

Potential for Phytotoxicity of Mogeton 25 WP  
(Quinoclamine) on  
Winter Creeper (*Euonymus fortunei* 'Green and Gold')

By

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Project: Interregional Research Project #4  
Project Number 24885A – August 24, 2005

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TRIAL:	1
DATE:	8/24/2005

**IR-4 ORNAMENTAL DATA REPORTING FORM**

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<b>Location of Trial</b>	UC Davis				
<b>TRIAL TYPE:</b> (field, container, greenhouse, etc)	Greenhouse containers				
<b>Chemical - Common Name</b>	Quinoclamine				
- Formulation	Wettable Powder 25%				
- Batch Number					
- Product	Mogeton				
- EPA Registration Number	CAS number 2797-51-5				
- Manufacture	Crompton				
<b>USE INFORMATION</b>					
- Plant Common Name	Winter Creeper				
- Plant Scientific Name	<i>Euonymus fortunei</i> 'Green and Gold'				
- Pest (s) / Pathogen(s) / Weed(s)	Liverworts				
<b>Soil Type or Type of Potting Mix:</b>	<b>% Sand</b>	<b>% Silt</b>	<b>% Clay</b>	<b>% OM</b>	<b>pH</b>
50% Perlite + 50 % UC Mix	15			35	6.5
<b>Enter each DATE for:</b>	<b>Seeding:</b>	<b>Emergence:</b>		<b>Transplanting:</b> 5/25/2005	
<b>Enter each SPACING for:</b>	<b>Plant or Pot:</b> 6 inches		<b>Row:</b> 6 inches		
<b>Enter each SIZE for:</b>	<b>Pot:</b> 6-inch		<b>Plot:</b> 45 feet <sup>2</sup>		
<b>Experimental Design:</b>	Randomized Complete Block				
<b>Number of Reps:</b>	3 blocks X 3reps/block = 9 replicates 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, four weeks apart
<b>Application Type:</b>	Over the top
<b>Nozzle Type/Size:</b>	Manual spray bottles
<b>Nozzle Pressure:</b>	
<b>Delivery Rate:</b>	
<b>Calibration Date(s):</b>	

**APPLICATION SUMMARY**

<b>APPLICATION DATE</b>	<b>RATES (a.i./100 gallons water) (Be sure to provide units)</b>	<b>Brief Description of Growth Stage (Dormant, New Growth Present, Bud, etc)</b>
6/02/2005	0, 2, 4, 8 oz./gal	Vegetative, 1 week post-transplant
6/29/2005	0, 2, 4, 8 oz./gal	Vegetative, 5 weeks post-transplant

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

The plants were watered daily during the 12-week experiment with half-strength Hoagland's solution using a drip irrigation system delivering 1 gallon per hour.

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**OTHER PESTICIDES, FERTILIZER, LIME AND ADJUVANTS USED:**

PRODUCT	AMOUNT	DATE
Pylon	6 mL/4 gal	6/17/2005
Marathon II	4 oz/4 gal	6/17/2005

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

**Materials and Methods**

**Plant Material and Culture.** Young plants of *Euonymus fortunei* 'Green and Gold' were received from Hines Nursery April 7, 2005. These were transplanted into 6-inch pots containing 50% perlite and 50% UC Mix (by volume) on May 25, 2005 and maintained in a greenhouse under natural day length for 5 days until the experiment began on June 2, 2005. For the experiment, the plants were transferred to a greenhouse under natural day length with day/night temperatures of 77°/67°F (25°/19°C) (Figure 1). The plants were watered daily during the 12-week experiment with half-strength Hoagland's solution 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 (1X), 4 (2X), or 8 (4X) oz./gal Mogeton with 9 replicates per treatment. These dosages were prescribed in IR4 Ornamental Protocol 05-004 dated 5/05 (Appendix A). The plants received the first foliar spray application on June 2, 2005 and the second application 4 weeks later on June 29, 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 week 0, 1, 2, 4, 8, and 12. Visual phytotoxicity evaluations were based on a numerical rating scale ranging from 0 (no injury) to 10 (complete kill) (Table 1). Plant height (cm) was measured from the container soil surface to the top of the 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 Mogeton. 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.

**Results**

Phytotoxicity index readings were generally low (less than or equal to 1.0) for all treatments at all times (Table 2, Figure 2, Appendix B). Only on week 4 did we observe slightly elevated levels of the phytotoxicity index but even then, the average values were very small, indicating that the damage level even at the highest rate of Mogeton application was negligible (Figure 3).

Both plant height and width changed substantially for all treatments over the 12 weeks of the trial (Table 3, Figures 2 and

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4, Appendix B). The height increase was significantly smaller for the 4 (2X) and 8 oz/gal (4X) treatments than for the control or 2 oz/gal (1X) treatment. Similarly, the plant width increase was significantly reduced by the two higher rates of Mogeton application. Even the mean values of height increase and width increase were smaller for the 2 oz/gal (1X) treatment compare to the control plants, but the variation in the data were such that this was not found to be significantly different at either the 5% or 10% level.

**Discussion**

Although there were few foliar symptoms on *Euonymus fortunei* 'Green and Gold' plants attributable to Mogeton, there was a substantial reduction in the amount of plant growth at all rates of application of the material. The conclusion is that Mogeton should not be used on this slow-growing crop.

**GOOD RESEARCH PRACTICE STATEMENT:**

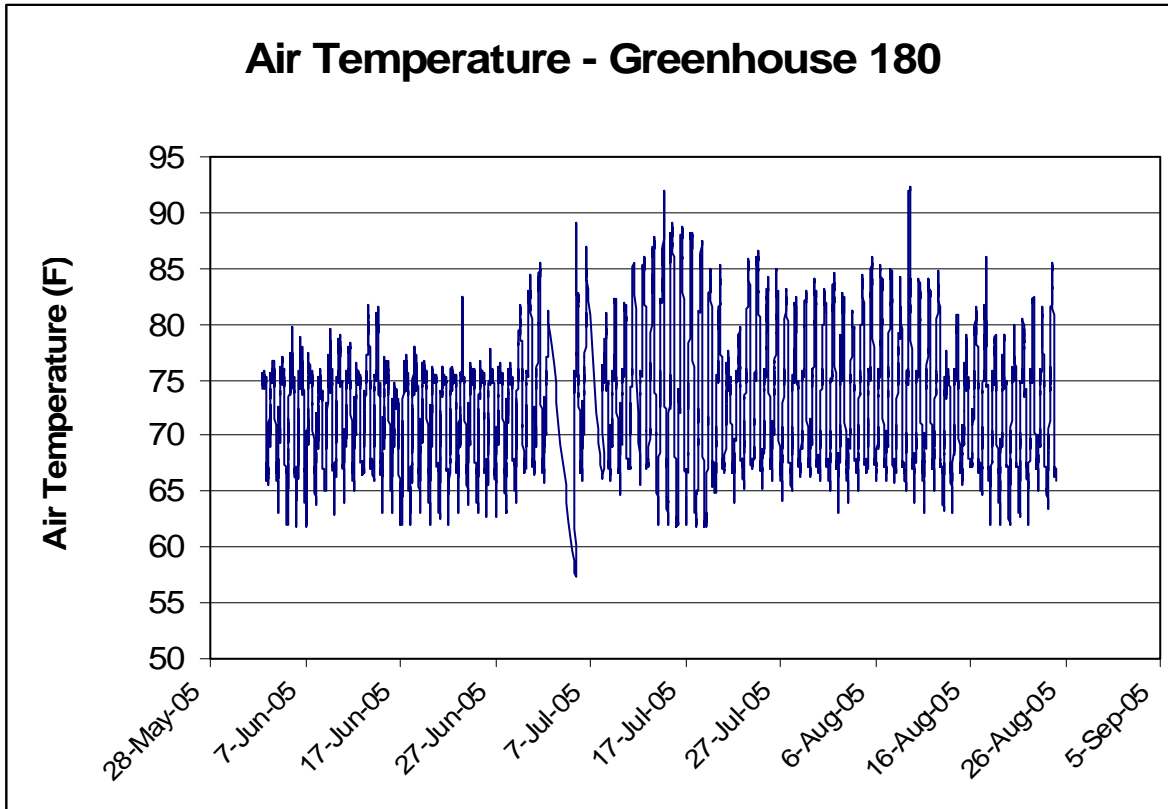
**I acknowledge that I have read and followed the IR-4 Research protocol and completed this trial following good agricultural practice, or reported any deviations (note any changes from authorized protocol in narrative).**

**SIGNATURE (PRINCIPAL INVESTIGATOR)** \_\_\_\_\_

**Date Completed:**

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**Figure 1. Greenhouse air temperatures during the experiment to evaluate the phytotoxicity of Mogeton on *Euonymus fortunei* 'Green and Gold'.**

**Table 1. 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

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**Table 2. Phytotoxicity ratings over 12 weeks for *Euonymus fortunei* 'Green and Gold' treated with 0 (Control), 2 (1X), 4 (2X), or 8 (4X) oz./gallon of Mogeton, 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 Increase  
at/after:

Treatment (oz/gal)	Week 1	no	Week 2	no	Week 4	at 10%	Week 8	no	Week 12	no
0	0.33 ± 0.17 a		0.44 ± 0.24 a		0.33 ± 0.17 ab		0.22 ± 0.15 a		0.78 ± 0.15 a	
2	0.22 ± 0.15 a		0.22 ± 0.15 a		0.56 ± 0.18 a		0.44 ± 0.24 a		1.00 ± 0.17 a	
4	0.00 ± 0.00 a		0.00 ± 0.00 a		0.11 ± 0.11 b		0.22 ± 0.15 a		0.67 ± 0.17 a	
8	0.33 ± 0.24 a		0.22 ± 0.22 a		0.22 ± 0.15 ab		0.56 ± 0.24 a		0.78 ± 0.15 a	

**Table 3. Plant height, width and volume changes over 12 weeks for *Euonymus fortunei* 'Green and Gold' treated with 0 (Control), 2 (1X), 4 (2X), or 8 (4X) oz./gallon of Mogeton, 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)**

Treatment (oz/gal)	Height Increase after 12 weeks	yes	Width Increase after 12 weeks:	yes	Relative Volume Index Increase after 12 weeks	no
0	15.78 ± 4.13 a		6.36 ± 1.23 a		12368.2 ± 4041.82 a	
2	9.28 ± 1.57 ab		4.64 ± 1.28 ab		7499.76 ± 2583.91 ab	
4	5.94 ± 1.48 b		1.22 ± 0.49 c		2593.44 ± 1110.15 b	
8	3.61 ± 1.21 b		2.03 ± 0.70 bc		3147.31 ± 1292.08 b	

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Species: *Euonymus* -- Material: Mogeton

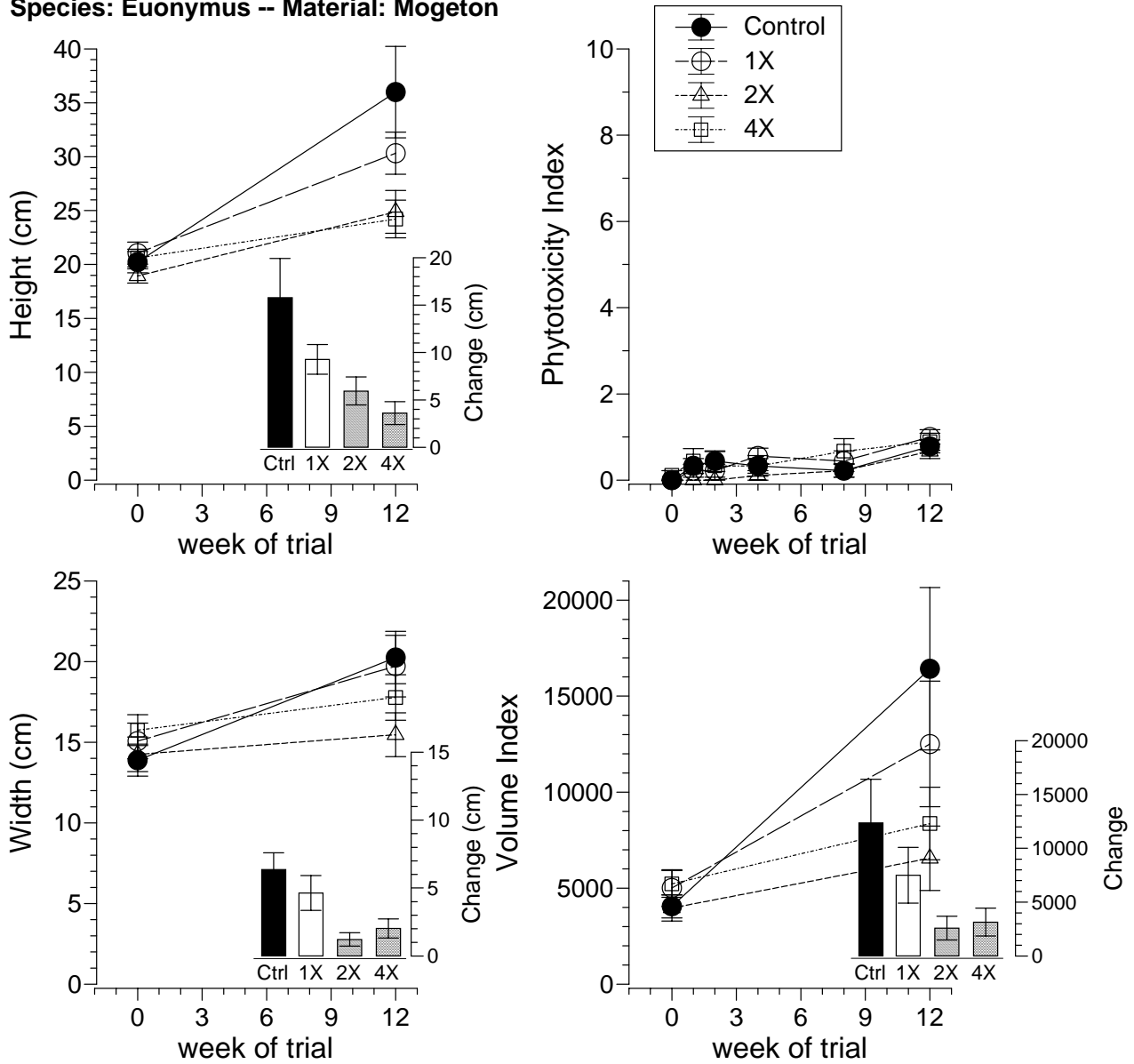


Figure 2. Summary of results for *Euonymus fortunei* 'Green and Gold' treated with 0 (Control), 2 (1X), 4 (2X), or 8 (4X) oz./gallon of Mogeton, applied at weeks 0 and 4. Both means and cumulative changes over time are plotted for phytotoxicity index, plant height, plant width and plant volume index. Histograms show changes over the 12-week trial period. SE bars shown. (n = 9)

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Figure 3. Phytotoxicity symptoms seen on *Euonymus fortunei* 'Green and Gold' 12 weeks after two foliar applications of Mogeton. Scattered leaves showed partial necrosis. The orange spots are residue from the spray application of Mogeton.

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Block A



Block B

CONTROL

1X

2X

4X

Figure 4. *Euonymus fortunei* 'Green and Gold' plants twelve weeks after two foliar applications of 0 (Control), 2 (1X), 4 (2X), or 8 (4X) oz./gal Mogeton, applied at weeks 0 and 4.

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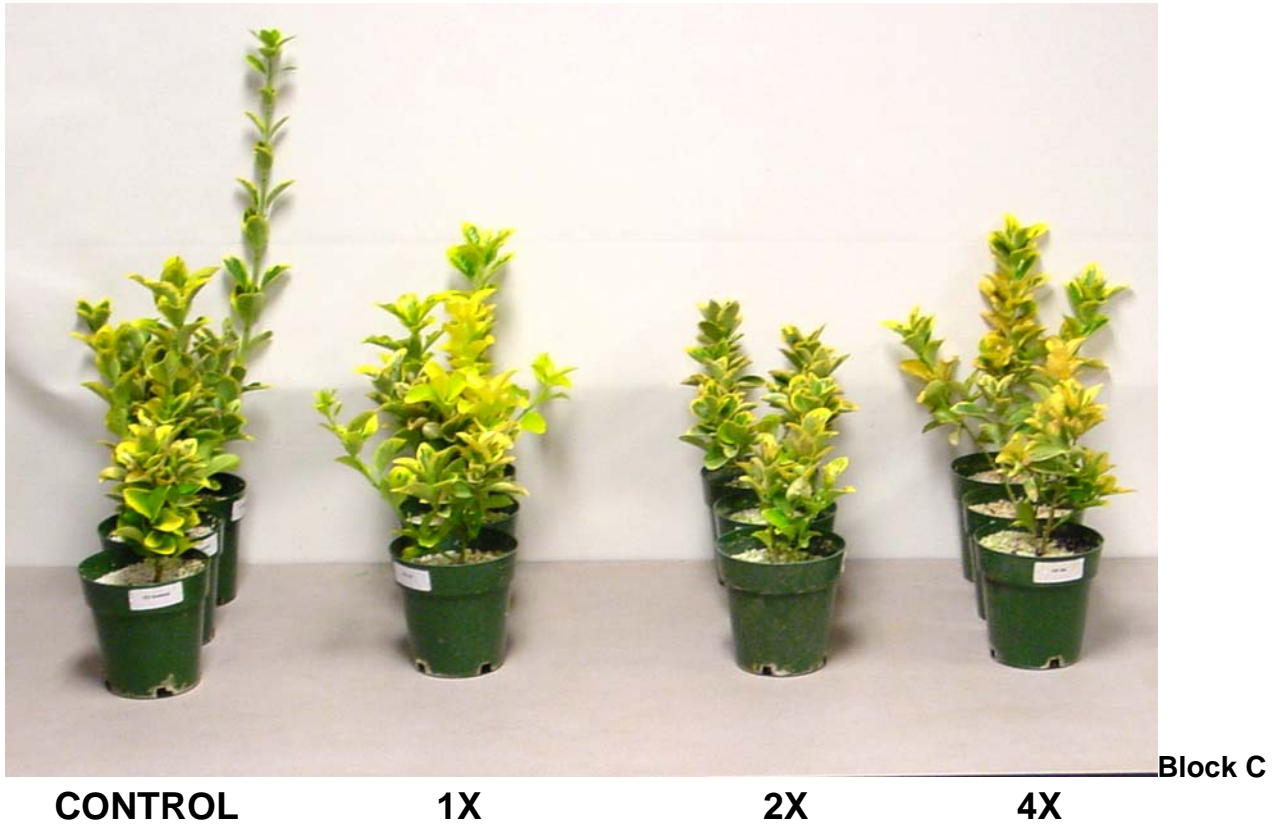


Figure 4. *Euonymus fortunei* 'Green and Gold' plants twelve weeks after two foliar applications of 0 (Control), 2 (1X), 4 (2X), or 8 (4X) oz./gal Mogeton, applied at weeks 0 and 4.

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**APPENDIX A**

**Phytotoxicity to herbaceous perennial plants with applications of Mogeton 25WP**

**Ornamental Protocol Number: 05-004**

**REVISED DATE: 05/05**

**Objective:** Determine phytotoxicity of Mogeton 25WP to perennial plants commonly grown in greenhouse and/or 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. Plant materials must be established in containers and have broken dormancy prior to first application. Use 2 qts of final spray solution per 100 sq ft or about 218 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 must be growing in containers and not field grown.

**Evaluations:** Record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) at 1, 2, 4, 8, and 12 weeks after initial application. If appropriate, also include ratings for chlorosis, defoliation, stunting or other growth effects on a scale of 0 to 10 (0 = No effect; 10 = Complete plant affected). If any 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:**

<b>Product</b>	<b>Rate</b>	<b>Post-Application Irrigation Instructions</b>
Mogeton 25WP (quinoclamine)	2.0 oz/gal 4.0 oz/gal 8.0 oz/gal	Do not overhead water for 24 h after application.
Untreated	--	--

**For labels, materials, and any required adjuvants contact:**

Mogetan - Crompton, Kevin Donovan, 203-393-2163 x 2028, [kevin.donovan@cromptoncorp.com](mailto:kevin.donovan@cromptoncorp.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

Treatment	Block	Rep	Phytotoxicity at week						Growth at week 0			Growth at week 12		
			0	1	2	4	8	12	Height (cm)	Width1 (cm)	Width 2 (cm)	Height (cm)	Width1 (cm)	Width 2 (cm)
Control	A	1	0	0	0	0	0	1	27	18	14	30.5	20.5	17
Control	A	2	0	0	0	0	0	1	20.5	18.5	13	53	38	15
Control	A	3	0	0	0	0	0	0	18.5	12	12	37.5	19.5	13
Control	B	1	0	0	0	0	0	1	19.5	20.5	15	35.5	29	23.5
Control	B	2	0	1	1	1	1	1	19.5	10	8	29	21	13
Control	B	3	0	0	0	0	0	1	18	20	12.5	24	21	16
Control	C	1	0	0	0	0	0	0	21	14	14	59.5	25	28
Control	C	2	0	1	1	1	0	1	21.5	16	12.5	34	19	18
Control	C	3	0	1	2	1	1	1	16.5	9.5	10.5	21	16	12
Mean			0.0	0.3	0.4	0.3	0.2	0.8	20.2	15.4	12.4	36.0	23.2	17.3
1X	A	1	0	0	0	1	1	1	24	19	16.5	25.5	20	14
1X	A	2	0	0	0	0	0	0	26	17	11	39	21	13
1X	A	3	0	0	0	0	0	1	19.5	12	9	29	15	13.5
1X	B	1	0	0	0	0	0	1	21	15	15.5	37	23	14
1X	B	2	0	1	1	1	2	2	20	21.5	11	23.5	22	12
1X	B	3	0	0	0	0	0	1	23.5	22	22	33	39	29
1X	C	1	0	1	1	1	1	1	21	16.5	11	34.5	26	17
1X	C	2	0	0	0	1	0	1	16	16	10.5	23	24	13
1X	C	3	0	0	0	1	0	1	18.5	13.5	12.5	28.5	18.5	21
Mean			0.0	0.2	0.2	0.6	0.4	1.0	21.1	16.9	13.2	30.3	23.2	16.3
2X	A	1	0	0	0	0	0	1	21	21	12.5	31	21	14.5
2X	A	2	0	0	0	0	0	1	22.5	15	21.5	37.5	30.5	16
2X	A	3	0	0	0	0	0	0	18.5	12.5	9	21	13	11
2X	B	1	0	0	0	1	1	1	20	12.5	11	20.5	13	12
2X	B	2	0	0	0	0	1	1	17	15	8.5	23	13	10.5
2X	B	3	0	0	0	0	0	1	19	11.5	14.5	26	14	13
2X	C	1	0	0	0	0	0	1	18.5	19	11.5	25	20	12
2X	C	2	0	0	0	0	0	0	16	13	10	19	15	10
2X	C	3	0	0	0	0	0	0	18	20.5	18	21	21	19
Mean			0.0	0.0	0.0	0.1	0.2	0.7	18.9	15.6	12.9	24.9	17.8	13.1
4X	A	1	0	2	0	0	1	1	19	19	13	18.5	20	11
4X	A	2	0	0	0	0	0	1	18.5	12.5	14	19	16.5	12
4X	A	3	0	0	0	0	2	1	21.5	19	12.5	28.5	23	15
4X	B	1	0	0	0	0	0	1	17.5	10	10.5	19	13	11
4X	B	2	0	0	0	1	0	0	20.5	19	17.5	30.5	25	19
4X	B	3	0	0	0	0	0	1	20	21.5	16	25	24	16
4X	C	1	0	0	0	0	0	0	26	24.5	14	32.5	32	19
4X	C	2	1	2	3	2	2	2	22	13.5	15	22.5	16	16
4X	C	3	0	0	0	0	1	1	20.5	19	13	22.5	19	12.5
Mean			0.1	0.4	0.3	0.3	0.7	0.9	20.6	17.6	13.9	24.2	20.9	14.6