Field Efficacy Trials

Company Name
Cutting Edge Formulations, Inc.

Product Identification
Nature's AvengerTM Organic Herbicide Concentrate
EPA Reg. No. 82052 – 1_
[D-Limonene: 70%]

Author
Various
Collated by: Olav Messerschmidt (OMC Ag Consulting)

Volume Number
5 of 5

Study Completion Date
March 14, 2007

Field Efficacy Trials
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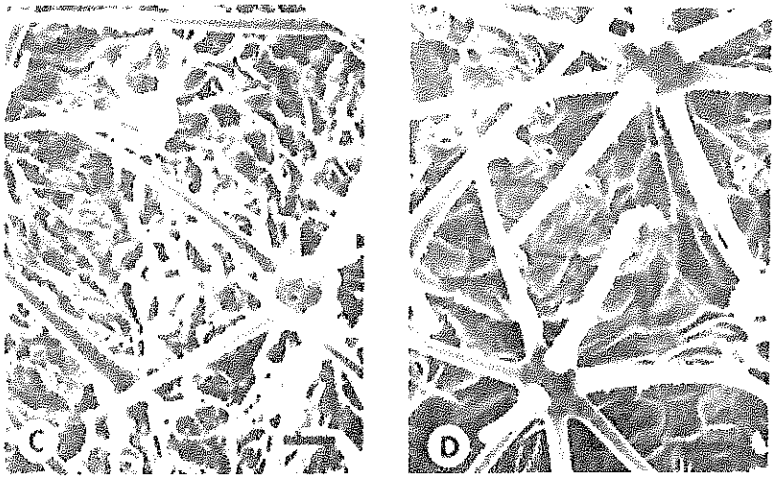
Field Efficacy Data Trials Summary

These applications are for the registrations with the following products:

1. Nature's Avenger RTU Organic Herbicide (EPA Reg. No. 82052-3)
2. Nature's Avenger Organic Herbicide Concentrate (EPA Reg. No. 82052-1)
3. GreenMatch Organic Burndown Herbicide (EPA registration pending)

Mode of Action:
The active ingredient in each product is d-limonene which is the primary component of citrus oil (citrus oil contains 92 to 97% d-limonene). d-Limonene or citrus oil is commonly used in many industrial and consumer detergents and soaps due to its excellent degreasing properties. It is this degreasing capability that dissolves the waxy cuticle on plant leaf surfaces. The following electron micrographs by Michigan State University demonstrate the effect of low levels of d-limonene on velvetleaf's leaf surface.

Effect on Plant Cuticle:
Scanning Electron Micrograph
8-wk old Velvetleaf Plant Leaf Surface



10% Limonene Distilled Water

Results in Field Trials
In support of the California DPR, eleven field trials on 52 weeds were conducted on the following products:

Nature's Avenger RTU Organic Herbicide	EPA Reg. No. 82052-3	17.5% d-limonene
Nature's Avenger Organic Herbicide Concentrate (also called MOI – 001)	EPA Reg. No. 82052-1	70% d-limonene

The standard in almost all trials is Roundup Herbicide by Monsanto, which is the primary non-selective, burndown herbicide used in the consumer, professional and agricultural markets. Roundup is not an organic herbicide. Another less common, but the only available organic herbicide product for the organic grower is Matran. Matran is a 25(b) product that consists of clove oil and acetic acid. A few trials also used Matran as another standard.

In all trials, Nature's Avenger was significantly and substantially faster acting than Roundup. After a few weeks, Nature's Avenger was equal to or slightly less effective than Roundup. It was typically much more effective than Matran.

During the end of December, 2006 and early January, 2007, there was a cold snap in the Central Valley during which nighttime temperatures were in the low to mid twenties. Trials conducted by Tom Lanini of UC Davis, Duane Ewing of Ewing & Associated, and Daniel Forey of BioResearch all occurred during that time. Performance of Nature's Avenger during that cold spell was substandard (as is typical for all herbicides) but Nature's Avenger efficacy was comparable to Roundup. There is a statement on the GreenMatch label that cautions the user against spraying GreenMatch in very cold conditions.

> *Cool weather will slow the activity of GreenMatch. For best results, spray when ambient high temperatures are expected above 50°F and lows above freezing. On cooler days, spray during the warm part of the day.*

Summary

Statistically significant results were obtained in all trials. The d-limonene products were significantly faster acting than Roundup and equal to or slightly less than Roundup after a couple of weeks. The d-limonene products outperformed the only commercial organic herbicide on the market, Matran.

Red Sorrel (*Rumex acetosella)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Ralph Zingaro
White Mt. Horticultural Consulting LLC
4381 Bodega Ave.
Petaluma, CA 94952

Report: White Mountain Horticultural Consulting LLC Report Date:			**Percent Control** Application Date: November 28, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger Concentrate	17.5 %	99.75	a	100.0	a	100.0	a
3	Nature's Avenger Concentrate	14.0 %	97.25	a	97.5	a	97.0	a
4	Nature's Avenger Concentrate	10.0 %	90.5	b	88.75	b	86.25	b
5	Nature's Avenger Concentrate	8.75 %	88.0	b	88.0	b	84.25	b
LSD (P = .05)			3.31		4.00		3.29	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: Two days after the treatment, Nature's Avenger with 17.5 or 14.0 % provided an almost complete control of *Rumex acetosella.* Nature's Avenger treatments with lower limonene concentrations were slightly inferior.

Redstem filaree (*Erodium cicutarium)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Ralph Zingaro
White Mt. Horticultural Consulting LLC
4381 Bodega Ave.
Petaluma, CA 94952

Report: White Mountain Horticultural Consulting LLC Report Date:			**Percent Control** Application Date: November 28, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated	0 %	0.0	d	0.0	d	0.0	d
2	Nature's Avenger Concentrate	17.5 %	100.0	a	100.0	a	100.0	a
3	Nature's Avenger Concentrate	14.0 %	99.25	a	99.25	a	98.25	a
4	Nature's Avenger Concentrate	10.0 %	92.25	b	90.5	b	89.0	b
5	Nature's Avenger Concentrate	8.75 %	84.5	c	82.75	c	80.75	c
LSD (P = .05)			3.17		4.27		4.00	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: The two Nature's Avenger solutions with the highest limonene concentrations (17.5 and 14.0%) performed similarly providing an almost complete control of *Erodium cicutarium* within two days. Limonene concentration had a significant effect on the % control – the product with 8.75 % limonene being significantly less effective than the tree higher concentrations at all time points.

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Efficacy of MOI-001 Concentrate Rate Trial Homeowner Use Herbicide Trial No. 112806

Study Director: Olav Messerschmidt
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Email: omesserschmidt@comcast.net

Investigator: Ralph Zingaro
Affiliation: White Mt. Horticultural Consulting LLC
Phone: (707) 781-7235
Email: nhcal@yahoo.com
Trial location: White Mt. Horticultural Consulting LLC, 4381 Bodega Ave, Petaluma, CA

Products Evaluated:
1. Nature's Avenger Organic Herbicide Concentrate (70% d-Limonene) at various dilutions.

Objective: Determine the efficacy of Nature's Avenger Organic Concentrate Herbicide on representative homeowner weeds.

Conclusions: This trial was conducted at White Mt. Horticultural Consulting in Petaluma, CA. The predominant weed species were Redstem Filaree (*Erodium cicutarium*) and Red Sorrel (*Rumex acetosella*).

Excellent control was observed 2 days after treatment for the 1:3 and 1:4 Concentrate to water dilutions. All treatments performed better than the untreated control; dilution 1:3 gave the best control but the difference between 1:3 and 1:4 was not statistically significant; both 1:3 and 1:4 performed better than the other two dilutions (1:6 and 1:7).

Ralph Zingaro
White Mt. Horticultural Consulting LLC

Site and Design:

Plot Width:	5 Ft.
Plot Length:	15 Ft.
Site Type:	Field
Replications:	4
Study Design:	Randomized Complete Block

Application Description:

Application Date:	Nov. 28, 2006
Time of Day:	1 PM
Application Method:	Spray
Application Placement:	Foliar
Applied By:	R. Zingaro
Air Temperature, Unit:	54°F
% Relative Humidity:	70%
Wind Velocity, Unit:	3 MPH
Dew Presence (Y/N):	N
Water Hardness:	N
% Cloud Cover:	none

Pest Stage At Each Application:

Erodium cicutarium	3 inch
Rumex acetosella	Prostrate

Application Equipment:

Appl. Equipment:	Backpack Sprayer
Operating Pressure:	50 PSI
Nozzle Type:	Flat Fan
Nozzle Size:	8012
Nozzle Spacing, Unit:	Inches
Nozzles/Row:	1
Boom Length, Unit:	2 Ft
Boom Height, Unit:	14 In
Ground Speed, Unit:	1 MPH
Carrier:	Water
Spray Volume:	150
Volume Unit:	Gal/Acre
Propellant:	None
Tank Mix (Y/N):	None

Pest Name				Filaree		Red Sorrel	
Rating Date							
Rating Data Type				% Control		% Control	
Assessed By				R. ZINGARO		R. ZINGARO	
Days After Treatment				7 DAT		7 DAT	
Trt #	Treatment Name	% v/v Rate	% w/w Rate (% A.I.)				
1	Untreated Control	0%	**0%**	0	d	0	c
2	Nature's Avenger Concentrate	25%	**17.5%**	100	a	100	a
3	Nature's Avenger Concentrate	20%	**14%**	98.25	a	97	a
4	Nature's Avenger Concentrate	14.3%	**10%**	89	b	86.5	b
5	Nature's Avenger Concentrate	12.5%	**8.75%**	80.75	c	84.25	b
LSD (P=.05)				4.00		3.29	
Standard Deviation				2.096624			

Pest Name				Filaree		Red Sorrel		Filaree		Red Sorrel	
Rating Date											
Rating Data Type				% Control		% Control		% Control		% Control	
Assessed By				R. ZINGARO		R. ZINGARO		R. ZINGARO		R. ZINGARO	
Days After Treatment				2 DAT		2 DAT		4 DAT		4 DAT	
Trt #	Treatment Name	% v/v Rate	% w/w Rate (% A.I.)								
1	Untreated Control	0%	0%	0	d	0	c	0	d	0	c
2	Nature's Avenger Concentrate	25%	17.5%	100	a	99.75	a	100	a	100	a
3	Nature's Avenger Concentrate	20%	14%	99.25	a	97.25	a	99.25	a	97.5	a
4	Nature's Avenger Concentrate	14.3%	10%	92.25	b	90.5	b	90.5	b	88.75	b
5	Nature's Avenger Concentrate	12.5%	8.75%	84.5	c	88	b	82.75	c	66	b
LSD (P=.05)				3.17		3.31		4.27		4.00	
Standard Deviation				1.664582				2.240722			

Red Sorrel (*Rumex acetosella)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Ralph Zingaro
White Mt. Horticultural Consulting LLC
4381 Bodega Ave.
Petaluma, CA 94952

Report: White Mountain Horticultural Consulting LLC Trial No: 11-9-2006			**Percent Control** Application Date: November 11, 2006	
Treatments		**Application Rate (% AI)**	**9 DAT**	
1	Untreated		0.0	
2	Nature's Avenger RTU	17.5 %	100	
3	Nature's Avenger Concentrate	17.5 %	100	
LSD (P = .05)				

Conclusions: Nine days after the treatment, Nature's Avenger RTU and 1:3 dilution of concentrate, both with 17.5 % limonene, provided a complete control of *Rumex acetosella.*

Redstem filaree (*Erodium cicutarium)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Ralph Zingaro
White Mt. Horticultural Consulting LLC
4381 Bodega Ave.
Petaluma, CA 94952

Report: White Mountain Horticultural Consulting LLC Trial No: 11-9-2006			**Percent Control** Application Date: November 11, 2006	
Treatments		**Application Rate (% AI)**	**9 DAT**	
1	Untreated		0.0	
2	Nature's Avenger RTU	17.5 %	100	
3	Nature's Avenger Concentrate	17.5 %	100	
LSD (P = .05)				

Conclusions: The two Nature's Avenger solutions with 17.5 % limonene performed well providing a complete control of *Erodium cicutarium* within nine days.

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Efficacy of MOI-001 RTU and Concentrate on California Weeds for Homeowner Use
Trial No. 11-19-2006

Study Director: Olav Messerschmidt
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Email: omesserschmidt@comcast.net

Investigator: Ralph Zingaro
Affiliation: White Mt. Horticultural Consulting LLC
Phone: (707) 781-7235
Email: nhcal@yahoo.com
Trial location: White Mt. Horticultural Consulting LLC, 4381 Bodega Ave, Petaluma, CA

Products Evaluated:
1. Nature's Avenger Ready To Use Organic Herbicide (17.5% d-Limonene)
2. Nature's Avenger Organic Herbicide Concentrate (70% d-Limonene)

Objective: Determine the efficacy of Nature's Avenger Organic RTU and Concentrate Herbicides on representative homeowner weeds.

Conclusions: This trial was conducted at White Mt. Horticultural Consulting in Petaluma, CA. The predominant weed species were Redstem Filaree (*Erodium cicutarium*) and Red Sorrel (*Rumex acetosella*).

Excellent control was observed 1 day after treatment.

Site and Design:

Plot Width:	5 Ft.
Plot Length:	15 Ft.
Site Type:	Field
Replications:	4
Study Design:	Randomized Complete Block

Application Description:

Application Date:	11-19-06
Time of Day:	Afternoon
Application Method:	Spray
Application Placement:	Foliar
Applied By:	R. Zingaro
Air Temperature, Unit:	51.4
% Relative Humidity:	97
Wind Velocity, Unit:	2.2
Wind Direction:	NW
Dew Presence (Y/N):	N
Water Hardness:	N
% Cloud Cover:	25-50

Pest Stage At Each Application:

Erodium cicutarium	3 inch
Rumex acetosella	Prostrate

Application Equipment:

Appl. Equipment:	Backpack Sprayer
Operating Pressure:	50 PSI
Nozzle Type:	Flat Fan
Nozzle Size:	8012
Nozzle Spacing, Unit:	Inches
Nozzles/Row:	1
Boom Length, Unit:	2 Ft
Boom Height, Unit:	14 In
Ground Speed, Unit:	1 MPH
Carrier:	Water
Spray Volume:	150
Volume Unit:	Gal/Acre
Propellant:	None
Tank Mix (Y/N):	None

Pest Name				Filaree	Red Sorrel
Rating Date				11-20-06	11-20-06
Rating Data Type				% CONTROL	% CONTROL
Rating Unit				PERCENT	PERCENT
Assessed By				R. ZINGARO	R. ZINGARO
Days After Last Application				1	1
Trt	Treatment		Rate		
No.	Name	Rate	Unit	1	2
1	Untreated Control			0	0
2	Nature's Avenger RTU	100	% v/v	100	100
3	Nature's Avenger Concentrate	25	% v/v	100	100
LSD (P=.05)					
Standard Deviation					
CV					

Note: All reps were either 0% (Treatment 1 - Untreated) or 100% (Treatments 2 and 3). Thus, there was no variability.

Ralph Zingaro
White Mt. Horticultural Consulting LLC

12/06/06
Date

Common weeds in a walnut orchard, Montna Farms, CA

(Avena fatua, Hordeum spp., Sinapis arvensis, Amsinckia spp., Malva neglecta, Sonchus oleraceus, Erodium cicutarium, Rumex crispus, Stellaria media)

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Lawrence J Marais
Affiliation: Monterey Ag Resources
Address: 3654 S Willow Ave., Fresno, CA 93745

Report: White Mountain Horticultural Consulting LLC Report Date: February , 2007			**Weed Control (scale 1-10)** Application Date: January 12, 2007		
Treatments		**Application Rate (% AI)**	**7 DAT**	**21 DAT**	**35 DAT**
1	Untreated		1	1	1
2	Nature's Avenger	17.5 %	9	8	5
3	Nature's Avenger	10 %	8.75	8.5	5.5
4	Nature's Avenger	7 %	5	6.25	2.25
5	Matran EC	7 % dilution	7.75	4.25	1.75

Application rate 180 gpa

Numbers in each column are averages of two replicated plots

Conclusions:

Nature's Avenger at dilutions 1:3 (17.5 %) and 1:6 (10 %) provided good and long-lasting control of most weeds in a walnut orchard. The effect was better and lasted longer than that of Matran's. Higher dilution of NAO (1:9) controlled only 50 % of all weeds at best.

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Efficacy of MOI-001 Concentrate - Rate Trial

Montna Farms 2007

Study Director: Lawrence J Marais
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Email: lmarais@montereyagresources.com

Investigator: Ralph Zingaro
Affiliation: White Mt. Horticultural Consulting LLC
Phone: (707) 781-7235
Email: nhcal@yahoo.com
Trial location: Montna Farms, Yuba City, CA

Products Evaluated:

1. Nature's Avenger Organic (NAO) Herbicide Concentrate (70% d-Limonene) at various dilutions with and without a surfactant.

Objective: Determine the efficacy of Nature's Avenger Organic Concentrate Herbicide on representative weeds in a walnut orchard.

Conclusions:

Nature's Avenger concentrate provided good control of most weeds in the walnut orchard. Dilution had a significant effect on the results – 1:3 dilution (17.5 % limonene) being the most effective treatment. Dilution 1:6 (10% limonene) provided almost as good control of weeds lasting about 4 weeks. Dilution 1:9 (7% limonene) was less effective controlling about 50 % of weeds, and its effect did not last as long as the two higher concentrations' of NAO. Matran EC (used as a control) was less effective than 1:3 and 1:6 with an effect that did not last as long.

Ralph Zingaro
White Mt. Horticultural Consulting LLC

7/26/07
Date

Site and Design:

Plot Width:	6 Ft.
Plot Length:	20 Ft.
Site Type:	Walnut Orchard
Replications:	2
Study Design:	Randomized

Application Description:

Application Date:	Jan 12, 2007
Time of Day:	10 AM
Application Method:	Spray
Application Placement:	Foliar
Applied By:	L J Marais
Air Temperature, Unit:	60 F
% Relative Humidity:	55%
Wind Velocity, Unit:	2 mph
Dew Presence (Y/N):	Y
Water Hardness:	Municipal water
% Cloud Cover:	60%

Pest Stage At Each Application:

grasses	6 - 12 inch
broadleaved	6 – 24 inch

Application Equipment:

Appl. Equipment:	Backpack Sprayer
Operating Pressure:	100 psi
Nozzle Type:	Cone
Nozzle Size:	2 mm
Nozzle Spacing, Unit:	Single
Nozzles/Row:	NA
Boom Length, Unit:	NA
Boom Height, Unit:	NA
Ground Speed, Unit:	NA
Carrier:	Water
Spray Volume:	180
Volume Unit:	Gal/Acre
Propellant:	None
Tank Mix (Y/N):	N

Treatments:

Dilution	% Active ingredient
MOI-001 1:3	17.5 % limonene
MOI-001 1:6	10 % limonene
MOI-001 1:9	7 % limonene
Matran 7 %	3.5 % Clove oil
Surfactant	0.5% (v/v)Yucca

Visual Evaluations:

1st evaluation – 7 DAT	Jan 19th
2nd evaluation – 21 DAT	Feb 2nd
3rd evaluation – 35 DAT	Feb 16th
Scale:	1 = no control
	10 = complete
	control

RESULTS

			Weed control (1 = no control, 10 = complete control)					
Treatment	**rep**	**species**	**7 days**	**7-day overall**	**21 Days**	**21-Day overall**	**35 days**	**35 day overall**
1:3	1	wild barley	8		7		5	
17.5%		wild oats	10		7		4	
limonene		clover	7		7		2	
from		wild mustard	10	9	10	8	none	5
Nature's		filaree big	4.5		5		1	
Avenger		sowthistle	10		9		none	
conc.		chickweed	2		2		1	
		brome	1		1		1	
	2	wild oats	8		7		4	
		wild mustard	8		5		4	
		chickweed	10		10		1	
		hare barley	10	9	9	8	5	5
		moss	8.5		9		6	
		miner's lettuce	9.5		10		1	
1:3 +	1	sowthistle	10		10		1	
17.5%		fiddleneck	9.5		8.5		none	
limonene		wild barley	10	9.5	7	9	6	6
with		wild mustard	10		9.5		none	
surfactant		clover	9		5		1	
		chickweed	10		7		none	
					9			
	2	sowthistle	10		10		none	
		fiddleneck	10		10		1	
		wild barley	10	10	9	9	4	6
		wild mustard	10		10		none	
		clover	9		5		2	
		chickweed	10		8		1	

			Weed control (1 = no control, 10 = complete control)					
Treatment	**rep**	**species**	**7 days**	**7-day overall**	**21 Days**	**21-Day overall**	**35 days**	**35 day overall**
1:6	1	wild barley	8		8.5		5	
10%		clover	9.5		5		1	
limonene		wild mustard	10	8.5	10	8.5	1	6
from		chickweed	8		7		1	
concentrate		sowthistle	10		10		1	
		moss	9		9		6	
	2	filaree, big	6.5		1		1	
		chickweed	10		7		1	
		wild mustard	10		8		1	
		wild oats	10		8		5	
		clover	5.5	9	6	8.5	1	5
		moss	8.5		9		2	
		fiddleneck (big)	10		10		none	
		wild barley	9		8		5	
1: 6 +	1	wild mustard	10		10		5	
10%		chickweed	10		10		1	
limonene		wild barley	8.5		8		4	
with		wild oats	9	7.5	10	6.5	5	3
surfactant		curly dock	2		1		1	
		filaree, big	3.5		10		1	
		sowthistle	9		10		6	
	2	mallow	2		2		1	
		dandelion	10		10		4	
		sowthistle	8		10		2	
		clover	5		5		1	
		filaree, big	2	7.5	2	7	1	3.5
		moss	8.5		7		5	
		wild oats	10		7		4	
		wild mustard	10		10		1	
		curly dock	3		1		1	

			Weed control (1 = no control, 10 = complete control)					
Treatment	**rep**	**species**	**7 days**	**7-day overall**	**21 Days**	**21-Day overall**	**35 days**	**35 day overall**
1:9	1	chickweed	9		5		1	
7%		wild barley	5		5		3	
limonene		clover	4		4		1	
from		moss	8.5	4.5	9	6	1	2
concentrate		wild oats	4.5		4		2	
		wild mustard	10		8		1	
		fiddleneck	7		5		1	
		curly dock	1.5		1		1	
	2	wild mustard	10		10		1	
		wild barley	8		7		2	
		clover	6.5		4		1	
		chickweed	8.5	5.5	5	6.5	1	2.5
		fiddleneck	9.5		10		none	
		mallow	1.5		1		1	
		wild oats	6.5		5		2	
1:9 +	1	clover	7.5		6		1	
7%		filaree, old	5		5		1	
limonene		wild mustard	8.5		7		1	
with		chickweed	9	5.5	7	5	1	3
surfactant		mallow	1.5		1		1	
		moss	9		9		2	
		wild oats	5		5		3	
		wild barley	4		5		3	
	2	mallow	1.5		1		1	
		wild mustard	8.5		5		1	
		filaree small	5	4.5	4	4.5	1	3.5
		wild barley	7		5		3.5	
		wild oats	2		4		3	
		chickweed	3		5		1	

			Weed control (1 = no control, 10 = complete control)					
Treatment	**rep**	**species**	**7 days**	**7-day overall**	**21 Days**	**21-Day overall**	**35 days**	**35 day overall**
Matran	1	moss	5		5		2	
7%		fiddleneck	10		10		1	
Dilution		wild barley	6.5	7.5	5	5	2	2
		wild oats	10		5		2	
		wild mustard	6		10		1	
		chickweed	8		4		1	
	2	mallow	10		5		1	
		sowthistle	10		10		1	
		wild barley	9		4		1	
		wild oats	8.5	8	5	3.5	1	1.5
		wild mustard	9		10		1	
		moss	6		5		6	
		chickweed	7.5		4		1	
		clover	7		5		1	

Overall average ratings:

	average ratings		
treatment	**7 DAT**	**21 DAT**	**35 DAT**
1:3	9	8	5
1:3 +	9.75	9	6
1:6	8.75	8.5	5.5
1:6 +	7.5	6.75	3.25
1:9	5	6.25	2.25
1:9 +	5	4.75	3.25
Matran	7.75	4.25	1.75

1 = no control
10 = complete control

Common weeds in a walnut orchard, Montna Farms, CA

(Avena fatua, Hordeum spp., Sinapis arvensis, Amsinckia spp., Malva neglecta, Sonchus oleraceus, Erodium cicutarium, Rumex crispus, Stellaria media)

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Lawrence J Marais
Affiliation: Monterey Ag Resources
Address: 3654 S Willow Ave., Fresno, CA 93745

Report: White Mountain Horticultural Consulting LLC Report Date: February , 2007			**Weed Control (scale 1-10)** Application Date: January 12, 2007		
Treatments		**Application Rate (% AI)**	**7 DAT**	**21 DAT**	**35 DAT**
1	Untreated		1	1	1
2	Nature's Avenger	17.5 %	9	8	5
3	Nature's Avenger	10 %	8.75	8.5	5.5
4	Nature's Avenger	7 %	5	6.25	2.25
5	Matran EC	7 % dilution	7.75	4.25	1.75

Application rate 180 gpa

Numbers in each column are averages of two replicated plots

Conclusions:

Nature's Avenger at dilutions 1:3 (17.5 %) and 1:6 (10 %) provided good and long-lasting control of most weeds in a walnut orchard. The effect was better and lasted longer than that of Matran's. Higher dilution of NAO (1:9) controlled only 50 % of all weeds at best.

Mallow (*Malva neglecta)*

Nature's Avenger Organic Herbicide Concentrate (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	b	0.0	b
2	Nature's Avenger Concentrate	17.5	78.3	a	53.3	a
3	Nature's Avenger Concentrate	14.0	87.0	a	46.7	b
4	Nature's Avenger Concentrate	10.0	76.7	a	20.0	c
5	Nature's Avenger Concentrate	8.75	71.7	a	20.0	c
LSD (P = .05)			15.5		6.6	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Pigweed (*Amaranthus retroflexus)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	d	0.0	e
2	Nature's Avenger Concentrate	17.5	96.0	a	90.0	a
3	Nature's Avenger Concentrate	14.0	86.7	ab	50.0	b
4	Nature's Avenger Concentrate	10.0	78.3	b	36.7	c
5	Nature's Avenger Concentrate	8.75	50.0	c	20.0	d
LSD (P = .05)			10.6			

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Common purslane (*Portulaca oleracea)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	d
2	Nature's Avenger Concentrate	17.5	86.7	a	81.0	a
3	Nature's Avenger Concentrate	14.0	79.3	a	68.3	b
4	Nature's Avenger Concentrate	10.0	55.0	b	38.3	c
5	Nature's Avenger Concentrate	8.75	51.7	b	30.0	c
LSD (P = .05)			14.2		9.8	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Prickly lettuce (*Lactuca serriola)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	b	0.0	d
2	Nature's Avenger Concentrate	17.5	73.3	a	81.3	a
3	Nature's Avenger Concentrate	14.0	68.3	a	61.7	b
4	Nature's Avenger Concentrate	10.0	63.3	a	61.7	b
5	Nature's Avenger Concentrate	8.75	68.3	a	33.3	c
LSD (P = .05)			8.5		8.3	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Annual bluegrass (*Poa annua)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	d	0.0	d
2	Nature's Avenger Concentrate	17.5	91.7	a	87.7	a
3	Nature's Avenger Concentrate	14.0	88.3	ab	68.3	b
4	Nature's Avenger Concentrate	10.0	73.3	bc	63.3	b
5	Nature's Avenger Concentrate	8.75	67.7	c	43.3	c
LSD (P = .05)			13.6		12.1	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Shepherd's purse (*Capsella bursa-pastoris*)
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	d
2	Nature's Avenger Concentrate	17.5	100.0	a	90.0	a
3	Nature's Avenger Concentrate	14.0	100.0	a	71.0	b
4	Nature's Avenger Concentrate	10.0	93.3	ab	66.7	b
5	Nature's Avenger Concentrate	8.75	82.7	b	40.0	c
LSD (P = .05)			13.1		9.8	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Annual sowthistle (*Sonchus oleraceus)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	b	0.0	d
2	Nature's Avenger Concentrate	17.5	90.0	a	73.3	a
3	Nature's Avenger Concentrate	14.0	81.7	a	64.3	b
4	Nature's Avenger Concentrate	10.0	84.3	a	61.0	b
5	Nature's Avenger Concentrate	8.75	88.3	a	30.0	c
LSD (P = .05)			12.7		5.0	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Lambsquarters (*Chenopodium album)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006			
Treatments		**Application Rate (% AI)**	**2 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	d
2	Nature's Avenger Concentrate	17.5	94.3	a	81.0	a
3	Nature's Avenger Concentrate	14.0	74.0	b	65.0	b
4	Nature's Avenger Concentrate	10.0	66.7	b	61.7	b
5	Nature's Avenger Concentrate	8.75	71.7	b	33.3	c
LSD (P = .05)			11.2		6.8	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

General Trial Information

Study Director: OLAV MESSERSCHMIDT Title: OWNER
Affiliation: OMC AG CONSULTING
Postal Code: 48823 E-mail: OMESSERSCHMIDT@COMCAST.NET

Investigator: Brooks Bauer Title: FIELD SCIENTIST
Affiliation: TWO BEES AGRICULTURAL RESEARCH AND CONSULTING
Postal Code: 95320 E-mail: BBAUER@TWOBEESAG.COM

Keywords:

Trial Location

City: Escalon
State/Prov.: CA
Postal Code: 95320
Country: USA
-Latitude of LL Corner °:
Altitude of LL Corner: Unit:
Map Reference:
Directions:

Trial Status: ONE-YEAR/FINAL
Trial Reliability: HIGH
Initiation Date: 10-27-2006
Planned Completion Date: 11-15-2006
-Longitude of LL Corner °:
Angle y-axis to North °:

Conducted Under GLP: Official Trial Code:
Conducted Under GEP: Other Trial Code:

	Guideline	Description
1.		

Objectives:
DETERMINE THE EFFICACY OF NATURE'S AVENGER ORGANIC HERBICIDE ON REPRESENTATIVE HOMEOWNER WEEDS.

Conclusions:
This trial was conducted at the Two Bees Agricultural Research Farm near Escalon, CA, on the weeds listed in this report. The application and evaluations were conducted following the protocol provided.

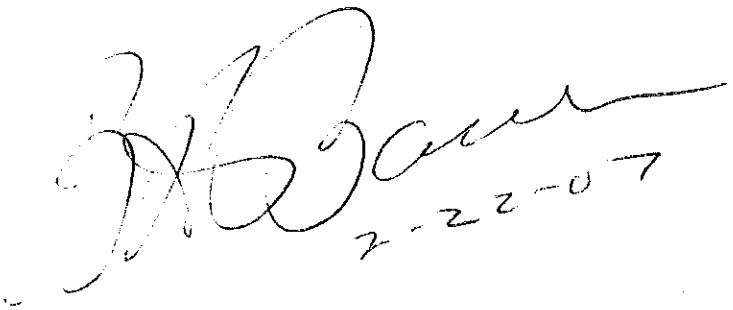
Application Note: Foaming increased in the spray bottle as the concentration of Nature's Avenger increased. The degree of foaming, even at the highest concentration, was well within limits of commercial acceptability.

Nature's Avenger Concentrate provided fair to very good control of weeds at the 25% V/V dose (highest rate tested). Very good control was recorded on pigweed species, Annual Bluegrass, Shepherd's Purse, Annual Sowthistle, and Lambsquarters. Fair control was recorded for Malva and Prickly Lettuce and moderate control of purselane.

Lower doses of Natures's Avenger Concentrate resulted in less weed control and a significant dose response resulted. Control diminished from 4 DAT to 7 DAT due to re-greening.

Cooperator/Landowner

Cooperator: BROOKS BAUER Country: USA
Organization: TWO BEES AGRICULTURAL RESEARCH Phone No: 209-838-0606
Address 1: 20592 AYERS AVENUE Fax No: 209-838-3639
Address 2:
City: ESCALON
State/Prov: CA
Postal Code: 95320 E-mail: BBAUER@TWOBEESAG.COM



Two Bees Agricultural Research & Consulting

Crop Description

Crop 1:	N.A.		N.A.
Variety:	N.A.	Description:	N.A.
BBCH Scale:		Planting Date:	
Planting Method:		Rate, Unit:	
Depth, Unit:		Perennial Age, Unit:	
Row Spacing, Unit:		Spacing Within Row, Unit:	
Seed Bed:		Soil Temperature, Unit:	
Soil Moisture:		Emergence Date:	
Harvest Date:		Harvest Equipment:	
Harvested Width, Unit:		Harvested Length, Unit:	
% Standard Moisture:		Moisture Meter:	
Weighing Equipment:			

Pest Description

Pest 1 Type: W Code: MALNE Malva neglecta
Common Name: Cheeseplant
Description:

Pest 2 Type: W Code: STEME Stellaria media
Common Name: Common chickweed
Description:

Pest 3 Type: W Code: POROL Portulaca oleracea
Common Name: Purslane, common
Description:

Pest 4 Type: W Code: LACSE Lactuca serriola
Common Name: Lettuce, prickly
Description:

Pest 5 Type: W Code: AMARE Amaranthus retroflexus
Common Name: PIGWEED
Description:

Pest 6 Type: W Code: POAAN Poa annua
Common Name: Annual bluegrass
Description:

Pest 7 Type: W Code: CAPBP Capsella bursa-pastoris
Common Name: Shepherd's purse
Description:

Pest 8 Type: W Code: AMAGR Amaranthus graecizans
Common Name: Pigweed, tumbling
Description:

Pest 9 Type: W Code: SONOL Sonchus oleraceus
Common Name: Annual sowthistle
Description:

Pest10 Type: W Code: CHEAL Chenopodium album
Common Name: Lambsquarters, common
Description:

Site and Design

Plot Width, Unit:	5	FT	Site Type:	FIELD	
Plot Length, Unit:	15	FT	Tillage Type:	NO TILL	
Replications:	3		Study Design:	Randomized Complete Block	
% Slope:			Soil Drainage:		

Trial Initiation Comments:

	Previous Crops	Previous Pesticides	Year
1.			

Maintenance

		Maintenance		Form	Form	Form		Rate	Tank
No.	Date	Treatment	Name	Conc	Unit	Type	Rate	Unit	Mix
1.									

Comment:

Field Prep./Maintenance:

Two Bees Agricultural Research & Consulting

Soil Description

Description Name:
% Sand: % OM: Texture:
% Silt: pH: Soil Name:
% Clay: CEC: Fert. Level:
Analyzed By:

Additional Measured Elements

Element	Quantity	Unit

Moisture Conditions

Overall Moisture Conditions:
Closest Weather Station: Distance: Unit:

	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Application Description

	A
Application Date:	10-27-2006
Time of Day:	12:45
Application Method:	SPRAY
Application Timing:	FOLIARGTH
Application Placement:	FOLIAR
Applied By:	B. BAUER
Air Temperature, Unit:	75 F
% Relative Humidity:	26
Wind Velocity, Unit:	3 MPH
Wind Direction:	W
Dew Presence (Y/N):	N
Water Hardness:	N.A.
Soil Temperature, Unit:	
Soil Moisture:	
% Cloud Cover:	0
Next Rain Occurred On:	

Crop Stage At Each Application

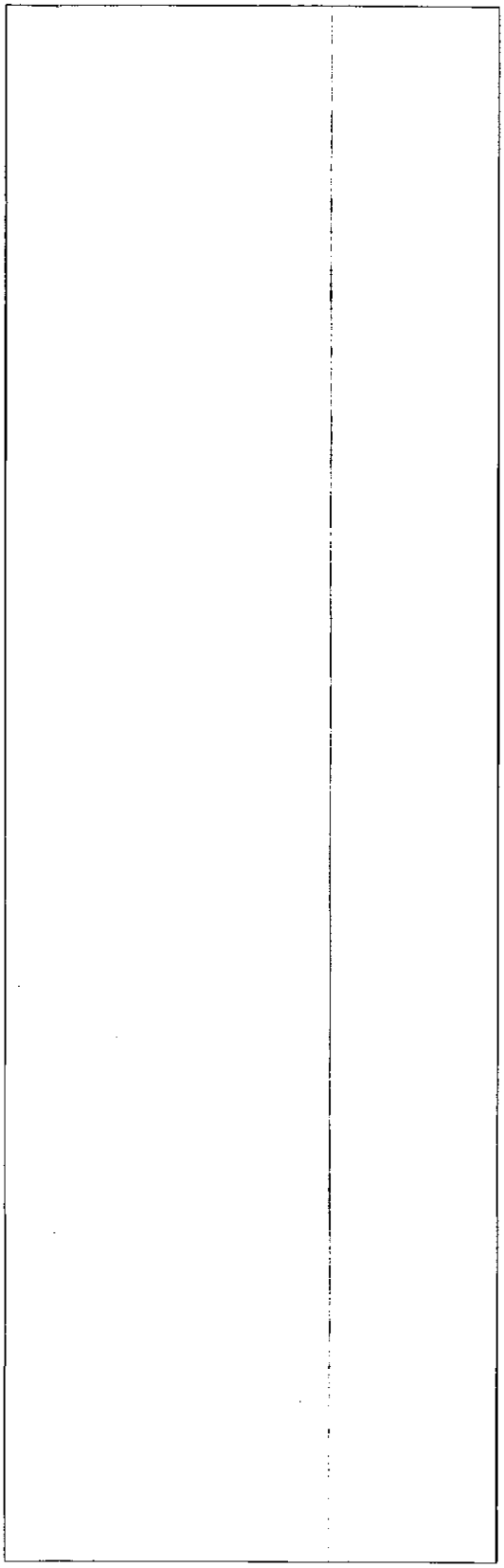
	A
Crop 1 Code, BBCH Scale:	
Stage Scale Used:	
Stage Majority, Percent:	
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	

Pest Stage At Each Application

A

Pest 1 Code, Disc., Scale: MALNE W DESC
Stage Majority, Percent: 6 INCH 100
Stage Minimum, Percent:
Stage Maximum, Percent:
Diameter, Unit:
Height, Unit:
Height Minimum, Maximum:
Density, Unit:

Coverage, Unit:



Two Bees Agricultural Research & Consulting

Pest 2 Code, Disc., Scale:	STEME W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 3 Code, Disc., Scale:	POROL W DESC
Stage Majority, Percent:	3 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 4 Code, Disc., Scale:	LACSE W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 5 Code, Disc., Scale:	AMARE W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 6 Code, Disc., Scale:	POAAN W DESC
Stage Majority, Percent:	3 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 7 Code, Disc., Scale:	CAPBP W
Stage Majority, Percent:	
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 8 Code, Disc., Scale:	AMAGR W
Stage Majority, Percent:	

Two Bees Agricultural Research & Consulting

Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 9 Code, Disc., Scale:	SONOL W
Stage Majority, Percent:	
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest10 Code, Disc., Scale:	CHEAL W
Stage Majority, Percent:	
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	

Application Equipment

	A
Appl. Equipment:	CO2 SPRAYER
Operating Pressure, Unit:	50 PSI
Nozzle Type:	FLAT FAN
Nozzle Size:	8012
Nozzle Spacing, Unit:	22 IN
Nozzles/Row:	2
Nozzle Calibration, Unit:	
Band Width, Unit:	N.A.
Boom ID:	
Boom Length, Unit:	4 FT
Boom Height, Unit:	14 IN
Ground Speed, Unit:	1 MPH
Incorporation Equip.:	N.A.
Hours to Incorp.:	
Incorp. Depth, Unit:	
Carrier:	WATER
Spray Volume, Unit:	150 GAL/AC
Mix Size, Unit:	
Spray pH:	6.8
Propellant:	CO2
Tank Mix (Y/N):	N

Equipment Comment:

Trt No Treatment Application Comment

Date By Notes

Date By Deviations

Two Bees Agricultural Research & Consulting

Reasons:

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	MALNE	AMARE	AMAGR	POROL	POAAN	CAPBP	SONOL	CHEAL
Pest Name	Cheeseplant	Pigweed, Re>	Pigweed, tu>	Purslane, c>	Annual blue>	Shepherd's >	Annual sowt>	Lambsquarte>
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale								
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description								
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size								
Sample Size Unit								
Collection Basis								
Collection Basis Unit								
Number of Subsamples								
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale								
Crop Density, Unit								
Pest Stage								
Pest Density, Unit								
Footnote Number								
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name								
SE Description								
Rating Timing								
Days After First/Last Applic.	2	2	2	2	2	2	2	2
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval								
ARM Action Codes								
Sort Order for View								
Number of Decimals								
Trt Treatment No. Name								
1 UNTREATED CONTROL	0.0 b	0.0 d	0.0 d	0.0 c	0.0 d	0.0 c	0.0 b	0.0 c
2 NATURE'S AVENGER	78.3 a	96.0 a	96.0 a	86.7 a	91.7 a	100.0 a	90.0 a	94.3 a
3 NATURE'S AVENGER	87.0 a	86.7 ab	86.7 ab	79.3 a	88.3 ab	100.0 a	81.7 a	74.0 b
4 NATURE'S AVENGER	76.7 a	78.3 b	78.3 b	55.0 b	73.3 bc	93.3 ab	84.3 a	66.7 b
5 NATURE'S AVENGER	71.7 a	50.0 c	50.0 c	51.7 b	67.7 c	82.7 b	88.3 a	71.7 b
LSD (P=.05)	16.89	10.10	10.10	11.05	15.03	12.38	11.71	12.15

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

AOV For W Weed MALNE Cheeseplant N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	15848.933333			
Replicate	2	80.133333	40.066667	0.498	0.6255
Treatment	4	15124.933333	3781.233333	46.982	0.0001
Error	8	643.866667	80.483333		

AOV For W Weed AMARE Pigweed, Redroot N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	18396.400000			
Replicate	2	109.200000	54.600000	1.898	0.2115
Treatment	4	18057.066667	4514.266667	156.927	0.0001
Error	8	230.133333	28.766667		

AOV For W Weed AMAGR Pigweed, tumbling N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	18396.400000			
Replicate	2	109.200000	54.600000	1.898	0.2115
Treatment	4	18057.066667	4514.266667	156.927	0.0001
Error	8	230.133333	28.766667		

AOV For W Weed POROL Purslane, common N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	14495.733333			
Replicate	2	330.533333	165.266667	4.800	0.0427
Treatment	4	13889.733333	3472.433333	100.845	0.0001
Error	8	275.466667	34.433333		

AOV For W Weed POAAN Annual bluegrass N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	17224.400000			
Replicate	2	53.200000	26.600000	0.418	0.6721
Treatment	4	16661.733333	4165.433333	65.409	0.0001
Error	8	509.466667	63.683333		

AOV For W Weed CAPBP Shepherd's purse N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	22328.400000			
Replicate	2	173.200000	86.600000	2.002	0.1973
Treatment	4	21809.066667	5452.266667	126.015	0.0001
Error	8	346.133333	43.266667		

AOV For W Weed SONOL Annual sowthistle N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	18399.733333			
Replicate	2	176.533333	88.266667	2.282	0.1644
Treatment	4	17913.733333	4478.433333	115.772	0.0001
Error	8	309.466667	38.683333		

AOV For W Weed CHEAL Lambsquarters, commo N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	15821.333333			
Replicate	2	48.933333	24.466667	0.588	0.5779
Treatment	4	15439.333333	3859.833333	92.710	0.0001
Error	8	333.066667	41.633333		

Two Bees Agricultural Research & Consulting

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	LACSE	MALNE	AMARE	AMAGR	POROL	POAAN	CAPBP	SONOL
Pest Name	Lettuce, pr>	Cheeseplant	Pigweed, Re>	Pigweed, tu>	Purslane, c>	Annual blue>	Shepherd's >	Annual sowt>
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale								
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description								
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size								
Sample Size Unit								
Collection Basis								
Collection Basis Unit								
Number of Subsamples								
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale								
Crop Density, Unit								
Pest Stage								
Pest Density, Unit								
Footnote Number								
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name								
SE Description								
Rating Timing								
Days After First/Last Applic.	2	7	7	7	7	7	7	7
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval								
ARM Action Codes								
Sort Order for View								
Number of Decimals								
Trt No. Treatment Name								
1 UNTREATED CONTROL	0.0 b	0.0 d	0.0 e	0.0 e	0.0 d	0.0 d	0.0 d	0.0 d
2 NATURE'S AVENGER	73.3 a	53.3 a	90.0 a	90.0 a	81.0 a	87.7 a	90.0 a	73.3 a
3 NATURE'S AVENGER	68.3 a	46.7 b	50.0 b	50.0 b	68.3 b	68.3 b	71.0 b	64.3 b
4 NATURE'S AVENGER	63.3 a	20.0 c	36.7 c	36.7 c	38.3 c	63.3 b	66.7 b	61.0 b
5 NATURE'S AVENGER	68.3 a	20.0 c	20.0 d	20.0 d	30.0 c	43.3 c	40.0 c	30.0 c
LSD (P=.05)	9.49	6.43	4.86	4.86	10.29	12.49	10.36	4.36

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

AOV For W Weed LACSE Lettuce, prickly N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	11573.333333			
Replicate	2	13.333333	6.666667	0.262	0.7757
Treatment	4	11356.666667	2839.166667	111.705	0.0001
Error	8	203.333333	25.416667		

AOV For W Weed MALNE Cheeseplant N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	5840.000000			
Replicate	2	40.000000	20.000000	1.714	0.2401
Treatment	4	5706.666667	1426.666667	122.286	0.0001
Error	8	93.333333	11.666667		

AOV For W Weed AMARE Pigweed, Redroot N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	13893.333333			
Replicate	2	13.333333	6.666667	1.000	0.4096
Treatment	4	13826.666667	3456.666667	518.500	0.0001
Error	8	53.333333	6.666667		

AOV For W Weed AMAGR Pigweed, tumbling N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	13893.333333			
Replicate	2	13.333333	6.666667	1.000	0.4096
Treatment	4	13826.666667	3456.666667	518.500	0.0001
Error	8	53.333333	6.666667		

AOV For W Weed POROL Purslane, common N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	12661.733333			
Replicate	2	50.533333	25.266667	0.846	0.4640
Treatment	4	12372.400000	3093.100000	103.621	0.0001
Error	8	238.800000	29.850000		

AOV For W Weed POAAN Annual bluegrass N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	13777.733333			
Replicate	2	90.533333	45.266667	1.028	0.4004
Treatment	4	13335.066667	3333.766667	75.739	0.0001
Error	8	352.133333	44.016667		

AOV For W Weed CAPBP Shepherd's purse N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	14861.733333			
Replicate	2	50.533333	25.266667	0.835	0.4685
Treatment	4	14569.066667	3642.266667	120.339	0.0001
Error	8	242.133333	30.266667		

AOV For W Weed SONOL Annual sowthistle N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	11114.933333			
Replicate	2	32.533333	16.266667	3.040	0.1042
Treatment	4	11039.600000	2759.900000	515.869	0.0001
Error	8	42.800000	5.350000		

Two Bees Agricultural Research & Consulting

Pest Type	W Weed	W Weed
Pest Code	CHEAL	LACSE
Pest Name	Lambsquarte>	Lettuce, pr>
Crop Code	N.A.	N.A.
BBCH Scale		
Crop Name	N.A.	N.A.
Crop Variety	N.A.	N.A.
Description		
Part Rated	PLADEA P	PLADEA P
Rating Date	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT
Sample Size		
Sample Size Unit		
Collection Basis		
Collection Basis Unit		
Number of Subsamples		
Crop Stage	N.A.	N.A.
Crop Stage Scale		
Crop Density, Unit		
Pest Stage		
Pest Density, Unit		
Footnote Number		
Assessed By	B. BAUER	B. BAUER
SE Name		
SE Description		
Rating Timing		
Days After First/Last Applic.	7	7
Trt-Eval Interval	1 DA-A	1 DA-A
Plant-Eval Interval		
ARM Action Codes		
Sort Order for View		
Number of Decimals		
Trt Treatment No. Name		
1 UNTREATED CONTROL	0.0 d	0.0 d
2 NATURE'S AVENGER	81.0 a	81.3 a
3 NATURE'S AVENGER	65.0 b	61.7 b
4 NATURE'S AVENGER	61.7 b	61.7 b
5 NATURE'S AVENGER	33.3 c	33.3 c
LSD (P=.05)	5.73	7.41

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

AOV For W Weed CHEAL Lambsquarters, commo N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	12390.400000			
Replicate	2	65.200000	32.600000	3.518	0.0801
Treatment	4	12251.066667	3062.766667	330.514	0.0001
Error	8	74.133333	9.266667		

AOV For W Weed LACSE Lettuce, prickly N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	14	12219.600000			
Replicate	2	86.800000	43.400000	2.803	0.1195
Treatment	4	12008.933333	3002.233333	193.901	0.0001
Error	8	123.866667	15.483333		

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

No plot data footnotes entered in study

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC - CONCENTRATE EFFICACY EVALUATIONS

Trial ID: NATURE'S CONCENTRATE Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	MALNE	AMARE	AMAGR	POROL	POAAN	CAPBP	SONOL	CHEAL
Pest Name	Cheeseplant	Pigweed, Re>	Pigweed, tu>	Purslane, c>	Annual blue>	Shepherd's >	Annual sowt>	Lambsquarte>
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale								
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description								
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size								
Sample Size Unit								
Collection Basis								
Collection Basis Unit								
Number of Subsamples								
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale								
Crop Density, Unit								
Pest Stage								
Pest Density, Unit								
Footnote Number								
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name								
SE Description								
Rating Timing								
Days After First/Last Applic.	2	2	2	2	2	2	2	2
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval								
ARM Action Codes								
Sort Order for View								
Number of Decimals								
Trt No. Treatment Name								
1 UNTREATED CONTROL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 NATURE'S AVENGER	90.0	90.0	90.0	80.0	80.0	100.0	90.0	90.0
	75.0	98.0	98.0	90.0	95.0	100.0	90.0	93.0
	70.0	100.0	100.0	90.0	100.0	100.0	90.0	100.0
Mean =	78.3	96.0	96.0	86.7	91.7	100.0	90.0	94.3
3 NATURE'S AVENGER	95.0	80.0	80.0	70.0	80.0	100.0	85.0	60.0
	91.0	80.0	80.0	73.0	85.0	100.0	90.0	80.0
	75.0	100.0	100.0	95.0	100.0	100.0	70.0	82.0
Mean =	87.0	86.7	86.7	79.3	88.3	100.0	81.7	74.0
4 NATURE'S AVENGER	70.0	80.0	80.0	50.0	80.0	100.0	90.0	70.0
	70.0	75.0	75.0	50.0	75.0	90.0	80.0	65.0
	90.0	80.0	80.0	65.0	65.0	90.0	83.0	65.0
Mean =	76.7	78.3	78.3	55.0	73.3	93.3	84.3	66.7
5 NATURE'S AVENGER	75.0	50.0	50.0	50.0	70.0	100.0	100.0	75.0
	70.0	50.0	50.0	50.0	65.0	75.0	85.0	70.0
	70.0	50.0	50.0	55.0	68.0	73.0	80.0	70.0
Mean =	71.7	50.0	50.0	51.7	67.7	82.7	88.3	71.7

Two Bees Agricultural Research & Consulting

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	LACSE	MALNE	AMARE	AMAGR	POROL	POAAN	CAPBP	SONOL
Pest Name	Lettuce, pr>	Cheeseplant	Pigweed, Re>	Pigweed, tu>	Pursiane, c>	Annual blue>	Shepherd's >	Annual sowt>
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale								
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description								
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size								
Sample Size Unit								
Collection Basis								
Collection Basis Unit								
Number of Subsamples								
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale								
Crop Density, Unit								
Pest Stage								
Pest Density, Unit								
Footnote Number								
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name								
SE Description								
Rating Timing								
Days After First/Last Applic.	2	7	7	7	7	7	7	7
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval								
ARM Action Codes								
Sort Order for View								
Number of Decimals								
Trt No. Treatment Name								
1 UNTREATED CONTROL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 NATURE'S AVENGER	80.0	60.0	90.0	90.0	80.0	90.0	90.0	70.0
	70.0	50.0	90.0	90.0	83.0	93.0	90.0	75.0
	70.0	50.0	90.0	90.0	80.0	80.0	90.0	75.0
Mean =	73.3	53.3	90.0	90.0	81.0	87.7	90.0	73.3
3 NATURE'S AVENGER	60.0	50.0	50.0	50.0	75.0	70.0	70.0	60.0
	75.0	40.0	50.0	50.0	70.0	70.0	68.0	63.0
	70.0	50.0	50.0	50.0	60.0	65.0	75.0	70.0
Mean =	68.3	46.7	50.0	50.0	68.3	68.3	71.0	64.3
4 NATURE'S AVENGER	60.0	20.0	40.0	40.0	40.0	70.0	70.0	60.0
	65.0	20.0	30.0	30.0	30.0	50.0	60.0	60.0
	65.0	20.0	40.0	40.0	45.0	70.0	70.0	63.0
Mean =	63.3	20.0	36.7	36.7	38.3	63.3	66.7	61.0
5 NATURE'S AVENGER	70.0	20.0	20.0	20.0	35.0	50.0	50.0	30.0
	70.0	20.0	20.0	20.0	25.0	40.0	40.0	30.0
	65.0	20.0	20.0	20.0	30.0	40.0	30.0	30.0
Mean =	68.3	20.0	20.0	20.0	30.0	43.3	40.0	30.0

Two Bees Agricultural Research & Consulting

Pest Type	W Weed	W Weed
Pest Code	CHEAL	LACSE
Pest Name	Lambsquarte>	Lettuce, pr>
Crop Code	N.A.	N.A.
BBCH Scale		
Crop Name	N.A.	N.A.
Crop Variety	N.A.	N.A.
Description		
Part Rated	PLADEA P	PLADEA P
Rating Date	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT
Sample Size		
Sample Size Unit		
Collection Basis		
Collection Basis Unit		
Number of Subsamples		
Crop Stage	N.A.	N.A.
Crop Stage Scale		
Crop Density, Unit		
Pest Stage		
Pest Density, Unit		
Footnote Number		
Assessed By	B. BAUER	B. BAUER
SE Name		
SE Description		
Rating Timing		
Days After First/Last Applic.	7	7
Trt-Eval Interval	1 DA-A	1 DA-A
Plant-Eval Interval		
ARM Action Codes		
Sort Order for View		
Number of Decimals		
Trt No. Treatment Name		
1 UNTREATED CONTROL	0.0	0.0
	0.0	0.0
	0.0	0.0
Mean =	0.0	0.0
2 NATURE'S AVENGER	80.0	80.0
	83.0	84.0
	80.0	80.0
Mean =	81.0	81.3
3 NATURE'S AVENGER	60.0	60.0
	65.0	55.0
	70.0	70.0
Mean =	65.0	61.7
4 NATURE'S AVENGER	60.0	60.0
	60.0	60.0
	65.0	65.0
Mean =	61.7	61.7
5 NATURE'S AVENGER	30.0	30.0
	30.0	30.0
	40.0	40.0
Mean =	33.3	33.3

Common chickweed (*Stellaria media)*

Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	100.0	a	100.0	a	100.0	a
3	Roundup RTU	2 % glyphosate	18.3	b	18.3	b	35.0	b
LSD (P = .05)			13.62		13.62		6.54	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Annual sowthistle (*Sonchus oleraceus)*
Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	100.0	a	100.0	a	98.7	a
3	Roundup RTU	2 % glyphosate	3.3	b	3.3	b	28.3	b
LSD (P = .05)			7.56		7.56		9.53	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Shepherd's purse (*Capsella bursa-pastoris*)
Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	96.7	a	96.7	a	97.3	a
3	Roundup RTU	2 % glyphosate	25.0	b	25.0	b	36.0	b
LSD (P = .05)			15.11		15.11		6.59	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Annual bluegrass (*Poa annua)*
Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	90.0	a	90.0	a	100.0	a
3	Roundup RTU	2 % glyphosate	45.0	b	45.0	b	90.0	b
LSD (P = .05)			13.88		13.88		6.54	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Prickly lettuce (*Lactuca serriola)*

Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0		0.0		0.0	
2	Nature's Avenger RTU	17.5 %	100.0		100.0		100.0	
3	Roundup RTU	2 % glyphosate	0.0		0.0		0.0	
LSD (P = .05)			N.S.		N.S.		N.S.	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Common purslane (*Portulaca oleracea)*
Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	100.0	a	100.0	a	91.0	a
3	Roundup RTU	2% glyphosate	11.7	b	11.7	b	11.7	b
LSD (P = .05)			3.78		3.78		6.39	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Pigweed (*Amaranthus retroflexus)*
Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	100.0	a	100.0	a	90.3	a
3	Roundup RTU	2 % glyphosate	20.0	b	20.0	b	43.3	b
LSD (P = .05)			11.33		11.33		8.41	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Mallow (*Malva neglecta)*
Nature's Avenger Organic Herbicide RTU (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Brooks Bauer
Affiliation Two Bees Agricultural Research and Consulting
Address 20592 Ayers Avenue
Escalon, CA 95320

Report: Two Bees Ag. Research & Consulting Report Date:			**Percent Control** Application Date: October 27, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**7 DAT**	
1	Untreated		0.0	b	0.0	b	0.0	c
2	Nature's Avenger RTU	17.5 %	86.7	a	86.7	a	57.7	a
3	Roundup RTU	2 % glyphosate	5.0	b	5.0	b	43.3	b
LSD (P = .05)			12.81		12.81		10.79	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Overall conclusions from the trial with Nature's Avenger Organic (NAO) herbicide RTU:

- Almost complete control (90-100 %) was achieved by using NAO RTU on *Amaranthus retrolexus, Portulaca oleracea, Poa annua, Capsella bursa-pastoris, Sonchus oleraceus, and Lactuca serriola.*
- Effect on mallow was not as good; after 7 days, more than 50 % of *Malva neglecta* was controlled by Nature's Avenger RTU
- During the 7days after treatment, NAO performed significantly faster and more effectively than Roundup.

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

General Trial Information

Study Director: OLAV MESSERSCHMIDT Title: OWNER
Affiliation: OMC AG CONSULTING
Postal Code: 48823 E-mail: OMESSERSCHMIDT@COMCAST.NET

Investigator: Brooks Bauer Title: FIELD SCIENTIST
Affiliation: TWO BEES AGRICULTURAL RESEARCH AND CONSULTING
Postal Code: 95320 E-mail: BBAUER@TWOBEESAG.COM

Keywords:

Trial Location

City: Escalon Trial Status: ONE-YEAR/FINAL
State/Prov.: CA Trial Reliability: HIGH
Postal Code: 95320 Initiation Date: 10-27-2006
Country: USA Planned Completion Date: 11-15-2006
-Latitude of LL Corner °: -Longitude of LL Corner °:
Altitude of LL Corner: Unit: Angle y-axis to North °:
Map Reference:
Directions:

Conducted Under GLP: Official Trial Code:
Conducted Under GEP: Other Trial Code:

	Guideline	Description
1.		

Objectives:
DETERMINE THE EFFICACY OF NATURE'S AVENGER ORGANIC HERBICIDE RTU ON REPRESENTATIVE HOMEOWNER WEEDS.

Conclusions:
This trial was conducted at the Two Bees Research Farm near Escalon, CA, targeting the weeds listed in this report. The application and evaluations were performed following the protocol provided.

Application Note: Very slight foaming occurred when spray bottle was shaken. The degree of foaming was well within limits of commercial acceptability.

Nature's Avenger RTU provided excellent and rapid control of both broadleaf and grassy weeds. Control was very good 1 DAT and increased to excellent at 2 DAT except for Malva. Malva control diminished at 7 DAT to 57% due to re-greening.

Roundup did not perform satisfactorily during the time period of this trial, but control with Roundup would be expected to increase over time when temperature are cool.

Cooperator/Landowner

Cooperator: BROOKS BAUER Country: USA
Organization: TWO BEES AGRICULTURAL RESEARCH Phone No: 209-838-0606
Address 1: 20592 AYERS AVENUE Fax No: 209-838-3639
Address 2:
City: ESCALON
State/Prov: CA
Postal Code: 95320 E-mail: BBAUER@TWOBEESAG.COM

Crop Description

Crop 1: N.A. N.A.
Variety: N.A. Description: N.A.
BBCH Scale: Planting Date:
Planting Method: Rate, Unit:
Depth, Unit: Perennial Age, Unit:
Row Spacing, Unit: Spacing Within Row, Unit:
Seed Bed: Soil Temperature, Unit:
Soil Moisture: Emergence Date:
Harvest Date: Harvest Equipment:
Harvested Width, Unit: Harvested Length, Unit:
% Standard Moisture: Moisture Meter:
Weighing Equipment:

Two Bees Agricultural Research & Consulting

Pest Description

Pest 1 Type: W Code: MALNE Malva neglecta
Common Name: Cheeseplant
Description:

Pest 2 Type: W Code: STEME Stellaria media
Common Name: Common chickweed
Description:

Pest 3 Type: W Code: POROL Portulaca oleracea
Common Name: Purslane, common
Description:

Pest 4 Type: W Code: LACSE Lactuca serriola
Common Name: Lettuce, prickly
Description:

Pest 5 Type: W Code: AMARE Amaranthus retroflexus
Common Name: PIGWEED
Description:

Pest 6 Type: W Code: POAAN Poa annua
Common Name: Annual bluegrass
Description:

Pest 7 Type: W Code: CAPBP Capsella bursa-pastoris
Common Name: Shepherd's purse
Description:

Site and Design

Plot Width, Unit: 5 FT
Plot Length, Unit: 15 FT
Replications: 3
% Slope:
Site Type: FIELD
Tillage Type: NO TILL
Study Design: Randomized Complete Block
Soil Drainage:

Trial Initiation Comments:

	Previous Crops	Previous Pesticides	Year
1.			

Maintenance

No.	Date	Maintenance Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Tank Mix
1.								

Comment:

Field Prep./Maintenance:

Soil Description

Description Name:
% Sand: % OM: Texture:
% Silt: pH: Soil Name:
% Clay: CEC: Fert. Level:
Analyzed By:

Additional Measured Elements

Element	Quantity	Unit

Moisture Conditions

Overall Moisture Conditions:
Closest Weather Station: Distance: Unit:

	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Two Bees Agricultural Research & Consulting

Application Description

	A
Application Date:	10-27-2006
Time of Day:	1:15 PM
Application Method:	SPRAY
Application Timing:	FOLIARGTH
Application Placement:	FOLIAR
Applied By:	B. BAUER
Air Temperature, Unit:	73 F
% Relative Humidity:	25
Wind Velocity, Unit:	3 MPH
Wind Direction:	W
Dew Presence (Y/N):	N
Water Hardness:	N.A.
Soil Temperature, Unit:	
Soil Moisture:	
% Cloud Cover:	0
Next Rain Occurred On:	

Crop Stage At Each Application

	A
Crop 1 Code, BBCH Scale:	
Stage Scale Used:	
Stage Majority, Percent:	
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	

Pest Stage At Each Application

	A
Pest 1 Code, Disc., Scale:	MALNE W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 2 Code, Disc., Scale:	STEME W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 3 Code, Disc., Scale:	POROL W DESC
Stage Majority, Percent:	3 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	

Two Bees Agricultural Research & Consulting

Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 4 Code, Disc., Scale:	LACSE W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 5 Code, Disc., Scale:	AMARE W DESC
Stage Majority, Percent:	6 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 6 Code, Disc., Scale:	POAAN W DESC
Stage Majority, Percent:	3 INCH 100
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	
Pest 7 Code, Disc., Scale:	CAPBP W
Stage Majority, Percent:	
Stage Minimum, Percent:	
Stage Maximum, Percent:	
Diameter, Unit:	
Height, Unit:	
Height Minimum, Maximum:	
Density, Unit:	
Coverage, Unit:	

Two Bees Agricultural Research & Consulting

Application Equipment

	A
Appl. Equipment:	CO2 SPRAYER
Operating Pressure, Unit:	50 PSI
Nozzle Type:	FLAT FAN
Nozzle Size:	8012
Nozzle Spacing, Unit:	22 IN
Nozzles/Row:	2
Nozzle Calibration, Unit:	
Band Width, Unit:	N.A.
Boom ID:	
Boom Length, Unit:	4 FT
Boom Height, Unit:	14 IN
Ground Speed, Unit:	1 MPH
Incorporation Equip.:	N.A.
Hours to Incorp.:	
Incorp. Depth, Unit:	
Carrier:	WATER
Spray Volume, Unit:	150 GAL/AC
Mix Size, Unit:	
Spray pH:	6.8
Propellant:	C02
Tank Mix (Y/N):	N

Equipment Comment:

Trt No Treatment Application Comment

Date By Notes

Date By Deviations

Reasons:

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU
Location: ESCALON, CA

Protocol ID:
Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	MALNE	AMARE	AMAGR	POROL	LACSE	POAAN	CAPBP
Pest Name	Cheeseplant	RED ROOT PI>	Pigweed, tu>	Purslane, c>	Lettuce, pr>	Annual blue>	Shepherd's >
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale							
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description							
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size							
Sample Size Unit							
Collection Basis							
Collection Basis Unit							
Number of Subsamples							
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale							
Crop Density, Unit							
Pest Stage							
Pest Density, Unit							
Footnote Number							
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name							
SE Description							
Rating Timing							
Days After First/Last Applic.	2	2	2	2	2	2	2
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval							
ARM Action Codes							
Sort Order for View							
Number of Decimals							
Trt Treatment No. Name							
1 UNTREATED CONTROL	0.0 b	0.0 c	0.0 c	0.0 c	0.0 b	0.0 c	0.0 c
2 NATURE'S AVENGER RTU	86.7 a	100.0 a	100.0 a	100.0 a	100.0 a	90.0 a	96.7 a
3 Roundup	5.0 b	20.0 b	20.0 b	11.7 b	0.0 b	45.0 b	25.0 b
LSD (P=.05)	12.81	11.33	11.33	3.78	0.00	13.88	15.11

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU
Location: ESCALON, CA
Protocol ID:
Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

AOV For W Weed MALNE Cheeseplant N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	14372.222222			
Replicate	2	38.888889	19.444444	0.609	0.5878
Treatment	2	14205.555556	7102.777778	222.348	0.0001
Error	4	127.777778	31.944444		

AOV For W Weed AMARE RED ROOT PIGWEED N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	16950.000000			
Replicate	2	50.000000	25.000000	1.000	0.4444
Treatment	2	16800.000000	8400.000000	336.000	0.0001
Error	4	100.000000	25.000000		

AOV For W Weed AMAGR Pigweed, tumbling N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	16950.000000			
Replicate	2	50.000000	25.000000	1.000	0.4444
Treatment	2	16800.000000	8400.000000	336.000	0.0001
Error	4	100.000000	25.000000		

AOV For W Weed POROL Purslane, common N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	17955.555556			
Replicate	2	5.555556	2.777778	1.000	0.4444
Treatment	2	17938.888889	8969.444444	3229.000	0.0001
Error	4	11.111111	2.777778		

AOV For W Weed LACSE Lettuce, prickly N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	20000.000000			
Replicate	2	0.000000	0.000000	0.000	1.0000
Treatment	2	20000.000000	10000.000000	0.000	1.0000
Error	4	0.000000	0.000000		

AOV For W Weed POAAN Annual bluegrass N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	12450.000000			
Replicate	2	150.000000	75.000000	2.000	0.2500
Treatment	2	12150.000000	6075.000000	162.000	0.0001
Error	4	150.000000	37.500000		

AOV For W Weed CAPBP Shepherd's purse N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	15322.222222			
Replicate	2	38.888889	19.444444	0.438	0.6732
Treatment	2	15105.555556	7552.777778	169.938	0.0001
Error	4	177.777778	44.444444		

Two Bees Agricultural Research & Consulting

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	SONOL	STEME	MALNE	AMARE	AMAGR	POROL	LACSE
Pest Name	Annual sowt>	Common chic>	Cheeseplant	RED ROOT PI>	Pigweed, tu>	Purslane, c>	Lettuce, pr>
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale							
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description							
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	10-29-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size							
Sample Size Unit							
Collection Basis							
Collection Basis Unit							
Number of Subsamples							
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale							
Crop Density, Unit							
Pest Stage							
Pest Density, Unit							
Footnote Number							
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name							
SE Description							
Rating Timing							
Days After First/Last Applic.	2	2	7	7	7	7	7
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval							
ARM Action Codes							
Sort Order for View							
Number of Decimals							
Trt No. Treatment Name							
1 UNTREATED CONTROL	0.0 b	0.0 c	0.0 c	0.0 c	0.0 c	0.0 c	0.0 c
2 NATURE'S AVENGER RTU	100.0 a	100.0 a	57.7 a	90.3 a	90.3 a	91.0 a	92.7 a
3 Roundup	3.3 b	18.3 b	43.3 b	43.3 b	43.3 b	11.7 b	36.7 b
LSD (P=.05)	7.56	13.62	10.79	8.41	8.41	6.39	6.72

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

AOV For W Weed SONOL Annual sowthistle N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	19422.222222			
Replicate	2	22.222222	11.111111	1.000	0.4444
Treatment	2	19355.555556	9677.777778	871.000	0.0001
Error	4	44.444444	11.111111		

AOV For W Weed STEME Common chickweed N.A. N.A. N.A. PLADEA P 10-29-2006 % CONTROL PERCENT N.A. B. BAUER 2 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	17222.222222			
Replicate	2	72.222222	36.111111	1.000	0.4444
Treatment	2	17005.555556	8502.777778	235.462	0.0001
Error	4	144.444444	36.111111		

AOV For W Weed MALNE Cheeseplant N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	5568.000000			
Replicate	2	68.666667	34.333333	1.515	0.3238
Treatment	2	5408.666667	2704.333333	119.309	0.0003
Error	4	90.666667	22.666667		

AOV For W Weed AMARE RED ROOT PIGWEED N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	12326.222222			
Replicate	2	24.222222	12.111111	0.879	0.4826
Treatment	2	12246.888889	6123.444444	444.444	0.0001
Error	4	55.111111	13.777778		

AOV For W Weed AMAGR Pigweed, tumbling N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	12326.222222			
Replicate	2	24.222222	12.111111	0.879	0.4826
Treatment	2	12246.888889	6123.444444	444.444	0.0001
Error	4	55.111111	13.777778		

AOV For W Weed POROL Purslane, common N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	14753.555556			
Replicate	2	10.888889	5.444444	0.685	0.5547
Treatment	2	14710.888889	7355.444444	925.860	0.0001
Error	4	31.777778	7.944444		

AOV For W Weed LACSE Lettuce, prickly N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	13166.888889			
Replicate	2	64.222222	32.111111	3.658	0.1249
Treatment	2	13067.555556	6533.777778	744.355	0.0001
Error	4	35.111111	8.777778		

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Pest Type	W Weed	W Weed	W Weed	W Weed
Pest Code	POAAN	CAPBP	SONOL	STEME
Pest Name	Annual blue>	Shepherd's >	Annual sowt>	Common chic>
Crop Code	N.A.	N.A.	N.A.	N.A.
BBCH Scale				
Crop Name	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.
Description				
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	11-3-2006	11-3-2006	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size				
Sample Size Unit				
Collection Basis				
Collection Basis Unit				
Number of Subsamples				
Crop Stage	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale				
Crop Density, Unit				
Pest Stage				
Pest Density, Unit				
Footnote Number				
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name				
SE Description				
Rating Timing				
Days After First/Last Applic.	7	7	7	7
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval				
ARM Action Codes				
Sort Order for View				
Number of Decimals				
Trt Treatment No. Name				
1 UNTREATED CONTROL	0.0 c	0.0 c	0.0 c	0.0 c
2 NATURE'S AVENGER RTU	100.0 a	97.3 a	98.7 a	100.0 a
3 Roundup	90.0 b	36.0 b	28.3 b	35.0 b
LSD (P=.05)	6.54	6.59	9.53	6.54

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU Protocol ID:
Location: ESCALON, CA Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

AOV For W Weed POAAN Annual bluegrass N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	18250.000000			
Replicate	2	16.666667	8.333333	1.000	0.4444
Treatment	2	18200.000000	9100.000000	1092.000	0.0001
Error	4	33.333333	8.333333		

AOV For W Weed CAPBP Shepherd's purse N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	14600.222222			
Replicate	2	34.888889	17.444444	2.066	0.2420
Treatment	2	14531.555556	7265.777778	860.421	0.0001
Error	4	33.777778	8.444444		

AOV For W Weed SONOL Annual sowthistle N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	15604.000000			
Replicate	2	48.666667	24.333333	1.377	0.3507
Treatment	2	15484.666667	7742.333333	438.245	0.0001
Error	4	70.666667	17.666667		

AOV For W Weed STEME Common chickweed N.A. N.A. N.A. PLADEA P 11-3-2006 % CONTROL PERCENT N.A. B. BAUER 7 1 DA-A

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	15500.000000			
Replicate	2	16.666667	8.333333	1.000	0.4444
Treatment	2	15450.000000	7725.000000	927.000	0.0001
Error	4	33.333333	8.333333		

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU
Location: ESCALON, CA
Protocol ID:
Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

No plot data footnotes entered in study

Two Bees Agricultural Research & Consulting

NATURE'S AVENGER ORGANIC RTU - EFFICACY EVALUATIONS

Trial ID: NATURE'S RTU
Location: ESCALON, CA
Protocol ID:
Study Director: OLAV MESSERSCHMIDT
Investigator: Brooks Bauer

Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	MALNE	AMARE	AMAGR	POROL	LACSE	POAAN	CAPBP
Pest Name	Cheeseplant	RED ROOT PI>	Pigweed, tu>	Purslane, c>	Lettuce, pr>	Annual blue>	Shepherd's >
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale							
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description							
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006	10-29-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size							
Sample Size Unit							
Collection Basis							
Collection Basis Unit							
Number of Subsamples							
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale							
Crop Density, Unit							
Pest Stage							
Pest Density, Unit							
Footnote Number							
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name							
SE Description							
Rating Timing							
Days After First/Last Applic.	2	2	2	2	2	2	2
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval							
ARM Action Codes							
Sort Order for View							
Number of Decimals							
Trt Treatment No. Name							
1 UNTREATED CONTROL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 NATURE'S AVENGER RTU	85.0	100.0	100.0	100.0	100.0	85.0	100.0
	90.0	100.0	100.0	100.0	100.0	100.0	90.0
	85.0	100.0	100.0	100.0	100.0	85.0	100.0
Mean =	86.7	100.0	100.0	100.0	100.0	90.0	96.7
3 Roundup	15.0	15.0	15.0	10.0	0.0	35.0	15.0
	0.0	15.0	15.0	10.0	0.0	50.0	30.0
	0.0	30.0	30.0	15.0	0.0	50.0	30.0
Mean =	5.0	20.0	20.0	11.7	0.0	45.0	25.0

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Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	SONOL	STEME	MALNE	AMARE	AMAGR	POROL	LACSE
Pest Name	Annual sowt>	Common chic>	Cheeseplant	RED ROOT PI>	Pigweed, tu>	Purslane, c>	Lettuce, pr>
Crop Code	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BBCH Scale							
Crop Name	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Description							
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	10-29-2006	10-29-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size							
Sample Size Unit							
Collection Basis							
Collection Basis Unit							
Number of Subsamples							
Crop Stage	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale							
Crop Density, Unit							
Pest Stage							
Pest Density, Unit							
Footnote Number							
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name							
SE Description							
Rating Timing							
Days After First/Last Applic.	2	2	7	7	7	7	7
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval							
ARM Action Codes							
Sort Order for View							
Number of Decimals							
Trt No. Treatment Name							
1 UNTREATED CONTROL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 NATURE'S AVENGER RTU	100.0	100.0	60.0	90.0	90.0	90.0	95.0
	100.0	100.0	63.0	88.0	88.0	88.0	88.0
	100.0	100.0	50.0	93.0	93.0	95.0	95.0
Mean =	100.0	100.0	57.7	90.3	90.3	91.0	92.7
3 Roundup	0.0	15.0	50.0	50.0	50.0	15.0	40.0
	10.0	10.0	40.0	40.0	40.0	10.0	30.0
	0.0	30.0	40.0	40.0	40.0	10.0	40.0
Mean =	3.3	18.3	43.3	43.3	43.3	11.7	36.7

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Pest Type	W Weed	W Weed	W Weed	W Weed
Pest Code	POAAN	CAPBP	SONOL	STEME
Pest Name	Annual blue>	Shepherd's >	Annual sowt>	Common chic>
Crop Code	N.A.	N.A.	N.A.	N.A.
BBCH Scale				
Crop Name	N.A.	N.A.	N.A.	N.A.
Crop Variety	N.A.	N.A.	N.A.	N.A.
Description				
Part Rated	PLADEA P	PLADEA P	PLADEA P	PLADEA P
Rating Date	11-3-2006	11-3-2006	11-3-2006	11-3-2006
Rating Data Type	% CONTROL	% CONTROL	% CONTROL	% CONTROL
Rating Unit	PERCENT	PERCENT	PERCENT	PERCENT
Sample Size				
Sample Size Unit				
Collection Basis				
Collection Basis Unit				
Number of Subsamples				
Crop Stage	N.A.	N.A.	N.A.	N.A.
Crop Stage Scale				
Crop Density, Unit				
Pest Stage				
Pest Density, Unit				
Footnote Number				
Assessed By	B. BAUER	B. BAUER	B. BAUER	B. BAUER
SE Name				
SE Description				
Rating Timing				
Days After First/Last Applic.	7	7	7	7
Trt-Eval Interval	1 DA-A	1 DA-A	1 DA-A	1 DA-A
Plant-Eval Interval				
ARM Action Codes				
Sort Order for View				
Number of Decimals				
Trt Treatment No. Name				
1 UNTREATED CONTROL	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0
Mean =	0.0	0.0	0.0	0.0
2 NATURE'S AVENGER RTU	100.0	97.0	98.0	100.0
	100.0	95.0	98.0	100.0
	100.0	100.0	100.0	100.0
Mean =	100.0	97.3	98.7	100.0
3 Roundup	95.0	40.0	30.0	30.0
	85.0	30.0	20.0	40.0
	90.0	38.0	35.0	35.0
Mean =	90.0	36.0	28.3	35.0

Florida field mustard (*Sinapis sp.*), 2-3 leaf stage
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Tom Lanini
Affiliation University of California, Dept. of Plant Sciences
Address One Shields Avenue
Davis, CA 95616

Report: University of California, Davis Report Date:			**Percent Control** Application Date: December 20, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**13 DAT**		**37 DAT**	
1	Untreated		0.0	b	0.0	f	0.0	e
2	Nature's Avenger – 70 gpa	8.2	1.25	b	17.5	de	28.75	cd
3	Nature's Avenger – 70 gpa	10.0	10.0	a	30.0	cd	40.0	c
4	Nature's Avenger – 70 gpa	12.7	17.5	a	46.25	b	63.75	b
5	Nature's Avenger – 70 gpa	17.5	15.0	a	82.5	a	90.75	a
6	Nature's Avenger RTU –70 gpa	17.5	0.0	b	76.25	a	80.0	a
7	Acetic acid – 70 gpa	10 % dilution	2.5	b	12.5	ef	5.0	e
8	Matran EC - 35 gpa	10 % dilution	17.5	a	82.5	a	23.75	d
LSD (P = .05)			11.9		15.8		16.6	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Florida field mustard (*Sinapis sp.*), 4-5 leaf stage
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator:

Name Tom Lanini
Affiliation University of California, Dept. of Plant Sciences
Address One Shields Avenue
Davis, CA 95616

Report: University of California, Davis Report Date:			**Percent Control** Application Date: January 19, 2007					
Treatments		**Application Rate (% AI)**	**1 DAT**		**13 DAT**		**34 DAT**	
1	Untreated		0.0	d	0.0	d	0.0	c
2	Nature's Avenger – 140 gpa	10.0	16.25	b	85.0	a	57.5	a
3	Nature's Avenger – 70 gpa	10.0	17.5	b	38.75	c	37.5	ab
4	Nature's Avenger – 70 gpa	12.7	20.0	b	65.0	b	55.0	a
5	Nature's Avenger – 70 gpa	17.5	28.75	a	52.5	b	25.0	bc
6	Nature's Avenger RTU -70 gpa	17.5	26.25	a	56.25	b	37.5	ab
7	Acetic acid - 70 gpa	10 % dilution	8.75	c	13.75	d	7.5	c
8	Matran EC – 35 gpa	10 % dilution	17.5	b	36.25	c	25.0	bc
LSD (P = .05)			6.6		15.5		28.3	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Comparison of Organic Herbicides for control of Brown Mustard (*Brassica juncea*)

W. Thomas Lanini, Dept. of Plant Sciences, University of California, Davis

Natural product herbicides have the potential to play an important role on organic farms by reducing reliance on tillage and cultivation and replacing expensive hand weeding operations. Commercially available natural product herbicides containing either vinegar (acetic acid) or clove oil (eugenol) are increasing in demand by organic growers, but only limited information is available on their effective use. Greenhouse and field trials have shown that vinegar applied in concentrations between 10 and 30% can effectively suppress multiple broadleaf weed species, but cannot consistently control grasses (Curran et al. 2003). Clove oil at concentrations of 1 to 10 % has also been demonstrated to provide good control of several broadleaf weed species in some studies (Curran et al., 2003; Tworkoski, 2002), but inconsistent control in others.

Although natural product herbicides are potentially valuable, effective rates of currently available products are often both prohibitively expensive and potentially toxic. For example, 20% vinegar (acetic acid) can cause skin burns and eye damage (Sullivan 2004). Clove oil based herbicides like Matran II, can cost over $250/A if broadcast at even the lowest recommended rate. Preliminary research suggests that effective rates of these products can be reduced through improved knowledge of the impact of growth stage and weather conditions on efficacy. For example, in preliminary greenhouse trials, clove oil was effective in controlling weeds at a 1% concentration when weeds were in the cotyledon stage (Lanini, unpublished). Anecdotal evidence also suggests that the effectiveness of these products may be increased under sunny conditions or high relative humidity, but more information is needed to assess these factors. Reductions in rates may also be achieved through better characterization of the sensitivity of specific weeds at different growth stages. The objective of this study was to assess the efficacy of several organic herbicides for controlling mustard (*Brassica juncea*).

Methods

A field study was conducted at UC Davis Vegetable Crops farm in the Fall/winter, 2006/2007. Brown mustard was planted in October, 2006, as a single row per bed, with rows spaced 5ft. Mustard was sprinkler irrigated to assist germination, with natural rainfall providing subsequent moisture. On Dec. 20, 2006, the first trial was established when mustard was in the 2 to 3 leaf stage of development. Treatments were arranged in a randomized complete block design with four replications. Treatments were applied using a CO_2 backpack sprayer and a spray pressure of 30 psi, treating the entire 5ft. bed. Treatments are shown in Table 1. Additional weeds present at the time treatment included Fiddleneck (*Amsinckia menziesii* var. *intermedia*) – 3 inches and

shepherdspurse (*Capsella bursa-pastoris*) -1-2 inches. Weed control (% control) was visually estimated on December 22, 25, 29, 2006, and January 2, 24, 2007. A second study in an adjoining set of plots was established on January 19, 2007, when mustard was in the 4-5 leaf stage of development. Plot arrangement and number of replications was the same in the second trial. Application equipment was the also same as used for the first mustard study and treatments were the same except where noted in Table 1. Weed control was evaluated on January 20, 24, February 2, and 23, 2007.

Results

Increasing the concentration of the active ingredient for all the products appeared to improve mustard control (Table 2). The fastest acting product at the 2-3-leaf stage of mustard growth was Matran EC at the 15% and 20% concentrations, providing over 35% control at 2 days after treatment (DAT) and over 90% control by 5 DAT. MOI-001 at 17.5% concentration and also the RTU formulation of MOI-001 provided equivalent control to the Matran EC (15% and 20%) treatments by 9 DAT and these treatments were still providing the best control at 37 DAT. Lower concentrations of MOI-001 (8.75%, 10%, and 12.7%) were less effective in controlling mustard, compared to Matran EC at 15% or 20%, however they were equivalent with Matran EC applied at 5% or 10% concentrations at 37 DAT. Acetic acid at 20% provided over 60% mustard control at 5 to 13 DAT, but lower concentrations were much less effective. Matran EC appeared to control mustard more rapidly than did other treatments, however, MOI-001 was equivalent to Matran by the end of the study. Neither surfactant nor higher pH improved the performance of MOI-001 10% concentration.

Organic herbicides were generally less effective at controlling mustard at the 4-5 leaf stage of growth, compared to the 2-3 leaf stage (Tables 2 and 3). Acetic acid caused spotting and some tissue necrosis, but mustard growth was only temporarily stunted. Matran EC at 10 to 20% fair control (30 to 50%) by 13 DAT, but controlled declined considerably by 34 DAT. MOI-001 applied at 70 gpa was equivalent to Matran EC through the 13 DAT evaluation, but were generally providing better control by 34 DAT. Increasing the spray volume to 140 gpa improved activity of MOI-001 considerably, with 72.5% control at 5DAT, 85% control at 13DAT and 57.5 % control at 34DAT. Thus higher spray volume appears to be needed for control of larger weeds. Modifying the pH of the MOI-001 spray solutions resulted in slight improvements (not statistically significant) in weed control. MOI-001 and Matran EC were significantly better at controlling 4-5 leaf mustard in this study, compared to acetic acid, C-cide, or Weed Zap treatments.

Table 1. Treatment, rate applied, and spray volume. Treatments at the 2-3 leaf mustard or 4-5 leaf stage*.

	Treatment	Conc.	Spray volume
1.	Acetic acid[1]	5%	70 gpa
2.	Acetic acid[1]	10%	70 gpa
3.	Acetic acid[1]	15%	70 gpa
4.	Acetic acid[1]	20%	70 gpa
5.	Matran EC[2]	5%	35 gpa
6.	Matran EC[2]	10%	35 gpa
7.	Matran EC[2]	15%	35 gpa
8.	Matran EC[2]	20%	35 gpa
9.	MOI-001	8.75%	70 gpa
	9b. MOI-001	10%	140 gpa
10.	MOI-001	10%	70 gpa
11.	MOI-001	12.7%	70 gpa
12.	MOI-001	17.5%	70 gpa
13.	MOI-001	RTU	70 gpa
14.	MOI-001 + Natur'l Wet	10% + 1% v/v	70 gpa
	14b. MOI-001	10% -pH 8.0	70 gpa
15.	C-cide	1.6% (1:2 dilution)	70 gpa
16.	C-cide	1% (1:4 dilution)	70 gpa
17.	Weed Zap[2]	5%	35 gpa
18.	Untreated		

* Treatments 9b and 14b were applied to 4-leaf mustard in place of treatments 9 and 14.
[1] Add 0.1% yucca extract as the adjuvant.
[2] Add 2.5% Humasol as the adjuvant.

Table 2. Mustard (*Brassica juncea*) control (%) at 2, 5, 9, 13, and 37 DAT, after treatment with organic herbicides. Mustard was treated at the 2 to 3-leaf stage on Dec. 20, 2006. Temperature 45F and 66% humidity at the time of treatment.

Treatment	% Mustard control									
	2 DAT		5 DAT		9 DAT		13 DAT		37 DAT	
Acetic acid 5%	1.25	c	6.25	g	6.25	fg	5.00	f	5.00	e
Acetic acid 10%	2.50	c	10.00	g	12.50	fg	12.50	f	5.00	e
Acetic acid 15%	2.50	c	22.50	ef	23/75	e	26.25	de	22.50	de
Acetic acid 20%	16.25	b	62.50	c	61.25	b	61.25	bc	28.75	d
Matran EC 5 %	3.75	c	12.50	fg	12.50	fg	17.50	ef	5.00	e
Matran EC 10%	17.50	b	77.50	b	81.25	a	82.50	ab	23.75	de
Matran EC 15%	37.50	a	91.25	a	92.50	a	92.50	a	75.00	ab
Matran EC 20%	45.00	a	95.00	a	95.00	a	95.00	a	83.75	a
MOI-001 8.2%	1.25	c	11.25	g	13.75	fg	17.50	ef	28.75	d
MOI-001 10%	10.00	b	20.00	fg	28.75	e	30.00	d	40.00	c
MOI-001 12.7%	17.50	b	35.00	e	45.00	cd	46.25	cd	63.75	b
MOI-01 17.5%	15.00	b	55.00	cd	80.00	a	82.50	ab	90.75	a
MOI-001 RTU	0.00	c	50.00	cd	66.25	ab	76.25	b	80.00	ab
MOI-001 10%+	6.25	c	21.25	fg	30.00	de	33.75	d	22.50	de
C-cide 1.6%	5.00	c	45.00	de	50.00	bc	63.75	b	46.25	c
C-cide 1%	3.75	c	17.50	fg	17.50	ef	21.25	def	11.25	e
Weed Zap 5%	5.00	c	30.00	e	30.00	de	28.75	de	28.75	d
Untreated	0.00	c	0.00	g	0.00	g	0.00	f	0.00	e
LSD (p = 0.05)	11.948		13.024		15.044		15.804		16.586	

Table 3. Mustard (*Brassica juncea*) control (%) at 1, 5, 13, and 34 DAT, after treatment with organic herbicides. Mustard was treated at the 4 to 5-leaf stage on Jan, 19, 2007. Temperature 50F and 55% humidity at the time of treatment.

Treatment	% Mustard control							
	1 DAT		5 DAT		13 DAT		34 DAT	
Acetic acid 5%	0.00	g	6.25	fg	8.75	fg	12.50	c
Acetic acid 10%	8.75	ef	11.25	f	13.75	fg	7.50	c
Acetic acid 15%	13.75	e	18.75	ef	15.00	fg	5.00	c
Acetic acid 20%	21.25	cd	27.50	de	21.25	de	7.50	c
Matran EC 5 %	2.50	fe	8.75	fg	10.00	fg	15.00	c
Matran EC 10%	17.50	d	23.75	de	36.25	cd	25.00	bc
Matran EC 15%	25.00	bc	46.25	c	33.75	cde	12.50	c
Matran EC 20%	35.00	a	52.50	b	50.00	bc	30.00	ab
MOI-001 10% 140 gpa	16.25	d	72.50	a	85.00	a	57.50	a
MOI-001 10%	17.50	d	31.25	cd	38.75	c	37.50	ab
MOI-001 12.7%	20.00	cd	52.50	b	65.00	b	55.00	a
MOI-01 17.5%	28.75	ab	52.50	b	52.50	bc	25.00	bc
MOI-001 RTU	26.25	bc	57.50	b	56.25	b	37.50	ab
MOI-001 10% pH 8	18.75	d	41.25	c	50.00	bc	50.00	ab
C-cide 1.6%	8.75	ef	30.00	d	33.75	cde	5.00	c
C-cide 1%	5.00	fg	20.00	ef	18.75	ef	6.25	c
Weed Zap 5%	7.50	ef	11.25	f	15.00	fg	5.00	c
Untreated	0.00	g	0.00	g	0.00	g	0.00	c
LSD (p = 0.05)	6.630		10.980		15.544		28.346	

Table 4. Comparison of MOI-001 treatments – 2-3 leaf stage

	2 DAT		5 DAT		9 DAT		13 DAT		37 DAT	
UTC	0	b	0	d	0	d	0	d	0	e
8.2%	1.25	b	11.25	cd	13.75	cd	17.5	cd	28.75	cd
10%	10	ab	20	cd	28.75	bc	30	bc	40	c
12.7%	17.5	a	35	b	45	b	46.25	b	63.75	bc
17.5%	15	ab	55	a	80	a	82.5	a	90.75	a
RTU 17.5%	0	b	50	a	66.25	a	76.25	a	80	ab
10% + surfactant	6.25	b	21.25	bc	30	bc	33.75	bc	22.5	d
LSD	**10.2**		**14.7**		**18.3**		**18.9**		**16.7**	

First study with mustard at 2.25 to 3-leaf stage

1. All MOI-001 treatments performed significantly better than the untreated control
2. The MOI-001 concentrate at 1:3 dilution gave 90 % control of small (mustard) weeds.
3. RTU at the same AI % was slightly less effective at all evaluation points, but not significantly
4. After two weeks, MOI-001 at 1:4 controled less than 50 % of weeds.
5. Concentration of limonene (= dilution) made a significant difference in the results - 1:7 being the worst of all treatments at all time points.
6. Surfactant (Natural Wet, 1%) did not improve the performance of MOI-001 at 1:6 dilution. At 37 DAT, it was significantly less effective than MOI-001 alone.

Table 5. Comparison of MOI-001 treatments – 4-5 leaf stage

	1DAT		5 DAT		13 DAT		34 DAT
UTC	0	c	0	d	0	d	0
10% 140 gpa	16.25	b	72.5	a	85	a	57.5
10%	17.5	b	31.25	c	38.75	c	37.5
12.70%	20	b	52.5	b	65	ab	55
17.5%	28.75	a	52.5	b	52.5	bc	25
RTU 17.5%	26.25	a	57.5	ab	56.25	bc	37.5
10% pH8.0	18.75	b	41.25	bc	50	bc	50
LSD	**5.6**		**17.0**		**23.3**		**ns**

Second study with mustard at 4-5 -leaf stage

1. All MOI-001 treatments performed significantly better than the untreated control.
2. The highest concentration of limonene controlled more than 25 % of weeds at 1 DAT.
3. Coverage (volume of liquid per acre) affected the % control the most - the more liquid the better control.
4 Both 1:3 and 1:4 dilutions gave similar results to RTU.
5. 1:6 dilution (10 % limonene) at 70 gpa was significantly less effective than at 140 gpa
6. Treatment with higher pH performed a little better than the one without pH adjustment but the difference was not statistically significant.

Literature Cited:

Curran, W.S., D.D. Lingenfelter, and C.B. Muse. 2003. Vinegar and clove oil for non-selective control of annual weeds. Proceedings of the Northeastern Weed Science Society 88: 21.

Sullivan, P. 2004. Field bindweed control alternatives. Current Topic 106. ATTRA Publication 103. National Sustainable Agriculture Information Service: Fayetteville, AR. 6pp.

Tworkoski, T. 2002. Herbicide effects of essential oils. Weed Sci. 50(4): 425-431.

Common weeds in a Field Study 1

(*Trifolium spp., Amsinckia spp., Poa annua, Erodium cicutarium, Silybium marianum)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Marja Koivunen
Affiliation: Marrone Organic Innovations
Address: 215 Madson Place, Davis, CA 95618

Report: Marrone Organic Innovations Report Date: January 31, 2007			% Weed Control Application Date: November 24, 2006					
Treatments		**Application Rate (% AI)**	**7 DAT**		**30 DAT**		**60 DAT**	
1	Untreated		0	b	0	b	0	c
2	Nature's Avenger RTU	21.6 %	99.25	a	97.5	a	90.25	b
3	Nature's Avenger RTU	17.5 %	100	a	100	a	95.25	bc
4	Nature's Avenger concentrate	11.7 %	100	a	100	a	98.75	c
LSD (p = 0.05)			1.1		3.8		7.7	

Application rate 180 gpa

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions:

Nature's Avenger RTUs and concentrate at 1:5 dilution provided a complete control of weeds within one week. The long term effect of the concentrate was better than the old RTU formulation's.

Common weeds in a Field Study 2

(*Trifolium spp., Amsinckia spp., Poa annua, Erodium cicutarium, Silybium marianum)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Marja Koivunen
Affiliation: Marrone Organic Innovations
Address: 215 Madson Place, Davis, CA 95618

Report: Marrone Organic Innovations Report Date: January 31, 2007			% Weed Control Application Date: November 25, 2006					
Treatments		**Application Rate (% AI)**	**7 DAT**		**30 DAT**		**60 MAT**	
1	Roundup	2 % glyphosate	55.0	b	100	a	99.5	
2	Nature's Avenger RTU	21.6 %	100	a	100	a	87.75	
3	Nature's Avenger RTU	17.5 %	100	a	100	a	93.5	
4	Nature's Avenger concentrate	11.7 %	100	a	100	a	95.0	
LSD (p = 0.05)			5.4		N.D.		N.S.	

Application rate 180 gpa

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions:

Nature's Avenger RTUs and concentrate at 1:5 dilution provided a complete control of all weeds within one week. The herbicidal effect was significantly faster than the one obtained using Roundup (as a control).

Marrone™
Organic Innovations

Study Report

Efficacy of MOI-001 on controlling weeds

Field Studies 1 and 2

January 25, 2007

Marja Koivunen
Marrone Organic Innovations
Davis, CA 95618

MOI-001 field study 1
Site: Davis, CA
Soil: clay loam with sand on the top
Major weeds: clover, ryegrass, fiddleneck, redstem filaree, annual bluegrass, blessed milkthistle at 2-4 leaf-stage
Plot size: one square foot in 4 replicates
Trial design: completely randomized block
Spraying: November 24, 2006
GPA: 180
Temperature: 60°F, cool, breezy, sunny
Rating: 100=complete control; 0= no control

Day 7after treatment

Treatment	**1**	**2**	**3**	**4**	average	
RTU	100	100	97	100	99.25	a
RTU microemulsion	100	100	100	100	100	a
NAO 1:5	100	100	100	100	100	a
control	0	0	0	0	0	b
LSD (p=0.05)						1.1

1 month after treatment

Treatment	**1**	**2**	**3**	**4**	average	
RTU	100	100	90	100	97.5	a
RTU microemulsion	100	100	100	100	100	a
NAO 1:5	100	100	100	100	100	a
control	0	0	0	0	0	b
LSD (p=0.05)						3.85

2 months after treatment

Treatment	**1**	**2**	**3**	**4**	average	
RTU	85	98	80	98	90.25	b
RTU microemulsion	90	97	95	99	95.25	ab
NAO 1:5	98	99	99	99	98.75	a
control	1	1	1	1	1	c
LSD (p=0.05)						7.74

RTU - 21.6 % limonene
RTU microemulsion - 17.5 % limonene
NAO - Nature's Avenger Organic Concentrate - 70 % limonene (1:5 = 11.7 %)
control - untreated

Conclusions: At time points 1-week and 1-month, all MOI-001 treatments resulted in complete control of all weeds in the treated plots. After 2 months, Nature's Avenger at 1:5 dilution performed significantly better than RTU. The RTU microemulsion was similar to NAO 1:5 and better than the regular RTU, but the difference was not statistically significant at p= 0.05.

MOI-001 field study 2
Site: Davis, CA
Soil: clay loam with sand on the top
Major weeds: clover, ryegrass, fiddleneck, redstem filaree, alfalfa, blessed milkthistle at 2-4 leaf-stage
Plot size: one square foot in 4 replicates
Trial design: completely randomized block
Spraying: November 25, 2006
GPA: 180
Temperature: 55°F, cool, breezy, cloudy
Rating: 100=complete control; 0 = no control

Day 7after treatment

Treatment	1	2	3	4	average	
RTU	100	100	100	100	100	a
RTU microemulsion	100	100	100	100	100	a
NAO 1:5	100	100	100	100	100	a
Roundup RTU Plus	50	65	55	50	55	b
LSD (p=0.05)						5.4

1 month after treatment

Treatment	1	2	3	4	average		
RTU	100	100	100	100	100		
RTU microemulsion	100	100	100	100	100		
NAO 1:5	100	100	100	100	100		
Roundup RTU Plus	100	100	100	100	100		
LSD (p=0.05)						N.D.	not determined

2 months after treatment

Treatment	1	2	3	4	average		
RTU	96	85	95	75	87.75		
RTU microemulsion	97	95	97	85	93.5		
NAO 1:5	95	98	97	90	95		
Roundup RTU Plus	100	100	99	99	99.5		
LSD (p=0.05)						N.S.	not significant

RTU - 21.6 % limonene
RTU microemulsion - 17.5 % limonene
NAO - Nature's Avenger Organic Concentrate - 70 % limonene (1:5 = 11.7%)
Roundup RTU Plus - 2 % glyphosate

Conclusions:
At the first observation point (7 days after treatment), all MOI-001 treatments performed well with 100 % of all weeds. Roundup as a systemic herbicide did not work as fast as MOI-001 but it resulted in a complete control at the second observation (1 month after treatment).
After two months, Roundup out-performed RTU providing the best control. However, it was not statistically different from RTU microemulsion or Nature's Avenger concentrate at 1:5 dilution.

study 1
Anova: Single Factor at 1 week after treatment

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
RTU	4	397	99.25	2.25
RTU micro	4	400	100	0
NAO 1:5	4	400	100	0
control	4	0	0	0

ANOVA

rce of Varia	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between G	29851.69	3	9950.563	17689.89	3.91E-22	3.490295
Within Gro	6.75	12	0.5625			
Total	29858.44	15				

LSD p=0.05 1.15

Study 1
Anova: Single Factor at 1 month after treatment

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
RTU	4	390	97.5	25
RTU microemulsion	4	400	100	0
NAO 1:5	4	400	100	0
control	4	0	0	0

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	29518.75	3	9839.583	1574.333	7.76E-16	3.490295
Within Groups	75	12	6.25			
Total	29593.75	15				

LSD p=0.05 3.85

Study 1
Anova: Single Factor at 2 months after treatment

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
RTU	4	361	90.25	84.25
RTU micro	4	381	95.25	14.91667
NAO 1:5	4	395	98.75	0.25
control	4	0	0	0

ANOVA

rce of Varia	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between G	27078.69	3	9026.229	363.1676	4.88E-12	3.490295
Within Gro	298.25	12	24.85417			
Total	27376.94	15				

LSD p = 0.05 7.74

Study 2
Anova: Single Factor at 1 week after treatment

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
RTU	4	400	100	0
RTU microemulsion	4	400	100	0
NAO 1:5	4	400	100	0
Roundup RTU Plus	4	220	55	50

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6075	3	2025	162	5.68E-10	3.490295
Within Groups	150	12	12.5			
Total	6225	15				

LSD p=0.05 5.45

Study 2
Anova: Single Factor at 1 month after treatment

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
RTU	4	400	100	0
RTU microemulsion	4	400	100	0
NAO 1:5	4	400	100	0
Roundup RTU Plus	4	400	100	0

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0	3	0	65535	#NUM!	3.490295
Within Groups	0	12	0			
Total	0	15				

No variance

Study 2
Anova: Single Factor at 2 months after treatment

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
RTU	4	351	87.75	96.91667
RTU microemulsion	4	374	93.5	33
NAO 1:5	4	380	95	12.66667
Roundup RTU Plus	4	398	99.5	0.333333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	282.1875	3	94.0625	2.632653	0.097791	3.490295
Within Groups	428.75	12	35.72917			
Total	710.9375	15				

No significant differences

Redstem filaree (*Erodium cicutarium)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Duane Ewing
Affiliation: Ewing & Associates
Address: 1812 Olvera Drive, Woodland, CA 95776

Report: Ewing & Associates Report Date: January 4, 2007			**Weed Control (scale 0-10)** Application Date: December 19, 2006					
Treatments		**Application Rate (% AI)**	**1 DAT**		**5 DAT**		**14 DAT**	
1	Untreated		0.0	b	0.0	d	0.0	b
2	Nature's Avenger RTU	17.5 %	0.7	b	2.7	b	0.7	b
3	Nature's Avenger 65 %	16.25 %	2.3	a	5.3	a	5.7	a
4	Nature's Avenger 65 %	9.3 %	0.0	b	1.3	c	0.7	b
5	Roundup 18.7 %	3 oz/a	0.0	b	1.0	c	7.7	a
LSD (p= 0.05)			1.14		0.909		2.803	

Means followed by same letter do not significantly differ (p = 0.05, Student-Newman-Keuls)

Conclusions:
At 1:3 dilution (16.25% limonene) significant control of redstem filaree when compared against the untreated control.
At this level of coverage (60 gpa), inadequate control from application of the concentrate at 1:6 dilution (9.3% limonene) and from the ready-to-use (RTU) formulation.

Annual bluegrass (*Poa annua)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Duane Ewing
Affiliation: Ewing & Associates
Address: 1812 Olvera Drive, Woodland, CA 95776

Report: Ewing & Associates Report Date: January 4, 2007			**Weed Control (scale 0-10)** Application Date: December 19, 2006					
Treatments		**Application Rate (% AI)**	**1 DAT**		**5 DAT**		**14 DAT**	
1	Untreated		0.0	a	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	0.7	a	1.7	b	1.0	c
3	Nature's Avenger 65 %	16.25 %	0.7	a	4.7	a	7.7	b
4	Nature's Avenger 65 %	9.3 %	0.3	a	1.0	b	0.7	c
5	Roundup 18.7 %	3 oz/a	0.0	a	1.0	b	9.7	a
LSD (p= 0.05)			0.909		0.595		1.396	

Means followed by same letter do not significantly differ (p = 0.05, Student-Newman-Keuls)

Conclusions:
At 1:3 dilution (16.25% limonene) significant control of annual bluegrass when compared against the untreated control.
At this level of coverage (60 gpa), inadequate control from application of the concentrate at 1:6 dilution (9.3% limonene) and from the ready-to-use (RTU) formulation.

Fiddleneck, coast (*Amsinckia intermedia)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Duane Ewing
Affiliation: Ewing & Associates
Address: 1812 Olvera Drive, Woodland, CA 95776

Report: Ewing & Associates Report Date: January 4, 2007			**Weed Control (scale 0-10)** Application Date: Dec 19, 2006					
Treatments		**Application Rate (% AI)**	**1 DAT**		**5 DAT**		**14 DAT**	
1	Untreated		0.0	b	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5 %	1.7	a	1.7	b	0.7	c
3	Nature's Avenger 65 %	16.25 %	1.7	a	4.7	a	8.3	b
4	Nature's Avenger 65 %	9.3 %	1.0	a	1.7	b	0.7	c
5	Roundup 18.7 %	3 oz/a	0.0	b	1.3	b	10.0	a
LSD (p= 0.05)			0.729		0.972		1.002	

Means followed by same letter do not significantly differ (p = 0.05, Student-Newman-Keuls)

Conclusions:
At 1:3 dilution (16.25% limonene) significant control of fiddleneck when compared against the untreated control.
At this level of coverage (60 gpa), inadequate control from application of the concentrate at 1:6 dilution (9.3% limonene) and from the ready-to-use (RTU) formulation.

EWING
& ASSOCIATES

January 4, 2007

Pam Marrone
215 Madison, Suites B/C
Davis, CA 95618

Dear Pam:

Nature's Avenger Organic (NAO) Herbicide

Enclosed is the final report for the NAO herbicide trial conducted near Winters, CA, along with supporting data (weather and weed evaluation system) and final invoice. I deliberately kept the ARM report brief and without much commentary; however, I am including comments regarding application, evaluation and overall herbicide performance in this letter. This allows you to make conclusions on a field trial program rather than just one study.

The material mixed well, although the concentrate tends to foam. Coverage was excellent and, at 60 GPA, materials were applied well past the point of runoff. Most plots were a carpet of weeds with redstem filaree the most dominant in terms of surface area. Annual bluegrass and common or coastal fiddleneck were also uniformly present.

Evaluations were made using a Weed Evaluation System as published by the Southern Weed Science Society, is embedded in the ARM report and is also provided separately with the supporting documents. This method allows an easy transposition to percent control; for example, if a treatment mean is 5.8, this equates to 58% control.

On the negative side, the 1:6 dilution of the concentrate did not do much, as you probably expected. Unfortunately, neither did the RTU formulation which I assumed was already formulated as a 1:3 dilution. Both treatments "burned" the edges of the weeds but did not kill them. It appears from this trial that the RTU formulation is not quite ready.

NAO concentrate applied at a 1:3 dilution provided very rapid results, even in the cold weather. Affected weeds appeared water soaked and darkened, much like someone dumped a can of spinach on the plots. Complete control could have been reported except that a significant number of weeds were not affected, as if they were not treated. It looked as if there were "skips" within the spray swath. In fact, if I had not made the application myself and had not looked at the plots afterwards, I would have said it was a poor application.

I can provide further a description of the plots and the application methodology, but I have confidence in the application. The final proof occurred at 14 DAT when Roundup finally showed significant control, and uniform control, throughout the plot areas. The only explanation I have is that some of the weeds were protected by other weeds, therefore not receiving much or any contact with the spray solution. Control ratings will decrease as weeds continue to grow because more of the plot area will be covered.

Call me if there are questions. I assume those with more experience with the product can offer a better interpretation of the results.

Sincerely,

Duane D. Ewing
President

Enclosures (4)

1812 Olivera Drive
Woodland, CA 95776

Phone 530.662.8414
Fax 530.662.8685

EwingAssociates@aol.com

Ewing & Associates

GreenMatch/Nature's Avenger Organic Herbicide (NAO) Efficacy Evaluation

Trial ID: NAOEwing
Location: Winters, CA
(Solano County)

Protocol ID: NAOMarrone
Study Director: Pam Marrone
Investigator: Duane Ewing

Trt No.	Treatment Name	Form Conc	Form Unit	Form Type	Lot Code	Rate	Rate Unit	Appl Code	Spray Volume	Volume Unit	Mix Size	Mix Unit
1	Untreated Check											
2	RTU	17.5	%W/W	RTU	1067	As is		A	60	GAL/AC	1	Gal
3	NAO Conc.	65	%W/W	C	1074	1:3	V/V	A	60	GAL/AC	1	Gal
4	NAO Conc.	65	%W/W	C	1074	1:3	V/V	A	60	GAL/AC	1	Gal
5	Roundup Conc. Plus	18.7	%W/W	EC		3	oz/G	A	60	GAL/AC	1	Gal

Replications: 3, Design: Randomized Complete Block, Treatment units: US standard, Treated plot size Width: 5 feet, Treated plot size Length: 15 feet, Application volume: 60 gal/ac, Mix size: 1 Gal, Format definitions: G-All7.DEF, G-All7.FRM

Ewing & Associates

GreenMatch/Nature's Avenger Organic Herbicide (NAO) Efficacy Evaluation

Trial ID: NAOEwing
Location: Winters, CA
(Solano County)

Protocol ID: NAOMarrone
Study Director: Pam Marrone
Investigator: Duane Ewing

General Trial Information

Study Director: Pam Marrone — **Title:** CEO
Affiliation: Marrone Organic Innovations
Investigator: Duane D. Ewing — **Title:** President
Affiliation: Ewing & Associates

Trial Location

City: Winters
State/Prov.: CA
Country: USA

Trial Status: Completed
Trial Reliability: High
Initiation Date: 19-Dec-06
Completion Date: 2-Jan-07

Objectives:

Evaluate two formulations of Nature's Avenger Organic Herbicide against three weed species.

Conclusions:

The concentrate formulation of Nature's Avenger Organic Herbicide provided significant control of all three weed species tested when compared against the untreated check when applied at a 1:3 dilution. Inadequate weed control resulted from the application of the concentrate at a 1:6 dilution and from the ready to use formulation.

Cooperator/Landowner

Cooperator: Peter Hunter
Organization: Hunter Farms
City: Winters
State/Prov: CA

Crop Description

Crop 1: YNKKX Non-crop land — Non-crop land

Pest Description

Pest 1 Type: W **Code:** EROCI Erodium cicutarium
Common Name: Redstem filaree

Pest 2 Type: W **Code:** POAAN Poa annua
Common Name: Annual bluegrass

Pest 3 Type: W **Code:** AMSIN Amsinckia intermedia
Common Name: Fiddleneck, coast

Site and Design

Plot Width, Unit: 5 FT
Plot Length, Unit: 15 FT
Replications: 3

Site Type: Non-Crop Area
Tillage Type: NO-TILL
Study Design: Randomized Complete Block

Application Description

	A
Application Date:	19-Dec-06
Time of Day:	2 PM
Application Method:	SPRAY
Application Timing:	NCPOPE
Application Placement:	BROFOL
Air Temperature, Unit:	47.9 F
% Relative Humidity:	42
Wind Velocity, Unit:	0.8 MPH
Wind Direction:	S
Dew Presence (Y/N):	N
Soil Moisture:	Moist
% Cloud Cover:	5

Crop Stage At Each Application

	A
Crop 1 Code, BBCH Scale:	YNKK X

Pest Stage At Each Application

	A
Pest 1 Code, Disc., Scale:	EROCI W
Stage Majority, Percent:	4-6Lf
Diameter, Unit:	2 IN
Height, Unit:	4 IN
Pest 2 Code, Disc., Scale:	POAAN W
Stage Majority, Percent:	Tiller
Diameter, Unit:	.5 IN
Height, Unit:	1 IN
Pest 3 Code, Disc., Scale:	AMSIN W
Stage Majority, Percent:	6-8Lf
Diameter, Unit:	2 IN
Height, Unit:	1 IN

Application Equipment

	A
Appl. Equipment:	Roundup Professional Hand Sprayer
Operating Pressure, Unit:	MAX
Nozzle Type:	Flat Fan
Nozzle Spacing, Unit:	18 IN
Nozzles/Pass:	1
No. Passes/Plot	2
Boom Height, Unit:	18 IN
Ground Speed, Unit:	1.2 MPH
Carrier:	Water
Spray Volume, Unit:	60 GAL/AC
Mix Size, Unit:	1 GAL
Propellant:	AIR
Tank Mix (Y/N):	N

Ewing & Associates

GreenMatch/Nature's Avenger Organic Herbicide (NAO) Efficacy Evaluation

Trial ID: NAOEwing
Location: Winters, CA
(Solano County)

Protocol ID: NAOMarrone
Study Director: Pam Marrone
Investigator: Duane Ewing

Rep	Blk					
1	1	3	1	5	4	2
	Plot	101	102	103	104	105
2	2	4	5	1	2	3
	Plot	201	202	203	204	205
3	3	2	3	4	5	1
	Plot	301	302	303	304	305

Weed Evaluation System
0 – 10 Scale

Rating Description		Description of Main Detailed Categories
0	No Effect	No weed control
1	Slight Effect	Very poor weed control
2		Poor weed control
3		Poor to deficient weed control
4	Moderate Effect	Deficient weed control
5		Deficient to moderate weed control
6		Moderate weed control
7	Severe Effect	Weed control somewhat less than satisfactory
8		Satisfactory to good weed control
9		Very good to excellent weed control
10	Complete Effect	Complete weed destruction

(NAOEwing)

Ewing & Associates

GreenMatch/Nature's Avenger Organic Herbicide (NAO) Efficacy Evaluation

Trial ID: NAOEwing
Location: Winters, CA
(Solano County)

Protocol ID: NAOMarrone
Study Director: Pam Marrone
Investigator: Duane Ewing

Trt No.	Treatment Name	Form Conc	Form Unit	Rate	Rate Unit	Appl Code	W Weed EROCI Redstem fil> YNKKX Non-crop la> PLANT P 19-Dec-06 CONTRO 0-10Scal Ewing D. 0 0 0 DA-A D05	W Weed POAAN Annual blue> YNKKX Non-crop la> PLANT P 19-Dec-06 CONTRO 0-10Scal Ewing D. 0 0 0 DA-A D05	W Weed AMSIN Coast fiddl> YNKKX Non-crop la> PLANT P 19-Dec-06 CONTRO 0-10Scal Ewing D. 0 0 0 DA-A D05	W Weed EROCI Redstem fil> YNKKX Non-crop la> PLANT P 20-Dec-06 CONTRO 0-10Scal Ewing D. 1 1 1 DA-A D05	W Weed POAAN Annual blue> YNKKX Non-crop la> PLANT P 20-Dec-06 CONTRO 0-10Scal Ewing D. 1 1 1 DA-A D05	W Weed AMSIN Coast fiddl> YNKKX Non-crop la> PLANT P 20-Dec-06 CONTRO 0-10Scal Ewing D. 1 1 1 DA-A D05
							1	2	3	4	5	6
1	Untreated Check						0.00 a	0.00 a	0.00 a	0.00 b	0.00 a	0.00 b
2	RTU	17.5	%W/W	As is		A	0.00 a	0.00 a	0.00 a	0.67 b	0.67 a	1.67 a
3	NAO	65	%W/W	1:3	V/V	A	0.00 a	0.00 a	0.00 a	2.33 a	0.67 a	1.67 a
4	NAO	65	%W/W	1:6	V/V	A	0.00 a	0.00 a	0.00 a	0.00 b	0.33 a	1.00 a
5	Roundup Conc. +	18.7	%W/W	3	oz/a	A	0.00 a	0.00 a	0.00 a	0.00 b	0.00 a	0.00 b
LSD (P=.05)							0.000	0.000	0.000	1.140	0.909	0.729
Standard Deviation							0.000	0.000	0.000	0.606	0.483	0.387
CV							0.0	0.0	0.0	100.92	144.91	44.69
Grand Mean							0.0	0.0	0.0	0.6	0.33	0.87
Bartlett's X2							0.0	0.0	0.0	0.85	0.0	0.0
P(Bartlett's X2)							.	.	.	0.357	0.001*	1.00
Friedman's X2							0.0	0.0	0.0	5.667	3.333	9.8
P(Friedman's X2)							1.00	1.00	1.00	0.225	0.504	0.044
Replicate F							0.000	0.000	0.000	0.545	0.286	0.444
Replicate Prob(F)							1.0000	1.0000	1.0000	0.5997	0.7588	0.6561
Treatment F							0.000	0.000	0.000	8.364	1.429	14.000
Treatment Prob(F)							1.0000	1.0000	1.0000	0.0059	0.3088	0.0011

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Trt No.	Treatment Name	Form Conc	Form Unit	Rate	Rate Unit	Appl Code	W Weed EROCI Redstem fil> YNKKX Non-crop la> PLANT P 22-Dec-06 CONTRO 0-10Scal Ewing D. 3 3 3 DA-A D05	W Weed POAAN Annual blue> YNKKX Non-crop la> PLANT P 22-Dec-06 CONTRO 0-10Scal Ewing D. 3 3 3 DA-A D05	W Weed AMSIN Coast fiddl> YNKKX Non-crop la> PLANT P 22-Dec-06 CONTRO 0-10Scal Ewing D. 3 3 3 DA-A D05	W Weed EROCI Redstem fil> YNKKX Non-crop la> PLANT P 24-Dec-06 CONTRO 0-10Scal Ewing D. 5 5 5 DA-A D05	W Weed POAAN Annual blue> YNKKX Non-crop la> PLANT P 24-Dec-06 CONTRO 0-10Scal Ewing D. 5 5 5 DA-A D05	W Weed AMSIN Coast fiddl> YNKKX Non-crop la> PLANT P 24-Dec-06 CONTRO 0-10Scal Ewing D. 5 5 5 DA-A D05
							7	8	9	10	11	12
1	Untreated Check						0.00 c	0.00 b	0.00 d	0.00 d	0.00 c	0.00 c
2	RTU	17.5	%W/W	As is		A	1.33 b	1.00 b	1.67 b	2.67 b	1.67 b	1.67 b
3	NAO	65	%W/W	1:3	V/V	A	3.33 a	3.33 a	3.00 a	5.33 a	4.67 a	4.67 a
4	NAO	65	%W/W	1:6	V/V	A	0.67 bc	1.00 b	1.00 bc	1.33 c	1.00 b	1.67 b
5	Roundup Conc. +	18.7	%W/W	3	oz/a	A	0.00 c	0.00 b	0.33 cd	1.00 c	1.00 b	1.33 b
LSD (P=.05)							0.909	0.876	0.769	0.909	0.595	0.972
Standard Deviation							0.483	0.465	0.408	0.483	0.316	0.516
CV							45.29	43.64	34.02	23.37	18.97	27.66
Grand Mean							1.07	1.07	1.2	2.07	1.67	1.87
Bartlett's X2							0.0	0.548	0.0	0.0	0.0	0.0
P(Bartlett's X2)							1.00	0.459	1.00	1.00	1.00	1.00
Friedman's X2							9.6	9.4	9.867	11.467	10.4	9.8
P(Friedman's X2)							0.048	0.052	0.043	0.022	0.034	0.044
Replicate F							0.286	2.154	0.000	0.286	2.667	1.000
Replicate Prob(F)							0.7588	0.1785	1.0000	0.7588	0.1296	0.4096
Treatment F							24.571	25.692	25.600	54.571	95.000	32.875
Treatment Prob(F)							0.0002	0.0001	0.0001	0.0001	0.0001	0.0001

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Trt No.	Treatment Name	Form Conc	Form Unit	Rate	Rate Unit	Appl Code	W Weed EROCI Redstem fil> YNKKX Non-crop la> PLANT P 2-Jan-07 CONTRO 0-10Scal Ewing D. 14 14 14 DA-A D05	W Weed POAAN Annual blue> YNKKX Non-crop la> PLANT P 2-Jan-07 CONTRO 0-10Scal Ewing D. 14 14 14 DA-A D05	W Weed AMSIN Coast fiddl> YNKKX Non-crop la> PLANT P 2-Jan-07 CONTRO 0-10Scal Ewing D. 14 14 14 DA-A D05
							13	14	15
1	Untreated Check						0.00 b	0.00 c	0.00 c
2	RTU	17.5	%W/W	As is		A	0.67 b	1.00 c	0.67 c
3	NAO	65	%W/W	1:3	V/V	A	5.67 a	7.67 b	8.33 b
4	NAO	65	%W/W	1:6	V/V	A	0.67 b	0.67 c	0.67 c
5	Roundup Conc. +	18.7	%W/W	3	oz/a	A	7.67 a	9.67 a	10.00 a
LSD (P=.05)							2.803	1.396	1.002
Standard Deviation							1.489	0.742	0.532
CV							50.76	19.52	13.53
Grand Mean							2.93	3.8	3.93
Bartlett's X2							3.674	1.518	1.273
P(Bartlett's X2)							0.299	0.468	0.529
Friedman's X2							9.533	10.667	10.067
P(Friedman's X2)							0.049	0.031	0.039
Replicate F							0.211	3.273	3.059
Replicate Prob(F)							0.8145	0.0915	0.1031
Treatment F							16.496	111.091	246.118
Treatment Prob(F)							0.0006	0.0001	0.0001

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Ewing & Associates

GreenMatch/Nature's Avenger Organic Herbicide (NAO) Efficacy Evaluation

Trial ID: NAOEwing
Location: Winters, CA
(Solano County)

Protocol ID: NAOMarrone
Study Director: Pam Marrone
Investigator: Duane Ewing

Trt No.	Treatment Name	Form Conc	Form Unit	Rate	Rate Unit	Appl Code	Plot	1	2	3	4	5	6
	Pest Type							W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
	Pest Code							EROCI	POAAN	AMSIN	EROCI	POAAN	AMSIN
	Pest Name							Redstem fil>	Annual blue>	Coast fiddl>	Redstem fil>	Annual blue>	Coast fiddl>
	Crop Code							YNKKX	YNKKX	YNKKX	YNKKX	YNKKX	YNKKX
	Crop Name							Non-crop la>	Non-crop la>	Non-crop la>	Non-crop la>	Non-crop la>	Non-crop la>
	Part Rated							PLANT P	PLANT P	PLANT P	PLANT P	PLANT P	PLANT P
	Rating Date							19-Dec-06	19-Dec-06	19-Dec-06	20-Dec-06	20-Dec-06	20-Dec-06
	Rating Data Type							CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
	Rating Unit							0-10Scal	0-10Scal	0-10Scal	0-10Scal	0-10Scal	0-10Scal
	Assessed By							Ewing D.	Ewing D.	Ewing D.	Ewing D.	Ewing D.	Ewing D.
	Days After First/Last Applic.							0 0	0 0	0 0	1 1	1 1	1 1
	Trt-Eval Interval							0 DA-A	0 DA-A	0 DA-A	1 DA-A	1 DA-A	1 DA-A
	ARM Action Codes							D05	D05	D05	D05	D05	D05
1	Untreated Check						102	0.00	0.00	0.00	0.00	0.00	0.00
							203	0.00	0.00	0.00	0.00	0.00	0.00
							305	0.00	0.00	0.00	0.00	0.00	0.00
							Mean =	0.00	0.00	0.00	0.00	0.00	0.00
2	RTU	17.5	%W/W	As is		A	105	0.00	0.00	0.00	2.00	1.00	2.00
							204	0.00	0.00	0.00	0.00	0.00	1.00
							301	0.00	0.00	0.00	0.00	1.00	2.00
							Mean =	0.00	0.00	0.00	0.67	0.67	1.67
3	NAO	65	%W/W	1:3	V/V	A	101	0.00	0.00	0.00	2.00	1.00	1.00
							205	0.00	0.00	0.00	3.00	1.00	2.00
							302	0.00	0.00	0.00	2.00	0.00	2.00
							Mean =	0.00	0.00	0.00	2.33	0.67	1.67
4	NAO	65	%W/W	1:6	V/V	A	104	0.00	0.00	0.00	0.00	0.00	1.00
							201	0.00	0.00	0.00	0.00	0.00	1.00
							303	0.00	0.00	0.00	0.00	1.00	1.00
							Mean =	0.00	0.00	0.00	0.00	0.33	1.00
5	Roundup Conc. Plus	18.7	%W/W	3	oz/a	A	103	0.00	0.00	0.00	0.00	0.00	0.00
							202	0.00	0.00	0.00	0.00	0.00	0.00
							304	0.00	0.00	0.00	0.00	0.00	0.00
							Mean =	0.00	0.00	0.00	0.00	0.00	0.00

Trt No.	Treatment Name	Form Conc	Form Unit	Rate	Rate Unit	Appl Code	Plot	7	8	9	10	11	12
	Pest Type							W Weed	W Weed	W Weed	W Weed	W Weed	W Weed
	Pest Code							EROCI	POAAN	AMSIN	EROCI	POAAN	AMSIN
	Pest Name							Redstem fil>	Annual blue>	Coast fiddl>	Redstem fil>	Annual blue>	Coast fiddl>
	Crop Code							YNKKX	YNKKX	YNKKX	YNKKX	YNKKX	YNKKX
	Crop Name							Non-crop la>	Non-crop la>	Non-crop la>	Non-crop la>	Non-crop la>	Non-crop la>
	Part Rated							PLANT P	PLANT P	PLANT P	PLANT P	PLANT P	PLANT P
	Rating Date							22-Dec-06	22-Dec-06	22-Dec-06	24-Dec-06	24-Dec-06	24-Dec-06
	Rating Data Type							CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
	Rating Unit							0-10Scal	0-10Scal	0-10Scal	0-10Scal	0-10Scal	0-10Scal
	Assessed By							Ewing D.	Ewing D.	Ewing D.	Ewing D.	Ewing D.	Ewing D.
	Days After First/Last Applic.							3 3	3 3	3 3	5 5	5 5	5 5
	Trt-Eval Interval							3 DA-A	3 DA-A	3 DA-A	5 DA-A	5 DA-A	5 DA-A
	ARM Action Codes							D05	D05	D05	D05	D05	D05
1	Untreated Check						102	0.00	0.00	0.00	0.00	0.00	0.00
							203	0.00	0.00	0.00	0.00	0.00	0.00
							305	0.00	0.00	0.00	0.00	0.00	0.00
							Mean =						
2	RTU	17.5	%W/W	As is		A	105	2.00	1.00	2.00	3.00	2.00	2.00
							204	1.00	1.00	2.00	3.00	2.00	2.00
							301	1.00	1.00	1.00	2.00	1.00	1.00
							Mean =						
3	NAO	65	%W/W	1:3	V/V	A	101	3.00	3.00	3.00	5.00	5.00	5.00
							205	4.00	4.00	3.00	5.00	5.00	5.00
							302	3.00	3.00	3.00	6.00	4.00	4.00

					Mean =							
4 NAO	65 %W/W	1:6 V/V	A	104		0.00	0.00	1.00	1.00	1.00	2.00	
				201		1.00	2.00	1.00	2.00	1.00	2.00	
				303		1.00	1.00	1.00	1.00	1.00	1.00	
					Mean =							
5 Roundup Conc. Plus	18.7 %W/W	3 oz/a	A	103		0.00	0.00	0.00	1.00	1.00	1.00	
				202		0.00	0.00	0.00	1.00	1.00	1.00	
				304		0.00	0.00	1.00	1.00	1.00	2.00	
					Mean =							
Pest Type						W Weed	W Weed	W Weed				
Pest Code						EROCI	POAAN	AMSIN				
Pest Name						Redstem fil>	Annual blue>	Coast fiddl>				
Crop Code						YNKKX	YNKKX	YNKKX				
Crop Name						Non-crop la>	Non-crop la>	Non-crop la>				
Part Rated						PLANT P	PLANT P	PLANT P				
Rating Date						2-Jan-07	2-Jan-07	2-Jan-07				
Rating Data Type						CONTRO	CONTRO	CONTRO				
Rating Unit						0-10Scal	0-10Scal	0-10Scal				
Assessed By						Ewing D.	Ewing D.	Ewing D.				
Days After First/Last Applic.						14 14	14 14	14 14				
Trt-Eval Interval						14 DA-A	14 DA-A	14 DA-A				
ARM Action Codes						D05	D05	D05				
Trt No.	Treatment Name	Form Conc	Form Unit	Rate	Rate Unit	Appl Code	Plot	13	14	15		
1	Untreated Check						102	0.00	0.00	0.00		
							203	0.00	0.00	0.00		
							305	0.00	0.00	0.00		
							Mean =					
2	RTU	17.5 %W/W		As is		A	105	1.00	1.00	1.00		
							204	1.00	1.00	1.00		
							301	0.00	1.00	0.00		
							Mean =					
3	NAO	65 %W/W		1:3	V/V	A	101	6.00	9.00	9.00		
							205	3.00	6.00	8.00		
							302	8.00	8.00	8.00		
							Mean =					
4	NAO	65 %W/W		1:6	V/V	A	104	2.00	2.00	2.00		
							201	0.00	0.00	0.00		
							303	0.00	0.00	0.00		
							Mean =					
5	Roundup Conc. Plus	18.7 %W/W		3	oz/a	A	103	7.00	10.00	10.00		
							202	9.00	9.00	10.00		
							304	7.00	10.00	10.00		
							Mean =					

Supplemental Data

1. Weather Data
2. Weed Evaluation System

Weed Evaluation System
0 – 10 Scale

Rating	Description of Main Detailed Categories	Description
0	No Effect	No weed control
1	Slight Effect	Very poor weed control
2		Poor weed control
3		Poor to deficient weed control
4	Moderate Effect	Deficient weed control
5		Deficient to moderate weed control
6		Moderate weed control
7	Severe Effect	Weed control somewhat less than satisfactory
8		Satisfactory to good weed control
9		Very good to excellent weed control
10	Complete Effect	Complete weed destruction

Daily Report

California Irrigation Management Information System
Department of Water Resources
Office of Water Use Efficiency
Rendered in ENGLISH units
December 19, 2006 - January 2, 2007
Printed on January 3, 2007

Sacramento Valley - Winters - 139

Date	CIMIS ETo (in)	Precip (in)	Sol Rad (Ly/day)	Avg Vap (mBars)	Max Air Temp (°F)	Min Air Temp (°F)	Avg Air Temp (°F)	Max Rel Hum (%)	Min Rel Hum (%)	Avg Rel Hum (%)	Dew Pt (°F)	Avg wSpd (MPH)	Wnd Run (miles)	Avg Soil Temp (°F)
12/19/06	N	0.00	216	4.8	50.7	23.8	36.3	87	34	66	25.9	2.4	58.3	47.7
12/20/06	N	0.00	167	6.0	50.8	26.6	38.5	95	53	76	31.6	2.3	56.7	46.9
12/21/06	N	0.65	23	8.1	43.1	40.2	41.5	99	79	91	39.0	2.6	61.7	47.4
12/22/06	N	0.00	224	6.8	58.0	37.2	45.4	93	35	66	34.8	4.1	98.4	47.8
12/23/06	N	0.00	144	7.5	50.6	29.6	39.9	100	72	90	37.2	2.3	54.3	47.5
12/24/06	N	0.00	127	8.2	50.7	33.2	41.0	100	73	94	39.3	2.0	49.2	47.4
12/25/06	N	0.00	62	9.2	46.2	36.8	42.0	100	95	100	42.2	1.8	42.7	47.7
12/26/06	N	0.50	42	10.9	56.1	41.3	49.4	100	70	91	46.8	5.0	119.9	48.3
12/27/06	N	0.00	199	6.4	60.4	45.5	52.2	76	29	48	33.2	9.7	234.6	49.3
12/28/06	N	0.00	228	3.5	56.3	43.6	49.0	37	22	30	18.6	8.8	213.4	48.3
12/29/06	N	0.00	186	4.9	52.7	28.5	40.9	92	29	56	26.5	3.2	76.9	47.4
12/30/06	N	0.00	213	6.3	53.4	27.3	38.4	98	53	80	32.9	2.6	63.6	46.3
12/31/06	N	0.00	186	7.4	55.6	32.4	42.0	98	56	81	36.8	2.2	53.2	46.6
Tot/Avgs	--	1.15	155	6.9	52.7	34.3	42.8	90	54	75	34.2	3.8	91.0	47.6

Sacramento Valley - Winters - 139

Date	CIMIS ETo (in)	Precip (in)	Sol Rad (Ly/day)	Avg Vap (mBars)	Max Air Temp (°F)	Min Air Temp (°F)	Avg Air Temp (°F)	Max Rel Hum (%)	Min Rel Hum (%)	Avg Rel Hum (%)	Dew Pt (°F)	Avg wSpd (MPH)	Wnd Run (miles)	Avg Soil Temp (°F)
01/01/07	N	0.00	219	6.1	67.6	31.8	51.9	96	24	46	32.0	4.5	109.2	46.8
01/02/07	N	0.00	137	7.6	52.3	33.6	41.0	100	69	88	37.6	2.0	48.5	47.0
Tot/Avgs	--	0.00	178	6.9	59.9	32.7	46.5	98	47	67	34.8	3.3	78.9	46.9

Flag Legend

A - Historical Average	I - Ignore	R - Far out of Normal Range
C or N - Not Collected	M - Missing Data	S - Not In Service
H - Hourly Missing or Flagged	Q - Related Sensor Missing	Y - Moderately Out of Range

Conversion Table

W/sq.m = Ly/day / 2.065	Inches * 25.4 = mm

Daily Report

Conversion Table

C = 5/9 * (F - 32)	m/s = mph * 0.447
kPa = mBars * 0.1	

Weed Evaluation System
0 – 10 Scale

Rating	Description of Main Detailed Categories	Description
0	No Effect	No weed control
1	Slight Effect	Very poor weed control
2		Poor weed control
3		Poor to deficient weed control
4	Moderate Effect	Deficient weed control
5		Deficient to moderate weed control
6		Moderate weed control
7	Severe Effect	Weed control somewhat less than satisfactory
8		Satisfactory to good weed control
9		Very good to excellent weed control
10	Complete Effect	Complete weed destruction

1. Annual Bluegrass (*Poa annua)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	c	0.0	d	0.0	b
2	Nature's Avenger RTU	17.5%	26.3	ab	61.3	ab	60.0	a
3	Nature's Avenger Concentrate	17.5%	28.8	a	68.8	a	56.3	a
4	Nature's Avenger Concentrate	10.0%	30.0	a	47.5	bc	45.0	a
5	Roundup (glyphosate)	4 qt/A	21.3	b	32.5	c	40.0	a
LSD (P = .05)			6.63		18.70		19.67	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusion: All Nature's Avenger treatments had a significant effect on controlling *Poa annua*. After 15 days, the % weed control with Nature's Avenger RTU was the highest (60 %) but the product did not perform significantly better than the two dilutions of the concentrate or Roundup.

2. California burclover (*Medigaco polymorpha)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	c	0.0	d	0.0	b
2	Nature's Avenger RTU	17.5%	50.0	a	88.3	a	65.0	a
3	Nature's Avenger Concentrate	17.5%	50.0	a	87.7	a	73.3	a
4	Nature's Avenger Concentrate	10.0%	30.0	b	57.5	b	60.0	a
5	Roundup (glyphosate)	4 qt/A	21.7	c	15.0	c	66.7	a
LSD (P = .05)			7.66		14.64		27.62	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusion: Nature's Avenger is a fast-acting burndown herbicide. One day after the treatment, products with the highest limonene concentration controlled 50 % of *Medigaco polymorpha.* All Nature's Avenger treatments had a significant herbicidal effect. After 1 5 days, the % weed control with 1:3 dilution of Nature's Avenger concentrate was the highest (73.3%) but the difference to other treatments was not statistically significant.

3. Common Chickweed *(Stellaria media)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	b	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5%	46.7	a	60.8	a	71.3	a
3	Nature's Avenger Concentrate	17.5%	41.7	a	48.3	ab	76.7	a
4	Nature's Avenger Concentrate	10.0%	37.5	a	43.8	abc	71.3	a
5	Roundup (glyphosate)	4 qt/A	11.7	b	10.0	bc	43.3	b
LSD (P = .05)			22.00		42.74		13.81	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: All Nature's Avenger treatments outperformed Roundup in controlling *Stellaria media*.

4. Mouseeared chickweed *(Cerastum vulgatum)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	c	0.0	c	0.0	c
2	Nature's Avenger RTU	17.5%	57.5	a	98.0	a	95.0	a
3	Nature's Avenger Concentrate	17.5%	72.5	a	98.0	a	94.5	a
4	Nature's Avenger Concentrate	10.0%	60.0	b	97.0	a	88.8	a
5	Roundup (glyphosate)	4 qt/A	23.3	b	12.5	b	40.0	b
LSD (P = .05)			17.24		2.05		8.73	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: After one week, all Nature's Avenger treatments resulted in almost 100 % control of *Cerastum vulgatum*.

5. Redstem filaree (*Erodium cicutarium)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	b	0.0	b	0.0	b
2	Nature's Avenger RTU	17.5%	21.3	a	53.3	a	43.8	a
3	Nature's Avenger Concentrate	17.5%	23.3	a	46.7	a	41.7	a
4	Nature's Avenger Concentrate	10.0%	25.0	a	33.3	a	41.7	a
5	Roundup (glyphosate)	4 qt/A	25.0	b	35.0	a	55.0	a
LSD (P = .05)			7.41		30.43		19.17	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: The control of *Erodium cicutarium* was similar (40-50%) with all the products tested in this study.

6. Shepherdspurse (*Capsella bursa-pastoris)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	c	0.0	c	0.0	b
2	Nature's Avenger RTU	17.5%	81.3	a	83.5	a	96.5	a
3	Nature's Avenger Concentrate	17.5%	90.0	a	98.0	a	97.3	a
4	Nature's Avenger Concentrate	10.0%	72.5	a	97.3	a	97.3	a
5	Roundup (glyphosate)	4 qt/A	38.8	b	51.7	b	90.3	a
LSD (P = .05)			18.81		24.90		9.82	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: All Nature's Avenger treatments provided fast and effective control of *Capsella bursa-pastoris*. After 15 days, the effect was comparable to Roundup's.

7. Common lambsquarters (*Chenopodium album)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	d	0.0	c	0.0	d
2	Nature's Avenger RTU	17.5%	60.0	a	98.0	a	83.5	b
3	Nature's Avenger Concentrate	17.5%	63.8	a	98.0	a	97.8	a
4	Nature's Avenger Concentrate	10.0%	50.0	b	87.5	a	98.3	a
5	Roundup (glyphosate)	4 qt/A	30.0	c	41.7	b	50.0	c
LSD (P = .05)			8.51		18.54		10.55	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: All Nature's Avenger treatments outperformed Roundup in controlling *Chenopodium album*. Both dilutions of the concentrate performed better than the RTU formulation.

8. Common groundsel (*Senecio vulgaris)*
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	c	0.0	c	0.0	
2	Nature's Avenger RTU	17.5%	23.3	b	55.0	a	31.7	
3	Nature's Avenger Concentrate	17.5%	36.3	a	46.3	ab	47.5	
4	Nature's Avenger Concentrate	10.0%	21.3	b	28.3	b	32.5	
5	Roundup (glyphosate)	4 qt/A	15.0	b	27.5	b	28.3	
LSD (P = .05)			11.28		23.62		N.S.	
Standard deviation							18.60	
CV (%)							66.42	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
N.S. – no (statistically) significant differences

Conclusions: After two weeks, the two Nature's Avenger treatments with highest limonene concentration worked best on *Senecio vulgaris.* However, due to variability within treatments, differences were not significant later on (at 15 DAT).

9. Pineapple weed (*Matricaria matricarioides)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0		0.0		0.0	c
2	Nature's Avenger RTU	17.5%	12.5		25.0		31.7	ab
3	Nature's Avenger Concentrate	17.5%	10.0		15.0		40.0	a
4	Nature's Avenger Concentrate	10.0%	25.0		21.7		22.5	b
5	Roundup (glyphosate)	4 qt/A	10.0		10.0		25.0	b
LSD (P = .05)			N.S.		N.S.		14.13	
Standard Deviation			2.24		5.16			
CV			19.44		36.03			

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
N.S. – no (statistically) significant differences

Conclusions: One week after treatment, control of *Matricaria matricarioides* was marginal with all tested products. However, a week later, the products with the highest limonene concentration we most effective with 32-40 % control.

10. Henbit (*Lamium ampleicaule)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	d	0.0	b	0.0	c
2	Nature's Avenger RTU	17.5%	22.5	ab	23.8	a	22.5	a
3	Nature's Avenger Concentrate	17.5%	30.0	a	28.8	a	22.5	a
4	Nature's Avenger Concentrate	10.0%	17.5	bc	20.0	a	20.0	ab
5	Roundup (glyphosate)	4 qt/A	7.5	cd	2.5	b	12.5	b
LSD (P = .05)			11.34		13.21		7.96	

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Conclusions: Control of *Lamium ampleicaule* was poor with all tested products. After 2 weeks, only the two Nature's Avenger treatments with the highest limonene concentration resulted in higher than 20 % control of this weed.

11. Fiddleneck (*Amsinckia spp.)*

Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Daniel Forey
Bio Research
1738 N. Fowler Ave.
Fresno, CA 93727

Report: Bio Study No. 325-06 Report Date: January 17, 2007			**Percent Control** Application Date: **December 28, 2006**					
Treatments		**Application Rate (% AI)**	**1 DAT**		**8 DAT**		**15 DAT**	
1	Untreated	0	0.0	c	0.0		0.0	b
2	Nature's Avenger RTU	17.5%	28.8	a	43.8		33.8	a
3	Nature's Avenger Concentrate	17.5%	25.0	ab	35.0		28.8	a
4	Nature's Avenger Concentrate	10.0%	18.8	b	38.8		18.8	ab
5	Roundup (glyphosate)	4 qt/A	17.5	b	27.5		22.5	a
LSD (P = .05)			8.81		N.S.		19.33	
Standard Deviation					16.24			
CV					56.01			

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
N.S. – no (statistically) significant differences

Conclusions: Control of *Amsinckia sp.* was poor overall in this study. The two Nature's Avenger products with 17.5 %-limonene performed similarly to Roundup with 22-34 % control.

The Efficacy of GreenMatch/ Nature's Avenger® Organic Herbicide on Representative Homeowner Weeds.

BIO STUDY NO. 325-06
January 17, 2007

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The Efficacy of GreenMatch/ Nature's Avenger® Organic Herbicide on Representative Homeowner Weeds.

I. Introduction

The objectives of this study were to evaluate the EPA registered organic herbicide, Nature's Avenger Organic Herbicide, for efficacy and formulation characteristics. The product is a non-selective broad-spectrum contact material containing d-limonene, a citrus extract that is reportedly effective against broadleaf weeds and grasses.

II. Materials and Methods

A. Site Location: Bio-Research
1738 N. Fowler Ave
Fresno, CA 93722

B. Weeds:

Scientific Name	Common Name	Variety/Bayer Code
1. Annual bluegrass	*Poa annua*	POAAN
2. California burclover	Medicago polymorpha	MEDPO
3. Common chickweed	Stellaria media	STEME
4. Common groundsel	Senecio vulgaris	SENVU
5. Common lambsquarters	Chenopodium album	CHEAL
6. Common mallow	Malva parviflorra	MALPA
7. Fiddleneck	Amsinckia spp.	AMSTE
8. Henbit	Lamium ampleicaule	LAMAM
9. Horseweed	Conzya canadensis	ERICA
10. Mouseeared chickweed	Cerastum vulgatum	CERVU
11. Pineapple weed	Matricaria matricarioides	MATMA
12. Redstem filaree	Erodium cicutarium	EROCI
13. Shepherdspurse	Capsella bursa-pastoris	CAPBP
14. Wild Radish	Raphus raphanistrum	RAPRA

C. Plot Description:

Plot Size: 10 x 10 ft.

Cultural Practices: The test area was plowed during the late summer and early fall to promote establishment of a weed complex. This area was also planted in the early fall with 33 different weed species for use in projected winter, spring and summer herbicide trials.

Soil: Hanford Sandy Loam.

D. Pesticide History: No pesticides other than those specified in the protocol were applied to the plots during the test interval.

E. Experimental Design: Randomized Complete Block Design

F. Replication No. & Units: 4 replicate plots/treatment

G. Application Equipment:

A CO_2 compressed air, backpack sprayer was used to deliver forty gallons per acre. A metronome was used to synchronize a walking application speed of 3 mph. The attached spray boom consisted of four nozzles spaced 16" apart to provide an effective 64" spray swath.

Spray Tank:	3 liter plastic bottle
Boom Nozzle:	4 8003-XR nozzles
PSI:	42
Spray volume:	40 gpa
Water pH:	6.5 (treatments 3-5)
Height above crop:	18 inches

The water pH was measured using pH paper manufactured by Micro Essential Laboratory, Inc.

H. Treatments:

	Dilution of NAO to Water[1]
1. Untreated Check	
2. Nature's Avenger Organic RTU[2]	No dilution
3. Nature's Avenger Organic conc.	1:3 (33% dilution)
4. Nature's Avenger Organic conc.	1:6 (16.7% dilution)
5. Roundup Pro	4 qt/A

(1) No adjuvant or surfactant was added to the NAO products or to the standard, Roundup Pro.
(2) d-Limonene technical grade): 17.5%
Emulsifiers: 0 to 8%
Water: 72 to 78%

I. Application

Date:	December 28, 2006
Time:	11:00 a.m. to 12:00 p.m.
Temperature:	51° F
Relative Humidity:	74%
Wind Speed:	1.5 mph
Wind Direction:	S

Cloud Cover:	80%	
Plant Growth Stage:	POAAN	2-6" bloom
	MEDPO	4-6" bloom
	STEME	1-4" prostrate
	SENVU	3-12" bloom
	MALPA	3-20" prostrate, no bloom
	LAMAM	2-8" bloom
	CERVU	2-5" bloom
	MATMA	3-8" bloom
	EROCI	4-24" radial prostrate, no bloom
	CAPBP	0.5-18" rosette to bloom
	RAPRA	0.5-18" rosette to bloom
Plant Vigor:	Good	
Foliar Moisture:	Dry	

J. Environmental Conditions:

The following weather data was recorded at the Fresno weather station, located approximately 5 miles southwest of the test site (Statewide Weather Service – CIMIS Project) from December 28, 2006 to January 15, 2007:

Total Rainfall:	0.9 inches
High Temperature:	63.4° F (January 9, 2007)
Low Temperature:	21.0° F (January 15, 2007)
Min. Relative Humidity:	27-72%
Max. Relative Humidity:	78-91%

See Appendix 1 for complete environmental data.

K. Test Procedures:

The trial was placed in an established open area on-site at Bio Research with a well-developed infestation and assortment of various weed species at different growth stages. At the time of study initiation, bermudagrass was dormant and weeds such as California burclover, common chickweed, henbit, and shepherd's purse were in bloom. Most perennial plants were in the rosette stage. Grasses, such as annual bluegrass, ranged from newly emerged plants less than 3 inches tall, to seedhead stage plants that were 6+ inches tall.

After an initial pre-treatment inventory of the weed species present in each plot, a visual rating of the efficacy of treatments was performed at 1, 4, 7, and 14 days after application (DAA). Efficacy was based on a visual rating of plant injury using a 0-100% rating scale as follow:

0 = no injury; plants did not look any different from the untreated group or plants infesting areas outside the plots.

25 = slight chlorosis (yellowing) on 25% of the plant, or a slight stunting/growth inhibition of plants with no chlorosis.

50% = more severe chlorosis (yellowing) turning to necrosis (black) on 50% of individual plants and/or a combination of chlorosis and/or necrosis plus stunting/growth inhibition of plant.

75% = necrosis (black) on 75% of plants and/or a combination of necrosis plus stunting/growth inhibition of plant.

100% = complete kill of the visible aboveground plant parts, no green or live tissue visible.

L. Statistical Analysis:

The percent plant injury was analyzed using LSD, CV, and Duncan's New Multiple Range Test (p = 0.05) using Gylling's Agriculture Research Manager Program.

III. Results and Discussion

Plant injury in plots treated with Nature's Avenger Organic RTU Herbicide was observed within 3 hours of application. The symptoms included white and yellow tissue discoloration, along with black spotting on many of the broadleaf weeds. In addition, plants such as grasses and fiddleneck appeared to be "water soak" and "limp" indicating a loss in turgor pressure.

Overall weed control was fair to excellent depending on the stage of growth of that particular weed (Tables 1-4). In general, Nature's Avenger Organic Herbicide performed best at a 1:3 dilution (33% v/v), which was both faster acting and achieved the highest level of control of most species (Figure 1). Second was the undiluted RTU formulation, followed by NAO at a 1:6 dilution (16.7% v/v). The least effective treatment, at least initially, was the standard, Roundup at 4 qt/acre. It also appeared that the products were faster acting and more consistent against broadleaf weeds in general than the grass weed species Poa annua.

Shepherdspurse had matured and seeded by the time of study initiation and plants were easily killed by all treatments. The fact that most of the plants were probably on the decline encouraged the perception of increased control by all treatments compared to other weed species. In contrast, of the 14 weeds evaluated in this test the following were not altogether effectively controlled (i.e. control was never consistently greater than 60%) by NAO at any dilution rate: redstem filaree, horseweed, common groundsel, wild radish, pineapple weed, common mallow, henbit, and fiddleneck spp. On the positive side, 6 weed species were consistently controlled with the NAO treatments, including: poa annua, California burclover, common and mouseeared chickweed, common lambsquarters, and shepherdspurse, although, as mentioned, this species was

already fully mature and susceptible to treatments at the time of study initiation.

Poa annua: Peak control was achieved with the NAO products at 4 to 8 days after application with significant control by all treatments observed beginning 1 DAA (Table 1). Plots treated with Roundup showed a gradual increase in control through 15 DAA at which time they attained statistical parity with the NAO groups (Table 4). Peak control by the various treatments were as follows:

NAO (33% v/v)	72.5%
NAO RTU	61.3%
NAO (16.7%)	50.0%
Roundup	40.0%

No treatment fully eliminated Poa and a reapplication, or greater initial coverage, would likely be needed to eliminate this weed.

California burclover: Significant control by all treatments was observed 1 DAA, ranging 30 to 50% with the NAO treatments, and 21% with Roundup (Table 1). As with Poa, the non-diluted RTU and the 33% dilution proved faster acting than the 16.7% dilution, with the former showing 83 to 93% control through 8 DAA, compared to 50 to 60% control with the 16.7% v/v treatment. Roundup ended the study 15 DAA at 67% control. None of the treatments fully eliminated California burclover and a reapplication would be needed to completely control this weed.

Chickweed: Plant injury by NAO treatments to Common chickweed ranged from 38 to 46% 1 DAA, compared to 58 to 73% damage to Mouseeared chickweed. Roundup, by comparison, provided 12 to 23% control initially, and ended the study at just over 40% control 15 DAA. Mouseeared chickweed proved to be one of the easiest weeds to control using NAO herbicide. At 4 DAA, all NAO treatments provided greater than 95% control, with peak control of 97 to 98% observed 8 DAA (Table 3). Common chickweed seemed to withstand treatments a little better, although at 15 DAA all NAO applications resulted in greater than 70% control. No treatment completely eliminated common chickweed, although with better coverage one application might succeed. Mouseeared chickweed was all but eliminated from plots following a single application of NAO. Again, slightly better coverage may have succeeded where 40 gpa did not.

Shepherdspurse: As discussed this weed was controlled 90+% by all treatments, including Roundup. It is likely that less control would be seen during times of optimum growth, consequently subsequent evaluations during the optimum growing season should be considered to better gain an idea of the effectiveness of NAO against this species.

Common lambsquaters: NAO was generally fast acting against this species, with products averaging 50 to 64% control only 1DAA, and about 80% control by 4 DAA (Table 2). Optimum control was observed 8 to 15 DAA with the NAO materials, all achieving 98% control at some point during that time interval. In contrast, Roundup achieved a maximum of about 50% control during the test period. This weed most likely

would be controlled entirely with a single application when the correct coverage again was applied.

Further Discussion:

It would appear that application volume is an area in need of further exploration. Clearly, to optimize the control of most weeds in this study a second application would be required, at least at the application volume used here. It may be that at an increased volume, above 40 GPA, enough increased coverage would offset the need for a second application. The products are undoubtedly efficacious and certainly faster acting than the standard, Roundup. Coverage and timing seem to be the key.

TABLES

Table 1. Evaluation of percent weed control using Nature's Avenger Organic RTU Herbicide at 1 day after application (DAA) (see Appendix 2 for plot data).

Weed Code Crop Code Part Rated Rating Data Type Rating Unit Rating Date Trt-Eval Interval			POAAN A. blueg PERCNT DAMAGE 0-100% 12/29/06 1 DAA	MEDCO Burclove PERCNT DAMAGE 0-100% 12/29/06 1 DAA	STEME C. chick PERCNT DAMAGE 0-100% 12/29/06 1 DAA	CERVU M. chick PERCNT DAMAGE 0-100% 12/29/06 1 DAA	EROCI Redstem PERCNT DAMAGE 0-100% 12/29/06 1 DAA	CAPBP Shep PERCNT DAMAGE 0-100% 12/29/06 1 DAA	CHEAL Lambsqua PERCNT DAMAGE 0-100% 12/29/06 1 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0 c	0.0 d	0.0 b	0.0 c	0.0 b	0.0 c	0.0 d
Nature's Avenger Org. RTU			26.3 ab	50.0 a	46.7 a	57.5 a	21.3 a	81.3 a	60.0 a
Nature's Avenger Org. Con	33	% v/v	28.8 a	50.0 a	41.7 a	72.5 a	23.3 a	90.0 a	63.8 a
Nature's Avenger Org. Con	16.7	% v/v	30.0 a	30.0 b	37.5 a	60.0 a	25.0 a	72.5 a	50.0 b
Roundup (Glyphosate)	4	qt/a	21.3 b	21.7 c	11.7 b	23.3 b	25.0 a	38.8 b	30.0 c
LSD (P=.05)			6.63	7.66	22.00	17.24	7.41	18.81	8.51
Standard Deviation			4.31	4.79	13.75	11.08	4.54	12.20	5.32
CV			20.26	15.8	50.01	25.96	24.01	21.6	13.06
Grand Mean			21.25	30.33	27.5	42.67	18.92	56.5	40.75
Bartlett's X2			5.416	0.092	6.822	5.472	1.705	4.193	0.048
P(Bartlett's X2)			0.144	0.762	0.078	0.14	0.426	0.123	0.826
Friedman's X2			10.95	14.85	12.85	13.1	8.65	14.2	15.25
P(Friedman's X2)			0.027	0.005	0.012	0.011	0.07	0.007	0.004

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Table 1, continued. Evaluation of percent weed control using Nature's Avenger Organic RTU Herbicide at 1 day after application (DAA)(see Appendix 2 for plot data).

Weed Code Crop Code Part Rated Rating Data Type Rating Unit Rating Date Trt-Eval Interval			ERICA Horsewee PERCNT DAMAGE 0-100% 12/29/06 1 DAA	SENVU Groundse PERCNT DAMAGE 0-100% 12/29/06 1 DAA	RAPRA Wild rad PERCNT DAMAGE 0-100% 12/29/06 1 DAA	MATMA Pineappl PERCNT DAMAGE 0-100% 12/29/06 1 DAA	MALPA Mallow PERCNT DAMAGE 0-100% 12/29/06 1 DAA	LAMAM Henbit PERCNT DAMAGE 0-100% 12/29/06 1 DAA	AMSTE F.neck PERCNT DAMAGE 0-100% 12/29/06 1 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0	0.0 c	0.0 c	0.0 c	0.0	0.0 d	0.0 c
Nature's Avenger Org. RTU			15.0	23.3 b	25.0 a	12.5 b	10.0	22.5 ab	28.8 a
Nature's Avenger Org. Con	33	% v/v		36.3 a	10.0 b	10.0 b		30.0 a	25.0 ab
Nature's Avenger Org. Con	16.7	% v/v	20.0	21.3 b	25.0 a	25.0 a	0.0	17.5 bc	18.8 b
Roundup (Glyphosate)	4	qt/a	10.0	15.0 b	25.0 a	10.0 b		7.5 cd	17.5 b
LSD (P=.05)			.	11.28	0.00	6.80	.	11.34	8.81
Standard Deviation			.	7.16	0.00	2.24	.	7.36	5.66
CV			.	37.35	0.0	19.44	.	47.48	31.45
Grand Mean			2.81	19.17	17.0	11.5	0.83	15.5	18.0
Bartlett's X2			.	1.763	0.0	0.0	.	0.979	0.08
P(Bartlett's X2)			.	0.623	.	.	.	0.806	0.961
Friedman's X2			.	14.5	12.8	14.15	.	11.75	10.7
P(Friedman's X2)			.	0.006	0.012	0.007	.	0.019	0.03

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Table 2. Evaluation of the weed control using Nature's Avenger Organic RTU Herbicide at 4 DAA (see Appendix 3 for plot data).

Weed Code			POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code			A. blueg	Burclove	C. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated			PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type			DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit			0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date			1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07
Trt-Eval Interval			4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0 d	0.0 d	0.0 b	0.0 d	0.0 b	0.0 c	0.0 b
Nature's Avenger Org. RTU			55.0 ab	83.3 a	78.3 a	95.8 ab	21.3 ab	98.0 a	83.3 a
Nature's Avenger Org. Con	33	% v/v	72.5 a	93.3 a	63.3 a	97.3 a	23.3 ab	98.0 a	74.0 a
Nature's Avenger Org. Con	16.7	% v/v	50.0 b	48.8 b	56.3 a	94.5 b	43.3 a	97.3 a	83.3 a
Roundup (Glyphosate)	4	qt/a	26.3 c	21.7 c	11.7 b	10.0 c	32.5 a	56.3 b	53.3 a
LSD (P=.05)			20.72	16.19	39.80	2.42	28.79	10.38	38.43
Standard Deviation			13.45	10.12	24.88	1.56	17.66	6.74	24.02
CV			33.0	20.48	59.36	2.62	73.32	9.64	40.86
Grand Mean			40.75	49.42	41.92	59.5	24.08	69.9	58.8
Bartlett's X2			4.161	6.938	6.561	2.569	9.08	9.376	11.874
P(Bartlett's X2)			0.245	0.074	0.087	0.277	0.028*	0.002*	0.008*
Friedman's X2			13.45	16.0	13.4	13.85	10.6	12.95	11.6
P(Friedman's X2)			0.009	0.003	0.009	0.008	0.031	0.012	0.021

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Table 2, continued. Evaluation of the weed control using Nature's Avenger Organic RTU Herbicide at 4 DAA (see Appendix 3 for plot data).

Weed Code			ERICA	SENVU	RAPRA	MATMA	MALPA	LAMAM	AMSTE
Crop Code			Horsewee	Groundse	Wwild rad	Pineappl	Mallow	Henbit	F.neck
Part Rated			PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type			DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit			0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date			1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07
Trt-Eval Interval			4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0	0.0 c	0.0 a	0.0 c	0.0	0.0 c	6.3 b
Nature's Avenger Org. RTU			15.0	28.3 ab	62.5 a	12.5 b	10.0	30.0 ab	48.8 a
Nature's Avenger Org. Con	33	% v/v		50.0 a	10.0 a	10.0 b		47.5 a	49.5 a
Nature's Avenger Org. Con	16.7	% v/v	20.0	32.5 ab	25.0 a	22.5 a	0.0	17.5 bc	33.8 ab
Roundup (Glyphosate)	4	qt/a	10.0	11.7 bc	25.0 a	10.0 b		7.5 c	17.5 ab
LSD (P=.05)			.	24.21	255.70	8.33	.	20.14	34.08
Standard Deviation			.	15.37	28.46	2.74	.	13.07	22.12
CV			.	62.73	116.17	24.9	.	63.76	71.01
Grand Mean			2.81	24.5	24.5	11.0	0.83	20.5	31.15
Bartlett's X2			.	1.313	0.0	0.0	.	6.414	5.606
P(Bartlett's X2)			.	0.726	.	1.00	.	0.093	0.231
Friedman's X2			.	13.8	15.2	14.15	.	13.1	9.75
P(Friedman's X2)			.	0.008	0.004	0.007	.	0.011	0.045

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Table 3. Mean control treatment data for the evaluation of the weed control using Nature's Avenger Organic RTU Herbicide at 8 DAA (see Appendix 4 for plot data).

Weed Code			POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code			A. blueg	Burclove	C. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated			PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type			DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit			0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date			1/5/07	1/5/07	1/5/07	1/5/07	1/5/07	1/5/07	1/5/07
Trt-Eval Interval			8 DAA	8 DAA	8 DAA	8 DAA	8 DAA	8 DAA	8 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0 d	0.0 d	0.0 c	0.0 c	0.0 b	0.0 c	0.0 c
Nature's Avenger Org. RTU			61.3 ab	88.3 a	60.8 a	98.0 a	53.3 a	83.5 a	98.0 a
Nature's Avenger Org. Con	33	% v/v	68.8 a	87.7 a	48.3 ab	98.0 a	46.7 a	98.0 a	98.0 a
Nature's Avenger Org. Con	16.7	% v/v	47.5 bc	57.5 b	43.8 abc	97.0 a	33.3 a	97.3 a	87.5 a
Roundup (Glyphosate)	4	qt/a	32.5 c	15.0 c	10.0 bc	12.5 b	35.0 a	51.7 b	41.7 b
LSD (P=.05)			18.70	14.64	42.74	2.05	30.43	24.90	18.54
Standard Deviation			12.14	9.16	26.72	1.28	18.66	16.00	10.20
CV			28.9	18.42	82.04	2.1	55.46	24.21	15.68
Grand Mean			42.0	49.7	32.57	61.1	33.65	66.08	65.03
Bartlett's X2			3.297	2.697	1.191	0.682	4.992	12.768	1.901
P(Bartlett's X2)			0.348	0.441	0.551	0.409	0.172	0.002*	0.168
Friedman's X2			11.75	15.4	13.0	13.4	10.6	11.65	15.2
P(Friedman's X2)			0.019	0.004	0.011	0.009	0.031	0.02	0.004

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Table 3, continued. Mean control treatment data for the evaluation of the weed control using Nature's Avenger Organic Herbicide at 8 DAA (see Appendix 4 for plot data).

Weed Code Crop Code Part Rated Rating Data Type Rating Unit Rating Date Trt-Eval Interval			ERICA Horsewee PERCNT DAMAGE 0-100% 1/5/07 8 DAA	SENVU Groundse PERCNT DAMAGE 0-100% 1/5/07 8 DAA	RAPRA Wild rad PERCNT DAMAGE 0-100% 1/5/07 8 DAA	MATMA Pineappl PERCNT DAMAGE 0-100% 1/5/07 8 DAA	MALPA Mallow PERCNT DAMAGE 0-100% 1/5/07 8 DAA	LAMAM Henbit PERCNT DAMAGE 0-100% 1/5/07 8 DAA	AMSTE F.neck PERCNT DAMAGE 0-100% 1/5/07 8 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0	0.0 c	0.0	0.0 b	0.0	0.0 b	0.0 b
Nature's Avenger Org. RTU				55.0 a	10.0	25.0 a	15.0	23.8 a	43.8 a
Nature's Avenger Org. Con	33	% v/v		46.3 ab		15.0 ab		28.8 a	35.0 a
Nature's Avenger Org. Con	16.7	% v/v	25.0	28.3 b	25.0	21.7 a	10.0	20.0 a	38.8 a
Roundup (Glyphosate)	4	qt/a		27.5 b	85.0	10.0 ab		2.5 b	27.5 a
LSD (P=.05)			.	23.62	.	15.71	.	13.21	25.28
Standard Deviation			.	14.48	.	5.16	.	8.58	16.24
CV			.	46.1	.	36.03	.	57.17	56.01
Grand Mean			3.13	31.42	7.5	14.33	2.08	15.0	29.0
Bartlett's X2			.	5.912	.	0.0	.	9.897	3.999
P(Bartlett's X2)			.	0.116	.	.	.	0.019*	0.262
Friedman's X2			.	12.05	.	14.95	.	12.5	8.9
P(Friedman's X2)			.	0.017	.	0.005	.	0.014	0.064

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Table 4. Mean control treatment data for the evaluation of the weed control using Nature's Avenger Organic RTU Herbicide at 15 DAA (see Appendix 5 for plot data).

Weed Code			POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code			A. blueg	Burclove	Cc. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated			PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type			DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit			0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date			1/12/07	1/12/07	1/12/07	1/12/07	1/12/07	1/12/07	1/12/07
Trt-Eval Interval			15 DAA	15 DAA	15 DAA	15 DAA	15 DAA	15 DAA	15 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0 b	0.0 b	0.0 c	0.0 c	0.0 b	0.0 b	0.0 d
Nature's Avenger Org. RTU			60.0 a	65.0 a	71.3 a	95.0 a	43.8 a	96.5 a	83.5 b
Nature's Avenger Org. Con	33	% v/v	56.3 a	73.3 a	76.7 a	94.5 a	41.7 a	97.3 a	97.8 a
Nature's Avenger Org. Con	16.7	% v/v	45.0 a	60.0 a	71.3 a	88.8 a	41.7 a	97.3 a	98.3 a
Roundup (Glyphosate)	4	qt/a	40.0 a	66.7 a	43.3 b	40.0 b	55.0 a	90.3 a	50.0 c
LSD (P=.05)			19.67	27.62	13.81	8.73	19.17	9.82	10.55
Standard Deviation			12.76	17.53	8.76	5.61	11.76	6.37	6.70
CV			31.71	33.08	16.69	8.82	32.29	8.36	10.16
Grand Mean			40.25	53.0	52.5	63.65	36.42	76.25	65.92
Bartlett's X2			0.998	8.114	4.902	2.653	0.816	20.888	13.616
P(Bartlett's X2)			0.802	0.044*	0.179	0.265	0.846	0.001*	0.003*
Friedman's X2			9.85	8.5	12.85	13.4	10.2	8.4	13.75
P(Friedman's X2)			0.043	0.075	0.012	0.009	0.037	0.078	0.008

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

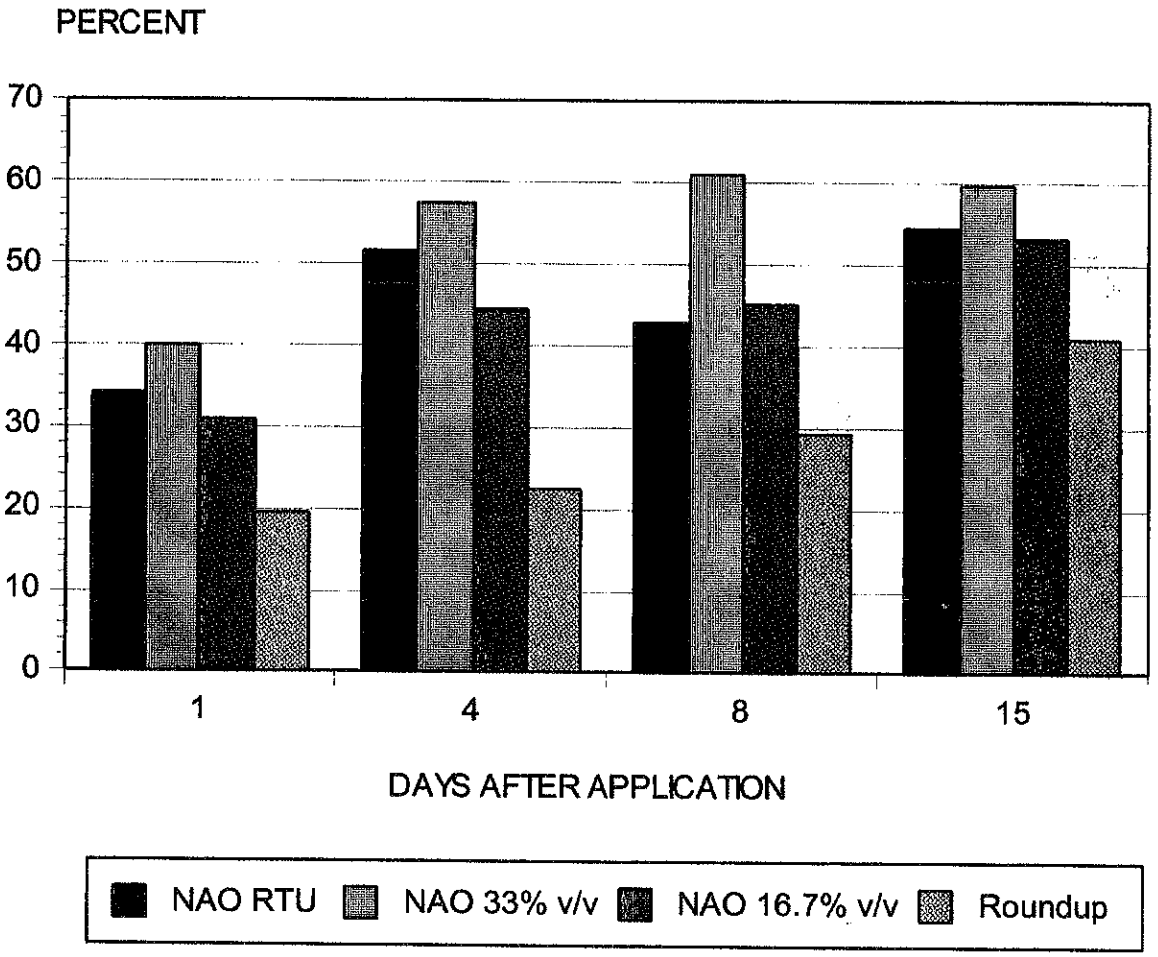
Table 4, continued. Mean control treatment data for the evaluation of the weed control using Nature's Avenger Organic RTU Herbicide at 15 DAA (see Appendix 5 for plot data).

Weed Code			ERICA	SENVU	RAPRA	MATMA	MALPA	LAMAM	AMSTE
Crop Code			Horsewee	Groundse	Wild rad	Pineappl	Mallow	Henbit	F.neck
Part Rated			PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type			DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit			0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date			1/12/07	1/12/07	1/12/07	1/12/07	1/12/07	1/12/07	1/12/07
Trt-Eval Interval			15 DAA	15 DAA	15 DAA	15 DAA	15 DAA	15 DAA	15 DAA
Treatment Name	Rate	Rate Unit							
Untreated			0.0	0.0 b	0.0 a	0.0 c	0.0	0.0 c	0.0 b
Nature's Avenger Org. RTU				31.7 a	50.0 a	31.7 ab	25.0	22.5 a	33.8 a
Nature's Avenger Org. Con	33	% v/v		47.5 a		40.0 a	40.0	22.5 a	28.8 a
Nature's Avenger Org. Con	16.7	% v/v	75.0	32.5 a	50.0 a	22.5 b	25.0	20.0 ab	18.8 ab
Roundup (Glyphosate)	4	qt/a	10.0	28.3 ab	50.0 a	25.0 b		12.5 b	22.5 a
LSD (P=.05)			.	29.30	275.09	14.13	.	7.96	19.33
Standard Deviation			.	18.60	30.62	6.28	.	5.16	12.42
CV			.	66.42	81.65	26.35	.	33.32	59.87
Grand Mean			7.08	28.0	37.5	23.83	5.63	15.5	20.75
Bartlett's X2			.	2.532	0.0	0.584	.	3.062	3.435
P(Bartlett's X2)			.	0.47	.	0.445	.	0.382	0.329
Friedman's X2			.	9.25	7.2	14.15	.	10.75	9.25
P(Friedman's X2)			.	0.055	0.066	0.007	.	0.03	0.055

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

FIGURES

FIGURE 1. OVERALL PERCENT CONTROL OF BROADLEAF WEEDS AND GRASSES AT EACH EVALUATION PERIOD.



APPENDIX

Appendix 1. Environmental Data for the trial duration.

Daily Weather Data for Station # 80 Fresno State CIMIS Project
in Region -SJV- San Joaquin Valley

2007 DATE	ETo in.	PRECIP in.	SOLAR RAD Ly/dy	VAPOR AVE mBars	AIR TEMP. MAX --Fahrenheit--	AIR TEMP. MIN	AIR TEMP. AVE	REL. HUM. MAX -----%-----	REL. HUM. MIN	REL. HUM. AVE	DEW PT F	WIND AVE mph	WIND RUN mi	AVE SOIL F
12/28/06	0.05	0.00	229	5.9	49.5	30.7	39.8	87	58	71	31.1	4.1	98.3	51.4
12/29/06	0.04	0.01	216	6.0	53.4	28.6	39.4	90	47	73	31.6	2.3	56.5	50.1
12/30/06	0.05	0.00	230	6.0	55.8	27.7	39.7	90	41	72	31.4	2.1	51.2	49.4
12/31/06	0.05	0.00	212	6.8	55.7	30.0	42.4	90	51	74	34.8	4.5	109.1	49.1
01/01/07	0.02	0.00	122	6.9	48.5	32.6	38.6	91	72	87	35.0	3.2	78.3	49.5
01/02/07	0.04	0.00	174	7.0	55.2	29.8	41.6	91	55	78	35.3	3.0	73.3	49.1
01/03/07	0.05	0.00	224	7.5	61.3	31.9	44.6	90	46	74	37.0	2.1	50.1	49.4
01/04/07	0.02	0.13	56	8.3	52.9	35.7	45.1	89	66	82	39.8	6.5	155.8	49.7
01/05/07	0.05	0.00	245	5.7	50.8	31.9	40.5	84	44	67	30.4	5.8	140.2	49.6
01/06/07	0.05	0.00	227	5.8	51.7	27.5	38.9	89	49	73	30.9	2.6	63.7	48.8
01/07/07	0.05	0.00	228	6.0	55.9	28.9	40.2	90	43	71	31.7	2.2	52.0	48.5
01/08/07	0.05	0.00	233	6.4	59.6	28.3	41.3	90	44	73	33.2	1.8	42.8	48.2
01/09/07	0.05	0.00	235	6.8	63.4	28.3	42.8	91	41	73	34.7	1.9	44.9	48.1
01/10/07	0.05	0.00	216	7.0	61.5	29.6	43.9	91	42	72	35.5	2.9	69.7	48.2
01/11/07	0.06	0.00	188	5.0	48.3	26.2	39.9	78	35	60	27.0	6.4	153.6	48.5
01/12/07	0.05	0.00	249	4.0	45.3	21.9	32.8	88	28	63	21.5	3.6	87.7	47.1
01/13/07	0.05	0.00	260	3.3	46.0	23.0	32.9	86	27	52	17.4	2.5	59.7	45.8
01/14/07	0.05	0.00	250	3.5	47.2	22.3	32.8	81	31	56	18.8	2.3	55.5	42.0
01/15/07	0.06	0.00	259	3.6	52.4	21.0	34.2	85	23	54	19.2	2.4	57.9	41.4

Ly/day*.484=W/sq.m in.*25.4=mm (F-32)*5/9=c mph*.447=m/s mBars*.1=kPa

QUALITY CONTROL FLAGS

A-hist. ave. C-not collected E-one sensor hist. ave. F-out of normal range
H-missing hourly I-ignore M-missing Q-related sensor miss. S-not in service

Appendix 2. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 1 DAA.

Weed Code				POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code				A. blueg	burclove	c. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				12/29/06	12/29/06	12/29/06	12/29/06	12/29/06	12/29/06	12/29/06
Trt-Eval Interval				1 DAA	1 DAA	1 DAA	1 DAA	1 DAA	1 DAA	1 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102	25.0			60.0	10.0	75.0	60.0
			203	30.0	50.0	40.0	60.0	25.0	80.0	
			305	25.0	50.0	50.0	60.0	25.0	90.0	60.0
			403	25.0	50.0	50.0	50.0	25.0	80.0	60.0
			Mean =	26.3	50.0	46.7	57.5	21.3	81.3	60.0
Nature's Avenger Org. Con	33	% v/v	103	30.0	50.0		75.0		90.0	60.0
			204	30.0		50.0	75.0	25.0	90.0	75.0
			302	30.0	50.0	50.0	60.0	20.0	90.0	60.0
			404	25.0	50.0	25.0	80.0	25.0	90.0	60.0
			Mean =	28.8	50.0	41.7	72.5	23.3	90.0	63.8
Nature's Avenger Org. Con	16.7	% v/v	104	25.0	30.0	50.0	50.0	20.0	60.0	50.0
			201	40.0	25.0	15.0	50.0		80.0	50.0
			303	30.0	40.0	25.0	60.0	30.0	60.0	50.0
			402	25.0	25.0	60.0	80.0	25.0	90.0	
			Mean =	30.0	30.0	37.5	60.0	25.0	72.5	50.0
Roundup (Glyphosate)	4	qt/a	105	10.0	25.0	10.0	10.0		30.0	25.0
			202	25.0					25.0	
			304	25.0	15.0	15.0	10.0	25.0	25.0	25.0
			401	25.0	25.0	10.0	50.0	25.0	75.0	40.0
			Mean =	21.3	21.7	11.7	23.3	25.0	38.8	30.0

Appendix 2, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 1 DAA.

AOV For POAAN A. blueg PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	2793.750000			
Replicate	3	133.750000	44.583333	2.404	0.1183
Treatment	4	2437.500000	609.375000	32.865	0.0001
Error	12	222.500000	18.541667		

AOV For MEDCO burclove PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	7292.220960			
Replicate	3	9.999064	3.333021	0.145	0.9302
Treatment	4	7075.554211	1768.888553	77.032	0.0001
Error	9	206.667685	22.963076		

AOV For STEME c. chick PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	8525.000232			
Replicate	3	122.778263	40.926088	0.216	0.8826
Treatment	4	6700.000928	1675.000232	8.856	0.0035
Error	9	1702.221041	189.135671		

AOV For CERVU M. chick PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	16385.557321			
Replicate	3	616.667979	205.555993	1.675	0.2295
Treatment	4	14418.890744	3604.722686	29.372	0.0001
Error	11	1349.998599	122.727145		

AOV For EROCI Redstem PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	15	2062.638534			
Replicate	3	70.416361	23.472120	1.138	0.3905
Treatment	4	1827.221956	456.805489	22.148	0.0002
Error	8	165.000216	20.625027		

AOV For CAPBP Shep PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	24555.000000			
Replicate	3	775.000000	258.333333	1.734	0.2131
Treatment	4	21992.500000	5498.125000	36.910	0.0001
Error	12	1787.500000	148.958333		

AOV For CHEAL Lambsqua PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	11363.750000			
Replicate	3	63.750000	21.250000	0.750	0.5493
Treatment	4	11045.000000	2761.250000	97.456	0.0001
Error	9	255.000000	28.333333		

Appendix 2, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 1 DAA.

Weed Code				ERICA	SENVU	RAPRA	MATMA	MALPA	LAMAM	AMSTE
Crop Code				Horsewee	groundse	wild rad	pineappl	mallow	Henbit	F.neck
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				12/29/06	12/29/06	12/29/06	12/29/06	12/29/06	12/29/06	12/29/06
Trt-Eval Interval				1 DAA	1 DAA	1 DAA	1 DAA	1 DAA	1 DAA	1 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102		30.0	25.0			25.0	25.0
			203		15.0	25.0			30.0	25.0
			305	15.0			10.0		10.0	25.0
			403		25.0		15.0	10.0	25.0	40.0
			Mean =	15.0	23.3	25.0	12.5	10.0	22.5	28.8
Nature's Avenger Org. Con	33	% v/v	103		40.0				25.0	25.0
			204		30.0				30.0	25.0
			302		50.0				25.0	25.0
			404		25.0	10.0	10.0		40.0	25.0
			Mean =	.	36.3	10.0	10.0	.	30.0	25.0
Nature's Avenger Org. Con	16.7	% v/v	104		25.0				25.0	15.0
			201		25.0	25.0			10.0	10.0
			303		15.0		25.0		25.0	25.0
			402	20.0	20.0		25.0	0.0	10.0	25.0
			Mean =	20.0	21.3	25.0	25.0	0.0	17.5	18.8
Roundup (Glyphosate)	4	qt/a	105	10.0	25.0				10.0	25.0
			202		10.0	25.0			10.0	10.0
			304		10.0		10.0		10.0	10.0
			401						0.0	25.0
			Mean =	10.0	15.0	25.0	10.0	.	7.5	17.5

Appendix 2, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 1 DAA.

AOV For SENVU groundse PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	17	3497.221862			
Replicate	3	191.666377	63.888792	1.247	0.3441
Treatment	4	2793.055284	698.263821	13.625	0.0005
Error	10	512.500201	51.250020		

AOV For RAPRA wild rad PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	2120.000000			
Replicate	3	0.000000	0.000000	0.000	1.0000
Treatment	4	2120.000000	530.000000	0.000	1.0000
Error	1	0.000000	0.000000		

AOV For MATMA pineappl PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	9	1292.500000			
Replicate	3	2.500000	0.833333	0.167	0.9106
Treatment	4	1280.000000	320.000000	64.000	0.0154
Error	2	10.000000	5.000000		

AOV For LAMAM Henbit PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	2945.000000			
Replicate	3	25.000000	8.333333	0.154	0.9252
Treatment	4	2270.000000	567.500000	10.477	0.0007
Error	12	650.000000	54.166667		

AOV For AMSTE F.neck PERCNT DAMAGE 0-100% 12/29/06 1 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	2520.000000			
Replicate	3	210.000000	70.000000	2.184	0.1475
Treatment	4	1957.500000	489.375000	15.271	0.0002
Error	11	352.500000	32.045455		

Appendix 3. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 4 DAA.

Weed Code				POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code				A. blueg	burclove	c. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07
Trt-Eval Interval				4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102	50.0			95.0	10.0	98.0	85.0
			203	60.0	75.0	50.0	95.0	25.0	98.0	
			305	60.0	85.0	95.0	95.0	25.0	98.0	85.0
			403	50.0	90.0	90.0	98.0	25.0	98.0	80.0
			Mean =	55.0	83.3	78.3	95.8	21.3	98.0	83.3
Nature's Avenger Org. Con	33	% v/v	103	80.0	90.0		98.0		98.0	8.0
			204	85.0		85.0	98.0	25.0	98.0	98.0
			302	75.0	95.0	80.0	95.0	20.0	98.0	95.0
			404	50.0	95.0	25.0	98.0	25.0	98.0	95.0
			Mean =	72.5	93.3	63.3	97.3	23.3	98.0	74.0
Nature's Avenger Org. Con	16.7	% v/v	104	25.0	30.0	80.0	95.0	20.0	98.0	90.0
			201	40.0	50.0	15.0	95.0		95.0	80.0
			303	75.0	40.0	50.0	90.0	30.0	98.0	80.0
			402	60.0	75.0	80.0	98.0	80.0	98.0	
			Mean =	50.0	48.8	56.3	94.5	43.3	97.3	83.3
Roundup (Glyphosate)	4	qt/a	105	10.0	25.0	10.0	10.0		40.0	25.0
			202	25.0					60.0	
			304	30.0	15.0	15.0	10.0	50.0	50.0	75.0
			401	40.0	25.0	10.0	10.0	15.0	75.0	60.0
			Mean =	26.3	21.7	11.7	10.0	32.5	56.3	53.3

Appendix 3, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 4 DAA.

AOV For POAAN A. blueg PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	15413.750000			
Replicate	3	573.750000	191.250000	1.058	0.4031
Treatment	4	12670.000000	3167.500000	17.516	0.0001
Error	12	2170.000000	180.833333		

AOV For MEDCO burclove PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	26484.863993			
Replicate	3	397.087738	132.362579	1.293	0.3353
Treatment	4	25166.116606	6291.529151	61.437	0.0001
Error	9	921.659649	102.406628		

AOV For STEME c. chick PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	24968.196395			
Replicate	3	745.974728	248.658243	0.402	0.7554
Treatment	4	18649.447129	4662.361782	7.530	0.0060
Error	9	5572.774538	619.197171		

AOV For CERVU M. chick PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	39865.000000			
Replicate	3	19.800000	6.600000	2.719	0.0955
Treatment	4	39818.500000	9954.625000	4101.157	0.0001
Error	11	26.700000	2.427273		

AOV For EROCI Redstem PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	15	6984.582273			
Replicate	3	370.137740	123.379247	0.396	0.7598
Treatment	4	4119.998698	1029.999674	3.303	0.0706
Error	8	2494.445835	311.805729		

AOV For CAPBP Shep PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	30273.800000			
Replicate	3	130.600000	43.533333	0.959	0.4436
Treatment	4	29598.300000	7399.575000	162.956	0.0001
Error	12	544.900000	45.408333		

AOV For CHEAL Lambsqua PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	26902.519690			
Replicate	3	2019.233945	673.077982	1.166	0.3753
Treatment	4	19688.521826	4922.130457	8.528	0.0040
Error	9	5194.763919	577.195991		

Appendix 3, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 4 DAA.

Weed Code				ERICA	SENVU	RAPRA	MATMA	MALPA	LAMAM	AMSTE
Crop Code				Horsewee	groundse	wild rad	pineappl	mallow	Henbit	F.neck
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07	1/1/07
Trt-Eval Interval				4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA	4 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	25.0
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	6.3
Nature's Avenger Org. RTU			102		30.0	40.0			25.0	50.0
			203		15.0	85.0			60.0	50.0
			305	15.0			10.0		10.0	25.0
			403		40.0		15.0	10.0	25.0	70.0
			Mean =	15.0	28.3	62.5	12.5	10.0	30.0	48.8
Nature's Avenger Org. Con	33	% v/v	103		40.0				50.0	50.0
			204		75.0				75.0	98.0
			302		60.0				25.0	25.0
			404		25.0	10.0	10.0		40.0	25.0
			Mean =		50.0	10.0	10.0		47.5	49.5
Nature's Avenger Org. Con	16.7	% v/v	104		30.0				25.0	25.0
			201		30.0	25.0			10.0	10.0
			303		50.0		20.0		25.0	50.0
			402	20.0	20.0		25.0	0.0	10.0	50.0
			Mean =	20.0	32.5	25.0	22.5	0.0	17.5	33.8
Roundup (Glyphosate)	4	qt/a	105	10.0	25.0				10.0	25.0
			202		10.0	25.0			10.0	10.0
			304		0.0		10.0		10.0	10.0
			401						0.0	25.0
			Mean =	10.0	11.7	25.0	10.0		7.5	17.5

Appendix 3, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 4 DAA.

AOV For SENVU groundse PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	17	8533.888932			
Replicate	3	196.110731	65.370244	0.277	0.8409
Treatment	4	5975.555729	1493.888932	6.324	0.0084
Error	10	2362.222472	236.222247		

AOV For RAPRA wild rad PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	8	10032.500000			
Replicate	3	202.500000	67.500000	0.083	0.9595
Treatment	4	9020.000000	2255.000000	2.784	0.4188
Error	1	810.000000	810.000000		

AOV For MATMA pineappl PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	9	1055.000000			
Replicate	3	10.000000	3.333333	0.444	0.7470
Treatment	4	1030.000000	257.500000	34.333	0.0285
Error	2	15.000000	7.500000		

AOV For LAMAM Henbit PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	8645.000000			
Replicate	3	925.000000	308.333333	1.805	0.1999
Treatment	4	5670.000000	1417.500000	8.298	0.0019
Error	12	2050.000000	170.833333		

AOV For AMSTE F.neck PERCNT DAMAGE 0-100% 1/1/07 4 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	12272.550000			
Replicate	3	563.350000	187.783333	0.384	0.7666
Treatment	4	5838.300000	1459.575000	2.983	0.0634
Error	12	5870.900000	489.241667		

Appendix 4. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 8 DAA.

Weed Code				POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code				A. blueg	burclove	c. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				1/5/07	1/5/07	1/5/07	1/5/07	1/5/07	1/5/07	1/5/07
Trt-Eval Interval				8 DAA	8 DAA	8 DAA	8 DAA	8 DAA	8 DAA	8 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102	50.0		25.0	98.0	15.0	98.0	98.0
			203	75.0	95.0	98.0	98.0	40.0	98.0	
			305	70.0	90.0	95.0	98.0	98.0	40.0	
			403	50.0	80.0	25.0	98.0	60.0	98.0	98.0
			Mean =	61.3	88.3	60.8	98.0	53.3	83.5	98.0
Nature's Avenger Org. Con	33	% v/v	103	85.0	85.0		98.0		98.0	98.0
			204	80.0		70.0	98.0	50.0	98.0	
			302	60.0	80.0	50.0	98.0	50.0	98.0	
			404	50.0	98.0	25.0	98.0	40.0	98.0	98.0
			Mean =	68.8	87.7	48.3	98.0	46.7	98.0	98.0
Nature's Avenger Org. Con	16.7	% v/v	104	50.0	40.0	25.0	98.0	25.0	98.0	90.0
			201	40.0	65.0	25.0	95.0		95.0	85.0
			303	50.0	50.0	50.0		50.0	98.0	
			402	50.0	75.0	75.0	98.0	25.0	98.0	
			Mean =	47.5	57.5	43.8	97.0	33.3	97.3	87.5
Roundup (Glyphosate)	4	qt/a	105	25.0	15.0	10.0	15.0		30.0	25.0
			202	30.0						
			304	25.0	10.0			50.0	50.0	40.0
			401	50.0	20.0	10.0	10.0	20.0	75.0	60.0
			Mean =	32.5	15.0	10.0	12.5	35.0	51.7	41.7

Appendix 4. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 8 DAA.

AOV For POAAN A. blueg PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	13720.000000			
Replicate	3	70.000000	23.333333	0.158	0.9222
Treatment	4	11882.500000	2970.625000	20.168	0.0001
Error	12	1767.500000	147.291667		

AOV For MEDCO burclove PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	27740.422226			
Replicate	3	309.977638	103.325879	1.233	0.3536
Treatment	4	26676.088902	6669.022226	79.566	0.0001
Error	9	754.355685	83.817298		

AOV For STEME c. chick PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	18803.356758			
Replicate	3	1427.267771	475.755924	0.666	0.5935
Treatment	4	10951.189722	2737.797431	3.835	0.0436
Error	9	6424.899264	713.877696		

AOV For CERVU M. chick PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	16	40447.300000			
Replicate	3	3.700000	1.233333	0.750	0.5493
Treatment	4	40428.800000	10107.200000	6146.271	0.0001
Error	9	14.800000	1.644444		

AOV For EROCI Redstem PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	15	11371.438923			
Replicate	3	1833.794370	611.264790	1.755	0.2332
Treatment	4	6751.355691	1687.838923	4.846	0.0279
Error	8	2786.288862	348.286108		

AOV For CAPBP Shep PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	31019.311065			
Replicate	3	730.553984	243.517995	0.951	0.4494
Treatment	4	27472.894792	6868.223698	26.830	0.0001
Error	11	2815.862289	255.987481		

AOV For CHEAL Lambsqua PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	12	30443.927621			
Replicate	3	109.170646	36.390215	0.350	0.7917
Treatment	4	29814.761272	7453.690318	71.671	0.0001
Error	5	519.995703	103.999141		

Appendix 4. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 8 DAA.

Weed Code				ERICA	SENVU	RAPRA	MATMA	MALPA	LAMAM	AMSTE
Crop Code				Horsewee	groundse	wild rad	pineappl	mallow	Henbit	F.neck
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				1/5/07	1/5/07	1/5/07	1/5/07	1/5/07	1/5/07	1/5/07
Trt-Eval Interval				8 DAA	8 DAA	8 DAA	8 DAA	8 DAA	8 DAA	8 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102		40.0	10.0			25.0	25.0
			203		75.0				25.0	50.0
			305						25.0	50.0
			403		50.0		25.0	15.0	20.0	50.0
			Mean =	.	55.0	10.0	25.0	15.0	23.8	43.8
Nature's Avenger Org. Con	33	% v/v	103		25.0				25.0	40.0
			204		85.0				30.0	50.0
			302		50.0				10.0	25.0
			404		25.0		15.0		50.0	25.0
			Mean =	.	46.3	.	15.0	.	28.8	35.0
Nature's Avenger Org. Con	16.7	% v/v	104						15.0	40.0
			201		30.0	25.0	15.0		15.0	15.0
			303		30.0		25.0		25.0	25.0
			402	25.0	25.0		25.0	10.0	25.0	75.0
			Mean =	25.0	28.3	25.0	21.7	10.0	20.0	38.8
Roundup (Glyphosate)	4	qt/a	105		15.0				10.0	40.0
			202		40.0	85.0			0.0	25.0
			304				10.0		0.0	20.0
			401						0.0	25.0
			Mean =	.	27.5	85.0	10.0	.	2.5	27.5

Appendix 4. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 8 DAA.

AOV For SENVU groundse PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	15	10550.140203			
Replicate	3	1719.584722	573.194907	2.732	0.1137
Treatment	4	7152.223645	1788.055911	8.523	0.0055
Error	8	1678.331837	209.791480		

AOV For MATMA pineappl PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	9	1635.555820			
Replicate	3	13.333552	4.444517	0.167	0.9106
Treatment	4	1568.889070	392.222268	14.708	0.0647
Error	2	53.333197	26.666599		

AOV For LAMAM Henbit PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	3700.000000			
Replicate	3	130.000000	43.333333	0.589	0.6337
Treatment	4	2687.500000	671.875000	9.136	0.0013
Error	12	882.500000	73.541667		

AOV For AMSTE F.neck PERCNT DAMAGE 0-100% 1/5/07 8 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	7980.000000			
Replicate	3	310.000000	103.333333	0.392	0.7615
Treatment	4	4767.500000	1191.875000	4.517	0.0211
Error	11	2902.500000	263.863636		

Appendix 5. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 15 DAA.

Weed Code				POAAN	MEDCO	STEME	CERVU	EROCI	CAPBP	CHEAL
Crop Code				A. blueg	burclove	c. chick	M. chick	Redstem	Shep	Lambsqua
Part Rated				PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT	PERCNT
Rating Data Type				DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE	DAMAGE
Rating Unit				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%	0-100%
Rating Date				1/12/07	1/12/07	1/12/07	1/12/07	1/12/07	1/12/07	1/12/07
Trt-Eval Interval				15 DAA	15 DAA	15 DAA	15 DAA	15 DAA	15 DAA	15 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102	50.0	90.0	75.0	95.0	25.0	98.0	80.0
			203	75.0	95.0	75.0	95.0	50.0	95.0	99.0
			305	50.0	50.0	50.0	95.0	50.0	95.0	75.0
			403	65.0	25.0	85.0	95.0	50.0	98.0	80.0
			Mean =	60.0	65.0	71.3	95.0	43.8	96.5	83.5
Nature's Avenger Org. Con	33	% v/v	103	60.0	75.0		90.0		98.0	98.0
			204	75.0		80.0	98.0	60.0	98.0	99.0
			302	50.0	70.0	75.0	95.0	25.0	95.0	99.0
			404	40.0	75.0	75.0	95.0	40.0	98.0	95.0
			Mean =	56.3	73.3	76.7	94.5	41.7	97.3	97.8
Nature's Avenger Org. Con	16.7	% v/v	104	30.0	50.0	80.0	95.0	25.0	98.0	99.0
			201	50.0	80.0	75.0	95.0		98.0	98.0
			303	50.0	50.0	60.0	85.0	50.0	95.0	98.0
			402	50.0	60.0	70.0	80.0	50.0	98.0	
			Mean =	45.0	60.0	71.3	88.8	41.7	97.3	98.3
Roundup (Glyphosate)	4	qt/a	105	25.0	75.0	40.0	30.0		70.0	40.0
			202	25.0					95.0	
			304	50.0	75.0	50.0	50.0	50.0	98.0	50.0
			401	60.0	50.0	40.0	40.0	60.0	98.0	60.0
			Mean =	40.0	66.7	43.3	40.0	55.0	90.3	50.0

Appendix 5, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 15 DAA.

AOV For POAAN A. blueg PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	11523.750000			
Replicate	3	413.750000	137.916667	0.847	0.4946
Treatment	4	9155.000000	2288.750000	14.049	0.0002
Error	12	1955.000000	162.916667		

AOV For MEDCO burclove PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	17	18792.222256			
Replicate	3	1310.000000	436.666667	1.421	0.2938
Treatment	4	14408.889025	3602.222256	11.721	0.0009
Error	10	3073.333232	307.333323		

AOV For STEME c. chick PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	17	17480.555055			
Replicate	3	202.777785	67.592595	0.880	0.4838
Treatment	4	16509.720222	4127.430055	53.739	0.0001
Error	10	768.057049	76.805705		

AOV For CERVU M. chick PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	29102.550000			
Replicate	3	55.350000	18.450000	0.586	0.6367
Treatment	4	28700.800000	7175.200000	227.850	0.0001
Error	11	346.400000	31.490909		

AOV For EROCI Redstem PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	15	8673.747248			
Replicate	3	445.969977	148.656659	1.075	0.4127
Treatment	4	7121.664551	1780.416138	12.877	0.0015
Error	8	1106.112720	138.264090		

AOV For CAPBP Shep PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	29783.750000			
Replicate	3	87.750000	29.250000	0.720	0.5590
Treatment	4	29208.500000	7302.125000	179.745	0.0001
Error	12	487.500000	40.625000		

AOV For CHEAL Lambsqua PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	17	28435.300691			
Replicate	3	99.879325	33.293108	0.742	0.5508
Treatment	4	27886.885525	6971.721381	155.433	0.0001
Error	10	448.535841	44.853584		

Appendix 5, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 15 DAA.).

Weed Code Crop Code Part Rated Rating Data Type Rating Unit Rating Date Trt-Eval Interval				ERICA Horsewee PERCNT DAMAGE 0-100% 1/12/07 15 DAA	SENVU groundse PERCNT DAMAGE 0-100% 1/12/07 15 DAA	RAPRA wild rad PERCNT DAMAGE 0-100% 1/12/07 15 DAA	MATMA pineappl PERCNT DAMAGE 0-100% 1/12/07 15 DAA	MALPA mallow PERCNT DAMAGE 0-100% 1/12/07 15 DAA	LAMAM Henbit PERCNT DAMAGE 0-100% 1/12/07 15 DAA	AMSTE F.neck PERCNT DAMAGE 0-100% 1/12/07 15 DAA
Treatment Name	Rate	Rate Unit	Plot							
Untreated			101	0.0	0.0	0.0	0.0	0.0	0.0	
			205	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			301	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			405	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Mean =	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nature's Avenger Org. RTU			102		30.0	25.0			25.0	10.0
			203		25.0	75.0	30.0		15.0	25.0
			305				25.0		25.0	50.0
			403		40.0		40.0	25.0	25.0	50.0
			Mean =	.	31.7	50.0	31.7	25.0	22.5	33.8
Nature's Avenger Org. Con	33	% v/v	103		25.0				25.0	10.0
			204		75.0				30.0	50.0
			302		40.0				25.0	30.0
			404		50.0		40.0	40.0	10.0	25.0
			Mean =	.	47.5	.	40.0	40.0	22.5	28.8
Nature's Avenger Org. Con	16.7	% v/v	104		50.0				25.0	15.0
			201		10.0	50.0			15.0	10.0
			303		40.0		25.0		25.0	25.0
			402	75.0	30.0		20.0	25.0	15.0	25.0
			Mean =	75.0	32.5	50.0	22.5	25.0	20.0	18.8
Roundup (Glyphosate)	4	qt/a	105	10.0	15.0				15.0	25.0
			202		10.0	50.0			15.0	10.0
			304		60.0		25.0		10.0	30.0
			401						10.0	25.0
			Mean =	10.0	28.3	50.0	25.0	.	12.5	22.5

Appendix 5, continued. Plot data summary of weed control using Nature's Avenger Organic RTU Herbicide at 15 DAA.

AOV For SENVU groundse PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	17	8625.555551			
Replicate	3	374.444492	124.814831	0.361	0.7827
Treatment	4	4792.222205	1198.055551	3.464	0.0505
Error	10	3458.888854	345.888885		

AOV For RAPRA wild rad PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	7	8750.000000			
Replicate	3	312.500000	104.166667	0.111	0.9423
Treatment	3	7500.000000	2500.000000	2.667	0.4164
Error	1	937.500000	937.500000		

AOV For MATMA pineappl PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	10	3704.721212			
Replicate	3	10.832242	3.610747	0.092	0.9598
Treatment	4	3575.554425	893.888606	22.662	0.0141
Error	3	118.334545	39.444848		

AOV For LAMAM Henbit PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	19	1895.000000			
Replicate	3	105.000000	35.000000	1.313	0.3157
Treatment	4	1470.000000	367.500000	13.781	0.0002
Error	12	320.000000	26.666667		

AOV For AMSTE F.neck PERCNT DAMAGE 0-100% 1/12/07 15 DAA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	18	5063.750000			
Replicate	3	683.750000	227.916667	1.477	0.2745
Treatment	4	2682.500000	670.625000	4.346	0.0238
Error	11	1697.500000	154.318182		

Henbit (*Lamium amplexicaule*)
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Dr. Fred Yelverton
Affiliation: North Carolina State University
Address: Williams Hall 4401C
PO Box 7620
Raleigh, NC 27695-7620

Report: North Carolina State University Report Date: December 5, 2006			**Percent Control (%)** Application Date: November 9, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**19 DAT**	
1	Untreated		0.0	b	0.0	c	0.0	c
2	Nature's Avenger RTU–162.5 gpa	17.5 %	98.0	a	99.0	a	98.0	a
3	BurnOut RTU – 162.5 gpa		96.0	a	98.0	a	85.0	b
4	Roundup RTU – 162.5 gpa		0.0	b	15.0	b	100.0	a
LSD (p= 0.05)			4.7		5.0		7.8	

Means followed by same letter do not significantly differ (p = 0.05)

Conclusions: Two days after treatment, both Nature's Avenger RTU and BurnOut RTU controlled 94-98 % of henbit. At nineteen days, Nature's Avenger RTU and Roundup RTU provided very good weed control while BurnOut RTU was significantly less effective.

Carolina geranium (*Geranium carolinianum*)
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Dr. Fred Yelverton
Affiliation: North Carolina State University
Address: Williams Hall 4401C
PO Box 7620
Raleigh, NC 27695-7620

Report: North Carolina State University Report Date: December 5, 2006			**Percent Control (%)** Application Date: November 9, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**19 DAT**	
1	Untreated		0.0	b	0.0	d	0.0	c
2	Nature's Avenger RTU–162.5 gpa	17.5 %	98.0	a	100.0	a	98.0	a
3	BurnOut RTU – 162.5 gpa		94.0	a	93.0	b	79.0	b
4	Roundup RTU – 162.5 gpa		6.0	b	15.0	c	100.0	a
LSD (p= 0.05)			6.1		6.4		16.4	

Means followed by same letter do not significantly differ (p = 0.05)

Conclusions:
The results were quite similar to those for Henbit with the exception of Nature's Avenger RTU being the best of all treatments at time point 4 DAT.

Hairy vetch (*Vicia villosa villosa*)
Nature's Avenger Organic Herbicide (EPA Reg. No. 82052-1)

Consultant/Applicator: Name Dr. Fred Yelverton
Affiliation: North Carolina State University
Address: Williams Hall 4401C
PO Box 7620
Raleigh, NC 27695-7620

Report: North Carolina State University Report Date: December 5, 2006			**Percent Control (%)** Application Date: November 9, 2006					
Treatments		**Application Rate (% AI)**	**2 DAT**		**4 DAT**		**19 DAT**	
1	Untreated		0.0	b	0.0	b	0.0	c
2	Nature's Avenger RTU–162.5 gpa	17.5 %	18.0	a	63.0	a	49.0	b
3	BurnOut RTU – 162.5 gpa		19.0	a	19.0	b	0.0	c
4	Roundup RTU – 162.5 gpa		1.0	b	9.0	b	99.0	a
LSD (p= 0.05)			14.5		33.5		45.2	

Means followed by same letter do not significantly differ (p = 0.05)

Conclusions:
Hairy vetch was a difficult-to-control weed in this study. The efficacy of Nature's Avenger was the best four days after treatment at which point it controlled more then 60 % of hairy vetch. Fifteen days later, it controlled less than 50 % of weeds whereas Roundup RTU provided a complete control of hairy vetch at this time point.

Fred Yelverton
NC State
Trial ID# 07-T10

Formulation Characteristics:
There were no mixing, spraying, or plot coverage concerns from any of the treatments. All of the chemicals were applied in clear 2-liter bottles so symptoms could be documented if observed.

Henbit and Carolina geranium observations:
Nature's Avenger burned out henbit and geranium 85% in approximately 4 hours while Burnout provided 20% burn of both weed species at this time. Roundup RTU displayed no symptoms at this time.

By 2 days, Nature's Avenger and Burnout were providing 94%+ control or burndown of both weed species with Roundup RTU still showing no symptoms on henbit and only 6% injury on geranium (slight yellowing).

Roundup RTU at 4 days was beginning to show injury symptoms of 15% (yellowing) on both species.

By 26 days after treatment, new henbit and geranium plants were germinating most noticeably in the Nature's Avenger and Burnout plots. Henbit control was reduced to 85% for Avenger and only 50% for Burnout, while geranium control was reduced to 94% for Avenger and only 81% for Burnout. Roundup RTU was controlling both species 100% at this time with no new germination occurring.

Hairy vetch observations:
At 4 hours after treatment, Nature's Avenger provided only 10% burn of hairy vetch. There were no symptoms from Burnout or Roundup RTU.

2 days after treatment, Nature's Avenger and Burnout injured hairy vetch 18 and 19%, respectively. Roundup RTU symptoms not observed at this time.

4 days after treatment, Nature's Avenger injured hairy vetch 63% and Burnout injured only 19%. Roundup RTU injured hairy vetch 9% at this time.

By 26 days after treatment, Nature's Avenger was providing 66% hairy vetch control. Hairy vetch had completely recovered in the Burnout plots (0% control). Roundup RTU was providing 98% control at this time.

Summary:
Nature's Avenger provided more complete control of henbit, Carolina geranium and hairy vetch than Burnout. Due to higher than average rainfall in October and November (3+ and 7+ inches, respectively), these weeds have continued to germinate which have resulted in lower control ratings at 26 days after treatment. These herbicides appear to have no or very little residual soil effects as indicated by the new flush of weed germination after application. It will be important to apply these contact, postemergence herbicides after all weeds have germinated to avoid having to make repeat applications.

12-05-06 (07-T10)

North Carolina State University

POSTEMERGENCE WINTER ANNUAL BROADLEAF WEED CONTROL IN COMMON BERMUDAGRASS USING ORGANIC HERBICIDES VS ROUNDUP RTU

Trial ID: 07-T10 Protocol ID: 07-T10
Location: SAMPSON COUNTY Study Director: L.S. WARREN
Investigator: Fred Yelverton

Reps: 4 Plots: 4 by 8 feet
Spray vol: 162.5 gal/ac Mix size: 0.375 gallons (min .4775)

Trt No.	Treatment Name	Form Type	Rate	Rate Unit	Growth Stage	Appl Code	Amt Product to Measure	Plot No. By Rep 1	2	3	4
1	NATURE'S AVENGER RTU	L	162.5	GAL/A	NOV 9	A	1419.4 ml/mx	104	202	303	402
2	BURNOUT RTU	L	162.5	GAL/A	NOV 9	A	1419.4 ml/mx	103	201	304	403
3	ROUNDUP RTU	L	162.5	GAL/A	NOV 9	A	1419.4 ml/mx	101	204	302	401
4	CHECK							102	203	301	404

Sort Order: Treatment

North Carolina State University

POSTEMERGENCE WINTER ANNUAL BROADLEAF WEED CONTROL IN COMMON BERMUDAGRASS USING ORGANIC HERBICIDES VS ROUNDUP RTU

Trial ID: 07-T10 Protocol ID: 07-T10
Location: SAMPSON COUNTY Study Director: L.S. WARREN
Investigator: Fred Yelverton

General Trial Information

Study Director: L.S. WARREN Title: RESEARCH ASSOCIATE
Affiliation: NORTH CAROLINA STATE UNIVERSITY
Postal Code: 27695 E-mail: leon_warren@ncsu.edu
Investigator: Fred Yelverton Title: PROFESSOR
Affiliation: NORTH CAROLINA STATE UNIVERSITY
Postal Code: 27695 E-mail: fred_yelverton@ncsu.edu

Trial Location

City: CLINTON Trial Status: COMPLETED
State/Prov.: NC
Postal Code: 28328 Initiation Date: 11-09-06
Country: USA

Objectives:
TO EVALUATE ORGANIC HERBICIDES VS ROUNDUP RTU FOR POSTEMERGENCE WINTER ANNUAL BROADLEAF WEED CONTROL IN COMMON BERMUDAGRASS

Cooperator/Landowner

Cooperator: RAY GAINEY Country: USA
Phone No: 910/533-3804

City: CLINTON
State/Prov: NC
Postal Code: 28328

Crop Description

Crop 1: CYNDA Cynodon dactylon Bermuda grass
Variety: COMMON
BBCH Scale: BGRM

Pest Description

Pest 1 Type: W Code: LAMAM Lamium amplexicaule
Common Name: Henbit

Pest 2 Type: W Code: GERCA Geranium carolinianum
Common Name: Carolina geranium

Pest 3 Type: W Code: VICVI Vicia villosa villosa
Common Name: Hairy vetch

Site and Design

Plot Width, Unit: 4 FT Site Type: TURF - RESEARCH
Plot Length, Unit: 8 FT Tillage Type: NA
Replications: 4 Study Design: Randomized Complete Block

Soil Description

% OM: 0.51 Texture: CLAY LOAM
pH: 5.6
CEC: 6.3 Fert. Level: GOOD

Moisture Conditions

Overall Moisture Conditions: OCT 3.05"; NOV 7.26"

Closest Weather Station: HORTICULTURAL CROP RES STA Distance: 5 Unit: MI

North Carolina State University

Application Description

	A
Application Date:	11-09-06
Time of Day:	1:30 PM
Application Method:	SPRAY
Application Timing:	POST
Application Placement:	BROFOL
Applied By:	L.S. WARREN
Air Temperature, Unit:	74 F
% Relative Humidity:	50
Wind Velocity, Unit:	4.2 MPH
Dew Presence (Y/N):	N
Soil Temperature, Unit:	66 F
Soil Moisture:	MOIST
% Cloud Cover:	0

Crop Stage At Each Application

	A
Crop 1 Code, BBCH Scale:	CYNDA BGRM
Stage Scale Used:	BBCH
Stage Majority, Percent:	MOWED 100
Height, Unit:	1.5 IN

Pest Stage At Each Application

	A
Pest 1 Code, Disc., Scale:	LAMAM W
Stage Majority, Percent:	2-4 LF 95
Height, Unit:	1.5 IN
Density, Unit:	5 FT2
Pest 2 Code, Disc., Scale:	GERCA W
Stage Majority, Percent:	2-4 LF 95
Height, Unit:	1.5 IN
Density, Unit:	1 FT2
Pest 3 Code, Disc., Scale:	VICVI W
Stage Majority, Percent:	2-4 LF 95
Height, Unit:	2.5 IN
Density, Unit:	1 FT2

Application Equipment

	A
Appl. Equipment:	BACSPR
Operating Pressure, Unit:	28 PSI
Nozzle Type:	FLAT FAN
Nozzle Size:	XR 8002VS
Nozzle Spacing, Unit:	10 IN
Band Width, Unit:	40 IN
Boom Length, Unit:	40 IN
Boom Height, Unit:	10 IN
Ground Speed, Unit:	0.6 MPH
Carrier:	WATER
Spray Volume, Unit:	162.5 GPA
Mix Size, Unit:	0.375
Propellant:	COMCO2
Tank Mix (Y/N):	N

North Carolina State University

POSTEMERGENCE WINTER ANNUAL BROADLEAF WEED CONTROL IN COMMON BERMUDAGRASS USING ORGANIC HERBICIDES VS ROUNDUP RTU

Trial ID: 07-T10 Protocol ID: 07-T10
Location: SAMPSON COUNTY Study Director: L.S. WARREN
Investigator: Fred Yelverton

Trial Comments

11-09-06: SPRAYER CALIBRATED TO DELIVER 162.5 GPA PER PASS AT 0.6 MPH (9 SECONDS PER PLOT)

11-28-06 AND 12-05-06: LOWER LAMAM CONTROL RATINGS DUE TO NEW GERMINATION AFTER EVALUATION ON 11-13-06;
LOWER GERCA AND VICVI RATINGS DUE MOSTLY TO RECOVERY FROM INITIAL APPLICATION

North Carolina State University

POSTEMERGENCE WINTER ANNUAL BROADLEAF WEED CONTROL IN COMMON BERMUDAGRASS USING ORGANIC HERBICIDES VS ROUNDUP RTU

Trial ID: 07-T10 Protocol ID: 07-T10
Location: SAMPSON COUNTY Study Director: L.S. WARREN
Investigator: Fred Yelverton

Pest Type							W Weed		W Weed		W Weed	
Pest Code							LAMAM		LAMAM		LAMAM	
Pest Name							Henbit		Henbit		Henbit	
Rating Date							11-09-06		11-11-06		11-13-06	
Rating Data Type							BURN		CONTROL		CONTROL	
Rating Unit							PERCENT		PERCENT		PERCENT	
Assessed By							L.S. WARREN		L.S. WARREN		L.S. WARREN	
Days After First/Last Applic.							0 0		2 2		4 4	
Trt-Eval Interval							0 DA-A		2 DA-A		4 DA-A	
ARM Action Codes							P		P		P	
Trt No.	Treatment Name	Form Type	Rate	Rate Unit	Growth Stage	Appl Code	1		2		3	
1	NATURE'S AVENGER RTU	L	162.5	GAL/A	NOV 9	A	85	a	98	a	99	a
2	BURNOUT RTU	L	162.5	GAL/A	NOV 9	A	20	b	96	a	98	a
3	ROUNDUP RTU	L	162.5	GAL/A	NOV 9	A	0	c	0	b	15	b
4	CHECK						0	c	0	b	0	c
LSD (P=.05)							13.3		4.7		5.0	
Standard Deviation							8.3		2.9		3.1	
CV							31.75		6.02		5.87	
Replicate F							0.360		0.673		1.461	
Replicate Prob(F)							0.7834		0.5896		0.2893	
Treatment F							93.480		1471.041		1154.931	
Treatment Prob(F)							0.0001		0.0001		0.0001	

Means followed by same letter do not significantly differ (P=.05, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

03-13-07 (07-T10)

North Carolina State University

Pest Type							W Weed		W Weed		W Weed	
Pest Code							LAMAM		LAMAM		GERCA	
Pest Name							Henbit		Henbit		Carolina ge>	
Rating Date							11-28-06		12-05-06		11-09-06	
Rating Data Type							CONTROL		CONTROL		BURN	
Rating Unit							PERCENT		PERCENT		PERCENT	
Assessed By							L.S. WARREN		L.S. WARREN		L.S. WARREN	
Days After First/Last Applic.							19 19		26 26		0 0	
Trt-Eval Interval							19 DA-A		26 DA-A		0 DA-A	
ARM Action Codes							P		P		P	
Trt No.	Treatment Name	Form Type	Rate	Rate Unit	Growth Stage	Appl Code	4		5		6	
1	NATURE'S AVENGER RTU	L	162.5	GAL/A	NOV 9	A	98	a	85	b	85	a
2	BURNOUT RTU	L	162.5	GAL/A	NOV 9	A	85	b	50	c	20	b
3	ROUNDUP RTU	L	162.5	GAL/A	NOV 9	A	100	a	100	a	0	c
4	CHECK						0	c	0	d	0	c
LSD (P=.05)							7.8		9.4		13.3	
Standard Deviation							4.9		5.9		8.3	
CV							6.91		10.02		31.75	
Replicate F							1.356		0.871		0.360	
Replicate Prob(F)							0.3170		0.4910		0.7834	
Treatment F							379.419		226.974		93.480	
Treatment Prob(F)							0.0001		0.0001		0.0001	

Means followed by same letter do not significantly differ (P=.05, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

North Carolina State University

Pest Type							W Weed		W Weed		W Weed		
Pest Code							GERCA		GERCA		GERCA		
Pest Name							Carolina ge>		Carolina ge>		Carolina ge>		
Rating Date							11-11-06		11-13-06		11-28-06		
Rating Data Type							CONTROL		CONTROL		CONTROL		
Rating Unit							PERCENT		PERCENT		PERCENT		
Assessed By							L.S. WARREN		L.S. WARREN		L.S. WARREN		
Days After First/Last Applic.							2 2		4 4		19 19		
Trt-Eval Interval							2 DA-A		4 DA-A		19 DA-A		
ARM Action Codes							P		P		P		
Trt No.	Treatment Name	Form Type	Rate	Rate Unit	Growth Stage	Appl Code	7		8		9		
1	NATURE'S AVENGER RTU	L	162.5	GAL/A	NOV 9	A	98		a 100		a 98		a
2	BURNOUT RTU	L	162.5	GAL/A	NOV 9	A	94		a 93		b 79		b
3	ROUNDUP RTU	L	162.5	GAL/A	NOV 9	A	6		b 15		c 100		a
4	CHECK						0		c 0		d 0		c
LSD (P=.05)							6.1		6.4		16.4		
Standard Deviation							3.8		4.0		10.3		
CV							7.73		7.64		14.86		
Replicate F							0.714		0.088		1.602		
Replicate Prob(F)							0.5678		0.9648		0.2563		
Treatment F							784.714		680.000		83.987		
Treatment Prob(F)							0.0001		0.0001		0.0001		

Means followed by same letter do not significantly differ (P=.05, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

North Carolina State University

Pest Type							W Weed		W Weed		W Weed	
Pest Code							GERCA		VICVI		VICVI	
Pest Name							Carolina ge>		Hairy vetch		Hairy vetch	
Rating Date							12-05-06		11-09-06		11-11-06	
Rating Data Type							CONTROL		BURN		CONTROL	
Rating Unit							PERCENT		PERCENT		PERCENT	
Assessed By							L.S. WARREN		L.S. WARREN		L.S. WARREN	
Days After First/Last Applic.							26 26		0 0		2 2	
Trt-Eval Interval							26 DA-A		0 DA-A		2 DA-A	
ARM Action Codes							P		P		P	
Trt No.	Treatment Name	Form Type	Rate	Rate Unit	Growth Stage	Appl Code	10		11		12	
1	NATURE'S AVENGER RTU	L	162.5	GAL/A	NOV 9	A	94	a	10	a	18	a
2	BURNOUT RTU	L	162.5	GAL/A	NOV 9	A	81	b	0	b	19	a
3	ROUNDUP RTU	L	162.5	GAL/A	NOV 9	A	100	a	0	b	1	b
4	CHECK						0	c	0	b	0	b
LSD (P=.05)							8.1		0.0		14.5	
Standard Deviation							5.1		0.0		9.1	
CV							7.41		0.0		96.97	
Replicate F							1.998		0.000		0.681	
Replicate Prob(F)							0.1850		1.0000		0.5857	
Treatment F							333.068		0.000		4.966	
Treatment Prob(F)							0.0001		1.0000		0.0265	

Means followed by same letter do not significantly differ (P=.05, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

03-13-07 (07-T10)

North Carolina State University

Pest Type							W Weed		W Weed		W Weed	
Pest Code							VICVI		VICVI		VICVI	
Pest Name							Hairy vetch		Hairy vetch		Hairy vetch	
Rating Date							11-13-06		11-28-06		12-05-06	
Rating Data Type							CONTROL		CONTROL		CONTROL	
Rating Unit							PERCENT		PERCENT		PERCENT	
Assessed By							L.S. WARREN		L.S. WARREN		L.S. WARREN	
Days After First/Last Applic.							4 4		19 19		26 26	
Trt-Eval Interval							4 DA-A		19 DA-A		26 DA-A	
ARM Action Codes							P		P		P	
Trt No.	Treatment Name	Form Type	Rate	Rate Unit	Growth Stage	Appl Code	13		14		15	
1	NATURE'S AVENGER RTU	L	162.5	GAL/A	NOV 9	A	63	a	49	b	66	b
2	BURNOUT RTU	L	162.5	GAL/A	NOV 9	A	19	b	0	c	0	c
3	ROUNDUP RTU	L	162.5	GAL/A	NOV 9	A	9	b	99	a	98	a
4	CHECK						0	b	0	c	0	c
LSD (P=.05)							33.5		45.2		25.8	
Standard Deviation							20.9		28.3		16.1	
CV							93.11		76.46		39.16	
Replicate F							1.377		1.000		0.836	
Replicate Prob(F)							0.3113		0.4363		0.5072	
Treatment F							7.016		11.205		37.402	
Treatment Prob(F)							0.0099		0.0022		0.0001	

Means followed by same letter do not significantly differ (P=.05, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Avenger® Weed Killer

Avenger® Weed Killer Concentrate
Active Ingredients:
d-Limonene (citrus oil).....70%
Inert Ingredients 30%

EPA Registration: Yes, #82052-1
Patented Formula: Yes

Avenger® Weed Killer Ready To Use
Active Ingredients:
d-Limonene (citrus oil).....17.5%
Inert Ingredients.....82.5%

EPA Registration: Yes, #82052-3
Patented Formula: Yes

- Faster acting - Visible results in 2 hours or less.
- Works in cool & cloudy conditions (as low as 40° F).
- More efficient - Provides more coverage per concentrated gallon. One gallon of concentrate mixed at a maximum dilution ratio of (1:6 [1 part Avenger® / 6 parts H20]) will make 7 gallons of final spray volume.
- Easier to use. Emulsion technology (white milky spray) allows you to visually reference your spray target.
- U.S. Environmental Protection Agency (EPA) registered label. In evaluating a pesticide registration application, the EPA assess a wide variety of potential human health and environmental effects associated with the use of the product. The company registering the product must provide data studies that comply with EPA testing guidelines. *Source EPA.gov*
- **More effective - Longer suppression times and kill rates**

vs.

COMPARISON

BurnOut II Weed & Grass Killer

BurnOut II Concentrate
Active Ingredients:
Clove Oil 8%
Citric Acid..... 24%
Inert Ingredients:..... 68%
EPA Registration: Exempt from federal registration under section 25(b) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
Patented Formula: No

BurnOut II Ready To Use
Active Ingredients:
Clove Oil 2%
Citric Acid..... 6%
Inert Ingredients:..... 92%
EPA Registration: Exempt from federal registration under section 25(b) of FIFRA.
Patented Formula: No

- Slower acting - Visible results in more than 2 hours.
- Works in warm & sunny conditions (generally 60° F).
- Less efficient - Provides less coverage per concentrated gallon. One gallon of concentrate mixed at a maximum dilution ratio of (1:3 [1 part BurnOut II / 3 parts H20]) will make 4 gallons of final spray volume. Harder to control weeds require a (1:2 [1 part BurnOut II / 2 parts H20]) dilution ratio. At this ratio, one gallon of concentrate will make 3 gallons of final spray volume
- Harder to use. Brown spray makes it more difficult to visually target and cover grases and weeds.
- Not registered by the EPA. Qualifies for exemption under under section 25(b) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). *Source BurnOut II Concentrate Label.*
- **Less effective - Shorter suppression times and more regrowth**

vs.

The dandelion treated with Avenger® Weed Killer has terminated. The weed treated with BurnOut II shows regrowth. Photos taken 16 days after treatment. Sunny, 60F.

Cutting Edge Formulations, Inc. • 3057 Summer Oak Place • Buford, GA 30518 • 866.906.9333 • avengerorganics.com