

configure®

PRODUCT INFORMATION AND
UNIVERSITY TRIAL RESULTS





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Excellence in PGR technology

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Hosta

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Edited by Dr. Joyce Latimer, Virginia Tech and Dr. Brian Whipker, North Carolina State University.

configure®

Configure®, from Fine Americas, Inc. is one of the newest plant growth regulators on the market. Configure® contains the active ingredient N-(phenylmethyl)-1H-purine-6-amine (most commonly called benzyladenine or 6-BA); a synthetic cytokinin. Cytokinins are essential hormones for plant growth and development, and are involved in many physiological functions, including the release of lateral buds from apical dominance and the promotion of cell division and differentiation from undifferentiated tissues.

Plant responses to Configure® can be strongly influenced by species or variety and a plant's growth stage. Water and fertilizer management, temperature, light, greenhouse composition, and other cultural practices may also impact plant response. Although Configure® has been shown to be effective on a broad range of crops, it is impossible to ensure an acceptable response in all cultivars. First-time users of Configure® should first conduct trials using recommended label rates on a limited number of plants before initiating wide-scale usage.

Apical dominance is defined as the phenomenon whereby the main stem of a plant is dominant over (i.e., grows more strongly than) side or basal branches. Apical dominance is naturally maintained by a balance of auxin, a plant hormone produced in the apical meristem; and cytokinin, which is produced in the roots. Apical dominance can be interrupted by increasing the ratio of cytokinin to auxin with foliar applications of Configure®.

Applications of Configure® have been shown to increase branching and enhance flowering in a wide range of ornamental species, providing fuller and more marketable plants. Use of Configure® may also result in more compact plants. Shorter, more compact plants are likely due to the plant dividing its 'energy budget' among a greater number of side shoots.

The main purpose of this guide is to provide growers with general guidelines on optimal use rates and application timings for Configure® on an extensive range of crops. This guide provides information from evaluations conducted by numerous growers and researchers, including:

Mara Grossman, Margaret Tackett, John Freeborn, Kevin Harris, Holly Scoggins, and Joyce Latimer; Virginia Tech

Dennis Carey, Wayne Buhler, Ingram McCall, and Brian Whipker; North Carolina State University

Paul Pilon; Perennial Solutions Consulting

Matthew Blanchard and Erik Runkle; Michigan State University

Sonali Padhye and Jude Groninger; University of Florida

Dennis Carey, Wayne Buhler, and Brian Whipker

Stimulating Plant Growth With Configure®

One of the newest plant growth regulators (PGRs) on the market is Configure®, from Fine Americas Inc. Configure® is a synthetic cytokinin that is labeled for use on herbaceous ornamental crops to stimulate branching and flower bud initiation.

What is Configure®?

Configure® is a 2% liquid solution of benzyladenine, a synthetic cytokinin. Configure® is used as a branching agent and to stimulate additional flower bud development. It was introduced in 2007 for use as a foliar spray on Christmas cactus, Echinacea and hosta. In 2008, it was registered in 25 states and it received a supplemental label for experimental use on any annual, perennial, foliage or tropical crop grown in a greenhouse.

What Effect Does BA Have on Plants?

The primary activity of Configure is to interrupt apical dominance and stimulate axillary buds to break. Apical dominance is the phenomenon where the terminal bud on a branch inhibits axillary buds along the branch from breaking. Apical dominance is maintained by a balance of auxin produced in the apical meristem of the plant and cytokinin produced in the roots of the plant. Apical dominance can be interrupted by increasing the ratio of cytokinin to auxin with a foliar application of the synthetic cytokinin contained in Configure. This reduces the ability of auxin to prevent axillary bud break and allows the axillary buds to escape from apical dominance. An added benefit can be plant size control, because a side effect of reduced apical dominance is that the plant has to divide its energy budget amongst a greater number of side shoots. As a result, growers may observe that their plants are shorter and more compact.

Configure® Research Results

Extensive research has been done to study the effect of cytokinins on ornamental crops. Research from Japan in the 1970s reported that cytokinins increase branching in Christmas cactus. Configure® also increases branching of the phylloclades of Christmas cactus. In addition, if Configure® is applied during the floral initiation stage of flower development, then it can increase flowering in Christmas cactus by stimulating additional flower buds to break. The floral initiation period in Christmas cactus begins under short day conditions. Optimally this is achieved with exact control of the long day and short day photoperiod. The typical timing for applying Configure® is one week after floral initiation when black cloth is used or it is suggested to wait until the initial flower buds are visible for plants induced under natural season lighting conditions. The increase in flowering caused by Configure® depends on the concentration used. A single foliar application of 100 to 200 ppm Configure® is ideal for increasing the number of

flowers and branches on most Christmas cactus cultivars. Higher concentrations of 400 ppm or greater can result in the production of numerous small flower buds, which may not all open.

Configure® can increase the number of branches that form in a hosta crown. A number of researchers (Gary Keever, Auburn University; Joyce Latimer, Virginia Tech, and Paul Pilon, Perennial Solutions Consulting) have worked on suitable Configure® rates for hostas. Hostas require high rates of Configure®, from 500 to 3000 ppm. For optimal results, pot the hosta roots in the fall to allow them to become established. Spray the plants in early spring once new growth has just emerged, and then repeat 2 weeks later. Paul Pilon recommended two sprays of 500 ppm instead of a single spray of the higher dose. Responses can vary by cultivar and growers may need to conduct their own trials to determine optimal concentrations for each cultivar.

Dr. Latimer has also studied Configure® on Echinacea and found that 300 to 900 ppm foliar sprays increased branching by 3 times over the control, but noted cultivar differences.

Our research at NC State University focused on applying Configure® onto a wide variety of annuals and a few perennials. Configure® is effective on slower growing petunia cultivars such as 'Improved Charlie' at 80 to 160 ppm. Configure® greatly increased branching of this prostrate plant and as a result it reduced the average diameter of the plants. On slow growing but highly branched cultivars 'Surprise White' and 'Surprise Blue Vein Improved', Configure® at 80 to160 ppm tightened up the somewhat loose canopy of the plants. The overall width was smaller, but the overall height was slightly increased.

Configure® is very effective on hens and chicks at increasing the number of offsets that form. Out of seven cultivars that were trialed, five had an increase in the offset number. The ideal concentration of Configure® for Hens and Chicks is from 200 to 400 ppm and the number of offsets increased from 2.5 to 10 times over the untreated plants.

Configure® was also effective in controlling the height and increasing the branching of Salvia 'Caradonna' at concentrations of 400 to 800 ppm. Flowering was delayed by 3 weeks, however once flowering began, up to 3 times as many inflorescences were produced.



Hosta

Application Cost

As with all PGRs, the cost per pot is an important variable to consider when deciding whether or not to use it. Using a representative cost for Configure® of $85 for a 2-quart container (costs may vary so you may need to do your own cost determination), some example costs per plant were calculated using the spray recommendations discussed below (Table 1). For the significant improvement in plant quality, the per pot costs are very economical for using Configure®. To treat a single Christmas cactus costs less than one-tenth of a cent, while at the upper end, it costs 1 cent to treat a hosta with 1000 ppm.

Table 1. Chemical costs for Configure® foliar sprays.
Based on pot tight spacing of plants, using 0.5 gallons of solution per 100 square feet of bench area.

Plant	Concentration (ppm)	Pot Spacing (pot tight)	Cost Per Pot	Cost to Treat 1000 Pots
Christmas Cactus	100 to 200	4 inch	<$0.0005 to $0.001	$0.50 to $1.00
Hens and Chicks (Sempervivum)	200 to 400	4 inch	<$0.001 to $0.002	$1.00 to $2.00
Saliva 'Caradonna'	400	6 inch	$0.0048	$4.30
Echinacea	300 to 900	Gallon	$0.0032 to $0.0096	$3.20 to $9.60
Hosta	1000	Gallon	$0.01	$10.06

Application Methods

As with all PGRs, the methods used to apply Configure® are very important. Configure® is similar to daminozide (Dazide®) in that it takes several hours to be fully absorbed across the leaf cuticle. Thus, the best time to apply Configure® is when the leaf surface will stay wet for >4 hours, such as early or late in the day when the sun is low, or on cloudy days. It is better to apply Configure® when humidity is high in the greenhouse, such as early in the morning or on rainy days. Avoid irrigating the plants overhead for at least 4 hours after spraying Configure® or you will wash it off of the leaves. Configure® is similar to paclobutrazol (Piccolo®) in that it is not translocated very far from the point of contact. Configure® moves primarily in the xylem and much less so in the phloem. Thus it will tend to move upward/outward in the plant from the point of contact. Configure® affects the axillary buds. Thus complete spray coverage is vital so that the spray comes into contact with the axillary buds and their nearby stems. This is even more important once the crop's canopy has closed over. Growers will need to apply Configure® with a high pressure spray and a swirling motion in order to drive the mist under the canopy and into the axils. On plants that have a tight rosette or crown, a high volume spray (sprench) may be the best way to get the chemical down into the crown.

Configure® is best absorbed when the tank solution has a near neutral pH (5.0-8.0). Acidic and basic tank solutions reduce the solubility of benzyladenine in water and may result in precipitation. Precipitation generally can be prevented with the use of a labeled surfactant applied to the pray solution prior to adding Configure®. Spray timing and repetition is also very important with Configure®. Configure® does not cause buds to form, rather it affects quiescent buds that have already formed. Thus, in order to increase the effect of Configure® on branching, it must be applied during a time when the plant is forming new vegetative or floral buds. Some plants only form buds at a certain time of the year. This is the best time to influence their growth with Configure®. Other plants continuously produce new buds. Thus, multiple applications of Configure® may provide better results than a single application in order to hit the appropriate physiological window. The benzyladenine in Configure® is metabolized by the plant fairly rapidly (roughly 10 days). Thus, multiple lower-dose applications throughout the production cycle may work better than a single spray application.

Sensitivity / Overdose / Phytotoxicity

Configure® is not effective on all plants though. Some plants such as pansy and exacum appear to be very sensitive to foliar spray applications of Configure®. Concentrations as low as 50 to 100 ppm can cause long-lasting leaf yellowing and other phytotoxic effects on these sensitive plants. Other plants, such as petunia, will display minor levels of leaf yellowing at higher concentrations, but the discolorations disappear in a few weeks. On other plants, phytotoxicity can appear with excessively high concentrations in the form of leaf cupping (Iresine and Zinnia), changes to leaf morphology (e.g., more lobes) or leaf edge necrosis (Salvia, Heuchera). In cases where you discover that a plant is sensitive to Configure®, multiple applications of a lower concentration may provide better results than a single high-concentration application.

Conclusion

Configure® is an excellent addition to a grower's PGR toolbox. It has the advantage of being both cost effective and useful for improving the architecture of plants.

Keys for Applying Configure®

- Maximize plant uptake by applying when the leaves can remain wet for greater than 4 hours.
- Complete coverage required for even results.
- Split applications of half rates, applied at a week interval, may provide improved results.
- The label allows for grower trials on all greenhouse plants.

By Paul Pilon, Perennial Solutions Consulting

Calibrachoa – Using Configure® to Promote Lateral Branching

In research trials, Calibrachoa 'Spring Fling Purple' was treated with Configure® to determine its effectiveness at promoting lateral branching on this variety.

Rooted 105-cell liners were transplanted into 5-inch pots containing a peat/perlite professional growing medium. The plants were sprayed with 300 ppm Configure® two weeks later after the roots reached the edge of the pot. Sixteen days after Configure® was applied, a moderate amount of lateral branching was observed. At 47 days following the applications, the number of branches on each replication was counted.

The branches were separated into two categories: Large Branches (>3/8 – inch) and Small Branches (< 3/8 – inch). The large branches are those lateral and terminal branches that are horticulturally viable or appear to be developing into shoots suitable for vegetative propagation or that would develop into a flowering shoot. Conversely, the small branches are physically present but are NOT suitable for vegetative propagation or likely to contribute to a plants overall appearance and marketability.

Calibrachoa treated with a single 300 ppm Configure® application produced 22% more total branches than the untreated plants. The replications from this treatment produced 51.4 large branches and 41.1 small branches compared to the 36.9 large and 39 small branches developed on the untreated replications; this represents a 39% increase in the number of large branches and 5% increase in small branches. In addition, to increased lateral branching, Configure® provided a slight amount of height control as the treated plants were marginally smaller than the untreated replications (Figure 1).

These results indicate that Configure® can be used to promote lateral branching on Calibrachoa 'Spring Fling Purple' and likely other Calibrachoa cultivars. Increased branching with Configure® could be used for stock plant production, to increase the total flowers, and improve the overall appearance and marketability of Calibrachoa crops.



Figure 1. *Configure® increased the total number of lateral branches produced and improved plant quality and appearance; untreated (left) and plants treated with a single 300 ppm Configure® application (right). Picture taken 47 days after treatment.*

By Brian Whipker and Ingram McCall, NC State University

Christmas Cactus – Increasing the Number of Phylloclades and Flower Buds

The efficacy of Configure® on increasing the number of phylloclades and flower buds being produced was evaluated on Christmas cactus (*Schlumbergera bridgessii*). Over 30 years ago, researchers in Japan reported that benzyladenine, the active ingredient in Configure®, increased branching and flower bud production in Christmas cactus. We conducted trials to confirm the results with Configure®. Configure® applied as a foliar spray during the spring when the plants were vegetative resulted in increased branching (additional phylloclades) (Figure 2).

In addition, Configure® can be applied during the floral initiation stage of flower development to increase the number of flower buds (Figure 3). Timing is critical for both applications (see Key Points below).

A single foliar application of 100 to 200 ppm Configure® is ideal for increasing the number of branches and flowers on most Christmas cactus cultivars. Initial trials should target the rate of 100 ppm. Higher concentrations of 400 ppm or greater can result in the production of numerous small flower buds, which may not all open. Overall, Configure® foliar sprays to Christmas cactus (*Schlumbergera bridgessii*) is an excellent method of increasing both the number of phylloclades and flower buds being produced.

Key Points:

- Apply Configure® in the spring to stimulate an increase of phylloclades. This will improve the branching of the plants. Keep in mind, the application must be early enough to allow the phylloclades to fully mature before the start of short days.
- Apply Configure® after the start of short days to stimulate an increase of flower bud production. The floral initiation period in Christmas cactus begins under short day conditions. Optimally short day conditions are achieved with exact control of the long day and short day photoperiods. The time to apply Configure® is one week after floral initiation when black cloth is used. If relying upon natural season day length conditions, apply Configure® within 2 days after the first flower buds are visible. This typically occurs in early October.
- Applications made in late September while the plants are still vegetative will stimulate additional phylloclades instead of flower buds. This will delay the overall flowering of the plant.
- Initially target a rate of 100 ppm. Lower rates of 50 ppm may be effective on some cultivars.
- Complete spray coverage required, especially for pots containing multiple cuttings.



Figure 2. *A spring application of Configure® at 100 ppm applied to actively growing (vegetative) Christmas cactus plants resulted in increased branching.*



Figure 3. *A fall application of Configure® at 100 ppm applied to reproductive Christmas cactus plants resulted in increased flower bud production.*

By Dennis Carey, Wayne Buhler, Ingram McCall, and Brian Whipker, NC State University

Echeveria – Stimulating Flowering

The efficacy of Configure® on increasing the number of offshoots and stimulating flowering was evaluated. Echeveria setosa plants were received in 4-in. square pots.

Configure® was applied on March 8th as a single foliar spray at 0, 50, 100, 200, or 400 ppm with a spray volume of 2 quarts per 100 sq ft. Plants were grown in a greenhouse with temperature set points of 75 °F days and 65°F nights under natural photoperiod. The number of basal shoots was recorded 8 weeks after the treatment.

Configure® only slightly increased the number of offshoots produced and the results would not be considered commercially significant. Configure® applied at 400 ppm resulted in an increase of flower stalk production (Figure 4). Plants with flowers sell better than ones without. Overall, a Configure® foliar spray of 400 ppm to Echeveria setosa is an excellent method of stimulating the production of flower stalks.

Only one cultivar was trialed, so grower trials should be conducted to evaluate the optimal rates on other Echeverias.

Key Points:

- Apply Configure® to well rooted, actively growing plants.
- Target a rate of 200 to 400 ppm. Lower rates may be effective.
- Complete spray coverage required.



Figure 4. *Configure® at 400 ppm (right) significantly increased the number of flower stalks produced on Echeveria setosa as compared to the untreated control (left).*

By Margaret Tackett, John Freeborn, Holly Scoggins and Joyce Latimer, Virginia Tech

Echinacea – Timing of Configure® Application

To evaluate a role for Configure® in earlier pot fill and sales of herbaceous perennials, we evaluated the time of application of Configure® relative to potting of plugs using Echincacea purpurea 'White Swan'.

Commercially grown plugs (size 72s) were planted into quart pots (1.1 liter) filled with Fafard 3B. Plants were treated with a single foliar spray of 600 ppm Configure® at 0, 1, 2, 3, or 4 weeks after planting and evaluated for basal branching weekly after planting.

Plants treated with Configure® at the time of planting (0 weeks after planting) had a significantly greater number of basal branches relative to the untreated control plants at three weeks after planting. At this time, untreated plants had 1.7 basal branches per plant while treated plants had 5.0 branches per plant. For each of the other treatment times, a significant increase in the number of branches was noted at two weeks after treatment. However, all Configure® treatments resulted in the same number of basal branches, i.e., at eight weeks after planting, all treated plants had 6 to 7 branches while control plants had 2 basal branches.

However, earlier treatment resulted in earlier pot fill. At four weeks after treatment, plants treated at the time of planting (0 weeks) had the same number of basal branches as plants treated at one or two weeks after planting but those branches were more fully developed. This resulted in a fuller pot and improved plant appearance (Figure 5). Root growth of treated plants was not measured during this test but we did not observe any reductions in plant establishment with the early treatments with Configure®.

In summary treatment time, up to four weeks after planting, did not affect the final number of basal branches on Echinacea 'White Swan' but earlier treatments resulted in earlier pot fill.

Key Points:

- Time of application of Configure® for a spring Echinacea crop did not affect the total number of basal branches, but earlier treatments improved earliness of pot fill.
- Target a rate of 600 ppm. Lower rates, perhaps with multiple applications, also may be effective.
- Complete spray coverage required.



Figure 5. *Configure® increased the number of basal branches Echinacea purpurea 'White Swan' plants; untreated (left) or treated with a single foliar application of 600 ppm Configure® at 0, 1, 2, or 3 weeks after planting. Number of basal branches per pot (left to right): 1.7, 4.8, 5.5, 3.8, 2.8. Picture taken at four weeks after planting.*

By Sonali Padhye and Jude Groninger, University of Florida

Echinacea Liners – Improved Liner Quality by Increased Basal Branches

The efficacy of Configure® on increasing basal shoot number to improve the quality of Echinacea 'Coconut Lime' liners was tested. Well-rooted tissue-cultured liners of Echinacea 'Coconut Lime' were obtained in 72-cell liner trays. On the day of receipt, Configure® was applied as a single foliar spray at 300 ppm using CapSil as a surfactant at the manufacturer's recommended rate. Additional treatments included a single foliar spray of 300 ppm Florel® with the surfactant and non-treated controls. Liners were grown in the 72-cell trays in a greenhouse set at 68F under a 16-hour photoperiod. The number of basal shoots was counted three weeks after the treatment.

Configure®-treated 'Coconut Lime' liners had 3 times more basal shoots compared with the non-treated controls (Figure 6). Florel® application at 300 ppm did not influence the basal shoot number of 'Coconut Lime'. Visual quality of Configure®-treated liners was significantly improved compared with the non-treated controls and the Florel-treated liners.

The basal shoots from all treated liners were separated and stuck in a peat-perlite medium and rooted under mist. The influence of Configure® treatment on rooting of the shoots was evaluated. There was no difference in rooting time or root mass of Configure® or Florel®-treated liners compared with the liners from the non-treated shoots. Propagating 'Coconut Lime' liners from basal shoots rather than tissue culture can be quicker and cheaper based on the labor cost. Thus, Configure® application can also serve as a tool to increase the propagation efficiency of Echinacea 'Coconut Lime'.

Key Points:

- Apply Configure® as a foliar spray to well-rooted liners.
- A single spray of 300 ppm was effective on 'Coconut Lime' under our conditions.
- Grow liners in trays under long-day photoperiods and warm temperatures, environmental conditions conducive for rapid growth.
- Complete spray coverage is required.



Figure 6. *Configure® increased the number of basal shoots by 3 times in Echinacea 'Coconut Lime' liners (center) compared with nontreated controls (left) and Florel-treated (right) liners.*

By Joyce Latimer and John Freeborn, Virginia Tech

Gaillardia – Increased Branching and Flower Numbers

In screening trials with Configure® on herbaceous perennials, we treated two Gaillardia cultivars to test for increased branching and faster pot fill.

Commercially grown plugs (size 72s) were planted into quart pots (1.1 liter) filled with Fafard 3B. Plants were treated with a single foliar spray of Configure® about 14 days after planting at which time the plants had resumed active growth and roots had reached the edge of the pot.

In the first trial, Gaillardia arista 'Dazzler' was treated with 600 ppm Configure® which produced excessive development of basal branches. At four weeks after treatment, treated plants had developed 153 basal branches as compared to only 23 on untreated control plants. Flowering was delayed by the Configure® treatment but the number of flowers tended to be greater.

In a subsequent trial, Gaillardia x grandiflora 'Gallo Yellow', a more upright cultivar, was treated with 600 ppm Configure® which also increased the number of lateral branches in the pot with differences evident at two weeks after treatment where treated plants averaged 23 branches per pot as compared to 10 branches per pot in untreated control plants. At eight weeks after treatment, untreated plants averaged 29 branches per pot while treated plants averaged 76 branches per pot (Figure 7). Again, flowering was delayed but treated plants had almost three times as many flowers at eight weeks after treatment as did control plants: treated plants had 82 flowers and buds while control plants had 29 flowers and buds. Plants treated with Configure® also had a more upright growth habit in the pots, which improved plant appearance and ease of handling.



Figure 7. *Configure® increased the number of lateral branches and flowers on Gaillardia 'Gallo Yellow' plants; untreated (left) and treated with a single foliar application of 600 ppm Configure® (right). Picture taken at eight weeks after treatment.*

Gaillardia is very responsive to Configure® which significantly increases branching and the number of flowers. However, Configure® delays the opening of these flowers.

Key Points:

- Apply Configure® 10 to 14 days after plug transplant (when roots are to the side of the pot).
- Gaillardia is very responsive to Configure®. Test rates between 300 and 600 ppm – use lower rates on basal branching cultivars. Lower rates, perhaps with multiple applications, also may be effective.
- Complete spray coverage required.

By Joyce Latimer and John Freeborn, Virginia Tech

Gaura – Increased Shoots, Lateral Branching and Flowers

In screening trials with Configure® on herbaceous perennials, we treated Gaura lindheimeri 'Siskiyou Pink' to test for increased branching and faster pot fill.

Commercially grown plugs (size 72s) were planted into quart pots (1.1 liter) filled with Fafard 3B. Plants were treated with a single foliar spray of 600 ppm Configure® about 10 days after planting at which time the plants had resumed active growth and roots had reached the edge of the pot.

Configure® increased the number of shoots in the pot with differences evident at two weeks after treatment. At four weeks after treatment, the treated plants averaged 7.3 shoots per pot as compared to 5.0 shoots per pot in untreated control plants (Figure 8). Furthermore, Configure® increased the number of lateral branches and flowers on those shoots.

At four weeks after treatment, treated plants averaged 39 lateral branches per plant as compared to 30 lateral branches per pot for untreated plants. The numbers of inflorescences and flowers were also higher on Configure® treated plants at seven weeks after treatment. Treated plants averaged 36 inflorescences with 220 flowers while untreated plants had 25 inflorescences with only 160 flowers.

By improving plant branching and improved flowering, Configure® increased pot fill and improved plant appearance.

Key Points:

- Apply Configure® 10 to 14 days after plug transplant (when roots are to the side of the pot).
- Target a rate of 600 ppm. Lower rates, especially with multiple applications, also may be effective.
- Complete spray coverage required.

Additional Notes: In plug studies, we've found that Gaura root growth was not affected by Configure®. Therefore, Configure® may be applied in the plug tray.



Figure 8. *Configure® increased the number of shoots, lateral branches, inflorescences and flowers of Gaura lindheimeri 'Siskiyou Pink' plants; untreated (left) and treated with a single foliar application of 600 ppm Configure® (right). Picture taken at four weeks after treatment.*

By Joyce Latimer and John Freeborn, Virginia Tech

Heuchera – Increased Basal Branching and Earlier Pot Fill

In screening trials with Configure® on herbaceous perennials, we treated Heuchera x 'Raspberry Ice' to test for increased branching and faster pot fill.

Commercially grown plugs (size 72s) were planted into quart pots (1.1 liter) filled with Fafard 3B. Plants were treated with a single foliar spray of 600 ppm Configure® about 14 days after planting at which time the plants had resumed active growth and roots had reached the edge of the pot.

Configure® increased the number of basal branches in the pot with differences evident at four weeks after treatment where treated plants averaged 18.1 branches per pot as compared to 11.8 branches per pot in untreated control plants (Figure 9a and 9b). At eight weeks after treatment, untreated plants averaged 15.5 branches per pot while treated plants averaged 26 basal branches per pot.

By improving basal branching of Heuchera x 'Raspberry Ice', Configure® increased early pot fill and improved plant appearance. Additional cultivars were evaluated in subsequent tests: 'Silver Lode' exhibited increased branching in response to treatment with 600 ppm Configure® while 'Palace Purple' showed no significant response to this rate.



Figure 9a. and 9b.. *Configure® increased the number of basal branches on Heuchera x 'Raspberry Ice' plants; A) untreated and B) treated with a single foliar application of 600 ppm Configure® (right). Pictures taken at four weeks after treatment.*

Key Points:

- Apply Configure® 10 to 14 days after plug transplant (when roots are to the side of the pot).
- Target a rate of 600 ppm. Lower rates, especially with multiple applications, also may be effective.
- Complete spray coverage required.
- Cultivars differ in responsiveness to Configure®.

By Paul Pilon, Perennial Solutions Consulting

Hosta -Using Configure® to Promote Basal Branching

Many researchers have documented good results with using Benzyladenine on Hosta cultivars to promote basal branching. For commercial growers, a hosta with more basal branches will appear fuller and be perceived to have higher quality compared to a Hosta with only a single stem in the pot. Configure® can be used on many cultivars to successfully promote basal branching, improve crop quality, and decrease the time needed to produce basal branches using traditional production practices.



Figure 10. *Configure® is very effective at promoting basal shoots on numerous Hosta cultivars. Here is an example of its effectiveness on Hosta 'Guacomole'; two applications of 1000 ppm were applied 14 days apart (left) compared to the untreated plant on right. Picture taken 60 days after treatment.*

Due to several factors, getting consistent results with Configure® on Hosta cultivars can be challenging for growers at times. Compared to other plant species, Hosta require higher rates and have a wider range of effective rates (500 ppm to 3,000 ppm). Each Hosta cultivar requires a specific rate to obtain adequate branching compared to a general application; some cultivars respond well with rates of 500 ppm, others require 1000 ppm, some require rates higher than 2500 ppm, and some cultivars are relatively unresponsive to Configure® applications (Table 1).

One of the essential keys to improving branching with Configure® on Hosta is to make the applications when the plants are actively growing. Keep in mind that Hosta requires long days to keep them actively growing. When the days are naturally short in the early spring (before mid-April) or as the days become shorter in the late summer (mid-August) the rate of growth is decreased dramatically and so will be the effectiveness of Configure® applications.

Configure® is effective when applied after the initial flush of shoots has occurred in the early spring (at 2-4 inches tall – just as the leaves are beginning to unfold) after overwintering. In the early spring, it is not uncommon for hosta to flush initially, then the new growth stops until the natural day length become longer. Night interruption lighting can be used to keep Hosta actively growing if more basal branches are desired before the plants are to be sold.

Treating the plants after planting them in June or July is another good window of opportunity as the day lengths are long enough to promote active, vegetative growth.

Make Configure® applications when new growth resumes and after the roots reach the edge of the pot.

In most of the trials I have conducted, there was usually better basal branching with lower rates (500 to 1000 ppm) applied twice as opposed to a single higher rate (1000 to 3000 ppm) application. The effectiveness of multiple applications using lower rates is demonstrated in the table below with 'Blue Angel' where 2 applications of 1000 ppm resulted in more than triple the amount of basal shoots (5.7) compared to a higher rate application of 3000 ppm which produced 1.8 basal shoots. A good starting rate for Hosta is 1500 ppm. An additional 1500 ppm application can be made after 14 days if no branching is observed or if additional branches are required.

Table 1.

Summary of Hosta Branching Research

Cultivar	Configure® Rate (ppm)	Basal Branches Untreated	Basal Branches Treated	% Increase	Days After Treatment
Abba Dabba Do	1000x2	2.2	5.8	164%	45
Big Daddy	1250	0.5	5.4	980%	60
Blue Angel	3000	0.8	1.8	125%	45
Blue Angel	1000x2	0.8	5.7	613%	45
Fragrant Blue	1250	1.7	3.6	112%	60
Fragrant Bouquet	1000x2	0.9	2.9	222%	45
Frances Williams	3750	0.2	4.7	2250%	60
Great Expectations	1250	0.6	2.7	350%	60
Guacomole	1000x2	1.8	7.0	289%	45
Iron Gate Delight	1000x2	1.3	6.1	369%	45
June	1000x2	1.2	3.3	175%	45
Krossa Regal	1250	0.8	5.7	613%	60
Minute Man	1000	1.1	1.5	36%	45
Minute Man	1000x2	1.1	3.9	255%	45
Patriot	1250	2.3	4.0	74%	60
Patriot	3750	2.3	5.7	148%	60
Whirlwind	1000x2	1.9	3.9	105%	45

Research conducted by Perennial Solutions Consulting

By Joyce Latimer and John Freeborn, Virginia Tech

Lobelia cardinalis – Increased Basal Branching and Early Pot Fill

In screening trials with Configure® on herbaceous perennials, we treated Lobelia cardinalis to test for increased branching and faster pot fill.

Commercially grown plugs (size 72s) were planted into quart pots (1.1 liter) filled with Fafard 3B. Plants were treated with a single foliar spray of 600 ppm Configure® about 14 days after planting at which time the plants had resumed active growth and roots had reached the edge of the pot.

Configure® increased the number of basal branches in the pot with differences evident at two weeks after treatment. At two weeks after treatment, treated plants averaged 12.8 basal shoots per pot as compared to 3.8 shoots per pot in the untreated control plants (Figure 11). By six weeks after treatment, the treated plants averaged 16.0 shoots per pot as compared to 10.6 shoots per pot in untreated control plants.

By increasing plant branching, Configure® increased pot fill earlier in the production cycle and improved plant appearance.

Key Points:

- Apply Configure® 10 to 14 days after plug transplant (when roots are to the side of the pot).
- Target a rate of 600 ppm. Lower rates, especially with multiple applications, also may be effective.
- Complete spray coverage required.
- Cultivars differ in responsiveness to Configure®.



Figure 11. *Configure® increased the number of basal branches of Lobelia cardinalis plants resulting in faster pot fill; untreated (left) and treated with a single foliar application of 600 ppm Configure® (right). Picture taken at two weeks after treatment.*

By Matthew Blanchard and Erik Runkle, Michigan State University

Phalaenopsis Orchids – Increased and Earlier Flowering

Studies were performed to determine how foliar spray applications of benzyladenine (BA) influenced flowering of potted Doritaenopsis and Phalaenopsis orchids.

In one experiment, two vegetative orchid clones (Phalaenopsis Brother Apollo '070' and Phalaenopsis Golden Treasure '470') growing in 6-inch (15-cm) pots were transferred from a 82°F (28°C) greenhouse that inhibited flowering to a 73°F (23°C) greenhouse for flower induction. Three foliar spray applications (volume 2 qt/100 sq ft) of BA at 100, 200, or 400 ppm were made at 1 week intervals, beginning on the day of transfer to the cooler greenhouse. Plants treated with BA at 200 or 400 ppm had a visible inflorescence 3 to 9 days earlier and had a mean of 0.7 to 3.5 more inflorescences and 3 to 8 more flowers per plant than nontreated plants (Figure 12).

In another experiment, three orchid clones (Doritaenopsis 'Alice Girl', Doritaenopsis 'Malibu Chablis', and Phalaenopsis 'Pink Twilight') received a single foliar spray of BA at 200 ppm at six different times relative to transfer from 84 °F to 73 °F (-1, 0, +1, +2, +4, or +6 weeks). Inflorescence number was generally greatest in all three orchid clones when plants were treated with BA at 1 week after the temperature transfer.

Additional notes:

Abnormal inflorescence development has been observed in some Phalaenopsis varieties following the application of BA. In such instances, plants develop inflorescences that are crooked and may not be acceptable for commercial sale. This was more prevalent with late BA applications (applications made more than 3 weeks after the start of the cooling treatment). Therefore, growers should perform their own trials on a small scale to determine possible side effects and desirable rates for each variety.



Figure 12. *BA increased the number of inflorescences and promoted earlier flowering of Phalaenopsis Golden Treasure '470'. Plants were treated with three foliar spray applications of BA at 100, 200, or 400 ppm at 1 week intervals, beginning on the day of transfer to cooling.*

Key Points:

- To increase the number of inflorescences per plant in Doritaenopsis and Phalaenopsis orchids, apply a foliar spray of Configure® during forcing at approximately 1 week after the onset of cooling.
- Target rates of 200 to 400 ppm, but lower rates may be effective.
- In some Phalaenopsis varieties, BA can cause abnormal flower development.
- Independent trials should be performed on each Phalaenopsis variety to determine desirable rates and flowering responses to Configure®.

By Paul Pilon, Perennial Solutions Consulting

Osteospermum - Using Configure® to Promote Lateral Branching

Osteospermum 'Pinwheel Purple' was one of several greenhouse crops that were screened to determine the effectiveness of Configure® at promoting lateral branches.

For this study, rooted 105-cell liners were transplanted into 5-inch pots containing a peat/perlite growing mix. Two weeks after transplanting, once the roots reached the edge of the pot, the plants were sprayed with a single 300 ppm application of Configure®.

A moderate amount of new lateral branches developed within the first two weeks of the application. At 51 days following the applications, the number of branches on each replication was counted.

The branches were separated into two categories: Large Branches (>1/2 – inch) and Small Branches (< 1/2 – inch). The large branches are those lateral and terminal branches that would develop into viable cuttings or produce flowers. Conversely, the small branches were physically present, but would NOT be suitable for vegetative propagation or increase the number of flowers produced. The Osteospermum treated with Configure® produced 69% more total branches than the untreated plants. The treated plants produced an average of 32.9 large branches per plant; a 93% increase over the untreated replications (Figure 13). The Configure® application also developed 11.9 small branches on the untreated replications which represents a 33% increase in the small branches produced. The plants treated with Configure® did exhibit a slight amount of flower delay.

This study demonstrated that Configure® can be used to significantly increase lateral branching on Osteospermum 'Pinwheel Purple' and will likely be effective on other Osteospermum cultivars. With increased branching, Configure® can be used in place of mechanically pinching the plants and will result in more overall branching than pinches provide.



Figure 13. *Configure® can be used in place of pinching and significantly increased the total number of lateral branches produced and improved plant quality and appearance on Osteospermum 'Pinwheel Purple'; untreated (left) and plants treated with a single 300 ppm Configure® application (right). Picture taken 51 days after treatment.*

By Joyce Latimer and John Freeborn, Virginia Tech

Penstemon – Increased Basal Branching and Foliage Density

In several screening trials with Configure® on herbaceous perennials, we treated Penstemon digitalis 'Husker Red' to test for increased branching and faster pot fill.

Commercially grown plugs (size 72s) were planted into quart pots (1.1 liter) filled with Fafard 3B. Plants were treated with a single foliar spray of 600 ppm Configure® about 14 days after planting at which time the plants had resumed active growth and roots had reached the edge of the pot.

Configure® increased the number of basal branches in the pot with differences evident at four weeks after treatment. At four weeks after treatment, treated plants averaged 7.7 basal shoots per pot as compared to 6.2 shoots per pot in the untreated control plants (Figure 14). Plant height was reduced over 30% by 600 ppm Configure® as well, with control plants measuring 12.6 cm in height and treated plants measuring 8.5 cm tall. Treated plants appeared to have a greater number of leaves even though the increase in number of basal branches was small.

Configure® treatment improved early pot fill with an increase in branches and foliage density that also improved final plant appearance.

Key Points:

- Apply Configure® 10 to 14 days after plug transplant (when roots are to the side of the pot).
- Target a rate of 600 ppm. Lower rates, especially with multiple applications, also may be effective.
- Complete spray coverage required.
- Cultivars differ in responsiveness to Configure®.



Figure 14a and 14b. *Configure® increased the number of basal branches of Penstemon digitalis 'Husker Red' plants; untreated (left) and treated with a single foliar application of 600 ppm Configure® (right). A) Picture taken at four weeks after treatment. B) Picture taken at seven weeks after treatment.*

By Mara Grossman, John Freeborn, Holly Scoggins and Joyce Latimer, Virginia Tech

Configure® for Plug Production-Effects on Branching and Root Growth

We evaluated Configure® applied during plug production of herbaceous perennials for increased branching and effects on root growth.

Unrooted cuttings of Agastache 'Purple Haze', Gaura lindheimeri 'Siskiyou Pink', Lavandula x intermedia 'Provence', Leucanthemum x superbum 'Snowcap' and Salvia nemorosa 'May Night' were treated with IBA rooting hormone and stuck in size 72 cells under mist with bottom heat. Plugs were treated with Configure® at 0, 300 ppm (applied once at 0 weeks after initial treatment or twice – at 0 and 2 weeks after initial treatment), or 600 ppm. Treatments were applied when the plugs were moderately rooted (roots visible on all sides of the plug but root ball was not intact; 27 or 34 days after sticking). Four weeks after initial treatment, plugs were transplanted into quart pots (1.1 liter) and allowed to grow for four weeks to evaluate grow out and finished plant quality.

All rates of Configure® increased the number of branches on Agastache at three weeks after treatment by more than 40%. However, two treatments of Configure® at 300 ppm or a single application of 600 ppm reduced root dry weight 41% and reduced subsequent grow out of these plants.

All Configure® treatments doubled the number of basal branches on Leucanthemum but reduced root dry weight 25% to 40% at four weeks after treatment. However, finished plants (four weeks after planting) were comparable to untreated control plants.

Configure® applied once or twice at 300 ppm increased basal branching of Salvia by 40% with no significant reduction in root dry weight at four weeks after treatment and no effect on finished plants.

Configure® increased the number of shoots and lateral branches, and shoot dry weight of Lavandula plugs at four weeks after treatment (Figure 15a). Only treatment with



Figure 15a. *Configure® increased the number of shoots and lateral branches as well as shoot dry weight of Lavandula x intermedia 'Provence'; untreated, 300 ppm applied once, 300 ppm applied twice, 600 ppm applied once (left to right). Only the plugs treated with 300 ppm twice had reduced root growth. Picture taken at four weeks after treatment.*

two applications of 300 ppm, Configure® reduced root dry weight. However, this treatment resulted in the highest number of shoots and branches on the finished plants at four weeks after planting.

All treatments with Configure® increased the number of shoots and lateral branches as well as shoot dry weight of Gaura with no effect on root dry weight at four weeks after treatment (Figure 15b). Finished plants treated with Configure® also had more shoots and branches compared to control plants.

In all five crops, plug quality and appearance at three or four weeks after treatment were improved with Configure®. However, Configure® may reduce root growth of treated plugs, especially at higher rates or with multiple applications. However, this reduction in root growth only reduced finished plant quality in one of these five crops, Agastache, where two applications of 300 ppm or a single application of 600 ppm reduced finished plant quality.

Key Points:

- Test Configure® on plugs that are moderately well rooted, roots on all sides of the plug but root ball not intact.
- To affect plug branching, apply Configure® two to four weeks prior to shipping.
- Target a rate of 300 ppm. Evaluate root growth before making a second application; delay if necessary.
- Complete spray coverage required.



Figure 15b. *Configure® increased the number of shoots and lateral branches as well as shoot dry weight of Gaura lindheimeri 'Siskiyou Pink' plugs without reducing root growth; untreated, 300 ppm applied once, 300 ppm applied twice, 600 ppm applied once (left to right). Picture taken at four weeks after treatment.*

By Dennis Carey, Wayne Buhler, Ingram McCall, and Brian Whipker, NC State University

Petunia - Increasing Branching

The efficacy of Configure® on increasing the branching of petunias was evaluated. Configure® was applied as a foliar spray at rates between 10 and 160 ppm during the initial trials with the cultivar 'Improved Charlie'.

Axillary shoot development was maximized with 80 ppm (Figure 16) and the overall plant diameter was smaller.

Rates of 160 ppm resulted in a slight amount of phytotoxicity to the leaves, but new growth quickly covered the spotting. In a second experiment, slower growing but highly branched cultivars 'Surprise White' and 'Surprise Blue Vein Improved' were trialed (Figure 17). Configure® at 80 to160 ppm resulted in more compact growth and less overall loose appearance. The overall width was smaller but the overall height was slightly increased. In summary, Configure® foliar sprays to petunias help increase the branching of the plants and result in more compact growth. Cultivar response did vary, so grower trials should be conducted to evaluate the optimal rate.

Key Points:

- Apply Configure® 14 days after plug transplant (when the plants are actively growing).
- Target a rate of 80 to 160 ppm.
- Complete spray coverage required.



Figure 16. *Configure® foliar sprays of 0, 10, 20, 40, 80 and 160 ppm (left to right) were applied to 'Improved Charlie' vegetative petunias. Axillary shoot number was increased with rates of 80 ppm and plant diameter was smaller.*



Figure 17. *Configure® foliar sprays of 160 ppm (right) resulted in tighter plant growth of 'Surprise Blue Vein Improved' vegetative petunias, as compared to the untreated control*

By Dennis Carey, Wayne Buhler, Ingram McCall, and Brian Whipker, NC State University

Sempervivium - Increasing the Production of Chicks

The efficacy of Configure® on increasing the number of chicks being produced on mother plants was evaluated. Rooted mother plants of 'Red Heart' and 'Green Wheel' were obtained in 102-cell trays. Plants were transplanted on March 8th into 4-inch round pots containing a peat-based substrate. Configure® was applied as a single foliar spray at 0, 50, 100, 200, or 400 ppm with a spray volume of 2 quarts per 100 ft^2. Plants were grown in a greenhouse with temperature set points of 75°F days and 65°F nights under natural photoperiod. The number of basal shoots was recorded 8 weeks after the treatment. The experiment was repeated with five additional cultivars ('Dark Cloud', 'Neptune', 'Red Devils Food', 'Rubicon Improved', and hybrid species Sempervivum cantabricum montanum var. striacum).

Configure® is very effective on hens and chicks at increasing the number of offsets that form. Out of seven cultivars that were trialed, five had an increase in the offset number. The ideal concentration of Configure® for hens and chicks is between 200 to 400 ppm and the number of offsets increased from 2.5 to 10 times over the untreated plants (Figure 18).

Overall, a foliar spray of Configure® to Sempervivum is an excellent method of increasing the number of chicks produced. Cultivar response did vary, so grower trials should be conducted to evaluate the optimal rate.

Key Points:

- Apply Configure® 14 days after plug transplant (when the plants are rooted and actively growing).
- Target a rate of 200 to 400 ppm. Lower rates may be effective.
- Complete spray coverage required.



Figure 18. *Configure® at 400 ppm (plants at the right) significantly increased the number of chicks produced on both 'Green Wheel' and 'Red Heart' as compared to the untreated control (plants at the left).*



TRIAL RESULTS TABLE

The Configure® label allows for your own greenhouse trialing. Some of the research results reported in the table had no effect. This information is provided to allow further trials by possibly increasing the rate, modifying the application timing, or increasing the number of applications. Please keep in mind when trying to determine the suitability of Configure® on a particular crop, treat only a few plants and start by using the lower rate range. Multiple applications at lower rates may be more effective than a single larger dose. Keep good notes so that you can revise your production protocols to maximize your future results.

Extensive research has been conducted on benzyladenine, the active ingredient found in Configure®. The following table summarizes the trial results and is color-coded:

- Research trials conducted with Configure®
- Grower research trials with Configure®
- Research results reported for benzyladenine

Heuchera

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Acalypha microphylla	Induce lateral or basal branching	50 to 80ppm	Single foliar spray applied 2 weeks after potting. Rates to 800 ppm only resulted in smaller leaves and no increase in lateral branching.	Carey 2008
Aeonium hybrid	Increase offsets	50 to 400ppm	Single foliar spray applied 2 wks after potting. Rates to 400 ppm had no effect.	Carey 2008
Agastache 'Purple Haze' (Hyssop)	Induce branching of plugs	300 ppm	Foliar spray applied ~27 days after sticking (plants moderately rooted) increased lateral branching but not basal branching. Multiple applications or higher rates decreased root surface area.	Grossman et al. 2010
Agave hybrid, A. guiengola, A. gemniflora	Increase offsets	100 to 800 ppm	Two foliar sprays applied 1 month apart, starting 6 weeks after potting. Rates to 800 ppm had no effect.	Carey 2008
Aloe hybrids, A. gastrolea	Increase offsets	100 to 800 ppm	Two foliar sprays applied 1 month apart, starting 6 weeks after potting. Rates to 800 ppm had no effect.	Carey 2008
Alpinia (Red Ginger)	Induce lateral or basal branching	100 ppm	Foliar soak of rooted plants. No effect at the single rate used.	Criley 1988
Anthurium	Induce lateral or basal branching	250 ppm	10 ml drench applied at the plant base. 250 ppm recommended.	Henny 2001
Anthurium	Induce lateral or basal branching	1000 ppm	Single foliar spray. 1000 ppm recommended.	Henny 2001
Asclepias tuberosa (Butterfly Weed)	Induce lateral or basal branching	600 ppm	Not responsive to a single foliar spray.	Latimer and Freeborn 2010
Aquilegia flabellate (Columbine)	Induce lateral or basal branching	50 to 1600 ppm	Single foliar spray applied 2 weeks after potting. No effect.	Carey 2008
Aquilegia 'Winky Purple White' (Columbine)	Induce basal branching	600 ppm	Not responsive to a single foliar spray.	Latimer and Freeborn 2010
Banksia ashbyi	Flower enhancer / Dormancy interruption / Branching inducer	100 to 500 ppm	BA overcame winter quiescence of buds and breaks apical dominance. The effects are long lasting. Plants have many more branches. 400 ppm BA sprayed on the overwintering inflorescences hastened spring flowering by 1 to 2 months.	Wallerstein 1986
Begonia x hybrida (Dragon Wing begonia)	Induce lateral or basal branching	20 to 160 ppm	Foliar spray. Slight increase in branching but no decrease in height. Flowers emerged slightly earlier.	Carey 2008

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Bletilla striata (Hardy Orchid)	Increase the sprouting of pseudobulbs	50 and 100 ppm	Soak pseudobulbs in solution for 30 min - 1 hr. 50 ppm increased growth rate but only under low temperatures. 100 ppm inhibited sprouting.	Yoon et al. 2002
Boronia heterophylla (Red Boronia)	Induce lateral or basal branching	100 ppm foliar spray every 3 days for 18 days on mature plants in mid-fall or 10 to 150 ppm foliar spray every 2 days for 4 to 8 days on rooted cuttings in mid-fall	100 ppm on mature plants vastly increased branching over pinching. Transient phytotoxicity noted. 50 ppm, 4 applications increased branching over pinching in rooted cuttings. Higher rates and more applications causd phytotoxicity and reduced flowering.	Richards 1985
Boronia metastigma (Brown Boronia)	Induce lateral branching and additional cuttings	100 ppm	Foliar spray 3 times, 1 week apart - 2 months prior to taking cuttings. BA increased branching but subsequent cuttings rooted very poorly compared to control.	Day and Loveys 1998
Caladium bicolor	Branching agent and de-eying agent	250 to 4000 ppm	Pre-plant bulb soak for 1 hour. Shoot emergence delayed, shorter plants, and fewer shoots than non-de-eyed controls.	Whipker et al. 2005
Calibrachoa	Induce lateral or basal branching	150 to 300 ppm	Rates of 150 to 300 ppm improved branching of the cultivars 'Callie Bright Red' and 'Deep Yellow'.	Virginia grower
Capsicum annuum (Ornamental Pepper)	Induce lateral branching	400 to 1200 ppm	Single foliar spray onto pinched and unpinched plants before, at, or after pinching. No increase in branching. No phytotoxicity.	Khademi and Khosh-Khui 1977
Catharanthus roseus (Madagascar Periwinkle)	Induce lateral branching	50 to 800 ppm	Foliar spray or drench applied at 2 weeks after potting (WAP), 2+3 WAP, or 2+3+4 WAP. BA increased branching.	Carey 2008
Chamaecereus silverstri (Succulent, Peanut Cactus)	Induce lateral branching	100 to 200 ppm	Single foliar spray. 200 ppm increased branching.	Sanderson et al. 1986
Chamaecerus silvestrii f. variegata (Peanut Cactus)	Increase offset production	1000 to 5000 ppm	Application method not listed. 5000 ppm increased offset (Tubercles) of sufficient size.	Cho et al. 2008
Chrysanthemum	Induce lateral branching	200 to 400 ppm	Single foliar spray 2 weeks before pinch, at pinch, or 2 weeks after pinch. 400 ppm applied at pinch increased branching and was better than spraying 2 weeks before or after pinch. No delay in flowering. Plants shorter.	Carpenter and Carlson 1972b

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Chysanthemum morifolium	Flower enhancer	0.1 to 10 ppm	Three foliar sprays (planting day, at 5 open leaves or 10 open leaves) in the early summer on field grown plants, 0.1 to 1.0 ppm resulted in slightly earlier flowering (up to 3.9 days) and stem lengths were unchanged. 10 ppm delayed flowering, stem lengths were shorter, leaves were larger and there was slight phytotoxicity.	Sugiura 2004
Columnea microphylla (Goldfish plant)	Induce lateral branching	5 to 50 ppm	No effect	Lyons and Hale 1987
Cordyline	Induce lateral or basal branching	250 ppm	8 foliar sprays applied weekly, 250 ppm recommended.	Henry 2001
Coreopsis grandiflora (Tickseed)	Induce lateral branching	50 to 1600 ppm	No effect	Carey 2008
Coreopsis verticillata	Induce lateral branching	250 to 2000 ppm	Single foliar spray or crown drench. 500 ppm increased branching and also delayed flowering. Higher rates caused phytotoxicity.	Farris and Keever 2008
Coreopsis verticillata 'Zagreb' (Thread Leaf Coreopsis)	Induce lateral branching	600 ppm	Single foliar spray increased number of early branches. Difference did not persist. Multiple applications may improve response.	Latimer and Freeborn 2010
Coreopsis	Induce lateral or basal branching on plugs	300 to 500 ppm	Rates to 300 to 500 ppm improved branching of the cultivars 'American Dreams','Moonbeam', 'Zagreb' and 'Rum Punch'.	Virginia grower
Crassula (Succulent)	Induce lateral branching	10 to 50 ppm	No effect	Lyons and Hale 1987
Cyclamen persicum	Flower enhancer and promote early flowering	50 to 100 ppm	Foliar spray applications. Flowering was advanced, espically at low temperatures. Flower malformations at high teperatures and when BA was applied with high levels of nitrogen. A foliar spray of 50 to 100 ppm applied after early October (cooler temperatures) is recommended.	Sakai et al. 1979
Dahlia	Induce lateral or basal branching	20 to 40 ppm	3 foliar sprays made one week apart in summer. Lateral branching increased.	Rounkova 1985
Dianthus caryophyllus (Carnation)	Induce basal branching and cutting number	25 to 800 ppm	Single foliar spray onto stock plants. 400 ppm increased the cutting number by 35% without inhibiting subsequent rooting.	Mynett 1977

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Dianthus caryophyllus (Carnation)	Induce lateral or basal branching	100 ppm	Single foliar spray at various times. BA increased branching but the timing of the spray was very important. Plants sprayed at the 5 open leaf stage of development branched the most.	Yamaguchi 1987
Delphinium x elatum 'Galahad' (Larkspur, Candle Delphinium)	Induce lateral or basal branching	600 ppm	Not responsive to a single foliar spray. This rate was our screening rate. Multiple applications may be effective.	Latimer and Freeborn 2010
Dieffenbachia	Induce lateral or basal branching	500 to 2000 ppm	Single foliar spray 500 to 1000 ppm was optimal. 2000 ppm caused phytotoxicity.	Wilson and Nell 1983
Dieffenbachia	Induce lateral or basal branching	750 ppm	Apply foliar sprays on 3 consecutive days.	Henny 2001
Doritaenopsis (Orchid)	Flower enhancer	100 to 400 ppm	3 foliar sprays on days 0, 7, 14 from the time they were moved into into a floral inductive environment, or a single spray from -1 to +6 weeks after moving to an inductive environment. 200 to 400 ppm sprayed 3 times resulted in 3 to 9 days earlier flowering and produced 3 to 8 additional flowers per plant than the untreated plants. Spraying 1 week after the transfer to inductive conditions increased flowering the most.	Blanchard and Runkle 2008
Echeveria setosa (Firecracker plant)	Induce lateral or basal branching / flower enhancer	50 to 400 ppm	Single foliar spray. 400 ppm improved offsetting and accelerated flowering.	Carey et al. 2008
Echinacea hybrids 'Fragrant Angel', 'Merlot', 'Tiki Torch' (Hybrid Coneflower)	Induce lateral or basal branching	600 ppm	Single foliar application increased basal branching. This rate was our screening rate. Lower rates may be effective.	Latimer and Freeborn 2010
Echinacea purpurea	Induce lateral or basal branching on plugs	300 ppm	Single foliar application increased basal branching on plugs.	Virginia Grower
Echinacea purpurea' Doubledecker','Magnus', Ruby Star', 'White Swan' (Purple Coneflower)	Induce lateral or basal branching	300 ppm	Single foliar spray increased basal branching. No significant effect on plant height.	Latimer and Freeborn 2010
Epipremnum aureum (syn Rhaphidophora aurea) (Golden Pothos)	Induce lateral or basal branching	50 to 200 ppm	Foliar spray 3 times every two weeks starting 2 weeks after potting. 200 ppm increased branching.	Sieminska-Michalak 1989

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Euphorbia dulcis 'Chameleon' (Purple spurge)	Induce lateral or basal branching	600 ppm	Single foliar spray increased lateral branching but not basal branching. Lower rates may be effective.	Latimer and Freeborn 2010
Euphorbia pulcherrima (Poinsettia)	Growth enhancer/ Rooting enhancer	1250 ppm	Single drench when IBA treated cuttings were stuck in the mist bed. Increased the number of roots per cutting and the root fresh weight.	Carlson and Carpenter 1972
Euphorbia pulcherrima (Poinsettia)	Disease resistance	100 ppm	Single foliar spray at the beginning of bract necrosis. BA completely arrested the progress of bract necrosis after symptoms appeared. Effect lasted for 34 days.	McAvoy and Bible 1998
Euphorbia pulcherrima (Poinsettia)	Branching agent/ Enhance cutting numbers	62.5 to 500 ppm	Foliar spray 2 times at 20 day intervals. BA 125 ppm worked optimally at maximizing the number of cuttings produced on stock plants. Rooting percentage was not affected by this rate. 500 ppm BA delayed rooting in the cuttings.	Witaszek 1989
Exacum affine (Persian Violet)	Induce lateral or basal branching	50 to 400 ppm	Foliar spray applied twice at weekly interval. No effect on growth. Phytotoxicity at all rates. Severely delayed flowering. Applications to Exacum is **NOT** recommended.	Carey 2008
Fosterella penduliflora (Bromeliad)	Branching agent / Enhance cutting numbers	200 to 800 ppm	Foliar spray on 9 month old plants 4 times at two week intervals. BA 800 ppm increased lateral shoot production by 50% and is better than pinching. New shoots were shorter and not as thick.	Pytlewski and Hetman 1985
Gaillardia arista 'Dazzler' (Common gaillardia)	Induce lateral or basal branching	600 ppm	A single foliar spray caused excessive branching. Use much lower rates for this crop.	Latimer and Freeborn 2010
Gaillardia x grandiflora 'Gallo Yellow', 'Orange Lemon'	Induce lateral or basal branching on plugs	300 ppm	Single foliar spray increased lateral branching.	Virginia grower
Gaillardia x grandiflora 'Gallo Yellow' (Blanket flower)	Induce lateral or basal branching	600 ppm	A single foliar spray resulted in increased branching and a more upright growth habit.	Latimer and Freeborn 2011
Gaura lindheimeri 'Siskiyou Pink' (White gaura)	Induce branching on plugs	300 ppm	Single or multiple foliar sprays applied ~27 days after sticking (plants moderately rooted) increased lateral and basal branching with no adverse effects on rooting.	Grossman et al. 2010

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Gaura lindheimeri 'Siskiyou Pink' (White gaura)	Induce lateral or basal branching/ enhance flower numbers	600 ppm	A single foliar spray resulted in increased lateral and basal branching. Increased number of flower stalks. This was our screening rate. Lower rates may be effective.	Latimer and Freeborn 2010
Gerbera jamesonii (Gerber Daisy)	Branching agent/ Enhance cutting numbers	100 to 400 ppm	Plants defoliated and sprayed twice 6 weeks apart to induce new shoots. 2 sprays of 200 ppm BA promoted more sprouting shoots harvested for cuttings. Large cultivar differences.	Zieslen et al. 1985
Gerbera jamesonii (Gerber Daisy)	Flower enhancer	25 or 50 ppm	Single foliar spray. No effect on height, branching, flower number or timing.	Carey 2008
Gladiolus (Gladiola)	Increase corm and cormel yield	25 ppm	Corm or cormel preplant soak for 24 to 30 hours just after harvesting in April. BA decreased time to sprouting from 90 days to 10 days and increased the number of corms and slightly increased the number of cormels produced one year later.	Ahmad and Murty 1977
Gladiolus (Gladiola)	Increase corm and cormel yield	25 to 100 ppm	Pre-plant bulb soak for 24 hours. 25 ppm BA decreased the number days to sprouting by 10 days as well as increasing sprouting percentage. BA increased corm diameter and weight and cormel number and weight.	Ram et al. 2002
Hedera canariensis (Algerian Ivy)	Induce lateral or basal branching	50 to 200 ppm	Foliar spray 3 times every two weeks starting 2 weeks after potting. 200 ppm increased branching.	Sieminska-Michalak 1989
Helenium (Sneezeweed)	Induce laterals/ Flowering enhancer	20 to 40 ppm	Foliar sprays 3 times, one week apart in summer. Increased lateral branching but did not affect height. Delayed flowering but increased flower number.	Rounkova 1985
Helenium autumnale 'Coppelia' (Sneezeweed)	Induce lateral or basal branching	600 ppm	Not responsive to a single foliar spray at this screening rate. Multiple sprays may be effective.	Latimer and Freeborn 2010
Helianthus annuus (Sunflower)	Enhance seed set	150 to 250 ppm	Single foliar spray 20 to 60 days after planting to field grown plants. 150 ppm applied on day 40 was optimal and increased seed set and yield by 25%.	Beltrano et al. 1994
Helleborus ×hybridus (Lenten Rose)	Induce lateral or basal branching	50 to 800 ppm	Foliar spray or drench applied every 2 weeks for 12 weeks during the summer. Some increase in branching. No phytotoxicity but leaves are feathered.	Carey 2008

Trial Results Table

Research trials conducted with Configure® | Grower research trials with Configure® | Research results reported for benzyladenine

Plant	Purpose	Rate	Remarks	Reference
Hemerocallis (Daylily)	Induce lateral or basal branching	2500 or 5000 ppm	Foliar spray for 1, 2, 3, 4, or 5 consecutive weeks. BA increased offset formation. Higher rates and more applications were generally optimal.	Amling et al. 2007
Hemerocallis (Daylily)	Induce lateral or basal branching	1250, 2500, 3750 ppm	Foliar sprays applied twice in the summer. BA at 2500 ppm increased divisions by 20%.	Leclerc et al. 2006
Hemerocallis 'Strutters Ball' (Daylily)	Induce lateral or basal branching	600 ppm	Not responsive to a single foliar spray. Multiple applications may improve response.	Latimer and Freeborn 2010
Heuchera 'Raspberry Ice', 'Silver Lode' (Coral bells)	Induce lateral or basal branching	600 ppm	A single foliar spray increased basal branching. Lower rates may be effective.	Latimer and Freeborn 2010
Hosta	Induce lateral or basal branching	1250 to 3750 ppm	Single foliar sprays in summer onto plants with 0, 1, 2, or 3 pre-existing offsets. The optimal rate was 3750 ppm onto plants with 0 initial offsets.	Garner and Keever 1995
Hosta	Induce lateral or basal branching	3000 ppm	1 to 4 foliar sprays at 30 day intervals. 4 applications yielded the highest number of offsets.	Garner et al. 1996
Hosta	Induce lateral or basal branching	1250 to 3750 ppm	Single foliar spray. Optimal rate varied by cultivar. 10 cultivars trialed. BA improves offset number on all cultivars. No phytotoxicity was observed.	Garner et al. 1997
Hosta	Induce lateral or basal branching	3000 ppm	Foliar spray, crown spray, crown + foliar spray, crown drench, root immersion, or crown+root immersion. Foliar sprays were the least effective. Crown and crown+root immersions were the most effective.	Keever and Warr 2005
Hylocereus	Induce lateral or basal branching	25 to 100 ppm	24-hour soak of cuttings (apical tip only). 100 ppm caused more lateral shoots to break, providing more shoots for propagation.	Shimomura and Fujihara 1980
Hypocalymma angustifolia (White myrtle)	Induce lateral or basal branching	100 ppm	Foliar spray 3 times, 1 week apart – 2 months prior to taking cuttings. BA increased branching but subsequent cuttings rooted very poorly compared to control.	Day and Loveys 1998
Ipomoea batatas (Ornamental Sweet Potato)	Induce lateral or basal branching	12.5 to 1600 ppm	Two foliar sprays applied 30 days apart during winter production. No effect with rates used.	Carey 2008

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Plant	Purpose	Rate	Remarks	Reference
Iresine hybrid (Blood Leaf)	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray applied 2 weeks after potting. No effect on growth. Some phytotoxicity at the highest rates.	Carey 2008
Iris germanica (Tall bearded Iris)	Induce lateral branching/ Flowering enhancer	100 to 200 ppm	Single foliar spray. 100 ppm slightly increased lateral branching on one cultivar. This resulted in more bloom stalks the following year.	Leeson and Harkess 2006
Jovibarba hirta (Hens and Chicks)	Induce lateral or basal branching	50 to 1600 ppm	Single foliar spray. 1600 ppm increased offsetting the most.	Carey 2008
Kalanchoe	Induce lateral branching/Pinching replacement	10 to 50 ppm	Single foliar spray. 50 ppm increased branching above that of hand pinching.	Lyons and Hale 1987
Lantana camara	Induce lateral or basal branching	800 to 1200 ppm	Weekly foliar sprays for 3 weeks. BA increased branching.	Carey 2008
Lavandula x intermedia 'Provence' (Lavandin)	Induce branching on plugs	300 ppm	Two foliar sprays applied, first at ~34 days after sticking (plants moderately rooted) and again 2 weeks later; increased lateral and basal branching but reduced root dry weight of plugs. Improved branching and pot fill of finished plants.	Grossman et al. 2010
Leucanthemum x superbum 'Alaska', 'Becky' (Shasta Daisy)	Induce basal branching/ enhance flower number	600 ppm	A single foliar spray increased basal branching on both cultivars but effect was short term on 'Alaska'. Multiple applications may improve branching. This treatment doubled the number of flowers on 'Alaska'.	Latimer and Freeborn 2010
Leucanthemum x superbum 'Snowcap' (Shasta daisy)	Induce branching on plugs	300 ppm	Single or multiple foliar sprays applied ~27 days after sticking (plants moderately rooted) increased basal branching but reduced root dry weight. Plant establishment was not reduced.	Grossman et al. 2010
Leucospermum (Pincushion)	Flower enhancer	50 to 300 ppm	Foliar spray (50 to 300 ppm) applied once or 200 ppm applied 1 to 4 times in late summer to fall. 200 ppm applied once in late summer increased the number of florets and increased flower stem diameter.	Napier et al. 1986
Lobelia cardinalis (Cardinal flower)	Induce basal branching	600 ppm	A single foliar spray increased basal branching. Lower rates may be effective.	Latimer and Freeborn 2010

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Plant	Purpose	Rate	Remarks	Reference
Lobelia x speciosa 'Fan Deep Rose' (Hybrid Lobelia)	Induce basal or lateral branching	600 ppm	A single foliar spray increased number of shoots not branches. Moderate response. This rate was our screening rate. Multiple applications may be more effective.	Latimer and Freeborn 2011
Lilium x formolongi (Lily)	Propagation/Seed Germination	100 ppm	24 hour pre-plant seed soak. 100 ppm increased germination by 20%, and reduced germination time by 3 days.	Roh and Sim 1996
Lupinus angustifolius (Lupine)	Enhance seed set	450 ppm	Painted onto flowers daily until senescence with a paint brush. BA increased the number of seed pods set, but reduced the number of seeds per pod. Overall seed production increased 11%.	Liu and Longnecker 2002
Lychnis x arkwrightii 'Vesuvius' (Arkwright's Campion)	Induce basal or lateral branching	600 ppm	A single foliar spray increased lateral branching. Lower rates may be effective.	Latimer and Freeborn 2010
Mammillaria elongata (Succulent)	Induce lateral branching	100 to 200 ppm	Single foliar spray. 200 ppm increased branching (linearly with rate).	Sanderson et al. 1986
Muscari armeniacum M. comosum (Grape hyacinth)	Propagation/ Increase bulblet production	1000 to 5000 ppm	BA mixed with lanolin paste and applied to basal plate of 6 to 7 cm bulbs. All rates increased bulblet formation 30x over controls in M. armeniacum and 3x over controls in M. comosum.	Saniewski and Puchalski 1983
Nephrolepis exaltata (Boston Fern)	Induce lateral branching	50 to 150 ppm	Single foliar spray 4 weeks after planting. BA reduced frond length but did not stimulate more fronds.	Carter et al. 1996
Oenothera fruiticosa youngii (Sundrops)	Induce lateral branching	50 to 1600 ppm	Single foliar spray applied 2 weeks after potting. No effect.	Carey 2008
Osteospermum 'Astra Yellow', 'Voltage Yellow'	Induce lateral or basal branching	150 to 200 ppm	Single foliar spray increased lateral branching and reduced plant height.	Virginia grower
Opuntia microdasys (Pricklypear cactus)	Induce lateral branching	100 to 200 ppm	Single foliar spray. No effect.	Sanderson et al. 1986
Paeonia (Peony)	Induce lateral branching	100 to 1600 ppm	5 minute pre-plant bulb soaks in the fall. BA caused buds to sprout earlier and closer together. Without BA, bud emergence occurred over a longer period of time. With BA, bud emergence was more synchronized and overall,the bud emergence dates per plant were about 20 days earlier.	Carey 2008

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Plant	Purpose	Rate	Remarks	Reference
Pelargonium (Grandiosa geranium)	Induce lateral or basal branching	150 ppm	Single foliar spray increased lateral branching and reduced plant height.	Virginia grower
Pelargonum x hortorum (Geranium)	Induce lateral or basal branching	1000 ppm	Single foliar sprays applied 2 weeks before, during, or 2 weeks after a soft pinch. BA applied at pinch increased branching of geranium. BA applied at pinch delayed flowering 2 to 5 days.	Carpenter and Carlson 1972a
Pelargonum x hortorum (Geranium)	Induce lateral or basal branching	50 to 200 ppm	Rates of 50 to 200 ppm improved branching of the cultivars 'Melody', 'Candy Lavender', and 'Patriot Bright Red'. Some cultivars may be sensitive to Configure®, and small trials should be conducted to evaluate the potential for phytotoxicity.	North Carolina grower
Pelargonum (Ivy Geranium)	Induce lateral or basal branching	50 to 200 ppm	Rates of 50 to 200 ppm improved branching of the cultivars 'Caliente Rose', 'Caliente Lavender, and 'Caliente Dark Red. Some cultivars may be sensitive to Configure®, and small trials should be conducted to evaluate the potential for phytotoxicity.	North Carolina grower
Penstemon digitalis 'Husker Red' (Smooth White Penstemon)	Induce basal branching	600 ppm	A single foliar spray induced a small increase in number of laterals but increased pot fill. Slight delay in plant development resulted in reduced plant height.	Latimer and Freeborn 2010
Pentas lanceolata	Induce lateral or basal branching	50 to 400 ppm	Single foliar spray. No effect.	Carey 2008
Peperomia	Induce lateral or basal branching	250 to 1000 ppm	Single foliar spray applied at planting. 500 ppm recommended. 1000 ppm BA resulted in more than double the number of lateral branches and a reduction in plant height and internode length. No phytotoxicity noted. Custom solution of BA used, not commercial mix. Effects lasted about 12 weeks.	Henny 1985
Petunia ×hybrida	Induce lateral or basal branching	20 to 160 ppm	Foliar spray 1 to 2 times. 80 ppm applied twice was optimal at increasing branching, improving shape, increasing flowering. Transient phytotoxicity noted at 160 ppm.	Carey et al. 2007

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Plant	Purpose	Rate	Remarks	Reference
Phalaenopsis (Orchid)	Flower enhancer	100 to 400 ppm	3 Foliar sprays on days 0, 7, 14 from the time they were moved into a floral inductive environment or a single spray from -1 to +6 weeks after moving to an inductive environment. BA 200 to 400 ppm sprayed 3 times caused flowering to occur 3 to 9 days earlier and produce 3 to 8 more flowers per plant than control. BA sprayed 1 week after the transfer to inductive conditions increased flowering the most.	Blanchard and Runkle 2008
Phlox paniculata 'David' (Garden Phlox)	Induce lateral or basal branching	600 ppm	Not responsive to a single foliar spray. Multiple applications may be effective.	Latimer and Freeborn 2010
Phlox paniculata 'Franz Schubert' (Garden Phlox)	Induce lateral or basal branching	600 ppm	A single foliar spray increased the number of shoots. No effect on height.	Latimer and Freeborn 2011
Platycodon	Induce lateral or basal branching	300 ppm	Single foliar spray resulted in significant phytotoxicity.	Virginia grower
Portulaca grandiflora (Moss rose)	Induce lateral or basal branching	62.5 to 250 ppm	Single foliar spray. 250 ppm BA reduced shoot length by 25%, increased branching by 143%, and caused a more prostrate habit.	Banko and Stefani 1997b
Portulaca oleracea (Moss rose)	Induce lateral or basal branching	50 to 400 ppm	Single foliar spray. BA increases branching of one of two cultivars tested.	Carey 2008
Pseuderanthemum atropurpureum (False Eranthemum)	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray. No effect.	Carey 2008
Rebutia violaciflora (Cactus)	Flower enhancer	10 to 100 ppm	Applied 1 to 3 times. 100 ppm sprayed 3 times induces more flower buds but many of these buds die.	Runger and Patzer 1986
Rhipsalidopsis gaertneri (Thanksgiving Cactus)	Branching agent/ Flower enhancer	10 to 200 ppm	Single foliar spray 3 or 6 months after planting. 200 ppm on older plants increases branching and improves appearance.	Boyle 1992
Ricinus (Castor Bean)	Flower enhancer	50 to 75 ppm	Applied to buds 0 to 8 days after formation. BA 75 ppm at 4 to 8 days after bud formation causes the normally monecious flowers to become perfect.	Sindagi and Puttarudrappa 1972

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Plant	Purpose	Rate	Remarks	Reference
Rosa (Pot roses)	Senescence inhibitor	45 to 1800 ppm	Single foliar spray followed by simulated shipping. At 180 ppm inhibit flower senescence and leaf abscission in simulated shipping and was nearly equal to silver thiosulfate (STS).	Serek and Anderson 1993, 1995
Rosa (Rose)	Induce lateral or basal branching	100 ppm	Foliar spray 2 to 32 times. Slight increase in branching and increase in the length of the side branches. Subsequent flowering was increased too. Effect was better than pinching.	Richards and Wilkinson 1984
Rudbeckia hirta (syn. R. bicolor) (Blackeyed susan)	Induce lateral or basal branching	50 to 1600 ppm	Single foliar spray applied 2 weeks after potting. Height controlled. 1600 ppm caused phytotoxicity.	Carey 2008
Rudbeckia 'Goldstrum'	Induce lateral or basal branching on plugs	300 ppm	Single foliar spray increased basal branching with significant early phytotoxicity.	Virginia grower
Salvia farinacea (Mealy sage)	Induce lateral or basal branching	250 ppm	Single foliar spray. Controlled height and increased branching on par with Florel sprayed at 500 ppm.	Banko and Stefani 1991
Salvia nemorosa	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray applied 2 weeks after potting. Branching increased and flowering delayed with increasing rates. 400 ppm was optimal.	Carey 2008
Salvia nemorosa 'May Night' (Meadow sage)	Induce branching on plugs	300 ppm	Single or multiple foliar sprays applied ~34 days after sticking (plants moderately rooted) increased basal branching with no effect on root dry weight.	Grossman et al. 2010
Salvia splendens (Scarlet sage)	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray applied 2 weeks after potting. Growth index decreased with increasing rates.	Carey 2008
Scabiosa caucasica (Pincushion flower)	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray applied 2 weeks after potting. No effect.	Carey 2008
Schlumbergera (Christmas Cactus)	Flower enhancer	10 to 100 ppm	High temperatures and foliar sprays applied at beginning of short days or 10 to 20 days later. BA inhibits flower production if applied at beginning of short day. At temperatures above 20C it is best applied 10 to 20 days after short days.	Runger 1984

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Plant	Purpose	Rate	Remarks	Reference
Schlumbergera (Christmas Cactus)	Flower enhancer	100 to 1000 ppm	Foliar sprays during long days as well as 5 to 10 days after start of short days. Under long days, 100 to 200 ppm was ideal for increasing phylloclade branching. From 5 to 10 days after start of short days, BA caused more flowers per phylloclade and flowering occurred 10 days sooner. BA also induced flowering on immature plants under short days when short days alone did not.	Yonemura 1979
Schlumbergera truncata (Christmas Cactus)	Flower enhancer	100 to 800 ppm	Single foliar spray applied 5 to 10 days after start of short days. BA hastens time to flower and increases number of flowers. BA 100 to 200 ppm was optimal.	Yonemura and Higuchi 1978
Schlumbergera truncata (Thanksgiving Cactus)	Phylloclade enhancer/Flower enhancer	100 ppm	Single foliar spray 2 weeks after start of short days or during long days. Applications at 2 weeks after beginning of short days increased number of flower buds by 40%. Applications during long days increased phylloclade numbers by 150%.	Heins et al. 1981
Scutellaria (Skullcap)	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray applied 2 weeks after potting. No effect.	Carey 2008
Sempervivum cantabricum x montanum var striacum (Hens and Chicks)	Offset enhancer	50 to 400 ppm	Single foliar spray. Rates between 200 and 400 ppm was optimal for increasing offsets. Rates up to 400 ppm did not affect subsequent rooting of offsets. Cultivars varied in the number of offsets produced.	Carey 2008
Senecio cinerea (Dusty Miller)	Induce lateral or basal branching	50 to 400 ppm	Foliar spray or drench applied at 2 weeks after potting (WAP), 2+3 WAP or 2+3+4 WAP. BA decreased the size of the plants.	Carey 2008
Senecio sp.	Disease control	22.5 to 225 ppm	Single foliar spray 1 hour prior to inoculation. BA at 225 ppm reduced Botrytis severity on flowers and leaves by 99%. It reduced the plant's sensitivity to ethylene but does not affect the plant's production of ethylene.	Elad 1993
Solenostemon scutellarioides (syn Coleus blumei) (Coleus)	Induce lateral or basal branching	400 to 1200 ppm	Foliar spray. 800 ppm BA increased branching and height of pinched and unpinched coleus.	Khosh-Khui et al. 1978

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Plant	Purpose	Rate	Remarks	Reference
Solenostemon scutellarioides (syn Coleus blumei) (Coleus)	Induce lateral or basal branching	20 to 160 ppm	Single foliar spray applied 1 week after a pinch. No effect on branching or growth at these rates.	Carey 2008
Solenostemon scutellarioides (syn Coleus blumei) (Coleus)	Induce lateral or basal branching	100 to 3200 ppm	Single foliar spray applied 2 weeks after potting. BA reduced plant size in one of 2 cultivars tested.	Carey 2008
Spathiphyllum cv. (Peace lily)	Induce lateral or basal branching	250 to 1000 ppm	Single foliar spray or 10 ml substrate drench. Drench rates of 500 ppm recommended. Drenches at 1000 ppm resulted in the greatest number of lateral shoots and reduced overall height. All drench rates were better than any foliar rate.	Henny and Fooshee 1985
Stokesia laevis 'Silver Moon' (Stoke's Aster)	Induce basal branching	600 ppm	Not responsive to a single foliar spray. Higher rates or multiple applications may be effective.	Latimer and Freeborn 2010
Sutera (Bacopa)	Induce lateral or basal branching	20 to 160 ppm	Single foliar spray. No effect.	Carey 2008
Syngonium podophyllum (Arrowhead vine)	Induce lateral or basal branching	250 to 2000 ppm	Single foliar spray onto rooted cuttings at the 3 or 5 leaf stage. BA at the 3 to 5 leaf stage resulted in earlier development of lateral shoots and shorter bushier plants.	Wang and Boogher 1987
Tecoma stans (Texas star)	Induce lateral or basal branching	125 to 500 ppm	4 foliar sprays at 2 week intervals following a hard pinch. BA increased the number of cuttings but reduced rooting percentage.	Whipker and Gibson 2007
Tillandsia butzii T. aeranthos T. cacticola (Succulent / Bromeliad)	Induce lateral or basal branching	1 to 50 ppm	Applied 2 to 3 times per week for 2 to 10 weeks as a foliar spray, or cuttings dipped 1 to 3 times for 1 to 24 hours. 25 to 50 ppm sprays and 1 hour dips greatly increased offsets.	Bessler 1997
Tulipa (Tulip)	Senescence inhibitor	1 to 100 ppm	Applied via injecting bulbs or buds with 0.5 ml of 100 ppm solution, single foliar spray, of single soil drench. BA reduced bud blasting with 10 ppm being better than 1 ppm and the same as 100 ppm. BA reduced the time to flowering, increased the flower size, reduced the bulblet size, and hastened the exhaustion of the mother bulb.	de Munk and Gijzenberg 1977

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Verbena	Induce lateral or basal branching	20 to 160 ppm	Single foliar spray onto rooted plants. No effect of branching, height, or flowering.	Carey 2008
Verbena 'Lanai Deep Purple'	Induce lateral or basal branching	150 to 300 ppm	Single foliar spray increased lateral branching.	Virginia grower
Verbena × hybrida	Induce lateral or basal branching	30 to 300 ppm	Single foliar spray onto new cuttings. 30 ppm BA applied at cutting improved rooting after 12 days and improved branching after 24 days.	Svenson 1991
Verbena canadensis (Clump verbena)	Induce lateral or basal branching	250 to 1000 ppm	Single foliar sprays immediately after pinching. 1000 ppm controlled shoot elongation by 19%.	Banko and Stefani 1997a
Veronica longifolia 'Icicle' (Speedwell)	Induce lateral or basal branching	600 ppm	A single foliar spray induced a short term increase in number of shoots and lateral branches. Multiple applications may improve response.	Latimer and Freeborn 2010
Vinca minor 'Sterling Silver' (Lesser Periwinkle)	Induce lateral or basal branching	600 ppm	No response to a single foliar spray. Higher rates or multiple applications may improve response.	Latimer and Freeborn 2010
Viola ×wittrockiana (Pansy)	Induce lateral or basal branching	50 to 800 ppm	Single foliar spray. Limited plant height control and small increase in branching. There were cultivar differences with violas being more tolerant than pansies. Flowering was delayed. Phytotoxicity occurred above 100 ppm.	Carey 2008
Zantedeschia aethiopica (Calla Lily)	Flower enhancer	250 to 350 ppm	Pre-plant rhizome dip for 20 minutes. BA at 350 ppm increased total flowers produced. BA caused some flower abnormalities. Increasing flower production in one year reduces future production from the rhizome.	Luria et al. 2005
Zinnia	Flower enhancer	100 to 200 ppm	Single foliar spray. 100 ppm reduced time from bud emergence to flowering by 7 days.	Miyajima 2000
Zinnia	Senescence inhibitor	90 to 225 ppm	Single foliar spray, followed by simulated shipping. No effect on senescence.	Pinto et al. 2005
Zinnia elegans	Induce lateral or basal branching	20 to 800 ppm	1, 2, or 3 foliar sprays applied 1 week apart starting 1 week after potting seedlings. BA increased branching, decreased internode length.	Carey 2008

References (Literature Cited)

Ahmad, M.R., and A.S. Murty. 1977. Note on the effect of benzyladenine on corm and cormel yield in Gladiolus. Indian J. Agric. Res. 11 (4):249-250.

Amling, J.W., G.J. Keever, J.R.J. Kessler, and D.J. Eakes. 2007. Benzyladenine (BA) promotes ramet formation in Hemerocallis. J. Environ. Hort. 25 (1):9-12.

Banko, T.J., and M.A. Stefani. 1991. Chemical growth control of Salvia farinacea 'Victoria Blue'. SNA Research Conference Proceedings 41:214-215.

Banko, T.J., and M.A. Stefani. 1997a. Growth control in container production of Verbena 'Homestead Purple'. SNA Research Conference Proceedings 42:290-291.

Banko, T.J., and M.A. Stefani. 1997b. Growth regulators enhance branching of Portulaca. SNA Research Conference Proceedings 42:288-289.

Basak, A., and Z. Soczek. 1986. The influence of Promalin on branching of one-year-old apple nursery trees. Acta Horticulturae 179:279-280.

Beach, S.E. 2005. Shipping and nitrogen toning effects on postharvest shelf life of vegetative annuals. Floriculture, Thesis for Master of Science, Texas A&M University. College Station, TX.

Beckett, R.P., and J. van Staden. 1992. The effect of thidiazuron on the yield of wheat grown with varying nutrient supply. Plant Growth Regulation 11:343-348.

Beede, R.H. 2005. Uses of plant growth regulators in tree nut crops. Proceedings of the Plant GrowthRregulation Society of America 32nd Annual Meeting 32:36-37.

Beltrano, J., D.O. Caldiz, R. Barreyro, G.S. Vallduvi, and R. Bezus. 1994. Effects of foliar applied gibberellic acid and benzyladenine upon yield components in sunflower (Helianthus annuus L.). Plant Growth Regulation 15:101-106.

Bessler, B. 1997. The use of 6-benzylaminopurine for rapid multiplication of Tillandsias. HortScience 32 (2):256-258.

Blanchard, M.G., and E.S. Runkle. 2008. Benzyladenine promotes flowering in Doritaenopsis and Phalaenopsis orchids. J. Plant Growth Regul. 27:141-150.

Boyle, T.H. 1992. Modification of plant architecture in 'Crimson Giant' Easter cactus with benzyladenine. J. Amer. Soc. Hort. Sci. 117 (4):584-589.

Boyle, T.H., D.J. Jacques, and D.P. Stimart. 1988. Influence of photoperiod and growth regulators on flowering of Rhipsalidopsis gaertneri. J. Amer. Soc. Hort. Sci. 113 (1):75-78.

Carey, D.J. 2008. The effects of benzyladenine on ornamental crops. Thesis for Master of Science, Department of Horticultural Science, North Carolina State University, Raleigh.

Carey, D.J., B.E. Whipker, I. McCall, and W. Buhler. 2007. Cytokinin based PGR affects growth of vegetative petunia. SNA Research Conference Proceedings 52 (8):102-104.

Carey, D.J., B.E. Whipker, I. McCall, and W. Buhler. 2008. Benzyladenine foliar sprays increase offsets in Sempervivum and Echeveria. SNA Research Conference Proceedings 53:19-21.

Carlson, W. H., and W. J. Carpenter. 1972. Drenches of plant growth regulators improve poinsettia rooting. Michigan Florist 491:22-23.

Carpenter, W. J., and G.R. Beck. 1972. Growth regulator induced branching of poinsettia stock plants. HortScience 7 (4):405-406.

Carpenter, W. J., and W. H. Carlson. 1972a. Improved geranium branching with growth regulator sprays. HortScience 7 (3):291-292.

Carpenter, W.J., and W.H. Carlson. 1972b. The effect of growth regulators on Chrysanthemum. J. Amer. Soc. Hort. Sci. 97 (3):349-351.

Carter, J., B.P. Singh, and W. Whitehead. 1996. Dikegulac, but not benzyladenine enhances the quality of Boston fern. HortScience 31 (6):978-980.

Cho, I.J., Lee C.H., and Cho J.H. 2008. Effects of CPPU, TDZ, and BAP on tubercle proliferation of Chamaecereus silvestrii f. variegata. Korean Journal of Horticultural Science and Technology 26 (2):124-128.

Criley, R.A. 1988. Propagation of tropical cut flowers: Strelitzia, Alpinia, and Heliconia. Acta Horticulturae 226:509-517.

Day, J.S., and B.R. Loveys. 1998. Propagation from cuttings of two woody ornamental Australian shrubs, Boronia megastigma Nees (brown boronia) and Hypocalymma angustifolium Endl. (white myrtle). Australian Journal of Experimental Agriculture 38:201-206.

de Munk, W.J., and J. Gijzenberg. 1977. Flower bud blasting in tulip plants mediated by the hormonal status of the plant. Scientia Horticulturae 7:255-268.

Elad, Y. 1993. Regulators of ethylene biosynthesis or activity as a tool for reducing susceptibility of host plant tissues to infection by Botrytis cinerea. Neth. J. Pl. Path. 99:105-113.

Farris, M.E. and G.J. Keever. 2008. Benzyladenine and cyclanilide affect shoot production and flowering of Coreopsis verticillata 'Moonbeam'. SNA Research Conference Proceedings 53. Pp. 511-514

Garner, J.M., and G.J. Keever. 1995. Initial offset number affects Hosta's responses to BA. SNA Research Conference Proceedings 40:69-70.

Garner, J.M., G.J. Keever, D.J. Eakes, and J.R.J. Kessler. 1996. Sequential BA Applications enhance offset formation in Hosta. SNA Research Conference Proceedings 41:48-49.

Garner, J.M., G.J. Keever, D.J. Eakes, and J.R.J. Kessler. 1997. BA application promotes offset formation in Hosta cultivars. J. Environ. Hort. 15 (3):119-122.

Heins, R.D., A.M. Armitage, and W.D. Carlson. 1981. Influence of temperature, water stress, and BA on vegetative and reproductive growth of Schlumbergera truncata. HortScience 16 (5):679-680.

Grossman, M., J. Freeborn, H.L. Scoggins, J.G. Latimer. 2010. BA application affects branching and rooting of herbaceous perennial plugs. HortTechnology (in prep)

Henny, R.J. 1985. BA induces lateral branching of Peperomia obtusifolia. HortScience 20 (1):115-116.

Henny, R.J., and W.C. Fooshee. 1985. Induction of basal shoots in Spathiphyllum 'Tasson' following treatment with BA. HortScience 20 (4):715-717.

Henny, R.J., 2001. Section 15 Foliage Plants, p. 83-87. In: OFA Tips on Regulating Growth of Floriculture Crops.

Keever, G.J., and J.C. Warr. 2005. Response of Hosta to method and time of BA application. PGRSA Quarterly 33 (1):4-11.

Khademi, M., and M. Khosh-Khui. 1977. Effect of growth regulators on branching, flowering, and fruit development of ornamental pepper (Capsicum annuum L.). J. Amer. Soc. Hort. Sci. 102 (6):796-798.

Khosh-Khui, M., I. Rouhani, and B. ShayBany. 1978. Axillary shoot stimulation and plant development of coleus treated with certain plant growth regulators. Canad. J. Plant Sci. 58:971-976.

Latimer, J and J. Freeborn. 2010. New uses of PGRs in ornamentals: Configure (6-BA) increases branching of herbaceous perennials. Proc. PGRSA 36: In press.

Latimer, J. and J. Freeborn. 2011. Branching enhancers, Configure (6-BA) and Augeo (dikegulac sodium), affect branching of herbaceous perennials. Proc. PGRSA 37: In prep

Leclerc, M., C.D. Caldwell, and R.R. Lada. 2006. Effect of plant growth regulators on propagule formation in Hemerocallis spp. and Hosta spp. HortScience 41 (3):651-653.

Leeson, T., and R. Harkess. 2006. Influence of cytokinins on lateral branching of Iris germanica rhizome. SNA Research Conference Proceedings 51:330-331.

Liu, F.H., and N. Longnecker. 2002. Interactive effect of cytokinin and potassium on sink-source relationships in Lupinus angustifolius. Plant Growth Regulation 36:1-6.

Lyons, R.E., and C.L. Hale. 1987. Comparison of pinching methods on selected species of Columnea, Kalanchoe, and Crassula. HortScience 22 (1):72-74.

References (Literature Cited)

McAvoy, R.J., and B.B. Bible. 1998. Poinsettia bract necrosis is affected by scion/rootstock combinations and arrested by a benzyladenine spray. HortScience 33 (2):242-246.

Miyajima, D. 2000. Flower bud removal and cytokinin treatment stimulate capitulum formation in double-flowered zinnias. HortScience 35 (2):260-261.

Mynett, K.J. 1977. La benzyladenine influence les plantes meres chez L oeillet en serre. Acta Horticulturae 71:19-21.

Napier, D.R., G. Jacobs, Can Staden J., and C. Forsyth. 1986. Cytokinins and flower development in Leucospermum. J. Amer. Soc. Hort. Sci. 111 (5):776-780.

Pytlewski, C., and J. Hetman. 1985. The effect of growth regulators on development of lateral shoots in Fosterellia penduliflora. Acta Horticulturae 167:327-333.

Ram, R., D. Mukherjee, and S. Manuja. 2002. Plant growth regulators affect the development of both corms and cormels in Gladiolus. HortScience 37 (2):343-344.

Richards, D. 1985. Effect of cytokinin application and environment on growth and flowering of Boronia heterophylla F. Meull. Scientia Horticulturae 27:325-334.

Richards, D., and R.I. Wilkinson. 1984. Effect of manual pinching, potting-on and cytokinins on branching and flowering of Camellia, Rhododendron, and Rosa. Scientia Horticulturae 23:75-83.

Roh, M.S., and Y.G. Sim. 1996. Seed germination of Lilium x formolongi as influenced by temperature and plant growth regulators. Acta Horticulturae 414:243-250.

Rounkova, L.A. 1985. Cytokinins effect on some ornamental plants. Acta Horticulturae 167:69-77.

Runger, W. 1984. Effect of 6-benzyladenine at different temperatures in short day on flowering and vegetative growth of Schlumbergera. Gartenbauwissenschaft 49 (1):36-39.

Runger, W., and H. Patzer. 1986. Influence of N6-benzyladenine on the flowering of Rebutia vioaciflora. Gartenbauwissenschaft 51 (3):108-110.

Sakai, K., Y. Katano, and H. Higuchi. 1979. Promoting flowering in Cyclamen persicum by benzyladenine. Research Bulletin of the Aichi-Ken Agricultural Research Center 11:81-87.

Sanderson, K.C., Y.S. Ho, W.C. Martin, and R.B. Reed. 1986. Effect of photoperiod and growth regulators on growth of three Cactaceae. HortScience 21 (6):1381-1382.

Saniewski, M., and J. Puchalski. 1983. The synergistic effect of benzyladenine and cyclohexaminde in Muscari bulblets formation. Prace Instytutu Sadownictwa i Kwiaciarstwa w kierniewicach, B (Rosliny Ozdobne) 8:167-177.

Serek, M., and A.S. Anderson. 1993. AOA and BA influence on floral development and longevity of potted 'Victory Parade' miniature rose. HortScience 28 (10):1039-1040.

Sieminska-Michalak, E. 1989. Influence of growth regulators on branching and elongation of pot plants. Acta Horticulturae 251:341-343.

Sindagi, S.S., and K. Puttarudrappa. 1972. Sex conversion in castor (Ricinus communis Lin.). Science and Culture 39 (9):408-410.

Sugiura, H. 2004. Effects of 6-benzylaminopurine and ethephon applications on flowering and morphology in summer-to-autumn-flowering chrysanthemum under open field conditions. J. Pestic. Sci. 29 (4):308-312.

Svenson, S.E. 1991. Rooting and lateral shoot elongation of Verbena following benzylaminopurine application. HortScience 26 (4):391-392.

Wallerstein, I. 1986. Banksia ashbyi. In CRC Handbook of Flowering, ed. A. H. Halevy, 87-93. Boca Raton, Fl: CRC Press.

Wang, Y.T., and C.A. Boogher. 1987. Effect of stock plant shading, developmental stage and cytokinin on growth and lateral branching of Syngonium podophyllum 'White Butterfly'. Scientia Horticulturae 33:137-145.

Whipker, B.E., and J.L. Gibson. 2007. Lateral branching agents. Paper read at Southeast Greenhouse Conference, June 2007, at Greenville, SC.

Whipker, B.W., B.A. Krug, and I. McCall. 2005. Pre-plant tuber soaks of 6-benzyladenine ineffective for chemical de-eyeing of Caladium. PGRSA Quarterly 33 (1):16-20.

Wilson, M.R., and T.A. Nell. 1983. Foliar applications of BA increase branching of 'Welkeri' Dieffenbachia. HortScience 18 (4):447-448.

Witaszek, W. 1989. Light and growth regulators in the cuttings production of poinsettia Euphorbia pulcherrima mother plants. Acta Horticulturae 251:315-317.

Yamaguchi, T. 1987. Stimulating effects of some chemical and physical treatments on the growth of carnation. Acta Horticulturae 216:281-288.

Yonemura, K. 1979. Studies on the control of flowering in Christmas cactus. Aichi-ken Nogyo Sogo Shikenjo tokubetsu hokoku:1-35. (Special Bull Aichi-Ken Agric Res Center, Nagakute, Aichi, Japan, pp 32–35)

Yonemura, K., and H. Higuchi. 1978. The control of flowering in Christmas cactus V. Res. Bull. Aichi Agric. Res. Centr. 10:30-35.

Yoon, M.J., K.B. Park, and C.H. Pak. 2002. Effects of growth regulators and temperature on the growth of pseudobulbs in Bletilla striata. Korean Journal of Horticultural Science and Technology 20 (2):120-123.

Zieslen, N., E. Khayat, S. Yogev, and J. Shoub. 1985. Promotion of cuttings of Gerbera jamesonii by cytokinin. Acta Horticulturae 226:425-429.

Zimmer, K., and K. Junker. 1986. Salvia splendens. In CRC Handbook of Flowering, ed. A. H. Halevy, 265-273. Boca Raton, Fl: CRC Press.

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