Phytotoxicity and Efficacy of Fascination
(6-Benzyl Adenine + Gibberellic Acid)
for Enhanced Branching of
Vervain (Verbena canadensis ‘Homestead Purple’)

By

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Linda Dodge
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Ron Lane
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Project: Interregional Research Project #4
Project Number 23190A – August 3, 2004

Acknowledgements: Ahmet Gulcu

Donors/Supporters:
CDFA Minor Crops Research Grant, Project 2: Enhancement of the Western Region IR-4 Program to Address California Needs
Green Leaf Perennials, Lancaster, PA

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Davis, CA 95616
http://envhort.ucdavis.edu/ir4
1. INVESTIGATOR (Name, Address, Phone#):
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   Department of Environmental Horticulture
   University of California
   One Shields Ave.
   Davis, CA 95616
   Ph 530-752-7198
   FAX 530-752-1819
   Email: jhlieth@ucdavis.edu

LOCATION OF TRIAL:
TRIAL TYPE:(check one) __FIELD  ___CONTAINER  ___GREENHOUSE  ___INTERIORSCAPE

2. PESTICIDE:
   COMMON NAME: 6-Benzyl Adenine + Gibberellic Acid A₄ A₇.  FORMULATION: 1.8% + 1.8% (w/w)
   BATCH NO.:
   PRODUCT: Fascination
   EPA REG. NO. 27135  MFG: Valent

3. USE INFORMATION:
   COMMON NAME  SCIENTIFIC NAME
   PLANT: Vervain  Verbena canadensis 'Homestead Purple'
   REASON: enhanced branching of potted crops
   SOIL TYPE OR TYPE OF POTTING MIX: UC Mix
   % SAND 35  % SILT  % CLAY  % OM 65  % pH 6.5
   SEEDING DATE  EMERGENCE DATE  TRANSPLANTING DATE 5/25/04
   PLANT OR POT SPACING 6”  ROW SPACING 6”  POT SIZE 4-inch
   PLOT SIZE 50 sq. ft.  EXPERIMENTAL DESIGN randomized complete block  NO. OF REPS 9
   (3 blocks)

4. APPLICATION PARAMETERS:
   TYPE OF APPLICATION: foliar
   NO. OF APPLICATIONS 2  APPLICATION TYPE manual spray bottle
   NOZZLE TYPE/SIZE  NOZZLE PRESSURE  DELIVERY RATE
   CALIBRATION DATE(S)

5. APPLICATION SUMMARY:

<table>
<thead>
<tr>
<th>APPL.DATE</th>
<th>RATES (ppm)*</th>
<th>GROWTH STAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/22/04</td>
<td>0, 125 (0.5X), 250 (1X), 500 (2X)</td>
<td>4 weeks post-transplant</td>
</tr>
<tr>
<td>7/13/04</td>
<td>0, 125 (0.5X), 250 (1X), 500 (2X)</td>
<td>7 weeks post-transplant</td>
</tr>
</tbody>
</table>

*Be sure to provide units
6. RAINFALL/IRRIGATION RECORDS:
   INCLUDE RAINFALL/IRRIGATION INFORMATION (printouts, IR-4 forms, etc.)
   Plants were watered as needed (at least once daily) with half-strength Hoagland's solution

7. OTHER PESTICIDES, FERTILIZER, LIME AND ADJUVANTS USED:
   PRODUCT                AMOUNT            DATE
   Orthene + Sanmite       6/23/04           
   Orthene + Heritage      6/30/04           
   Talstar F               7/08/04           
   Pylon                   7/21/04           
   Flagship                7/29/04           

8. NARRATIVE SUMMARY OF METHODS AND RESULTS: (Use more pages if needed)

Materials and Methods

Plant Material and Culture. Young plants of Verbena canadensis ‘Homestead Purple’ were received from Yoder Bros. on 5/24/04. These were transplanted to 4-inch pots containing UC Mix on 5/25/04 and maintained in a greenhouse under natural day length for 4 weeks until the experiment began on June 22, 2004. Prior to the experiment, the plants were pruned to heights of 7-12 cm and widths of 11 to 17 cm. For the experiment, the plants were transferred to a greenhouse under natural day length with day/night temperatures of 82°F/65°F (28°C/18°C) (Figure 1). The plants were watered as needed (at least once daily) during the 6-week experiment with half-strength Hoagland’s solution. Applications of pesticides as part of a normal pest management program were made as needed (see No. 7 above).

Experimental Procedure. Thirty-six plants were randomly chosen and individually tagged for treatment with 0, 125 ppm (0.5X), 250 ppm (1X) or 500 ppm (2X) Fascination with 9 replicates per treatment. These dosages were prescribed in an IR4 Fascination protocol dated 6/04 (Appendix A). The plants received the first of two foliar spray applications of the designated treatments on June 22, 2004 using manual spray bottles to spray leaves to runoff. The second application was made 21 days later on July 13, 2004. The plants were arranged in a randomized complete block design with 3 blocks and 3 treatment replicates per block. Phytotoxicity and efficacy measurements were taken at day 0 (June 22, 2004), day 21 (July 13, 2004) and day 42 (August 3, 2004). Phytotoxicity evaluations were based on a numerical rating scale of 0 (no injury) to 10 (complete kill) (Table 1). Efficacy measurements consisted of overall plant height (cm) and width (cm). In addition, the number of branches per plant was counted.

Statistical Analysis. The data were analyzed using Proc GLM of the Statistical Analysis System (SAS). The phytotoxicity and change in mean value from the starting plant height and width were analyzed for significant differences using t-tests.

Results

Phytotoxicity. Fascination at rates of 250 and 500 ppm resulted in an increased phytotoxicity index for Verbena canadensis ‘Homestead Purple’ at 6 weeks (Figure 2, Appendix B). All phytotoxicity index means were less than 1.0.

Efficacy. Fascination at an application rate of 500 ppm increased plant height for V. canadensis ‘Homestead Purple’ at both 3 and 6 weeks (Figures 3 and 3a, Table 2). Fascination had no effect on plant width (Figure 4, Table 2). Fascination at an application rate of 500 ppm increased branching on V. canadensis ‘Homestead Purple’ at 6 weeks (Figure 5, Appendix C). Fascination at all application rates had fewer flowers at 6 weeks for V. canadensis ‘Homestead Purple’ than control (Figure 6, Appendix C).
Discussion

Phytotoxicity. Fascination caused no significant phytotoxicity on V. canadensis ‘Homestead Purple’ at any of the tested application rates. While there was a significant increase in phytotoxicity index for the 250 and 500 ppm application rates at 6 weeks, the phytotoxicity observed did not decrease plant marketability.

Efficacy. The highest rate of Fascination applied (500 ppm) was effective at increasing the height and branching of V. canadensis ‘Homestead Purple’. Fascination had no effect on plant width (Figure 4, Appendix C). There was a decrease in number of flowers per plant with any of the application rates of Fascination and this could be considered a detriment to marketability.

9. GOOD RESEARCH PRACTICE STATEMENT:
   I acknowledge that I have read and followed the IR-4 Research protocol and completed this trial following good agricultural practice, or reported any deviations (note any changes from authorized protocol in narrative).

SIGNATURE ______________________________ DATE

PRINCIPAL INVESTIGATOR
Table 1. Numerical plant damage rating scale used for phytotoxicity determinations.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description of plant damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No damage</td>
</tr>
<tr>
<td>1</td>
<td>No visible damage but unintended (non-permanent) impact</td>
</tr>
<tr>
<td>2</td>
<td>Slight leaf/tissue damage (curling leaves, necrosis, etc.)</td>
</tr>
<tr>
<td>3</td>
<td>Marginal chlorosis on some leaves (damage on up to 10% of plant)</td>
</tr>
<tr>
<td>4</td>
<td>10% – 20% of plant damaged</td>
</tr>
<tr>
<td>5</td>
<td>Significant damage to much of plant (30% - 40%)</td>
</tr>
<tr>
<td>6</td>
<td>40% – 60% of plant damaged</td>
</tr>
<tr>
<td>7</td>
<td>Chlorosis or necrosis on most of plant (60% - 70%)</td>
</tr>
<tr>
<td>8</td>
<td>Abscised leaves, branch dieback</td>
</tr>
<tr>
<td>9</td>
<td>Tissue severely damaged (80% - 100% of plant)</td>
</tr>
<tr>
<td>10</td>
<td>Complete kill</td>
</tr>
</tbody>
</table>

Figure 1. Greenhouse temperatures during the experiment to evaluate the effects of Fascination on *Verbena canadensis* ‘Homestead Purple’.
Figure 2. Phytotoxicity Index for *Verbena canadensis* ‘Homestead Purple’ treated with 0, 125, 250 or 500 ppm Fascination. SE bars shown. n=9. See Table 1 for explanation of values.
Figure 3. Plant height of *Verbena canadensis* ‘Homestead Purple’ treated with 0, 125, 250 or 500 ppm Fascination. SE bars shown. n=9.

Table 2. Average increase (cm) of height and width for plants in the control and Fascination treatments for *Verbena canadensis* ‘Homestead Purple’. The letters indicate significant differences between different treatments ($P < 0.05$). Means ± SE (n=9).

<table>
<thead>
<tr>
<th></th>
<th>Height increase</th>
<th>Width increase</th>
</tr>
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<tr>
<td></td>
<td>over 3 weeks</td>
<td>over 6 weeks</td>
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<tr>
<td>Control</td>
<td>4.22 ± 1.76 b</td>
<td>7.33 ± 2.62 b</td>
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<tr>
<td>125 ppm</td>
<td>4.00 ± 1.43 b</td>
<td>10.11 ± 1.64 b</td>
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<tr>
<td>250 ppm</td>
<td>6.11 ± 1.66 b</td>
<td>9.56 ± 1.99 b</td>
</tr>
<tr>
<td>500 ppm</td>
<td>13.22 ± 2.51 a</td>
<td>19.89 ± 1.88 a</td>
</tr>
</tbody>
</table>
Figure 3a. Representative plants of *Verbena canadensis* ‘Homestead Purple’ 6 weeks after 2 foliar applications of 0, 125, 250 or 500 ppm Fascination (Week 0 and Week 3).
Figure 4. Plant width of *Verbena canadensis* ‘Homestead Purple’ treated with 0, 125, 250 or 500 ppm Fascination. SE bars shown. n=9.
Figure 5. Number of branches per plant for *Verbena sempervirens* ‘Homestead Purple’ treated with 0, 125, 250 or 500 ppm Fascination. SE bars shown. n=9.
Figure 6. Number of flowering branches per plant at day 42 for *Verbena sempervirens* ‘Homestead Purple’ treated with 0, 125, 250 or 500 ppm Fascination. SE bars shown. n=9.
Appendix A:

**GROWTH ENHANCEMENT OF ORNAMENTAL PLANTS WITH FOLIAR APPLICATIONS OF 6-BENZYL ADENINE + GIBBERELLIC ACID (FASCINATION)**

**Date:** 6/04

**Ornamental Protocol Number:** 670

**General label directions:** Refer to product label or Technical Bulletin.

**Research program:**

**Pest(s)/Plants:** Plants other than labeled species.

**Pesticide (common name and trade name):** Refer to treatment list shown below.

**For label, material & if needed, spray surfactant contact:**

Valent USA, Joe Chamberlin, 770-985-0303, jcham@valent.com

- Plot size (must be adequate to reflect actual use condition)
- Replicates Minimum of 4 Treatment Units
- Controls (untreated controls to be included in all experiments)

**Application:** **FASCINATION**

**Dosages:**
- 1/2x 125 ppm or 0.125 pt/5 gal.
- 1x 250 ppm or 0.25 pt/5 gal.
- 2x 500 ppm or 0.5 pt/5 gal.

**Active Ingredient:** 6-benzyl adenine + gibberellic acid (FASCINATION).

**Volume:** Minimum of 100 gal/A.

**Timing:** 2 Applications, 21 day spray interval. Record number of branches and length, then increased branching, increased extension and crop safety at 7, 14, 21 (then 2nd appl.), 28 and 42 DAT.

**Reports:**

- Method of application: Treatments should be applied according to product label instructions. Application equipment consistent with conventional commercial equipment. Report completely on experimental design and method of application. Report plant size height x width before treatment and throughout the experiment.
- **Weather**: Maintain temperature and precipitation (including irrigation) data.
- **Soil type**: Identify soil type used in experimental area.
- **Product**: When submitting data, include EPA registration number of product used.
- **Efficacy**: Data should include percent control as well as an indication that infestation was light, heavy, etc.
- **Phytotoxicity**: Record phytotoxicity data at all rates. Use a 0-10 scale. 0 = No Phytotoxicity 10 = complete kill.

**Please direct questions to:** Dr. Robert M. Herrick, IR-4 Project, 681 US Highway #1 South, North Brunswick, NJ Phone: (732) 932-9575, Ext. 629.
## Appendix B: PHYTOTOXICITY REPORT FORM

### Verbena Data

<table>
<thead>
<tr>
<th>Fascination</th>
<th>Treatment</th>
<th>Block</th>
<th>Rep</th>
<th>6/22/04</th>
<th>7/13/04</th>
<th>8/3/04</th>
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</tbody>
</table>

**NOTE:** DEFINE MEASUREMENT OF PHYTOTOXICITY, OR INDEX OF INJURY (0=NO INJURY, 10=COMPLETE KILL) (See Table 1)
## Appendix C: EFFICACY REPORT FORM

### Verbena Data

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Block</th>
<th>Rep</th>
<th>Date</th>
<th>Height (cm)</th>
<th>Width (cm)</th>
<th># Flowering</th>
<th># Branches</th>
<th># Branches</th>
<th># Branches</th>
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<tbody>
<tr>
<td><strong>Fascination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
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<td>13</td>
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<td>13</td>
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