Branching Agents on Herbaceous Perennial Plugs

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Chemical Approach to Branching
Goal is to improve plant architecture

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

Chemical Approach to Branching

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

Echinacea ‘Doubledecker’

- 600 ppm Configure (BA)
- Control 1.2 vs. Configure 4.6 breaks at 4 WAT

Application Timing (Margaret Tackett)

- 600 ppm Configure applied 0, 1, 2, 3, weeks after planting
- Echinacea purpurea ‘White Swan’ at 4 WAP
- Improved pot fill with earlier applications

Why Increase Plug Branching?

- To improve plant architecture
- To provide growth regulation
- To improve plug quality
- To reduce production time
Augeo (OHP, Inc.)

- Active ingredient dikegulac-sodium
- Marketing as a branching agent – works as a chemical pinching agent, thus decreasing apical dominance and increasing lower bud initiation.
- Broad label for spray applications
- Excellent response with fuchsia, lantana, petunia, verbena

Augeo – Keys to 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
- Apply to well-rooted, actively growing plants
- Plants should be stress free
- Apply sufficient volume to wet the foliage (2 qt/100 sf)

Configure (Fine Americas, Inc.)

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

Configure – 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

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 Begonia Cuttings

- Increased branching, removed flowers
**Nature of Study**

- Plants arrived as unrooted cuttings
- Dipped in 1000 ppm IBA
- Rooted under mist until roots visible on all 4 sides of plug

**Plugs – Day 0**

- Agastache
- Gaura
- Salvia
- Lavandula
- Leucanthemum

**Nature of Study**

- Treatments were applied to six-packs of plugs
- Branching agents studied:
  - Augeo
    - One application of 400, 800 or 1600 ppm
  - Configure
    - One application of 300 ppm
    - Two applications of 300 ppm (2nd application two weeks after first)
    - One application of 600 ppm
  - Florel
    - One application of 500 ppm as either a spray or drench

**Methods**

- Measurements included:
  - Plant height
  - Average plant width
  - Lateral branches and leaders or basal branches
  - Ratings of phytotoxicity
  - Flowering status,
  - Root and shoot dry weights

Data were collected at 0, 2, and 3-4 weeks after treatment (WAT)
Plants were then transplanted and grown out for an additional 4 weeks

**Plants Studied**

- Agastache ‘Purple Haze’
- Aster ‘Professor Kippenburg’
- Campanula ‘Cherry Bells’
- Cosmos atrosanguineus
- Delosperma ‘Table Mountain’
- Gaura lindheimeri ‘Siskiyou Pink’
- Lavandula x intermedia ‘Provence’
- Leucanthemum x superbum ‘Snowcap’
- Phlox paniculata ‘Bright Eyes’
- Rosmarinus officinalis ‘Hill Hardy’
- Salvia nemorosa ‘May Night’
- Sedum spectabile ‘Autumn Joy’
- Verbena bonariensis ‘Lollipop’
- Veronica ‘Goodness Grows’

**Agastache ‘Purple Haze’**

- Common name giant hyssop
- Herbaceous perennial hardy in zones 6-9
- Tested with Configure
Configure on *Agastache*

- 40% increase in lateral branches
- Root dry weight reduced 40% at 3WAT

Configure on *Agastache ‘Purple Haze’*

- Reduction in root dry weight of plugs did not affect appearance of finished plants after 4 wk grow out

Aster ‘Anton Kippenburg’

- *Symphyotrichum novi-belgii ‘Professor Anton Kippenburg’*
- Common name michaelmas daisy
- Herbaceous perennial hardy in zones 4-8
- Tested with Augeo, Configure and Florel
- Not responsive to Florel

Augeo on Aster

- 40% increase in leaders and 30% increase in branches in plants treated with 1600 ppm at 3 WAT
- Significant decrease in width and height

Configure on Aster

- Significant phytotoxicity at 1 WAT
- Significant tip burn
- Did NOT grow out of damage at 3 WAT

*Campanula punctata ‘Cherry Bells’*

- Common name spotted bellflower
- Herbaceous perennial hardy in zones 5-7
- Tested with Augeo, Configure and Florel
- Not responsive to Configure or Florel
**Augeo on *Campanula punctata***

- 800 ppm Augeo increased branching with no effect on shoot or root dry weight

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**Configure on *Campanula***

- No significant differences in branching or growth

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**Augeo on *Cosmos atrosanguineus***

- Only 1600 ppm Augeo increased numbers of branches (30%) and leaders (40%), reduced shoot dry wt and increased root dry wt at 3 WAT. Florel had no effect.

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**Augeo – 3 wk Grow Out***

- No significant effects on finished plants (4 wk after grow out)

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**Cosmos atrosanguineus***

- Common name chocolate cosmos
- Herbaceous perennial hardy in zones 7-9
- Tested with Augeo, Configure and Florel
- Not responsive to Florel

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**Augeo on *Cosmos atrosanguineus***

- Grow out (3 wk): Increased leaders and branches persisted in plants treated with 1600 ppm Augeo with no effect on shoot or root dry weights
Configure on *Cosmos*

- Treatment caused distorted leaves

*Cosmos atrosanguineus*

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**Delosperma cooperi ‘Table Mountain’**

- Common name pink ice plant
- Herbaceous perennial hardy in zones 5-9
- Ongoing studies with Ageo and Configure

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**Gaura lindheimeri ‘Siskiyou Pink’**

- Common name gaura
- Herbaceous perennial hardy in zones 5-8
- Tested with Configure

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**Configure on Gaura**

- Increased shoots and lateral branches with no effect on root dry weight at 4WAT

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**Lavandula x intermedia ‘Provence’**

- Common name lavender
- Herbaceous perennial hardy in zones 5-8
- Tested with Configure
Configure on *Lavandula*

- 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 *Leucanthemum*

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

Configure on *Phlox paniculata* ‘Bright Eyes’

- Common name garden phlox
- Herbaceous perennial hardy in zones 4-8
- Ongoing trials with Augeo and Configure

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**Rosmarinus officinalis 'Hill Hardy'**
- Common name: rosemary
- Herbaceous perennial hardy in zones 7-10
- Tested with Augeo, Configure and Florel

**Augeo on Rosmarinus 'Hill Hardy'**
- Augeo increased numbers of leaders (150-350%) and branches (20%). Leaders (c 1.6 vs. 4 to 7 with Augeo; branches c 20 vs. 23 to 25). 1600 ppm reduced SDW, not RDW; 4 WAT

**Configure on Rosemary**
- Leaders and lateral branches were increased with all treatments
- Root dry weight increased

**Salvia ‘May Night’**
- Common name: wood sage
- Herbaceous perennial hardy in zones 4-8
- Tested with Configure

**Configure on Salvia**
- 300 mg·L⁻¹ once or twice increased basal branching 40%, no effect on root weight at 4WAT
- No effect on finished plants
**Sedum ‘Autumn Joy’**
- Common name autumn stonecrop
- Herbaceous perennial hardy in zones 2-9
- Ongoing trials with Augeo and Configure

**Configure on Sedum ‘Autumn Joy’**
- Treatment caused distorted leaves at 3 WAT; no symptoms at grow out

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**Verbena bonariensis ‘Lollipop’**
- Common name butterfly verbena
- Herbaceous perennial hardy in zones 7-10
- Tested with Augeo, Configure and Florel

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

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

**Augeo on Verbena**
- After 4 wk grow out, Augeo (800 & 1600) increased branching (C28 vs. 32 – 38).
- Florel reduced branching (18).
**Configure on Verbena**

- Number of lateral branches was increased with 300x2 or 600x1 Configure at 3 WAT
- Root dry weight was not affected

**Veronica spicata ‘Goodness Grows’**

- Common name speedwell
- Herbaceous perennial hardy in zones 3-8
- Tested with Augeo, Configure and Florel

**Augeo and Florel on Veronica**

- At 4 WAT, 400 ppm Augeo increased branching (Untreated 1.0 vs. treated 8.0)
- Florel increased branching (C 1.0 vs. 4.1 to 4.8)
- Root dry wt not affected

**Augeo on Veronica spicata**

- After 4 wk grow out, all Augeo treatments increased branching but the 800 and 1600 ppm treatments caused excessive stunting – plants did not grow out.
- Florel (spray or drench) increased branching without reducing plant growth.

**Configure on Veronica**

- All Configure treatments increased basal branching at 2 and 4 WAT
  - C 2.3 vs. Trt 5.0 to 9.3
- Root dry weight not affected
Configure on Veronica

After 4 wk grow out, plants showed few differences in branching or dry weights except 300x2 had reduced root dry wt.

Branching Agent Phytotoxicity

- **Augeo**
  - Verbena - distorted leaves - plants grew out normally
- **Configure**
  - Aster - significant tip burn
  - Cosmos - distorted leaves
  - Sedum - distorted leaves - grew out normally
- Florel - no phyto

Summary of Branching Effects

<table>
<thead>
<tr>
<th>Plant</th>
<th>Configure</th>
<th>Augeo</th>
<th>Florel</th>
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</thead>
<tbody>
<tr>
<td>Agastache</td>
<td>40% increase</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Aster</td>
<td>Phyto-tip burn</td>
<td>30% increase at 1600 ppm</td>
<td>No effect</td>
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<tr>
<td>Campanula</td>
<td>No effect</td>
<td>40% increase at 800 ppm</td>
<td>No effect</td>
</tr>
<tr>
<td>Cosmos</td>
<td>Phyto - distorted leaves</td>
<td>30% increase</td>
<td>No effect</td>
</tr>
<tr>
<td>Delosperma</td>
<td>Ongoing trials</td>
<td>Ongoing trials</td>
<td>NA</td>
</tr>
<tr>
<td>Gaura</td>
<td>20% increase</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Lavandula</td>
<td>20% increase at 300x2 or 600x1 ppm</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Summary of Branching Effects con’t.

<table>
<thead>
<tr>
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<th>Configure</th>
<th>Augeo</th>
<th>Florel</th>
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</thead>
<tbody>
<tr>
<td>Leucanthemum</td>
<td>100% increase</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Phlox</td>
<td>Ongoing trials</td>
<td>Ongoing trials</td>
<td>NA</td>
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<tr>
<td>Rosemary</td>
<td>40% increase at 300x2 or 600x1 ppm</td>
<td>20% increase at 400 or 800 ppm</td>
<td>NA</td>
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<tr>
<td>Salvia</td>
<td>35% increase at 1 or 2 apps. of 300 ppm</td>
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<td>NA</td>
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<tr>
<td>Sedum</td>
<td>Ongoing trials</td>
<td>Ongoing trials</td>
<td>NA</td>
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<tr>
<td>Verbena</td>
<td>70%-140% increase</td>
<td>600-800% increase</td>
<td>250% increase</td>
</tr>
<tr>
<td>Veronica</td>
<td>100%-200% increase</td>
<td>Over 100% increase</td>
<td>600% increase</td>
</tr>
</tbody>
</table>

Does Configure Reduce Root Growth?

- Three of eleven crops showed reduced root dry wt of finished plugs
  - Agastache
  - Leucanthemum
  - Lavandula
- Finished plant quality not affected for these crops
- Configure effects on plug root development do not appear to affect finished plant quality
- Augeo did not reduce root wt of plugs

Do Branching Agents Affect Final Plant Performance?

- Plug performance was generally enhanced by branching agents
- Some crops showed improvement in final plant quality (gaura, lavandula, rosemary, verbena, veronica)
- Except for phytotoxic effects on specific crops, we have seen no negative effects of plug-applied branching agents on finished plant quality
Summary

- Branching agents can improve branching during plug production
- Decreases in rooting do not affect finished plant quality
- Branching agents have phytotoxic effects on some crops
- Branching agents have limited activity in some crops which indicates a value in reapplying branching agents to the plants shortly after transplanting plugs to finished containers.

Augeo – Sedum ‘Autumn Joy’

- Multiple applications on responsive plants may enhance branching; take care with chlorosis (phyto)

Special thanks to:

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http://www.horticulture.vt.edu/floriculture

Questions?