation of ornamental herbaceous plants" prepared by J. Vaidelys in 2005. Phytopathological state of plants was

Copyright © 2019 The Authors. Published by Vytautas Magnus University. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

monitored by regular inspection of all plants in the collection. Plant diseases were identified according to manuals "Plant Protection in Landscape" (Kazlauskaite, 2012) and "Diseases and Pests of Ornamental Plants" (Pirone, 1978).

RESULTS

The collection of *Symphyotrichum* spp. was started in 1923 when Kaunas Botanical Garden was established (now Vytautas Magnus University Botanical Garden). The major part of the collection consists of *S. novi-belgii* (32 collection numbers) and *S. novae-angliae* (19 collection numbers) (Table 1).

Table 1. Collection of *Symphyotrichum* spp. at Vytautas Magnus University Botanical Garden in 2019.

Species	Infraspecific taxon	Cultone
S. cordifolium		'Little Carlow'
S. dumosum		'Amoranth', 'Andry', 'Damelight', 'Diana', 'Herbstarus vom Besserhof', 'Herbstgrüb vom Bresserhof', 'Herbstrot', 'Ronald'
S. ericoides		'First Snow', 'Golden Spray', 'Weisser Zwerg'
S. laeve		'Blue Bird'
S. lanceolatum	var. *lanceolatum*	
S. lateriflorum		'Lady in Black', 'Prince'
S. novae-angliae		'Alba', 'Andenken an Alma Pötschke', 'Bars Pink', 'Cardinal Tarcisio Bertone', 'Dapper Tapper', 'Erfurt Blut', 'Harington Pink', 'Herbstschnee', 'Kylie', 'Lye End Beauty', 'Primrose Upward', 'Purple Dome', 'Rosa Sieger', 'Röter Turm', 'Ruderburg', 'Violetta', 'W. Bowman'
S. novi-belgii	var. *novi-belgii*	'Apollo', Bahamas, Barbados, 'Belosnezka', 'Blauer Vorläufer', 'Crimson Brocade', 'Fuldatal', 'Jenny', 'Kassel', 'Kristina', 'Lady in Blue', 'Lilac Time', 'Magic Blue', 'Marie Ballard', 'Melbourne', 'Patricia Ballard', 'Pink Lace', 'Professor Anton Kippenberg', 'Rose Bonnet', 'Rosenwichtel', 'Royal Ruby', 'Rosalinde', 'Rosenponpon', Samoa, 'Snowdrift', 'Snowsprite', 'Strawberries and Cream', Tonga, 'White Ladies'
S. oblongifolium		
S. pilosum		
S. × salignum		
S. tradescantii		
S. turbinellum		'JS Leaflet'
S. urophyllum		'Ann Leys', 'Newstars Glory', 'Pink Star', 'Woods Purple'

Symphyotrichum spp. collection has been collected through seed exchange with other botanical gardens as well as living plants were purchased from private collections, nurseries, and botanical gardens in Lithuania, Latvia, Estonia, Great Britain, Germany, Ukraine, Croatia, Hungary. *S. cordifolius* was recognized as the oldest representative growing in the collection (Table 2). The plant has been purchased from the Botanical Garden of the Justus Liebig University Giessen due to the Seed Exchange Program in 1979.

Table 2. Introduction of *Symphyotrichum* spp. at Vytautas Magnus University Botanical Garden.

Species	Year of acquisition	Country of acquisition	Authority from which the material was obtained
S. cordifolium	1979	Germany	Botanical Garden of the Justus Liebig University Giessen
S. cordifolium 'Little Carlow' (cordifolium hybrid)	2012	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. dumosum 'Amoranth'	Unknown	Unknown	Unknown
S. dumosum 'Andry'	Unknown	Unknown	Unknown
S. dumosum 'Damelight'	Unknown	Unknown	Unknown
S. dumosum 'Diana'	Unknown	Unknown	Unknown
S. dumosum 'Herbstarus vom Besserhof'	2014	Latvia	National Botanic Garden of Latvia, Salaspils
S. dumosum 'Herbstgrüb vom Bresserhof'	Unknown	Unknown	Unknown
S. dumosum 'Herbstrot'	Unknown	Unknown	Unknown
S. *dumosum* 'Ronald'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. ericoides	Unknown	Unknown	Unknown
S. ericoides 'First Snow'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. ericoides 'Golden Spray'	2014	Lithuania	Vyšniauskai floriculture farm, Raseiniai

Species	Year of acquisition	Country of acquisition	Authority from which the material was obtained
S. ericoides 'Weisser Zwerg'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. laeve 'Blue Bird'	1983	Ukraine	Dnipropetrovsk University Botanical Garden, Dnipropetrovsk
S. laeve 'Blue Bird'	2000	Croatia	Faculty of Science, University of Zagreb, Zagreb
S. lanceolatum var. *lanceolatum*	1989	Estonia	University of Tartu Botanical Gardens, Tartu
S. lateriflorum 'Lady in Black'	2013	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. lateriflorum 'Lady in Black'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. lateriflorum 'Prince'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. novae-angliae 'Alba'	2013	Unknown	Unknown
S. novae-angliae 'Andenken an Alma Pötschke'	2007	Latvia	National Botanic Garden of Latvia, Salaspils
S. novae-angliae 'Bars Pink'	2013	Unknown	Unknown
S. novae-angliae 'Bars Pink'	Unknown	Unknown	Unknown
S. novae-angliae 'Cardinal Tarcisio Bertone'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. novae-angliae 'Dapper Tapper'	2014	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novae-angliae 'Erfurt Blut'	Unknown	Unknown	Unknown
S. novae-angliae 'Harington Pink'	Unknown	Unknown	Unknown
S. novae-angliae 'Herbstschnee'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. novae-angliae 'Herbstschnee'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novae-angliae 'Kylie'	2014	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novae-angliae 'Lye End Beauty'	2014	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novae-angliae 'Primrose Upward'	2014	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novae-angliae 'Purple Dome'	2014	Great Britain	Market, Ely
S. novae-angliae 'Rosa Sieger'	2012	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novae-angliae 'Röter Turm'	2013	Latvia	Botanical Garden of the University of Latvia, Riga
S. novae-angliae 'Ruderburg'	Unknown	Unknown	Unknown
S. novae-angliae 'Violetta'	2014	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novae-angliae 'W. Bowman'	1981	Unknown	Unknown
S. novi-belgii var. *novi-belgii*	1987	Hungary	Unknown
S. novi-belgii 'Apollo'	2017.	Lithuania	Parko medelynas Ltd, Marijampolė
S. novi-belgii Bahamas	2012	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novi-belgii Barbados	2017.	Lithuania	Parko medelynas Ltd, Marijampolė
S. novi-belgii 'Belosnezka'	2012	Lithuania	Kęstutis Volkus private collection, Kėdainiai
S. novi-belgii 'Blauer Vorläufer'	2013	Latvia	Botanical Garden of the University of Latvia, Riga
S. novi-belgii 'Crimson Brocade'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novi-belgii 'Fuldatal'	2014	Latvia	National Botanic Garden of Latvia, Salaspils
S. novi-belgii 'Jenny'	2014	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novi-belgii 'Jenny'	2003	Lithuania	Monika Sadauskienė private collection, Kaunas
S. novi-belgii 'Kassel'	2015	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novi-belgii 'Kristina'	1987	Unknown	Unknown
S. novi-belgii 'Lady in Blue'	2014	Estonia	Tallinn Botanical Garden, Tallinn
S. novi-belgii 'Lilac Time'	Unknown	Unknown	Unknown
S. novi-belgii 'Magic Blue'	2013	Lithuania	Augustė Mieldažienė private collection, Kazlų Rūda
S. novi-belgii 'Marie Ballard'	2011	Lithuania	Danielė Šležienė private collection, Vilnius
S. novi-belgii 'Melbourne'	1987	Hungary	Unknown
S. novi-belgii 'Patricia Ballard'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novi-belgii 'Pink Lace'	2013	Latvia	Botanical Garden of the University of Latvia, Riga
S. novi-belgii 'Professor Anton Kippenberg'	Unknown	Unknown	Unknown
S. novi-belgii 'Rose Bonnet'	2014	Estonia	Tallinn Botanic Garden, Tallinn

Species	Year of acquisition	Country of acquisition	Authority from which the material was obtained
S. novi-belgii 'Rosenwichtel'	2011	Lithuania	Angelė Žiukienė private collection, Kaunas
S. novi-belgii 'Royal Ruby'	2014	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novi-belgii 'Rosalinde'	1987	Hungary	Unknown
S. novi-belgii 'Rosenponpon'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novi-belgii Samoa	2017.	Lithuania	Parko medelynas Ltd, Marijampolė
S. novi-belgii 'Snowdrift'	Unknown	Unknown	Unknown
S. novi-belgii 'Snowsprite'	2014	Great Britain	Market, Ely
S. novi-belgii 'Strawberries and Cream'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. novi-belgii Tonga	2012	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. novi-belgii Tonga	2017.	Lithuania	Parko medelynas Ltd, Marijampolė
S. novi-belgii 'White Ladies'	2012	Lithuania	Dariaus Gėlės Ltd, Kaunas
S. oblongifolium	2014	Latvia	National Botanic Garden of Latvia, Salaspils
S. pilosum	2014	Latvia	National Botanic Garden of Latvia, Salaspils
S. × *salignum*	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. tradescantii	1983	Unknown	Unknown
S. turbinellum 'JS Leaflet'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. urophyllum	2014	Latvia	National Botanic Garden of Latvia, Salaspils
S. 'Ann Leys'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. 'Newstars Glory' (Newstars Series)	2014	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. 'Pink Star'	2015	Lithuania	Vyšniauskai floriculture farm, Raseiniai
S. 'Pink Star'	2015	Lithuania	Parko medelynas Ltd, Marijampolė
S. 'Woods Purple'	Unknown	Unknown	Unknown

Phytopathological status of *Symphyotrichum* spp. was monitored during the time period 2016-2018. Powdery mildew (caused by *Erysiphe cichoracearum*) was the most prominent and damaging the decorativeness of the plant (Fig. 1). *S. dumosum, S. novi-belgii, S. ericoides*, and *S. tradescantii* plants were the most seriously affected by the fungi (Table 3). Meanwhile, *S. cordifolium*, *S. laeve*, *S. lanceolatum*, *S. lateriflorum*, *S. novae-angliae*, *S. oblongifolium*, *S. pilosum*, *S.* × *salignum*, *S. turbinellum*, *S. urophyllum* did not show any symptoms of the disease.

Table 3. Susceptibility of different *Symphyotrichum* spp. to powdery mildew with respect to the growth period in the same site, (2016-2018).

Species	Susceptibility to powdery mildew, %		
	1st year	2nd year	>3 year
S. cordifolium	0	0	0
S. dumosum	5	15	90
S. ericoides	0	0	10
S. laeve	0	0	0
S. lanceolatum	0	0	0
S. lateriflorum	0	0	0
S. novae-angliae	0	0	0
S. novi-belgii	5	15	50
S. oblongifolium	0	0	0
S. pilosum	0	0	0
S. × *salignum*	0	0	0
S. tradescantii	0	0	5
S. turbinellum	0	0	0
S. urophyllum	0	0	0

Almost all plants planted in the first year were healthy and only some representatives of *S. dumosum* and *S. novi-belgii* showed symptoms of powdery mildew injury. However, it should be acknowledged that the affected plants did not grow under ideal environmental conditions - in the shade, quite dry place, near to the trees. Powdery mildew became

more prevalent in the following year of growth in the same site. The disease damaged the same species of *Symphyotrichum*: *S. dumosum* (15 %), and *S. novi-belgii* (15 %).

Figure 1. Leaves of *Symphyotrichum* sp. damaged by powdery mildew.

The third year of *Symphyotrichum* spp. growing in the same site was even more encouraging to the spread of powdery mildew. Up to 90 percent of *S. dumosum* plants were affected by the disease. Phytopathological status in *S. novi-belgii* was slightly better: powdery mildew damaged a half of collection. However, symptoms of the disease were observed on the leaves of *S. tradescantii* (5 %) and *S. ericoides* (10 %). Thus, the longer period of growth in the same site, the more susceptible plants to the powdery mildew outbreak. *S. cordifolium*, *S. laeve*, *S. lanceolatum*, *S. lateriflorum*, *S. novae-angliae*, *S. oblongifolium*, *S. pilosum*, *S.* × *salignum*, *S. turbinellum*, *S. urophyllum* may be grown in the same site without replanting for more than three years.

CONCLUSIONS

1. *Symphyotrichum* spp. collection at Vytautas Magnus University Botanical Garden consists of 82 collection numbers: *Symphyotrichum cordifolium*, *S. dumosum*, *S. ericoides*, *S. laeve*, *S. lanceolatum*, *S. lateriflorum*, *S. novae-angliae*, *S. novi-belgii*, *S. oblongifolium*, *S. pilosum*, *S.* × *salignum*, *S. tradescantii*, *S. turbinellum*, *S. urophyllum* and their infraspecific taxa and cultones.
2. The collection has been accumulated through seed exchange with other botanical gardens and purchasing living plants from private collections, nurseries or other botanical gardens in Lithuania, Latvia, Estonia, Great Britain, Germany, Ukraine, Croatia, and Hungary.
3. *S. cordifolium*, *S. laeve*, *S. lanceolatum*, *S. lateriflorum*, *S. novae-angliae*, *S. oblongifolium*, *S, pilosum*, *S.* × *salignum*, *S. turbinellum*, and *S. urophyllum* demonstrated resistance to powdery mildew after growth in the same site for more than three years.
4. *S. dumosum*, *S. novi-belgii*, *S. ericoides*, and *S. tradescantii* showed susceptibility to powdery mildew during three years of growth without replantation.

REFERENCES

1. Cayuela L., Oksanen J. 2016. *Taxonomic Standardization of Plant Species Names, Automated standardization of taxonomic names and removal of orthographic errors in plant species names using 'The Plant List' website* (www.theplantlist.org), viewed 20 July 2019, http://www.theplantlist.org/browse/A/Compositae/Symphyotrichum/ .
2. Hertlė B., Kyrmejeris,P., Nikig M. 1996. *Sodo gėlės*. UAB "Gamta", 237 p. (In Lithuanian)
3. Kazlauskaitė, S. 2012. *Želdinių apsauga*. Akademija. 193 p. (In Lithuanian)
4. Nesom G. L. 1994. Review of the taxonomy of *Aster* sensu lato (Asteraceae: Astereae), emphasizing the New World species, *Phytologia*, Vol. 77 (3), pp. 141–297.
5. Pirone P.P. 1978. *Diseases and Pests of Ornamental Plants*. Fifth Edition. New York, Chichester, Brisbane, Toronto, 566 p.
6. Vaidelys, J. 2005. *Dekoratyviųjų žolinių augalų fenologinių stebėjimų, biometrinių matavimų ir sortimento sudarymo metodika*. Kauno kolegijos leidybos centras, Mastaičiai, 83 p. (In Lithuanian)