

What determines the flowering of *Aster* L., *Heterotheca* Cass., *Miyamayomena* Kitam. and *Symphotrichum* Nees genera plants?

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Introduction

According to Alisov's climate classification, the territory of Lithuania belongs to the south-western subregion of the Atlantic continental forest area (Alisov, 1969). Lithuania is characterized by 4, 5, 6, 7 USDA climate severity zones. Lithuania is characterized by strong seasonality. The average annual precipitation reaches about 657 mm. The course of seasonal development of plants is influenced by meteorological factors. Plant vegetation usually begins in March-April and ends in November-December. The variety of perennial herbaceous plants that flower in autumn is not large. Plants belonging to the family Compositae, some species and varieties of the genera *Persicaria*, *Hylotelephium*, plants of the family Poaceae flower in late autumn mostly. Plants of various other genera flowers for the second time in autumn. However, most of the assortment of the latest flowering plants in Lithuania consists of plants of the Compositae family – namely, plants of the genera *Aster*, *Heterotheca*, *Miyamayomena*, *Symphotrichum*.

Compositae is one of the most abundant plant families, with about 32,000 annual, biennial, perennial herbaceous and woody plant species common throughout the world. Until 1833 such genera like *Aster* (Cayuela, Oksanen, 2016a), *Heterotheca* (Cayuela, Oksanen, 2016b), *Miyamayomena* (Cayuela, Oksanen, 2016c), *Symphotrichum* (Cayuela, Oksanen, 2016d) were assigned to the same genus *Aster*. Finally, it was observed that some species of genus *Aster* are morphologically different from other species and have been assigned to other genera (Nesom, 1994).

The aim of this study was to investigate the assortment of perennial herbaceous plants of the latest flowering family Compositae and what climatic factors influence their flowering time and duration.

Methodology

Botanical names of plants verified according to the system of taxonomic standardization of plant species names (The Plant List, 2013).

The research was carried out in Vytautas Magnus University Botanical Garden in 2019-2020. Phenological observations of plants were performed in accordance with methodological publication prepared by J. Vaidelys (2005) "Methodology of phenological observations, biometric measurements and assortment formation of ornamental herbaceous plants".

The analysis of autumn flowering plants grown in Lithuania was performed by examining assortment of Lithuanian collectors, nurseries, flower growers, botanical gardens, etc.

Meteorological data of Kaunas Meteorological Station which belongs to the Lithuanian Hydrometeorological Service under the Ministry of Environment were used for the research in 2019 – 2020.

Results

Table 1. Flowering time of studied plants, 2019-2020 (Vytautas Magnus University Botanical Garden)

The name of the plant	Beginning of the flowering 10%		Massive flowering 50 %		End of the flowering 10%	
	2019	2020	2019	2020	2019	2020
<i>Aster ageratoides</i> 'Starshine'	14.10	09.10	25.10	26.10	15.11	07.11
<i>Heterotheca villosa</i> 'Golden Sunshine'	07.10	05.10	23.10	23.10	06.11	01.11
<i>Miyamayomena savatieri</i> 'Variegata'	09.10	05.10	23.10	23.10	13.11	09.11
<i>Symphotrichum cordifolium</i> 'Little Carlow'	07.10	09.10	23.10	23.10	06.11	01.11
<i>Symphotrichum dumosum</i> 'Herbstrot'	07.10	12.10	23.10	26.10	04.11	30.10
<i>Symphotrichum ericoides</i> 'First Snow'	07.10	05.10	23.10	23.10	08.11	03.11
<i>Symphotrichum ericoides</i> 'Golden Spray'	04.10	07.10	23.10	21.10	08.11	03.11
<i>Symphotrichum ericoides</i> 'Weisser Zwerg'	08.10	05.10	23.10	21.10	08.11	03.11
<i>Symphotrichum lateriflorum</i> 'Lady in Black'	08.10	07.10	23.10	26.10	16.11	13.11
<i>Symphotrichum lateriflorum</i> 'Prince'	04.10	12.10	21.10	23.10	08.11	03.11
<i>Symphotrichum novae-angliae</i> 'Kylie'	08.10	05.10	21.10	23.10	08.11	03.11
<i>Symphotrichum novibelgii</i> 'Kristina'	28.09	26.09	21.10	23.10	04.11	30.10
<i>Symphotrichum novibelgii</i> 'Magic Blue'	08.10	05.10	23.10	23.10	08.11	03.11
<i>Symphotrichum novibelgii</i> 'Professor Anton Kippenberg'	28.09	25.09	23.10	21.10	08.11	03.11
<i>Symphotrichum novibelgii</i> 'Rosenwichtel'	08.10	05.10	23.10	23.10	08.11	03.11
<i>Symphotrichum</i> 'Ann Leys'	08.10	05.10	25.10	21.10	08.11	07.11
<i>Symphotrichum</i> 'Pink Star'	08.10	05.10	23.10	23.10	08.11	03.11

1. Higher air temperatures and lower precipitation made the flowering time earlier in 2-8 days.
2. Air temperatures and precipitation did not affect the massive flowering of the studied plants.
3. Low air temperature and precipitation shortened the flowering time of the studied plants by 1-8 days.
4. Autumn frosts (-1°C - -3°C) did not affect the time and duration of the flowering of studied plants.