Lamiaceae Response to PGRs

Research from Virginia Tech reveals the PGRs that work best for crops such as lavender, lamium and coleus.

By Joyce Latimer, Holly Scoggins and Velva Groover

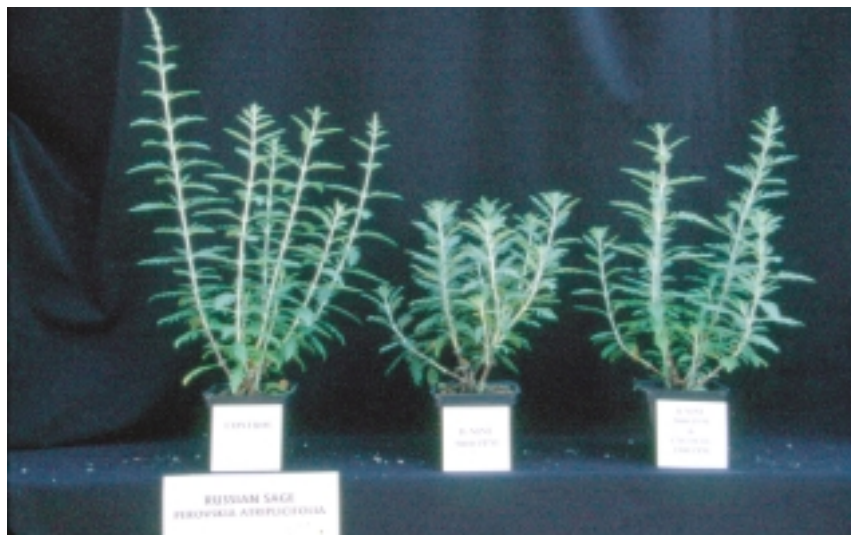
The Lamiaceae (mint) family is a relatively small family, containing about 180 genera of herbs and shrubs, only about 68 of which are produced commercially. These cultivated genera include many of our culinary (Mentha, Ocimum, Origanum, Perilla, Thymus and Rosmarinus) and medicinal (Prunella, Melissa, Pycnanthemum and Satureja) herbs. Some of the more common ornamental perennials include Agastache, Ajuga, Calamintha, Cedronella, Coleus, Hyssopus, Lamium, Lamiastrum, Lavandula, Leonurus, Monarda, Nepeta, Perovskia, Physostegia, Salvia, Scutellaria, Stachys and Teucrium. The landscape use of many of these plants is limited to herb gardens, where they function as foliage plants and often are used for fragrance, filler, bee and butterfly attractors or insect repellants.

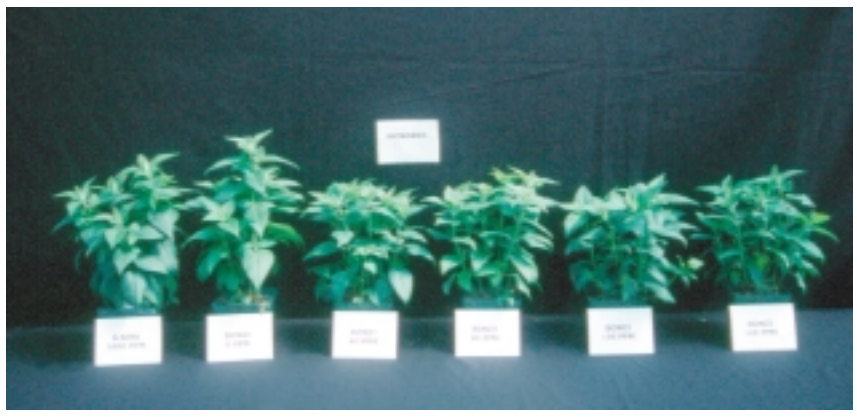
Current research results on Lamiaceae response to PGRs only covers about 12 genera, which includes 18 different species or cultivars, but the major flowering species have been tested (information about Lamiaceae and other families can be located in a searchable database at www.onhort.com). Since PGRs are not labeled for use on food crops, they are not commonly used on herbs due to the potential culinary use of the materials. If you use PGRs on these crops, they should be labeled as "Ornamental Use Only."

RESPONSES TO B-NINE

B-Nine is a short-term growth retardant that has been quite effective on a wide variety of perennials. Only one (Physostegia) of the eight genera in Figure 1, starting on page 102, was not responsive when treated with B-Nine. Height control was generally moderate (20- to 30-percent reductions) and required multiple applications at 5,000 ppm to obtain 4-6 weeks of height control. Many of these plant species were transplanted into the landscape with no landscape persistence of the B-Nine treatments.

Cultivar differences were noted within some genera. While the height of *Monarda didyma* 'Marshall's Delight' was effectively controlled, 'Blue Stocking' was not responsive to two applications of 5,000 ppm B-Nine. On the other hand, four salvia cultivars were responsive to B-Nine. The height of 10 species or cultivars of the 12 tested was effectively controlled by 5,000 ppm B-Nine. Multiple applications were required for most plants and would be recommended for coleus 'Solar Storm' where only moderate control was achieved with a single application. B-Nine caused a moderate delay in the flowering of *Perovskia atriplicifolia.*





Top to bottom: Agastache x *'Blue Fortune' at eight weeks after treatment. Left to right: untreated control, 5,000 ppm B-Nine applied three times at two-week intervals, tank mix of 5,000 ppm B-Nine and 1,500 ppm Cycocel applied once;* Perovskia atriplicifolia *at five weeks after treatment. Left to right: untreated control, 5,000 ppm B-Nine applied three times at two-week intervals, tank mix of 5,000 ppm B-Nine and 1,500 ppm Cycocel applied once;* Salvia leucantha *at five weeks after treatment. Left to right: untreated control, 5,000 ppm B-Nine applied three times at two-week intervals, tank mix of 5,000 ppm B-Nine and 1,500 ppm Cycocel applied once;* Monarda didyma *'Blue Stocking' at four weeks after treatment. Left to right: 5,000 ppm B-Nine applied twice at two-week intervals, untreated control, and Bonzi at 40, 80, 120 and 160 ppm. (Photos courtesy of Joyce Latimer)*

Figure 1. Summary of research results on the use of plant growth regulators (PGRs) on containerized, herbaceous perennials in the Lamiaceae family. Rates listed were tested as spray applications at label-recommended volumes unless otherwise stated. Note: "NR" means the plants were not responsive to the rates tested.

Variety	Spray Rate (ppm) x No. Applications*	Source	Remarks
B-NINE			
Agastache x 'Blue Fortune'	5,000 x multiple	South	Excessive growth reduction; reduce rate or frequency. For use on ornamental plants only.
Coleus 'Solar Storm'	5,000 x 1	South	Moderate control. Test multiple applications at 10-14 day intervals.
Lavandula angustifolia 'Munstead Dwarf'	5,000 x 4	North	Apply at 10-14 day intervals.
Monarda didyma 'Marshall's Delight'	5,000 x multiple	South	Apply at 10-14 day intervals.
Monarda didyma 'Blue Stocking'	NR @ 5,000 x 2	South	Apply at 10-14 day intervals.
Nepeta faassenii 'Six Hills Giant'	5,000 x 2	South	Apply at 10-14 day intervals.
Perovskia atriplicifolia	5,000 x multiple	South	Delayed flowering. Apply at 10-14 day intervals.
Physostegia virginiana 'Summer Snow'	NR @ 5,000 x 4	North	
Salvia greggii	5,000 x multiple	South	Apply at 10-14 day intervals.
Salvia leucantha	5,000 x 3	South	Apply at 10-14 day intervals.
Salvia x *sylvestris* 'Blue Queen'	5,000 x 4	South	Apply at 10-14 day intervals.
Salvia x *sylvestris* 'May Night'	5,000 x 2	South	Apply at 10-14 day intervals.
B-NINE/CYCOCEL			
Agastache x 'Blue Fortune'	5,000/1,500 x 1	South	Excessive growth reduction. Test with lower rates. For use on ornamental plants only.
Coleus 'Solar Storm'	2,500/1,500 x 1	South	
Monarda didyma 'Marshall's Delight'	5,000/1,500 x 1	South	
Nepeta faassenii 'Six Hills Giant'	5,000/1,500 x 1	South	May require multiple applications.
Perovskia atriplicifolia	5,000/1,500 x 1	South	
Salvia greggii	5,000/1,500 x 1	South	
Salvia leucantha	5,000/1,500 x 1	South	

RESPONSES TO B-NINE/CYCOCEL TANK MIX

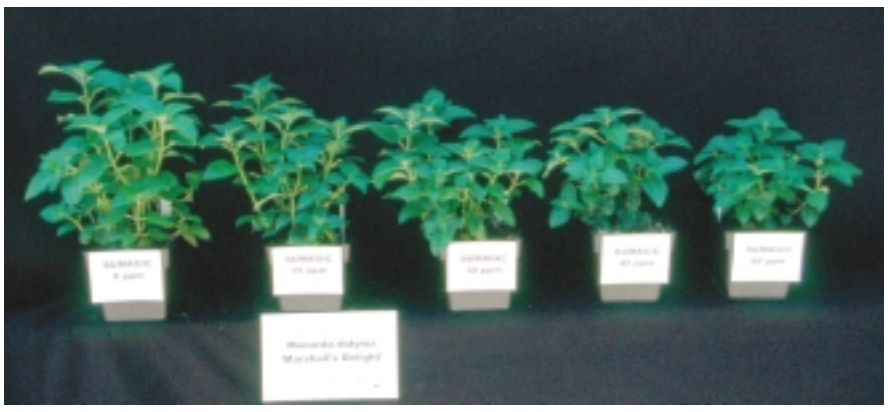
The tank mix of B-Nine and Cycocel provides a very active PGR that is more forgiving of non-uniform application than are the triazoles. However, this tank mix is less often tested in PGR trials. Only seven species are reported as tested for response to the B-Nine/Cycocel tank mix (See Figure 1, starting above), but the height of each of these species was effectively controlled with a single application, usually at 5,000 ppm B-Nine and 1,500 ppm Cycocel. These include *Agastache x* 'Blue Fortune', *Coleus x* 'Solar Storm', *Monarda didyma* 'Marshall's Delight', *Perovskia atriplicifolia, Salvia greggii* and *S. leucantha.* For long production periods, multiple applications of the tank mix may be required to provide adequate height control. Evaluate the growth response 3-4 weeks after treatment to determine if a second application will be required to maintain plants for your market window.

RESPONSES TO BONZI

Bonzi is one of the very active triazole PGRs and has been very effective on many of the vigorous perennial plants. Of the 13 Lamiaceae species listed in Figure 1, starting above, as being tested with Bonzi, the height of 10 species was adequately controlled by Bonzi. Most applications resulted in moderate height control, with recommendations to test higher rates or multiple applications.

We again saw cultivar differences in response. Monarda 'Jacob Cline' was responsive to Bonzi, while 'Blue Stocking' was not. *Salvia greggii, S. leucantha* and salvia 'Blue Queen' were responsive to Bonzi, but height of salvia 'May Night' was not controlled by 160 ppm Bonzi. *Nepeta faassenii* 'Six Hills Giant' has been inconsistent in its response to Bonzi. The test found adequate height control with two applications of 30 ppm Bonzi (See Figure 1, starting above). However, a nursery test here in Virginia found no effect of Bonzi at 160 ppm. Application timing and plant size at treatment can significantly affect plant response to PGR applications. Remember that plant growth retardants reduce plant growth, so applications must be made prior to excessive stretch.

Variety	Spray Rate (ppm) x No. Applications*	Source	Remarks
BONZI			
Coleus 'Solar Storm'	60 x 1		Moderate control. Test higher rates or multiple applications.
Coleus 'Solar Storm'	30 x 1 (drench)		Moderate control. Test higher rates or multiple applications.
Lamiastrum galeobdolon	30 x multiple	North	Apply at 10-14 day intervals.
Lavandula angustifolia 'Munstead Dwarf'	30 x 4	North	Moderate control. Test higher rates.
Monarda citriodora	60-100 x 1		
Monarda citriodora	4 x 1 (drench)		Moderate control. Test higher rates or multiple applications.
Monarda didyma 'Blue Stocking'	NR @ 160	South	Test multiple applications.
Monarda didyma 'Jacob Cline'	120 x 1 or 60 x 2	South	Excessive growth regulation. Test lower rates.
Nepeta faassenii 'Six Hills Giant'	30 x 2		May require multiple applications.
Perovskia atriplicifolia	30 x 4	South	Moderate control. Test higher rates.
Perovskia atriplicifolia	30 x 1 (drench)		Moderate control. Test higher rates or multiple applications.
Physostegia virginiana 'Summer Snow'	NR @ 100 x 1 or 30 x 7	North	
Salvia greggii	6 x 1 (drench)		Moderate control. Test higher rates or multiple applications.
Salvia leucantha	60 x 1	South	
Salvia x sylvestris 'Blue Queen'	30 x 4 or 120 x 1	South	Moderate control. Test rates higher than 30 ppm with multiple applications.
Salvia x sylvestris 'Blue Queen'	30 x 1 (drench)		Moderate control. Test higher rates or multiple applications.
Salvia x sylvestris 'May Night'	NR @ 160 x 1	South	



Monarda didyma '*Marshall's Delight' at four weeks after treatment. Left to right: 0, 15, 30, 45 and 60 ppm Sumagic.*

For new crops, test rates from 40-60 ppm in the South (about half that in the North), plan on multiple applications and develop estimates for single applications based on your test results. Many growers find that multiple applications at lower rates may provide better control than a single application at a higher rate.

RESPONSES TO SUMAGIC

Sumagic is another triazole PGR that has a higher activity level than Bonzi and has also been very effective in height control of perennials. Of the 17 Lamiaceae species reported in the database that were evaluated for response to Sumagic, 14 were responsive to foliar sprays. These included multiple species of salvia and three monarda cultivars. The two that were not responsive, *Physostegia virginiana* 'Summer Snow' and *Salvia x sylvestris* 'May Night', were evaluated with very low rates (15 and 20 ppm, respectively). However, most of the tested species in this family were responsive to rates of Sumagic between 5 and 30 ppm, though many required multiple applications. *Agastache x* 'Blue Fortune' was very sensitive to Sumagic, with excessive height reduction in response to a single application of 15 ppm.

The lamium and stachys data are from Michigan (courtesy of Paul Pilon, Sawyer Nursery, Hudsonville, Mich.), so Southern growers will need to test rates about twice those reported. For untested crops in Lamiaceae, test rates around 20 ppm in the South (about half that in the North), make additional applications as necessary and be alert to excessive growth regulation for sensitive crops.

RESPONSES TO OTHER PGRS

Although there is some data available for perennial plant response to Cycocel, Florel, Atrimmec and Topflor, there have

Variety	Spray Rate (ppm) x No. Applications*	Source	Remarks
SUMAGIC			
Agastache x 'Blue Fortune'	15 x 1	South	Sensitive to Sumagic. Test lower rates. For use on ornamental plants only.
Ajuga reptans	5 x multiple	North	Apply at 10-14 day intervals.
Lamiastrum galeobdolon	5 x multiple	North	Apply at 10-14 day intervals.
Lamium maculatum	5 x multiple	North	Apply at 10-14 day intervals.
Lavandula angustifolia 'Munstead Dwarf'	5-10 x 3	North	
Monarda didyma 'Blue Stocking' 1	5-30 x 1	South	
Monarda didyma 'Jacob Cline'	15 x 1	South	
Monarda didyma 'Marshall's Delight'	30 x 1	South	
Nepeta faassenii 'Six Hills Giant'	15 x 2	South	
Perovskia atriplicifolia	15-30 x 1	South	
Physostegia virginiana 'Alba'	25 x 1 (drench)	South	
Physostegia virginiana 'Summer Snow'	NR @ 15 x 7	North	
Salvia greggii	15 x 1	South	Sensitive to Sumagic. Test lower rates. No landscape persistence at 15 ppm.
Salvia leucantha	30 x 1	South	No landscape persistence at 30 ppm.
Salvia x sylvestris 'Blue Queen'	60 x 1	South	Moderate control. Multiple applications may be required.
Salvia x sylvestris 'May Night'	NR @ 20 x 1	South	Test higher rates or multiple applications.
Stachys byzantina	5 x multiple	North	Apply at 10-14 day intervals.

not been enough genera tested to make any suggestions of rates. Check the *GPN* database for crops of particular interest to you, or search by the product to see which crops have been tested and found responsive.

SUMMARY

In summary, the plants of the Lamiaceae family are fairly responsive to PGRs. However, there does not appear to be enough commonality of plant response to suggest any rate recommendations based on family relationships. We are still finding significant differences between the responses of different cultivars of the same species. So, it is not surprising that we can't make generalizations across an entire family.

However, with the small number of ornamental members of the Lamiaceae family, this article contains PGR information on the primary ornamentals in this family and will provide you with a good starting point for using PGRs in ➧

your operation. Be aware that many of the results discussed are from a single experiment, and most involve a single application. These are also the results of scientific experiments, which means that the treatments are applied on a pre-determined schedule. A grower would evaluate growth on a frequent basis and apply treatments according to plant growth and growing conditions, which would improve the overall quality of the plant and may actually affect the efficacy of the treatment. In other words, don't be afraid to try a treatment that we found to be ineffective.

A word of caution: PGR rates used in the South are generally higher than rates used in the North. In addition, these lower rates may be applied at wider treatment intervals in the North. Most of the information in the *GPN* database and presented in this article is from research done in the South. Northern growers should evaluate rates about half those presented in this article.

Plant condition, growing environment and your specific application methods will all affect plant response to your treatment. It is very important to keep records so you can duplicate your successes and learn from your mistakes. Growth regulation is an art that you must perfect. Through science, we can give you suggestions for starting points in the process and guidelines to develop your own PGR program, but successful growth regulation of these fuzzy and fragrant perennials is in your hands.

Responses of many of the individual species discussed in this article may be found in *GPN*'s searchable PGR database at www.onhort.com. GPN

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