FEATURES OF THE SPECIES MONARDA DIDYMA CULTIVATED UNDER THE PEDOCLIMATIC CONDITIONS OF DIDACTIC-EXPERIMENTAL STATION IN TIMISOARA, ROMANIA

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Abstract. *In Romania a series of traditional herbs are grown – sage, mint, lavender, etc. for which agrotechnical processes have been developed. At the same time, research is being carried out to broaden the variety of herbs. [1] Monarda is among herbaceous plants whose healing properties were known in Antiquity. The flower is often used as a medicine, as well as added to foods as spices. Monarda was brought to Romania in the 19th century and, for a long time, it had a decorative use. The Didactic-Experimental Station in Timisoara, Romania, is, from a geomorphological point of view, part of the large physical-geographical unit "Banato-Crisana Field" . The Didactic-Experimental Station is located in the south-western part of the country, benefiting from moderate continental temperate climate, with shorter and milder winters, frequently under the influence of the activity of cyclones and masses of warm air from the Mediterranean and Adriatic Seas. From the climate type map of Romania, it follows that the perimeter of the Didactic-Experimental Station falls within the moderate continental climate, the interference between the oceanic climate province sector and the climate province sector with sub-Mediterranean influences. The annual average temperature is 10.7°C, fluctuations from this multiannual average are a few subunits to 1-1.2oC more or less. During the period 1927-1996, the values of the annual averages show the following oscillations: 407.2 mm in 1983 and 908.1 mm in 1970. The biological material was produced by Dacia Plant Brasov. In 2014, the plants of Monarda didyma in the form of rooted cuttings were grown in the experimental field located in the "Young Naturalist Station" in Timisoara. The preparation of the ground for the establishment of the culture was achieved through the soil works specific to the technology of the culture. Rooted cuttings were planted on October 3, 2014, at a distance of 70 cm between rows and 40 cm between plants at a time. The Monarda didyma species was kept in the culture until 2016. In November, the rooted cuttings were transplanted into the experimental field of the Timişoara Didactic Station. In the Monarda didyma culture, care works were carried out to control weeds mechanically. During the growing season, phenological observations were made (flowering is staggered, taking place throughout June).*

Keywords*: features, Monarda Didyma, pedoclimatic, Timișoara, biometric measurement*

INTRODUCTION

Medicinal plants in various forms have served health from the beginning of the world. As the chemical industry develops, some of the popular remedies have been given a different form, being modernized. Most of the time, the effect of using medicinal plants is slower, requiring longer treatment, but it is less risky and cheaper. The effect of medicinal plants is more complex, acting on several organs or systems at the same time. Herbs produce fewer and much lesser side effects. [1-3]. Therapeutic essential oils are the most concentrated natural substances: they are volatile, biologically active, and very therapeutically effective. Essential oils are obtained from plants by a distillation method in most cases, under special conditions of low pressure and temperature. As a result of this process, plants release some biologically active volatile components, from the floral part, from the leaves, branches, roots, bark, or seeds of the plant. [4-6]

Monarda is among herbaceous plants whose healing properties were known in Antiquity. The flower is often used as a medicine, as well as added to foods in the form of spices. Monarda was brought to our country in the 19th century and, for a long time, it had a decorative

use. Today, the herb is widely used to treat various conditions, strengthen the immune system and solve cosmetic problems. [72-73]. The name of this genus was given by the 18th-century Swedish physicist and physician, Karl Linné, in honour of the Spanish researcher and physician Nicholas Monardes of the 16th century, who published a paper in 1574 on the new plants of America. [74]

The plant contains biologically active compounds and auxiliary components. The bioactive elements are turpentines – substances in the composition of essential oil [75-76]. Some varieties of Monarda, in their composition, contain characteristic substances that mimic the taste and smell of mint and lemon.It has been scientifically proven that prolonged use of Monarda-based medicinal products is not addictive. Comprehensive treatment of a number of diseases with this plant and antibiotics accelerates recovery. [80]

MATERIAL AND METHODS

The Didactic-Experimental Station in Timisoara, Romania, is, from a geomorphological point of view, part of the large physical-geographical unit "Banato-Crisana Field". The Didactic-Experimental Station is located in the south-western part of the country, benefiting from moderate continental temperate climate, with shorter and milder winters, frequently under the influence of the activity of cyclones and masses of warm air from the Mediterranean and Adriatic Seas. From the climate type map of Romania, it follows that the perimeter of the Didactic-Experimental Station falls within the moderate continental climate, the interference between the oceanic climate province sector and the climate province sector with sub-Mediterranean influences. The annual average temperature is 10.7°C, fluctuations from this multiannual average are a few subunits to 1-1.2oC more or less. During the period 1927-1996, the values of the annual averages show the following oscillations: 407.2 mm in 1983 and 908.1 mm in 1970. The biological material was produced by Dacia Plant Brasov. In 2014, the plants of Monarda didyma in the form of rooted cuttings were grown in the experimental field located in the "Young Naturalist Station" in Timisoara. The preparation of the ground for the establishment of the culture was achieved through the soil works specific to the technology of the culture. Rooted cuttings were planted on October 3, 2014, at a distance of 70 cm between rows and 40 cm between plants at a time. The Monarda didyma species was kept in the culture until 2016. In November, the rooted cuttings were transplanted into the experimental field of the Timişoara Didactic Station. In the Monarda didyma culture, care works were carried out to control weeds mechanically. During the growing season, phenological observations were made (flowering is staggered, taking place throughout June).

Starting with the second decade of June, when 50% of the plants bloomed, herba was harvested. After harvesting, the plants were dried in the shade, after which they were shredded, processed and prepared for the extraction of essential oil. Separating a flavour from its natural environment is a difficult task, as it must be isolated or concentrated with a minimum of loss, changes in composition, and without impurities. All inappropriate operations result in degradation of natural composition. [113-114]

Volatile oils are distributed throughout the plant or, more commonly, they accumulate in a plant organ. [115-116]. In general, all organs of the plant contain the same oil, but there are exceptions. In this respect, the most notable examples are the cinnamon tree and the bitter orange tree. The cinnamon tree produces three types of volatile oils: an oil rich in eugenol (in the leaves), an oil whose main component is cinnamic aldehyde (in the bark) and an oil rich in camphor (in the root). From the bitter orange are extracted oil and absolute neroli (from the flowers), orange oil (from the peel of the fruit) and petitgrain oil bigarade (from the leaves, immature fruits and young branches). [120]

Biometric measurements where taken between 08.04.2020 -21.06.2020.

RESULTS AND DISCUSSIONS

The biometric measurement is showing in the following tables and figures.

Table 1.

Bushes height (cm) for R1

R1	08.04.2020	15.04.2020	22.04.2020	06.05.2020	20.05.2020	03.06.2020	17.06.2020	21.06.2020
Bushes 1	6	9	16	32	53	64	70	90
Bushes 2	9	13	21	45	65	78	98	105
Bushes 3	2	4/5	7/8	20	32	48	52	58
Bushes 4	11	14	18	33	43	56	70	78
Bushes 5	5	9	9	11	12	14	16	20
Bushes 6	5	9	5	9	10	10	10	10

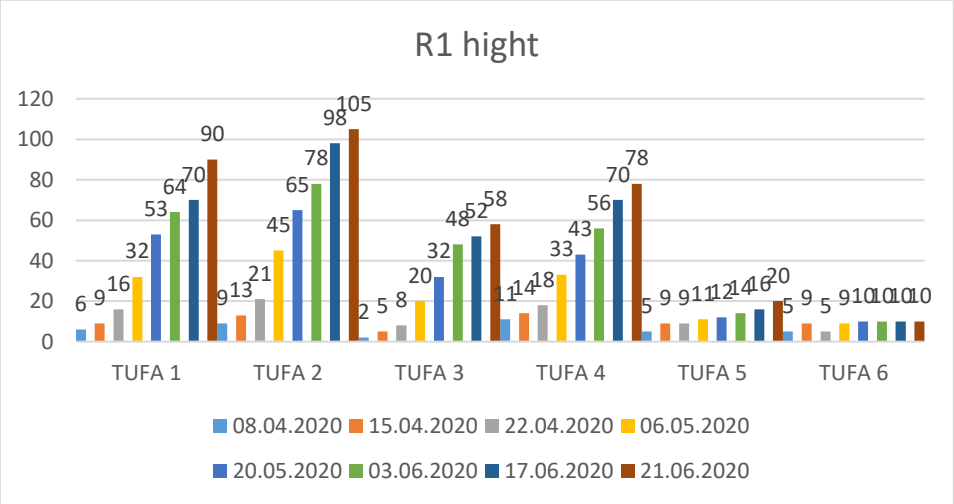


Fig. 1. Bushes height (cm) for R1

Table 2.

Bushes height (cm) for R2

R2	08.04.2020	15.04.2020	22.04.2020	06.05.2020	20.05.2020	03.06.2020	17.06.2020	21.06.2020
Bushes 1	12	17	27	48	70	80	100	120
Bushes 2	5/6	11	15	28	48	66	70	80
Bushes 3	7	12	17	32	46	57	75	75
Bushes 4	5	9	13	23	37	55	67	70
Bushes 5	8	10	19	35	55	70	92	95
Bushes 6	6	14	20	39	52	64	78	80

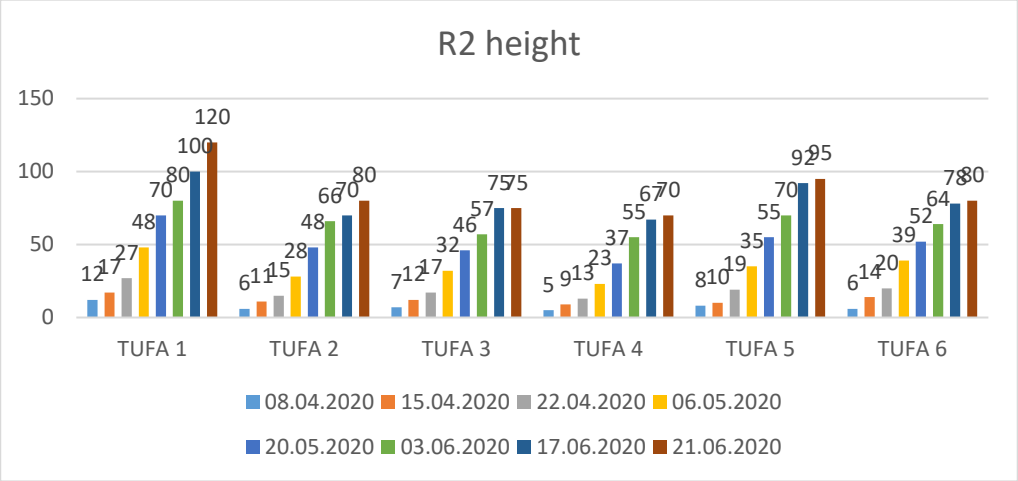


Fig. 2. Bushes height (cm) for R2

Table 3.

Bushes height (cm) for R3

R3	15.04.2020	22.04.2020	06.05.2020	20.05.2020	03.06.2020	17.06.2020	21.06.2020
Bushes 1	5	7	16	20	22	26	28
Bushes 2	13	15	24	27	28	34	39
Bushes 3	5	8	17	22	29	29	29
Bushes 4	6	8	17	19	23	30	31
Bushes 5	7	8	10	12	12	16	18

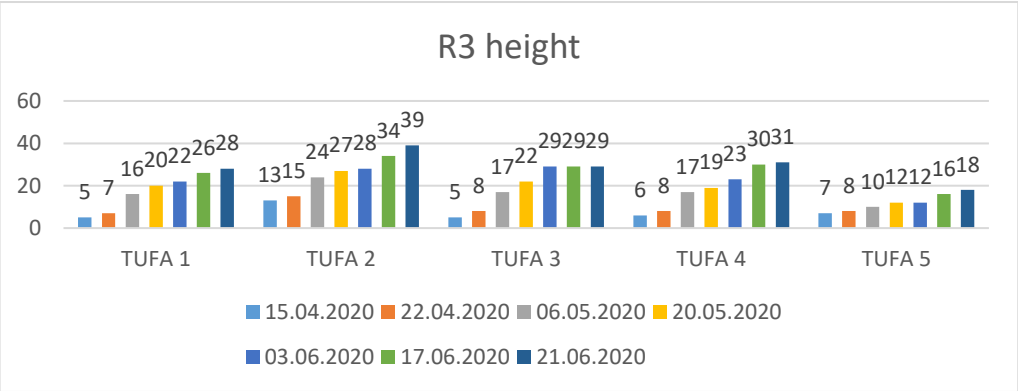
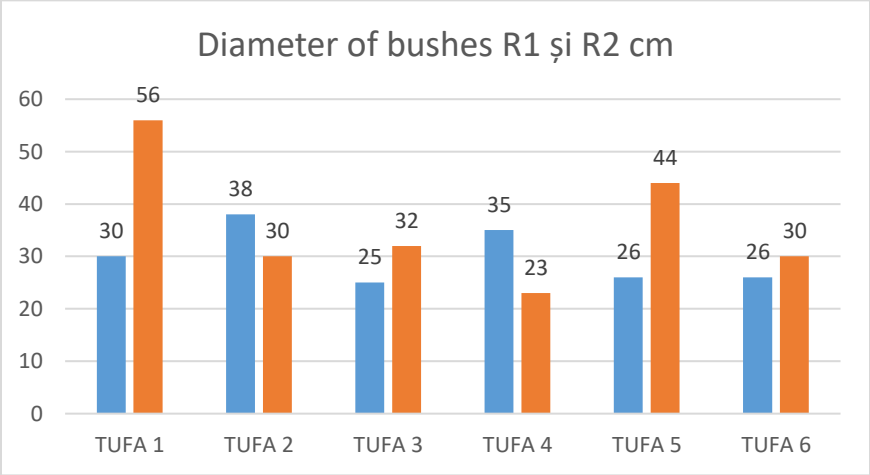


Fig. 3. Bushes height (cm) for R3

Table 4.

Diameter of bushes from row R1, R2, R3 (06.05.2020-20.05.020)

Bushes 1	30	56
Bushes 2	38	30
Bushes 3	25	32
Bushes 4	35	23
Bushes 5	26	44
Bushes 6	26	30



CONCLUSIONS

- Monarda oil has the following medicinal properties:
- It is used as a bactericidal and antiviral agent;
- It is used as a panacea for different types of inflammation;
- Monarda oil is an immunomodulatory tool;
- It has strong antioxidant properties;
- It is an antisclerotic and desensitizing agent;
- It is an effective antispasmodic;
- The quality of radiation protection is important;
- It helps with depression and stress;
- It is an adaptogenic tool;
- Recommended for people with anaemia;
- Finally, it is one of the best anticarcinogen drugs;
- Monarda extract removes parasites from the body;
- It helps heal old, purulent wounds;
- It helps eczema and other skin conditions;
- Treatment of burns.
- It helps with headaches;
- In the absence of appetite, like all spices, it helps a lot;
- It improves the digestive system.

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