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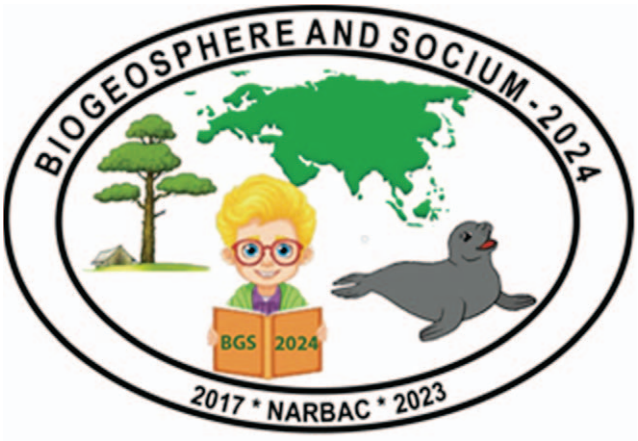

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(September 25-27, 2024; Słupsk, Poland)

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The materials of the International Scientific Conference “Biogeosphere and Socium”, which was held on September 25-27, 2024 in the Pomeranian University in Słupsk (Poland), are presented in the book. The the results of research into the functioning of biological and ecological systems, geosystems and landscape complexes, nature conservation areas, the use of natural resources, human health, the relationship between man and the technosphere, as well as methodological and pedagogical aspects of the interaction “nature and human” were presented by the authors from four European countries.

The abstracts are presented in the following working languages of the conference: English, Polish and Ukrainian.

The publication is addressed to biologists, geographers, ecologists, specialists in resource science, nature management, nature conservation, recreation and tourism, forestry and agriculture workers, environmental protection institutions, educational institutions.

У книзі представлені матеріали Міжнародної наукової конференції «Біогеосфера і соціум», яка відбулася 25–27 вересня 2024 р. у Поморському університеті в Слупську (Польща). Авторами з чотирьох країн Європи представлені результати досліджень функціонування біологічних та екологічних систем, геосистем та ландшафтних комплексів, природоохоронних територій, використання природних ресурсів, здоров’я людини, взаємовідносин людини і техносфери, а також методологічних та педагогічних аспектів вивчення природи і людини.

Тези доповідей представлені робочими мовами конференції: англійською, польською українською.

Видання адресоване біологам, географам, екологам, фахівцям з ресурсознавства, природокористування, охорони природи, рекреації та туризму, працівникам лісового та сільського господарства, природоохоронних установ, освітніх установ.

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Khrokalo, L. (2022) Chemical properties of *Helix aspersa* mucus as a component of cosmetics and pharmaceutical products. *Mater. Today Proc., 62* (15): 7650-7653 https://doi.org/10.1016/j.matpr.2022.02.217

Kulyk, A. (2024, 21 травня). *Development of innovative cosmetic additives on a base of Helix aspersa mucus conjugated silver and gold nanoparticles*. [Тези доповіді на конференції]. VI Всеукр. наук-практ. конф. «Стан і перспективи розвитку хімічної, харчової та парфумерно-косметичної галузей промисловості». Хмельницький, Україна.

Zhu, K. (2024) Extraction, structure, pharmacological activities and applications of polysaccharides and proteins isolated from snail mucus. *Int. J. Biol. Macromol.*, *258* (1), 128878, https://doi.org/10.1016/j.ijbiomac.2023.128878

Formation and development of cornelian cherry (*Cornus mas* L.) culture in Ukraine

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Keywords: Cornelian cherry (*Cornus mas* L.), formation, development of culture, selection, Ukraine

Cornelian cherry (*Cornus mas* L.) is an important plant called “super plant”, with various parts being utilized and consumed globally. The fruits of cornelian cherry have been used for medicinal purposes. Specifically, the fruit is frequently consumed as food. In addition, parts such as flowers, seeds, and fruits are rich in essential oils. In traditional medicine, it is used to treat diseases such as respiratory infections and digestive disorders. It is recognised for its potential as a natural antioxidant and antimicrobial agent, which may prove advantageous in food preservation and could contribute to its efficacy in treating a range of diseases.

Cornelian cherry (*Cornus mas* L.) which has been cultivated for many centuries, is now rarely cultivated. It is only in recent decades that this wonderful plant has been revived.

The Ukrainian name for the true cornelian cherry is deren, deren real, derenko, drinkove tree. In America, all Cornel species are called Dogwood, and the true dogwood is called Cornelian cherry. Botanically, *Cornus mas* is not related to cherries. The term "cornelian" cherry is derived from the resemblance of the fruit's hue to that of Cornelian quartz. Cornelian cherry is a member of the *Cornaceae* Bercht. & J. Presl family of plants.

The aim of study was to generalize years of work with the culture of *Cornus* species in Ukraine; particularly, in the M.M. Gryshko National Botanical Garden (NBG) of the National Academy of Sciences of Ukraine.

In Ukraine, the polymorphic *Cornaceae* family is represented by only three species: the true cornelian cherry (*Cornus mas* L.), the blood-red dogwood (*Swida*

sanguinea (L.) Opiz), and the southern dogwood (*Swida australis* (C.A. Mey.) Pojark. ex Grossh.) (Klymenko et al., 2021).

About 100 species of Cornaceae are known to be used as ornamental plants, most of which are common in North America.

Cornelian cherry is the only edible species among the numerous other *Cornus* species cultivated in Ukraine, mainly as ornamental.

Systematics. The size of the *Cornaceae* Bercht. et J. Presl family is ambiguously interprented by taxonomists. The family *Cornaceae* is estimated to contain between 50 and 110 species, according to various sources. Particular attention should be paid to species of the genus *Cornus,* the majority of researchers have identified the subgenus *Cornus* L. s. L. (*Macrocarpium*). It has a disjunctive area and is represented by 4 species on the globe:

1. *Cornus m*as - the true, male cornelian cherry;
2. *Cornus chinensis* - the Chinese cornelian cherry;
3. *Cornus officinalis* - the medicinal cornelian cherry;
4. *Cornus sessilis* - the sessile cornelian cherry.

There are three species growing in Eurasia: *C. mas in the* west of the continent, C. *chinensis* Wangerin in the southwest and central regions of China, C. *officinalis* in Japan, and only one species of this genus, *C. sessilis,* is native to North America (Klymenko et al., 2021).

History of cornelian cherry culture. Cornelian cherry has been cultivated for over 4000 years. Even before the beginning of our era, the Greeks grew cornelian cherry in Crimea and drank cornelian cherry sap and wine.

It is possible that many cornelian cherry plants currently found in different regions of Kyiv may have their origins in this area. Interesting genotypes were obviously selected then, and they have survived to this day due to the longevity of this plant. After all, cornelian cherry has the capacity to grow and produce for up to 100–150 years, with the potential for even longer life spans with proper care.

The Ukrainian toponymic tradition includes a number of villages called Derenkivtsi, as observed in Cherkasy, Transcarpathia, and other regions of Ukraine. Given that the Ukrainian name for cornelian cherry is deren, it is a reasonable assumption that the name of the ancient settlements is derived from this term (Klymenko et al., 2023).

Cornelian cherry in culture in Ukraine. Cornelian cherry is cultivated in many European countries, but there are no special plantations. Cornelian cherry culture is as popular in European countries as it is in Ukraine.

Cornelian cherry trees are common in amateur gardens in Ukraine (Transcarpathia, Ternopil, Vinnytsia, Ivano-Frankivsk regions, Crimea), Moldova. Cornelian cherry has a wide cultural area - it is grown in Kyiv, Chernihiv, and Zhytomyr regions. The northern limit of successful cornelian cherry fruiting is Chernihiv-Hlukhiv.

Cornelian cherry in nature. Most people's idea of cornelian cherry is associated with the south of our country, in particular, with Crimea. Unfortunately, the resources of wild cornelian cherry have now significantly decreased.

This decline is largely due to human activities that have created extreme conditions for its growth.

History of cornelian cherry research. The loss of natural cornelian cherry reserves can be compensated for by the creation of farm and industrial gardens, as well as by introducing it into amateur plantations. In recent decades, there has been a steady interest in cornelian cherry among both farmers and amateur gardeners. In many private and farming households in Zaporizhzhia, Transcarpathia, Vinnytsia, Volyn, Khmelnytskyi, Mykolaiv, Kyiv, Cherkasy, and Dnipro regions, cornelian cherry cultivars of our selection have been producing abundantly for decades.

For the past 60 years, the M.M. Gryshko National Botanical Garden (NBG) of the National Academy of Sciences of Ukraine in Kyiv has been conducting research on the cornelian cherry gene pool. This includes collection, conservation, selection, reproduction, and introduction of various cultivars, including many forms from amateur breeding. The task was to collect cornelian cherry genotypes in different regions of Ukraine, as many of them are disappearing without a trace, and use them to create new promising cultivars. The selection was based on a number of key indicators, including fruit size, shape, quality, ripening time and yield. During the course of the expeditionary surveys, in excess of 350 forms were described, with more than 100 selected and propagated. Thus, we have collected a cornelian cherry genetic fund that represents the source material for breeding for various traits. The M.M. Gryshko has an extensive collection of *Cornus mas* cultivars, which differ in many respects. The history of the modern recovery of cornelian cherry in Ukraine began in the 1960-s with a small collection of the M.F. Kashchenko acclimatization garden in Kyiv.

Local cornelian cherry cultivars have been studied in almost all regions of Ukraine, and natural cornelian cherry populations have been surveyed. Interesting genotypes of cornelian cherry were found in Crimea - in Tatar gardens of Sokoline, Tankove, Kyzylivka villages), Bilohirsk and Simferopol districts, in Cherkasy, Vinnytsia, Ternopil, Khmelnytsky, Lviv, Ivano-Frankivsk, Kropyvnytskyi, Dnipro, Zhytomyr, Poltava and other regions, and in Transcarpathia. A yellow-fruited cornelian cherry with bottle-shaped fruits was found in Vinnytsia region in the village of Murovani Kurylivtsi. The yellow colour of the cornelian cherry fruit is rare - it is a recessive trait (a trait that, unlike the dominant red colour, is much less common). It is exceedingly rare to encounter such forms in the natural world.

As a rule, cornelian cherry bears fruit abundantly and annually. It has no periodicity in fruiting. Cornelian cherry yield is high - at the age of 5-10 years it is 10-20 kg, at 15 years - 30-50 kg, at 25 years - 80-100 kg per tree. In Kyiv, the maturation of fruit occurs 125–140 days after the onset of flowering, occurring in August–September. On one tree, the fruits ripen within 20-25 days; after full ripening in most cultivars they do not crumble and can hang on the tree until November, acquiring an excellent sweet taste.

The NBG has collected a gene pool of cornelian cherry samples of Austrian, Bulgarian, Georgian, Polish, and Slovak selection. The cornelian cherry gene pool of

the NBG is distinguished by a wide variety of biological characteristics and economic traits.

To create cornelian cherry cultivars analytical (selection of seedlings from free pollination), synthetic (creation of cultivars with planned traits through hybridisation) and somatic breeding (use of mutational variability in plants. Currently, cornelian cherry has a bud mutation, which is the appearance of a shoot on a plant that differs morphologically from all other shoots of the same plant.

For the first time, 14 cornelian cherry cultivars were included in the State Register of Cultivars of Ukraine (in 1990-2001): Vavilovets, Vydubetskyi, Volodymyrskyi, Grenadier, Exoticnyi, Elegantnyi, Evgeniya, Koralovyi Marka, Lukianivskyi, Nikolka, Olena, Radist, Svetlyachok, Semen (previously, in 1985-1988, several cultivars were registered in the Soviet Union's Register of Cultivars) (Klymenko, 2000).

According to the ripening period, cultivars are divided into early, early-middle, middle and late. Early ones: Alyosha, Olena, Nikolka, Niznyi, Elegantny. Early-medium: Bukovinian yellow, Vyshgorodsky, Galician yellow, Grenadier, Coral, Radist, Slastena, Ugolyok. Middle: Vavilovets, Volodymyrskyi, Vydubetskyi, Evgenyja, Coral Mark, Lukianivskyi, Mriya Shaidarovoy, Nespodivany, Originalny, Pervenets, Priorskyi, Samofertulny, Svetlyachok, Starokyivskyi, Exotichny, Jntarnyi. Late: Kozerig, Kostya, Semen, Sokoline, Sulija. In addition to the registered cultivars, there is a great potential for hybrid cforms with various biological, ecological and economic properties (Klymenko et al., 2021).

As a result of many years of breeding work, cultivars with oval, spherical, pear-shaped, bottle-shaped fruits with red, cherry, dark red, black, yellow and pink colours have been created that are promising for horticulture in Ukraine. The average weight of the fruit is from 4.0 to 8.0-10.0 g, the length of the fruit is 22-36 mm, the width is 11-19 mm, the stone is 9.8-12.0% of the fruit weight (in wild cornelian cherry these indicators are respectively: 1.6-2.5 g, 13.0-18.0 mm, 6.9-11.0 mm, 18.0-20.0%). The taste of the fruit is sweet, sour-sweet, sweet-sour with a pleasant specific aroma (Antoniewska-Krzeska et al., 2022).

Scientific research on the selection of cornelian cherry (*Cornus mas* L.), its introduction into culture for 60 years has been conducted by the M.M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine. As a result of analytical and synthetic selection, new horticultural cornelian cherry cultivars for cultivation in all zones of Ukraine were created. Fourteen cultivars were registered in the State Register of Plant cultivars of Ukraine, which became the basis for the revival of cornelian cherry culture in Ukraine.

References

Klymenko, S., Kucharska, Sokół-Łętowska, A., Piórecki, N., Przybylska, D., Grygorieva, O. (2021). Iridoids, Flavonoids, and Antioxidant Capacity of *Cornus mas, C.officinalis, and C.mas* × *C.officinalis* Fruits. *Biomolecules, 11*(6), 776. https://doi.org/10.3390/biom11060776

Klymenko, S. V., Ilyinska, A. P., Kustovska, A. V., Melnychenko, N. V. (2021). California's endemic *Cornus sessilis* in Ukraine. *Regulatory Mechanisms in Biosystems, 12*(1). P. 42-49. https://doi.org/10.15421/022107

Klymenko, S., Ilyinska, A. (2023). The new earliest cultivar of cornelian cherry *(Cornus mas* L.) *Plant Introduction, 97/98*, 46-60. https://doi.org/10.46341/PI2023002

Klymenko, S. V. (2000). *Kyzyl v Ukraini: biologiia, vyroshchuvannja, sorty*. Phitosociocentr.

Klymenko, S. Ilyinska, A. (2021). Phenological Stages of Development of *Cornus* L. S. Str. Species (*Cornaceae*) According to BBCH Scale. .). *Agrobiodiversity for Improving Nutrition, Health and Life Quality, 5*, 185–196. https://doi.org/10.15414/ainhlq.2021.001

Antoniewska-Krzeska, A., Ivanišová, E., Klymenko, S., Bieniek, A.A., Šramková, K.F., Brindza, J. (2022). Nutrients content and composition in different morphological parts of Cornelian cherry (*Cornus mas* L.). *Agrobiodiversity for Improving Nutrition, Health and Life Quality, 6,*(1), 1–10. https://doi.org/10.15414/ainhlq.2022.0001

Współczesne technologie w ekologii: analiza różnorodności biologicznej za pomocą algorytmów uczenia maszynowego

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Słowa kluczowe: ekologia, bioróżnorodność, uczenie maszynowe, rozpoznawanie gatunków, *Chironomidae*

Współczesna nauka coraz częściej sięga po zaawansowane technologie, które pozwalają na analizę złożonych zjawisk biologicznych w sposób szybki i precyzyjny. Jednym z obszarów, w którym technologia odgrywa kluczową rolę, jest ekologia, gdzie zrozumienie dynamiki populacji i bioróżnorodności wymaga analizowania ogromnych zbiorów danych. W badaniach nad różnorodnością gatunkową oraz monitorowaniem środowiska naturalnego, zastosowanie nowych metod numerycznych, takich jak metody uczenia maszynowego, staje się obszarem, który w sposób znaczący przesuwa barierę możliwości poznawczych i charakteryzuje się ogromnym potencjałem nowości naukowej. Przykładem zastosowania tych technologii jest rozpoznawanie gatunków *Chironomidae*, w którym algorytmy różnych modeli sieci neuronowych i technik klasyfikacyjnych pozwalają na automatyczne i precyzyjne klasyfikowanie gatunków w oparciu o cechy morfologiczne oraz genetyczne, co znacząco przyspiesza procesy badawcze i monitorowanie ekosystemów.