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Discovering the Beauty and Benefits of Beebalm, Part 2: Floral Traits and Nectar Content

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Introduction

Monarda, commonly known as beebalm (also written as bee balm), is a captivating genus of flowering plants native to North America. These vibrant perennials, belonging to the mint family (Lamiaceae), are celebrated for their striking blooms and aromatic foliage (Figure 1).

Figure 1. Lemon Bergamot, *M. citriodora*. Although not included in the study, lemon bergamot is an excellent annual/biennial species with a strong lemony fragrance.

Beyond their aesthetic appeal, *Monarda* species and cultivars exhibit a fascinating range of floral traits that contribute to their horticultural and ecological appeal. While gardeners are interested in which plants would be most successful in their gardens, scientists look toward the future to continue offering improved varieties. In addition to pleasing us humans, these new varieties appeal to wildlife and continue to provide ecological value.

The first part of this series discussed the horticultural performance of 10 different species/cultivars (collectively referred to as ***taxa***). This publication will focus on the intricacies of these plants' floral traits.

How We Evaluated Beebalm's Floral Traits

Monarda were evaluated in plots at the Georgia Mountain Research and Education Center in Blairsville and at the State Botanical Garden of Georgia in Athens, GA (Smith et al., 2024). Growing plants in multiple locations allows for more reliable findings and accurate predictions of plant performance in other areas. The plants were monitored over two growing seasons, with data collected on several floral traits (Figure 2).

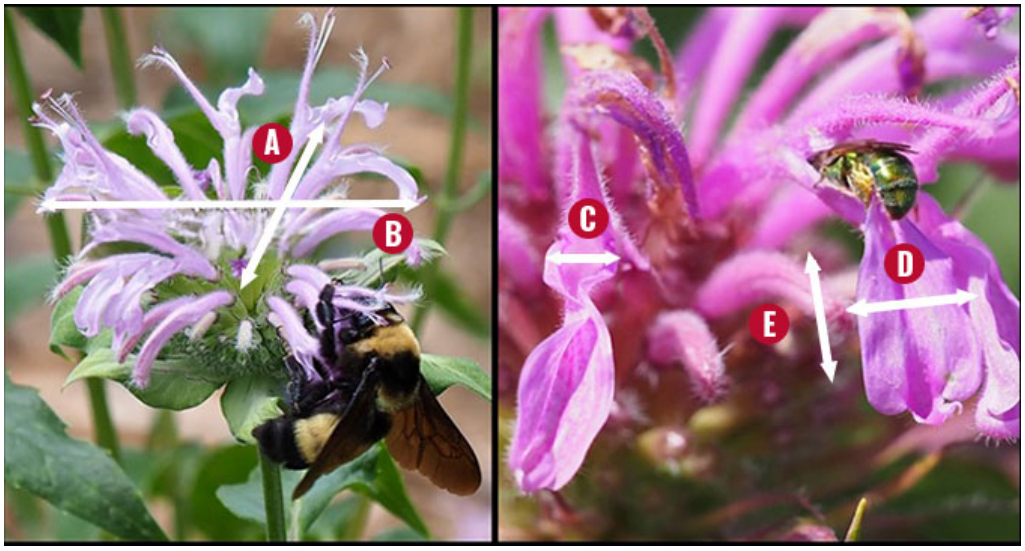

Figure 2. Beebalm Flower Morphology (or Shape) and Measurements of Floral Characteristics. Two bees are seen drinking nectar from the flowers; the insect in the top left is a large bumblebee, while the insect in the top right is a much smaller sweat bee. Labeled parts of the morphology: A) glomerule diameter, B) corolla length, C) corolla width, D) lobe width, and E) petal lobe length.

Monarda's ***inflorescences*** (flower heads), often referred to as ***glomerules***, are composed of

tightly packed clusters of flowers (Figure 2). The dimensions of each floral characteristic were carefully recorded and analyzed.

- **Glomerule diameter:**Inflorescence size influences the plant's overall appearance. Larger inflorescences typically create a more dramatic display, while smaller ones can be more subtle but equally charming.
- **Corolla width and length:**The size of the ***corolla*** (the width of the opening and the depth of the channel it forms that leads to the nectary) determines how accessible the nectar is for various insects.
- **Petal lobe width and length:** The petal lobes are individual segments of the corolla, and their width and length are crucial for determining the flower's overall form and aesthetic. The lobe functions as a "landing pad" for insects, and may also function as a brake or guide for hummingbirds.
- **Total sugar content:** How much nectar is produced by the plant. The more nectar produced, the higher the plant's resource value. Measuring the sugar content per flower provides insights into the plant's ecological role and its attractiveness to pollinators.

Flower morphology refers to the shape of a plant's inflorescence. By taking detailed measurements of the individual parts that make up the beebalm's inflorescence (glomerule) we sought to find correlations between various floral traits—for example, the size of the flower and how much nectar it produces.

Research has shown a general pattern that flowers with longer corolla tubes produce more nectar (Kalaman et al., 2022). Within beebalm, larger flowers with more nectar coincided with fewer flowers per plant. The beebalm project conducted at UGA shows wildlife value also depends on nectar load at the whole-plant level (Smith et al., 2024a, 2024b) This type of information can be useful to breeders who can incorporate traits to support wildlife in their selection process.

Detailed Findings on Beebalm's Floral Traits

Individual plants had very different floral traits, and this study found interesting and significant differences among the 10 taxa of *Monarda* studied (Table 1).

Table 1. Detailed Comparison of the Floral Traits of 10 *Monarda* Taxa.

Taxa	Glomerule diame	Petal lobe	Corolla	Sugar content pe

	ter (mm)	Width (mm)	Length (mm)	Width (mm)	Length (mm)	r flower (µg)
M. bradburiana	42	—	—	—	—	0.53
M. 'Sugar Buzz® Grape Gumball'	49	—	—	—	—	0.15
M. didyma	68	4.2	16.2	3.1	23.7	0.69
M. didyma 'Jacob Cline'	82	4.6	19.5	3.3	27.5	1.04
M. x 'Judith's Fancy Fuchsia'	72	4.8	15.5	3.6	22.7	0.94
M. 'Raspberry Wine'	69	4.8	15.8	3.6	22.8	1.00
M. fistulosa	47	37	10.4	2.4	15.7	0.14
M. fistulosa 'Claire Grace'	53	4.8	12.8	2.9	21.3	0.19
M. punctata GA	23	5.8	10.3	3.3	14.1	0.13
M. punctata NJ	23	4.6	8.2	3.3	10.7	0.25

Note. For detailed descriptions of the plants, refer to Part 1 of this publication series.
Sugar content is measured in micrograms (µg). 1,000 micrograms = 1 milligram (mg).

The Intricacies of *Monarda's* Floral Morphology

Table 1 reveals the diverse floral morphology of *Monarda* taxa. For instance, *Monarda didyma* 'Jacob Cline' boasts the largest glomerule diameter at 82 mm, making it a standout choice for gardeners seeking a bold visual impact. In contrast, *M. bradburiana* has a more modest glomerule diameter of 42 mm, offering a delicate charm suitable for smaller garden spaces.

The petal lobe dimensions vary significantly, with *M. didyma* 'Jacob Cline' featuring the largest lobes at 4.6 mm in width and 19.5 mm in length. These robust lobes contribute to the overall fullness and texture of the flower, while smaller lobes—such as those of *M. punctata* NJ at 4.6 mm in width and 8.2 mm in length—create a more delicate appearance.

The corolla dimensions, ranging from the relatively small 2.4 mm width of *M. fistulosa* to the larger 3.6 mm width of *M.* 'Raspberry Wine', further emphasize the variation in flower size and shape. These differences can influence pollinator attraction and insect communities in the garden. Larger corollas are attractive to hummingbirds and long-tongued insects. Comparatively, shorter and wider corollas provide a more accessible source of nectar for other pollinators.

Another variation among the taxa is the sugar content per flower, a measure of nectar production, with *M. didyma* 'Jacob Cline' producing the highest sugar content at 1.04 µg per flower. This makes it an excellent choice for gardeners looking to support pollinators in their landscapes.

We found that glomerule size, petal length, and corolla length strongly correlated with sucrose and nectar production. Further observations revealed more diverse insect communities on *M. fistulosa* and *M. punctata* taxa despite smaller flower size and lower amounts of nectar and sucrose per flower.

Practical Beebalm Selection for Gardeners

For gardeners, understanding the specific floral traits of *Monarda* taxa is crucial for selecting the right plants for their landscapes. Whether aiming to attract pollinators, create a visually stunning garden, or simply enjoy the aromatic beauty of these native plants, careful consideration of these traits can enhance the gardening experience.

For a Bold Display

Choose cultivars like *M. didyma* 'Jacob Cline' or *M.* 'Raspberry Wine' with larger inflorescences and vibrant colors.

To Attract Pollinators

Choose cultivars that prolong length of bloom in your garden to provide a continuous nectar source for beneficial insects. *M. bradburiana* blooms in spring, followed by *M. didyma* and *M. fistulosa* taxa in the summer, and finally *M. punctata* in the late summer or early fall.

For Small Gardens

Consider more compact taxa like *M. bradburiana* or *M.* 'Sugar Buzz® Grape Gumball', which offer a refined, space-saving beauty.

Conclusion

Monarda's diverse floral traits, from inflorescence size to nectar production, make it a versatile and valuable addition to any garden. By understanding and appreciating these characteristics, gardeners can make informed choices that enhance their landscapes while supporting the ecological needs of pollinators. Whether for their vibrant colors, unique shapes, or environmental benefits, beebalm's flowers truly are a gem in the garden.

This expanded exploration of *Monarda's* floral traits provides a deeper understanding of the genus, highlighting its horticultural potential and ecological significance. By appreciating the intricate details of these flowers, gardeners can create more dynamic and pollinator-friendly landscapes.

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