Plant Growth Regulators to Increase Branching

Joyce Latimer  Dave Barcel
Virginia Tech  OHP
Blacksburg VA  Genesee, WI.

Lateral Branching Methods

- Mechanical methods
- Chemical approach “PGRs”
  - Non hormone & Hormone based products.

Lateral Branching Methods

- Mechanical methods
- Chemical approach “PGRs”
  - Non hormone & Hormone based products.

What is the effect of less Auxin at the meristem or leaf areas?

“This is an example of what happens when you prune branches for the effect of making your plant bushier. Notice I snipped the center branch about a week ago. Back then, those two, side branches were just barely visible. Now they’re doing exactly what I had pruned for—to produce new branches at the same top level where before there was only one. Access to the greatest amount of light by the greatest amount of branches, and therefore bud sites, is a way to ensure hefty harvests in healthy plants.”
Pruning/Pinching

- Physical removal of the actively growing tip.
  - Hard pinch/prune
  - Soft pinch/prune
- Result is a reduced apical dominance.
  - Lower auxiliary buds released
  - More compact growth
  - Rejuvenate growth

Disbudding

- Removal of secondary or lower flower buds.
  - Increases flower size of the primary bloom.
    - Carnations
    - Mums
    - Plate dahlias

Non-PGR...... “PGRs”

- Auxin inhibitors
  - Auxin transport inhibitors.
  - Prevent the flow auxin downwardly from cell to cell.
- Chemical Pinchers
  - Reduced apical dominance through a chemical pinch or cell wall disruption.

Polar auxin transport. Movement of auxin basipetally (from the apex toward the base) through the center of shoots and roots occurs by an iterated movement through cells—inward at the apical membrane and outward at the basal membrane. After auxin reaches the root tip, it moves acropetally (from the base toward the apex) in the cortical tissues.

Auxin Transport Inhibitors
- Cyclanilide
- Napthalam sodium

Cyclanilide: Barcel/Kern 2007
Napthalam sodium

Wounding

- **Girdling**: used on fruit trees to increase fruit size and early harvest.
- **Mechanical brushing**: used on vegetable plants to reduce plant height. Activity based on the release of ethylene from wounded tissue.

Chemical Pinching Agents

- **Chemical Pinching Agents**: The active ingredients are the methyl-esters of fatty acids. (Off Shoot O)
  - Reduces apical dominance
  - Works like a chemical pinch
  - "The emulsion kills the rapidly growing shoot tips of the plant while leaving the remainder of the plant essentially unaffected. The effect is similar to manual removal of the tip".

Fatty Acid Compounds

- **Fatty Acid Compounds**: Augeo works on the cell wall
  - Uptake is through leaf tissues or through root uptake.
  - The active ingredient, Dikegulac, induces cell lysis or cell wall collapse and begins to leak cell contents*.
  - Effect is like a chemical pinch, decreased apical dominance, release of lower bud initiation and increasing shoot.

Verbena: Augeo @ 0-400-800-1600 PPM

Chemical Approach to Branching

- Goal is to improve plant architecture.

Increase Branching

- PGRs to substitute for pinching
- Pinching labor intensive
- Pinching delays growth and bloom
- PGRs improve quality and may control growth

Enhancement of Branching

- Apply or activate plant hormones
- Activate dormant buds
- Stimulate formation of adventitious buds
- Axillary buds grow out normally

Florel Brand Pistill (Monterey Chemical)

- Ethylene releasing compound
- Absorbed by leaves
- Delays flowering
  - Excessive at high rates
- Enhances branching
- Used on stock plants, hanging baskets, pansies
- Broad label

Florel on Geranium

- To increase branching
- To enhance plant form
- Also delays flowering

Joyce Latimer and Dave Barcel
February 2011
Multiple Applications of Florel

- 'Designer Red'; Florel at 350 ppm

Florel on Begonia Cuttings

- Increased branching, flowers removed

Florel on Lantana camara

- Increased branching in plug flat
- Elimination of flowers during propagation

Configure (Fine Americas)

- 6-BA (promotes cell division)
- Label use on Christmas Cactus to promote vegetative branching (June to July) and increase flower bud count (September)
- Labeled for hosta and Echinacea
- Supplemental label allows evaluation on additional crops

Christmas Cactus: BA Sprays

- Increase branching

Christmas Cactus (100 ppm)

- Increases branching
**Christmas Cactus**  
*Increases flower buds*

**Configure on Hosta ‘Ginkgo Craig’**

- 8WAT, increased branching >4WAT
- Control 4.5 vs. 8.8 with 1000ppm Config

**Branching of Hosta Cultivars***

<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

**Configure: Key Points for Hosta**

- **Spring applications:**
  - Actively growing with good root growth
  - Multiple applications of 500 to 1000 ppm
- **Summer/Fall applications:**
  - June/July planted hostas
  - Treat when resume active growth
  - Roots to the edge of the pot
  - Multiple applications of 1000 to 1500 ppm
  - Repeat Configure application(s) in Spring

**BA on Echinacea ‘Ruby Star’**

- 6-BA (Exilis, Fine Americas)
- 6 WAT
- Increased branching
  - (5 vs.11.6)

**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>Doubledeker</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>
Configure on Perennials \((600 \text{ ppm}; p \leq 0.05)\)

<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 '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>Lychnis '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>

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

Margaret G. Tackett  
Department of Horticulture, Virginia Tech

**Why Increase Plug Branching?**

- To improve plant architecture  
- To provide growth regulation  
- To improve plug quality  
- To reduce production time

**Why Increase Plug Branching?**

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**Final Number of Basal Branches**

Echinacea purpurea 'White Swan' at 8 WAP

- Control  
- 600 ppm

Echinacea purpurea 'White Swan' at 4 WAP  
- Control  
- 600 ppm
Configure on Herbaceous Perennial Plugs

- 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

**Plant Materials**

- Aster ‘Professor Anton Kippenberg’
- Campanula punctata ‘Cherry Bells’
- Cosmos atrosanguineus
- Verbena bonariensis ‘Lollipop’
- Rosmarinus ‘Hill Hardy’
- Veronica spicata ‘Goodness Grows’

**Treatments and Rates**

- Configure sprays
  - 0, 300x1, 300x2 (day 0 and 2 WAT), 600x1 ppm
- Cuttings treated when roots on all 4 sides
- Harvested at 2 & 3 or 4 weeks after treatment

**Representative Plants at Treatment Time**

**Configure Phyto – 1 WAT**

- Phytotoxicity at 1 WAT
- Significant tip burn

- Aster ‘Professor Anton Kippenberg’
Configure Phytotoxicity

Cosmos atrosanguineus

1 WAT  2 WAT

Configure Phytotoxicity – 4 wk Grow Out

Cosmos atrosanguineus

- Distorted leaves at 4 wk after potting

Untreated 300x2

Configure at 4 WAT

Campanula punctata 'Cherry Bells'

- No significant differences in branching or growth of plugs or grow out plants

Untreated 300x1 300x2 600x1

Configure – at 4 WAT

Rosmarinus 'Hill Hardy'

- Increased leaders (C 1.3 vs Trt 3.8) and lateral branches (C 17 vs Trt 20 to 24) and shoot and root dry wt

Untreated 300x1 300x2 600x1

Configure – 4 wk grow out

Rosmarinus 'Hill Hardy'

- Differences in numbers of leaders or branches were no longer significant
- Shoot dry wts were reduced 25-30% in higher treatments
- Root dry wts were reduced by all treatments (up to 40%)

Untreated 300x1 300x2 600x1

Configure – at 3 WAT

Verbena bonariensis 'Lollipop'

- Number of lateral branches was increased with 300x2 or 600x1 Configure
- Root dry weight was not affected

Untreated 300x1 300x2 600x1
Configure – at 4 WAT

- All Configure treatments increased basal branching at 2 and 4 WAT
  - C 2.3 vs. Trt 5.0 to 9.3

- Increased shoot dry weight of plugs treated with 300x2 Configure.
- Root dry weight not affected by Configure

Configure – 4 wk Grow Out

- Plants showed little difference in branching or dry weights except 300x2 had reduced root dry wt

Configure – Keys for Use on Plugs

- Test new crops for phyto especially at plug stage, e.g. aster, cosmos, verbena?
- Severely damaged plugs do NOT grow out of it e.g., aster
- Need more info on timing of applications

WOW!
WOW is:
- Packers won the Super Bowl
- Atlanta has more snow than Genesee WI
- WOW, my plants look thicker & fuller..........  

AUGEKO Plant Growth Regulator/Enhancer

dikegulac-sodium
sodium 3,3'-4,6-bis-O-(1-methylethylidene)-α-L-xylo-2-hexulofuranosonate

Active ingredient pronounced: di-kē-gūl-āk ˈsō-ðē-am.

Products for lateral branch development

A. PGR class- Cytokinins
   1. Configure
   2. BAP-10

B. PGR class- Ethylene
   1. Florel or Pistil Brand Florel

C. PGR class- Cyclohexaketone
   1. Augeo

Augeo...... a Plant Enhancer
- Typical PGR height or growth control is not our focus with Augeo.
- Augeo works by increasing branches, shoot’s, stems, buds and flowers, a thicker & fuller plant.
- OK, so what plants does it work on?
  Well here is what we know so far......
  Woody type plants-Dave Barcel
  Herbaceous Plants- Joyce Latimer

Augeo Testing Rates

- Woody Plants
  - Trees: 800-1600-3200 PPM
  - Shrub: 400-800-1600 PPM

- Herbaceous Plants
  - Bedding, Potted, Perennials etc:400-800-1600 PPM
  - Apply early post transplant, 1 wk.
  - Plugs & Liners, early results suggest:400-800 PPM
  - Apply post true leaf stage mid to late plug program
Sugar Maple-Baileys, OR.

Sugar maple, 0 DAT, Goal is to increase branching in the crown.

Augeo 4 MAT sugar maple

(Left) 400PPM-800PPM-1600 PPM-UTC (right)

Bailes MN seedbed testing
Grower Picks "WOW's" in BOLD.

Prunus makii -
Cornus racemosa ++ 1200+1
Rosa woodsii ++ 1800
Contoneaster ++ 600 or 1200+2
Prunus virginiana -
Amalancer sp -
Prunus besi ++ 1200+1
Prunus tomentosa ++ 1800
Prunus merritima + all rate better than UTC
Acer ginila'flame ++ 1200+.5
Ribes aurium -
Viburnum lentago – except the drench at 1200+2 was grower
pick ++
Cornus alterinofolia –
Syringa ritscolata –
Buffalo berry ++ 1200+.5
Viburnum lantanum -
Gary Keever, Auburn.

"Response to Augeo varied with species and concentration, but Augeo promoted new shoot growth on all species tested, except camellia.

**Blueberry:** +
**Nuttall oak:** +++
**Camellia:** -
**Knockout rose:** +
**Azalea:** ++

Augeo promoted new shoot development in blueberry, Nuttall oak, Knockout rose, and azalea, but not camellia. Temporary foliar chlorosis or slight necrosis was typical following Augeo application, and only in camellia was it severe enough to adversely affect plant appearance 18 WAT. Symptoms on camellia were those of classic overdose indicating lower concentrations should be tested in the future.

Dr. Gary Keever, Auburn, 2010; Nuttall Oak.

Dr. Gary Keever, Auburn.

**Azalea Growth Response 5 WAT**
Dr. Gary Keever, Auburn. 2010

Azaleas are a WOW plant
Woodburn Nursery, OR.

Azalea Response 47 DAT
Woodburn N, OR.

# Shoots

Scrub

Azalea ‘Gibraltar’ 4 MAT UTC 1600 PPM 31%

Erca, 4 MAT, Woodburn Nursery.
Another WOW

Woodburn Nursery

Pieris japonica + 400 but GS of pruning finished best
Blueberry ‘blue sky’ 1600 looked good early all finished similar
Azalea gibralter ++ 1600
Azalea mary poppins +800 and GS of pruning
Erica sp. ++ 800
Azalea stuardsonia ++ 400-800-1600
Skimia sp. +1600 but chlorosis GS pruning best pick
Azalea florist sp. + 800, 1600 also good but significant yellowing
Rhody nova zembla +800 or 1600 good bud set but GS pruned best pick

Kraemer Nursery, OR.

Kraemer Nursery, OR.

Potentilla, 4 MAT

Spirea, 4 MAT
Customer Feedback

“At this time the verdict on Augeo is far from known. I have been very impressed with its ability to switch on lateral buds in a predictable way. Adventitious root formation has been interesting to observe and I doubt it will prove deleterious to final crop presentation. Root growth has also been interesting to note, on some genera improved root branching has occurred.”

cheers
Scott Rose

Agastache ‘Golden Jubilee’ a seed grown selection. The terminal shoot tip is an inch above the soil line and there are over 6 shoots suckering at soil level. This cultivar is challenging to produce Augeo 400 PPM liner stage

Atrimmec on Clematis

- New branches showed cluster habit
- Best rate 800 ppm
- 4 week delay in growth
- No phytotoxicity

Atrimmec – Clusters on Clematis

- Suppressed leader lengths
- 800 ppm increased number of branches
Atrimmec on Perennials

- Increased branching
- Some reduction in height
- Thinner leaves

Verbena rigida

Control 1600 ppm

Atrimmec on Bearberry

- Applied in September (in Georgia)
- Resulted in increased branching of Spring growth

Atrimmec on English Ivy

- Applied in December (in Georgia)
- Resulted in increased branching of Spring growth

Atrimmec on Hypericum

- Applied in December (in Georgia)
- Increased branching of Spring growth
Augeo on *Gaillardia* ‘Gallo Yellow’

- Low rate increased branching
- Control 24.5 vs. 400 ppm 45.3 branches
- Rates >800 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 (delayed flowering)
- 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
Joyce Latimer and Dave Barcel
February 2011

**Augeo on Coleus Royal Glissade**

- Control
- Applied once
- Applied twice + 500 ppm Florel
- Florel

**Royal Glissade**

- Control
- Augeo 1600 ppm twice

**Royal Glissade**

- Control
- 500 ppm Florel
- 500 ppm Florel + 800 ppm Augeo

**Iresine Purple Lady**

- Control
- 400 ppm Augeo
- 400 ppm Augeo + 500 ppm Florel

**Iresine Purple Lady**

- Control
- 400 ppm Augeo twice
Joyce Latimer and Dave Barcel
February 2011

Control Augeo 1 application 1 wk after transplant Lantana 'New Gold' A WOW

Control Augeo 800 ppm twice Calibrachoa, Another WOW

Control Augeo 400 ppm Verbena, yep, another WOW

Control Augeo 800 ppm Prestige Early Red (no pinch) Day 7 and 14
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
- Trial starting point: 400 to 800 ppm foliar spray. Apply sufficient volume to wet the foliage
  - (2 qts /100 sq ft)
- Plants should be stress-free.

Augeo on Plugs

- Aster ‘Professor Anton Kippenberg’
- Campanula punctata ‘Cherry Bells’
- Cosmos atrosanguineus
- Verbena bonariensis ‘Lollipop’
- Rosmarinus ‘Hill Hardy’
- Veronica spicata ‘Goodness Grows’

Treatments and Rates

- Augeo sprays (ppm)
  - 0, 400, 800, 1600
- Florel 500 ppm
  - Spray and/or drench
- Cuttings treated when roots on all 4 sides
- Harvested at 2 & 3 or 4 weeks after treatment

Representative Plants at Treatment Time
Augeo Phyto – 2 WAT

- 1600 ppm Augeo caused early phyto – stunting, yellowing
- Plants grew out normally

Augeo – 3 WAT

- Only 1600 ppm Augeo increased branching moderately (Ctrl 18 vs. 23 on plants treated with 1600 ppm)
- Florel had no significant effects

Augeo – 3 WAT

- Augeo reduced plant ht and shoot dry weight; no reduction in root dry weight.

Augeo – 3 wk Grow Out

- No significant differences in finished plants

Augeo – 3 wk Grow Out

- No significant differences in finished plants

- 800 ppm increased branching slightly with no effect on shoot or root dry wt
- Florel had no significant effect
Augeo Phyto – 2 WAT

- Stunting, chlorosis, twisted leaves

Augeo – 3 WAT

- Only 1600 ppm Augeo increased number of branches
- Florel had no effect

Augeo – 3 WAT

- Leaders
  - C 3.4 vs. Trt 4.8
- Branches
  - C 17.6 vs. Trt 23.3
- Reduced shoot dry wt 25%
- Increased root dry wt 64%

Augeo – 3 wk Grow out

- Increased leaders and branches persisted in plants treated with 1600 ppm Augeo; reduced shoot dry weights.
- Florel had no effect.

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

Augeo – 4 wk Grow Out

- Augeo (800 & 1600) increased numbers of leaders (C 11 vs. Trt 14-15) & branches (C 46 vs. Trt 56-64).
- No effect on shoot or root dry wt
Joyce Latimer and Dave Barcel
February 2011

**Augeo Phyto (?) – 3 WAT**
- Augeo caused twisting of leaves but plants grew out of symptoms in grow out phase

**Augeo – 3 WAT**
- Augeo increased branching: C 1.3 vs. Trt 9-12
- Florel also increased branching (5)

**Augeo – 4 wk Grow Out**
- Augeo (800 & 1600) increased branching (C 28 vs. 32 – 38)
- Florel reduced branching (18)

**Augeo – 2 WAT**
- All Augeo treatments increased branching but the 800 and 1600 ppm treatments caused excessive stunting – plants did not grow out.
- 400 ppm increased branching C 1.0 vs. Trt 4.5

**Augeo – 4 WAT**
- 400 ppm Augeo increased branching C 1.0 vs. 8.0)
- Florel increased branching (C 1.0 vs. 4.1 to 4.8) 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
- Florel drench reduced shoot and root dry wt.
Augeo – Keys for Use on Plugs

- 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
- Trial starting point: 400 to 800 ppm foliar spray.
- Appears to have no effect on root growth but apply to rooted cuttings
- New studies to look at second application at transplant

Table 1: Bedding, Flowering and Foliage Plants

<table>
<thead>
<tr>
<th>Plant</th>
<th>Rate Range</th>
<th>ppm</th>
<th>Use</th>
<th>Amount</th>
<th>Use, Augeo ppm</th>
<th>ppm, ppm Augeo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azalea</td>
<td>800 to 1500 ppm</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>170</td>
<td>100 ppm, 170 ppm</td>
</tr>
<tr>
<td>Calibrachoa</td>
<td>800 to 1500 ppm</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>170</td>
<td>100 ppm, 170 ppm</td>
</tr>
<tr>
<td>Euphorbia</td>
<td>800 to 1500 ppm</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>170</td>
<td>100 ppm, 170 ppm</td>
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<tr>
<td>Gazania</td>
<td>800 to 1500 ppm</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>170</td>
<td>100 ppm, 170 ppm</td>
</tr>
<tr>
<td>Salvia</td>
<td>800 to 1500 ppm</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>170</td>
<td>100 ppm, 170 ppm</td>
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<tr>
<td>Vinca minor</td>
<td>800 to 1500 ppm</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>170</td>
<td>100 ppm, 170 ppm</td>
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</tbody>
</table>

Current Augeo Label

Label additions for Augeo based on 2010 research.

Bedding plant, Flowering and Foliage plants.
- Catharanthus roseus: 1600 PPM
- Calibrachoa sp.: 800 PPM
- Euphorbia German White ‘hip hop’: 800 PPM
- Bucoppa sp.: 800 PPM
- Salvia sp.: 400 – 800 PPM
- Alyssum sp.: 3200 PPM
- Gazania sp.: 3200 PPM
- Vinca minor: 1600 – 3200 PPM
**Shrub Plants**
- Erica sp. (Heather) 800 PPM
- Spirea sp. 400 PPM
- Blueberry sp. 1600-3200 PPM
- Rose 'knockout' 1600-3200 PPM
- Barberry sp. 1600 PPM
- Prunus tomentosa 1800 PPM
- (Nanking cherry) seedlings 1200 PPM
- Prunus besseyi 1200 PPM
- (Sand cherry) seedlings* 1200 PPM
- Acer gililma flame 1200 PPM
- (Ginila maple) seedlings* 1200 PPM
- Escallonia sp. 1600-3200 PPM
- Lonicera sp. (Honeysuckle) 4800 PPM
- Trachelospermum sp. (Star jasmine) 3200 PPM

*Addition of Fascination PGR (Valent USA) enhanced branching effects. (0.5 PPM to 2 PPM)

**Trees**
- Quercus durata (Nuttall oak) 1600 PPM
- Morus alba (White Mulberry) 3200 PPM
- Podocarpus (Buddhist pine) 3200 PPM
- Ficus nitida (Laurel fig) 3200 PPM

**The Wow List To Get You Started**
- Cornus racemosa ++ 1200+1
- Rosa woodsii ++ 1800
- Contoneaster ++ 600 or 1200+2
- Prunus besi ++ 1200+1
- Prunus tomentosa ++ 1800
- Prunus meritima + all rate better than UTC
- Acer ginila’flame ++ 1200+.5
- Viburnum lantago – except the drench at 1200+2 was grower pick ++
- Buffalo berry ++ 1200+.5
- Blueberry: +
- Nuttall oak: +++

**Helping Customers With AUGEO**
1. Discuss what plants they need to improve
   Trees, Shrubs, Herbaceous plants
   Plug & Liner or Finish

2. Suggest rates to test
   Trees: 800-1600-3200 PPM
   Shrubs: 800-1600-3200 PPM
   Herbaceous-finish: 400-800-1600 PPM
   Herbaceous-plug/liner: 400-800 PPM; ~1600?

3. Suggest Trial lay out
   Map out the trial
   4 treatments × 10 plants = 40 plants per genera
   Data to collect
   # of shoots or % improvement vs. UTC
   Height
   Bloom effect (count, delay)
   Overall quality
### Simple AUGEIO Trial

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### Split Plot-- 1 application vs. 2 applications (1-2 Wk interval)

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### AUGEO Rates

- **400 PPM= ¼ fl oz per 1 gallon water**
- **800 PPM = ½ fl oz per 1 gallon water**
- **1600 PPM = 1 fl oz per 1 gallon water**
- **3200 PPM = 2 fl oz per 1 gallon water**

Apply as a foliar spray (one side then the other) at 2 qt/100 ft²
Drench rates yet to be tested but 10:1 was not enough in 2008

- Plug/Liner: 6 week program then early week 3
- Finish: 1 week after transplant
- Trees: spring or post spring leaf out.

### Plug/Liner Program 6-8wk | Finish Program 8-10wk

### PGR Calculators
- **Online: New Hampshire / NCSU**
  - [http://extension.unh.edu/Agric/AGGHFL/AGGHFL.htm](http://extension.unh.edu/Agric/AGGHFL/AGGHFL.htm)
- **OHP PGR calc.**
- **New Apple app program for**
  - iPhone
  - iPod
  - iPad
- **3G, 3GS or 4 iphone.**
- **Available at the Apple App store for free.**

### OHP PGR Calc.

- **Labels, MSDS, PIB, Rates**
- **Augeo**
- **B-Nine**
- **Cycocel**
- **Paczol**

### Product Information
Data Input and Calculations

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Drench Calculations