

Potential for Phytotoxicity of Snapshot 2.5TG
(Isoxaben + Trifluralin) on
Dwarf New Zealand Flax (*Phormium colinsoi*)

By

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Project: Interregional Research Project #4
Project Number 24803A – September 30, 2005

Donors/Supporters:
Suncrest Nursery, Watsonville CA

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Davis, CA 95616
<http://envhort.ucdavis.edu/ir4>

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| PR.NO. : | 24803 |
| TRIAL: | |
| DATE: | 9/30/05 |

IR-4 ORNAMENTAL DATA REPORTING FORM

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|---|--|
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| Location of Trial | University of California, Davis CA |
| TRIAL TYPE: (field, container, greenhouse, etc) | Field Container |
| Chemical - Common Name | Isoxaben + Trifluralin |
| - Formulation | 2.5TG |
| - Batch Number | |
| - Product | Snapshot 2.5TG |
| - EPA Registration Number | 62719-175 |
| - Manufacture | Dow AgroSciences |
| USE INFORMATION | |
| - Plant Common Name | Dwarf New Zealand Flax |
| - Plant Scientific Name | <i>Phormium colinsoi</i> |
| - Pest (s) | Weeds |
| Soil Type or Type of Potting Mix: Grower's Mix | a)%Sand: b)%Silt: c)%Clay: d)%OM: e)%pH: |
| Enter each DATE for: | Seedling: Emergence: Transplanting: |
| Enter each SPACING for: | Plant or Pot: 6 inches Row: 6 inches |
| Enter each SIZE for: | Pot: 1-gallon Plot: 50 sq ft |
| Experimental Design: | Randomized complete block (3 blocks X 3 reps) |
| Number of Reps: | 9 reps total for each treatment |

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APPLICATION PARAMETERS¹

| | |
|---|-------------------------|
| Type of Application: (aerial, ground, foliar, drench, ppi, chemigation, broadcast, directed, etc) | Broadcast over the top |
| Number of Applications: | 2, 30 days apart |
| Application Type: | manual shaker container |
| Nozzle Type/Size: | |
| Nozzle Pressure: | |
| Delivery Rate: | |
| Calibration Date(s): | |

APPLICATION SUMMARY

| APPLICATION DATE | RATES (a.i./A) (Be sure to provide units) | Brief Description of Growth Stage (Dormant, New Growth Present, Bud, etc) |
|-------------------------|---|---|
| August 5, 2005 | 0, 2.5, 5, 10 lb. a.i./A | Vegetative, actively growing |
| September 2, 2005 | 0, 2.5, 5, 10 lb. a.i./A | Vegetative, actively growing |

1 RAINFALL/IRRIGATION RECORDS: INCLUDE RAINFALL/IRRIGATION INFORMATION (printouts, IR-4 forms, etc.)

See Table 1 for environmental conditions. The plants were watered daily with tap water using a drip irrigation system delivering 1 gallon per hour.

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OTHER PESTICIDES, FERTILIZER, LIME AND ADJUVANTS USED:

| PRODUCT | AMOUNT | DATE |
|------------------|------------------------|-----------|
| Osmocote 19-6-12 | 0.5 tsp per 6-inch pot | 8/12/2005 |
| Pounce | 0.16 oz/2 gal | 8/26/2005 |
| Marathon II | 2.4 oz/2 gal | 8/26/2005 |

NARRATIVE SUMMARY OF METHODS AND RESULTS:

Materials and Methods

Plant Material and Culture. One-gallon plants of *Phormium colinsoi* were received from Suncrest Nursery on July 26, 2005 and held in an outdoor nursery for 10 days. The 8-week experiment took place in an outdoor nursery and began on August 5, 2005. Environmental conditions during the experiment are summarized in Table 1. Osmocote (19-6-12) controlled release fertilizer was added on August 12, 2005 at the rate of 1 teaspoon per 1-gallon pot. The plants were watered daily during the 8-week experiment using a drip irrigation system delivering 1 gallon per hour. Applications of pesticides as part of a normal pest management program were made as needed (see above).

Experimental Procedure. Thirty-six plants were randomly chosen and individually tagged for treatment with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Snapshot 2.5TG with 9 replicates per treatment. These dosages were prescribed in IR4 Ornamental Protocol 05-001 dated 1/05 (Appendix A). The plants received the first foliar spray application on August 5, 2005 and the second application 4 weeks later on September 2, 2005. The plants were arranged in a randomized complete block design with 3 blocks and 3 treatment replicates per block (Figure 1). Phytotoxicity ratings and plant height and width measurements were taken at day 0, 3, 7, 14, 28, 31, 35, 42 and 56. Visual phytotoxicity evaluations were based on a numerical rating scale ranging from 0 (no injury) to 10 (complete kill) (Table 2). Plant height (cm) was measured from the container soil surface to the top of the leaf canopy.

Plant width (cm) was measured twice along perpendicular lines at the widest part of the plant, resulting in W_1 and W_2 . For each observation a canopy volume index was calculated so as to be able to determine if canopy volume was affected by the application of Snapshot 2.5TG. The calculation was made as $H*W_1*W_2$, where H is the height and W_1 and W_2 are two width measurements. The usefulness of this index is based on the fact that many of the models for such a volume calculation are of the form $a*H*W_1*W_2$. The constant "a" depends on the assumption of the shape of the canopy. Since analyses of variance are scale-independent, the conclusion will thus be for the volume of the plant canopy.

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, width and volume index were analyzed for significant differences using t-tests.

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Results

All plants suffered from a case of leaf tip burn already at the time when the plants were received from the propagator. This blemish was present at the outset and persisted throughout the trial. Thus this resulted in an initial phytotoxicity index value observation of at least 1 for all plants. Where additional initial damage was present, a phytotoxicity index value of 2 was registered. Thus in this trial we investigated whether further damage was caused by the herbicide.

Phytotoxicity index values did not change appreciably over the trial period in any of the treatments (Table 3, Figure 2, Appendix B). The only date on which a significant difference was noted between the treatments was at Week 8; on this date the greatest phytotoxicity increase was found in the control and the mean value was only 0.8 greater than the average initial phytotoxicity index for the control. Overall, all phytotoxicity index means were 2.0 or lower, indicating that the magnitude of the blemishes were at an acceptable level throughout the trial. In any case, Snapshot did not cause any additional foliar damage.

Phormium plants in all treatments grew from 3 to 8 cm in height during the course of the trial (Table 4, Figures 2 and 3, Appendix B). A treatment effect was noted, with plants in the 2X and 4X treatment growing 7.9 and 7.7 cm respectively, which was significantly more than in the control or 1X treatment, which grew 3 and 3.1 cm, respectively. Width also expanded but no significant treatment effect was noted in the width increase. The greater height growth in the Snapshot treatment also resulted in the volume index being greater. The pictures of the plants bear out this difference.

Discussion

Snapshot caused no phytotoxicity on *Phormium*. In fact, we found that the plants in the 2x and 4X treatments grew significantly better than the plants in the control or 1X treatments. This suggests that Snapshot had a beneficial effect on *Phormium*.

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 (PRINCIPAL INVESTIGATOR) _____

Date Completed:

If submitted, using e-mail, please provide e-mail address and send confirming receipt.

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Table 1. Environmental conditions during the experiment to evaluate the phytotoxicity of Snapshot 2.5TG on *Phormium colinsoi*.

| Date | Sol Rad (Ly/day) | Max Air Temp (°F) | Min Air Temp (°F) | Avg Air Temp (°F) | Avg Vap (mBars) | Avg wSpd (MPH) | Precip (in) | CIMIS ETo (in) | Avg Rel Hum (%) | Dew Pt (°F) |
|-----------|------------------|-------------------|-------------------|-------------------|-----------------|----------------|-------------|----------------|-----------------|-------------|
| 8/5/2005 | 658 | 100.1 | 58.8 | 78.2 | 14.1 | 3.6 | 0 | 0.26 | 43 | 53.7 |
| 8/6/2005 | 647 | 102.6 | 57 | 77.7 | 13.8 | 4.2 | 0 | 0.27 | 42 | 53.1 |
| 8/7/2005 | 636 | 101.3 | 59.8 | 78.8 | 14.2 | 4 | 0 | 0.27 | 42 | 53.9 |
| 8/8/2005 | 573 | 92.2 | 59.6 | 73.8 | 14.9 | 4.8 | 0 | 0.23 | 52 | 55.2 |
| 8/9/2005 | 641 | 99 | 57.6 | 75.5 | 14.8 | 4.4 | 0 | 0.26 | 49 | 55.1 |
| 8/10/2005 | 650 | 94.6 | 55.8 | 74.5 | 14 | 4.2 | 0 | 0.26 | 48 | 53.6 |
| 8/11/2005 | 640 | 97.7 | 53.2 | 76 | 13 | 3.6 | 0 | 0.26 | 43 | 51.6 |
| 8/12/2005 | 640 | 97.6 | 57.4 | 75.5 | 13.8 | 4.8 | 0 | 0.27 | 46 | 53.1 |
| 8/13/2005 | 552 | 81.6 | 53.7 | 66.6 | 13.5 | 5.7 | 0 | 0.2 | 61 | 52.6 |
| 8/14/2005 | 613 | 84.7 | 54.3 | 67.1 | 14.2 | 5.9 | 0 | 0.23 | 62 | 53.8 |
| 8/15/2005 | 546 | 81.1 | 56.4 | 69 | 13.9 | 6.6 | 0 | 0.23 | 57 | 53.3 |
| 8/16/2005 | 579 | 94 | 62.3 | 76.1 | 14.7 | 4.8 | 0 | 0.25 | 48 | 54.9 |
| 8/17/2005 | 608 | 89.8 | 55.7 | 70.6 | 13.7 | 5.8 | 0 | 0.25 | 54 | 53 |
| 8/18/2005 | 611 | 79.8 | 54.4 | 65.1 | 14.1 | 8.9 | 0 | 0.23 | 67 | 53.7 |
| 8/19/2005 | 609 | 83.1 | 52.7 | 65.9 | 13.6 | 5.9 | 0 | 0.22 | 63 | 52.8 |
| 8/20/2005 | 608 | 88.8 | 51.3 | 69.7 | 13.1 | 3.9 | 0 | 0.22 | 53 | 51.8 |
| 8/21/2005 | 613 | 91.9 | 53.5 | 71.2 | 13.5 | 4.2 | 0 | 0.24 | 52 | 52.6 |
| 8/22/2005 | 609 | 95.3 | 50.1 | 73.3 | 13.6 | 4 | 0 | 0.24 | 48 | 52.7 |
| 8/23/2005 | 609 | 95.1 | 54.7 | 72.3 | 13 | 5.6 | 0 | 0.25 | 48 | 51.6 |
| 8/24/2005 | 607 | 89.2 | 52.9 | 70.7 | 12.4 | 6.9 | 0 | 0.26 | 48 | 50.2 |
| 8/25/2005 | 601 | 90.2 | 53.1 | 70.8 | 10.1 | 4.5 | 0 | 0.24 | 39 | 44.8 |
| 8/26/2005 | 605 | 95.2 | 52.2 | 73.3 | 9.6 | 4.4 | 0 | 0.25 | 34 | 43.5 |
| 8/27/2005 | 585 | 97.8 | 54.5 | 76.4 | 11.2 | 4 | 0 | 0.25 | 36 | 47.5 |
| 8/28/2005 | 601 | 98.4 | 56.8 | 77 | 11.2 | 4.6 | 0 | 0.26 | 35 | 47.6 |
| 8/29/2005 | 588 | 90.6 | 55.5 | 72.8 | 11.4 | 4.2 | 0 | 0.23 | 41 | 47.9 |
| 8/30/2005 | 587 | 92.9 | 65.4 | 78.3 | 7.6 | 11.9 | 0 | 0.36 | -- | -- |
| 8/31/2005 | 580 | 98.2 | 59.2 | 77.1 | 8.7 | 4.9 | 0 | 0.26 | 27 | 40.9 |
| 9/1/2005 | 568 | 91.7 | 52.8 | 71.2 | 12.4 | 4.6 | 0 | 0.23 | 47 | 50.2 |
| 9/2/2005 | 574 | 87.5 | 51.9 | 67.6 | 12.9 | 4.8 | 0 | 0.21 | 56 | 51.4 |
| 9/3/2005 | 568 | 87.5 | 50.8 | 67.2 | 12.8 | 5.7 | 0 | 0.22 | 56 | 51.1 |
| 9/4/2005 | 552 | 82.5 | 52 | 66.2 | 12.8 | 5 | 0 | 0.19 | 58 | 51 |
| 9/5/2005 | 554 | 87.4 | 50.2 | 68.8 | 11.8 | 3.5 | 0 | 0.2 | 49 | 49 |
| 9/6/2005 | 551 | 86.4 | 51.4 | 66.7 | 11.9 | 4.9 | 0 | 0.21 | 53 | 49.2 |
| 9/7/2005 | 544 | 84.2 | 48.4 | 64.6 | 12.3 | 4.8 | 0 | 0.19 | 59 | 50 |
| 9/8/2005 | 536 | 77.5 | 50.3 | 64 | 12.4 | 7 | 0 | 0.2 | 61 | 50.3 |
| 9/9/2005 | 524 | 73.7 | 53.5 | 62.1 | 12.9 | 9.6 | 0 | 0.19 | 68 | 51.2 |
| 9/10/2005 | 481 | 76.4 | 49.9 | 62 | 11.7 | 5.6 | 0 | 0.17 | 62 | 48.8 |
| 9/11/2005 | 531 | 76.2 | 45.3 | 61.4 | 11.1 | 4.1 | 0 | 0.17 | 60 | 47.3 |
| 9/12/2005 | 520 | 78.2 | 44 | 61.3 | 10.7 | 2.3 | 0 | 0.16 | 58 | 46.3 |
| 9/13/2005 | 521 | 78.5 | 42.8 | 60.6 | 10.7 | 4 | 0 | 0.17 | 59 | 46.4 |
| 9/14/2005 | 505 | 76.3 | 46.7 | 60.6 | 11.9 | 4.5 | 0 | 0.16 | 66 | 49.1 |
| 9/15/2005 | 506 | 81.1 | 46.3 | 62.6 | 11.8 | 3.5 | 0 | 0.16 | 61 | 48.9 |
| 9/16/2005 | 491 | 79.9 | 52.2 | 63.6 | 12.2 | 6.9 | 0 | 0.18 | 61 | 49.7 |
| 9/17/2005 | 486 | 78.1 | 48.7 | 63.4 | 11.9 | 4.4 | 0 | 0.17 | 60 | 49.1 |
| 9/18/2005 | 491 | 83.8 | 46.2 | 65.7 | 9.5 | 3.7 | 0 | 0.18 | 44 | 43.3 |
| 9/19/2005 | 495 | 89.7 | 46.9 | 68.1 | 9.3 | 3.5 | 0 | 0.19 | 39 | 42.5 |
| 9/20/2005 | 458 | 89.6 | 51.4 | 70.3 | 10.5 | 6.2 | 0 | 0.2 | 42 | 45.8 |
| 9/21/2005 | 464 | 86.5 | 54.6 | 67.8 | 12.4 | 4.3 | 0 | 0.17 | 54 | 50.3 |
| 9/22/2005 | 492 | 87.1 | 48.2 | 66.1 | 10.8 | 4 | 0 | 0.18 | 49 | 46.5 |
| 9/23/2005 | 480 | 80.1 | 53.1 | 65.7 | 9.8 | 9.1 | 0 | 0.23 | 45 | 44.1 |
| 9/24/2005 | 479 | 78.5 | 56.2 | 66.6 | 5.9 | 10.1 | 0 | 0.26 | 27 | 31.3 |
| 9/25/2005 | 460 | 82.3 | 52.3 | 66.2 | 6.5 | 5.9 | 0 | 0.2 | 29 | 33.4 |
| 9/26/2005 | 400 | 86.6 | 55.3 | 70 | 9.8 | 4.7 | 0 | 0.18 | 39 | 43.9 |
| 9/27/2005 | 441 | 84.8 | 52.1 | 68.5 | 11.7 | 2.7 | 0 | 0.16 | 49 | 48.7 |
| 9/28/2005 | 463 | 94.1 | 58.6 | 74.6 | 9.1 | 6.4 | 0 | 0.23 | 31 | 42 |
| 9/29/2005 | 451 | 92.4 | 49.6 | 70.8 | 10 | 2.9 | 0 | 0.17 | 39 | 44.5 |
| 9/30/2005 | 438 | 92.2 | 52.8 | 71 | 10.5 | 3.4 | 0 | 0.17 | 40 | 45.8 |

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Table 2. Numerical plant damage rating scale used for phytotoxicity determinations.

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

Table 3. Phytotoxicity ratings over 8 weeks for *Phormium colinsoi* treated with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Snapshot 2.5TG, applied at weeks 0 and 4. Different letters within a column indicate significant differences between treatments (P < 0.05). “Yes”/”No” refer to significant treatment effects at the 5% level. Means ± SE (n = 9)

| Phytotoxicity Effect of Snapshot on Phormium | | | | | | | | |
|---|-------------|----|--------------|----|--------------|----|--------------|-----|
| Phytotoxicity Index Increase from beginning of trial until: | | | | | | | | |
| Treatment | Day 3 | no | 1 week | no | 2 weeks | no | 4 weeks | no |
| 0X | 0.11 ± 0.11 | a | 0.22 ± 0.15 | a | 0.44 ± 0.24 | a | 0.33 ± 0.17 | ab |
| 1X | 0.00 ± 0.00 | a | 0.11 ± 0.11 | a | 0.44 ± 0.18 | a | 0.56 ± 0.18 | a |
| 2X | 0.00 ± 0.00 | a | 0.11 ± 0.11 | a | 0.33 ± 0.17 | a | 0.22 ± 0.15 | ab |
| 4X | 0.11 ± 0.11 | a | 0.33 ± 0.17 | a | 0.56 ± 0.18 | a | -0.11 ± 0.11 | b |
| Phytotoxicity Index increase from beginning of trial until: | | | | | | | | |
| Treatment | | | 5 week | no | 6 weeks | no | 8 weeks | yes |
| 0X | | | 0.33 ± 0.17 | a | 0.22 ± 0.15 | ab | 0.78 ± 0.15 | a |
| 1X | | | 0.33 ± 0.24 | a | 0.44 ± 0.18 | a | 0.56 ± 0.24 | ab |
| 2X | | | 0.22 ± 0.15 | a | 0.22 ± 0.15 | ab | 0.44 ± 0.18 | ab |
| 4X | | | -0.11 ± 0.11 | a | -0.11 ± 0.11 | b | 0.33 ± 0.17 | b |

Table 4. Plant height, width and volume changes over 8 weeks for *Phormium colinsoi* treated with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Snapshot 2.5TG, applied at weeks 0 and 4. Different letters within a column indicate significant differences between treatments (P < 0.05). “Yes”/”No” refer to significant treatment effects at the 5% level. Means ± SE (n = 9)

| Growth Effect of Snapshot on Phormium | | | | | | |
|---------------------------------------|-------------|-----|--------------------|----|-------------------|-----|
| Increase by week 8 of: | | | | | | |
| Treatment | Height (cm) | yes | Average Width (cm) | no | Volume Index | yes |
| 0X | 3.00 ± 1.59 | b | 3.50 ± 0.41 | a | 12250.8 ± 2162.40 | b |
| 1X | 3.11 ± 1.11 | b | 5.81 ± 0.98 | a | 20182.7 ± 3538.08 | ab |
| 2X | 7.94 ± 1.75 | a | 3.47 ± 0.58 | a | 28619.7 ± 5288.85 | a |
| 4X | 7.72 ± 1.85 | a | 5.42 ± 1.38 | a | 32015.9 ± 7804.66 | a |

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Figure 1. *Phormium colinsoi* plants were arranged in a randomized complete block design with 3 blocks and 3 treatment replicates per block for the experiment to evaluate the phytotoxicity of Snapshot 2.5TG.

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Species: *Phormium* -- Material: Snapshot

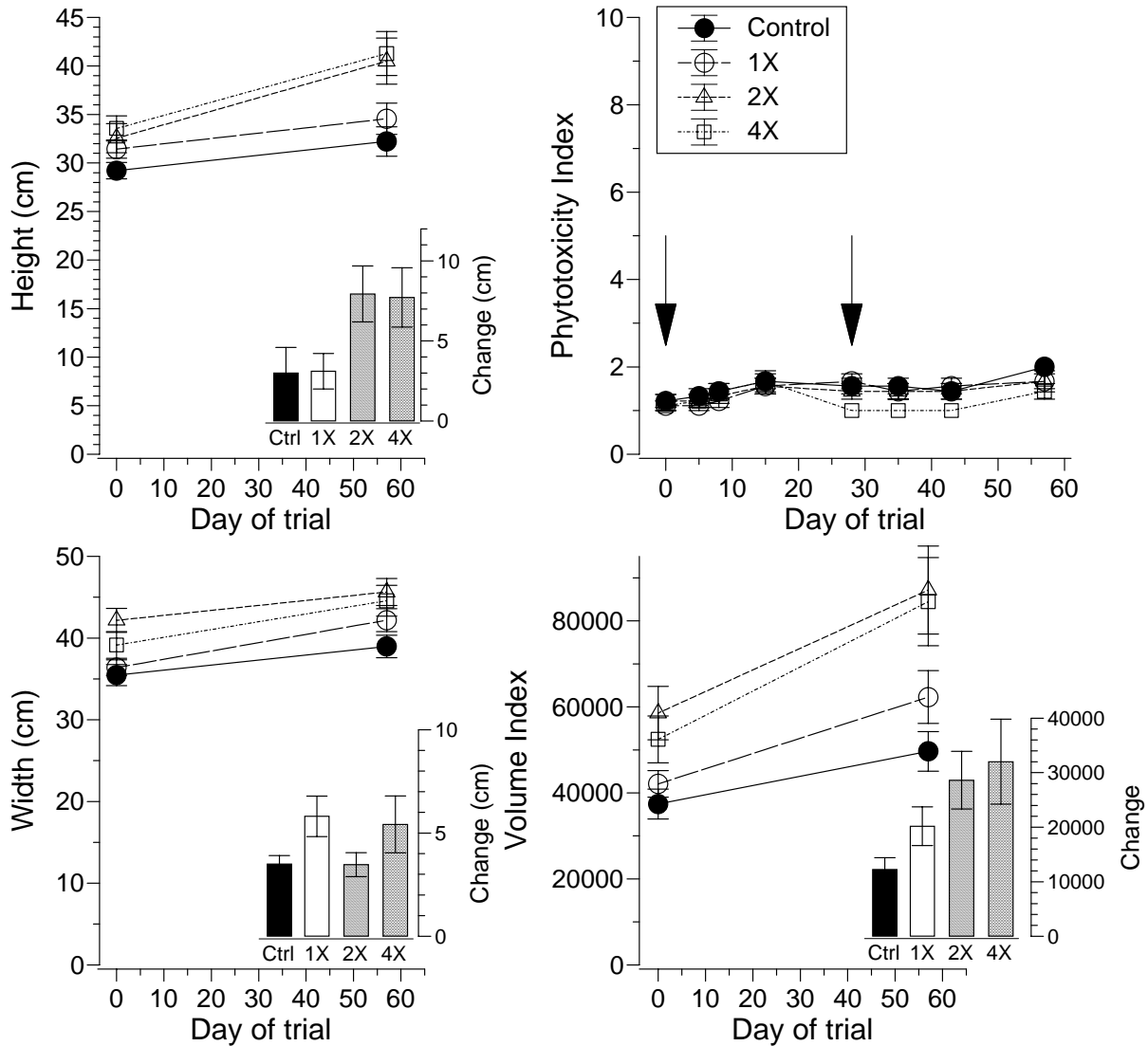


Figure 2. Summary of results for *Phormium colinsoi* treated with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Snapshot 2.5TG, applied at weeks 0 and 4 (arrows). Both means and cumulative changes over time are plotted for phytotoxicity index, plant height, plant width and plant volume index. Histograms show changes over the 8-week trial period. SE bars shown. (n = 9)

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Block A



Block B



Block C

CONTROL 1X 2X 4X

Figure 3. *Phormium colinsoi* plants 8 weeks after treatment with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Snapshot 2.5TG, applied at weeks 0 and 4.

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Appendix A

Phytotoxicity to herbaceous perennial plants with pre-emergent applications of Pendulum, Pennant Magnum, and Snapshot

Ornamental Protocol Number: 05-001

Objective: Determine phytotoxicity of Pendulum, Pennant Magnum, and Snapshot to unlabelled perennial plants commonly grown in nurseries.

Experimental Design:

Plot Size: Must be adequate to reflect actual use conditions.

Replicates: Minimum of 3 replications (preferably 4) with 3 pots per replicate

Application Instructions: Two applications made approximately 4 weeks apart with the first application within 7 days of potting. Plant materials must have broken dormancy prior to first application. For liquid applications, use a minimum of 20 gal per acre. Applications should be made over the top of the plants using application equipment consistent with conventional commercial equipment. Please see table below for instructions for post-application irrigation.

Plant Materials: See attached list of plant materials. Plants grown in field containers are preferred to in-ground.

Evaluations: Record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) at 3, 7, 14, and 28 days after each application. If phytotoxicity is observed in treated plants, take pictures comparing treated and untreated plant material.

Recordkeeping: Keep detailed records of weather conditions including temperature and precipitation, soil-type or soil-less media, application equipment, application volume per acre, irrigation, liner size, plant height & width, and plant growth stage at application and data collection dates.

Treatments:

| Product | Rate | Post-Application Irrigation Instructions |
|---------------------------------------|--------------|---|
| Pendulum 2G (pendimethalin) | 2.0 lb ai/A | Follow with sufficient overhead irrigation to wash Pendulum from the foliage to reduce the chance of injury |
| | 4.0 lb ai/A | |
| | 8.0 lb ai/A | |
| Pennant MAGNUM 7.62EC (s-metalochlor) | 2.5 lb ai/A | Follow with sufficient overhead irrigation to wash Pennant Magnum from the foliage to reduce the chance of injury |
| | 5.0 lb ai/A | |
| | 10.0 lb ai/A | |
| Snapshot 2.5TG (isoxaben+trifluralin) | 2.5 lb ai/A | Follow with sufficient overhead irrigation to wash Snapshot from the foliage to reduce the chance of injury |
| | 5.0 lb ai/A | |
| | 10.0 lb ai/A | |
| Untreated | -- | -- |

For labels, materials, and any required adjuvants contact:

Pendulum - BASF, Kathie Kalmowitz, 919-785-9659, email: kalmowk@basf-corp.com

Pennant Magnum - Syngenta, Dave Ross, 336-632-6411, david.ross@syngenta.com

Snapshot - Dow AgroSciences, Mike Melichar, 317-337-4982, mwmelichar@dow.com

Reports:

Report must include a brief summary paragraph of results, a summary table with appropriate statistical analyses, a section on experimental design and materials and methods, with raw data and recordkeeping information as listed above included as appendices. If pictures were taken, please include them.

An electronic report is preferred but not required. If the report is provided electronically, the basic report can be sent in MS Word or WordPerfect, the recordkeeping information as pdf or other electronic documents, and the raw data in MS Excel or other suitable program such as ARM.

Please direct questions to: Cristi Palmer, IR-4 HQ, Rutgers University, 681 US Hwy 1 S, North Brunswick, NJ 08902-3390, Phone 732-932-9575 x629, palmer@aesop.rutgers.edu OR Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-488, E-mail: evvea@comcast.net.

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Appendix B

| Phytotoxicity Report Form for Snapshot on Phormium | | | | | | | | | | | | | | | | | |
|--|-------|-----|-----------------------|-----|-----|-----|-----|-----|----------------|----------------|-----------------|----------------------|----------------|-----------------|----------------------|------|------|
| Treatment | Block | Rep | Phytotoxicity at week | | | | | | | | | Plant Size at week 0 | | | Plant Size at week 8 | | |
| | | | day | | | day | | | Height (cm) | Width1 (cm) | Width 2 (cm) | Height (cm) | Width1 (cm) | Width 2 (cm) | | | |
| | | | 0 | 3 | 1 | 2 | 4 | 3 | | | | | | | 5 | 6 | 8 |
| Control | A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 34 | 37 | 43 | 35 | 44 | 45 |
| Control | A | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 27 | 31 | 27.5 | 23.5 | 34 | 35 |
| Control | A | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 30 | 39 | 33 | 30 | 40 | 37 |
| Control | B | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 27.5 | 33 | 28 | 35 | 35 | 30 |
| Control | B | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 30 | 34 | 38 | 29 | 37 | 44 |
| Control | B | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 30 | 44 | 34 | 30 | 44 | 41 |
| Control | C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 25 | 35 | 30 | 34.5 | 35.5 | 34 |
| Control | C | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 30 | 40 | 34 | 39 | 43 | 40 |
| Control | C | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 29.5 | 39 | 39 | 34 | 43 | 40 |
| Mean | | | 1.2 | 1.3 | 1.4 | 1.7 | 1.6 | 1.6 | 1.4 | 2.0 | | 29.2 | 36.9 | 34.1 | 32.2 | 39.5 | 38.4 |
| 1X | A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 26 | 32 | 33 | 29.5 | 40 | 35 |
| 1X | A | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 31 | 33 | 30 | 28 | 41.5 | 41 |
| 1X | A | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 33 | 39 | 35 | 37 | 49 | 35 |
| 1X | B | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 30 | 37 | 32 | 32 | 36 | 33 |
| 1X | B | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 30 | 41 | 34 | 34 | 50 | 37 |
| 1X | B | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 34 | 41 | 39 | 43 | 55 | 41 |
| 1X | C | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 32 | 40 | 36 | 32 | 49 | 45 |
| 1X | C | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 36 | 41 | 36 | 39.5 | 44 | 44 |
| 1X | C | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 31 | 39 | 37 | 36 | 45 | 39 |
| Mean | | | 1.1 | 1.1 | 1.2 | 1.6 | 1.7 | 1.4 | 1.6 | 1.7 | | 31.4 | 38.1 | 34.7 | 34.6 | 45.5 | 38.9 |
| 2X | A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 35 | 50 | 39 | 50 | 52 | 46 |
| 2X | A | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 30 | 36 | 42 | 34 | 42 | 40 |
| 2X | A | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 35 | 52 | 44 | 44 | 56 | 48 |
| 2X | B | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 28 | 37 | 39 | 35 | 43 | 41 |
| 2X | B | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 35 | 49 | 47 | 49.5 | 49 | 50 |
| 2X | B | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 41.5 | 42 | 45 | 42 | 50 | 46 |
| 2X | C | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 28.5 | 41.5 | 35 | 33.5 | 43 | 45 |
| 2X | C | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 28 | 42 | 30.5 | 31.5 | 37.5 | 36 |
| 2X | C | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 32 | 57 | 31 | 45 | 57 | 40 |
| Mean | | | 1.2 | 1.2 | 1.3 | 1.6 | 1.4 | 1.4 | 1.4 | 1.7 | | 32.6 | 45.2 | 39.2 | 40.5 | 47.7 | 43.6 |
| 4X | A | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 32 | 41.5 | 34 | 33 | 37 | 39 |
| 4X | A | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 36.5 | 48 | 42 | 38 | 53 | 46 |
| 4X | A | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 34 | 52 | 35 | 38 | 41 | 44 |
| 4X | B | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 29 | 39 | 37 | 37.5 | 36 | 44 |
| 4X | B | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 38.5 | 44 | 45 | 45 | 54 | 55 |
| 4X | B | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 32 | 36 | 34 | 37 | 43 | 40 |
| 4X | C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 39 | 35 | 36 | 55 | 46 | 43 |
| 4X | C | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 28 | 29 | 33 | 40 | 40 | 40 |
| 4X | C | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 33 | 43 | 41 | 48 | 47 | 54 |
| Mean | | | 1.1 | 1.2 | 1.4 | 1.7 | 1.0 | 1.0 | 1.0 | 1.4 | | 33.6 | 40.8 | 37.4 | 41.3 | 44.1 | 45.0 |