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Introduction of Monarda bicolor culture in the conditions of the Southern Steppe of Ukraine

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Abstract. The peculiarities of the essential oil culture of Monarda double and the conditions of its cultivation are studied. The main directions of application of the essential oil of this culture in various industries: food, medicine, perfumery, etc. are highlighted. The literature on the introduction of this species in the conditions of the Southern Steppe of Ukraine and the possible productivity of the plant outside its natural range is analyzed. The conclusion is made about the need for further research on the introduction of Monarda didyma L. and the influence of various factors on improving the quantitative and qualitative characteristics of the substances that make up the essential oil of the culture.
Keywords: *essential oil crops, introduction, Monarda didyma, productivity, essential oil.*

Despite the expansion of medicinal and essential oil crop production in the Southern Steppe of Ukraine, this segment is still quite narrow in our zone. In recent decades, the cultivation areas of these crops have decreased significantly, which has led to a decrease in the production of essential oils, as well as to problems in the production of specialty foods [1-2]. Therefore, Ukrainian producers have to import most of the raw materials for the production of this type of product. Imported raw materials account for more than 60% [3].

The problem described above raises new questions and challenges for the study and cultivation of new highly productive and profitable essential oil crops. In this direction, one of the promising crops is Monarda didyma L. The main area of cultivation of this crop is the eastern part

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of North America, some Eurasian regions. This plant is also naturalized in the western part of North America. However, modern agronomic technologies allow expanding the area of cultivation of the crop, as it is able to adapt to new soil and climatic conditions. The range of applications of the plant in the West is also wide. It is used in the food industry (for tea production and in the production of flour confectionery), as a medicinal plant (immunostimulant and antiseptic), as an essential oil crop and in landscape design.

The leaves of the double monarda contain a large number of useful chemicals that make this crop particularly valuable and attractive. This includes a large number of aromatic compounds (with the smell of mushrooms, bergamot, oregano, menthol) - they contain bactericidal, insecticidal, immune-stimulating and antioxidant properties. It also contains a number of fatty acids, flavonoid compounds, etc. that can be used as preservatives of natural origin in the confectionery industry [4].

In addition, this culture has been studied for its use in animal husbandry as an alternative to synthetic antibiotics used in animal feeding [5]. Some studies by foreign scientists show that the essential oil of Monarda didyma L. has the potential to be used as a component of bioherbicide formulations. In the future, it is planned to test these properties of the plant essential oil in the field to better understand the real effect [6].

In Ukraine, there are recommendations for cultivating monarda in Polissya and Forest-Steppe. Only a small number of resources and studies cover the issue of growing the crop in the Southern Steppe of Ukraine. This is what makes the topic relevant and the need for further research on this issue.

The research of various scientists leads to the conclusion that monarda has a high adaptive capacity and is a plastic crop that can be grown under different natural and soil and climatic conditions. However, the choice of variety is of great importance when growing the plant. Different varieties of essential oil crops produce different yields of essential oils, as well as different quality. When using plants of some varieties, you can get about 5 g per 1 m^2, and when growing others - up to 12 g per 1 m^2. Most of the essential oil in the conditions of monarda cultivation in the Ukrainian Southern Steppe is concentrated in inflorescences, and in the leaves this percentage is somewhat lower [7].

Monarda bicolor is an allelopathic plant, but many

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scientists have studied the effect of mulching as one of the agronomic elements of its cultivation. Studies of foreign researchers on the effect of soil mulching during the cultivation of M. Didyma L. on the content of essential oil in the leaves and inflorescences of the plant, as well as on its biological activity, indicate that this factor does not have a significant impact on these indicators, and under some conditions it can even reduce the growth and development of inflorescences. However, the use of synthetic mulch may have had a positive effect on the antibacterial and antihistamine effects of monarda essential oil [8].

Based on the above, it can be concluded that Monarda didyma L. is a promising plant for growing it in the Southern Steppe of Ukraine. The peculiarities of the introduction and cultivation of essential oil crops in the conditions of the Southern Steppe of Ukraine should be studied further. Particular attention should be paid to the effect of mulching, the use of fertilizers and micronutrient fertilizers on the productivity of essential oil in the leaves and inflorescences of the plant, as well as on its quality indicators.

References:

[1] Kovalenko O.A. Elements of nutrition of Hyssop officinalis on drip irrigation in the South of Ukraine. Scientific journal "Agrarian Innovations". Institute of climate-oriented agriculture of the National Academy of Agrarian Sciences of Ukraine. Odesa: Helvetica Publishing House, 2022. № 14. P. 51-59. https://doi.org/ 10.32848/ agrar.innov.2022.14.8.

[2] Kovalenko O. A., Andreichenko L. V., Polyansky S. V. Influence of sowing dates, Irrigation regimes and mineral fertilizers on the Productivity of Common Hyssop. Education and science of today: intersectoral issues and development of sciences: Collection of scientific papers "ΛΌГОΣ" with Proceedings of the III International Scientific and Practical Conference, Cambridge, May 20, 2022. Cambridge-Vinnytsia: P.C. Publishing House & European Scientific Platform, 2022. P.110-115. https://doi.org/10.36074/logos-20.05.2022.034.

[3] Economic aspects of the production of medicinal essential oil crops. Problems of a systematic approach in the economy, 2019. № 3 (71). P. 79-84.

[4] Lynx M.V. Elemental composition of the aboveground phytomass of plants of the genus Monarda L. introduced in the northern forest-steppe of Ukraine. Scientific Bulletin of NLTU. 2013. № 23.6. P. 286-291.

[5] Héloïse Côté, André Pichette, Alexis St-Gelais, Jean Legault. The Biological Activity of Monarda didyma L. Essential Oil and Its Effect as a Dietary Supplement in Mice and Broiler Chicken. Molecules, 2021. № 26. P. 1-10.

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[6] Donata Ricci, Francesco Epifano, and Daniele Fraternale1. he Essential Oil of Monarda didyma L. (Lamiaceae) Exerts Phytotoxic Activity In Vitro against Various Weed Seeds. Molecules, 2017. № 22. P. 1-7.
[7] Yanchenko I.A. Influence of varietal characteristics of Monarda double on the yield of essential oil from plant material in the Southern Steppe of Ukraine. Bulletin of Uman National University of Horticulture, No. 1. 2016. P. 54-58.
[8] Katarzyna Wróblewska, Antoni Szumny, Barbara Żarowska, Krystyna Kromer, Regina Dębicz, Saskia Fabian. Impact of mulching on growth essential oil composition and its biological activity in Monarda didyma L. Industrial Crops and Products, 2019. № 129. P. 299-308.