Environmental Horticulture Program Research Summaries

IR-4 Environmental Horticulture Program
Oxalis Efficacy

Oxalis sp.
Oxalis corniculata
Oxalis stricta

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Abstract

Nursery growers have had a longstanding battle to control weeds in environmental horticulture crops. Oxalis (*Oxalis* spp.) is one of the most difficult weeds to control in container grown ornamentals. It grows aggressively in containers and can outcompete ornamental crops for water, nutrients, and light. Several chemical tools are available for preemergent control. However, there remains a need for effective control of emerged weed seedlings. At the 2007 Environmental Horticulture Workshop, IR-4 initiated a study to determine whether preemergent herbicides could provide efficacy for oxalis, and other weeds, up to the 2-4 leaf stage. Research was conducted from 2008 through 2019. This report is a brief summary of available data from 27 experiments received through the IR-4 Environmental Horticulture Program. Early postemergence applications of Casoron, Certainty, Dismiss, Gallery, Marengo/Indaziflam, SureGuard, Tower and V-10142 provided significant impact on emerged oxalis (*Oxalis* spp.). These findings benefit growers by identifying select preemergence herbicides which control specific weeds at early emergence stages in container grown ornamental horticulture crops.

Introduction

Nursery growers have had a longstanding battle to control weeds in environmental horticulture crops. Oxalis (*Oxalis* spp.) is one of the most difficult weeds to control in container grown ornamentals. It grows aggressively in containers and can outcompete ornamental crops for water, nutrients, and light. Several chemical tools are available for preemergent control. However, there remains a need for effective control of emerged weed seedlings. At the 2007 Environmental Horticulture Workshop, IR-4 initiated a study to determine whether preemergent herbicides could provide efficacy for oxalis, and other weeds, up to the 2-4 leaf stage. Research was conducted from 2008 through 2019.

Materials and Methods

Between 2008 and 2019, several products were tested as preemergence or over-the-top foliar applications against oxalis. In many experiments, researchers also included other important weeds although this report is a summary of oxalis data. A minimum of four plants (replicate treatments) were required with many researchers exceeding this minimum. Evaluations of percent cover and percent control were estimated at various intervals after treatment. For more detailed materials and methods, please see Appendix 1: Protocols and Appendix 3: Research Reports. For IR-4 2018 and 2019 testing, the following protocols were used: 18-019 and 19-019. Please visit https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols to view and download these protocols.

Products were supplied to researchers (See list of researchers in Appendix 1) by their respective manufacturers.

For all research data tables, product names have been updated where manufacturers have established trade names and tables have been rearranged by product alphanumeric order.

Table 1. List of Products and Rates Tested from 2008 to 2019.

Product[1]	Active Ingredient(s)	Manufacturer	Rate(s) Tested/Acre	
			Pounds Active Ingredient	Product
Basagran	bentazon	BASF	1.0	1 quart
Broadstar 0.25G original formulation	flumioxazin	Valent	0.19	75 lb
			0.375	150 lb
			0.75	300 lb
Broadstar VC1604 0.25G	flumioxazin	Valent	0.19	75 lb
			0.38	150 lb
Casoron 4G	dichlobenil	Chemtura Corp.	1.0	25 lb
			2.0	50 lb
Certainty	sulfosulfuron	Valent	0.035	0.75 oz
			0.094	2.0 oz
Dimension	dithiopyr	Dow	0.5	32 fl oz
			1.0	64 fl oz
			2.0	128 fl oz
Dismiss 4F	sulfentrazone	FMC	0.25	8 fl oz
			0.375	12 fl oz
EXC3898 2.1G	mesotrione + prodiamine + s-metolachlor	Syngenta	2.10	100 lb
			3.15	150 lb
Fiesta	iron HEDTA	Neudorff		25/1 ksf
				50/1 ksf
FreeHand 1.75G	pendimethalin + dimethenamid-p	BASF	3.5	200 lb
			7.0	400 lb
Gallery 75DF	isoxaben	Dow AgroSciences	1.0	1.33 lb
HGH-63 2G	oxyfluorfen	Harrold's	1.0	50 lb
			2.0	100 lb
Indaziflam	indaziflam	Bayer	50 g/ha	150 lb
			100 g/ha	300 lb
Marengo 0.622SC	indaziflam	Bayer	0.04	9 fl oz
Pendulum 3.3EC	pendimethalin	BASF	2.0	77.58 fl oz
			4.0	155 fl oz
Pendulum 2G	pendimethalin	BASF	3	150 lb
			6	300 lb
			12	600 lb
Sedgehammer 75	halosulfuron-methyl	Gowan	0.04	9 fl oz
SureGuard 51WDG	flumioxazin	Valent	0.383	0.75 oz
			0.5625	8.2 oz
Tower 6.0EC (BAS 656h EC)	dimethenamid-p	BASF	0.97	21 fl oz
			1.5	32 fl oz
			1.94	42 fl oz
			3.0	64 fl oz
V-10142	imazosulfuron	Valent	0.375	75 lb
			0.75	150 lb

[1] In some cases surfactant such as crop oil concentrate (COC) or non-ionic surfactant (NIS) were used and noted in individual experiments.

Results and Summary

Comparative Efficacy on Oxalis

Several experiments were conducted during 2008-2019 looking primarily at postemergent applications of Broadstar VC1604, Certainty, EXC3898, Gallery, indaziflam and Tower on oxalis. A limited number of experiments included Basagran, Broadstar 0.25G, Casoron 4G and 1.4CS, HGH-63, and SureGuard. For this summary, commercial or acceptable weed control is defined as >70% efficacy is to be expected.

Products varied in efficacy depending on the stage treated (Table 2). The summary table below lists the number of experiments where commercial control was observed in at least one evaluation compared to the total number of experiments.

Overall, Certainty at 0.035 and 0.094 lb ai/a, indaziflam (50 and 100g/ha), SureGuard (0.562 lb ai/a) and V-10142 at 0.75 lb ai/a were the only treatments that demonstrated effective weed control in multiple tests on oxalis at all evaluation periods (Table 2) Tower at 1.94 lb ai/a also demonstrated efficacy at all stages, however, this is above the labeled rate. Tower at 0.97 lb ai/a effectively controlled the cotyledon to 1 leaf stage of oxalis as did Gallery (1 and 2 lb ai/a), HGH-63 (2 lb ai/a).

Stage 0: All products except Basagran and HGH-63 provided acceptable control of oxalis at germination. In one study, both rates of V-10142 and the high rate of Broadstar VC1604 showed long term control through 91 DAT.

Stage 1: At the cotyledon to one leaf stage Certainty, Gallery, Marengo/Indaziflam, SureGuard, and V-10142 demonstrated very good to excellent control of oxalis. In more than half of the experiments, Tower was also effective at this stage of growth. Casoron (4 lb ai/a) and HGH-63 were efficacious in limited experiments.

Stage 2: Certainty and Marengo/Indaziflam consistently provided excellent control of oxalis at this stage. Tower at 1.94 lb ai/a provided control in three of four experiments while V-10142 (0.75 lb ai/a) controlled oxalis at the 2-4 leaf stage in four of seven experiments. Broadstar VC1604 at 0.375 was efficacious in three out of six experiments. In limited tests, Broadstar 0.25G (0.375 lb ai/a), Casoron 4G, Casoron 1.4 CS, and SureGuard exhibited greater than 70% control at this growth stage.

Table 2. General Summary for Pre- and Post Emergence Efficacy for Oxalis.

Product (active)	Rate (lb ai/a)	Number of Experiments with Acceptable Control (>70%)		
		Stage 0: Preemergence	Stage 1: Cotyledon to 1 Leaf	Stage 2: 2 to 4 Leaves
Basagran (bentazon) + COC	0.75	-	-	1 of 3
	1.0	0 of 1	1 of 2	2 of 5
	2.0	-	-	0 of 1
	4.0	-	-	0 of 1
Broadstar 0.25G (flumioxazin)	0.19	1 of 1	0 of 1	0 of 1
	0.375	1 of 1	0 of 1	1 of 1
Broadstar VC1604 0.25G (flumioxazin)	0.19	4 of 6	0 of 6	2 of 5
	0.375	4 of 6	1 of 6	2 of 6
	0.75	1 of 1	0 of 1	1 of 1
Casoron 4 G (dichlobenil)	1.0	0 of 1	0 of 1	1 of 1
	2.0	0 of 1	0 of 1	1 of 1
	3.0	2 of 2	1 of 2	1 of 2
	4.0	2 of 2	2 of 2	1 of 2
Casoron 1.4 CS (dichlobenil)	1.0	0 of 1	----	1 of 1
Certainty (sulfosulfuron)	0.035	3 of 3	3 of 3	3 of 3
	0.094	3 of 3	3 of 3	3 of 3
Dimension (dithiopyr)	0.5	1 of 1	-	-
	1.0	1 of 1	-	-
	2.0	1 of 1	-	-
Dismiss 4F (sulfentrazone)	0.25	-	-	1 of 3
	0.375	-	-	2 of 3
EXC3898 (mesotrione + prodiamine + s-metolachlor)	2.1	5 of 6	2 of 6	1 of 6
	3.15	5 of 6	3 of 6	1 of 6
Fiesta	25/1 ksf	-	-	1 of 2
	50/1 ksf	-	-	1 of 2
Gallery (isoxaben)	0.5	4 of 4	2 of 3	0 of 3
	1.0	3 of 5	3 of 3	1 of 3
	2.0	1 of 1	-	-
	4.0	1 of 1	-	-
HGH-63 2G (oxyfluorfen)	2.0	0 of 1	1 of 1	0 of 1
Marengo G (indaziflam)	50 g/ha	3 of 3	3 of 3	3 of 3
	100 g/ha	3 of 3	3 of 3	3 of 3
Marengo 0.622SC (indaziflam)	0.04	-	-	3 of 3
Pendulum 2G (pendimethalin)	3	0 of 1	-	-
	6	1 of 1	-	-
	12	1 of 1	-	-
Sedgehammer + Capsil	0.05	-	-	0 of 1
SureGuard (flumioxazin)	0.562	2 of 2	2 of 2	2 of 2
Tower EC (dimethenamid-p)	0.97	4 of 6	4 of 6	3 of 6
	1.5	0 of 2	1 of 2	0 of 2
	1.94	3 of 4	3 of 4	3 of 4
V-10142 (imazasulfuron)	0.38	6 of 7	5 of 7	2 of 7
	0.75	6 of 7	7 of 7	4 of 7

[1] Highlighted numbers indicate efficacious treatments in the majority ($\geq$ 66%) of the experiments where at least two experiments were conducted.

Individual Research Reports

Boydston, 2008

In 2008, Boydston (WA) conducted an experiment to examine EXC3898 and V-10142 for postemergent control of oxalis grown in field containers under shade with drip irrigation. Phytoxicity ratings were collected and number of weeds was counted. Although in several cases weed counts for treated pots did not differ from the untreated, seedlings were significantly injured by the treatments as indicated by the efficacy ratings.

EXC3898 2.1G applied preemergently at 2.1 and 3.15 lb ai/A controlled oxalis 90 and 94% 4 WAT, respectively. EXC3898 2.1G applied to oxalis between the cotyledon to 1-leaf stage at 2.1 and 3.15 lb ai/A controlled oxalis 27 and 80% 4 WAT, respectively. EXC3898 2.1 G applied to oxalis between the 2 to 4 leaf stage at 2.1 and 3.15 lb ai/A controlled oxalis 30 and 92% 4-WAT, respectively.

V-10142 0.5G applied at Stage 0 at 2.1 and 3.15 lb ai/A controlled oxalis 93 and 95% 4 WAT, respectively. V-10142 0.5G applied to oxalis between the cotyledon to 1-leaf stage at 2.1 and 3.15 lb ai/A controlled oxalis 92 and 97% 4 WAT, respectively.V-10142 0.5G applied to oxalis between the 2 to 4 leaf stage at 2.1 and 3.15 lb ai/A controlled oxalis 62 and 70% 4 WAT, respectively.

Table 3. Efficacy of pre-emergent herbicides for Oxalis, Stage 0, Boydston, 2008.

Product	Efficacy Rating		Number of Weeds per pot	
	2 WAT	4 WAT	2 WAT	4 WAT
Preemergent				
EXC3898 – 2.1	68.33 a	90.00 a	71.00 a	24.00 b
EXC3898 – 3.15	80.00 a	94.00 a	103.67 a	12.00 b
Untreated Check	0.00 b	0.00 b	98.00 a	98.00 a
LSD (P=.05)	47.784	13.756	107.082	65.004
V-10142 – 0.375	91.67 a	93.33 a	37.33 a	49.33 a
V-10142 – 0.75	86.67 a	95.00 a	46.67 a	46.00 a
Untreated Control	0.00 b	0.00 b	60.00 a	61.33 a
LSD (P=.05)	*9.995*	*4.596*	*44.714*	*32.5411*

Table 4. Efficacy of pre-emergent herbicides for emerged Oxalis, Stages 1 and 2, Boydston, 2008.

Product - Rate (lb ai/A)	Efficacy Rating[1]		Number of Weeds per pot[2]		
	2 WAT[3]	4 WAT	0 WAT	2 WAT	4 WAT
Cotyledon to one leaf stage					
EXC3898 - 2.1	48.33 b	26.67 b	98.00 a	105.33 a	83.67 a
EXC3898 - 3.15	76.67 a	80.00 a	68.67 a	52.33 a	27.33 a
Untreated Check	0.00 c	0.00 c	98.00 a	98.00 a	98.00 a
LSD (P=.05)	*26.172*	*16.466*	*143.456*	*79.534*	*73.329*
V-10142 - 0.375	75.00 a	91.67 b	39.0 a		33.33 a
V-10142 - 0.75	78.33 a	97.00 a	62.00 a		46.33 a
Untreated Control	0.00 b	0.00 c	60.00 a		61.33 a
LSD (P=.05)	*9.995*	*5.289*	*26.368*		*31.434*
Two to Four leaf stage					
EXC3898 - 2.1	33.33 b	30.00 b	143.33 a	113.33 a	50.67 ab
EXC3898 - 3.15	90.00 a	91.67 a	101.67 a	80.33 a	10.00 b
Untreated Check	0.00 c	0.00 c	98.00 a	98.00 a	103.33 a
LSD (P=.05)	*14.385*	*17.719*	*108.828*	*103.91*	*10.00 b*
V-10142 - 0.375	43.33 a	61.67 a	124.0 ab		27.33 b
V-10142 - 0.75	58.33 a	70.00 a	165.67 a		15.33 b
Untreated Control	0.00 b	0.00 b	61.33 b		52.00 a
LSD (P=.05)	*32.276*	*40.511*	*66.714*		*21.114*

Gilliam 2008

Gilliam (AL), in 2008, examined Broadstar VC1604 0.25G, EXC3898 and V-10142 for efficacy against oxalis grown if field containers in the shade with overhead irrigation.

Stage 0: Efficacy was not rated at 1 WAT. All treatment groups had some weeds present at 18 DAT and were rated with a + (oxalis present) or – (no oxalis present) only. Data not shown. At 18 and 25 DAT, weed numbers were significantly lower in pots treated with any herbicide relative to those of the non-treated control group. Fresh weights at 91 DAT for Broadstar VC1604 (0.375 lb ai/A), and both rates of V-10142 were significantly different from the control (Table 5.)

Stage 1: Efficacy was most notable in pots treated with EXC3898 G at 2.1 lb ai/A or either rate of V-10142. V-10142 treatments at -0.375 and 0.75 lb ai/A received greater than 70% plant injury ratings at 51 and 85 DAT despite fresh weights remaining high in some cases (

Table 6.) Fresh weed weight, at 61 DAT, among containers receiving either rate of EXC3898 or V-10142 was substantially less than that of the non-treated control group. However, by 85 DAT, pots receiving EXC3898 G at 3.15 lb ai/A or Broadstar VC1604 at either rate had greater fresh weed weights than did the non-treated controls containers.

Stage 2: Plant injury at 21 DAT was significant among oxalis treated with V-10142 at 0.75 lb ai lb and either rate of EXC3898 G. By 85 DAT pots treated with EXC3898 G at 0.75 lb ai/A were significantly different but not at a commercial level. The high rate of V-10142 achieved 88% control at this stage. Injury to oxalis treated with either rate of Broadstar VC1604 was not noteworthy at any evaluation period during the trial. (

Table 6). Fresh weed weights, at 61 DAT, were notable only among those containers receiving V-10142 at either rate. At 85 DAT, fresh weed weight among pots receiving V-10142 remained outstanding (0.6g). Substantial differences in weed weight were also noted among containers treated with V-10142 at 0.375 lb ai/A or either rate of Broadstar VC1604.

Table 5. Efficacy of pre-emergent herbicides on Oxalis, Stage 0, Gilliam, 2008.

Product - Rate (lb ai/A)	Weed Numbers[5]		Fresh Weights[2]	
	18 DAT[3]	25 DAT	57 DAT	91 DAT
Preemergent Timing				
Broadstar VC1604 – 0.19	1.3c[4]	1.8cd	2.4b	5.7a
Broadstar VC1604 – 0.375	0.3c	0.2d	0.0c	0.8bc
EXC3898 – 1.57	3.4b	2.7bc	2.3b	3.9ab
EXC3898 – 3.15	1.6bc	3.7bc	1.1bc	4.1ab
V-10142 – 0.375	1.7bc	4.5b	0.1c	1.8bc
V-10142 – 0.75	0.4c	2.6bc	0.0c	0.0c
Untreated Control	8.3a	10.1a	4.4a	6.7a

Table 6. Efficacy of pre-emergent herbicides on emerged Oxalis, Stages 1 and 2, Gilliam, 2008.

Product – Rate (lb ai/A)	Plant Injury[1]				Fresh Weight	
	21 DAT[3]	28 DAT	51 DAT	85 DAT	61 DAT	85 DAT
Cotyledon to one leaf stage						
Broadstar VC1604 - 0.19	1.0d[4]	1.0e	1.4c	1.5c	6.1ab	9.9ab
Broadstar VC1604 - 0.375	1.0d	1.5e	1.0c	1.0c	7.3a	12.0ab
EXC3898 - 1.57	6.3a	8.1a	7.8a	6.6b	3.7cd	5.7ab
EXC3898 - 3.15	3.4b	3.4d	3.1b	1.0c	4.9bc	21.1a
V-10142 - 0.375	1.8c	6.2c	7.4a	8.3a	2.3d	8.5ab
V-10142 - 0.75	2.1c	7.2b	8.2a	8.9a	0.1e	0.8b
Untreated Control	1.0d	1.0e	1.0c	1.0c	7.8a	9.3ab
Two to four leaf stage						
Broadstar VC1604 - 0.19	1.0d	1.3c	1.0b	1.0d	6.3a	7.2b
Broadstar VC1604 - 0.375	1.0d	2.2c	2.6b	2.0d	6.7a	5.20b
EXC3898 - 1.57	3.1b	3.6b	2.1b	1.3d	7.0a	12.7a
EXC3898 - 3.15	4.2a	5.6a	5.4a	4.6c	7.0a	10.6a
V-10142 - 0.375	1.0d	4.7ab	6.4a	6.9b	1.8b	5.5b
V-10142 - 0.75	1.7c	5.1a	6.6a	8.8a	0.0b	0.6c
Untreated Control	1.0d	1.0c	1.0b	1.0d	6.7a	11.5a

[1]Plant injury ratings on scale of 1 to 10. 1 = no injury, 10 = dead

[2] Fresh weights measured in grams.

[3] DAT = Days after treatment

[4] Means separated using Duncan's Multiple Range Test at $p = 0.05$. Means with the same letter are not significantly different (P<.05).

[5] Mean weed numbers per treatment group

Neal, 2008

In 2008, Neal (NC) tested whether two different formulations of Broadstar (VC1604 and 0.25 G), EXC3898, and V-10142 0.5G provided effective control of *Oxalis stricta* grown in field containers with overhead irrigation.

Stage 0: All treatments provided effective control of oxalis when applied at preemergence (Table 7).

Stage 1: Oxalis was not well controlled at the cotyledon to one leaf stage by any treatments except for the high rate at V-10142 0.5 G which received a 73% efficacy rating at 12 WAT (Table 8).

Stage 2: Only the high rate of Broadstar 0.25G provided commercial control of oxalis at this growth stage 6 WAT (Table 9)

***Summary*:** The original formulation of Broadstar 0.25G tended to provide better efficacy for oxalis at each stage than the newer Broadstar VC1604 formulation. Broadstar 0.25G at 0.375 lb ai per acre exhibited the highest level of control at Stage 2. While EXC3898 and V-10142 showed some promise for Stage 1 control of oxalis, neither product will be registered.

Table 7. Efficacy of pre-emergent herbicides for Yellow Woodsorrel (*Oxalis stricta*), Stage 0, Neal, 2008.

	Efficacy Rating for Preemergence[1]			
Product – Rate (lb ai/A)	**8 WAT[2]**	**12WAT**	**14 WAT**	**18 WAT**
Broadstar 0.25G - 0.19	9.8 a	10.0 a	9.9 a	10.0 a
Broadstar 0.25G - 0.375	10.0 a	10.0 a	10.0 a	10.0 a
Broadstar VC1604 0.25G - 0.19	8.8 a	8.2 b	8.2 b	7.8 b
Broadstar VC1604 0.25G - 0.375	9.2 a	9.4 a	9.2 a	9.4 a
EXC3898 - 2.1	9.6 a	9.8 a	9.4 a	9.8 a
EXC3898 - 3.15	10.0 a	10.0 a	10.0 a	10.0 a
V-10142 0.5G - 0.375	9.9 a	10.0 a	9.9 a	10.0 a
V-10142 0.5G - 0.75	9.8 a	10.0 a	10.0 a	10.0 a
Untreated Control	0.0 b	0.0 c	0.0 c	0.0 c

[1] Efficacy was rated on a scale of 0 to 10 with 0 being no control and 10 being 100 percent.
[2] Weeks after Treatment

Table 8. Efficacy of pre-emergent herbicides for emerged Yellow Woodsorrel (*Oxalis stricta*), Stage 1, Neal, 2008.

	Efficacy Rating for Cotyledon to 1 Leaf[1]			
Product – Rate (lb ai/A)	2 WAT	6 WAT	8 WAT	12 WAT
Broadstar 0.25G - 0.19 lb ai/A	0.0 b	2.0 bc	0.8 c	0.5 c
Broadstar 0.25G - 0.375 lb ai/A	1.7 ab	3.5 abc	2.1 bc	3.0 bc
Broadstar VC1604 0.25G - 0.19 lb ai/A	0.1 b	0.0 c	0.0 c	0.0 c
Broadstar VC1604 0.25G - 0.375 lb ai/A	0.0 b	1.5 c	0.8 c	1.7 bc
EXC3898 - 2.1 lb ai/A	1.4 ab	0.8 c	0.1 c	2.5 bc
EXC3898 - 3.15 lb ai/A	3.4 a	6.1 a	5.1 a	6.8 a
V-10142 0.5G - 0.375 lb ai/A	1.7 ab	4.1 abc	3.8 ab	4.3 ab
V-10142 0.5G - 0.75 lb ai/A	2.2 ab	5.6 ab	4.9 a	7.3 a
Untreated Control	0.0 b	0.0 c	0.0 c	0.0 c

[1] Efficacy was rated on a scale of 0 to 10 with 0 being no control and 10 being 100 percent.

Table 9. Efficacy of pre-emergent herbicides for emerged Yellow Woodsorrel (*Oxalis stricta*), Stage 2, Neal, 2008.

Product – Rate (lb ai/A)	Efficacy Rating[1] for 2 to 4 leaf stage	
	10 DAT	6 WAT
Broadstar 0.25G - 0.19 lb ai/A	0.1 b	1.4 cd
Broadstar 0.25G - 0.375 lb ai/A	2.4 a	7.4 a
Broadstar VC1604 0.25G - 0.19 lb ai/A	---[2]	---
Broadstar VC1604 0.25G - 0.375 lb ai/A	0.0 b	0.0 d
EXC3898 - 2.1 lb ai/A	0.2 b	2.6 cd
EXC3898 - 3.15 lb ai/A	0.4 b	4.4 bc
V-10142 0.5G - 0.375 lb *ai*/A	0.1 b	3.9 bc
V-10142 0.5G - 0.75 lb ai/A	1.0 b	6.2 ab
Untreated Control	0.0 b	0.0 d

[1] Efficacy was rated on a scale of 0 to 10 with 0 being no control and 10 being 100 percent.
[2] Inadequate numbers of plants were available therefore the low rate of VC1604 was omitted.

Regan, 2008

In an experiment conducted within a greenhouse having a retractable roof, Regan (OR) examined the impact of preemergent herbicides for the postemergent control of *Oxalis corniculata*. Weeds were watered via overhead irrigation.

Stage 0: Broadstar VC1604, EXC3898 and V-10142 G treatments were very effective in preventing germination of oxalis.

Stage 1: Treatments containing both rates of EXC3898 and V-10142 G gave very good to excellent results in controlling weeds at the 1-2 leaf stage in the 3 WAT evaluation while the high rate of Broadstar VC1604 was slightly less injurious but commercially acceptable.

Stage 2: At the 2-4 leaf stage, oxalis control by both EXC3898 and V-10142 G was only slightly less compared to the 1-2 leaf stage ratings.. Broadstar VC1604 was not effective in controlling oxalis at both rates.

Summary: Overall, EXC3898 and V-10142 G were shown to be effective tools for early post-emergent control of oxalis (*Oxalis corniculata*). These two herbicides were generally effective at all three stages of early weed growth (germination, 1-2 leaf stage, 2-4 leaf stage). Broadstar VC1604 was the least effective treatment.

Table 10. Efficacy of pre-emergent herbicides for Oxalis (*Oxalis corniculata)*, Regan 2008.

Product - Rate (lb ai/A)	Percent Germination
	4 WAT[1]
Broadstar VC1604 0.25G – 0.19	0.0 a[2]
Broadstar VC1604 0.25G – 0.375	0.0 a
EXC3898 – 2.1	0.0 a
EXC3898 – 3.15	0.0 a
V-10142 – 0.375	0.0 a
V-10142 – 0.75	0.0 a
Untreated Control	33.0 b

[1]Weeks After Treatment
[2] Column mean numbers followed by the same letter are not significantly different (Alpha=0.05) as determined by

Fishers LSD multiple-comparison test (NCSS, 2004)

Table 11. Efficacy of pre-emergent herbicides for emerged Oxalis (*Oxalis corniculata)*, Regan 2008.

Product - Rate (lb ai/A)	Efficacy Rating[3]		
	1 WAT	2 WAT	3 WAT
One to two leaf stage			
Broadstar VC1604 0.25G – 0.19	0.0	0.0	5.9 b
Broadstar VC1604 0.25G – 0.375	0.0	0.0	7.8 c
EXC3898 – 2.1	0.0	0.0	9.1 cd
EXC3898 – 3.15	0.0	0.0	9.9 d
V-10142 – 0.375	0.0	0.0	10.0 d
V-10142 – 0.75	0.0	1.0	10.0 d
Untreated Control	0.0	0.0	0.8 a
Two to four leaf stage			
Broadstar VC1604 0.25G – 0.19	0.0 a	1.8 b	1.8 b
Broadstar VC1604 0.25G – 0.375	0.0 a	1.4 b	1.4 b
EXC3898 – 2.1	0.0 a	6.7 c	6.7 c
EXC3898 – 3.15	1.3 b	7.9 d	8.0 d
V-10142 – 0.375	0.0 a	9.0 e	9.0 e
V-10142 – 0.75	1.5 b	8.0 d	9.0 e
Untreated Control	0.0 a	0.0 a	0.0 a

[1]Weeks After Treatment

[2] Column mean numbers followed by the same letter are not significantly different (Alpha=0.05) as determined by Fishers LSD multiple-comparison test (NCSS, 2004)

[3] Efficacy Rating: 0-10 (0= no damage; 10= dead)

Senesac, 2008

During 2008, Senesac (NY) tested whether Broadstar VC1604 0.25G, EXC3898, and V-10142 could provide postemergent control of oxalis. Weeds were grown in the greenhouse with hourly mist during daylight hours.

Stage 0: V-10142 at 1.50 lb ai/A provided effective control up to 5 WAT when applied prior to weed emergence. The high rate of Broadstar VC1604 (0.75 lb ai/A) achieved 70% control 2 WAT but efficacy decreased over time. EXC3898 treated pots showed some reduction in germination at 4.20 lb ai/A but not at a commercial level. (Table 12Table 13Table 14)

Stage 1: Both V-10142 (at 0.75 and 1.50 lb ai/A) and EXC3898 (4.20 lb ai/A) demonstrated commercially acceptable levels of oxalis control at the cotyledon to one leaf stage. Broadstar VC1604 (0.375 to 0.75) had some reduction of oxalis at this stage.

Stage 2: Broadstar VC1604 demonstrated the greatest weed control at the two to four leaf stage with all three rates (0.190, 0.375 and 0.75 lb ai/A) providing 70% control 2 WAT. The high rates of V-10142 and EXC3898 provided 50% control or less 2 WAT.

Table 12. Efficacy of Broadstar VC1604 0.25G (flumioxazin) for emerged Oxalis, Senesac, 2008.

Product – Rate(lb ai/A)	Efficacy Rating[1]			
	1 WAT	2 WAT	3 WAT	5 WAT
Preemergent				
Broadstar VC1604 0.25G - 0.190	47	43	17	5
Broadstar VC1604 0.25G - 0.375	50	53	27	12
Broadstar VC1604 0.25G - 0.75	63	70	60	17
Untreated	0	0	0	0
Cotyledon to one leaf stage				
Broadstar VC1604 0.25G - 0.190	17	7	0	0
Broadstar VC1604 0.25G 4 - 0.375	23	23	20	23
Broadstar VC1604 0.25G - 0.75	33	43	50	30
Untreated	0	0	0	0
Two to four leaf stage				
Broadstar VC1604 0.25G - 0.190	60	70	53	
Broadstar VC1604 0.25G - 0.375	57	70	63	
Broadstar VC1604 0.25G - 0.75	80	70	80	
Untreated	0	0	0	
Fisher's LSD@ 0.05	*14*	*14*	*19*	*12*

[1] Efficacy Rating: 0-100 (0= no damage; 100= dead)

Table 13. Efficacy of V-10142 (imazasulfuron) for emerged Oxalis, Senesac, 2008.

Product – Rate (lb ai/A)	Efficacy Rating[1]			
	1 WAT	2 WAT	3 WAT	5 WAT
Preemergent				
V-10142 – 0.375	67	73	63	63
V-10142 – 0.75	77	82	73	63
V-10142 – 1.50	93	90	90	87
Untreated	0	0	0	0
Cotyledon to one leaf stage				
V-10142 – 0.375	30	40	47	47
V-10142 – 0.75	47	67	73	73
V-10142 – 1.50	57	77	80	90
Untreated	0	0	0	---
Two to four leaf stage				
V-10142 – 0.375	17	30	40	
V-10142 – 0.75	27	40	43	
V-10142 – 1.50	40	50	53	
Untreated	0	0	0	
Fisher's LSD@ 0.05	*12*	*10*	*15*	*12*

[1] Efficacy Rating: 0-100 (0= no damage; 100= dead)

Table 14. Efficacy of EXC3898 for emerged Oxalis, Senesac, 2008.

Product - Rate (lb ai/A)	Efficacy Rating[1]			
	1 WAT	2 WAT	3 WAT	5 WAT
Preemergent				
EXC3898 – 2.10	20	37	10	2
EXC3898 – 3.15	33	33	20	17
EXC3898 – 4.20	40	67	57	40
Untreated	0	0	0	0
Cotyledon to one leaf stage				
EXC3898 – 2.10	13	20	33	30
EXC3898 – 3.15	23	40	43	37
EXC3898 – 4.20	43	73	77	67
Untreated	0	0	0	0
Two to four leaf stage				
EXC3898 – 2.10	20	33	33	
EXC3898 – 3.15	17	40	43	
EXC3898 – 4.20	30	40	47	
Untreated	0	0	0	
Fisher's LSD@ 0.05	*24*	*22*	*25*	*35*

[1] Efficacy Rating: 0-100 (0= no damage; 100= dead)

Wilen, 2008

Wilen (CA), in 2008, examined whether oxalis grown in field containers with overhead irrigation could be managed with postemergence applications of Broadstar VC1604 0.25G, EXC3898, and V-10142.

Stage 0: All herbicides provided good preemergent oxalis control until 23 WAT. EXC3898 at 2.10 lb ai/A which was significantly less effective but commercial control was observed (Table 15.).

Stage 1: Evaluations of percent cover and percent control were estimated 9 days after treatment, and 2, 4, and 7 WAT (Table 16.) All of the herbicides reduced percent cover when compared to the control until 7 WAT. Broadstar VC1604 at 0.19 lb ai per acre was not significantly different from the untreated control at 7 WAT. EXC3898 at 2.1 lb ai per acre and V-10142 at 0.75 lb ai per acre provided about 80% control of oxalis by 7 WAT but not at the earlier dates. However, there were no statistical differences among Broadstar VC1604 at 0.375 lb ai per acre, EXC3898 at 3.15 lb ai per acre and V-10142 at both rates at 7 WAT.

Stage 2: None of the herbicides were effective at reducing cover or controlling oxalis during this stage. Overall, the herbicides tested are acceptable for preemergence control of oxalis. EXC3898 and V-10142 may have some utility for very early postemergence activity but it is unlikely that these materials will provide postemergence relief to growers at stages greater than 1-2 true leaves.

Table 15. Efficacy of pre-emergent herbicides for Oxalis, Wilen, 2008.

Product - Rate (lb ai/A)	Percent Cover[1]						Percent[2] Control	
	3 WAT	4 WAT	9 WAT	12 WAT	23 WAT		12 WAT	23 WAT
	Preemergent Timing							
Broadstar VC1604 – 0.19	0.00 a	0.00 a	0.33 a	0.17 a	2.17 a		40.69 bc	94.00 c
Broadstar VC1604 0.375	0.00 a	0.00 a	0.17 a	0.50 a	2.75 a		35.03 bc	89.92 c
EXC3898 – 2.1	0.00 a	0.08 a	5.75 a	5.50 a	12.08 b		70.42 cd	70.67 b
EXC3898 – 3.15	0.00 a	0.00 a	0.08 a	0.67 a	0.75 a		70.83 d	91.00 c
V-10142 – 0.375	0.17 a	0.00 a	0.00 a	0.08 a	0.67 a		68.57 bcd	98.00 c
V-10142 – 0.75	0.17 a	0.00 a	0.00 a	0.08 a	0.25 a		68.57 bcd	99.17 c
Untreated Control	1.25 b	1.67 b	15.38 b	20.63 b	35.00 c		0.00 a	0.00 a
Level of significance	***	***	***	***	***		***	***

[1]Percent weed cover was estimated for all containers.

[2]Percent control was rated as compared to the untreated containers in the same replication.

Mean Separation done by LSD at P=0.05

*** P<0.001

Table 16. Efficacy of pre-emergent herbicides for emerged Oxalis (Stage 1), Wilen, 2008.

Product - Rate (lb ai/A)	Percent[1] Cover					Percent [2] Control			
	9 DAT[3]	2 WAT	4 WAT	7 WAT		9 DAT	2 WAT	4 WAT	7 WAT
	Cotyledon to one leaf stage								
Broadstar VC1604 – 0.19	9.0 b	14.5 b	20.00 b	14.42 cd		1.67 ab	32.78 ab	39.44 ab	42.22 ab
Broadstar VC1604 – 0.375	4.42 a	5.17 a	10.50 ab	5.00 ab		27.50 bc	48.89 bc	49.44 b	65.73.bc
EXC3898 – 2.10	6.92 ab	7.92 ab	13.67 ab	10.17 bc		44.58 cd	45.56 bc	40.0 b	43.33 ab
EXC3898 – 3.15	5.33 ab	2.83 a	3.83 a	2.58 a		62.24 d	76.11 c	78.89 c	83.33 c
V-10142 – 0.375	8.25 ab	6.92 a	8.75 ab	4.08 ab		4.17 ab	33.89 ab	63.33 bc	77.78 c
V-10142 – 0.75	4.92 a	5.75 a	5.42 a	2.83 a		39.42 cd	37.22 ab	60.55 bc	80.56 c
Untreated	16.25 c	27.00 c	43.75 c	23.25 d		0.00 ab	0.00 a	0.00 a	0.00 a
Level of Significance	**	***	***	***		***	*	**	**

[1]Percent weed cover was estimated for all containers.

[2]Percent control was rated as compared to the untreated containers in the same replication.Mean Separation done by LSD at P=0.05 * P<0.05, ** P<0.01, *** P<0.001

Table 17. Efficacy of pre-emergent herbicides for emerged Oxalis (Stage 2), Wilen, 2008.

Product - Rate (lb ai/A)	Percent [1] Cover 1 WAT	Percent [2] Control 1 WAT		Percent Cover 17 DAT	Percent Control 17 DAT
Two to Four Leaves					
Broadstar VC1604 – 0.19	24.58 a	5.83 a		24.58 a	12.92 ab
Broadstar VC1604 – 0.375	24.58 a	12.50 b		22.08 a	21.25 b
EXC3898 – 2.10	46.25 b	7.08 a		43.33 b	31.67 c
EXC3898 – 3.15	27.50 a	13.34 b		25.83 a	13.75 ab
V-10142 – 0.375	22. 08 a	7.08 a		24.17 a	10.42 a
V-10142 – 0.75	25.00 a	5.00 a		27.08 a	4.17 a
Untreated Control	23.31 a	0.00 a		24.19 a	0.00 a
Level of Significance	***	**		***	***

[1]Percent weed cover was estimated for all containers.
[2]Percent control was rated as compared to the untreated containers in the same replication.
Mean Separation done by LSD at P=0.05, * P<0.01, *** P<0.001

Senesac, 2009

In an experiment conducted within a greenhouse with hourly mist, Senesac (NY) tested seven products for postemergent efficacy for oxalis.

Stage 0: Certainty (0.035 and 0.094 lb ai/A) and V-10142 gave 70% and 63 % control, respectively, at 4 WAT when applied prior to emergence. Other treatments delivered poor to moderate control at this stage.

Stage 1: At the second stage treatments of Certainty at either rate, HGH-63 (2.0 lb ai/A) and V-10142 had ratings of 70% or greater 4 WAT.

Stage 2: All treatments demonstrated significant initial injury with ratings of 75% or greater 1 WAT with the exception of HGH-63 (35%). At 2 WAT both rates of Certainty and V-10142, as well as Broadstar VC1604 at 0.375 and Casoron 1.4 CS at 1.0 lb ai/a provided commercially acceptable control of oxalis at this stage. However, Certainty (0.094 lb ai/A), Casoron 1.4 CS, and both rates of V-10142 were the only treatments which continued to control oxalis at the two to four leaf stage at 4 WAT.

Table 18. Efficacy of pre-emergent herbicides for Oxalis, Senesac, 2009.

Product	Rate lb ai/A	Percent Control		
		1 WAT	2 WAT	4 WAT
Preemergent				
Untreated	~	0	0	0
Broadstar VC1604 0.25G	0.19	14	30	3
Broadstar VC1604 0.25G	0.375	20	33	8
Casoron 4G	1.0	1	15	0
Casoron 4G	2.0	8	20	8
Casoron 1.4CS	1.0	10	45	38
Certainty	0.035	5	55	70
Certainty	0.094	10	50	70
HGH-63	2.0	8	58	20
Tower	0.97	40	45	10
Tower	1.94	63	68	43
V-10142	0.38	0	53	63
V-10142	0.75	0	43	63
One to two leaf stage				
Untreated	~	0	0	0
Broadstar VC1604 0.25G	0.19	13	50	38
Broadstar VC1604 0.25G	0.375	25	53	53
Casoron 4G	1.0	3	20	3
Casoron 4G	2.0	15	43	20
Casoron 1.4CS	---	---	---	---
Certainty	0.035	5	50	70
Certainty	0.094	13	58	73
HGH-63	2.0	20	70	83
Tower	0.97	20	48	35
Tower	1.94	33	58	50
V-10142	0.38	8	48	58
V-10142	0.75	18	65	80
Two to four leaf stage				
Untreated	~	0	0	0
Broadstar VC1604 0.25G	0.19	78	53	8
Broadstar VC1604 0.25G	0.375	85	85	60
Casoron 4G	1.0	88	38	18
Casoron 4G	2.0	93	63	50
Casoron 1.4CS	1.0	100	85	78
Certainty	0.035	93	78	68
Certainty	0.094	93	78	80
HGH-63	2.0	35	45	48
Tower	0.97	75	38	48
Tower	1.94	93	45	63
V-10142	0.38	78	70	70
V-10142	0.75	78	80	78
Fisher's LSD @ 0.05		*19*	*17*	*21*

Peachey, 2010

Peachey evaluated five herbicides for early postemergence activity on oxalis in the greenhouse at Oregon State University in Corvallis, Oregon. Applications were made sequentially; therefore, evaluation dates differ by stage of weed development (Table 19 and Table 20). Phytoxicity ratings evaluate chlorosis and necrosis as 0 = no injury, 10 = severe injury. Phytotoxicity ratings are not included if there were no surviving plants. The percent control rating evaluate reduction of growth or stunting as 0 = no reduction in growth, 100 = completely dead.

Stage 0: Casoron, Certainty, SureGuard and Tower effectively controlled oxalis prior to emergence at all rates through 10 WAT. Basagran was not evaluated at this stage.

Stage 1: This stage was evaluated at 2, 3, and 5 weeks after treatment. Excellent control at the cotyledon to two leaf stage was observed approximately 5 WAT with Certainty, Casoron, SureGuard and the high rate of Tower (1.94 lb ai/A). Basagran at 1 lb ai/A plus 1% COC and Tower at 0.97 lb ai/A provided good control (83 % and 73% respectively) at this evaluation as well.

Stage 2: Evaluations were taken 1, 2 and 4 weeks after treatment for this stage. All treatments provided complete control of the two to four leaf stage by 4 WAT. The low rate of Tower (0.97 lb ai/A) had a few seedlings survive but in general very good control was observed.

Table 19. Efficacy of pre-emergent herbicides for Preemergent Oxalis, Peachey, 2010.

Herbicide	Rate (lb ai/A)	Surfactant	App. Date	No./pot				Phytoxicity[1]			%Control[2]
				7 WAT Dec 18	8 WAT Dec 25	10 WAT Jan 8		7 WAT Dec 18	8 WAT Dec 25	10 WAT Jan 8	10 WAT Jan 8
Preemergent											
Certainty (sulfosulfuron)	0.035	NIS 0.25%	30-Oct	1.0	0	0		-	-	-	100
	0.094	NIS 0.25%	30-Oct	0.5	0	0		-	-	-	100
Casoron 4G (dichlobenil)	3	-	30-Oct	0.0	0	0		-	-	-	100
	4	-	30-Oct	0.0	0	0		-	-	-	100
SureGuard (flumioxazin)	0.5625	NIS 0.25%	30-Oct	0.0	0	0		-	-	-	100
Tower (dimethenamid-p)	0.97	-	30-Oct	1.0	0	0		9.0	-	-	100
	1.94	-	30-Oct	1.0	0	0		9.0	-	-	100
Untreated		-	-	5.8	5.2	5.2		-	-	-	-

[1]Phyto is evaluation of chlorosis and necrosis, 0 = no injury, 10 = severe injury. Phytotoxicity ratings are not included if there were no surviving plants.

[2] Percent Control is evaluation of reduction of growth or stunting, 0 = no reduction in growth, 100 = completely dead.

Table 20. Efficacy of pre-emergent herbicides for emerged Oxalis, Peachey, 2010.

Cotyledon to one leaf											
Herbicide	Rate (lb ai/A)	Surfactant	App. Date	No./pot				Phytoxicity			%Control
				2 WAT Dec 18	3 WAT Dec 25	5 WAT Jan 8		2 WAT Dec 18	3 WAT Dec 25	5 WAT Jan 8	5 WAT Jan 8
Certainty (sulfosulfuron)	0.035	NIS .25%	4-Dec	4.3	0.3	0		8.7	10	-	100
	0.094	NIS .25%	4-Dec	4.0	0.7	0		9.0	10	-	100
Casoron 4G (dichlobenil)	3	-	4-Dec	4.7	0.7	0.3		6.7	9	1.0	97
	4	-	4-Dec	5.0	0.3	0		8.7	10	-	100
Basagran + COC	1	COC 1%	4-Dec	6.0	4.7	2.0		6.7	6	0.5	83
SureGuard (flumioxazin)	0.5625	NIS .25%	4-Dec	3.0	0	0		9.0	-	-	100
Tower (dimethenamid-p)	0.97	-	4-Dec	12.0	12.0	7.5		3.0	6	1.0	73
	1.94	-	4-Dec	7.0	6.5	6.0		6.0	8	4.0	95
Untreated				5.8	5.2	5.2		0	0	0	0
Two to four leaf											
Herbicide	Rate (lb ai/A)	Surfactant	App. Date	No./pot				Phytoxicity			%Control
				1 WAT Dec 18	2 WAT Dec 25	4 WAT Jan 8		1 WAT Dec 18	2 WAT Dec 25	4 WAT Jan 8	4 WAT Jan 8
Certainty (sulfosulfuron)	0.035	NIS .25%	11-Dec	6.5	3.0	0		2.5	9	-	100
	0.094	NIS .25%	11-Dec	6.0	0.5	0		2.5	-	-	100
Casoron 4G (dichlobenil)	3	-	11-Dec	5.5	0	0		1.0	-	-	100
	4	-	11-Dec	5.0	0	0		3.0	-	-	100
Basagran + COC	1	COC 1%	11-Dec	2.5	0	0		5.0	-	-	100
SureGuard (flumioxazin)	0.5625	NIS .25%	11-Dec	2.0	0	0		9.0	-	-	100
Tower (dimethenamid-p)	0.97	-	11-Dec	8.5	7.0	5.5		5.5	8	5.5	90
	1.94	-	11-Dec	6.5	1.0	0		8.5	10	-	100
Untreated				5.8	5.2	5.2		0	0	0	0

[1]Phyto is evaluation of chlorosis and necrosis, 0 = no injury, 10 = severe injury. Phytotoxicity ratings are not included if there were no surviving plants.

[2] Percent Control is evaluation of reduction of growth or stunting, 0 = no reduction in growth, 100 = completely dead.

Senesac 2010

Senesac (NY) tested five products in containers in the field for control of spurge at four growth stages.

Stage 0: All treatments provided preemergent control except for Basagran (Table 21).

Stage 1: Oxalis at the cotyledon to one leaf stage was effectively controlled by all treatments at 1 WAT. However, weed control to 4 WAT was only observed with Certainty (0.035 and 0.094 lb ai/A), Casoron (4.0 lb ai/A), and SureGuard.

Stage 2: Good to very good control was achieved with Certainty (0.035 and 0.094 lb ai/A) and excellent control with SureGuard.

Stage 3: SureGuard provided excellent control at the 4+ leaf stage while Certainty at 0.094 gave acceptable control.

Summary*:* Oxalis at the 2-4+ leaf stage was best controlled by SureGuard at 0.383 lb ai/A and Certainty at 0.094. Smaller stages of emerged oxalis may be effectively controlled by SureGuard, Certainty (0.035 and 0.094 lb ai/A) and Casoron (4.0 lb ai/A).

Gilliam 2011

Gilliam (AL) evaluated Gallery, indaziflam and Tower for control of emerged *Oxalis stricta* at the cotyledon to one leaf stage and two to four leaf stage. A nonionic surfactant was included in Experiment 1 (Table 22) but not 2 (Table 23). Additionally, Experiment 2 only had 11 replications per treatment due to poor germination.

Stage 0: Preemergent control was assessed by taking weed counts at each evaluation. All treatments (except the surfactant alone) provided significant preemergent control compared to the untreated. Indaziflam demonstrated complete weed control at this stage.

Stage 1: Indaziflam provided the longest control at the cotyledon to one leaf stage with 100% control through 8 WAT. Tower at 0.97 and 1.5 lb ai/A gave very good control through 8 WAT in Experiment 2 but unacceptable in the first experiment where surfactant was used. Gallery controlled oxalis in both experiments through 4 WAT but control dropped thereafter.

Stage 2: Indaziflam delivered excellent control of oxalis by 8 WAT. Gallery at 1.0 lb ai/A provided acceptable control at 2 and 4 WAT in the second experiment only (no surfactant). Unacceptable control was observed with Tower treatments in both experiments.

Table 21. Efficacy of pre-emergent herbicides for emerged Oxalis, Senesac, 2010.

Product	Rate (lb ai/A)	Percent Control		
		1 WAT	2 WAT	4 WAT
		Preemergent		
Casoron 4G	3.0	-	90	100
Casoron 4G	4.0	-	90	100
Certainty 75WDG + NIS	0.035	-	70	100
Certainty 75 WDG + NIS	0.094	-	70	100
SureGuard 51 WDG + NIS	0.383	-	100	100
Tower 6EC	0.97	-	70	90
Tower 6EC	1.94	-	70	100
Basagran 4L + COC	1.0	-	33	0
Untreated		-	0	0
		Cotyledon to one leaf stage		
Casoron 4G	3.0	77	73	43
Casoron 4G	4.0	80	80	77
Certainty 75WDG + NIS	0.035	70	83	100
Certainty 75 WDG + NIS	0.094	70	83	100
SureGuard 51 WDG + NIS	0.383	100	100	100
Tower 6EC	0.97	90	57	33
Tower 6EC	1.94	90	53	53
Basagran 4L + COC	1.0	77	50	0
Untreated		-	0	0
		Two to four leaf stage		
Casoron 4G	3.0	37	43	20
Casoron 4G	4.0	47	67	60
Certainty 75WDG + NIS	0.035	33	77	80
Certainty 75 WDG + NIS	0.094	33	77	87
SureGuard 51 WDG + NIS	0.383	100	100	100
Tower 6EC	0.97	60	43	20
Tower 6EC	1.94	50	47	23
Basagran 4L + COC	1.0	60	47	0
Untreated		-	0	0
		Four + leaf stage		
Casoron 4G	3.0	10	17	0
Casoron 4G	4.0	50	33	0
Certainty 75WDG + NIS	0.035	30	37	60
Certainty 75 WDG + NIS	0.094	20	50	70
SureGuard 51 WDG + NIS	0.383	73	100	100
Tower 6EC	0.97	23	10	0
Tower 6EC	1.94	17	10	0
Basagran 4L + COC	1.0	30	7	0
Untreated		-	0	0
Fisher's LSD @ 0.05	*25 21 16*			

Table 22. Control of emerged oxalis (*Oxalis stricta)* with selected pre-emergent herbicides, Gilliam, 2011, Experiment 1.

Treatment	Rate	Weed Count[v] and Fresh Weight				
		1 WAT[y]	2 WAT	4 WAT	8 WAT	Fresh Weight[x]
Preemergent[v]						
Gallery	0.5 lb ai/A	0.0 b[w]	0.0 b	0.2 c	9.6 b	1.4 c
Gallery	1.0 lb ai/A	0.0 b	0.0 b	0.0 c	6.0 b	0.5 c
Indaziflam	50 g/ha	0.0 b	0.0 b	0.0 c	0.0 c	0.0 c
Indaziflam	100 g/ha	0.0 b	0.0 b	0.0 c	0.0 c	0.0 c
Tower	0.97 lb ai/A	0.6 ab	1.2 a	1.6 b	6.1 b	0.3 c
Tower	1.5 lb ai/A	0.0 b	0.2 b	0.2 c	5.2 b	0.1 c
Non-ionic Surfactant	0.25% v/v	0.2 ab	1.3 a	6.6 a	15.0 a	22.1 a
Untreated		0.8 a	1.7 a	6.8 a	17.6 a	13.1 b
Treatment	**Rate**	**Plant Injury[z] and Fresh Weight**				
		1 WAT[y]	**2 WAT**	**4 WAT**	**8 WAT**	**Fresh Weight[x]**
Cotyledon to one leaf						
Gallery	0.5 lb ai/A	7.7 b	9.0 b	7.2 b	1.8 c	18.6 c
Gallery	1.0 lb ai/A	8.3 b	9.0 b	9.0 a	3.5 b	5.0 c
Indaziflam	50 g/ha	9.4 a	10.0 a	10.0 a	10.0 a	0.0 d
Indaziflam	100 g/ha	9.7 a	10.0 a	10.0 a	10.0 a	0.0 d
Tower	0.97 lb ai/A	6.7 c	7.0 c	3.5 c	1.7 c	36.0 b
Tower	1.5 lb ai/A	5.8 d	6.6 c	1.0 d	l.0 d	50.0 b
Non-ionic Surfactant	0.25% v/v	0.0 e	0.0 d	0.0 d	0.0 d	98.6 a
Untreated		0.0 e	0.0 d	0.0 d	0.0 d	91.8 a
Two to four leaf stage						
Gallery	0.5 lb ai/A	0.3 c[v]	2.4 c	1.8 d	0.0 b	111.3 a
Gallery	1.0 lb ai/A	1.9 b	5.0 b	3.3 c	0.0 b	80.1 b
Indaziflam	50 g/ha	6.6 a	8.3 a	9.1 b	10.0 a	0.0 c
Indaziflam	100 g/ha	7.0 a	8.7 a	10.0 a	10.0 a	0.0 c
Tower	0.97 lb ai/A	2.1 b	0.3 d	0.2 e	0.0 b	100.3 ab
Tower	1.5 lb ai/A	2.4 b	0.0 d	0.0 e	0.0 b	92.6 ab
Non-ionic Surfactant	0.25% v/v	0.0 c	0.0 d	0.0 e	0.0 b	108.4 a
Untreated		0.0 c	0.0 d	0.0 e	0.0 b	113.4 a

[z]Injury ratings taken on a scale of 0 to 10, 0 = no injury, 10 = complete kill.
[y]WAT = weeks after treatment. All pots treated on 6/18/11.
[x]F.W. = Fresh weights taken on 8/11/11, presented in grams.
[w]Means separated using Duncan's Multiple Range Test (p = 0.05).
[v] Preemergent control was made by taking weed counts in each pot at each evaluation date.

Table 23. Control of emerged oxalis (*Oxalis stricta)* with selected pre-emergent herbicides, Gilliam, 2011, Experiment 2.

Treatment	Rate	Weed Count[v] and Fresh Weights[x]				
		1 WAT[y]	2 WAT	4 WAT	8 WAT	Fresh Weight[x]
Preemergent[v]						
Gallery	0.5 lb ai/A	0.3 c[w]	0.5 c	2.7 bc	8.3 b	4.2 b
Gallery	1.0 lb ai/A	0.0 c	0.0 c	2.0 bc	6.7 b	1.6 b
Indaziflam	50 g/ha	0.0 c	0.0 c	0.0 c	0.0 c	0.0 b
Indaziflam	100 g/ha	0.0 c	0.0 c	0.0 c	0.0 c	0.0 b
Tower	0.97 lb ai/A	2.5 b	4.5 b	5.5 b	8.5 b	0.5 b
Tower	1.5 lb ai/A	2.5 b	3.5 bc	4.9 b	6.5 b	0.3 b
Untreated		11.1 a	20.7 a	24.1 a	20.4 a	43.4 a
Treatment	**Rate**	**Plant Injury[z] and Fresh Weights**				
		1 WAT[y]	**2 WAT**	**4 WAT**	**8 WAT**	**Fresh Weight[x]**
Cotyledon to one leaf[z]						
Gallery	0.5 lb ai/A	6.5 bc	8.3 bc	7.9 c	4.0 c	1.5 b
Gallery	1.0 lb ai/A	8.5 ab	9.6 ab	9.6 ab	6.9 b	0.4 b
Indaziflam	50 g/ha	10.0 a	10.0 a	10.0 a	10.0 a	0.0 b
Indaziflam	100 g/ha	10.0 a	10.0 a	10.0 a	10.0 a	0.0 b
Tower	0.97 lb ai/A	7.8 b	8.3 bc	8.6 bc	7.6 b	0.3 b
Tower	1.5 lb ai/A	5.5 c	7.3 c	7.6 c	7.4 b	0.6 b
Untreated		0.0 d	0.0 d	0.0 d	0.0 d	18.8 a
Two to four leaf stage						
Gallery	0.5 lb ai/A	4.2 bc	5.9 c	4.8 c	1.1 cd	12.0 b
Gallery	1.0 lb ai/A	5.4 b	8.2 b	7.8 b	3.5 b	3.9 bc
Indaziflam	50 g/ha	8.5 a	9.8 a	9.9 a	10.0 a	0.0 c
Indaziflam	100 g/ha	8.6 a	9.8 a	10.0 a	10.0 a	0.0 c
Tower	0.97 lb ai/A	3.5 c	3.3 d	3.5 cd	2.5 bc	14.1 b
Tower	1.5 lb ai/A	1.6 d	2.0 d	2.1 d	1.2 cd	16.9 b
Untreated		0.0 e	0.0 e	0.0 e	0.0 d	52.2 a

[z]Injury ratings taken on a scale of 0 to 10, 0 = no injury, 10 = complete kill.
[y]WAT = weeks after treatment. All pots treated on 6/18/11.
[x]F.W. = Fresh weights taken on 8/11/11, presented in grams.
[w]Means separated using Duncan's Multiple Range Test (p = 0.05).
[v] Preemergent control was made by taking weed counts in each pot at each evaluation date.

Senesac 2011

In 2011 Senesac (NY) tested Gallery, indaziflam and Tower for postemergent control of *Oxalis stricta* in the greenhouse under mist irrigation.

Stage 0: All treatments provided 100% preemergent control at 2 and 4 WAT (Table 24).

Stage 1: Indaziflam and Gallery provided very good to excellent control through 8 WAT. Tower at 1.94 lb ai/A provided acceptable control at 2 WAT decreased with time.

Stage 2: Indaziflam delivered excellent control of oxalis at 2, 4, and 8 WAT. Unacceptable control was observed with Gallery and Tower treatments at the two to four leaf stage.

Table 24. Postemergent control of oxalis (*Oxalis stricta)* with selected pre-emergent herbicides, Senesac, 2011.

Treatment	Rate	Percent Injury			
		1 WAT	2 WAT	4 WAT	8 WAT
Preemergent					
Gallery	0.5 lb ai/A	---	100	100	100
Gallery	1.0 lb ai/a	---	100	100	100
Indaziflam	50 g/ha	---	100	100	100
Indaziflam	100 g/ha	---	100	100	100
Tower	0.97 lb ai/A	---	100	100	93
Tower	1.94 lb ai/A	---	100	100	100
Untreated		---	0	0	0
Newly Emerged					
Gallery	0.5 lb ai/A	45	100	100	98
Gallery	1.0 lb ai/a	50	100	100	100
Indaziflam	50 g/ha	50	100	100	100
Indaziflam	100 g/ha	70	100	100	100
Tower	0.97 lb ai/A	30	90	50	45
Tower	1.94 lb ai/A	30	90	90	85
Untreated		0	0	0	0
Cotyledon to one leaf					
Gallery	0.5 lb ai/A	35	93	90	80
Gallery	1.0 lb ai/a	40	98	98	93
Indaziflam	50 g/ha	48	95	100	100
Indaziflam	100 g/ha	70	98	100	100
Tower	0.97 lb ai/A	0	13	20	13
Tower	1.94 lb ai/A	30	70	60	50
Untreated		0	0	0	0
Two to four leaf stage					
Gallery	0.5 lb ai/A	23	20	15	8
Gallery	1.0 lb ai/a	45	43	35	30
Indaziflam	50 g/ha	45	95	100	100
Indaziflam	100 g/ha	70	98	100	100
Tower	0.97 lb ai/A	33	33	30	30
Tower	1.94 lb ai/A	60	45	38	35
Untreated		0	0	0	0
Fisher's LSD @ 0.05		*14*	*17*	*18*	*19*

Derr 2015

In 2015 Derr tested Dimension, Gallery and Pendulum for pre-emergence control of creeping woodsorrel (*Oxalis stricta*) in field containers. All products excellent control (Table 25).

Table 25. Efficacy of Pre-emergent Herbicides for Oxalis (*Oxalis stricta*), Derr, VA, 2015.

Treatment	Rate (lb ai/a)	No. Per Plot 27 DAT	% Control 40 DAT
Dimension	0.5	11.3	89
	1.0	0.8	100
	2.0	1.5	100
Gallery SC	1.0	11.8	76
	2.0	1.0	91
	4.0	1.0	98
Gallery + Dimension	1.0 + 0.5	1.8	95
Pendulum 2G	3	20.3	68
	6	3.5	100
	12	0.0	100
Pendulum AquaCap + Gallery SC	3.0 + 1.0	5.0	96
Untreated	-	84.5	0
LSD P=.05	-	19.5	7

Aulach 2018

In 2018, Aulach tested Basagran, Dismiss, Fiesta and Marengo for postemergence control of creeping woodsorrel (*Oxalis corniculata*) in field containers. Marengo and Dismiss at 12 fl oz/A provided 98% and 91 % control, respectively, while Basagran and Fiesta were ineffective (Table 26).

Table 26. Efficacy of Herbicides for Emerged Oxalis (*Oxalis corniculata*), Aulach, CT, 2018.

Product	Rate (fl oz/A)	Percent Control*			Fresh Biomass*
		7 DAT	14 DAT	21 DAT	3 WAT
Basagran T&O 4F	24	0d	0d	0c	13ab
	32	16d	0d	0c	25a
Dismiss 4F	8	52b	57c	64b	6bc
	12	72a	79b	91a	2b
Fiesta	25	40c	0d	0c	20a
	50	41c	0d	0c	12ab
Marengo SC	9	65a	87a	98a	0b
Untreated		-	0	0	14ab

*Average weed control from 4 flats/replications. Weeds were 2 to 3-inch tall at the time of treatment.
**Average weed fresh weight from 4 flats, each containing 25-30 plants/flat

Derr 2018

In 2018 Derr tested Basagran, Fiesta and Sedgehammer for postemergence control of yellow woodsorrel (*Oxalis stricta*) in field containers. No treatment provided control (Table 27). Fiesta provided no weed

control, most likely because rates used were too low. For example, the lowest rate should have been 25 fl oz/1000 sq feet instead of 25 fl oz/A.

Table 27. Efficacy of Herbicides for Emerged Oxalis (*Oxalis stricta*), Derr, VA, 2018.

Treatment	Rate	% Control		
		1 DAT	8 DAT	4 DAT2
Basagran T&O 4F + MSO	32 fl oz + 1 qt	18	13	24
	64 fl oz + 1 qt	31	28	29
	128 fl oz + 1 qt	36	28	41
Fiesta	25 fl oz	16	13	15
	50 fl oz	15	18	5
	100 fl oz	9	10	10
Sedgehammer 75 + Capsil	1 oz + 0.25% v/v	16	33	35
Untreated		14	15	18
LSD P=.05		14	16	19

Yellow woodsorrel was 10 inches tall at time of treatment.

Senesac 2018 & 2019

In 2018 and 2019, Senesac tested Basagran, Dismiss, Fiesta and Marengo for postemergence control of yellow woodsorrel (*Oxalis stricta*) in field containers. In 2018, Dismiss and Marengo provided excellent control, Fiesta provided mediocre and good control, while Basagran provided poor control (Table 28). In 2019, Fiesta and Marengo provided excellent control, while both Basagran and Dismiss provided poor to fair control (Table 29).

Table 28. Efficacy of Herbicides for Emerged Oxalis (*Oxalis stricta*), Senesac, NY, 2018.

Treatment	Rate	% Control				Fresh Wt (gm)
		3 DAT	7 DAT	14 DAT	21 DAT	21 DAT
Basagran T&O 4F	24 fl oz/A	35	35	30	18	27
	32 fl oz/A	38	63	45	30	28
Dismiss 4F	8 fl oz/A	90	90	90	98	5
	12 fl oz/A	93	93	100	100	0
Fiesta 26.52%	25 oz/1000 sq ft	80	78	60	63	16
	50 oz/1000 sq ft	85	85	68	80	2
Marengo 0.622SC	9 fl oz/A	53	53	100	100	0
Untreated		0	0	0	0	26
LSD P=.05		15	11	10	16	11

Table 29. Efficacy of Herbicides for Emerged Oxalis (*Oxalis stricta*), Senesac, NY, 2019.

Treatment	Rate	% Control			Fresh Wt (g)
		3 DAT	7 DAT	14 DAT	21 DAT
Basagran T&O 4F	24 fl oz/A	77	87	83	17
	32 fl oz/A	77	90	93	2.0
Dismiss 4F	8 fl oz/A	50	57	60	22
	12 fl oz/A	57	57	63	18
Fiesta 26.52%	25 oz/1000 sq ft	13	30	23	44
	50 oz/1000 sq ft	23	47	40	31
Marengo 0.622SC	9 fl oz/A	30	60	87	5.3
Untreated	-	0	0	0	19
LSD P=.05	-	7	32	32	43

Efficacy Summary by Product/Active Ingredient

A brief efficacy summary for select products is given below.

Basagran generally provided poor control when applied preemergence and at the cotyledon to 1 leaf and 2-4 leaf stages.

Broadstar VC1604 results were varied across experiments ranging from poor to very good. Overall, Broadstar VC1604 provided some degree of injury compared to the nontreated and to a greater degree with the higher rate particularly in experiments that conducted evaluations beyond 3 WAT. Further studies with higher rates and longer evaluation periods would be useful (6-12 WAT).

Broadstar 0.25G (original formulation) was tested by one researcher (Neal) and demonstrated effective control when applied preemergence, but not at the cotyledon to 1 leaf and 2-4 leaf stages.

Casoron provided good control when applied at the 2 to 4 leaf stage in one experiment.

Certainty provided very good early postemergence control.

Dimension provided very good preemergence control in one experiment.

Dismiss provided very good postemergence control in one experiment.

EXC3898 provided commercially acceptable control when applied preemergence, but not at the cotyledon to 1 leaf and 2-4 leaf stages. This product will not be registered.

Fiesta provided good control when applied postemergence in 1 of 2 experiments.

Gallery generally provided good control when applied preemergence and at the cotyledon to 1 leaf stage.

HGH-63 provided good control only when applied at the cotyledon to 1 leaf stage.

Marengo/Indaziflam provided excellent preemergence and postemergence control.

Pendulum provided excellent preemergence control in one experiment.

Sedgehammer was ineffective when applied at the 2-4 leaf stage in one experiment.

SureGuard controlled oxalis effectively when applied preemergence and postemergence.

Tower generally provided good control when applied preemergence and postemergence.

V-10142 generally provided good control when applied preemergence and postemergence.

Please see Table 30 for a list of all researchable studies and the summary of experiments conducted from 2008 to 2019.

Table 30. Summary of Efficacy By Product

Note: Table entries are sorted by crop Latin name. Only those experiments received by 1/30/2020 are included in the table below.

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
29601	Basagran SG (Bentazon)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Peachey	OR	2010	Over the top	Moderate to good oxalis control at cotyledon to 1 leaf stage and excellent control at 2-4 leaf stage with 1 lb ai per acre plus 1% COC.
29601	Basagran SG (Bentazon)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Senesac	NY	2010	Over the top	Poor control of emerged oxalis with 1.0 lbs ai/a.
29601	Basagran SG (Bentazon)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Senesac	NY	2018	Over the top	Poor control of yellow woodsorrel with 24 and 32 fl oz per acre.
34012	Basagran T&O Herbicide (Bentazon)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Aulakh	CT	2018	Over the top	24 and 32 fl oz per acre provided poor control of creeping woodsorrel
33819	Basagran T&O Herbicide (Bentazon)	Oxalis sp. (Oxalis sp.)	Hydrangea, Wild (Hydrangea arborescens)	Field Container	Derr	VA	2018	Over the top	Poor control with 32, 64 and 128 fl oz per acre + MSO applied twice. Severe crop injury.
34007	Basagran T&O Herbicide (Bentazon)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2019	Over the top	Poor to fair control with 24 and 32 fl oz + COC per acre.
28911	BroadStar 0.25G (Flumioxazin)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Neal	NC	2008	Over the top	Good control pre at 0.19 and 0.38 lb ai per acre; poor control at both rates applied at 1-leaf stage; poor control at 1X, fair at 2X applied at 4-leaf stage
34163	BroadStar 0.25G VC1604 (Flumioxazin)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Regan	OR	2008	Over the top	No control pre, fair control post at cotyledon to 1-leaf, and poor control post at 2 to 4-leaf with 0.19 and 0.375 lb ai per acre.
27565	BroadStar 0.25G VC1604 (Flumioxazin)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2008	Over the top	Good control pre, virtually no control post applied at cotyledon - one leaf or at 2-4 leaf stages at 75 and 150 lb per acre.

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
27565	BroadStar 0.25G VC1604 (Flumioxazin)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Wilen	CA	2008	Over the top	94 and 90 % control pre at 75 and 150 lb per acre; 13 and 21 % control at 1X and 2X applied at cotyledon to 1-leaf stage; 42 and 66 % control at 1X and 2X applied at 2 to 4-leaf stage
34164	BroadStar 0.25G VC1604 (Flumioxazin)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Neal	NC	2008	Over the top	Fair control pre at 0.19, good at 0.38 lb ai per acre; poor control at both rates applied at 1-leaf or 4-leaf stage
34164	BroadStar 0.25G VC1604 (Flumioxazin)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2008	Over the top	Poor to fair control pre, poor post at cotyledon to 1-leaf stage, 70 % control or higher post at 2-4 leaf stage, at 0.19, 0.375 and 0.75 lb ai per acre
28930	BroadStar 0.25G VC1604 (Flumioxazin)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2009	Over the top	Poor control pre, fair post at cotyledon to 1-leaf stage, good post at 2-4 leaf stage with 0.19 and 0.375 lb ai per acre.
28927	Casoron 4G (Dichlobenil)	Oxalis sp. (Oxalis sp.)	None (None)	Greenhouse	Peachey	OR	2010	Broadcast	Excellent oxalis control with 3 and 4 lb ia/A at the cotyledon to 1 leaf stage and 2-4 leaf stage.
28927	Casoron 4G (Dichlobenil)	Oxalis sp. (Oxalis sp.)	None (None)	Greenhouse	Senesac	NY	2010	Over the top	4.0 lb/A provided very good control at cotyledon-1 leaf stage from 1WAT-4WAT while other rates and growth stages were unremarkable.
34165	Casoron 4G (Dichlobenil)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2009	Over the top	Poor control pre and post cotyledon to 1-leaf, good control post at 2 to 4-leaf stage with 1 and 2 lb ai per acre.
29602	Certainty Turf Herbicide (Monsanto) (Sulfosulfuron)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Peachey	OR	2010	Over the top	Excellent oxalis control at .035 and .094 lb ai per acre at the cotyledon to 1 leaf stage and 2-4 leaf stage

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
29602	Certainty Turf Herbicide (Monsanto) (Sulfosulfuron)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Senesac	NY	2010	Over the top	4.0 lb/A was effective on all growth stages while 3.0 lb was effective at the cotyledon-1 leaf and 2-4 leaf stages.
28928	Certainty Turf Herbicide (Monsanto) (Sulfosulfuron)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2009	Over the top	Effective control pre and post at cotyledon to 1-leaf and 2 to 4-leaf stages with 0.035 and 0.094 lb ai per acre.
32620	Dimension 2EW (Dithiopyr)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Derr	VA	2015	Over the top	Good control with 0.5, excellent with 1 and 2 lb ai per acre.
34013	Dismiss 4F (Sulfentrazone)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Aulakh	CT	2018	Over the top	8 and 12 fl oz per acre provided good to excellent control of creeping woodsorrel
33820	Dismiss 4F (Sulfentrazone)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2018	Over the top	Excellent control of yellow woodsorrel with 8 and 12 fl oz per acre.
33820	Dismiss 4F (Sulfentrazone)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2019	Over the top	Poor to fair control with 8 and 12 fl oz per acre.
34166	EXC3898 (Mesotrione + prodiamine & S-metolachlor)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Regan	OR	2008	Over the top	Excellent control pre and post at cotyledon to 1-leaf, fair and good control at 2 to 4-leaf stages with 2.1 and 3.15 lb ai per acre.
27292	EXC3898 (Mesotrione + prodiamine & S-metolachlor)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2008	Over the top	Poor control pre, good control post applied at cotyledon - one leaf or at 2-4 leaf stages at 100 and 150 lb per acre.
27292	EXC3898 (Mesotrione + prodiamine & S-metolachlor)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Wilen	CA	2008	Over the top	71 and 91 % control pre at 100 and 150 lb per acre; 43 and 83 % control at 1X and 2X applied at cotyledon to 1-leaf stage; 32 and 14 % control at 1X and 2X applied at 2 to 4-leaf stage

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
34167	EXC3898 (Mesotrione + prodiamine & S-metolachlor)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Boydston	WA	2008	Over the top	90 and 94 % control pre at 2.1 and 3.15 lb ai per acre; 27 and 80 % control at 1X and 2X applied at cotyledon-1 leaf stage; 30 and 92 % control at 1X and 2X applied at 2-4 leaf stage
34167	EXC3898 (Mesotrione + prodiamine & S-metolachlor)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Neal	NC	2008	Over the top	Good control pre at 2.1 and 3.15 lb ai per acre; poor control at 2.1, fair at 3.15 lb applied at 1-leaf stage; poor control at both rates applied at 4-leaf stage
34167	EXC3898 (Mesotrione + prodiamine & S-metolachlor)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2008	Over the top	Fair control pre, good post at cotyledon to 1-leaf stage, poor post at 2-4 leaf stage, at 4.2 lb ai per acre; poor at lower rates
34014	Fiesta Herbicide (Iron HEDTA)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Aulakh	CT	2018	Over the top	25 and 50 oz per acre provided virtually no control of creeping woodsorrel
33908	Fiesta Herbicide (Iron HEDTA)	Oxalis sp. (Oxalis sp.)	Hydrangea, Wild (Hydrangea arborescens)	Field Container	Derr	VA	2018	Over the top	Poor control with 25, 50 and 100 fl oz per acre applied twice (rates should have been in oz per 1000 sq ft). Minor crop injury.
33821	Fiesta Herbicide (Iron HEDTA)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2018	Over the top	Moderate control of yellow woodsorrel at 25 oz and good control at 50 oz per 1000 sq ft.
33821	Fiesta Herbicide (Iron HEDTA)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2019	Over the top	Excellent control with 25 and 50 oz per 1000 sq ft.
30211	Gallery 75DF (Isoxaben)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2011	Over the top	Experiment 1: Good to very good control up to 4WAT at cotyledon to 1 lf stage at 0.5 and 1.0 lb ai per acre; 2-4 lf stage lacked acceptable control

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
30211	Gallery 75DF (Isoxaben)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2011	Over the top	Experiment 2: Good to very good control with 1 lb ai per acre up to 4WAT at all stages; 0.5 lb ai per acre provided good control at cotyledon to 1 leaf stage up to 4WAT.
34168	Gallery 75DF (Isoxaben)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2011	Over the top	Very good to excellent control with 1 lb ai per acre up to 8WAT at preemergent and cotyledon to one leaf stage but poor control at 2 to four leaf stage.
32621	Gallery SC (Isoxaben)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Derr	VA	2015	Over the top	Good control with 1, excellent with 2 and 4 lb ai per acre.
28929	HGH-63 2G (Oxyfluorfen)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2009	Over the top	Fair control pre, good post at cotyledon to 1-leaf, fair post at 2 to 4-leaf stage with 2 lb ai per acre.
30212	Indaziflam 0.03% G (Indaziflam)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2011	Broadcast	Experiment 1: Excellent control and reduction in fresh weight at all growth stages throughout the evaluation with 50 and 100 g ai/ha.
30212	Indaziflam 0.03% G (Indaziflam)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2011	Broadcast	Experiment 2: Excellent control and reduction in fresh weight at all growth stages throughout the evaluation with 50 and 100 g ai/ha.
34015	Marengo 74SC (Indaziflam)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Aulakh	CT	2018	Over the top	9 fl oz per acre provided effective control of creeping woodsorrel
30466	Marengo 74SC (Indaziflam)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2011	Over the top	Excellent control at all stages with 0.045 and 0.089 lb aia.
33822	Marengo 74SC (Indaziflam)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2018	Over the top	Excellent control of yellow woodsorrel with 9 fl oz per acre.
33822	Marengo 74SC (Indaziflam)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2019	Over the top	Excellent control with 9 fl oz per acre.
32622	Pendulum 2G (Pendimethalin)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Derr	VA	2015	Over the top	Mediocre control with 3, excellent with 6 and 12 lb ai per acre.

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
33909	SedgeHammer (Halosulfuron)	Oxalis sp. (Oxalis sp.)	Hydrangea, Wild (Hydrangea arborescens)	Field Container	Derr	VA	2018	Over the top	Poor control with 1 fl oz per acre + Capsil applied twice. Severe crop injury.
29603	SureGuard 51WDG (Flumioxazin)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Peachey	OR	2010	Over the top	Excellent oxalis control with 0.56 lb ai per acre plus 0.25% NIS at the cotyledon to 1 leaf stage and 2-4 leaf stage.
29603	SureGuard 51WDG (Flumioxazin)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Senesac	NY	2010	Broadcast	Excellent control of all growth stages with 0.383 lb ai per acre.
27761	Tower (Dimethenamid-p)	Oxalis sp. (Oxalis sp.)	None (None)	Greenhouse	Gilliam	AL	2011	Over the top	Experiment 1: Good control of cotyledon to 1 leaf stage at 2-4WAT decreasing over time with 0.97 and 1.94 lb ai per acre; signficantly decreased fresh weights.
27761	Tower (Dimethenamid-p)	Oxalis sp. (Oxalis sp.)	None (None)	Greenhouse	Gilliam	AL	2011	Over the top	Experiment 2: Good control at cotyledon to 1 leaf stage up to 8WAT and reduction in fresh weight with 0.97 and 1.94 lb ai per acre.
27761	Tower (Dimethenamid-p)	Oxalis sp. (Oxalis sp.)	None (None)	Greenhouse	Peachey	OR	2010	Over the top	Good to very good control of oxalis with 0.97 and 1.94 lb ai per acre.
34169	Tower (Dimethenamid-p)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2009	Over the top	Good control pre and post at cotyledon to 1-leaf and 2 to 4-leaf stages with 1.94 lb ai per acre; 0.97 lb good only at 2 to 4-leaf stage.
34169	Tower (Dimethenamid-p)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2010	Over the top	Ineffective all rates and timings except for 0.97 and 1.97 lb ai per acre at cotyledon to 1 leaf stage.

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
34169	Tower (Dimethenamid-p)	Oxalis stricta (Oxalis stricta)	None (None)	Greenhouse	Senesac	NY	2011	Over the top	Very good control pre and post at cotyledon to 1-leaf with 1.94 lb ai per acre but unacceptable at 2 to 4 leaf stage. Very good control with 1.94 lb ai per acre at pre and cotyldeon to one leaf stage but unacceptable at 2 to 4 leaf stage.
34170	V-10142 0.5G (Imazasulfuron)	Woodsorrel, Creeping (Oxalis corniculata)	None (None)	Field Container	Regan	OR	2008	Over the top	Excellent control pre and post at cotyledon to 1-leaf and 2 to 4-leaf stages with 0.375 and 0.75 lb ai per acre.
27295	V-10142 0.5G (Imazasulfuron)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Gilliam	AL	2008	Over the top	Good control pre, excellent control post applied at cotyledon - one leaf or at 2-4 leaf stages at 75 and 150 lb per acre; best post treatment.
27295	V-10142 0.5G (Imazasulfuron)	Oxalis sp. (Oxalis sp.)	None (None)	Field Container	Wilen	CA	2008	Over the top	98 and 99 % control pre at 75 and 150 lb per acre; 78 and 81 % control at 1X and 2X applied at cotyledon to 1-leaf stage; 10 and 4 % control at 1X and 2X applied at 2 to 4-leaf stage
34171	V-10142 0.5G (Imazasulfuron)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Boydston	WA	2008	Over the top	93 and 95 % control pre at 0.375 and 0.75 lb ai per acre; 92 and 97 % control at 1X and 2X applied at cotyledon-1 leaf stage; 62 and 70 % control at 1X and 2X applied at 2-4 leaf stage
34171	V-10142 0.5G (Imazasulfuron)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Neal	NC	2008	Over the top	Good control pre at 0.375 and 0.75 lb ai per acre; poor control at 1X, fair at 2X applied at 1-leaf and 4-leaf stages

PR#	Product (Active Ingredients)	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
34171	V-10142 0.5G (Imazasulfuron)	Oxalis stricta (Oxalis stricta)	None (None)	Field Container	Senesac	NY	2008	Over the top	Generally, 70 % or higher control pre and post at cotyledon to 1-leaf stage, less effective post at 2-4 leaf stage, at 0.38, 0.75 and 1.5 lb ai per acre
28931	V-10142 0.5G (Imazasulfuron)	Oxalis stricta (Oxalis stricta)	None (None) O. stricta	Greenhouse	Senesac	NY	2009	Over the top	Effective control pre and post at cotyledon to 1-leaf and 2 to 4-leaf stages with 0.38 and 0.75 lb ai per acre; higher rate betrter.

Label Suggestions

The following label suggestions are for use in container grown ornamentals provided an acceptable level of crop safety exists.

Certainty at 0.035 and 0.094 lb ai/a for preemergent and early postemergent control of oxalis.

V-10142 at 0.38 to 0.75 lb ai/a for preemergent and early postemergent control of oxalis.

Appendix 1: Contributing Researchers

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