PLANT GROWTH REGULATORS:
New Products and Concepts

Erik Runkle  Joyce Latimer  James Barrett

New PGRs
• Enhanced Branching
  • Augeo
  • Configure
• Growth Control
  • Sumagic label for vegetable transplants
  • New concentrated Piccolo 10XC
  • Topflor
• Drought Control
  • ConTego

Expanding PGR Toolbox

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancymidol</td>
<td>Abide, A-Rest</td>
</tr>
<tr>
<td>Chlormequat</td>
<td>Citadel, Chlormequat E-Pro, Cycocel</td>
</tr>
<tr>
<td>Chlorate chloride</td>
<td></td>
</tr>
<tr>
<td>Daminozide</td>
<td>B-Nine, Compress, Dazide</td>
</tr>
<tr>
<td>Dikegulac sodium</td>
<td>Augeo</td>
</tr>
<tr>
<td>Flurprimidol</td>
<td>Topflor</td>
</tr>
<tr>
<td>Paclobutrazol</td>
<td>Botri, Florazol, Paczo, Piccolo, Piccolo 10XC,</td>
</tr>
<tr>
<td></td>
<td>Downsize (drenches only)</td>
</tr>
<tr>
<td>Uniconazole</td>
<td>Concise, Sumagic</td>
</tr>
<tr>
<td>BA</td>
<td>Configure</td>
</tr>
<tr>
<td>GA</td>
<td>GibGro, ProGibb T&amp;O</td>
</tr>
<tr>
<td>BA-GA</td>
<td>Fascination, Fresco</td>
</tr>
<tr>
<td>S-ABA</td>
<td>ConTego</td>
</tr>
</tbody>
</table>

Augeo

• OHP is marketing a branching agent
• Works as a chemical pinching agent, thus decreasing apical dominance and increasing lower bud initiation.
• Active ingredient dikegulac-sodium
• Excellent response with fuchsia, lantana, petunia, verbena

Augeo on Gaillardia ‘Gallo Yellow’

• Low rate increased branching
• Control 24.5 vs. 400 ppm 45-3 branches
• 3200 ppm severely stunted plants
Augeo on *Echinacea* ‘Sombrero Hot Pink’

- 800 and 1600 ppm increased branching; 8 WAT
- Control 6.0 vs. 1600 ppm 9.5 branches (fewer flowers)
- 3200 ppm stunted plants

Augeo on *Phlox* ‘Laura’

- 1600 ppm increased branching at 4 WAT
- Control 13.3 vs. 1600 ppm 26.8 branches
- No phyto but 3200 ppm stunted plants

Representative Plants at Treatment Time

- Verbena
- Veronica
- Rosemary
- Campanula
- Cosmos

Augeo on Perennial Plugs

- Applied when moderately rooted, photo 3 WAT

Augeo on Perennial Plugs

- Applied when moderately rooted, photo 3 WAT

Augeo – 4 WAT

- Augeo increased numbers of leaders and branches. Leaders C 1.6 vs. 4 to 7 with Augeo; branches C 20 vs. 23 to 25. 1600 ppm reduced SDW, not RDW
- Florel had no significant effect.
Augeo on Perennial Plugs

- Applied when moderately rooted, photo 3 WAT

Augeo on Campanula punctata 'Cherry Bells' – 3 WAT

- 800 ppm Augeo increased branching with no effect on shoot or root dry weight. Florel had no significant effect

Augeo – 4 WAT

- Florel increased branching (C 1.0 vs. 4.1) without reducing plug growth
- Root dry wt not affected by Augeo or Florel

Augeo – 4 wk Grow Out

- All Augeo treatments reduced shoot and root dry wt. 1600 ppm reduced branching (just didn’t grow out)

Augeo

- Keys for use.
  - Apply early in the crop cycle to stimulate branching and allow ample time for new leaf growth to cover any yellowing or leaf necrosis that may occur.
  - Plants should be stress-free.
  - Trial starting point: 400 to 800 ppm foliar spray. Apply sufficient volume to wet the foliage
    - (2 qts / 100 sq ft).

Configure
**Influence cell expansion**

**Shoot Apex**

- New cell
- BA (benzyadenine)
- GA

**Configure**
- Active ingredient is BA (benzyadenine)
- Uses
  - Branching agent
  - Influence flowering
  - Height control
- Registered for:
  - Hosta, Echinacea and Holiday cactus.
  - Expanded label for experimental use approved in 2008.

**Keys to Use**
- Stimulates - but does not cause - branching or flowering.
  - Windows of opportunity.
  - Short period of activity (~1 week).
  - Multiple applications may be beneficial.
  - Complete spray coverage required
  - Not actively transported throughout the plant.

**Configure on Hosta***

*Perennial Solutions Consulting*

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Control</th>
<th>BA 1000 ppm x 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abba Dabba Do</td>
<td>2.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Blue Angel</td>
<td>1.0</td>
<td>5.7</td>
</tr>
<tr>
<td>Fragrant Bouquet</td>
<td>1.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Guacamole</td>
<td>1.8</td>
<td>7.0</td>
</tr>
<tr>
<td>Minute Man</td>
<td>1.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Whirlwind</td>
<td>1.9</td>
<td>3.9</td>
</tr>
<tr>
<td>June</td>
<td>1.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Iron Gate Delight</td>
<td>1.3</td>
<td>6.1</td>
</tr>
</tbody>
</table>

*Perennial Solutions Consulting; GrowerTalks May 2008*
**Echinacea ‘Doubledecker’**

- 6-BA (Exilis, Fine Americas)
- 4 WAT, fall application
- Increased branching (1.2 vs. 6.4)

---

**Branching of Echinacea (At 4 WAT)**

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Control</th>
<th>Configure 600 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnus</td>
<td>3.8</td>
<td>6.6</td>
</tr>
<tr>
<td>White Swan</td>
<td>2.4</td>
<td>11.4</td>
</tr>
<tr>
<td>Doubledecker</td>
<td>1.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Ruby Star</td>
<td>4.4</td>
<td>11.2</td>
</tr>
<tr>
<td>Tiki Torch</td>
<td>1.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Merlot</td>
<td>1.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Fragrant Angel</td>
<td>2.6</td>
<td>4.4</td>
</tr>
</tbody>
</table>

---

**Effect of Timing of Application of Benzyladenine (6-BA) on Branching of Herbaceous Perennials**

Margaret G. Tackett
Department of Horticulture, Virginia Tech

---

**PGR Treatment**

Foliar spray of Configure (6-BA)
- Rates of 0 or 600 ppm at 0, 1, 2, 3, or 4 weeks after potting (WAP)

Data were collected weekly for 9 collection periods:
- Number of basal branches

*Echinacea purpurea ‘White Swan’*

---

**Final Number of Basal Branches**

*Echinacea purpurea ‘White Swan’ at 8 WAP*

- Echinacea purpurea ‘White Swan’ at 4 WAP
- Improved pot fill with earlier applications
Configure: Key Points for *Echinacea*

- Spring applications:
  - In plug flat or within 3 weeks after planting plugs
  - Actively growing with good root growth
  - Single application of 600 ppm or multiple applications of 300 ppm at 2-wk interval
- Summer/Fall applications:
  - As above with multiple applications of 300 to 600 ppm
  - Repeat Configure application(s) in Spring

Configure on Herbaceous Perennial Plugs (Mara Grossman)

- Five crops treated when roots on all 4 sides
- Configure at 0, 300x1, 300x2, 600 ppm
- Harvested 2 and 4 weeks after treatment
- Planted for grow out at 4 WAT

Configure on Agastache ‘Purple Haze’

- 40% increase in lateral branches but root dry weight reduced 40% at 3WAT
- Grow out reduced by 300x2 or 600 ppm

Configure on Leucanthemum ‘Snowcap’

- Basal branches doubled but root dry weight reduced 25% to 40% at 4WAT
- Grow out not affected by reduced root dry wt

Configure on Salvia ‘May Night’

- 300 ppm once or twice increased basal branching 40%, no effect on root dry wt at 4WAT
- No effect on finished plants.
Configure on *Lavandula ‘Provence’*

- Increased number of shoots, lateral branches & shoot dry weight 4WAT
- 300x2 ppm reduced root dry wt, but also resulted in the highest number of shoots and branches on the finished plants at 4 weeks after planting

Configure on *Gaura ‘Siskiyou Pink’*

- Increased the number of shoots and lateral branches as well as shoot dry wt with no effect on root dry weight at 4WAT
- Finished plants had more shoots and branches

Representative Plants at Treatment Time

- Verbena
- Rosemary
- Campanula
- Cosmos

Configure – at 3 WAT

- Number of lateral branches was increased with 300x2 or 600x1 Configure

Configure Phytotoxicity – 4 wk Grow Out

- Increased branching
- Distorted leaves at 4 wk after potting

- Plugs had significantly fewer branches and less shoot dry weight than untreated control plants
Configure: Key Points on Plugs

- Improves plug quality and appearance at 2 or 4 WAT so apply 2 to 4 weeks prior to shipping
- May reduce root growth of treated plugs, esp. at higher rates or with multiple applications
- Apply after moderate root development; evaluate root growth before multiple applications

**Configure on Perennials** (600 ppm; p≤0.05)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Untreated</th>
<th>BA</th>
<th>WAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaura ‘Siskiyou Pink’</td>
<td>29.8</td>
<td>39.4</td>
<td>4</td>
</tr>
<tr>
<td>Euphorbia ‘Chameleon’</td>
<td>13.5</td>
<td>20.0</td>
<td>6</td>
</tr>
<tr>
<td>Gaillardia ‘Dazzler’</td>
<td>23</td>
<td>153</td>
<td>4</td>
</tr>
<tr>
<td>Heuchera x ‘Raspberry Ice’</td>
<td>11.8</td>
<td>18.1</td>
<td>4</td>
</tr>
<tr>
<td>Lobelia cardinalis</td>
<td>7.3</td>
<td>12.9</td>
<td>4</td>
</tr>
<tr>
<td>Penstemon ‘Husker Red’</td>
<td>6.2</td>
<td>7.7</td>
<td>4</td>
</tr>
<tr>
<td>Lycnhsis ‘Vesuvius’</td>
<td>3.1</td>
<td>5.3</td>
<td>4</td>
</tr>
<tr>
<td>Veronica ‘Icicle’</td>
<td>2.5</td>
<td>3.6</td>
<td>2</td>
</tr>
<tr>
<td>Coreopsis ‘Zagreb’</td>
<td>43.2</td>
<td>98.8</td>
<td>2</td>
</tr>
<tr>
<td>Leucanthemum x ‘Alaska’</td>
<td>9.5</td>
<td>14.9</td>
<td>2</td>
</tr>
</tbody>
</table>

**Gaura ‘Siskiyou Pink’**

- Increased number of shoots per pot at 4 WAT
  - Control 5 vs. Configure 7.3 shoots/plt
- Also increased lateral branching of shoots at 4 WAT
  - Control 29.8 vs. Configure 39.4 branches per pot

**Branching Options for Perennials**

- Both Configure and Augeo enhance branching
- Evaluate timing and specific crop responses to reduce phytotoxicity, especially in plug trays

**Sumagic**

**Use Label for Vegetable Transplants**

- Now approved for application to fruiting vegetable transplants
  - Eggplant, Groundcherry, Pepino, Pepper, Tomatillo, Tomato
- Applications will result in more compact transplants with thicker stems

Joyce Latimer
Sumagic

- Keys for use.
  - Follow label recommendations (www.valent.com)
  - Recommended spray concentration range is between 2 to 10 ppm.
  - Make uniform applications at 2 qts/100 sq ft
  - Initial application at the 2 to 4 true leaf stage
  - Sequential applications possible at lowest rate, but no later than 14 days after the 2 to 4 true leaf stage
  - Total amount applied can not exceed 10 ppm.

Sumagic on Tomato:
Southern Recommendations

- Based on three cultivars, no field trials
- Earlier applications have greater effect
- Make initial Sumagic spray at 1.0 to 2.5 ppm at 2 weeks after sowing
- Make up to three additional applications (same rates) at 7-day intervals
- Do not apply rates higher than 5 ppm spray

Schnelle & Barrett GPN Magazine, Nov. 2009

---

Sumagic on Vegetables:
Northern Recommendations

- To control stem extension in young vegetable transplants, a Sumagic foliar spray should be applied when seedlings have developed cotyledons
- If necessary, a second application could be made when seedlings develop two true leaves
- Suggests Sumagic spray rates of 2.5 to 5.0 ppm for pepper and tomato, and greater than 5 ppm for eggplant.

---

Piccolo 10XC

- Fine Americas is introducing a more concentrated form of their paclobutrazol PGR Piccolo.
  - The new formulation is 10 times stronger.
  - Smaller/ more convenient package size:
    - 1 qt. Piccolo 10xc = 2.5 gal. Piccolo
  - Overcomes the potential settling problems associated with all paclobutrazol formulations.

---

Piccolo 10XC

- Trials throughout the U.S. by university researchers found similar efficacies with both Piccolo and Piccolo 10XC.
  - Label approved in Virginia.
  - Expected availability by Spring 2011
Delphinium ‘Black Knight’

Height differences not significant but significant reductions in plant width

Piccolo on Monarda ‘Raspberry Wine’

Height and width significantly less than control only at 2WAT

Topflor

- Active ingredient is flurprimidol
- Activity
  - Foliar spray – target rates similar to paclobutrazol
  - Drenches – target rates similar to uniconazole

Early Drench - Poinsettias

Jim Barrett, UFL

Rates
- Bonzi 0.1 – 0.2 ppm
- Topflor 0.05 - 0.1 ppm

Applied as needed - No cutoff date
Early – option of drench or spray
Try first on strong growing varieties

Joyce Latimer
ConTego

- Active ingredient is s-ABA
  - A naturally occurring hormone found in plants.

- S-ABA signals stomata to close, thus:
  - Reduces water loss and controls water usage by the plant.
  - This reduced transpiration delays wilting.

- Expected availability by Spring 2011

- Sprays (+ Sprinkler):
  - Up to 2000 ppm ConTego
  - 2 to 3 quarts per 100 sq.ft.

Summary

- Expanded opportunities with PGRs.
  - Exciting new options for enhancing branching and increasing the shelf life of plants.
  - Growers now have a PGR registered for vegetable transplants.
  - The reformulation of Piccolo 10XC overcomes the settling out challenge which occurs with all paclobutrazol formulations.

- These new options will make your PGR toolbox even better.