

STUDY OF THE BEHAVIOUR OF CULTIVATED SPECIES OF THE GENUS *Monarda* L. IN VASLUI COUNTY, TO INTRODUCE THEM IN CULTIVATION AS MEDICINAL, AROMATIC AND DECORATIVE PLANTS

Ana-Maria CIURUȘNIUC¹, Teodor ROBU¹

e-mail: ciurusniucanamaria@yahoo.com

Abstract

Genus *Monarda* L. comprises about 30 species of annual and perennial medicinal, aromatic and ornamental plants, belonging to family *Lamiaceae*. The gender is originating in the USA, Canada and Mexico and is grown in Europe, Asia. The best known species are: *Monarda didyma* L., *M. fistulosa* L., *M. citriodora* Cerv. ex Lag., *M. punctata* L., *M. pectinata* L., *M. clinopodia* L., etc.. This paper aims monarda behavior of three species, *M. didyma* L., *M. citriodora* Cerv. ex Lag. and *M. fistulosa* L. in the climatic conditions in Vaslui county, to introduce their culture. The experience has been established both by direct seeding in the experimental field and the seedling, being made biometric measurements and observations to plant. The importance of this study is to determine which of the three species of the genus *Monarda* L. is most suitable to be cultivated in the climatic conditions of Vaslui county, identifying medicinal qualities, aromatic and ornamental.

Key words: *M. didyma* L., *M. fistulosa* L., *M. citriodora* Cerv. ex Lag.

Genus *Monarda* L., belonging to the botanical family *Lamiaceae*, includes popular plant also known as bergamot, mint decorative, Indian mint, bee balm, Oswego tea.

The genus name is in honor and memory of Nicolas Monardes Bautista, a known Spanish doctor from the sixth century. The genus species, originating from the North American continent, have been used for medicinally and aromatically purposes since the seventeenth century by numerous Indian tribes to treat respiratory, digestive, skin, with effects febrifuge, diaphoretic, antirheumatic, carminative, sedative, tonic with antibacterial, anticoagulant, antiseptic properties (JA Duke, 2007).

Like many other plant species belonging to the *Lamiaceae* family genus *Monarda* L. are used for ornamental purposes, suitable for the establishment of perennial gardens, parks, mixed borders, lawns fittings. Found spontaneously in their natural environment, plants are considered ideal for meadows and roadside beautification mixed with other wild plants, due to chromatic variety of flowers.

In the specialized literature genus *Monarda* L. number varies from 12 (Gușuleac M., 1961) to 30 species (Selaru Elena, 2007), being described as perennial and annual herbaceous plants.

Many authors place the genus *Monarda* L. in *Lamiaceae* family, *Nepetoideae* subfamily, tribe *Menthae*, subtribul *Menthinae* (Ryding O., 2009, Moon HK et al., 2009).

Genus *Monarda* L. species are plants resistant to unfavorable conditions (Selaru Elena, 2007), preferring open spaces.

Plants are heliofile genre, requiring high light intensity, long day conditions causing flower development, but can be cultivated and halfshade (Teuscher E. et al., 2005).

Average monthly temperatures in Vaslui optimal sowing period (April-June) is 12 to 16 ° C, being favorable to seed germination and the growth of the plant *Monarda* L., requiring temperatures of 21-23 ° C to flowering.

Plants prefer clayey-sandy soils, porous, moist, rich in nutrients and humus with a pH of 5.5 to 7. Genus are grown on a soil with moderate moisture (Ardelean A., Mohan G., 2011) watering too often causing root rot.

Genus *Monarda* L. species are plants resistant to unfavorable conditions, which prefer loose soil. Grown in full sun or half shade. Multiplication is achieved by seed and by dividing the parent plant. Sowing is in spring, in April-May, springing taking place within 1-4 weeks at temperatures of 16-18 ° C and dividing bush in early spring (Selaru Elena, 2007).

¹ University of Agricultural Sciences and Veterinary Medicine Iași

Special attention should be paid to combating pathogens and pests, using the agrotechnical measures, hygiene, cultural and chemical control measures when necessary. In cultures of *Monarda* L. are common powdery mildew (*Erysiphe monardae*) and rust (*Puccinia menthae*) (fig. 1) being used to control, fungicide Tops in M 70 (70% thiophanate methyl).

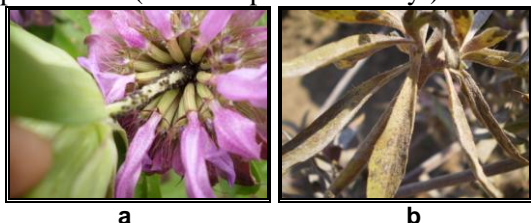


Figure 1 *M. citriodora* Cerv. ex Lag.
a- Plant lice b- Powdery mildew

MATERIALS AND METHODS

Experience has been placed in plots subdivided in three repetitions. Experimental factors were placed in bifactorial experience. Culture was established in spring 2011, in Vaslui county, the seeds and seedlings produced in the greenhouse Floriculture discipline of the University of Agricultural Sciences and Veterinary Medicine Iași, on chernozem soil of the steppe grasslands. The sowing was done in May and plant springing took place in about three weeks. Seedbed was planted in the same month, with a height of 14 cm, the distance of 50 cm between plants in the row and 50 cm between rows. The total area of the experience measured 230 sqm, of which the cultivated area of 180 sqm and area parcel 10 sqm. Each variant consisted of two rows of plants obtained by seeding and two rows of plants established by seedling. The average temperature and rainfall recorded were within normal limits.

The biological material used in establishing the experimental field is represented by three species of the genus *Monarda* L., *M. didyma* L., *M. fistulosa* L. and *M. citriodora* Cerv. ex Lag.

Monarda citriodora Cerv. ex Lag. Is an annual species, with heights of 25-90 cm, well-developed root system, swivel type, branched (fig. 2) stems are branched, squared, pubescent. The leaves are opposite, petiolate, lanceolate or oblong-lanceolate, pubescent, with serrate edges, with a strong lemon scent.

Flowers pink-purple, are grouped in whorls 2-7 capitulum formed terminals, accompanied by colorful bracts, tubular calyx, 5 lobes, two lipped corolla, tube long, glabrous narrow interior, straight or slightly curved upper lip, lower short, the three lobes, (Gușuleac M., 1961). The fruits are glossy ovoid nukas the plant is cultivated for its ornamental qualities, aromatic and medicinal.



Figure 2 *M. citriodora* Cerv. ex Lag.

Monarda didyma L. is a perennial species with flowering period from July to October (fig. 3). The strain is about 100-130 cm tall, branched from the base, forming a shrub of upright shoots, squared. The leaves are ovate-lanceolate, petiolate, thin, pale green, 7-15 cm long. The flowers are two lipped, red, arranged in 1-3 whorls capitulum formed terminals, accompanied by colorful bracts linear-sharp. Corolla is straight to slightly curved, stamens exserte. Calyx is finished with five teeth about the length of the tube diameter.

This species is used medicinally, and has diuretic, antifebrile, carminative, expectorant, rubefaciante, incentives, antiseptic, aromatic properties but also ornamental (H. Kalamouni C., 2010).

Leaves are used to prepare a tea to treat digestive disorders, or can be added and used to season salads. Decorative plants are used in parks, gardens, lawns fittings.



Figure 3 *M. didyma* L.

Monarda fistulosa L. is a perennial species, with the appearance of shrub 35-120 cm high (fig. 4). The stem is simple, erect, pubescent, reddish at the top. The leaves are strongly flavored, are large, ovate-lanceolate, petiolate, dental, 3-10 cm long. The flowers are lilac-purple color, grouped in terminal whorls, the calyx is tubular, 15-nerve finished with five teeth, the corolla is two lipped, 2-3 cm long, pubescent (Elizabeth McClintock, C. Epling, 1942). Like other species, *M. fistulosa* L. is grown for medical purposes, aromatic and ornamental.



Figure 4 *M. fistulosa* L.

RESULTS AND DISCUSSION

In Tables 1, 2 and 3 are presented data on sowing date, sunrise, planting date, flowering date, plant height and flowering both at the beginning and the full flowering of the three species studied. In experimental year 2011 the perennial species *M. didyma* L. and *M. fistulosa* L. have not reached the stage of flowering, flowering date observations on the average height of plants at full flowering annual species being made only on *M. citriodora* Cerv. ex Lag. In terms of plant height before blooming, it appears that the May average values were recorded in cultures established by seedling plants in all three species.

Comparing the establishment of the culture of the three species shows the following:

- the options established by seedling, average height before blooming perennial species *M. didyma* L. and *M. fistulosa* L., presented the value of 70.4 cm and 31.5 cm respectively, while the annual species *M. citriodora* Cerv. ex Lag. average height of plants before flowering was 38.7 cm.
- the options set by seeds, plants of *M. didyma* L. measured an average value of height before flowering, 53.6 cm, those of *M. fistulosa* L. of 28.64 cm, and the species of *M. citriodora* Cerv. ex Lag. measured on average 27.2 cm.

Table 1

Biometric measurements on *Monarda didyma* L. species, grown in the county of Vaslui

Characters	Seeds	Seedling
Seeding date in field/seedling shelter	14.05. 2011	17.03. 2011
Emerging date in field/seedling shelter	25. 05. 2011	22. 03. 2011
Planting date on field	-	20. 05
Emerging duration on field/seedling shelter – no. days	12	6
Height before blooming – cm	53.6	70.4

Table 2

Biometric measurements on *Monarda fistulosa* L. species, grown in the county of Vaslui

Characters	Seeds	Seedling
Seeding date in field/Seedling shelter	14. 05. 2011	17. 03. 2011
Emerging date in field/seedling shelter	25. 05. 2011	22. 03. 2011
Planting date on field	-	7.06. 2011
Emerging duration on field/ seedling shelter – no. days	12	6
Height before blooming – cm	28.64	31.5

Regarding the duration to emerge, established by seedling variants included 5 days for annual species *M. citriodora* Cerv. ex Lag. and six days for the perennial *M. didyma* L. and *M. fistulosa* L. The variants created by seeds sown directly in the field needed a greater number of days to emerge. Thus, the species *M. didyma* L. and *M. fistulosa* L. Took 12 days to emerge, and the species *M. citriodora* Cerv. ex Lag. 10 days.

Table 3

Biometric measurements on *Monarda citriodora* Cerv. ex Lag. Species, grown in the county of Vaslui

Characters	Seeds	Seedling
Seeding date in field/Seedling shelter	14. 05. 2011	17.03. 2011
Emerging date in field/seedling shelter	23. 05. 2011	21.03.2011
Planting date on field	-	20.05. 2011
Emerging duration on field/seedling shelter – no. days	10	5
Height before blooming – cm	27.2	38.7
Date of blooming	15.08.2011	6.06.2011
Height at full flowering–cm	41.8	61.71

Variants of *M. didyma* L. established by seedlings have the average height 16.8 cm higher than those established by seeds, those of *M. fistulosa* L. to 2.86 cm and variants of *M. citriodora* Cerv. ex Lag. Are established by seedlings 11.5 cm higher than those established by seed, before flowering.

On the average height of plants at full flowering, all the species *M. citriodora* Cerv. ex Lag., there is a difference of 19.91 cm of variants created by seedling and established by seed.

Plants of *M. citriodora* Cerv. ex Lag. of variants created by seedling bloomed to 18 days after planting, seed planting with an average height of 14 cm, while the variants established by seed plants have flowered three months after sowing in the field.

CONCLUSIONS

Climatic conditions favor the cultivation of Vaslui county three species of the genus *Monarda* L, both through direct seeding field and using seedlings.

All three species studied, the observations and measurements performed have shown a high degree of versatility in terms of Vaslui county, can be successfully promoted in Moldavia, and more, that plants can be used both as plants medicinal and aromatic plants as well as decorative.

Although moisture was sufficient, the variants established by seed, where the atmosphere

was not controlled, their springing was more difficult.

On small areas of land recommended by seedling establishment culture, and not by seeds, because they have very small size, greater duration of emergence, slow growth etc.

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Figure 5 Aspects of the experimental field