

# Comparative analysis of morpho-biological characteristics of *Iris laevigata* Fisch. and application in landscaping of Blagoveshchensk (Amur Oblast)

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**Abstract** The genus *Iris* L. belongs to the Iridaceae Juss family and is considered one of the promising plants for urban landscaping in Blagoveshchensk. The genus includes about 300 species, distributed in the Northern Hemisphere, in Russia and neighboring states. Representatives of this genus are plants in open, sunny places, and only a few are found in shady and swampy areas. Irises have good winter hardiness, early flowering and decorative properties. They are diverse in the shape and color of the flower, the timing of flowering, and have various biological and ecological characteristics.

The aim of the research is to observe the characteristics of growth and development of *Iris laevigata* Fisch. (smooth iris) in culture and compare this species growing in nature, to expand the range of plants, in the landscaping of Blagoveshchensk.

The article presents a comparative characteristic of the morbo-biological characters of *Iris laevigata* Fisch. Of the family Iridaceae Juss. growing in culture and nature. In culture, this species grows on the demonstration plot FSBEI Far Eastern SAU. As a result of the observations, it was found that under the conditions of the culture of *Iris laevigata* Fisch. two weeks later it enters the growing season, butanization and flowering. A good agrophone has a positive effect on the morpho-biological characteristics of the plant. The duration of the flowering period both in culture and in nature is 17 days. Throughout the growing season, the plant retains a high decorative effect, which characterizes it as promising for use in green building.

**Keywords:** *Iris* family, *Iris laevigata* Fisch., Phenological observations, biometric studies, decorativeness, gardening.

The successful solution of landscaping problems depends on many conditions, among which the selection of an assortment of ornamental plants is one of the most important. The main goal in the selection of ornamental plants is the formation of stable phytocenoses, actively performing ecological functions, achieving an abundance of greenery and the duration of flowering [5].

The passion for floriculture in the modern world allows people to maintain a connection between generations (after all, our ancestors also loved and knew how to grow flowers, we inherited a lot from them), enjoy communication with nature, draw strength for life and creativity [2].

Currently, the most relevant and popular among the population are plants with bright flowers, abundant and long flowering. Ornamental crop production in most regions is based mainly on an assortment of annual flower crops. A small assortment of plants is used, a lot of effort is put in, new annuals are planted every year using seedlings.

Meanwhile, there are quite a few wild and varietal plants of the iris family, which are very beautiful in their qualities and are used in a small assortment for landscaping territories [10].

Creating conditions for long-term growth, flowering and fruiting of perennials of the iris family consists in good care when growing them. It is necessary for the favorable development of their root system (rhizomes, corms, tubers) and buds of plant growth renewal. Thus, the rapid development of these perennials and their high decorative effect are achieved [3].

In recent years, active individual housing construction has been going on in the Amur Oblast, so there is a need for green landscaping of plots, parks and squares. This requires ornamental plants, among which representatives of the iris family occupy a special place [5].

The aim of the research is to observe the characteristics of growth and development of *Iris laevigata* Fisch. (smooth iris) in culture and compare this species growing in nature, to expand the range of plants, in the landscaping of Blagoveshchensk.

The genus *Iris* L. belongs to the Iridaceae Juss family and is considered one of the promising plants for urban landscaping in Blagoveshchensk (Amur Oblast) [13]. The genus includes about 300 species, distributed in the Northern Hemisphere [12], in Russia and neighboring states. Representatives of this genus are plants in open, sunny places, and only a few are found in shady and swampy areas [1]. Irises have good winter hardiness, early flowering and decorative properties. They are diverse in the shape and color of the flower, the timing of flowering, and have various biological and ecological characteristics [4].

*Iris laevigata* is an ornamental flowering perennial, its abundance in accessible places of natural growth is significantly reduced, mainly as a result of human economic activity, collection for bouquets.

Iris smooth (*Iris laevigata* Fisch.) Plant with a creeping rhizome, forming a loose turf, 75-100 cm high. The stem is hollow, cylindrical. The leaves are xiphoid, purple-red at the base, longer than or equal to the peduncle. The rhizome is covered with fibrous remains of dead leaves. Blooms in June. Planting depth 15-20 cm [11].

*Iris laevigata* Fisch. has been growing in culture on the demonstration site since 2017. According to the methodology of the GSI [7], to study short-rhizome perennial plants, it is necessary to have five rhizomes; this method was also used to assess decorativeness. Phenological observations were carried out according to the method of phenological observations in botanical gardens [8]. The experimental data were processed using Microsoft Office Excel 2007.

Blagoveshchensk has a continental variant of a temperate monsoon climate. The continentality of the climate is manifested in a large annual (43°C) and daily (10-15°C) temperature amplitude. The monsoon of the climate is expressed in the direction of seasonal winds, active cyclonic activity and a large amount of precipitation in the warm season. Summers are hot with a significant amount of sunshine. Winters are cold, dry, with a thin snow cover. The growing season lasts 150-165 days. The frost-free period is 134 days [6].

Spring in 2020 was early and moderately warm. The transition of the average daily air temperature through 0°C to positive values was noted in the southern regions of the Oblast on March 24-29, which is 2-11 days earlier than the average long-term dates. The average air temperature for the season exceeded the multiyear norm by 1-2° and amounted to 4-10°C. During the period, significant changes in temperature were noted. Spring was quite humid, May was characterized by a large amount of precipitation. In general, 41-131 mm of precipitation fell during the season.

Agrometeorological conditions for carrying out agrotechnical measures were predominantly favorable.

Summer in the southern regions of the Oblast came on May 27, which is 2-5 days earlier than the multi-year dates. The average daily air temperature steadily crossed + 15°, i.e. the meteorological summer has arrived. Summer weather was unstable, June and August were cold and rainy, July was hot and dry.

During the summer season, periods of cold snaps were replaced by intense warming. The second decade of July was unusually hot. The air warmed up to 32 ... 38° during the day, temperature records were recorded at many meteorological stations. A significant cooling with a decrease in average daily air temperatures relative to the climatic norm by 3-5° was observed on August 19, 20. As a result, the average air temperature for three summer months was within the multiyear norm and amounted to 16 ... 20°.

In autumn, a stable transition of the average daily air temperature through + 15° in the southern regions took place later than the multi-year dates from 2 to 11 days - September 10-17. Thus, the duration of the summer period in the southern regions turned out to be longer from 4 to 13 days, the duration was 97-113 days [9].

In general, the agrometeorological conditions of 2020 were favorable for the growth and development of ornamental plants, which allowed them to go through all phenological phases.

*Iris laevigata* Fisch. grows on the FAE demonstration site, Far Eastern SAU, and has been in the collection since 2017, first bloomed in 2019. The carried out phenological observations according to the method showed that in 2020 the regrowth in the culture began on May 4, and in *Iris* smooth growing in nature on the territory of the Ivanovo district on April 30 (tab. 1).

Table 1 Phenological phases of *Iris laevigata* Fisch., 2020

Phenological phases	<i>Iris laevigata</i> Fisch. grows in the demonstration plot of SAU Far Eastern SAU	<i>Iris laevigata</i> Fisch. grows in nature (in meadows), the territory of the Ivanovsky district
Regrowth	4.05	30.04
Budding	13.06	30.05
The beginning of flowering	15.06	2.06
Mass bloom	23.06	9.06
End of flowering	2.07	19.06

The budding phase in plants on the territory of the demonstration plot was noted on June 13, and in nature on May 30. The beginning of flowering two weeks earlier came in *iris* growing in a meadow in the Ivanovo Oblast. Mass flowering was observed after 8 days both in nature and in culture.

Thus, phenological phases in *iris* that grow naturally occur earlier than in plants that grow on the territory of the SAU demonstration plot. The difference between the beginning of the phenological phases of development in plants growing in different conditions from 5 (beginning of regrowth) to 17 days (end of flowering). At the same time, the duration of the flowering period both in culture and in nature is 17 days.

The end of flowering did not lead to the loss of decorativeness by the plants. Ripening seed pods, until the end of the growing season, gave the plant a unique look.

The comparative biometric analysis of *iris* smooth showed that the array of measurements is presented as an arithmetic mean with a standard deviation (table 2).

Plants growing in the natural environment are inferior to those cultivated in the demonstration plot in terms of biometric indicators. So *Iris laevigata* Fisch. growing in culture stood out by the height of the plants and the length of the leaf, which is 20 cm of the growing species in nature. The diameter of a flower in culture exceeded plants in the natural environment by 1 cm.

Table 2 Biometric observations *Iris laevigata* Fisch.

Biometric indicators	<i>Iris laevigata</i> Fich. growing in the demonstration plot of SAU Far Eastern SAU	<i>Iris laevigata</i> Fich. growing in nature (in meadows), the territory of the Ivanovsky district
Plant height, cm	100±5.8	80±5.4
Sheet length, cm	95±2.7	75±2.9
Sheet width, cm	2±0.1	1.5±0.1
Flower diameter, cm	10±1.2	9±1.1
Outer perianth lobes (length/width), cm	8±0.7/4±0.3	7±0.4/3.5±0.2

Decorativeness is assessed according to the following indicators: plant habit, abundance of flowering, decorative leaves, flower color, flower size, flower shape, general condition. The rating system is five-point, from 0 to 5. According to the indicators that determine decorativeness to the greatest extent.

When assessing the decorativeness of a plant, depending on the significance of the trait, a specific conversion factor was established for each species. Each sign of decorativeness is assessed within a five-point scale. In the future, the points (for each attribute separately) are multiplied by the conversion factor (the degree of significance of the attribute) and the result obtained, which is the final assessment of the attribute, is entered into the corresponding column of the decorativeness assessment card (tab. 3)

Table 3 – Scale for assessing ornamental and economic-biological characteristics *Iris laevigata* Fich

Feature	0/5*	K**	0/100***
Decorative features			
Flower color and its stability (strength, brightness, stain)	5	3	15
Number of petals (density)	5	1	5
Flower size (large, medium, small)	5	2	10
Inflorescence (the number of flowers is dense, loose)	5	2	6
Number of simultaneously opened flowers	5	2	6

Peduncle quality (strength, straightness)	5	2	10
Abundance of flowering	5	1	5
Plant condition	5	1	5
Originality of the species	5	2	6
Overall score			68
Economically valuable features			
Flowering duration	5	2	10
Drought tolerance	5	1	4
Winter hardiness	5	1	10
Disease and pest resistance	5	1	5
Resistance to adverse weather conditions	5	2	8
Intensity of vegetative reproduction	5	1	5
Overall score			32
Total			100

\* Assessment of a feature according to a five-point system \*\* K - a conversion factor depending on the significance of a feature \*\*\* Assessment of a feature according to a 100-point system

Reduce the decorative effect of *Iris laevigata* Fisch. during the period of mass flowering, unfavorable meteorological conditions, such as wind and rain, can occur, as a result of which the stems break, lodging of plants is observed. Plants resistant to these factors are rated at five points, with damage up to 20% - four points, up to 40% - three points, up to 60% - two points, over 80% - one point.

According to the results of the assessment, the species is promising for use in green construction. It is winter-hardy, not damaged by diseases and pests, and reproduces well vegetatively.

### Conclusions

Thus, under the conditions of the culture of *Iris laevigata* Fisch. two weeks later it enters the growing season, butanization and flowering. A good agricultural background has a positive effect on the morpho-biological characteristics of the plant. Throughout the growing season, the plant retains a high decorative effect, which characterizes it as promising for use in green building.

### References

1. Alekseeva, N.B. Genus *Iris* L. (Iridaceae) in Russia / N.B. Alekseeva // *Turczaninowia*. – 2008. – V. 11. - № 2. – P. 5-70.
2. Bednova, E. V. *Gladioli* / E. V. Bednova. – M.: Publishing house "Kladez-Buks", 2012. – 95 P. ISBN 978-5-93395-347-0.

3. Ornamental-growing perennials – Iris family, iris // Encyclopedia: website.– URL: <https://mastery-of-building.org/dekorativno-rastushhie-mnogoletniki-semejstvo-kasatikovye-irisovye/> (appeal date: 28.10.2020).
4. Dolganova, Z. V. Ways of increasing the resistance of representatives of the genus Iris L. to abiotic stressors of the forest-steppe of the Altai Territory // Fruit and berry production in Russia. 2018. V. 30. P. 216 – 228.
5. Iris smooth // Botanical Garden Institute FEB RAS: website. - URL: <http://botsad.ru/menu/mir-rastenii/dv-plants/amur-tree-lilac/> (appeal date: 4.04.2020).
6. Climate // Climate of Amur Oblast: website. – URL: <https://ru.wikipedia.org/wiki/> (appeal date: 10.07.2020).
7. Methodology for the state variety study of agricultural crops. – M.: Publishing house "Kolos". – 1968. – 223 P.
8. Methods of phenological observations in the botanical gardens of the USSR. – M.: GBS, 1975. – 27 P.
9. Weather in Blagoveshchensk. Weatherarchive.ru [Electron. resource]/ – Access: <http://www.weatherarchive.ru/Temperature/Blagoveshchensk/July-2020>. – (Appeal date: 19.02.2021).
10. Popova, Y. Garden design. Encyclopedia of garden plants / Yu. Popov, V. Molodov. – M.: Publishing house "Niola 21st century", 2004. – 352 P.
11. Mironova L.N. Prospects for the use of irises in landscaping the Far Eastern region / L.N. Mironova // Bulletin of the Irkutsk State Agricultural Academy. – 2011. – № 44. – P. 117-122.
12. Kharkevich S.S. Vascular Plants of the Soviet Far East / S.S. Kharkevich. – L.: Science, 1987. – P. 414-426. ISBN 5-02-026590-X.
13. Tsandekova O.L. Evaluation of the prospects of growing decorative perennials of the genus Iris L. for introduction in the conditions of the Kuzbass Botanical Garden / O.L. Tsandekova, O.O. Vronskaya // Bulletin of TSU. Series "Biology and Ecology". 2020. №4 (60). P. 133 -142. DOI: 10.24456/vtbio 177