Stimulating Plant Growth

Researchers at North Carolina State University recently trialed a synthetic cytokinin to see how it perfomed as a branching agent, Configure might be a powerful tool in their PGR arsenal.

Figure 1. *An increase in branching (phylloclades) occurs on Christmas cactus with Configure foliar spray applications during vegetative growth (early summer).*

Figure 2. *Bud count on Christmas cactus phylloclades occurs with Configure foliar sprays after floral induction.*

Figure 3. *Branching increases on slow-growing petunia 'Improved Charlie' with Configure foliar sprays.*

By Dennis Carey, Wayne Buhler and Brian Whipker

Schofield Media Growers have a wide range of PGRs to choose from to meet the growing requirements of their crops and the shipping requirements of their customers. One of the newest chemicals on the market is Fine Americas Inc.'s Configure, a synthetic cytokinin labeled for use on herbaceous ornamental crops as a branching agent.

How Does BA Affect 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 in Configure. This reduces auxin's ability to prevent axillary bud break and allows the axillary buds to escape from apical dominance. This ability to break apical dominance may potentially be used in certain crops to stimulate early flowering and force buds out of winter dormancy early. Decreased plant size may be a side effect of reduced apical dominance because the plant has to divide its energy budget among a greater number of side shoots. As a result, growers may observe that their plants are shorter. Depending on the overall structure of plant, increased branching may result in a wider or narrower plant.

Configure Research Results

Extensive research has been done to study the effect of cytokinins on ornamental crops. Research from Japan in the 1970s showed that cytokinins increase branching in Christmas cactus. Configure has been shown to increase branching of the phylloclades of Christmas cactus (Figure 1). In addition, if Configure is applied during the floral initiation stage of flower development, it can increase flowering in Christmas cactus by stimulating additional flower buds to break (Figure 2). The floral initiation period in Christmas cactus begins after a certain number short days have occurred. The exact number is different for every cultivar. 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. Higher concentrations cause many small buds to form, but many of them may not completely flower.

Configure can increase the number of branches that form in a hosta crown. Gary Keever of Auburn University, Joyce Latimer of Virginia Tech and Paul Pilon of Perennial Solutions Consulting have worked on suitable Configure rates for hostas. Hostas require high rates of Configure, from 500 to 3,000 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 again two weeks later. Paul Pilon recommends two sprays of 500 ppm instead of a single higher dose. Dr. Latimer has also studied Configure on Echinacea and found that 300- to 900-ppm foliar sprays increased branching by three times over the control, but noted cultivar differences.

Our research at North Carolina State University focused on applying Configure to a wide variety of annuals and a few perennials. Configure is effective on slower-growing petunia cultivars such as 'Improved Charlie' at 80-160 ppm. Configure greatly increased branching of this prostrate plant and, as a result, reduced the average diameter of the plants (Figure 3). On slow-growing but highly branched cultivars 'Surprise White' and 'Sur-

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
Salvia '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

prise Blue Vein Improved', Configure at 80-160 ppm tightened up the somewhat loose canopy of the plants. It reduced the overall width, but the overall height was slightly increased (Figure 4). However, on the fast-growing Wave petunias, Configure had no effect at the trial concentrations.

Configure is effective at increasing the number of offsets that form on hens-and-chicks. Out of seven cultivars that were trailed, five had an increase in the offset number. The ideal concentration of Configure for hens-and-chicks is 200-400 ppm, and the number of offsets increased from 2½ to 10 times over the untreated plants (Figure 5).

Configure was also effective on reducing the height and increasing the branching of salvia 'Caradonna' at concentrations of 400-800 ppm. It delayed flowering by three weeks, but once flowering began, there were up to three times as many inflorescences (Figure 6).

Application Costs

As with all PGRs, the cost per pot is an important variable to consider when deciding whether to use it. A representative cost for Configure is $85 for a 2-quart container, but growers' costs vary, so they will need to do their own cost determinations. Table 1 has some example costs for the spray recommendations discussed earlier. For the significant improvement in plant quality, per-pot costs are economical for Configure. To treat single Christmas cactus costs less than 1/10 of a cent; at the upper end, it costs 1 cent to treat a hosta with 1,000 ppm.

Application Methods

As with all PGRs, the way you apply Configure is important. Configure is similar to B-Nine (daminozide) in that it takes several hours to fully absorb across the leaf cuticle. Thus, the best time to apply Configure is when the leaf surface will stay wet for more than four 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. Do not water the plants with an overhead method soon after spraying Configure, it will wash off the leaves.

Configure is similar to Bonzi (paclobutrazol) in that it does not move 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. It affects the axillary buds, so complete spray coverage is vital to come in 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 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.

Spray timing and repetition is also very important with Configure. It 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 buds. Some plants form buds only at certain times of the year, and others continuously produce new buds. Thus, multiple applications of Configure may provide better results than a single application. Plants metabolize the benzyladenine in Configure 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. Some plants, such as pansy and exacum, appear to be very sensitive to foliar-spray applications of Configure. Concentrations as low as 50-100 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 at a lower concentration may provide better results than a single high-concentration application.

Overall, Configure is a good addition to a grower's PGR toolbox. It is inexpensive and effective on a number of plants by encouraging axillary shoots. GPN

Figure 4. *Width is reduced and the canopy is tightened up on slow-growing, highly-branched petunias 'Surprise Blue Vein Improved' and 'Surprise White' with Configure foliar sprays.*

Figure 5. *Offset number is increased on hens-and-chicks with Configure foliar sprays.*

Figure 6. *Height is reduced and flowering is increased but delayed by three weeks on salvia 'Caradonna' with Configure foliar sprays.*

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