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BIOECOLOGICAL FEATURES OF SEVERAL NEW TAXA OF *CORNUS ALBA* L. GROWN AT THE "ALEXANDRU CIUBOTARU" NATIONAL BOTANICAL GARDEN (INSTITUTE)

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Abstract

The article includes the results of a research on the bioecological features of some new taxa from the collection of the genus Cornus L. of the "Alexandru Ciubotaru" National Botanical Garden (Institute). The study includes the taxa of Cornus alba: 'Elegantisima', 'Aurea', 'Cream Cracker' PBR, 'Sibirica'. The studied taxa are known as dogwoods, having high decorative value due to their habit, crown, color of vines, leaves, fruits, long duration of flowering and fructification, all of which are determining criteria in landscape art. They are resistant to drought, frost, pollutant substances, do not require special care, only shaping cuts and compliance with the recommended technology throughout the growing season. They are used in landscaping particularly in the foreground, in small groups, in mixtures at the edges of tree plantations and hedges of different heights and colors.

Key words*: biomorphology, Cornus alba* L.*, development, growth, ornamental parameters, varieties.*

INTRODUCTION

The rapid urban development makes it necessary to provide green spaces with an assortment of plants with of high decorative value, in order to provide a microclimate that would benefit the well-being of city residents and to create favorable conditions to hold social activities. Raising living standards, including an improved urban landscape, must become a priority of modern society, and harmonizing artificial landscapes with natural ones can be successfully achieved by vegetation.

The lush appearance of the green spaces, as well as their volumetric spatial view and their coloristic expressiveness, are due to the vitalizing aesthetic composition of the selected plant species, as well as their successful association. Even if the proportion of non-native plants in the plant compositions of green spaces is significantly lower as compared with the native ones, the choice and association of taxa with high indices of decorativeness, according to their habit, crown shape, color of shoots, leaves, fruits, long duration of flowering and fruiting, are determining criteria for the successful creation of landscapes of high aesthetic value. From the multitude of woody species, taxa of the genus *Cornus* L. can be recommended for this purpose due to their important decorative indices, especially during winter against the background of snow. The family *Cornaceae* Bercht. & J. Presl includes 10 genera with about 100 species, distributed in the temperate and sub-tropical zones (Derevia i custarnichi SSSR, 1960).

The genus *Cornus* L. includes about 70 species and varieties widespread in temperate regions (http://www.theplantlist.org). In Europe, 6 species and multiple forms of high ornamental value are widespread (Iliescu, 2002) In the Republic of Moldova, 3 species (*Cornus alba* L., *Cornus mas* L., *Cornus sanguinea* L.) and diverse varieties occur (Palancean et Comanici, 2009).

The goal of this research included the study of the bioecological features of 4 new taxa of *Cornus alba* L., (*Cornus alba* 'Elegantisima', *Cornus alba* 'Aurea', *Cornus alba* 'Sibirica', *Cornus alba* 'Cream Craker' PBR) in the 5th growing season, under the conditions of the "Alexandru Ciubotaru" National Botanical Garden (Institute) of Moldova State University.

MATERIALS AND METHODS

The investigations were conducted in 2019-2024 as part of the project 20.80009.7007.19 (2020-2023) "The introduction and development of technologies for propagation and cultivation of new species of woody plants by conventional techniques and tissue culture" and continued within the subprogram 010101 "Research and *ex situ* and *in situ* conservation of plant diversity in the Republic of Moldova" in the plant nursery of the Dendrology Laboratory. During the study period, climatic conditions were favorable for plant growth. The highest temperatures were in 2020 $+38^0$ C, in other years the temperatures ranged on average from 25^0C to 28.5^0C. According to the data, there was a deficit of precipitation in both the winter and summer seasons, which led to the need for irrigation of plants. As research subjects served 4 taxa of *Cornus* L., (*Cornus alba* 'Elegantisima', *Cornus alba* 'Aurea', *Cornus alba* 'Sibirica', *Cornus alba* 'Cream Craker' PBR) at the end of the 5th growing season, which grow and develop in the collection of NBGI. The morphological parameters were determined for 3 specimens of each taxon, as well as for 100 flowers, leaves and shoots after regular annual pruning in spring. Phenological observations were made according to the method developed at the Moscow Botanical Garden (Metodica fenologhiceschih nabliodenii v botaniceschih cadah SSSR, 1979) and perfected by Dr. hab. A. Palancean (Palancean and Comanici, 2009).

RESULTS AND DISCUSSIONS

The contribution of the Botanical Gardens to the implementation of the Global Biodiversity Conservation Strategy targets a series of priority areas, one of which is the diversification of the gene pool of living plant collections, as well as the development of urban and rural green spaces. Green spaces are essential factors in human life and the development of public or private territories, which contribute to ensuring the conditions necessary to increase the quality of life. Moreover, the way of arranging and associating plants and the share of green spaces in urban planning constitute an indicator of the degree of civilization of a nation. Among the multitude of woody species recommended for this purpose, taxa of the genus *Cornus* L. are also listed. In recent years (2019-present), 5 species and 28 new taxa of dogwood have been mobilized and acclimatized in the NBGI (Roșca et al., 2024).

The species and taxa mobilized and conserved in the NBGI are briefly described below.

Cornus alba L. (*C. tatarica* Mill., *C. sibirica* Pall.) – the white dogwood – is a shrub that grows up to 3 m tall, occurring in Europe, Siberia and the Far East. It has erect stems, shoots with large, white pith and bright, bloody-red bark. The leaves are broadly ovate to elliptical, 7-9 cm long, rough on the ventral side, dark green, glaucous on the dorsal side with flattened hairs. The flowers of the studied taxa ('Elegantisima', 'Aurea', 'Sibirica', 'Cream Cracker' PBR), similar to the species, are white or yellowish-white, with very short sepals, ovate petals, hairy ovary (Figure 2a-2d). The flowers are united in a corymb-type inflorescence. The length of the inflorescence varies from 3.5 to 5 cm in length. The average diameter of the fruit was 5 mm. The fruit is a globose drupe, white or bluish in color depending on the taxon. It blooms in the May-June period, and the maturity of the fruits occurs in August. The taxa taken in the study similar to the species are with a high degree of decorativeness even in winter, when the leaves are missing.

Over the years in the NGBI they have been mobilized and acclimatized taxa of *Cornus alba* have adapted and acclimatized - 'Elegantissima', 'Aurea', 'Sibirica', 'Ivory Halo' PBR, 'Baton Rouge' Minbat, 'Cream Cracker' PBR, 'Siberian Pearls', *Cornus amomum* 'Blue Cloud', which have particular ornamental value due to the height and habit of the plant, the growth rate of the shoots, the striking color of the shoots against the snowy background, the foliage throughout the growing season, especially at the end of October-November. These characters amplify the aesthetic value of landscape designs. *Cornus alba* 'Elegantissima' (white dogwood 'Elegantissima') is a popular variety of dogwood, particularly prized for its elegant and attractive leaves, as well as its vibrant red stems. *Cornus alba* 'Elegantissima' has oval or elliptical leaves, bright green with white or cream edges (Figure 1a). This feature gives it a particularly attractive appearance in landscaping. The leaves remain decorative throughout the growing season. The

bright red stems are one of the distinguishing features of this dogwood variety (Figure 3a). These stems become more evident as the winter season progresses, providing a vibrant element to the winter landscape. *Cornus alba* 'Elegantissima' is a small to medium-sized shrub, reaching from 120 to 300 cm in height at maturity. In spring, this dogwood produces small, inconspicuous flowers in shades of white or cream (Figure 2a), which are followed by blue or white fruits in summer. At the end of the growing season, the leaves may turn shades of red and orange before falling, enhancing their decorativeness in late autumn.

Cornus alba 'Elegantissima' is frost hardy and can grow in temperate to cold climates. It is a versatile shrub, suitable for a wide range of climatic conditions. It prefers moist, well-drained soils, but can also tolerate clay or sandy soils. In the first years after planting, it is necessary to maintain constant soil moisture. It grows best in full sun, but tolerates partial shade. The 'Elegantissima' dogwood is relatively easy to care for. Periodic pruning of older stems can stimulate the growth of new red stems, which can improve the appearance of the landscape, maintain the shape and health of the shrub.

Plant height at the end of the fifth growing season ranged from 60 to 89 cm, with an average of 73.1 cm (Figure 4). The vibrant red stems make this shrub an excellent choice for mass planting or to create colorful hedges.

Cornus alba 'Elegantissima' is an attractive ornamental shrub that offers elegant leaves with white or cream edges, vibrant red stems, delicate flowers in spring and a variety of colors in autumn. It is low-maintenance and fits into a variety of landscape configurations. The growth of annual shoots in the fifth growing season ranged from 47 to 76 cm, with an average of 61 cm (Figure 4).

a) *Cornus alba* 'Elegantisima'

b) *Cornus alba* 'Aurea'

c) *Cornus alba* 'Sibirica'

d) *Cornus alba* 'Cream Cracker' PBR

Figure 1. Taxa of *Cornus alba* L. in the fifth growing season

Cornus alba 'Aurea' is a shrub with golden leaves, showy throughout the growing season (Figure 1b). The common name for this variety is Aurea dogwood. The stems are reddish-brown (Figure 3b). The red stems are often used in the art of making bouquets in floristry.

The leaves are ovate in shades of green to yellowish green. The Aurea dogwood blooms in May and June. The small, creamy white flowers appear in early summer (Figure 2b), followed by clusters of small white fruits. It is a medium-sized shrub that reaches 200-300 cm in height at

maturity. It grows best on well-drained, sandy, loamy, acidic soils. Its shiny golden leaves and red branches in winter bring a touch of color and elegance to any space. It is low-maintenance and adapts to different environmental conditions.
It is planted alone or as a hedge, in groups and in combination with other species to create spectacular color contrasts throughout the growing season.
The height of the shrub in the fifth growing season varied between 97 and 165 cm, with an average of 119.8 cm. The growth of the shoots by the end of the growing season varied between 46.5 and 127 cm, with an average of 97.95 cm (Figure 4).

a) *Cornus alba* 'Elegantisima'

b) *Cornus alba* 'Aurea'

c) *Cornus alba* 'Sibirica'

d) *Cornus alba* 'Cream Cracker' PBR

Figure 2. Taxa of *Cornus alba* L in the flowering phase

Cornus alba 'Sibirica' (Siberian dogwood) is a medium-sized shrub. In the fifth growing season, the plant height reached values between 87 and 161 cm, the average being 127.6 cm after annual shaping cuts (Figure 4). Mature shrubs reach 150-200 cm in height. The most distinctive feature of the studied taxon is its multiple bright red stems, of particular decorative value in winter (Figure 3c). The growth rate is fast, ranging from 67 to 133 cm, with an average of 94.3 cm, (Figure 4) depending on the compliance with the recommended technology, genotype and climatic conditions during the growing season. The leaves are medium-sized, oval or elliptical, dark green in summer (Figure 1c), may turn red or purple in autumn, adding another level of decorativeness and seasonal interest. During spring, the plant produces small, white flowers with a yellowish tinge, but the blooms are not as spectacular as compared with other dogwood varieties (Figure 2c). The fruits are small, bluish. It is frost-hardy, immune to diseases and pests, adapts to various soil types, but prefers fertile soil, tolerates both full sun and partial shade. It is relatively easy to maintain, only shape-correcting pruning may be needed. Periodic pruning, like in all the studied taxa, was carried out in spring to maintain decorativeness during winter, created through the vibrant color of the stems which contrasts perfectly with the immaculate white snow, and to stimulate the growth of annual vines.

Cornus alba 'Elegantisima' | *Cornus alba* 'Aurea' | *Cornus alba* 'Sibirica' | *Cornus alba* 'Cream Cracker' PBR

Figure 3. The general aspect of annual shoots in the winter season in *Cornus alba* L. taxa

Cornus alba 'Cream Cracker' PBR similar to other taxa, it is medium-sized with a high degree of decorativeness through various characters throughout the growing season. The round crown, with purple-red annual and biennial shoots, maintains its decorative effect during winter (Figure 3d).

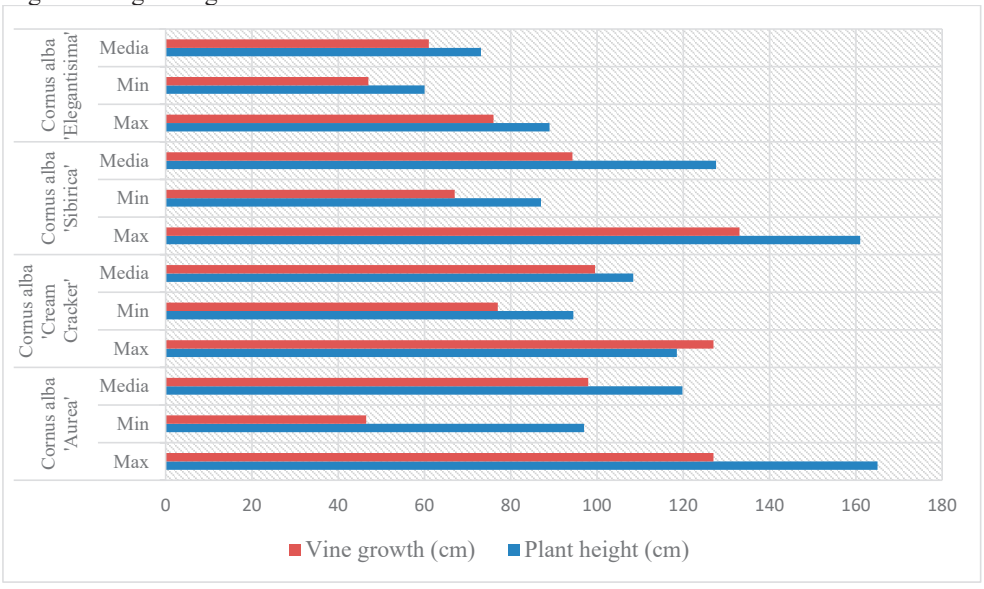

Figure 4. Morphological parameters in the fifth growing season of *Cornus alba* L. taxa

In the fifth growing season, the plant height varied between 94.5 and 118.5 cm, with an average of 108.4 cm (Figure 4). At maturity it reaches 200-250 cm. This taxon is spectacular in early spring with its young leaves with white edges, which turn yellow at maturity (Figure 1d). The rapid growth rate ranged from 77 to 127 cm, the average was 99.6 cm (Figure 4). It blooms profusely in June, and sometimes it blooms for the second time in August-September. The small, creamy flowers are grouped in corymb inflorescences (Figure 2d).

The fruits are small, white and few in number, depending on the climatic conditions at that time. It is resistant to frost, pollutant substances, diseases and pests. It prefers moist, drained, loose, slightly acidic soils and is unpretentious to soil fertility. It tolerates shade, but prefers sunny places. Similar to other taxa, it is planted at a distance of 60-100 cm in autumn or spring. The survival rate of transplanted seedlings is higher when they are with packed roots, protected or in a container.

CONCLUSIONS

The collection of the genus *Cornus* L. of the NBGI was diversified with 5 species and 28 new ornamental non-native taxa and totals 8 species and 28 taxa. The introduced species taken into the studio (*Cornus alba* 'Elegantisima', *Cornus alba* 'Aurea', *Cornus alba* 'Sibirica', *Cornus alba* 'Cream Craker' PBR) are varieties with high ornamental potential through various characteristics and are distinguished by diverse habit, intense colors of shoots, leaves, fruits, period and abundance of flowering, fruiting, as well as the ability to adapt to soil and climatic conditions.

The studied cultivars are resistant to drought, frost and polluting agents, and do not require special care, only sanitary and shaping pruning, as well as compliance with the recommended technology throughout the growing season.

The varieties researched of *Cornus* L. (*Cornus alba* 'Elegantisima', *Cornus alba* 'Aurea', *Cornus alba* 'Sibirica', *Cornus alba* 'Cream Craker' PBR) They are decorative due to the shape and size of their habit, the color of their shoots particularly showy during the winter, the shade of their foliage throughout the growing season, especially in late autumn, and the abundance of their flowering.

It is recommended for use in the landscape design of green spaces, in the foreground in small groups, in border mixes and for hedges of various heights and colors.

The study of these taxa contributes to the diversification of the dendrological gene pool of the Republic and to the implementation of biodiversity conservation strategies, demonstrating that the varieties of *Cornus alba* L. are promising and are recommended for large-scale use in rehabilitation and landscaping projects of green spaces in the 3 dendrological districts of the Republic of Moldova.

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