

Potential for Phytotoxicity of Pennant Magnum 7.62 EC  
(s-Metalochlor) on  
Transvaal Daisy (*Gerbera jamesonii* 'Lambada')

By

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Project: Interregional Research Project #4  
Project Number 24746A – September 23, 2005

Donors/Supporters:  
Terra Nigra Inc., Carpinteria CA

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**IR-4 ORNAMENTAL DATA REPORTING FORM**

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<b>Location of Trial</b>	University of California, Davis CA
<b>TRIAL TYPE:</b> (field, container, greenhouse, etc)	Field Container
<b>Chemical - Common Name</b>	s-Metalochlor
- Formulation	7.62% EC
- Batch Number	
- Product	Pennant Magnum 7.62 EC
- EPA Registration Number	100-950
- Manufacture	Syngenta
<b>USE INFORMATION</b>	
- Plant Common Name	Transvaal Daisy
- Plant Scientific Name	<i>Gerbera jamesonii</i> 'Lambada'
- Pest (s)	Weeds
<b>Soil Type or Type of Potting Mix:</b> UC Mix	a)%Sand: 35 b)%Silt: c)%Clay: d)%OM: 65 e)%pH: 6.5
Enter each <b>DATE</b> for:	<b>Seedling:</b> <b>Emergence:</b> <b>Transplanting:</b> 7/18/2005
Enter each <b>SPACING</b> for:	<b>Plant or Pot:</b> 6 inches <b>Row:</b> 6 inches
Enter each <b>SIZE</b> for:	<b>Pot:</b> 6-inch <b>Plot:</b> 50 sq ft
<b>Experimental Design:</b>	Randomized complete block (3 blocks X 3 reps)
<b>Number of Reps:</b>	9 reps total for each treatment

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**APPLICATION PARAMETERS<sup>1</sup>**

<b>Type of Application:</b> (aerial, ground, foliar, drench, ppi, chemigation, broadcast, directed, etc)	Foliar spray
<b>Number of Applications:</b>	2, 30 days apart
<b>Application Type:</b>	Manual spray bottle
<b>Nozzle Type/Size:</b>	
<b>Nozzle Pressure:</b>	
<b>Delivery Rate:</b>	
<b>Calibration Date(s):</b>	

**APPLICATION SUMMARY**

<b>APPLICATION DATE</b>	<b>RATES (a.i./A)</b> (Be sure to provide units)	<b>Brief Description of Growth Stage</b> (Dormant, New Growth Present, Bud, etc)
July 29, 2005	0, 2.5, 5, 10 lb. a.i./A	Vegetative/flowering, actively growing
August 26, 2005	0, 2.5, 5, 10 lb. a.i./A	Vegetative/flowering, 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.** Liners of *Gerbera jamesonii* 'Lambada' were received from Terra Nigra Nursery on July 15, 2005. These were transplanted to 6-inch pots containing UC Mix on July 18, 2005 and grown on in a greenhouse for 10 days. The 8-week experiment took place in an outdoor nursery and began on July 29, 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 0.5 teaspoon per 6-inch pot. The plants were watered daily during the 8-week experiment with tap water 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 Pennant Magnum 7.62 EC 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 July 29, 2005 and the second application 4 weeks later on August 26, 2005. The plants were arranged in a randomized complete block design with 3 blocks and 3 treatment replicates per block. 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). Because of mechanical damage on the liners during shipment, nearly all plants were given initial damage ratings of 1. Plant height (cm) was measured from the container soil surface to the top of the leaf canopy (excluding flower scapes).

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 Pennant Magnum 7.62 EC. 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

During the first two weeks of the trial no changes in phytotoxicity index were noted for most of the *Gerbera* plants resulting in a uniform index reading of 1.0 for most plants (Table 3, Figures 1 and 2, Appendix B). As a consequence no statistical methods are needed (or possible) to identify that the herbicide had no phytotoxicity effect on any of the plants during this time. By week 4, however, significant (although small) differences in the change in phytotoxicity index were noted. During the second half of the trial, after the second application, further phytotoxicity index value increases were noted in the plants to which Pennant was applied. By week 8 a pattern was evident with ever-increasing degrees of phytotoxicity with increasing dosage of the herbicide. Phytotoxicity symptoms included necrotic patches on leaves and distortion or puckering of new growth (Figure 1).

All *Gerbera* plant growth variables showed a significant negative effect due to Pennant (Table 4, Figures 2 and 3, Appendix B). At the 1X rate, the height increased only 8.1 cm over the trial, compared with 15.3 cm for the control. There was little or no height increase of the plants in the 2X and 4X treatments. The same pattern was evident in plant width increase. Volume index showed the same pattern: the canopy volume increase in the 1X treatment was only 36% of the canopy volume increase of the control while the plants in the 2X and 4X treatments had no increase in canopy volume.

### Discussion

Pennant caused both phytotoxicity and growth suppression on *Gerbera*. The effect is severe at the 2X and 4X rates of application. The effect is less severe at the 1X rate but even at this rate the growth reduction is so severe as to suggest that Pennant is not safe for use on *Gerbera*.

### 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 Pennant Magnum 7.62 EC on *Gerbera jamesonii* 'Lambada'.**

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)
7/29/2005	633	96.2	59.6	75.6	13.4	5.5	0	0.28	44	52.4
7/30/2005	655	98.2	59.3	77.2	14.4	4.6	0	0.27	45	54.3
7/31/2005	675	99.4	57.7	77.5	14.6	4.3	0	0.28	45	54.6
8/1/2005	689	100.7	57.1	77	12.2	5.4	0	0.29	38	49.8
8/2/2005	665	93.3	53.8	72.6	13.3	4.3	0	0.26	49	52.1
8/3/2005	661	94.4	53.4	74.1	13.6	4.6	0	0.27	47	52.8
8/4/2005	654	97.8	56.7	76.3	14.2	3.7	0	0.26	46	53.9
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

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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 *Gerbera jamesonii* ‘Lambada’ treated with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Pennant Magnum 7.62 EC, 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 Pennant on Gerbera								
Phytotoxicity Index Increase from beginning of trial until:								
Treatment	Day 3	(NA)	1 week	(NA)	2 weeks	(NA)	4 weeks	yes
0X	0.00 ± 0.00	a	0.00 ± 0.00	a	0.00 ± 0.00	a	-0.11 ± 0.11	b
1X	0.00 ± 0.00	a	0.00 ± 0.00	a	0.00 ± 0.00	a	0.56 ± 0.24	a
2X	0.00 ± 0.00	a	0.00 ± 0.00	a	0.00 ± 0.00	a	0.56 ± 0.18	a
4X	0.00 ± 0.00	a	0.00 ± 0.00	a	0.00 ± 0.00	a	0.89 ± 0.20	a
Phytotoxicity Index increase from beginning of trial until:								
Treatment	Day 3 of week4	yes	5 week	yes	6 weeks	yes	8 weeks	yes
0X	-0.11 ± 0.11	b	0.00 ± 0.00	c	0.00 ± 0.00	c	0.00 ± 0.00	d
1X	1.00 ± 0.24	a	1.00 ± 0.24	b	1.11 ± 0.20	b	1.22 ± 0.22	c
2X	1.56 ± 0.18	a	1.44 ± 0.18	ab	1.44 ± 0.18	ab	3.22 ± 0.36	b
4X	1.56 ± 0.24	a	1.78 ± 0.22	a	1.78 ± 0.22	a	5.00 ± 0.29	a

**Table 4. Plant height, width and volume changes over 8 weeks for *Gerbera jamesonii* ‘Lambada’ treated with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Pennant Magnum 7.62 EC, 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 Pennant on Gerbera						
Increase by week 8 of:						
Treatment	Height (cm)	yes	Average Width (cm)	yes	Volume Index	yes
0X	15.28 ± 1.49	a	9.19 ± 2.60	a	46298.9 ± 5184.44	a
1X	8.11 ± 2.31	b	5.25 ± 2.33	ab	16796.0 ± 4726.21	b
2X	0.89 ± 1.78	c	-1.14 ± 1.53	c	-4673.0 ± 4741.66	c
4X	-0.44 ± 1.80	c	-0.89 ± 1.85	bc	-2637.6 ± 2740.40	c

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Figure 1. Phytotoxicity symptoms seen on *Gerbera jamesonii* 'Lambada' plants 8 weeks after treatment with 2.5 lb. ai/A (1X rate) at left and 10 lb. ai/A (4X rate) at right of Pennant Magnum 7.62 EC. Foliar spray applications were made at week 0 and week 4. Symptoms included necrotic patches on leaves and distortion or puckering of new growth.

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Species: Gerbera -- Material: Pennant

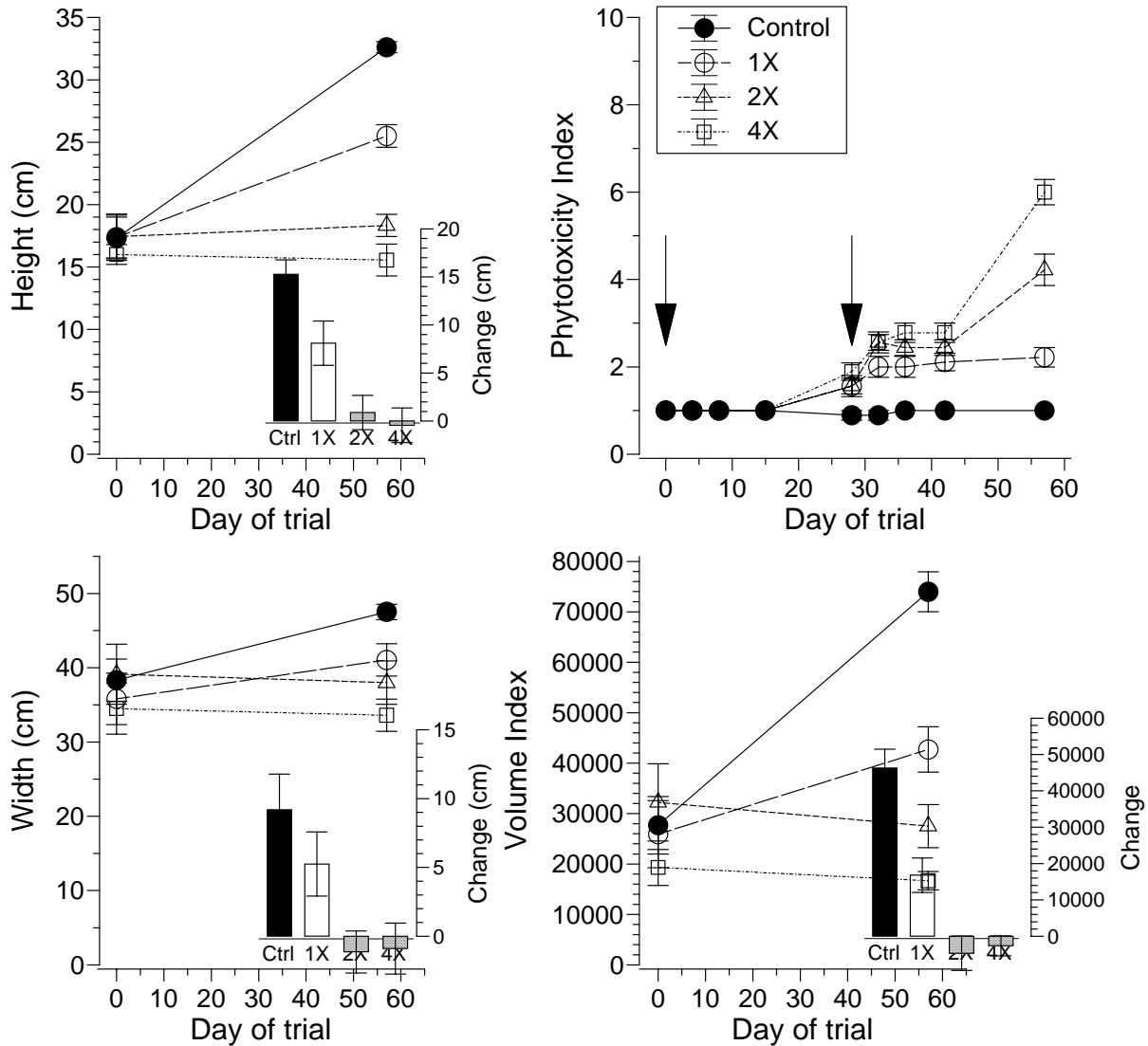


Figure 2. Summary of results for *Gerbera jamesonii* 'Lambada' treated with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Pennant Magnum 7.62 EC, applied at weeks 0 and 4 (arrows). Both means and cumulative changes over time are plotted for phytotoxicity index, plant height, plant width and plant 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. *Gerbera jamesonii* 'Lambada' plants 8 weeks after treatment with 0 (Control), 2.5 (1X), 5 (2X), or 10 (4X) lb. ai/A Pennant Magnum 7.62 EC, applied at weeks 0 and 4.

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## IR-4 ORNAMENTAL DATA REPORTING FORM

### 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
Pennant Magnum 7.62 EC (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](mailto:kalmowk@basf-corp.com)  
 Pennant Magnum - Syngenta, Dave Ross, 336-632-6411, [david.ross@syngenta.com](mailto:david.ross@syngenta.com)  
 Snapshot - Dow AgroSciences, Mike Melichar, 317-337-4982, [mwmelichar@dow.com](mailto: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](mailto:palmer@aesop.rutgers.edu) OR Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-488, E-mail: [evvea@comcast.net](mailto:evvea@comcast.net).

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**Appendix B**

Phytotoxicity Report Form for Pennant on Gerbera																	
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	1	9.5	44	21	30	43	42
Control	A	2	1	1	1	1	1	1	1	1	1	19	51	43.5	34	51	51
Control	A	3	1	1	1	1	1	1	1	1	1	21.5	48.5	48	32	51	46.5
Control	B	1	1	1	1	0	0	1	1	1	1	23.5	42.5	33	32.5	48	42
Control	B	2	1	1	1	1	1	1	1	1	1	18.5	50	22	32	51	43
Control	B	3	1	1	1	1	1	1	1	1	1	16	40.5	24.5	34	49.5	53
Control	C	1	1	1	1	1	1	1	1	1	1	10	30	17.5	32	48	47
Control	C	2	1	1	1	1	1	1	1	1	1	22	59	39	34	55	45.5
Control	C	3	1	1	1	1	1	1	1	1	1	16	37	39	33	42	47
Mean			1.0	1.0	1.0	1.0	0.9	0.9	1.0	1.0	1.0	17.3	44.7	31.9	32.6	48.7	46.3
1X	A	1	1	1	1	1	1	1	1	2	2	26	36	54	25	59	41
1X	A	2	1	1	1	3	3	3	3	3	3	9.5	38.5	25	24	25.5	41
1X	A	3	1	1	1	2	3	2	2	3	3	16	42	23	26	45	43
1X	B	1	1	1	1	2	2	3	3	3	3	12.5	24	21.5	32	35	43
1X	B	2	1	1	1	1	2	1	1	1	1	22.5	56	49	25.5	47	48
1X	B	3	1	1	1	1	2	2	2	2	2	18	49	35	26	53.5	31
1X	C	1	1	1	1	2	2	2	2	2	2	20.5	37	30	22	43	45
1X	C	2	1	1	1	1	2	2	2	2	2	11	19.5	22	25	36	23
1X	C	3	1	1	1	1	1	2	2	2	2	20.5	55	28	24	49	31
Mean			1.0	1.0	1.0	1.0	1.6	2.0	2.0	2.1	2.2	17.4	39.7	31.9	25.5	43.7	38.4
2X	A	1	1	1	1	2	3	3	3	5	5	17	48	51	14.5	48	38
2X	A	2	1	1	1	1	2	2	2	5	5	24	56	48	16	46	40
2X	A	3	1	1	1	2	3	3	3	5	5	11.5	26	15	15.5	27	25
2X	B	1	1	1	1	1	3	3	3	4	4	21	50	48	21	45	46
2X	B	2	1	1	1	1	2	2	2	4	4	21	50.5	30	19.5	47	38
2X	B	3	1	1	1	1	2	2	2	6	6	15	40.5	34	18	39	38
2X	C	1	1	1	1	2	2	2	2	3	3	23	52.5	49	20	43.5	54
2X	C	2	1	1	1	2	3	3	3	3	3	9.5	23	27.5	18	24	30.5
2X	C	3	1	1	1	2	3	2	2	3	3	15	32.5	23	22.5	22	33
Mean			1.0	1.0	1.0	1.0	1.6	2.6	2.4	2.4	4.2	17.4	42.1	36.2	18.3	37.9	38.1
4X	A	1	1	1	1	1	2	2	2	6	6	16	66	22.5	15	60	27
4X	A	2	1	1	1	3	3	3	3	6	6	11.5	25	23	22.5	23.5	27.5
4X	A	3	1	1	1	2	3	3	3	6	6	15.5	48	43	11	40	32
4X	B	1	1	1	1	2	2	3	3	7	7	17.5	30.5	38	16.5	34	31
4X	B	2	1	1	1	2	3	3	3	7	7	16	46	26	11	46	33
4X	B	3	1	1	1	1	1	2	2	7	7	17	36.5	27.5	12	32	33
4X	C	1	1	1	1	2	3	4	4	5	5	20.5	19	24	16	33	17
4X	C	2	1	1	1	2	3	3	3	5	5	14.5	25	22	19	33.5	24
4X	C	3	1	1	1	2	3	2	2	5	5	15.5	54	45	17	38	40.5
Mean			1.0	1.0	1.0	1.0	1.9	2.6	2.8	2.8	6.0	16.0	38.9	30.1	15.6	37.8	29.4