Alfalfa

INSECT and WEED CONTROL TRIAL RESULTS

SAN JOAQUIN COUNTY

Cooperative Extension University of California
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2006 ALFALFA

WEED CONTROL & INSECT RESEARCH PROGRESS REPORT

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San Joaquin County

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Caution

This report is a summary of alfalfa weed and insect control studies conducted in San Joaquin County. **It should not in any way be interpreted as a recommendation of the University of California**.

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

Trade Name	Common Name	Company
BAS 320 I	experimental	BASF
Baythroid	cyfluthrin	Bayer
Buctril	bromoxynil	Bayer
Butyrac 200	2,4-DB amine	Albaugh,Inc.
Chateau	flumioxazin	Valent
DPX-E2Y45	experimental	DuPont
Gramoxone	paraquat	Syngenta
GF-1668	chlorpyrifos	Dow
Intrepid	methoxyfenozide	Dow
LAF-1	chlorpyrifos	Dow
Lannate	methomyl	DuPont
Lorsban	chlorpyrifos	Dow
Mustang	zeta-cypermethrin	FMC
NNI 001	experimental	Bayer
Renounce	cyfluthrin	Bayer
Pursuit	imazethapyr	BASF
Raptor	imazamox	BASF
Roundup	glyphosate	Monsanto
Spod-X	nucleopolyhedrosis virus	Certis USA
Steward	indoxacarb	DuPont
Success	spinosad	Dow
V-10142	imazsulfuron	Valent
Velpar	hexazinone	DuPont
Warrior	lambda-cyhalothrin	Syngenta
XenTari	bacillus thuringiensis spp. aizawai	Valent

2006 Alfalfa Weed Control Trial Results

During the 2006 season, four weed control and one insecticide trial were established in San Joaquin County. Weed control trials were established to evaluate the effectiveness of candidate herbicides for controlling annual and perennial weeds in seedling and established alfalfa. The insecticide trial was conducted to evaluate a number of insecticides for controlling beet armyworms in an established alfalfa stand. Complete trial descriptions, insect counts and weed control/crop phytotoxicity ratings for each trial follow.

Trial 1 – **Yellow Nutsedge Control in Roundup Ready Alfalfa.** Mick Canevari, Don Colbert, Randall Wittie & Scott Whiteley.

OBJECTIVE: Evaluate several Roundup Weather Max (glyphosate) application scenarios for controlling Yellow nutsedge (*Cyperus esculentus*) in Roundup Ready Alfalfa.

MATERIALS & METHODS: The following Roundup Weather Max application scenarios were applied to an established Roundup Ready Alfalfa stand on the Klein Ranch located near Tracy, California: (1) Roundup Weather Max 5.5SL 1.0 lb ai/A applied after the 1st, 2nd and 3rd cutting, (2) Roundup Weather Max 5.5SL 1.5 lb ai/A applied after the 1st cutting, (3) Roundup Weather Max 5.5SL 2.0 lb ai/A applied after the 1st cutting followed by 1.0 lb ai/A applied after the 2nd and 3rd cutting, (4) Roundup Weather Max 5.5SL 1.5 lb ai/A applied after the 1st cutting followed by 1.0 lb ai/A applied after the 2nd and 3rd cutting, (5) Untreated check, (6) Roundup Weather Max 5.5SL 1.5 lb ai/A + BB5 Natural (buffering agent) 0.22% V/V applied after the 1st cutting, (7) V-10142 75%WP 0.5 lb ai/A + Agridex 1.25% V/V applied after the 1st cutting and (8) Roundup Weather Max 5.5SL 1.5 lb ai/A applied after the 2nd cutting. Plots were 10 by 25 ft arranged in a randomized complete block design with four replications. Applications were made with a CO_2 backpack sprayer, 35 psi in 20 gpa. Growth stages prior to the 1st application date (**A**) June 15, 2006: alfalfa = 7-12" ht. and yellow nutsedge = 3-4 lf, 3-10 inch ht. Growth stages prior to the 2nd application date (**B**) July 17, 2006: alfalfa = 6-18 inch ht. and yellow nutsedge = 3-5 lf, 6-8 inch ht. Growth stages prior to the 3rd application date (**C**) August 10, 2006: alfalfa 3-8 inch ht. and yellow nutsedge = 3-5 lf, 3-8 inch ht.

RESULTS & DISCUSSIONS:

V-10142: Gave poor overall control of yellow nutsedge with moderate to severe chlorosis and stunting to the alfalfa.

Roundup Weather Max: All treatments showed excellent alfalfa tolerance. All treatments which included sequential applications of Roundup Weather Max gave excellent (97-98%) yellow nutsedge control. A single application of Roundup Weather Max 1.5 lb ai/A after the 2nd cutting gave 96% control of the yellow nutsedge. All of the above treatments on 9/18/06 gave significantly better yellow nutsedge control than a single application of Roundup Weather Max 1.5 lb ai/A applied after the 1st cutting. The addition of BB5 Natural buffering agent to Roundup Weather Max 1.5 lb ai/A applied after the 1st cutting did not enhance the control of yellow nutsedge. Roundup Weather Max treatments with and without BB5 Natural gave 87% and 85% yellow nutsedge control, respectively.

Table – Yellow Nutsedge Control and Crop Tolerance in Roundup Ready Alfalfa

Treatment	Rate lb ai/A	Application[1] Timing	%-Alfalfa Injury[2] 6/22	7/17	8/10	%-Yellow Nutsedge Control[2] 7/17	8/10	9/5	9/18
Roundup Weather Max	1.0	1st,2nd,3rd	0	0	0	70c	98a	100a	98a
Roundup Weather Max	1.5	1st	0	0	0	90a	84b	89c	85b
Roundup Weather Max	2.0 1.0	1st 2nd, 3rd	0	0	0	95a	98a	99a	97a
Roundup Weather Max	1.5 1.0	1st 2nd,3rd	0	0	0	80b	97a	100a	98a
Roundup Weather Max + BB5[3] Natural	1.5	1st	0	0	0	93a	88b	88c	87b
Roundup Weather Max	1.5	2rd	0	0	0	-	96a	93b	96a
V-10142 + Agridex[4]	0.5	1st	60	11	0	40d	23c	0d	0c
Untreated Check	-	-	0	0	0	0e	0d	0d	0c

[1] – Herbicide applied after cutting; 1st = 6/15/06, 2nd = 7/17/06 & 3rd = 8/10/06

[2] – 0 = No weed control or crop injury, 100 = Complete weed control; crop dead

[3] – Added BB5 Natural buffering agent 0.22% V/V

[4] – Added Agridex COC 1.25% V/V

Trial 2 – **Stand Establishment Weed Control in Roundup Ready Alfalfa.** Mick Canevari, Don Colbert, Randall Wittie & Scott Whiteley.

OBJECTIVE: Evaluate Roundup Weather Max (glyphosate) applications applied alone and tank mixtures versus standard herbicide treatments for weed control in seedling Roundup Ready alfalfa.

MATERIALS & METHODS: The following postemergence herbicide treatments were applied to a seedling Roundup Ready alfalfa stand on the Klein Ranch located near Thornton, California: (1) Untreated Check, (2) Roundup Weather Max 5.5SL 1.0 lb ai/A application date (**A**) and (**C**), (3) Roundup Weather Max 5.5SL 2.0 lb ai/A application date ((**A**) and (**C**). Treatments #4 - #16 were applied on date (**B**): (4) Roundup Weather Max 5.5SL 1.0 lb ai/A, (5) Roundup Weather Max 5.5SL 2.0 lb ai/A, (6) Pursuit 2SL 0.094 lb ai/A + Butyrac 200EC 1.0 lb ai/A, (7) Raptor 1SL 0.047 lb ai/A + Butyrac 200EC 1.0 lb ai/A, (8) Pursuit 2SL 0.094 lb ai/A + Buctril 4EC 0.375 lb ai/A, (9) Raptor 1SL 0.047 lb ai/A + Buctril 4EC 0.375 lb ai/A, (10) Roundup Weather Max 5.5SL 1.0 lb ai/A + Pursuit 2SL 0.094 lb ai/A, (11) Roundup Weather Max 5.5SL 1.0 lb ai/A + Raptor 1SL 0.047 lb ai/A, (12) Roundup Weather Max 5.5SL 1.0 lb ai/A + Butyrac 200EC 1.0 lb ai/A, (13) Roundup Weather Max 5.5SL 1.0 lb ai/A + Buctril 4EC 0.375 lb ai/A, (14) Roundup Weather Max 5.5SL 1.0 lb ai/A + Pursuit 2SL 0.094 lb ai/A + Butyrac 200EC 1.0 lb ai/A, (15) Roundup Weather Max 5.5SL 1.0 lb ai/A + Pursuit 2SL 0.094 lb ai/A + Buctril 4EC 0.375 lb ai/A and (16) Pursuit 2SL 0.032 lb ai/A + Raptor 1SL 0.032 lb ai/A. No Foam A (NIS) added to treatments #4- - #16 at 0.25% V/V. Plots were 10 by 30 ft arranged in a randomized complete block design with three replications. Applications were made with a CO_2 backpack sprayer, 35 psi in 20 gpa. Growth stages prior to application (**A**) 2/6/06: alfalfa = 2-3 trifoliate, 1" ht., shepherd's purse (*Capsella bursa-pastoris*) = 4-8 lf, 1.5-3 inch diameter, annual bluegrass (*Poa annua*) = 1-2 tiller, 1-2.5 inch ht., annual sowthistle (*Sonchus oleraceus*) = 4-6 lf, 1-3 inch diameter, common chickweed (*Stellaria media*) = 10-20 lf, 1-2 inch ht., prickly lettuce (*Lactuca serriola*) = 4 lf, 3 inch diameter, common groundsel (*Senecio vulgaris*) = 6-8 lf, 1-2 inch ht. and henbit (*Lamium amplexicaule*) = 4-6 lf, 1 inch ht.. Application (**B**) growth stages prior to application 2/13/06: alfalfa = 80% 3-5 trifoliate, 20% 6 trifoliate, 1.5 inch ht., shepherd's purse = 6-12 lf, 3-6 inch diameter, annual bluegrass = 2-4 tiller, 2-4" ht., common groundsel = 8-12 lf, 2-3 inch ht., annual sowthistle = 6-8 lf, 2-3 inch ht., common chickweed = early flowering, 2-3 inch ht., prickly lettuce = 6 lf, 5 inch diameter and henbit = 6-10 lf, 1.5-2 inch ht. Growth stages prior to application (**C**) 3/1/06: alfalfa = crown developed, 8-14 trifoliate, 1-2.5 inch ht., henbit = 6-10 lf, 0.75 inch ht. and shepherd's purse 6-10 lf, 0.5-1.5 inch diameter. The above weeds were showing Roundup injury symptoms. All other weeds were controlled and there were no newly germinating weeds.

RESULTS & DISCUSSIONS:

The following treatments showed some early alfalfa stunting (%) Table 1: Roundup Weather Max 1.0 lb ai/A+ Buctril 0.375 lb ai/A = 10%, Roundup Weather Max 1.0 lb ai/A + Pursuit 0.094 lb ai/A = 11.7%, Roundup Weather Max 1.0 lb ai/A + Pursuit 0.094 lb ai/A + Buctril 0.375 lb ai/A = 18.3% and Roundup Weather Max 1.0 lb ai/A + Butyrac 200 1.0 lb ai/A = 30%. However, the alfalfa in the above treatments completely recovered before the first cutting. All other treatments showed very little or no alfalfa injury.

Weed Ratings 3/1/06 - Table 1
None of the treatments were controlling henbit.

Roundup Weather Max 1.0 and 2.0 lb ai/A sequential applications (**A**) + (**C**): Rating taken prior to (**C**) application gave excellent control of all weed species (92-100%).

Roundup Weather Max 1.0 and 2.0 lb ai/A application timing (**B**): The 2.0 lb ai/A rate was more effective in controlling the above weed species, control ranged from 78-99%. Weed control from the 1.0 lb ai/A rate ranged from 72-88%.

Roundup Weather Max tank mix combinations, application timing (**B**): Based on the overall % average control of the weed species shepherd's purse, annual bluegrass, prickly lettuce, common groundsel, annual sowthistle and common chickweed the best treatments were: (1) Roundup Weather Max 1.0 lb ai/A + Pursuit 0.094 lb ai/A + Buctril 0.375 lb ai/A = 96%, (2) Roundup Weather Max 1.0 lb ai/A + Buctril 0.375 lb ai/A = 95%, (3) Roundup Weather Max 1.0 lb ai/A + Raptor 0.047 lb ai/A = 94%, (4) Roundup Weather Max 1.0 lb ai/A + Pursuit 0.094 lb ai/A + Butyrac 1.0 lb ai/A = 91%, (5) Roundup Weather Max 1.0 lb ai/A + Pursuit 0.094 lb ai/A = 89% and (6) Roundup Weather Max 1.0 lb ai/A + Butyrac 1.0 lb ai/A = 88%.

Standard tank mix combinations, application timing (**B**): Pursuit 0.094 lb ai/A or Raptor 0.047 lb ai/A tank mixed with Buctril 0.375 lb ai/A were the most effective in controlling shepherd's purse, prickly lettuce, common groundsel and annual sowthistle. Other tank mixtures were giving poor to fair control of the above weed species.

Overall Visual Observations For Weed Control Prior to Harvest 5/8/06

Prior to harvest all of the herbicide treatments gave excellent weed control with a few annual sowthistle and annul bluegrass plants in the Pursuit 0.032 lb ai/A + Raptor 0.032 lb ai/A tank mix treatment. Some annual bluegrass plants were observed were Pursuit 0.094 lb ai/A was tank mixed with either Buctril 0.375 lb ai/A or Butyrac 1.0 lb ai/A. There were also a few annual bluegrass observed were Raptor 0.047 lb ai/A was tank mixed with either Buctril 0.375 lb ai/A or Butyrac 1.0 lb ai/A. For some unknown reason, there were only a few scattered annual sowthistle and prickly lettuce plants in the untreated check plots. The alfalfa stand became very competitive against the weed species present.

Alfalfa Yields & Quality 5/11/06 - Table 2

Quality: Samples were collected from four treatments: Roundup Weather Max 1.0 lb ai/A sequential applications (**A**) and (**C**), Roundup Weather Max 2.0 lb ai/A sequential applications (**A**) and (**C**), Roundup Weather Max 1.0 lb ai/A application timing (**B**) and the untreated check. There were no difference in hay quality between these treatments, TDN @ 90% DM ranged from 56.4 to 57.3.

Alfalfa Yields Weed Free: Yields ranged from a low of 2.0 tons/A in the untreated check to a high of 2.4 tons/A from treatments; Roundup Weather Max 2.0 lb ai/A sequential applications, timing (**A**) & (**C**), Roundup Weather Max 2.0 lb ai/A application timing (**B**) and Roundup Weather Max 1.0 lb ai/A + Pursuit 0.094 lb ai/A + Buctril 0.375 lb ai/A application timing (**B**). Herbicide treatments with alfalfa yields of 2.2 tons/A and above were significantly higher than the untreated check yield of 2.0 tons/A.

Table 1 – Weed Control in Stand Establishment of Roundup Ready Alfalfa

			……..% Weed Control[1] – March 1, 2006……...						
Treatment[2]	Rate lb ai/A	App[3] Time	Henbit	Annual Blue Grass	Chick Weed	Sow Thistle	Prickly Lettuce	Shepherds Purse	Ground Sel
Untreated Ck	-	-	0	0	0	0	0	0	0
Roundup[4]	1.0	AC	42	97	92	100	97	92	100
Roundup	2.0	AC	53	99	100	100	99	96	100
Roundup	1.0	B	55	72	82	88	72	73	88
Roundup	2.0	B	53	80	85	99	80	78	92
Pursuit + Butyrac	0.094 + 1.0	B	23	23	27	82	23	30	50
Raptor + Butyrac	0.047 + 1.0	B	30	42	37	73	42	67	63
Pursuit + Buctril	0.094 + 0.375	B	33	13	20	92	13	95	97
Raptor + Buctril	0.047 + 0.375	B	35	27	53	98	27	96	99
Roundup + Pursuit	1.0 + 0.094	B	33	86	87	95	86	83	90
Roundup + Raptor	1.0 + 0.047	B	43	87	86	98	87	90	100
Roundup + Butyrac	1.0 + 1.0	B	68	89	93	93	89	85	87
Roundup + Buctril	1.0 + 0.375	B	30	90	85	100	90	99	97
Roundup + Pursuit + Butyrac	1.0 + 0.094 + 1.0	B	37	83	90	94	83	83	93
Roundup + Pursuit + Buctril	1.0 + 0.094 + 0.375	B	20	85	92	100	85	99	100
Pursuit + Raptor	0.032 + 0.032	B	33	52	52	47	52	40	65

[1] – 0 = No weed control, 100 complete weed control

[2] – No Foam A (NIS) added to all tank mix combinations at 0.25% V/V

[3] – Application timing; (**A**) applied on 2/6/06, (**B**) applied on 2/13/06

[4] – Roundup formulation used in this trial was Roundup Weather Max 5.5SL

Table 2 – Alfalfa Tolerance, Yields and Quality in Roundup Ready Alfalfa

Treatment[2]	Rate Lb ai/A	App[3] Timing	% - Alfalfa Injury[5] 2/18	3/1	5/8	Alfalfa Yield[1] & Quality Yield Ton/A	% ADF	% TDN
Untreated Ck	-	-	0	0	0	2.0d	25.2	57.1
Roundup[4]	1.0	A+C	0	2	0	2.3ab	26.1	56.5
Roundup	2.0	A+C	0	0	0	2.4a	26.2	56.4
Roundup	1.0	B	0	3	0	2.3ab	25.0	57.3
Roundup	2.0	B	0	3	0	2.4a	-	-
Pursuit + Butyrac	0.094 + 1.0	B	0	0	0	2.1bcd	-	-
Raptor + Butyrac	0.047 + 1.0	B	0	1	0	2.1bcd	-	-
Pursuit + Buctril	0.094 + 0.375	B	0	0	0	2.1bcd	-	-
Raptor + Buctril	0.047 + 0.375	B	0	3	0	2.0cd	-	-
Roundup + Pursuit	1.0 + 0.094	B	0	7	0	2.1bcd	-	-
Roundup + Raptor	1.0 + 0.047	B	0	3	0	2.1bcd	-	-
Roundup + Butyrac	1.0 + 1.0	B	0	30	0	2.2abc	-	-
Roundup + Buctril	1.0 + 0..375	B	2	10	0	2.3ab	-	-
Roundup + Pursuit + Butyrac	1.0 + 0.094 + 1.0	B	8	12	0	2.2abc	-	-
Roundup + Pursuit + Buctril	1.0 + 0.094 + 0.375	B	5	18	0	2.4a	-	-
Pursuit + Raptor	0.032 + 0.032	B	0	2	0	2.2abc	-	-

[1] – 1st cutting; 5/8/06, 90% D.M.
[2] – No Foam A (NIS) added to all tank mix combinations at 0.25% V/V
[3] – Application timing; (**A**) applied on 2/6/06, (**B**) applied on 2/13/06
[4] – Roundup formulation used in this trial was Roundup Weather Max 5.5SL
[5] – 0 = No crop injury, 100 = Crop dead

Trial 3 – **Winter Weed Control in Dormant Alfalfa.** Mick Canevari, Don Colbert, Randall Wittie & Scott Whitely.

OBJECTIVE: Evaluate Herbicides Applied Alone and Tank Mix Combinations for Winter Weed Control in Dormant Alfalfa.

MATERIALS & METHODS: The following postemergence herbicide treatments were applied on 12/5/06 to a dormant alfalfa stand located near Stockton, California: (1) Chateau 51%WG 0.094 lb ai/A, (2) Chateau 51%WG 0.125 lb ai/A, (3) Chateau 51%WG 0.188 lb ai/A, (4) Chateau 51%WG 0.25 lb ai/A, (5) Gramoxone Inteon 2EC 0.5 lb ai/A, (6) Gramoxone Inteon 2EC 0.5 lb ai/A + Chateau 51%WG 0.125 lb ai/A, (7) Gramoxone Inteon 2EC 0.5 lb ai/A + Chateau 51%WG 0.125 lb ai/A + Velpar 2EC 0.5 lb ai/A, (8) Gramoxone Inteon 2EC 0.5 lb ai/A + Velpar 2EC 0.5 lb ai/A, (9) Raptor 1SL 0.047 lb ai/A, (10) Raptor 1SL 0.047 lb ai/A + Chateau 51%WG 0.125 lb ai/A, (11) Raptor 1SL 0.047 lb ai/A + Chateau 51%WG 0.188 lb ai/A, (12) Chateau 51% WG 0.125 lb ai/A + Velpar 2EC 0.5 lb ai/A, (13) Velpar 2EC 0.5 lb ai/A, (14) Gramoxone Max 3EC 0.5 lb ai/A + Velpar 2EC 0.5 lb ai/A, (15) Untreated Check and (16) Gramoxone Max 3EC 0.5 lb ai/A. No Foam A (NIS) added to all treatments at 0.25% V/V. Plots were 10 by 18 ft arranged in a randomized complete block design with three replications. Applications were made with a CO_2 backpack sprayer, 35 psi in 20 gpa. Growth stages prior to application: alfalfa = Semi dormant, 80% 5-7 inch ht., 20% 8-12 inch ht., common chickweed (*Stellaria media*) = 90% cotyledon, 10% 8-10 leaf, 0.25-1 inch ht., annual bluegrass (*Poa annua*) = 1leaf-1st tiller, 0.5-1 inch ht., common groundsel (*Senecio vulgaris*) = 4-8 leaf, 1-2.5 inch ht. and annual sowthistle (*Sonchus oleraceus*) = 3-6 leaf, 3-6 inch diameter.

RESULTS & DISCUSSIONS:

Alfalfa Injury - Table 1

Chateau alone: Depending upon the rate, 12 DAT (Days After Treatment) alfalfa necrosis ranged from 15-27%. Alfalfa stunting 36 DAT ranged from 13-28%. Prior to cutting 130 DAT, alfalfa had completely recovered from the initial injury.

Chateau tank mix combinations: Chateau combinations with Raptor or Velpar 12 DAT gave 25-38% alfalfa necrosis with 15-20% alfalfa stunting 36 DAT. Again, treatments were showing no alfalfa injury prior to cutting. Chateau tank mixed with Gramoxone Inteon resulted in 70-78% alfalfa necrosis 12 DAT and 12-18% alfalfa stunting 36 DAT. Alfalfa completely recovered prior to harvest, 130 DAT.

Gramoxone alone & tank mixtures with Velpar: 12 DAT alfalfa necrosis ranged from 62-72% with 2-7% alfalfa stunting 36 DAT. Alfalfa completely recovered prior to the 1st cutting, 130 DAT.

Velpar alone gave 37% alfalfa necrosis 12 DAT with 2% alfalfa stunting 36 DAT. No visible alfalfa injury prior to harvest, 130 DAT.

Raptor alone showed no alfalfa injury.

Weed Control 76 DAT – Table 1

Chateau alone: The low rate of 0.094 lb ai/A gave excellent control of common chickweed and common groundsel with 80% control of annual bluegrass and annual sowthistle. Higher rates gave excellent control of the above weed species.

Chateau tank mix combinations: All herbicide combinations gave excellent weed control.

Gramoxone alone & tank mixtures with Velpar: Gramoxone Inteon alone gave the following % control ratings; common chickweed 62%, annual bluegrass 70%, annual sowthistle 85% and 97% on common groundsel. When Gramoxone Inteon was tank mixed with Velpar ratings were; common chickweed 72%, annual bluegrass 77%, annual sowthistle 97% and 100% on common groundsel. Gramoxone Max alone gave poor control of annual bluegrass and common chickweed with 82% control of common groundsel and 100% annual sowthistle control. When tank mixed with Velpar % control ratings were; common chickweed 87%, annual bluegrass 67%, annual sowthistle 97% and common groundsel 100%.

Velpar alone: Poor control of annual bluegrass, annual sowthistle with 74% control of common chickweed and 100% control of common groundsel.

Raptor alone: Poor control of all weed species.

Alfalfa & Weed Yields – Table 2

Overall, the highest alfalfa yields were obtained where Chateau was applied alone or tank mixed with either Gramoxone Inteon, Velpar, Raptor or Gramoxone Inteon + Velpar. Yields form these treatments were significantly higher than the untreated check yield of 1.2 tons/A. Alfalfa yields from the Chateau alone 0.25 lb ai/A treatment (2.2 tons/A) and the Chateau 0.125 lb ai/A + Gramoxone Inteon 0.5 lb ai/A tank mixture (2.3 tons/A) were significantly higher than any of the other treatments. Yields that were not statistically different than the untreated check were from the following treatments; Gramoxone Inteon 0.5 lb ai/A, Raptor 0.047 lb ai/A, Velpar 0.5 lb ai/A and Gramoxone Max 0.5 lb ai/A + Velpar 0.5 lb ai/A. The only treatments with weeds present in the harvested sample were as follows: (1) Untreated check = 0.6 ton/A, (2) Gramoxone Max 0.5 lb ai/A = 0.5 ton/A, (3) Velpar 0.5 lb ai/A = 0.4 ton/A, (4) Gramoxone Inteon 0.5 lb ai/A = 0.4 ton/A, (5) Raptor 0.047 lb ai/A = 0.3 ton/A and (6) Gramoxone Max 0.5 lb ai/A + Velpar 0.5 lb ai/A = 0.2 ton/A. All other treatments were essentially weed free.

Table 1 – Weed Control and Crop Tolerance in Dormant Alfalfa

						…… % Weed Control[2]…….							
		% Alfalfa Injury –DAT[1]				Annual		Sow		Common		Ground	
	Rate	Necrosis	Stunting			Bluegrass		Thistle		Chickweed		sel	
Treatment[3]	Lb ai/A	36[1]	36	76	127	36	76	36	76	36	76	36	76
Chateau	0.094	15	13	3	0	85	80	87	80	96	98	92	97
Chateau	0.125	25	17	2	0	92	92	95	100	99	98	100	100
Chateau	0.188	33	20	3	0	96	95	95	95	100	98	97	97
Chateau	0.25	27	28	7	2	97	98	100	100	100	100	100	100
Gramoxone Inteon	0.5	67	2	0	0	93	70	96	85	88	62	93	97
Gramoxone Inteon + Chateau	0.5 + 0.125	78	12	5	0	100	98	100	100	99	96	100	100
Gramoxone Inteon + Chateau + Velpar	0.5 + 0.125 + 0.5	70	18	10	0	100	100	100	100	100	99	100	100
Gramoxone Inteon + Velpar	0.5 + 0.5	67	7	0	0	94	77	100	97	94	72	100	100
Raptor	0.047	0	0	0	2	20	0	63	30	47	27	53	20
Raptor + Chateau	0.047 + 0.125	25	15	2	2	90	85	100	100	100	99	100	100
Raptor + Chateau	0.047 + 0.188	28	20	5	2	93	96	97	100	100	98	100	100
Chateau + Velpar	0.125 + 0.5	38	17	3	2	100	100	100	100	100	100	100	100
Velpar	0.5	37	2	0	0	50	0	53	13	88	73	87	97
Gramoxone Max + Velpar	0.5 + 0.5	62	5	0	0	90	67	94	97	93	87	92	100
Check	-	0	0	0	0	0	0	0	0	0	0	0	0
Gramoxone Max	0.5	72	2	2	0	75	55	100	100	85	22	88	82

[1]DAT = 36, 76 and 127 days after treatment

[2] 0 = No weed control or crop injury, 100 = Complete weed control; crop dead

[3]No Foam A (NIS) added to all treatments 0.25% V/V

Table 2 – Alfalfa and Weed Yield in Dormant Alfalfa

Treatment[2]	Rate lb ai/A	Alfalfa and Weed Yield[1] Ton/Acre Weeds	Alfalfa	Alfalfa Quality TDN
Chateau	0.094	0.1 f	1.7 cd	58.4
Chateau	0.125	0.0 g	1.9 bc	58.3
Chateau	0.188	0.0 g	1.8 cd	58.5
Chateau	0.25	0.0 g	2.2 ab	55.8
Gramoxone Inteon	0.5	0.4 c	1.1 f	58.5
Gramoxone Inteon + Chateau	0.5 + 0.125	0.0 g	2.3 a	56.4
Gramoxone Inteon + Chateau + Velpar	0.5 + 0.125 0.5	0.0 g	1.7 cd	58.3
Gramoxone Inteon + Velpar	0.5 + 0.5	0.1 f	1.7 cd	57.7
Raptor	0.047	0.3 d	1.5 de	56.8
Raptor + Chateau	0.047 + 0.125	0.0 g	1.6 cd	56.8
Raptor + Chateau	0.047 + 0.188	0.0 g	1.8 cd	59.6
Chateau + Velpar	0.125 + 0.5	0.0 g	1.8 cd	58.3
Velpar	0.5	0.4 c	1.5 de	57.9
Gramoxone Max + Velpar	0.5 + 0.5	0.2 e	1.5 de	58.4
Check	-	0.6 a	1.2 ef	56.6
Gramoxone Max	0.5	0.5 b	1.6 cd	57.8

[1] – 1st cutting; 4/24/06, 90% D.M.

[2] – No Foam A (NIS) added to all herbicide treatments 0.25% V/V

Trial 4 – **Winter Weed Control in Dormant Alfalfa.** Mick Canevari, Don Colbert, Randall Wittie & Scott Whitely.

OBJECTIVE: Evaluate Herbicides Applied Alone and Tank Mix Combinations for Winter Weed Control in Dormant Alfalfa.

MATERIALS & METHODS: The following postemergence herbicide treatments were applied on 1/10/06 to a semi dormant alfalfa stand located near Stockton, California: (1) Chateau 51%WG 0.094 lb ai/A, (2) Chateau 51%WG 0/125 lb ai/A, (3) Chateau 51%WG 0.188 lb ai/A, (4) Chateau 51%WG 0.25 lb ai/A, (5) Gramoxone Inteon 2EC 0.5 lb ai/A, (6) Gramoxone Inteon 2EC 0.5 lb ai/A + Chateau 51%WG 0.125 lb ai/A, (7) Gramoxone Inteon 2EC 0.5 lb ai/A + Chateau 51%WG 0.125 lb ai/A + Velpar 2EC 0.5 lb ai/A, (8) Raptor 1SL 0.047 lb ai/A + Velpar 2EC 0.5 lb ai/A, (9) Gramoxone Inteon 2EC 0.5 lb ai/A + Velpar 2EC 0.5 lb ai/A, (10) Raptor 1SL 0.047 lb ai/A, (11) Raptor 1SL 0.047 lb ai/A + Chateau 51%WG 0.125 lb ai/A, (12) Raptor 1SL 0.047 lb ai/A + Chateau 51%WG 0.188 lb ai/A, (13) Chateau 51%WG 0.125 lb ai/A + Velpar 2EC 0.5 lb ai/A, (14) Velpar 0.5 lb ai/A, (15) Gramoxone Max 3EC 0.5 lb ai/A + Velpar 2EC 0.5 lb ai/A and (16) Untreated Check. No Foam A (NIS) 0.25% V/V added to all treatments except for Velpar 0.5 lb ai/A applied alone. Plots were 10 by15 ft arranged in a randomized complete block design with four replications. Applications were made with a CO_2 back pack sprayer, 35 psi in 20 gpa. Growth stages prior to application: alfalfa = Semi dormant, 5-10 inch ht., common chickweed (*Stellaria media*) = 6-14 leaf, 0.5-2 inch ht., henbit (*Lamium amplexicaule*) = 2-3 leaf, 1 inch ht., annual bluegrass (*Poa annua*) = 2 leaf to first tiller, 1" ht., prickly lettuce (*Lactuca serriola*) = 6-8 leaf, 4-6 inch diameter and annual sowthistle (*Sonchus oleraceus*) = 8-14 leaf, 4-8 inch diameter.

RESULTS & DISCUSSIONS:

Prior to application the alfalfa, stand and height were quite uniform throughout the trial area. However, in the winter months the alfalfa growth became quite uneven within the trial area. This uneven alfalfa growth was not due to the herbicide treatments.

Weed Control 76 DAT - Table 1

All rates of Chateau alone or tank mix combinations with; Gramoxone Inteon, Raptor, Velpar or Gramoxone Inteon + Velpar gave 88-100% control of common chickweed, annual bluegrass, henbit, annual sowthistle and prickly lettuce. Velpar alone and a tank mix combination with Raptor gave excellent control of the above weed species except for poor control of annual bluegrass. Raptor alone gave excellent control of common chickweed with poor to fair control of the other weed species. Gramoxone Inteon alone and a tank mix combination with Velpar gave 90-100% control of the above five weed species. Gramoxone Max + Velpar also gave excellent control of the above weed species.

Alfalfa Injury & Yields - Table 2

Chateau alone: Depending upon the rate, 10 DAT (Days After Treatment) alfalfa necrosis ranged from 29-38%. Alfalfa stunting 76 DAT ranged from 9.-16%. Alfalfa plant heights prior to cutting 4/20/06 were similar to the untreated check.

Chateau tank mix combinations: Chateau combinations with Raptor or Velpar 10 DAT alfalfa necrosis ranged from 38-41% with 14-21% alfalfa stunting 76 DAT. Again, alfalfa plant heights were similar to the untreated check. Chateau tank mixed with Gramoxone Inteon 10 DAT gave 48-70% alfalfa necrosis with 6-15% alfalfa stunting 76 DAT. Plant heights prior to harvest were similar to the untreated check.

Gramoxone alone & tank mixtures with Velpar: 10 DAT, alfalfa necrosis ranged from 28-55% with 5-11% alfalfa stunting 76 DAT. Alfalfa plant heights were similar to the check prior to the first cutting.

Velpar alone gave 9% alfalfa necrosis 10 DAT and 5% alfalfa stunting 76 DAT. No affect on alfalfa plant height.

Raptor alone showed good alfalfa tolerance with alfalfa plant heights similar to the untreated check.

Raptor tank mixed with Velpar gave 4% alfalfa necrosis 10 DAT and 18% alfalfa stunting 76 DAT. Alfalfa plant heights were not statically different than the untreated check.

Alfalfa Yields: The only treatments with weeds present in the harvest samples were Raptor alone and the untreated check. There were no significant differences in yields between any of the treatments.

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Table 1 – Weed Control in Dormant Alfalfa

		…… . . …... % - Weed Control 76 Days After Treatment[2]……..				
Treatment[1]	Rate lb ai/A	Henbit	Annual Bluegrass	Common Chickweed	Annual Sowthistle	Prickly Lettuce
Untreated Check	-	0	0	0	0	0
Chateau	0.094	96	91	95	90	100
Chateau	0.125	100	100	100	95	100
Chateau	0.188	100	100	100	88	98
Chateau	0.25	100	100	100	98	100
Gramoxone Inteon	0.5	90	95	100	93	100
Gramoxone Inteon + Chateau	0.5 + 0.125	100	100	100	100	100
Gramoxone Inteon + Chateau + Velpar	0.5 + 0.125 + 0.5	100	100	100	100	100
Raptor + Velpar	0.047 + 0.5	100	53	100	100	100
Gramoxone Inteon + Velpar	0.5 + 0.5	100	100	100	100	100
Raptor	0.047 +	74	63	99	65	33
Raptor + Chateau	0.047 + 0.125	100	98	100	95	98
Raptor + Chateau	0.047 + 0.188	100	100	100	100	100
Chateau + Velpar	0.125 + 0.5	100	100	100	100	100
Velpar	0.5	100	40	100	100	100
Gramoxone Max + Velpar	0.5 + 0.5	100	100	100	100	100

[1] - No Foam A (NIS) 0.25% V/V added to all treatments except for Velpar 0.5 lb ai/A applied at 0.25% V/V

[2] – 0 = No weed control, 100 = Complete weed control

Table 2 – Crop Tolerance and Yields in Dormant Alfalfa

Treatment[1]	Rate Rate lb ai/A	% - Alfalfa Injury[4] 10 DAT[2] Necrosis	 76 DAT Stunting	Alfalfa Height Inches	Alfalfa[3] Yield Ton/A
Untreated Check	-	0	0	15.0a	1.19a
Chateau	0.094	29	9	13.8a	1.05a
Chateau	0.125	35	15	14.8a	0.93a
Chateau	0.188	35	13	14.0a	1.18a
Chateau	0.25	38	16	14.8a	0.94a
Gramoxone Inteon	0.5	55	11	14.0a	0.86a
Gramoxone Inteon + Chateau	0.5 + 0.125	70	6	15.3a	1.09a
Gramoxone Inteon + Chateau + Velpar	0.5 + 0.125 + 0.5	48	15	13.8a	0.93a
Raptor + Velpar	0.047 + 0.5	4	18	10.8a	0.83a
Gramoxone Inteon + Velpar	0.5 + 0.5	29	5	14.8a	0.98a
Raptor	0.047	0	0	13.3a	0.98a
Raptor + Chateau	0.047 + 0.125	38	21	12.3a	0.94a
Raptor + Chateau	0.047 + 0.188	40	16	12.8a	0.86a
Chateau + Velpar	0.125 + 0.5	41	14	13.8a	0.83a
Velpar	0.5	9	5	15.0a	0.97a
Gramoxone Max + Velpar	0.5 + 0.5	28	8	14.3a	0.89a

[1]No Foam A (NIS) 0.25% V/V added to all treatments except for Velpar alone 0.5 lb ai/A
[2]DAT = Days after treatment
[3]1st cutting; 4/20/06, 90% D.M.
[4] – 0 = No crop injury, 100 = Crop dead

Trial 1 – **Worm Complex Control in Alfalfa .** Mick Canevari, Don Colbert, Randall Wittie & Scott Whiteley.

OBJECTIVE: Evaluate several registered and non-registered insecticides for worm control in established alfalfa.

MATERIALS & METHODS: The following materials were applied on September 19, 2006 to a population of beet armyworms (*Spodoptera exigua*), alfalfa caterpillar (*Colias eurytheme*) and western yellow-stripe armyworm (*Spodoptera praefica*) in an established alfalfa field near Tracy, California: (1) Intrepid 2F 0.125 lb ai/A + No Foam A (NIS) 0.25% V/V, (2) Success 2F 0.063 lb ai/A, (3) Lorsban 4E 1.0 lb ai/A, (4) Spod-X Flowable 3.4 oz/A + Agridex (COC) 1.0% V/V, (5) Baythroid 1EC 0.022 lb ai/A + Agridex (COC) 1.0% V/V (6) Renounce 20% WP 0.044 lb ai/A + 1.0% V/V, (7) LAF-1 3.8EC 1.0 lb ai/A, (8) Steward 1.25SC 0.098 lb ai/A, (9) Lannate 90% SP 0.9 lb ai/A, (10) DPX-E2Y45 1.7SC 0.134 lb ai/A, (12) BAS 320 I 0.25 lb ai/A + Penetrator Plus (NIS) 0.5% V/V, (13) XenTari 54% WP 0.54 lb ai/A, (14) Mustang 0.8EW 0.025 lb ai/A, (15) Warrior 1EC 0.03 lb ai/A, (16) GF 1668 1.7EC 1.0 lb ai/A, (17) NNI 001 24% WG 0.045 lb ai/A + No Foam A (NIS) 0.25% V/V. Plots were 10 by 30 ft arranged in a randomized complete block design with three replications. Applications were made with a CO_2 backpack sprayer, 35 psi in 20 gallons per acre water. Growth stage prior to the application: alfalfa = 10-12" ht. Pre-application worm counts were taken in a buffer area around the plot so as not to disturb the populations in the plots. Sweep counts were made with a standard insect net using a 180° sweep across the top of the alfalfa. The counts were as follows: beet armyworm (BAW) = 3.5/sweep, alfalfa caterpillar = 0.7/sweep and Western yellow-stripe armyworm = 0.2/sweep. Post-application sweep counts were taken by taking five sweeps in the first 10 ft. of the plot three days after treatment, middle 10 ft. seven days after treatment and last 10 ft. of the plot thirteen days after treatment.

RESULTS & DISCUSSIONS:

Three Day Sweep Counts: The check averaged 1.5 beet armyworm, 0.3 alfalfa caterpillar and 0.1 Western yellow-stripe armyworm per sweep. Success, Lorsban, LAF-1, Steward, Lannate and GF 1668 gave excellent BAW control, 0.1-0.3 larvae/sweep. DPX-E2Y45, BAS 320 I and Mustang gave 0.5, 0.7 and 0.7 BAW/sweep, respectively. There were no significant differences between any treatment and the check for the alfalfa caterpillar (data not shown). However, Success, Steward, Lannate, XenTari, GF 1668 and NNI 001 did not have any alfalfa caterpillar in their plots. There were no significant differences between the treatments and the check for the Western yellow-stripe armyworm due to a very low non-uniform infestation (data not shown). No foliar phytotoxicity was noted with any material.

Seven Day Sweep Counts: The check averaged 2.9 beet armyworms per sweep. Intrepid, Success, Lorsban, Steward, DPX-E2Y45, GF 1668 and NNI 001 continued to provide excellent BAW control with 0.0-0.3 larvae/sweep.LAF-1 and BAS 320 I had 0.5 and 0.7 BAW larvae/sweep, respectively. All other insecticide treatment counts were not significantly different than the check. All treatments and the check averaged < 0.5 larvae/sweep for the alfalfa caterpillar (data not shown). No western yellow-stripe armyworms were noted in any plot.

Thirteen Day Sweep Counts: The alfalfa caterpillar and the western yellow-stripe armyworm were insignificant. The beet armyworm population was increasing due to an additional egg hatch. The check averaged 5.6/sweep. Excellent residual activity was still being provided by Intrepid, Success, LAF-1, Steward, DPX-E2Y45, BAS 320 I, GF 1668 and NNI 001 with BAW counts ranging from 0.6-1.2 larvae/sweep. These materials were providing between 80 to 90% control of the beet armyworm.

The test was concluded because the alfalfa was harvested.

Table – Beet Armyworm Larvae Counts/Sweep in Alfalfa

		BAW Counts/Sweep – Days After Treatment(DAT)		
Treatment	Rate lb ai/A	3 DAT	7 DAT	13 DAT
Intrepid[1]	0.125	1.3 abc	0.1 c	1.1 def
Success	0.063	0.1 c	0.0 c	0.9 def
Lorsban	1.0	0.2 c	0.1 c	2.3 cde
Spod-X	3.4 Oz Product/A	3.1 a	3.7 a	4.2 ab
Baythroid[2]	0.022	1.3 bc	1.6 bc	3.3 bc
Renounce[2]	0.044	1.5 abc	2.7 ab	3.2 bc
LAF-1	1.0	0.1 c	0.5 c	1.1 def
Steward	0.098	0.2 c	0.1 c	1.1 def
Lannate	0.9	0.3 c	1.2 bc	2.5 cd
DPX-E2Y45	0.134	0.5 c	0.2 c	0.6 f
BAS 320 I[3]	0.25	0.7 c	0.7 c	1.2 def
XenTari	0.54	2.5 ab	2.5 ab	3.6 bc
Mustang	0.025	0.7 c	1.2 bc	2.4 cd
Warrior	0.03	2.6 ab	4.1 a	4.8 ab
GF-1668	1.0	0.3 c	0.3 c	1.1 def
NNI 001[1]	0.045	1.0 bc	0.1 c	0.7 ef
Untreated	-	1.5 abc	2.9 ab	5.6 a
LSD (05)	-	1.8	1.7	1.7

[1]No Foam A (NIS) added at 0.25% V/V
[2]Agridex (COC) added at 1.0% V/V
[3]Pentrator Plus (NIS) added at 0.5% V/V