

## Flowering phenology of some *Iris* species in the UASVM Cluj Agrobotanical Garden

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### Abstract

*Iris*es are among the most rewarding garden perennials. They have long been considered the backbone of flower gardens. Even though the flowering cycle is short for irises, by selecting the right species for a sequence of flowering times, it is possible to successfully extend the iris season from spring to early summer. Under the influence of the Cluj County temperate continental climate, it was observed that the flowering of certain species is delayed in some years. It was noted the species: *Iris pumila*, *Iris aphylla*, *Iris pallida*, *Iris sibirica*, *Iris pseudacorus*, *Iris orientalis*, *Iris setosa*, *Iris chrysographes* can bloom 1-2 weeks later than expected. Other species like *Iris versicolor* and *Iris missouriensis* do not seem to be influenced much by the longer winters. The persistence of the fully opened flowers varied by species, from 2-3 days (*Iris chrysographes*), to up to 5 days for the tall bearded (*Iris pallida*). As for a good continuous sequence of blooming in Cluj County, it is recommended that the species *Iris pumila* and *Iris aphylla* be planted to achieve an April to early May bloom, *Iris pallida*, *Iris sibirica* and *Iris pseudacorus* for mid-May bloom, and *Iris chrysographes* and *Iris orientalis* the late May until early June bloom.

**Keywords:** sequence of flowering, flower persistence, garden irises, continental climate

### 1. Introduction

The *Iris*, named after the Greek goddess of the rainbow is one of the oldest garden perennials and among the best known and loved spring flowers (C. R. SMITH & D. HERMAN [1]). The meaning associated with this plant goes deep into the history. The ancient Egyptians believed it to be the eye of heaven and the symbol of eloquence while the Greek women had a special devotion to irises and had them planted on their graves in the belief that they would accompany their souls to heaven (B. WHITE et al. [2]). The water iris (*Iris pseudacorus*) was adopted as a badge by several French monarchs (J. LUST [3]). To this day, the three upright tepals of the flower represent faith, wisdom, and valor (C. CUMO [4]). Also, well-known painters like Monet and Van Gogh depicted them in their art works (R. FLEMING-HAYES & D.C. ZLESK [5]). There are more than 300 species of iris worldwide but the most common are the tall bearded iris hybrids, followed by the shorter bearded irises. Siberian irises are less common, but they are easier to grow than bearded irises. And for those who want to provide an unusual touch of elegance to the gardens, there are the Japanese irises, which demand special care (D. BROWN [6]).

In Romania, the most popular garden species from this genus is *Iris germanica* (F. TOMA [7]) although other species such as *Iris pseudacorus*, *Iris kaempferi* and *Iris sibirica* are also popular (M. BĂLA [8]). In the wild the public can admire the endangered *Iris aphylla* ssp. *hungarica* (V. M. MARINESCU & V. ALEXIU [9]), the vulnerable *Iris humilis* (J. Z. WITKOWSKI et al. [10]) and other native or naturalized *Iris* species.

Today these flowers serve an important role in the setting of rain gardens, water gardens, or xeriscapes depending upon the variety and its cultural needs (R. FLEMING-HAYES & D.C. ZLESAK [5]). The duration of flowering cycles is short for irises (5-10 days) but by selecting cultivars that bloom early, mid, and late season, their seasonal presence can be extended for up to 3 or 4 weeks (L. NELSON [11]).

Besides providing help in optimizing the aesthetics of spring gardens, the phenological observations in the context of the environmental factors such as temperatures are the basic tools of bioclimatology in elaboration of bioclimatic models, which are useful instruments for assessing climatic changes (C. CHYI-RONG et al. [12]). In this regard, the botanic gardens are significant contributors to flowering phenology records and are considered well-placed to carry out this research (F. TOOKE & N. H. BATTEY [13]).

The main purpose of this study was to determine the flowering calendar based on the flowering phenology of each species studied which would allow one to plan and obtain a successive bloom in the Cluj County gardens during spring and early summer.

## 2. Materials and Methods

The biological material used for this study was represented by *Iris* species from the collection of Agrobotanical Garden UASVM Cluj-Napoca and one species that can be found at Fânațele Clujului Protected Area.

The species studied were: *Iris orientalis* Miller, *Iris pallida* Lamarck, *Iris sibirica* Linneaus, *Iris chrysographes* Dykes, *Iris pseudacorus* Linneaus, *Iris setosa* Pallas, *Iris ensata* Thunberg, *Iris versicolor* Linneaus, *Iris missouriensis* Nuttall, *Iris pumila* Linneaus planted in the garden, and *Iris aphylla* ssp. *hungarica* Linneaus from Fânațele Clujului.

In 2014 and 2015 phenological observations of the flowering were conducted to determine the period and the order in which they bloom, as well as how long the flowers last.

## 3. Results and discussion

It is known that of great significance in the bloom timing of *Iris* flowers are the weather (temperatures in particular) from the first months of the year. A colder debut of the year will delay or slow down the vegetative stage of the plants, and this delay in entering the vegetative stage of development will delay the blooming time.

From the bioclimatological stand of view, higher winter temperatures cause most plants to blossom and sprout earlier, however, fluctuating temperatures usually break plant dormancy more effectively than constant temperatures (C. CHYI-RONG et al. [12]). This is particularly important for the Cluj County situated in transitional temperate-continental climate (S. G. PHILANDER [13]) where two consecutive winters can be very different. Because of this the blooming of spring flowers in this area can fluctuate from one year to the next as described below.

It can be seen clearly in Figure 1 that the first months of 2015 were colder than those of 2014. There was heavy frost especially in January 2015 (-16°C and -18°C in the beginning of the month) compared with the mild frost temperatures from the beginning of January 2014, when temperatures had not plunged below -4°C. The trend of the cooler debut of 2015 continued with frost throughout the next months: February, March and even April. There was heavy frost especially in January 2015 (-16°C and -18°C in the beginning of the month) compared with the mild frost temperatures from the beginning of January 2014, when temperatures had not plunged below -4°C. The trend of the cooler debut of 2015 continued with frost throughout the next months: February, March and even April.

Thus, even though the highest temperature of 17 April was over 20°C in Cluj, there was some light frost present throughout April 2015 (days 3<sup>rd</sup>, 4<sup>th</sup>, 10<sup>th</sup>, 23<sup>rd</sup>) when the temperatures plunged below 0°C, compared with April 2014 when there was not a single day below 0°C. From the 21<sup>st</sup> April 2014 until the end of April, the highest temperatures of the day were mostly between 20-21°C.

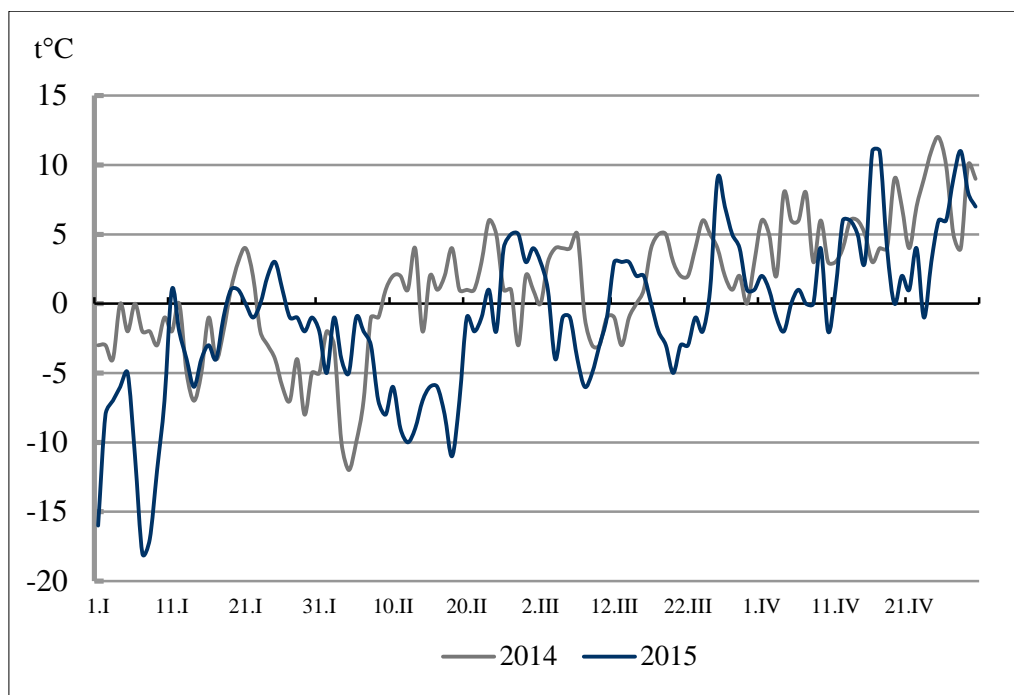


Figure 1. Lowest temperatures of January, February, March, and April 2014 and 2015 in Cluj-Napoca [17]

Analyzing the flowering synopsis of the *Iris* species studied (Table 1) it is obvious that some species experienced an earlier bloom in 2014 since the bloom in the following year (2015) occurred slightly later.

In 2014, the first species to flower were *Iris pumila* followed by *Iris aphylla* (April). *Iris chrysographes*, *Iris pallida*, *Iris pseudacorus* and *Iris sibirica* started to flower in the first part of May. The species *Iris setosa*, *Iris versicolor* and *Iris missouriensis* presented first flower buds completely emerged from the spathe shortly after the middle of May, and they flowered abundantly until the end of May. *Iris orientalis* flowered towards the end of May and *Iris ensata* closed the flowering season in the early summer.

In 2015 the first species to flower were again *Iris pumila* and *Iris aphylla*, although they flowered up to one-two weeks later than in the previous year. There were no opened flowers in the garden in the first days of May 2015, and 6 of the species studied flowered after 15<sup>th</sup> May: *Iris pallida*, *Iris sibirica*, *Iris pseudacorus*, *Iris missouriensis*, *Iris versicolor* and towards the very end of May *Iris chrysographes* which continued to flower in the first days of June. The species *Iris orientalis* and *Iris setosa* that bloomed also in May in 2014, produced flowers in the first days of June in 2015, while *Iris ensata* again closed the flowering season in the summer of 2015.

In conclusion, it can be said that the climatic conditions (Fig. 1) influenced the flowering time (Table 1) of the following species in 2014 compared to 2015:

- *Iris pallida*, *Iris sibirica*, *Iris pseudacorus*, *Iris chrysographes* flowered in the first half of May in 2014 and in the second half of the same month in the next year;  
 - *Iris orientalis* and *Iris setosa* flowered in second half of May in the warmer year (2014) and in the beginning of June in the cooler year (2015).  
 Some species however, flowered in the same interval in both years: *Iris missouriensis*, *Iris versicolor*, and *Iris ensata*.

Table 1. Flowering synopsis of some *Iris* species in Agrobotanical Garden UASVM-CN

Species	2014						2015						
	April		May		June		April		May		June		
	01-14	15-30	01-14	15-31	01-14	15-30	01-14	15-30	01-14	15-31	01-14	15-30	
<i>Iris orientalis</i>				x								x	
<i>Iris setosa</i>				x								x	
<i>Iris ensata</i>						x						x	
<i>Iris pallida</i>			x								x		
<i>Iris versicolor</i>				x							x		
<i>Iris missouriensis</i>				x							x		
<i>Iris sibirica</i>			x								x		
<i>Iris pseudacorus</i>			x								x		
<i>Iris chrysographes</i>			x								x		
<i>Iris pumila</i>	x							x					
<i>Iris aphylla</i>		x							x				

The earlier bloom of some species in 2014 was caused by the climatic conditions (a warmer debut of the year), as it was discussed above, and as CHYI-RONG et al. [12] note in their bioclimatologic review that mild winters cause most plants to blossom earlier.

As for the persistence of the flowers, it was observed that the least persistent flowers were those of *Iris chrysographes* and longest lasting flowers were those belonging to *Iris pallida*. The rest of the studied species were situated between these. The interval between the start of emerging from the spathe to senescence of the tepals varied between: 6 days for *Iris chrysographes* to 8-9 days for *Iris pallida*.

Thus, *Iris chrysographes* experienced a relatively fast emergence from the spathe-bloom-senescence; the opening of the bud after the complete emergence from the spathe took one day (11 May 2014), followed by a persistence of the open flower of only 3 days (12, 13, 14 May 2014). The senescence of the tepals began on the 15<sup>th</sup> and by the 16<sup>th</sup> of May only the petaloid style branches were still visible and violet in color. On the 19<sup>th</sup> of May, the flower was completely wilted, brown in color and the ovary was slightly swollen. *Iris pallida*, in comparison had a slower emergence from the spathe but longer lasting flowers. The flowers were completely open a day later (on 13<sup>th</sup> May), and the flowers were fully open for about 5 days. On 18<sup>th</sup> May the falls began to shrivel which became more obvious on 19<sup>th</sup> May when the flowers were no longer decorative.

## 4. Conclusion

It was observed that some species manifest either a delay or precocious blooming under the influence of the continental climatic conditions of Cluj County (either short/long or mild/harsh winters, late or warm spring). It was noted that colder spring months will delay the flowering period of many *Iris* species (*Iris pumila*, *Iris aphylla*, *Iris pallida*, *Iris sibirica*, *Iris pseudacorus*, *Iris orientalis*, *Iris setosa*). It was clearly observed for *Iris chrysographes* that bloomed before the middle of May in 2014 and the bloom did not last until the end of the month while this same species had the flowers open at the beginning of June in 2015. However, some species like *Iris versicolor* flowered within the same time range in both years, as well as *Iris missouriensis* and *Iris ensata*.

The flowers of some species are less persistent than others, notably the herbaceous-spathed *Iris chrysographes* whose flowers are open only for 2 to 3 days, followed by shorter bearded types like *Iris pumila*, compared with other species with strong robust multi-flowered stalks like the tall bearded *Iris pallida* that present flowers that last fully open up to 5 days. This aspect is of great importance in landscaping when planning the successive blooming of a garden because the flowers of some species are less persistent, to ensure that there is no gap in flowering in the spring until the next species blooms, it could be advantageous that some other species be used as “backups” to cover for example the same mid-May period. However, the blooming is usually long enough, that the flowering period overlaps with the bloom debut of other species, and the spring garden shall be in bloom continuously all the way from the end of April and throughout May to June if the right range of irises are used.

Based on the study of the flowering phenology conducted, the *Iris* species recommended for the spring landscape design in Cluj County are:

- end of April beginning of May: *Iris pumila*, *Iris aphylla*;
- middle of May: *Iris pallida*, *Iris pseudacorus*, *Iris sibirica*;
- end of May: *Iris missouriensis*, *Iris versicolor*, *Iris chrysographes*, *Iris setosa*;
- beginning of June: *Iris chrysographes*, *Iris orientalis*, *Iris setosa*, *Iris ensata*.

Overall, these recommendations are consistent with the literature (S. BREED [15]); (R.G. MOWER & R. E. LEE [16]), [18]; the tall bearded and Siberian irises bloom in May, the shorter types of irises bloom earlier (from April onward) and Japanese irises usually bloom in the early summer [19]. From these, two main types of irises do well in northern climates: the bearded and Siberians (R. FLEMING-HAYES & D.C. ZLESACK [5]). Although it should be always kept in consideration that the climatic conditions of each geographic region are very important. It was shown that flowering time can occur up to two weeks earlier or later from one year to another in Cluj County.

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