

# ALFALFA

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## WEED CONTROL 2005 TRIAL RESULTS

### SAN JOAQUIN COUNTY

Cooperative Extension      University of California  
420 Wilson Way, Stockton, California 95205

2005 ALFALFA

WEED CONTROL RESEARCH PROGRESS REPORT

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San Joaquin County

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Herbicide trade names are used in this report, as well as the less familiar common names to familiarize the reader with the various products tested. No endorsement of products mentioned or criticism of similar products is intended.

Herbicide rates in this report are always expressed as **active ingredient (a.i.) of material per treated acre.**

<b><u>Trade Name</u></b>	<b><u>Common Name</u></b>	<b><u>Company</u></b>
Buctril	bromoxynil	Bayer
Butyrac 200	2,4-DB amine	Albaugh, Inc.
Ethrel	ethephon	Bayer
Chateau	flumioxazin	Valent
Gramoxone	paraquat	Syngenta
Matran 2	clove oil	Bioganic Crop Protection
Prowl	pendimethalin	BASF
Pursuit	imazethapyr	BASF
Raptor	imazamox	BASF
Roundup	glyphosate	Monsanto
Shark	carfentrazone – ethyl	FMC
Velpar	hexazinone	DuPont
Visor	thiazopyr	Dow
Weed Pharma	acetic acid	Pharmsolution, Inc.

### **2005 Alfalfa Weed Control Trial Results**

During the 2005 season, six weed control trials were established in San Joaquin County.

Trials were established to evaluate the effectiveness of candidate herbicides for controlling annual, perennial and parasitic weeds in seedling and established alfalfa. Complete trial descriptions and weed control/crop phytotoxicity ratings for each trial follow.

**Trial 1 – Postemergence Herbicides and Tank Mix Combinations for Weed Control and Crop Tolerance in Seedling Alfalfa** Mick Canevari, Don Colbert, Randall Wittie and Scott Whiteley.

**OBJECTIVE:** Evaluate several postemergence herbicides and tank mix combinations for weed control and crop tolerance in seedling alfalfa.

**MATERIALS AND METHODS:** The following herbicides were applied postemergence to a uniform stand of seedling alfalfa on 12/2/04: (1) Weed Pharma 10% AL 20 gal/A, (2) Pursuit 2SL 0.094 lb ai/A + Buctril 4EC 0.375 lb ai/A, (3) Pursuit 2SL 0.094 lb ai/A + Butyrac 2SC 0.75 lb ai/A, (4) Pursuit 2SL 0.094 lb ai/A + Prowl 3.8 CS 1.0 lb ai/A, (5) Raptor 1SL 0.047 lb ai/A, (6) Raptor 1SL 0.024 lb ai/A + Pursuit 2SL 0.024 lb ai/A, (7) Raptor 1SL 0.032 lb ai/A + Pursuit 2SL 0.032 lb ai/A, (8) Raptor 1SL 0.032 lb ai/A + Pursuit 2SL 0.032 lb ai/A + Prowl 3.8 CS 1.0 lb ai/A, (9) Raptor 1SL 0.047 lb ai/A + Buctril 4EC 0.375 lb ai/A, (10) Raptor 1SL 0.047 lb ai/A + Buctril 4EC 0.375 lb ai/A + Prowl 3.8CS 1.0 lb ai/A, (11) Raptor 1SL 0.047 lb ai/A + Butyrac 2SC 0.75 lb ai/A, (12) Raptor 1SL 0.047 lb ai/A + Butyrac 2SC 0.75 lb ai/A + Prowl 3.8SC 1.0 lb ai/A, (13) Raptor 1SL 0.047 lb ai/A + Prowl 3.8SC 1.0 lb ai/A, (15) Pursuit 2SL 0.094 lb ai/A, (16) Buctril 4EC 0.375 lb ai/A, (17) Gramoxone Max 3EC 0.188 lb ai/A, (18) Butyrac 2SC 1.0 lb ai/A. Adjuvants; Unifilm 707 0.25% V/V and UN32 1.25% V/V were added to all treatments except for Gramoxone Max where 0.125% Unifilm 707 was added. No adjuvant added to Weed Pharma. Treatments were arranged in a randomized complete block design with three replicates. Plots were 10 ft. X 15 ft. Materials were applied with a CO<sup>2</sup> backpack sprayer, 35 psi in 20 gal/A of water. Growth stages prior to application: alfalfa = 3-5 trifoliolate leaf, 1" height, 16/ft<sup>2</sup>; common chickweed (*Stellaria media*) = 15-30 leaf, 3-4" diameter, 7/ft<sup>2</sup>; burning nettle (*Urtica urens*) = 8-12 leaf, 1-2" height, 3/ft<sup>2</sup>; common groundsel (*Senecio vulgaris*) = 8-12 leaf, 1-2" height, 3/ft<sup>2</sup>; roughseeded buttercup (*Ranunculus muricatus*) = 4-6 leaf, 2-3" diameter, 3/ft<sup>2</sup>; little mallow [malva] (*Malva parviflora*) = 10-20 leaf, 4-6" diameter, 4/ft<sup>2</sup>; annual bluegrass (*Poa annua*) = 4 leaf- 2 tillers, 1-2" height, 0.1/ft<sup>2</sup>; annual sowthistle (*Sonchus oleraceus*) = 4-6 leaf, 2-4" diameter, 2/ft<sup>2</sup>; seedling curly dock (*Rumex crispus*) = 2-4 leaf, 1-2" diameter, 0.2/ft<sup>2</sup>; prickly lettuce (*Lactuca serriola*) = 4-6 leaf, 2-12" diameter, 0.2/ft<sup>2</sup>; prostrate knotweed (*Polygonum aviculare*) = 3-6 leaf, 1.0" height, 0.1/ft<sup>2</sup>. Crop tolerance was evaluated on 12/14/04, 1/18, 2/8 and 3/10/05. Weed control efficacy data were collected on 1/18, 2/8 and 3/10/05. Alfalfa and weed yields (dry weight) were taken on 4/14 and 6/10/05. Area harvested was 3' by 10'. Fresh weight samples were collected from each treatment and oven dried in the laboratory.

**RESULTS AND DISCUSSION:**

Alfalfa Tolerance Table 1-1. All herbicide treatments showed good alfalfa tolerance except for Gramoxone Max which resulted in some severe necrosis with complete recovery prior to the first cutting 4/14/05. Buctril alfalfa plant stand counts (5/ft<sup>2</sup>) and Weed Pharma (3/ft<sup>2</sup>) reduced alfalfa stand counts similar to the untreated check of 2/ft<sup>2</sup>. Stand counts from all other treatments ranged from 8-13 alfalfa plants/ft<sup>2</sup>.

Weed Control Table 1-2. In general, the best treatments for overall weed control were tank-mixtures of: (1) Raptor + Buctril + Prowl, (2) Raptor + Buctril, (3) Raptor + Buctril, (4) Raptor + Butyrac + Prowl, (5) Pursuit + Buctril, (6) Pursuit + Butyrac and (7) Gramoxone Max.

Alfalfa and Weed Yields (Dry Weights) Table 1-3.

First Cutting 4/14/05. Treatments with the highest alfalfa yields (Ton/A) were: (1) Raptor + Pursuit + Prowl = 1.89, (2) Pursuit + Butyrac = 1.86, (3) Raptor 0.032 lb ai/A + Pursuit 0.032 lb ai/A = 1.83, (4) Raptor + Butyrac = 1.80, (5) Raptor + Buctril = 1.77 (6) Raptor alone = 1.69, (7) Raptor + Butyrac + Prowl = 1.64, (8) Raptor + Buctril + Prowl = 1.62, (9) Raptor 0.024 lb ai/A + Pursuit 0.024 lb ai/A = 1.59 and (10) Pursuit + Buctril = 1.55. Untreated check yielded 0.09 Ton/A of alfalfa. Weed Pharma, Buctril and Gramoxone Max gave yields similar to the untreated check. Treatments with the lowest weed yields (Ton/A) were: (1) Raptor + Buctril + Prowl = 0.05, (2) Raptor + Butyrac = 0.06, (3) Raptor + Butyrac + Prowl = 0.07, (4) Raptor + Buctril = 0.10, (5) Raptor + Prowl = 0.22, (6) Raptor 0.032 lb ai/A + Pursuit 0.032 lb ai/A + Prowl = 0.26 and (7) Pursuit + Butyrac = 0.35 Ton/A.

Second Cutting 6/10/05. Weed Pharma and Buctril treatments gave alfalfa yields similar to the untreated check 0.19 Ton/A. The alfalfa stand and vigor has been greatly reduced in these treatments due to the severe weed competition of which malva was the major weed. Due to poor malva control, the Gramoxone Max treatment yielded 0.62 Ton/A of alfalfa. The highest yielding (Ton/A) treatments were: (1) Raptor + Buctril + Prowl = 1.67, (2) Raptor + Buctril = 1.61, (3) Raptor + Butyrac + Prowl = 1.50, (4) Raptor + Pursuit + Prowl = 1.49, (5) Raptor + Prowl = 1.37, (6) Raptor 0.032 lb ai/A + Pursuit 0.032 lb ai/A = 1.35, (7) Pursuit + Butyrac = 1.32, (8) Raptor 0.024 lb ai/A + Pursuit 0.024 lb ai/A = 1.32, (9) Raptor + Butyrac = 1.27, (10) Pursuit + Prowl = 1.27, (11) Raptor alone = 1.24, (12) Butyrac alone = 1.20, (13) Pursuit alone = 1.14 and (14) Pursuit + Buctril = 1.11 Ton/A.. Weed yields (Ton/A) were substantially reduced compared to the first cutting. Weed Pharma, untreated check and Buctril treatments gave weed yields (Ton/A) similar to or higher than the alfalfa yield.

Third Cutting 7/13/05. Alfalfa yields were not taken on the third cutting. The alfalfa stand and vigor were still significantly reduced in the Weed Pharma, Buctril and untreated check plots. The Gramoxone Max treatment was still showing some moderate reduction in the alfalfa vigor.

**Table 1-1. Seedling alfalfa crop injury and stand counts.**

Treatment <sup>1</sup>	Rate lb ai/A	% Alfalfa Injury				Stand Count
		.....Necrosis.....	.....Stunting.....			Plants/ft <sup>2</sup>
		12 DAT <sup>2</sup>	47 DAT	68 DAT	96 DAT	151 DAT
Weed Pharma <sup>3</sup> 10%	20 gpa	8	0	0	0	3.0
Pursuit 2SL + Buctril 4EC	0.094 + 0.375	4	7	0	0	9.0
Pursuit 2SL + Butyrac 2SC	0.094 + 0.750	0	8	8	7	13.0
Pursuit 2SL + Prowl 3.8CS	0.094 + 1.0	0	0	0	0	10.0
Raptor 1SL	0.047	0	0	0	0	10.0
Raptor 1SL + Pursuit 2SL	0.024 + 0.024	0	3	0	0	10.0
Raptor 1SL + Pursuit 2 SL	0.032 + 0.032	0	10	5	2	11.0
Raptor 1SL + Pursuit 2SL + Prowl 3.8CS	0.032 + 0.032 + 1.0	0	3	0	0	12.0
Raptor 1SL + Buctril 4EC	0.047 + 0.375	0	5	0	0	10.0
Raptor 1SL + Buctril 4EC + Prowl 3.8CS	0.047 + 0.375 + 1.0	0	8	5	0	12.0
Raptor 1SL + Butyrac 2SC	0.047 + 0.75	0	10	0	0	10.0
Raptor 1SL + Butyrac 2SC + Prowl 3.8CS	0.047 + 0.75 + 1.0	0	8	7	0	11.0
Raptor 1SL + Prowl 3.8CS	0.047 + 1.0	0	0	0	0	11.0
Pursuit 2SL	0.094	0	0	0	0	9.0
Buctril 4EC	0.375	4	0	0	0	5.0
Gramoxone 3EC	0.188	57	48	30	0	10.0
Butyrac 2SC	1.0	5	13	0	0	8.0
Untreated check	-	0	0	0	0	2.0
LSD (0.05)						1.9

<sup>1</sup>Unifilm 707 (NIS) added to paraquat at 0.125% V/V. All other treatments Unifilm 707 0.25% V/V + UN32 1.25% V/V.

<sup>2</sup>DAT = days after treatment.

<sup>3</sup>Applied at 20 gallons of product/acre; no adjuvant added.

**Table 1-2. Postemergence herbicides and tank mixtures for weed control in seedling alfalfa.**

Treatment <sup>1</sup>	Rate Lb ai/A	.....68 DAT.....						.....98 DAT.....			
		Butter Cup	Curly Dock	Knot Weed	Chick Weed	Burning Nettle	Groundsel	Malva	Annual Bluegrass	Sow Thistle	Prickly Lettuce
Weed Pharma <sup>2</sup>	20 gpa	0	0	0	0	0	0	0	0	0	0
Pursuit + Buctril	0.094 + 0.375	92	82	92	77	82	95	83	10	90	93
Pursuit + Butyrac	0.094 + 1.0	90	93	89	65	92	48	87	13	92	93
Pursuit + Prowl	0.094 + 1.0	95	92	90	87	95	28	83	37	12	7
Raptor	0.047	92	93	91	98	87	12	93	42	25	13
Raptor + Pursuit	0.024 + 0.024	91	95	92	92	80	13	96	30	24	10
Raptor + Pursuit	0.032 + 0.032	90	94	92	95	97	23	94	60	30	12
Raptor + Pursuit + Prowl	0.032 + 0.032 + 1.0	94	93	92	99	92	20	93	58	47	17
Raptor + Buctril	0.047 + 0.375	94	93	92	96	82	96	93	42	99	97
Raptor + Buctril + Prowl	0.047 + 0.375 + 1.0	94	92	94	97	86	97	92	67	98	97
Raptor + Butyrac	0.047 + 0.75	94	94	95	95	89	18	94	50	93	96
Raptor + Butyrac + Prowl	0.047 + 0.75 + 1.0	94	95	97	97	95	40	95	67	99	100
Raptor + Prowl	0.047 + 1.0	96	92	97	99	93	10	93	85	33	43
Pursuit	0.094	92	93	93	78	88	35	88	23	18	10
Buctril	0.375	27	23	57	0	0	100	0	0	90	73
Gramoxone	0.188	83	100	27	70	25	86	18	100	95	97
Butyrac	1.0	57	96	72	0	83	38	72	17	100	100
Untreated Check	-	0	0	0	0	0	0	0	0	0	0

<sup>1</sup>Unifilm 707 (NIS) added to paraquat at 0.125% V/V, all other treatments Unifilm 707 0.25% V/V + UN32 1.25% V/V.

<sup>2</sup>Applied at 20 gallons of product/acre; no adjuvant added.

**Table 1-3. Alfalfa and weed yield with various postemergence herbicides and tank mixtures in seedling alfalfa.**

Treatment <sup>1</sup>	Rate lb ai/A	Alfalfa and Weed Yield – Ton/A			
		.....First Cutting.....		.....Second Cutting.....	
		Alfalfa	Weeds	Alfalfa	Weeds
Weed Pharma <sup>2</sup>	20 gpa	0.03	3.33	0.10	0.35
Pursuit + Buctril	0.094 + 0.375	1.55	0.52	1.11	0.06
Pursuit + Butyrac	0.094 + 0.75	1.86	0.35	1.32	0.02
Pursuit + Prowl	0.094 + 1.0	0.90	1.19	1.27	0.07
Raptor	0.047	1.69	1.06	1.24	0.00
Raptor + Pursuit	0.024 + 0.024	1.59	1.00	1.32	0.00
Raptor + Pursuit	0.032 + 0.032	1.83	0.48	1.35	0.01
Raptor+ Pursuit + Prowl	0.032 + 0.032 + 1.0	1.89	0.26	1.49	0.01
Raptor + Buctril	0.047 + 0.375	1.77	0.10	1.61	0.00
Raptor + Buctril + Prowl	0.047 + 0.375 + 1.0	1.62	0.05	1.67	0.02
Raptor + Butyrac	0.047 + 0.75	1.80	0.06	1.27	0.00
Raptor + Butyrac + Prowl	0.047 + 0.75 + 1.0	1.64	0.07	1.50	0.00
Raptor + Prowl	0.047 + 1.0	1.31	0.22	1.37	0.00
Pursuit	0.094	1.29	1.40	1.14	0.02
Buctril	0.375	0.17	2.40	0.26	0.20
Gramoxone	0.188	0.09	2.63	0.62	0.21
Butyrac	1.0	0.80	1.32	1.20	0.01
Untreated check	-	0.09	2.56	0.19	0.44
LSD (0.05)		0.30	0.47	0.21	0.14

<sup>1</sup>Unifilm 707 (NIS) added to paraquat at 0.125% V/V. All other treatments Unifilm 707 0.25% V/V + UN32 1.25% V/V.

<sup>2</sup>Applied at 20 gallons of product/acre; no adjuvant added.

Trial 2. **Roundup Alone and Tank Mix Combinations for Weed Control and Crop Tolerance in Roundup Ready Alfalfa.** Mick Canevari, Don Colbert, Randall Wittie and Scott Whiteley.

**OBJECTIVE:** Evaluate Roundup alone and tank mix combinations for weed control and crop tolerance in Roundup Ready alfalfa.

**MATERIALS AND METHODS:** The following herbicides were applied to an established stand of Roundup Ready alfalfa on 12/14/04: (1) Roundup Ultra Max 4 SL 2.0 lb ai/A., (2) Roundup Ultra Max 4 SL 1.0 lb ai/A., (3) Roundup Ultra Max 4 SL 0.5 lb ai/A., (4) Velpar 2 EC 0.5 lb ai/A. + Gramoxone Max 3EC 0.375 lb ai/A. + Unifilm 707 @ 0.25% V/V, (5) Roundup Ultra Max 4 SL 1.0 lb ai/A. + Velpar 2EC 0.5 lb ai/A., (7) Roundup Ultra Max 4 SL 2.0 lb ai/A., (8) Roundup Ultra Max 4 SL 1.0 lb ai/A., (9) Roundup Ultra Max 4 SL 0.5 lb ai/A., (10) Velpar 2 EC 0.5 lb ai/A. + Gramoxone Max 3EC 0.375 lb ai/A. + Unifilm 707 @ 0.25% V/V, (11) Roundup Ultra Max 4 SL 1.0 lb ai/A. + Velpar 2EC 0.5 lb ai/A. Treatments were arranged in a randomized complete block design with three replicates. Plots were 10 ft X 50 ft. Materials were applied with a CO<sup>2</sup> backpack sprayer, 35 psi in 20 gal/A of water. Growth stages prior to application were: alfalfa = non-dormant, 12" height, burning nettle (*Urtica urens*) = 8-12" height, 16-30 leaf, common chickweed (*Stellaria media*) = 5-6" height, early flowering, annual bluegrass (*Poa annua*) = 4-6 tillers, 6" height and annual sowthistle (*Sonchus oleraceus*) = 6-8 leaf, 6-8" height. Treatments 6, 12 and 13 are untreated checks. Visual data on alfalfa injury and weed control taken on 1/24 and 2/14/05 were collected on all thirteen treatments. However, since treatments 1-6 were a duplicate of treatments 7-12, % biomass data (4/8/05) were collected only on treatments 1-6.

**RESULTS AND DISCUSSION:**

Crop Injury. All treatments showed excellent alfalfa tolerance.

Weed Control.

62 DAT. None of the Roundup only treatments gave effective control of burning nettle or annual sowthistle. Depending upon rate, annual bluegrass control ranged from 85-93% and common chickweed 72-95%. Velpar + Gramoxone gave excellent control of burning nettle, common chickweed and annual bluegrass with 60% annual sowthistle control. Roundup + Velpar resulted in excellent control of burning nettle, common chickweed with 73% and 76% control of annual sowthistle and annual bluegrass, respectively.

115 DAT. Alfalfa and weed biomass data from the tank-mix treatments of Velpar + Gramoxone and Roundup + Velpar were significantly better than any of the Roundup only treatments. There were no significant differences between the tank-mix treatments.

**Table 2-1. Roundup alone and tank mixtures for weed control and crop tolerance in established roundup ready alfalfa.**

% Crop Injury and Weed Control<sup>1</sup> – DAT<sup>2</sup>

Treatments	Rate LbA.I./Acre	Alfalfa		Burning Nettle		Chickweed		Annual Bluegrass		Sowthistle	% Biomass 115 DAT	
		41	62	41	62	41	62	41	62	62	Alfalfa	Weeds
Roundup Ultra Max 4SL	2.0	0	0	12	73	92	95	98	93	48	53	47
Roundup Ultra Max 4SL	1.0	0	0	7	30	88	87	99	90	52	23	77
Roundup Ultra Max 4SL	0.5	0	0	3	0	82	72	97	85	43	18	82
Velpar 2EC + Gramoxone Max 3EC	0.5 + 0.375	0	0	100	95	97	95	97	93	60	74	26
Roundup Ultra Max 4SL + Velpar 2EC	1.0 + 0.5	0	0	100	95	90	88	93	76	73	73	27
Untreated		0	0	0	0	0	0	0	0	0	11	89
Roundup Ultra Max 4SL	2.0	0	0	N/A		92	89	98	92	58	N/A	N/A
Roundup Ultra Max 4SL	1.0	0	0	N/A		83	85	97	83	52	N/A	N/A
Roundup Ultra Max 4SL	0.5	0	0	N/A		79	76	97	82	40	N/A	N/A
Velpar 2EC + Gramoxone Max 3EC	0.5 + 0.375	0	0	N/A		96	93	100	94	67	N/A	N/A
Roundup Ultra Max 4SL + Velpar 2EC	1.0 + 0.5	0	0	N/A		92	89	98	93	70	N/A	N/A

LSD (0.05)  
48

13

<sup>1</sup> 0 = No weed control or crop injury, 100 = Complete weed control; crop dead  
<sup>2</sup> DAT = Days After Treatment

Trial 3. **Postemergence Herbicides for Controlling Weeds in an Established Stand of Roundup Ready Alfalfa.**  
Mick Canevari, Don Colbert, Randall Wittie and Scott Whiteley.

**OBJECTIVE:** Evaluate several postemergence herbicides applied alone and tank-mix combinations for controlling weeds in an established stand of Roundup Ready Alfalfa.

**MATERIALS AND METHODS:** The following herbicides were applied to an established stand of alfalfa on 12/13/04: (1) Chateau 51WG 0.094 lb ai/A + Unifilm 707; (2) Chateau 51WG 0.125 lb ai/A + Unifilm 707; (3) Chateau 51WG 0.188 lb ai/A + Unifilm 707; (4) Chateau 51WG 0.094 lb ai/A + Gramoxone Max 3EC 0.47 lb ai/A + Unifilm 707; (5) Chateau 51WG 0.125 lb ai/A + Gramoxone Max 3EC 0.47 lb ai/A + Unifilm 707; (6) Chateau 51WG 0.188 lb ai/A + Gramoxone Max 3EC 0.47 lb ai/A + Unifilm 707; (7) Raptor 1SL 0.047 lb ai/A + UN32 + MSO; (8) Raptor 1SL 0.047 lb ai/A + Prowl 3.8 CS 4.0 lb ai/A + MSO + UN32; (9) Pursuit 2SL 0.094 lb ai/A + MSO + UN32; (10) Pursuit 2SL 0.094 lb ai/A + MSO + UN32; (11) Velpar 2EC 0.5 lb ai/A.; (12) Gramoxone Max 3EC 0.47 lb ai/A + Unifilm 707. Adjuvant use rates were Unifilm 707 90SL 0.25% V/V, UN32 32SL 1.25% V/V and MSO 100%SL 1.0% V/V. Treatments were arranged in a randomized complete block design with three replicates. Plots were 10ft. X 15ft. Materials were applied with a CO<sup>2</sup> backpack sprayer, 35 psi in 20 gal/A of water. Growth stages prior to the 12/13/04 application were: alfalfa = non dormant, 10-14" height; annual sowthistle (*Sonchus oleraceus*) = 6-8 leaf, 6-8" height, 1.0/ft<sup>2</sup>; common chickweed (*Stellaria media*) = early flower, 6-8" height and 25/ft<sup>2</sup> and annual bluegrass (*Poa annua*) = 4-6 tillers, 6-8" height, 5/ft<sup>2</sup>.

## **RESULTS AND DISCUSSION:**

Alfalfa Injury. All herbicide treatments showed good crop tolerance. Chateau + Gramoxone Max tank mixtures were the only treatments to show some slight crop injury 63 DAT (7-13% stunting).

### Weed Control.

Chateau Alone: Depending upon rate, common chickweed control varied from 82-89%. Needed the high rate of 0.188 lb ai/A to give 89% annual bluegrass control. All rates showed no control of annual sowthistle.

Chateau + Gramoxone Max(TM): All tank-mixes gave excellent control (88-100%) control of the above weed species. These tank mixtures were the best treatments in trial.

Raptor and Pursuit: Both herbicides were not effective in controlling the above weed species.

Gramoxone Max: Gave 70% chickweed control, 87% control of annual bluegrass and 100% control of annual sowthistle.

Velpar: Resulted in 73% chickweed control, 82% control of annual bluegrass and 68% control of annual sowthistle.

**Table 3-1. Postemergence herbicides for controlling weeds in an established stand of roundup ready alfalfa.**

Treatment <sup>3</sup>	Lb ai/A	..% Alfalfa Injury <sup>1</sup> ...		..... % Weed Control <sup>1</sup> .....					
		42 DAT <sup>2</sup>	63 DAT	Chickweed		Annual bluegrass		Sowthistle	
				42 DAT	63 DAT	42 DAT	63 DAT	63 DAT	
Chateau 51WG	0.094	0	0	93	82	62	43	0	
Chateau 51WG	0.125	0	0	93	88	70	40	0	
Chateau 51WG	0.188	0	0	94	89	80	89	3	
Chateau 51WG + Gramoxone Max 3EC	0.094 + 0.47	4	0	96	88	98	96	100	
Chateau 51WG + Gramoxone Max 3EC	0.125 + 0.47	4	7	97	93	96	93	100	
Chateau 51WG + Gramoxone Max 3EC	0.188 + 0.47	4	13	98	93	94	96	100	
Raptor 1SL	0.047	0	0	80	52	59	57	30	
Raptor 1SL + Prowl 2.8CS	0.047 + 4.0	0	0	78	55	75	40	17	
Pursuit 2SL	0.094	0	0	72	30	35	0	0	
Pursuit 2SL + Prowl 3.8CS	0.094 + 4.0	0	0	48	38	13	7	0	
Velpar 2EC	0.5	0	0	82	73	18	82	68	
Gramoxone Max 3EC	0.47	8	0	63	70	92	87	100	
Untreated Control	-	0	0	0	0	0	0	0	

<sup>1</sup> 0 = no weed control, no crop injury

100 = complete weed control, crop dead

<sup>2</sup> Days after treatment

<sup>3</sup> Chateau and Gramoxone Max treatments included Unifilm 707 at 0.25% V/V.

Raptor and Pursuit treatments included MSO at 1.0% V/V and UN32 at 1.25% V/V.

Trial 4. **Postemergence Applications of Velpar for Common Groundsel Control in Established Alfalfa.** Mick Canevari, , Don Colbert, Randall Wittie and Scott Whiteley.

**OBJECTIVE:** Evaluate various postemergence applications of Velpar applied on three dates for controlling common groundsel in established alfalfa.

**MATERIALS AND METHODS:** All treatments were applied with a CO<sup>2</sup> back pack sprayer, 35 psi in 20 gal/A of water. Plots were 10ft. by 15ft. and treatments were arranged in a randomized complete block design with three replicates. Adjuvant use rates were; (1) Unifilm 707(Non-ionic surfactant) 0.25% V/V, (2) MSO (methylated seed oil) 1.0% V/V and (3) UN32 (liquid nitrogen fertilizer) 1.25% V/V. The following herbicides were applied postemergence on the **EARLY** application date (A) 11/29/2004 in an established alfalfa field located on the Klein Ranch near Stockton, CA; (1) Velpar 2L 0.25, 0.5, 1.0 and 2.0 lb ai/A, (2) Gramoxone MAX 3EC 0.47 lb ai/A + Unifilm 707, (3) Chateau 51% WG 0.094 and 0.188 lb ai/A + Unifilm 707, (4) Chateau 51% WG 0.094 lb ai/A + Velpar 2L 0.5 lb ai/A, (5) Chateau 51% WG 0.094 lb ai/A + Gramoxone MAX 3EC 0.47 lb ai/A + Unifilm 707, (6) Chateau 51% WG 0.094 lb ai/A + Raptor 1 SL 0.047 lb ai/A + UN32 + MSO and (7) Raptor 1SL 0.047 lb ai/A + UN32 + MSO. Growth stages prior to application; alfalfa = 4-8" height, common groundsel (*Senecio vulgaris*) = 15% cotyledon, 0.25" height, 25% 2-4 leaf, 0.5" height and 60% 5-6 leaf, 1-2" height, common chickweed (*Stellaria media*) = 5-20 leaf, 0.5-2" height. On the **MID** application date (B) 12/6/04, Velpar 2L was applied at 0.25, 0.5, 1.0 and 2.0 lb ai/A. Growth stages prior to application were; alfalfa = 5-8" height, common chickweed = early bud, 1-4" height, common groundsel = 40% 6-8 leaf, 2" height and 60% 10-16 leaf, 3.5" height. On the **LATE** application date (C) 1/13/05, Velpar 2L was applied at 0.25, 0.5, 1.0 and 2.0 lb ai/A. Growth stages prior to application were; alfalfa = 6-8" height, common groundsel = 10-20 leaf, early bud to flowering, 4-7" height and common chickweed = bud to flowering, 5-7" height.

#### **RAINFALL/LIGHT INTENSITY DATA:**

Rainfall and Light intensity (Solar Radiation LY) were collected after each application date from CIMIS #42 weather station located near Lodi, CA. DAT = Days After Treatment.

**EARLY** Application (A) 11/29/04: First rainfall 0.01" occurred on 12/2/04 (72 hours after application). Next rain event occurred on 12/7/04, 84 hours after the trace was received on 12/2/04. Total rainfall on 12/7/04 was 0.45" and on 12/8/04 another 0.32" fell. Total light intensity (Solar Radiation LY) 6 DAT = 1367, 13 DAT = 2177 and 30 DAT = 4146.

**MID** Application (B) 12/20/04: On 12/20/04 rain started 12 hours after the application, total 0.01". 12/21/04-12/22/04 = 0", 12/23 = 0.01", 12/24-12/26 = 0", 12/27 = 0.24", 12/28 = 0.66" and 12/29 = 0.07". Total light intensity (Solar Radiation LY) 6 DAT = 915, 13 DAT = 1678 and 30 DAT = 3221.

**LATE** Application (C) 01/13/05: Rained 0.01" 9 hours prior to application. First rainfall after application occurred on 1/24/05 = 0.01", 1/25/05 = 0.01", 1/26/05 = 0.36", 1/27/05 = 0.06" and 1/28/05 = 0.36". Total light intensity (Solar Radiation LY) 6 DAT = 427, 13 DAT = 864 and 30 DAT = 4905.

#### **RESULTS AND DISCUSSION:**

DAT = Days After Treatment.

##### Alfalfa Injury Table 4-1.

Velpar: All applications of Velpar alone showed some early alfalfa necrosis and stunting with complete recovery by 60 DAT.

Gramoxone: Gramoxone alone resulted in some substantial alfalfa necrosis and stunting with complete recovery within 90 DAT.

Chateau: Chateau alone treatments gave injury similar to Velpar rates of 0.5 lb ai/A and above. Chateau + Gramoxone (TM) gave injury similar to Gramoxone applied alone. 28 DAT, tank mixtures of Chateau with either Velpar or Raptor gave significantly more alfalfa injury than either herbicide applied alone at a similar rate. However, 90 DAT the alfalfa had completely recovered.

Raptor: Raptor alone showed no alfalfa injury.

Weed Control Table 4-1.

Velpar: The below label rate of Velpar at 0.25 lb ai/A was not effective in controlling common chickweed or common groundsel. Overall, taking into account all rates and dates of Velpar alone applications, the best weed control was obtained on the **EARLY** application date (A) 11/29/04 followed by the **LATE** application date (C) 1/13/05. Velpar applied on the **MID** application date (B) 12/20/04 resulted in significantly less weed control than the other two dates. This reduction in control could be attributed to a reduction in the total light intensity 30 days after the application (Table 4-2).

Chateau: Both rates of Chateau alone gave 88-94% chickweed control. Groundsel control at the low rate of 0.094 lb ai/A was 33% and 80% control with the 0.188 lb ai/A rate. Chateau tank mixed with either Velpar, Gramoxone or Raptor gave excellent (94-100%) control of the above weed species. Overall weed control from these tank mixtures was better than the herbicides applied alone at a comparable rate.

Raptor: Gave 73% chickweed control and 38% control of groundsel.

Alfalfa/Weed Yields From the **EARLY** Application Date (A) 11/29/04 Table 4-1

Alfalfa Yields: Velpar applied on the **EARLY** application date at 0.5, 1.0 and 2.0 lb ai/A gave yields (Ton/A) of 1.76, 1.79 and 1.67, respectively. Other alfalfa yields (Ton/A) were; Chateau 0.188 lb ai/A = 1.68, Chateau + Velpar (TM) = 1.57, Chateau + Gramoxone (TM) = 1.55 and Chateau + Raptor (TM) = 1.51. Untreated checked yielded = 1.42. Yields were not statistically different between treatments.

Weed Yields: Treatments with the least amount of weeds were: (1) Chateau tank mixed with either Velpar or Gramoxone followed by, (2) Velpar 1.0 and 2.0 lb ai/A, (3) Chateau 0.188 lb ai/A and (4) Chateau + Raptor tank mixture. Weed yields from the above treatments were not significantly different between treatments but all were significantly lower than the untreated check.

**Table 4-1. Postemergence herbicides applied on three different dates for common groundsel control in established alfalfa.**

% Crop Injury and Weed Control -- DAT<sup>1</sup>

Treatments <sup>4</sup>	Rate LbA.I./Acre	Alfalfa <sup>3</sup>				Chickweed <sup>3</sup>			Groundsel <sup>3</sup>			Yield Alfalfa	Ton/Acre <sup>2</sup> Weeds
		20	40	60	90	40	60	90	40	60	90		
Velpar 2EC (Early <sup>5</sup> )	0.25	8	2	0	0	70	60	45	80	77	62	1.45	0.13
Velpar 2EC (Early)	0.5	20	10	0	0	92	82	82	90	97	83	1.76	0.30
Velpar 2EC (Early)	1.0	23	12	4	0	97	96	96	100	100	98	1.79	0.04
Velpar 2EC (Early)	2.0	28	27	8	0	100	99	97	100	99	99	1.67	0.04
Gramoxone Max 3EC (Early)	0.5	87	75	17	0	91	87	80	100	100	100	1.50	0.12
Chateau 51WG (Early)	0.094	25	15	7	0	85	91	88	68	90	33	1.42	1.27
Chateau 51WG (Early)	0.188	30	30	13	0	92	98	94	78	92	80	1.68	0.07
Chateau 51WG + Velpar 2EC (Early)	0.094 + 0.5	78	33	12	0	95	99	99	100	99	99	1.57	0.0
Chateau 51WG + Gramoxone Max 3EC (Early)	0.094 + 0.47	90	67	12	0	96	99	99	100	100	100	1.55	0.0
Chateau 51WG + Raptor 1SL (Early)	0.094 + 0.047	80	47	15	0	97	98	98	95	99	94	1.51	0.08
Raptor 1SL (Early)	0.047	3	0	2	0	72	92	73	68	53	38	1.40	0.23
Velpar 2EC (Mid <sup>6</sup> )	0.25	10	2	0	0	13	10	3	8	17	12		
Velpar 2EC (Mid)	0.5	17	2	0	0	42	36	21	32	28	23		
Velpar 2EC (Mid)	1.0	23	7	0	0	70	72	67	48	45	38		
Velpar 2EC (Mid)	2.0	28	10	0	0	88	85	83	61	57	48		
Velpar 2EC (Late <sup>7</sup> )	0.25		3	0	0	20	20		63	62			
Velpar 2EC (Late)	0.5		5	0	0	77	77		78	80			
Velpar 2EC (Late)	1.0		13	0	0	85	85		100	99			
Velpar 2EC (Late)	2.0		15	0	0	99	99		100	99			
Untreated Check		0	0	0	0	0	0	0	0	0		1.42	0.25
LSD (0.05)												0.44	0.13

<sup>1</sup> Days after treatment

<sup>5</sup> -- Early Application = 11/29/04

<sup>2</sup> -- first cutting, 90% D.M.

<sup>6</sup> -- Mid Application = 12/20/04

<sup>3</sup> -- 0 = No weed control or crop injury.

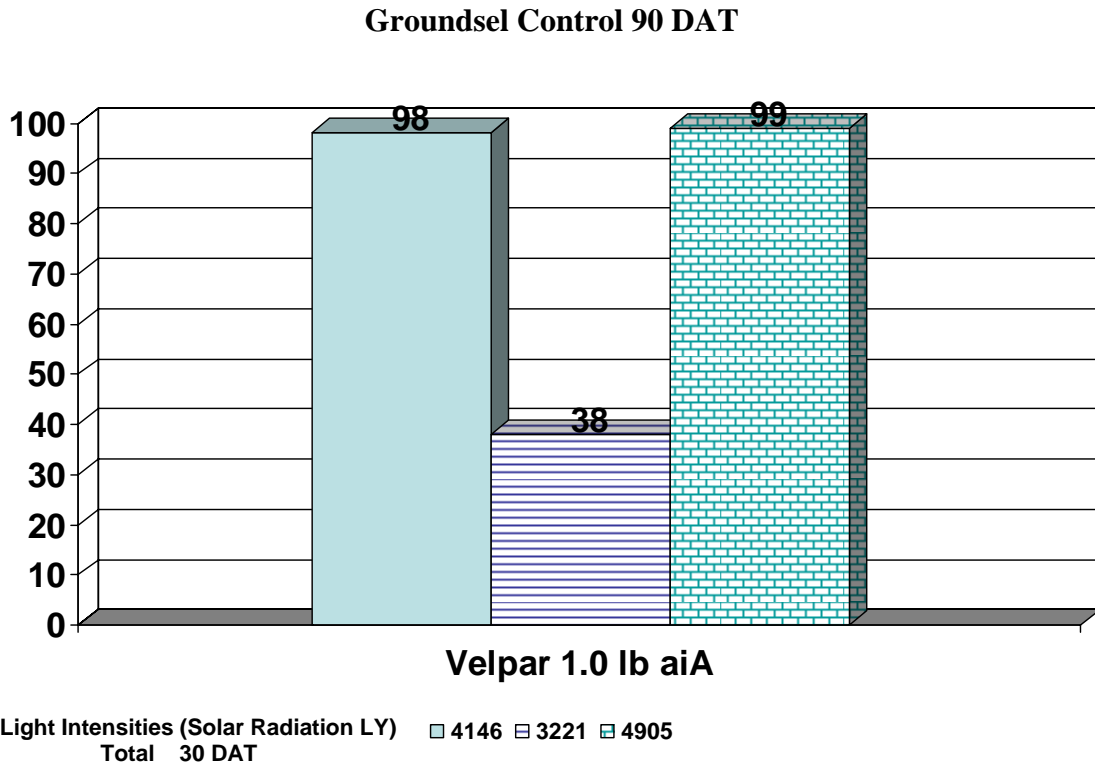
<sup>7</sup> -- Late Application = 1/13/05

100 = Complete weed control; crop dead.

<sup>4</sup> Chateau and Gramoxone Max treatments included Unifilm 707 @ 0.25% V/V.

Raptor treatments included MSO @ 1.0% V/V and UN32 @ 1.25% V/V.

Table 4-2. Velpar control of common groundsel under various light intensities (solar radiation LY).



**Trial 5. Postemergence Applications of Velpar for Common Groundsel Control Under Two Rainfall Regimes in Established Alfalfa.** Mick Canevari, Don Colbert, Randall Wittie and Scott Whiteley.

**OBJECTIVE:** Evaluate the performance of Velpar postemergence applications for common groundsel control under two rainfall regimes in established alfalfa.

**MATERIALS AND METHODS:** All treatments were applied with a CO<sup>2</sup> back pack sprayer, 35 psi in 20 gal/A of water. Plots were 10ft. by 15ft. and treatments were arranged in a randomized complete block design with three replicates. The following herbicides were applied postemergence on the first application date 11/29/04; (1) Velpar 2L 0.25, 0.50, 1.0 and 2.0 lb ai/A and (2) Gramoxone max 3EC 0.47 lb ai/A + Unifilm 707 0.25% V/V. Growth stages prior to application were: alfalfa = 4-8" height, common chickweed (*Stellaria media*) = 5-20 leaf, 0.5-2" height, common groundsel (*Senecio vulgaris*) = 15% cotyledon, 0.25" height, 25% 2-4 leaf, 0.5" height and 60% 5-6 leaf, 1-2" height. On the second application date 12/6/04, Velpar 2L was applied at 0.25, 0.50, 1.0 and 2.0 lb ai/A. Growth stages prior to application were: alfalfa = 5-8" height, common chickweed = 5-20 leaf, 0.5-2" height and common groundsel = 15% cotyledon, 0.5" height, 25% 2-4 leaf 0.5" height and 60% 5-6 leaf, 1-2" height.

**RAINFALL DATA/LIGHT INTENSITY DATA:**

Rainfall and Light intensity (Solar Radiation LY) data were collected after each application date from CIMIS #42 weather stations located near Lodi, CA.

First Application 11/29/04: First rainfall 0.01" occurred on 12/2/04 (72 hours after application). Next rain event occurred on 12/7/04, 84 hours after the trace was received on 12/2/04. Total rainfall on 12/7/04 was 0.45" and on 12/8/04 another 0.32" fell. Total light intensity (Solar Radiation LY) 6 DAT = 1367, 13 DAT = 2177 and 30 DAT = 4146.

Second Application 12/6/04: On 12/7/04 rain started 12 hours after the application, total 0.45". On 12/8/04 another 0.32" of rainfall occurred. Total light intensity (Solar Radiation (LY) 6 DAT = 723, 13 DAT = 1496 and 30 DAT = 3444.

**RESULTS AND DISCUSSIONS:**

Chickweed. On the first application date Velpar at 0.25 and 0.5 lb ai/A was more effective in controlling the chickweed than similar rates applied on the second date (Table 5-1). On both application dates, the higher rates of Velpar 1.0 and 2.0 lb ai/A gave similar chickweed control.

Groundsel. Overall, Velpar treatments applied on the first date 11/29/04 were much more effective in controlling groundsel than those applied on the second date 12/6/04. Velpar at 0.50 lb ai/A applied on the first application date gave similar groundsel control as 2.0 lb ai/A applied on the second date 12/6/04. This reduction in groundsel control could be attributed to a combination of rainfall occurrence and total light intensity 30 days after the application.

**Table 5-1. Postemergence applications of velpar for common groundsel control under two rainfall regimes in established alfalfa.**

% Crop Injury and Weed Control -- DAT<sup>1</sup>

Treatments	Rate LbA.I./Acre	Alfalfa <sup>2</sup>			Chickweed <sup>2</sup>			Groundsel <sup>2</sup>		
		36	76	96	36	76	96	36	76	96
Velpar 2L No Rain-1 <sup>st</sup>	0.25	2	7	0	70	58	45	80	70	62
Velpar 2L No Rain-1 <sup>st</sup>	0.5	10	2	0	92	79	82	90	88	83
Velpar 2L No Rain-1 <sup>st</sup>	1.0	12	5	0	97	96	96	100	100	98
Velpar 2L No Rain-1 <sup>st</sup>	2.0	27	7	0	100	97	97	100	99	99
Gramoxone <sup>3</sup> Max 3EC-1 <sup>st</sup>	0.47	75	13	0	90	86	80	100	100	100
Velpar 2L Rain-2 <sup>nd</sup>	0.25	10	0	0	10	7	0	10	20	20
Velpar 2L Rain-2 <sup>nd</sup>	0.5	15	0	0	70	62	55	17	13	8
Velpar 2L Rain-2 <sup>nd</sup>	1.0	18	0	0	92	89	88	27	18	13
Velpar 2L Rain-2 <sup>nd</sup>	2.0	25	0	0	97	96	97	78	79	86
Untreated Check		0	0	0	0	0	0	0	0	0

<sup>1</sup> Days after treatment

<sup>2</sup> 0 = No injury or no weed control.

100 = Complete weed control; crop dead.

<sup>3</sup>Gramoxone Max treatment included Unifilm 707 @ 0.25% V/V.

Trial 6. **Postemergence Herbicides for Dodder Control in Established Alfalfa.**

**OBJECTIVE:** Evaluate several postemergence herbicides and tank mix combinations for dodder control and crop tolerance in established alfalfa.

**MATERIALS AND METHODS:** The following herbicides and National Organic Program (NOP) approved materials were applied postemergence on June 30, 2005 to alfalfa with a high population of attached dodder (*Cuscuta indecora*): (1) Pursuit 2SL 0.094 lb ai/A + COC + UN32, (2) Raptor 1SL 0.047 lb ai/A + UN32, (3) Visor 2EC 1.0 lb ai/A + UN32, (4) Shark 40 EC 0.031 lb ai/A + COC + UN32, (5) Ethrel 2SL 1.0 lb ai/A + UN32, (6) Pursuit 2SL 0.094 lb ai/A + Ethrel 2SL 1.0 lb ai/A + UN32, (7) Raptor 1SL 0.047 lb ai/A + Ethrel 2SL 1.0 lb ai/A + UN32, (8) Matran2 46%SL 29.0 lb ai/A + Farmer's Friend surfactant (FF), (9) Weed Pharma 30%SL 80 gallons of product/A + Farmer's Friend surfactant, (10) Chateau 51%WG 0.003 lb ai/A + COC + UN32 and (11) Roundup Weathermax 6SL 1.0 lb ai/A + UN32. Adjuvant use rates were: (1) Crop Oil Concentrate (COC) 1.0% V/V, (2) Liquid Nitrogen (UN32) 1.0% V/V and (3) Farmer's Friend Surfactant (FF) 0.0125% V/V.

Treatments were randomly assigned by locating active dodder patches of similar size in an established alfalfa field. Thrice replicated treatments were applied to 10ft. X 10ft plots. Materials were applied with a CO<sup>2</sup> backpack sprayer, 35 psi in 40 gal/A of water; except for the organic materials (Trt 8 and 9) and Chateau (Trt 10) which were applied in 80 gal/A water.

Alfalfa had been cut and irrigated one week prior to herbicide application. Dodder control and crop tolerance data were collected simultaneously on 7/7, 7/15 and 7/21/2005.

**RESULTS AND DISCUSSION**

Alfalfa Injury. Weed Pharma and Chateau treatments showed some initial alfalfa injury (burning) of 79% and 89%, respectively. By 21 DAT, alfalfa injury (stunting) with Weed Phrama was only 10% and 7% for Chateau. Roundup 15 DAT gave 27% alfalfa injury (burning) with 19% stunting at 21 DAT. Alfalfa in the above treatments completely recovered prior to the second cutting. All other treatments showed excellent alfalfa tolerance.

Dodder Control. The only treatments that gave some dodder control 21 DAT were; (1) Chateau = 69%, (2) Roundup = 64% and (3) Weed Pharma = 24%.

**Table 6-1. Postemergence herbicides for dodder control in established alfalfa.**

% Crop Injury and Dodder Control<sup>1</sup> – DAT<sup>2</sup>

TREATMENT <sup>3</sup>	RATE lb ai/A.	Alfalfa			Dodder		
		7 DAT	15 DAT	21 DAT	7 DAT	15 DAT	21 DAT
1.Untreated Check		0	0	0	0	0	0
2.Pursuit 2SL	0.094	5	0	5	8	7	0
3.Raptor 1SL	0.047	0	10	17	5	5	0
4. Visor 2 EC	1.0	0	10	0	1	3	10
5. Shark 40%EC	0.031	14	0	9	18	18	4
6. Ethrel 2SL	1.0	0	0	10	6	0	10
7. Pursuit 2SL + Ethrel 2SL	0.094 + 1.0	0	0	7	2	3	7
8.Raptor 1SL + Ethrel 2SL	0.047 + 1.0	0	0	14	0	2	0
9. Matran 2 46%SL	29.0	14	5	7	1	0	0
10. Weed Pharma <sup>4</sup> 30%SL	80 Gal/A	79	23	10	19	38	24
11. Chateau 51WG	.047+.75	89	15	7	80	97	69
12.Roundup Weathermax 6SL	1.0	2	27	19	1	43	64

<sup>1</sup>Alfalfa 0 = no injury, 100 = crop dead

Dodder 0 = no control, 100 = complete control

<sup>2</sup> Days after treatment

<sup>3</sup> Treatments 2, 5, 7 and 11 included COC 1.0% V/V + UN32 1.0% V/V

Treatments 3,4,6,8 and 12 included UN32 1.0% V/V

Treatments 9 and 10 included Farmer's Friend 0.0125% V/V

<sup>4</sup> Applied at 80 gallons of product /acre