



**DRY
BEAN
RESEARCH**

***INSECT, WEED CONTROL,
VARIETY TRIALS
2006***

SAN JOAQUIN COUNTY

**Cooperative Extension University of California
2101 E. Earhart Ave., #200—Stockton—California—95206**

2006 DRY BEAN

RESEARCH PROGRESS REPORT

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The 2006 dry bean research program for San Joaquin County was conducted on Baby Limas, Garbanzo, Black-eye and Kidney beans. Research was conducted on variety evaluations, weed control, lygus and spider mite trials. The cooperation and management assistance of Eugene Caffese, Pete Katzakian, Rick Marcucci, Steve Temple and UC Davis staff are greatly appreciated. Many thanks are extended to them for their assistance, interest and patience.

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Caution

This report is a summary of dry bean insect control, plant growth regulator, weed control and variety studies conducted in San Joaquin County. **It should not in any way be interpreted as a recommendation of the University of California but rather a guide as to the progress in finding solutions to problems**

Pesticide 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.

Insecticide and herbicide rates in this report are always expressed as **active ingredient (a.i.) of material per treated acre.** Plant growth regulator rates expressed as **fluid ounces of product per treated acre.**

<u>Trade Name</u>	<u>Common Name</u>	<u>Company</u>
Insecticides		
Acramite	bifenazate	Crompton Uniroyal
Agri-Mek	abamectin	Syngenta
Steward	indoxacarb	DuPont
Comite	propargite	Crompton Uniroyal
Oberon	spiromesifen	Bayer
Onager	hexythiazox	Gowan

Plant Growth Regulators		
Apogee	prohexadione	BASF
HappyGro	kinetin	LT BioSyn,Inc.
Headline	pyraclostrobin	BASF
MaxCel	6-benzyladenine (6BA)	Valent
PIX	mepequat	BASF

Herbicides		
Basagran	bentazon	BASF
Caparol	prometryn	Syngenta
Chateau	flumioxazin	Valent
FirstRate	cloransulam	Dow
Goal Tender	oxyfluorfen	Dow
Osprey	mesosulfuron-methyl	Bayer
Prowl	pendimethalin	BASF
Python	flumetsulam	Dow
Raptor	imazamox	BASF
Sandea	halosulfuron-methyl	Gowan
Sencor	metribuzin	Bayer

Trial 1 Two-Spot Spider Mite (*Tetranychus urticae*) Control in Bush Baby Lima Beans. Mick Canevari, Randall Wittie

OBJECTIVE: Evaluate several acaricides for two-spot spider mite (*Tetranychus urticae*) control and crop safety in bush baby lima beans.

MATERIALS AND METHODS: The following materials were applied on July 14, 2006 to bush baby lima beans var. "Luna" planted on the UC Davis Agronomy Farm: (1) Acramite 4SC at 0.5 lb ai/A, (2) Acramite 4SC at 0.75 lb ai/A, (3) Comite 6.55EC at 2.46 lb ai/A, (4) Oberon 2EC at 0.19 lb ai/A, (5) Onager 1EC at 0.08 lb ai/A, (6) Onager 1EC at 0.09 lb ai/A, (7) Onager 1EC at 0.13 lb ai/A, (8) Agri-Mek 0.15EC at 0.009 lb ai/A. Silwet L-77 (organo silicone surfactant) at 0.12% V/V was added to all treatments. Plots were arranged in a randomized complete block design with four replicates. Plots were 2 rows (5ft) x 30 ft. The treatments were applied with a CO² backpack sprayer at 35 psi in 40 gpa water using drop nozzles on each side of the plant with one nozzle over the top. Bean growth stage at application was early bud and 12-16 inch height. Mite counts were made by removing ten trifoliate leaves randomly selected from the lower portion of the plants between the center rows of beans, bagged and brought to the lab. A single leaf was removed from each trifoliate leaf to be brushed and counted. Pre-treatment counts, two-spot spider mite (TSSM) averaged 2-4 motiles/leaf and mostly located on the lower portion of the plant. Post-treatment counts were made at 3, 6, 14, 21, 28 and 42 days.

RESULTS AND DISCUSSION: Two-spot spider mite (TSSM), predatory mites (*Galendromus* sp.), thrips (*Scolothrips sexmaculatus*), and the big-eyed bug (*Orius tristicolor*) were counted and recorded as number per leaf.

Three Days after Treatment: The check averaged 0.6 mites/leaf and 1.2 eggs/leaf. There was no significant difference between the treatments and the check for control of the TSSM. Mite eggs per leaf were highest (8.4) in the Acramite 0.5 lb ai treatment while Onager at 0.13 lb ai had the least (0.4). Very few predators were observed at this evaluation.

Six Days after Treatment: The check increased to 5.2 mites and 2.6 eggs. Excellent control was obtained with all treatments. Agri-Mek, Onager @ 0.09 LbA.I. and Oberon resulted in 100% control while Acramite provided 89% control, Comite 96%, Onager @ 0.08 and 0.13 LbA.I. provided 92 and 96% control of the motiles. Agri-Mek, Oberon and Acramite @ 0.75 lb ai provided 100% control of eggs. Comite and Acramite @ 0.5 LbA.I. provided 92% control of eggs. Onager @ 0.13 LbA.I. equaled the check for number of eggs/leaf. Neither thrips nor predatory mites were observed in any treatment. Orius was observed in the check, Oberon and Onager treatments.

Fourteen Days after Treatment: The check increased to 9.0 motiles and 23.0 eggs. All treatments were providing 100% control of the TSSM except Onager which was providing 98% control. Excellent egg control was provided by all treatments. Control was 98-100%. Only one thrips was observed in the Onager low rate treatment. No predatory mites were observed and only the check had Orius.

Twenty-one Days after Treatment: The check increased to 13.4 motiles and decreased to 16.8 eggs. All 8 treatments were providing 97 – 100% control of the motiles and 96 – 100% control of the eggs. Neither thrips nor predatory mites were observed in any treatment. Only the check had Orius.

Twenty-eight Days after Treatment: The check increased to 14.2 motiles while the egg count was dropping to 8.8. Acramite @ 0.75 lb ai was the best treatment at 99% control of the motiles and 84% control of the eggs. Comite provided 96% control of motiles and 96% control of the eggs. Onager @ 0.09 and 0.13 lb ai provided 92 and 90% control of the motiles respectively while giving 91 % control of the eggs. Agri-Mek provided 94% control of the motiles and 88% control of the eggs. The low rate of Onager had the most eggs at this count and control was 32%. Neither thrips nor predatory mites were observed in any treatment. Orius was observed in

the Acramite, Onager treatments as well as the check.

Forty-two Days after Treatment: The check increased to 19 motiles and 26.2 eggs. Residual control in all treatments has been reduced. However, treatments still holding the motiles and eggs down are Acramite @ 0.75 lb ai, Comite, Onager @ 0.09 and 0.13 lb ai and Agri-Mek. Thrips, predatory mites and Orius were observed in the treatments as well as the check but not in very high numbers.

Harvest: Yields taken at harvest resulted in no significant differences between treatments and the check. Yields averaged 37 – 40 cwt/acre. Seed quality evaluation for Lygus stings indicated no significant differences between the treatments and the check. However, the Agri-Mek treatment had the highest percentage of Lygus stings at 7.5 while the check had 3.3%. The lowest Lygus damage treatment was Oberon which resulted in 2.5% damaged seed.

Table 1. Control of two-spot spider mite in bush baby lima beans.

Treatment ²	Lb ai/Acre	Pre-Counts ³	% Control – DAT ¹					Yield Lb/Acre	% Lygus Damage Seed
			6	14	21	28	42		
Acramite	0.5	8.6 a	89	100	97	93	48	3836	6.3
Acramite	0.75	2.8 a	89	100	97	99	65	3758	5.3
Comite	2.46	2.4 a	96	100	100	96	61	3849	4.9
Oberon	0.19	3.8 a	100	100	100	87	45	4076	2.5
Onager	0.08	0.2 a	92	98	99	83	17	3961	4.3
Onager	0.09	2.2 a	100	98	100	92	62	3746	5.0
Onager	0.13	0.8 a	96	98	97	90	60	3873	5.4
Agri-Mek	0.009	0.6 a	100	100	99	94	67	3818	7.5
UTC		0.4 a						4072	3.3

LSD(P=.10)

5.1

546

2.69

1. Days after Treatment

2. All treatments included Silwet L-77 @ 0.12% v/v

3. Pre-Counts = Mites/Leaf

Trial 2 – Control of Lygus Bug with Steward (indoxacarb) in Lygus Tolerant Bush Baby Lima Bean Cultivars - IPM. Mick Canevari, Don Colbert, Randall Wittie, Scott Whiteley

OBJECTIVE: Evaluate Steward, a reduced risk insecticide, for the control of the lygus bug (*Lygus Hesperus*) in new cultivars bush baby lima beans.

MATERIALS & METHODS: The following treatment regimes were applied to several new cultivars of bush baby lima beans planted on the UC Davis Agronomy Farm: (1) Steward SC 14.5% 0.11 lb ai/Acre, early bloom on July 28, (2) Steward SC 14.5% 0.11 lb ai/Acre, late = piners to pod fill on August 10, (3) Untreated. Experimental five bush baby lima bean cultivars included 336(05)302, 336(05)124, 336(05)282, 336(05)299 and UC Luna as the standard. Plots (2 rows x 20 ft) were arranged so that the 5 cultivars were planted in three groups and replicated 4 times in a randomized complete block design. One group treated with Steward at 75% bloom (**Early/Mid**), the second group treated with Steward ranging from piners(1/2” - 1” long) to mature pods (**Late**) and the third group was **Untreated**. The treatments were applied with a CO² backpack sprayer at 35 psi in 20 gpa water. Lygus counts for the **Early/Mid** application were 1.0-1.2/sweep and 80% nymphs. Counts for the **Late** application were 1.9/sweep and were primarily adults.

RESULTS & DISCUSSION: Lygus counts were taken in each treatment block by taking 10 180° sweeps per block and counting nymphs and adults. On August 18 sweep counts were taken in all treatments. The **Early/Mid** Steward treatment was sampled 31 days after treatment and results were 2.3 nymphs and 1.2 adults /sweep. The **Late** Steward treatment was sampled 8 days after treatment resulting in 1.0 nymph and 0.9 adults/sweep. The untreated plots had 2.3 nymphs and 2.1 adults/sweep. Results indicate Steward gave good control of the lygus but residual control was weak. Lygus were building back up in the **Early/Mid** treatment at the 31 day count.

Seed samples were taken at harvest from each plot and brought to the lab for seed quality evaluations. Five hundred seed from each sample were evaluated for lygus stings (1 vs multiple stings/seed), fish mouth/skin cracking and other damage (mold, color, broken, etc.). One ounce of seed was weighed from each plot and counted to determine number of seed/pound.

The **Early/Mid** Steward treatment resulted in no significant difference between cultivars for % one sting/seed. 336(05)302 had the lowest at 1.03% while 336(05)124 and 336(05)299 had the most at 1.6 and 1.65% respectively. UC Luna had the least amount of multiple stings at 2.9% while the other four entries were 4.27 to 4.75% stings. These were not significantly different. Entries 336(05)299 and 336(05)302 had the least amount of fish mouth and skin cracking at 0.78 and 0.82% respectively. Entry 336(05)124 had 2.98% fish mouth/skin cracking. Entry 336(05)302 had the least amount of other damage at 0.61% while 336(05)299 had the highest at 1.76%. (Table I)

The **Late** Steward treatment resulted in entry 336(05)302 and 336(05)282 having 0.4 and 0.43% one sting/seed. Entry 336(05)124, 336(05)299 and UC Luna had 1.27, 1.53 and 1.58% one sting/seed. Entry 336(05)282 and 336(05)299 had the least amount of multiple stings at 2.66 and 2.92%. Entry 336(05)299 had the least amount of fish mouth/skin cracking at 0.8%. UC Luna had the highest amount of other damage at 2.81%. (Table I)

In the **Untreated** plots entries 336(05)302, 336(05)124 and 336(05)282 had the least amount of one sting damage. These were all less than 1%. The least amount of multiple stings was entry 336(05)302 at 1.74%. UC Luna and 336(05)302 had the least amount of fish mouth/skin cracking at 1.07 and 1.13%. The least amount of other damage was 336(05)302 at 1.0%. (Table I)

Yields were also highest in the **Early/Mid** treatment as compared to the **Late** treatment and the **Untreated**. (Table II) Entry 336(05) 124 had yields that were significantly different between the **Early/Mid** (3741 lb/A.) and the **Untreated** (3033 lb/A.). (Figure I) Bean size was slightly smaller in the **Early/Mid** treatment and

became slightly larger in the **Untreated** plots due to pod set in the **Early/Mid** treatment. The early Lygus control provided a long period for pod development.

Table I. Seed Quality Evaluations

Entry ¹	Steward @ 0.11lbai/A Application ²	% Single Lygus Sting/ Bean	% Multiple Lygus Stings/ Bean	% Total Lygus Damage	% Fish Mouth and Crack Skins	% Other Damage ³
336(05) 302 Bulk	Early/Mid	1.2 a	4.1 a	5.25 a	1.1 a	0.9 a
336(05) 124 cm(60)	Early/Mid	1.75 a	3.8 a	5.5 a	2.3 a	1.5 a
336(05) 282 Bulk	Early/Mid	1.75 a	4.2 a	5.95 a	1.4 a	1.9 a
336(05) 299 Bulk	Early/Mid	1.0 a	4.3 a	5.25 a	0.7 a	1.4 a
UC Luna	Early/Mid	1.0 a	3.4 a	4.4 a	1.3 a	1.5 a
	LSD (P=.05)	1.0	2.7	2.76	1.4	1.3
336(05) 302 Bulk	Late	0.8 a	3.5 a	4.2 a	1.4 a	1.6 a
336(05) 124 cm(60)	Late	1.4 a	4.4 a	5.7 a	2.1 a	1.6 a
336(05) 282 Bulk	Late	0.7 a	3.4 a	4.0 a	2.6 a	2.1 a
336(05) 299 Bulk	Late	1.4 a	2.8 a	4.15 a	1.2 a	1.3 a
UC Luna	Late	1.0 a	5.3 a	6.25 a	1.8 a	2.5 a
	LSD (P=.05)	1.2	1.9	2.6	1.6	1.7
336(05) 302 Bulk	Untreated Check	0.7 a	1.8 a	2.5 a	1.6 a	1.4 a
336(05) 124 cm(60)	Untreated Check	0.7 a	3.9 a	4.6 a	2.2 a	1.5 a
336(05) 282 Bulk	Untreated Check	0.6 a	3.6 a	4.2 a	2.1 a	1.6 a
336(05) 299 Bulk	Untreated Check	0.9 a	3.3 a	4.1 a	1.5 a	1.8 a
UC Luna	Untreated Check	0.8 a	4.0 a	4.8 a	1.1 a	2.1 a
	LSD (P=.05)	0.7	2.4	2.5	1.5	1.2

¹ Bush Baby Lima Bean Varieties planted June 2, 2006

² Steward application July 28 (Early/Mid = Beans 75% Bloom), August 10 (Late = Piners-Pod Fill).

³ Other Damage = Seeds that were mold damaged, worm damage, discolored or too small.

Table II. Bean yield by variety vs spray treatment.

Entry	Steward Application	Yield LB/Acre
336(05) 302 Bulk	Early/Mid	3809 a
336(05) 124 cm (60)	Early/Mid	3741 a
336(05) 282 Bulk	Early/Mid	3298 a
336(05) 299 Bulk	Early/Mid	3851 a
UC Luna	Early/Mid	3670 a
LSD (P=.05)		871
336(05) 302 Bulk	Late	3592 a
336(05) 124 cm (60)	Late	3400 a
336(05) 282 Bulk	Late	3157 a
336(05) 299 Bulk	Late	3525 a
UC Luna	Late	3091 a
LSD (P=.05)		739
336(05) 302 Bulk	Untreated Check	3528 a
336(05) 124 cm (60)	Untreated Check	3033 a
336(05) 282 Bulk	Untreated Check	3042 a
336(05) 299 Bulk	Untreated Check	3231 a
UC Luna	Untreated Check	3264 a
LSD (P=.05)		920

Figure I. Bush baby lima bean yield results.

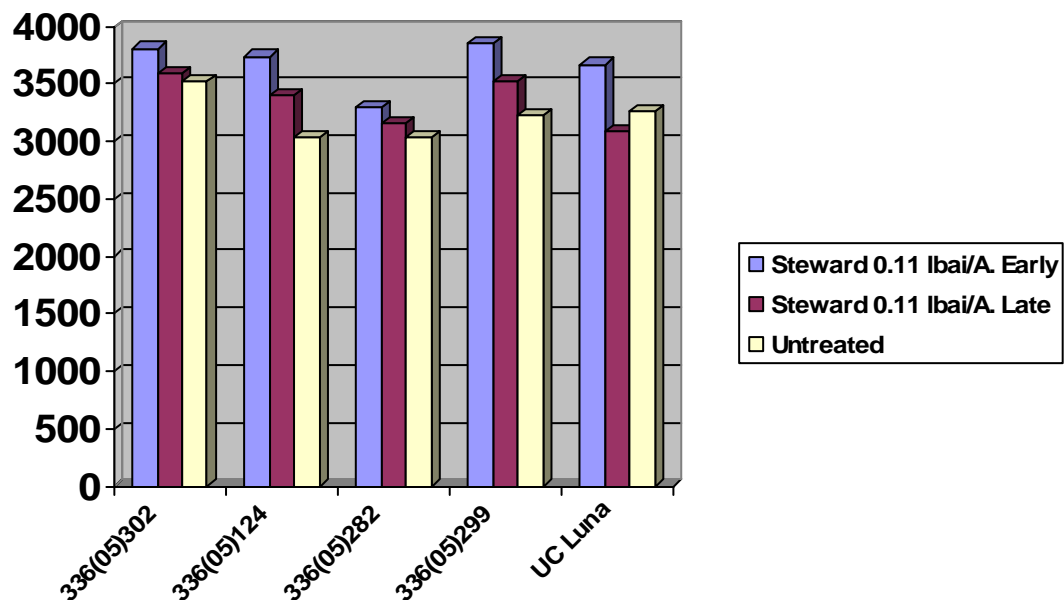


Table III. Effect of Steward spray for Lygus control and number beans per pound.

Entry	Steward Application	Seed/LB
336(05) 302 Bulk	Early/Mid	1052 ab
336(05) 124 cm (60)	Early/Mid	956 b
336(05) 282 Bulk	Early/Mid	1000 b
336(05) 299 Bulk	Early/Mid	1120 a
UC Luna	Early/Mid	1052 ab
LSD (P=.05)		97
336(05) 302 Bulk	Late	996 a
336(05) 124 cm (60)	Late	972 a
336(05) 282 Bulk	Late	988 a
336(05) 299 Bulk	Late	1012 a
UC Luna	Late	976 a
LSD (P=.05)		83
336(05) 302 Bulk	Untreated Check	940 ab
336(05) 124 cm (60)	Untreated Check	880 b
336(05) 282 Bulk	Untreated Check	912 ab
336(05) 299 Bulk	Untreated Check	932 ab
UC Luna	Untreated Check	952 a
LSD (P=.05)		68

Trial III Pre-emergent Herbicides for Weed Control in Vine Large Lima Beans. Mick Canevari, Don Colbert, Scott Whiteley and Randall Wittie

OBJECTIVE: Evaluate several pre-emergent herbicides for weed control in large vine lima beans in the San Joaquin Delta.

MATERIALS AND METHODS: The following herbicides were applied pre-emergent to vine large lima beans var. “White Ventura N” planted May 12, 2006 on the Rick Marcuchi farm located on Lower Jones Tract 15 miles west of Stockton in the San Joaquin Delta on May 12, 2006: (1) Goal Tender 4F + Sencor 75DF 0.125 + 0.125 lbai/A (TM), (2) Sencor 75DF 0.25 lbai/A, (3) Goal Tender 4F 0.25 lbai/A, (4) Chateau 51WG 0.094 lbai/A, (5) Raptor 1EC 0.047 lbai/A, (6) Sandea 75WP 0.048 lbai/A, (7) Python 80WG 0.05 lbai/A and (8) FirstRate 84WG 0.04 lbai/A. Treatments were applied in 10 ft x 25 ft strips across (perpendicular) the seed beds. Treatments were applied with a CO₂ backpack sprayer at 35 psi in 20 gpa water. Crop tolerance and weed control evaluations were made 10 and 31 days after treatment (DAT).

RESULTS AND DISCUSSION: A stand count was made 10 DAT. Results indicate no big differences between treatments and the check for number of plants per 10 ft. of row. The highest average was Sandea at 17.3 while the lowest was Python at 13.3 plants per 10 ft. of row. The check averaged 16.3 per 10 ft. of row. (Table I)

Crop tolerance evaluation made 31 DAT indicated unacceptable injury with FirstRate (30%) at 0.04 lb ai/A. Treatments showing slight injury were Goal Tender at 0.25 lb ai/A. (20%), Raptor at 0.047 lb ai/A. (10%) and Python at 0.05 lb ai/A. (10%). Goal Tender, Raptor and FirstRate gave 70% control of Jimson weed. Chateau, Goal Tender and FirstRate provided some control of pigweed but was not commercial control. Chateau and Raptor provided 80% control of smartweed while Goal Tender provided 60% control. Chateau was the only product providing commercial control of the citron melon at 80%. Raptor provided 70% control of the citron melon. (Table I)

Table I. Effect of preemergent herbicides for weed control and crop tolerance in large lima beans.

Treatment	Rate Lbai/A.	Stand Count ¹	Phytotoxicity ²	-----Weed Control ³ -----			
				Jimson Weed	Pigweed	Smartweed	Citron Melon
Goal Tender Sencor	0.125 0.125	14	0	70	30	0	0
Sencor	0.25	14	0	0	0	0	0
Goal Tender	0.25	15	20	70	50	60	0
Chateau	0.094	16	0	0	20	80	90
Raptor	0.047	14	10	70	0	80	70
Sandea	0.048	17	0	0	0	-	0
Python	0.05	13	10	0	0	-	0
FirstRate	0.04	14	30	70	50	-	0
UTC		16	0	0	0	-	0

¹ Stand Counts = Number plants per 10ft row. ² Phytotoxicity = 0, no injury; 100 plant dead.

³ Weed control = 0, no control; 100 complete control.

Trial IV Post-emergent Herbicides for Weed Control in Vine Large Lima Beans. Mick Canevari, Don Colbert, Scott Whiteley and Randall Wittie

OBJECTIVE: Evaluate several post-emergent herbicides for weed control in large vine lima beans in the Delta.

MATERIALS AND METHODS: The following herbicides were applied post-emergent to vine large lima beans var. “White Ventura N” planted May 12, 2006 on the Rick Marcuchi farm located on Lower Jones Tract 15 miles west of Stockton in the San Joaquin Delta on June 13, 2006: Herbicide treatments (1) FirstRate 84WG 0.04 lbai/A, (2) Python 80WG 0.05 lbai/A, (3) Sandea 75WP 0.048 lbai/A, (4) Raptor 1EC 0.047 lbai/A, (5) V-10142 75WP 0.5 lbai/A, (6) Basagran 4EC 0.5 lbai/A and (7) Basagran 4EC 1.0 lbai/A. NoFoam A (NIS) 0.25% V/V was added to all treatments except Basagran. COC 1.0 qt/A was added to the basagran treatments. Treatments were applied in 10 ft x 25 ft strips across (perpendicular) the beds. Treatments were applied with a CO₂ backpack sprayer at 35 psi in 20 gpa water. Growth stages at the time of application: beans 7-10 inch height with 20% runners, jimson weed (*Datura stramonium*) 2-4 inch height, 4-7 leaves; pigweed (*Amaranthus retroflexus*) 1-5 inch height; citron melon (*Citrullus lanatus citrioides*) 3-6 inch diameter and smartweed (*Polygonum pensylvanicum*) 3-6 inch height.

RESULTS AND DISCUSSION: Plant stunting and leaf chlorosis were evaluated 8 days after treatment. Python, Sandea and V-10142 resulted in unacceptable stunting and chlorosis. Raptor resulted in slight stunting and chlorosis. Control of pigweed, Jimson weed, citron melon and smartweed was not commercially acceptable with all the treatments except Basagran. Basagran at the 0.5 lb ai rate provided 80% control of Jimson weed. Python was still providing 50% stunting and 10% chlorosis of the beans at 17 days after treatment. Raptor and Python were the only two materials providing acceptable control of pigweed at 17 days after treatment. Jimson weed, smartweed and citron melon were slightly stunted or had very little chlorosis. (Table I)

Table I Post-emergent herbicides for weed control in large lima beans.

Treat- ment	Rate Lb ai/A	Phytotoxicity ¹				Percent Weed Control ³			
		Stunting ²		Chlorosis ²		Jimson Weed	Pigweed	Smart Weed	Citron Melon
		8	17	8	17				
FirstRate	0.04	0	0	0	0	10	0	10	-----
Python	0.05	30	50	30	10	20	60	10	65
Sandea	0.048	30	15	30	0	23	20	10	8
Raptor	0.047	20	20	20	0	35	100	25	23
V-10142	0.5	35	30	30	1	5	10	10	5
UTC		0	0	0	0	0	0	0	0
Basagran	0.5	0	0	0	0	-	20	-	10
Basagran	1.0	0	0	0	0	-	65	-	10

¹Phytotoxicity = 0 no injury; 100 plant dead. ²Stunting and Chlorosis days after treatment

³Percent weed control = 0 no control; 100 complete control.

Trial V Nightshade Control in Baby Lima Beans. Mick Canevari, Don Colbert, Randall Wittie, Scott Whitely.

OBJECTIVE: Evaluate Chateau in preemergence dry bean weed control programs for added annual nightshade control and crop tolerance.

MATERIALS AND METHODS: The following herbicides were applied to bush baby lima beans var. “Luna” planted May 17, 2006 on the Pete Katakian Farm on Comstock Rd east of Hwy 88 near Waterloo, CA: (1) Prowl 3.8CS 1.5 lbai/A, (2) Chateau 51WG 0.047 lbai/A, (3) Chateau 51WG 0.094 lbai/A, (4) Prowl 3.8CS 1.5lbai/A + Chateau 51WG 0.047 lbai/A, and (5) Prowl 3.8CS 1.5 lbai/A + Chateau 51WG 0.094 lbai/A. Treatments were arranged in a randomized complete block design with four replicates. Plots were 4 rows (10 ft.) x 30 ft. Treatments were applied with a CO² backpack sprayer at 35 psi in 20 gpa water. The application was made after the beans were planted but before emergence.

RESULTS AND DISCUSSION: Stand counts, crop injury and weed control ratings were made on May 30, June 5 and 26 which were 12, 18 and 39 days after treatment (DAT). Bean stand count made 12 DAT showed no significant differences between treatments. Treatments were averaging 11-13 plants per 3 row-ft. At 18 DAT, no phytotoxicity was observed in any plot. Treatments with Chateau provided excellent control of nightshade 18 DAT. Prowl was the weakest at only 23% control. The Chateau treatments alone and in combination with Prowl provided 91-94% control and were not significantly different from each other but were better than the Prowl alone. Excellent control of pigweed was provided by all treatments at the 18 DAT rating. Treatments averaged 91 – 96% control. Purslane control was excellent with all treatments at the 18 DAT rating. The best was Prowl + Chateau at 1.5 + 0.094 lbai/A with 98% control which was significantly better than the remaining treatments. Prowl alone provided 50% control while Chateau alone at both 0.047 and 0.094 lbai/A provided 93 and 94% control. Prowl + Chateau at 1.5 + 0.047 lbai/A provided 95% control. No foliar phytotoxicity was observed on the beans at the 39 DAT rating. Nightshade control was still excellent with 90-99% control for the treatments. Pigweed control went down a little especially with the Chateau alone treatments. But control of pigweed was significantly better than the check with all treatments and no difference between treatments. Control averaged 88-94% control. The best treatments for purslane at the 39 DAT rating were the Prowl + Chateau combinations. These treatments provided 92 and 94 % control respectively while Chateau alone at both rates provided 83% control. Prowl alone provided 86% control of purslane (Table I).

Table I. Weed control with preemergence herbicides in baby lima beans.

<u>Treatment</u>	<u>Rate lbai/A</u>	<u>Stand¹ Count</u>	<u>Phytotoxicity²</u>			<u>Nightshade³</u>		<u>Pigweed³</u>		<u>Purslane³</u>	
			12	18	39	18	39	18	39	18	39
Check		11.4	0	0	0	0	0	0	0	0	0
Prowl 3.8CS	1.5	12.0	0	0	0	23	50	91	94	93	86
Chateau 51WG	0.047	12.4	0	0	0	93	98	96	88	93	83
Chateau 51WG	0.094	10.8	0	0	0	91	97	93	89	94	83
Prowl 3.8CS Chateau 51WG	1.5 0.047	12.5	0	0	0	92	99	95	93	95	92
Prowl 3.8 CS Chateau 51WG	1.5 0.097	13.2	0	0	0	94	95	94	88	98	94
LSD (P=.05)						16.8	9.6	5.9	12.6	4.5	10.3

¹Four 3ft row samples were counted per plot.

²Phytotoxicity Days After Treatment (%) 0 = none, 100 plant dead.

³Weed Control Days After Treatment (%) 0 = none, 100 complete control.

OBJECTIVE: Evaluate several post emergent herbicides for crop tolerance in Baby Lima, Black-eye, Kidney and Garbanzo bean.

MATERIALS AND METHODS: The following herbicides were applied to garbanzos var. “Sierra”, black-eye cowpeas var. “UC46”, red kidney beans var. “9688” and bush baby lima beans var. “UC Luna” planted on June 2, 2006 on the UC Davis Agronomy Farm: (1) Untreated Check, (2) Python 80%WG 0.05 lb ai/A. Pre-bloom, (3) Python 80%WG 0.025 lb ai/A. Post-bloom, (4) FirstRate 84%WG 0.016 lb ai/A. Pre-bloom, (5) FirstRate 84%WG Post-bloom and (6) Raptor 1EC + Basagran 4EC 0.032 + 0.375 lb ai/A. Pre-bloom. Treatments were arranged in a randomized complete block design with three replicates. Plots were 2 rows per variety (20 ft wide) X 15 ft. Treatments were applied with a CO² backpack sprayer at 35 psi in 20 gpa water. The pre-bloom application was made on August 1. Stage of development for each variety was as follows: garbanzos pre-bud, 7” ht; black-eyes pre-bud, 13” ht; light red kidney beans pre-bud, 11” ht; bush baby lima beans pre-bud, 11” ht. The post-bloom application was made on August 21. Stage of development for each variety was as follows: garbanzos 5% flower, 18” ht.; black-eyes early pod to 1” pod, 24-30” ht; light red kidney beans early bloom, no pods, 20-24” ht; bush baby lima bean flowering to 5% pod, 18-24” ht.

RESULTS AND DISCUSSION:

PHYTOTOXICITY 3,7,9 AND 42 DAYS AFTER PRE-BLOOM TREATMENT:

Garbanzos: Herbicides Python and FirstRate resulted in moderate stunting and chlorosis at 3DAA. Severe stunting occurred up to 42 DAT. The plants were growing out of the chlorosis by the 9 day evaluation and plants were 0% chlorosis on the 42 day evaluation. FirstRate resulted in slight stunting (13%) at the 42 day evaluation. Raptor + Basagran did not stunt the plants but did result in slight chlorosis. At 42 DAT, plants had grown out of the chlorosis.

Black-Eyes: Three DAT both Python and FirstRate resulted in moderate stunting and chlorosis. At 7 and 9 DAT, Python and FirstRate were resulting in slight stunting and chlorosis. By the 42 DAT evaluation the black-eyes had grown out of the stunting and chlorosis. Raptor + Basagran resulted in early severe chlorosis but black-eyes had grown out of the chlorosis by the 42 DAT evaluation.

Light Red Kidney Bean: Early ratings indicated moderate stunting and chlorosis from Python and FirstRate. However, at the 9 DAT evaluation Python had 43% stunting and 43% chlorosis but by the 42 DAT evaluation the plants grew out of both the stunting and chlorosis. Raptor + Basagran resulted in slight stunting and chlorosis up to 42 DAT.

Bush Baby lima Bean: Python resulted in more severe stunting and chlorosis than FirstRate. FirstRate was safer for the 42 DAT. Python at 3 DAT resulted in severe stunting and chlorosis. At 7 DAT stunting was 23% and chlorosis was 37%. At 9 DAT stunting was 33% and chlorosis was 38%. By the 42 day evaluation stunting was 10% and no chlorosis. Raptor + Basagran resulted slight stunting and chlorosis early but was very safe to baby lima bean as the plant matured.

PHYTOTOXICITY 22 DAYS AFTER POST BLOOM TREATMENT:

Garbanzos: Python and FirstRate resulted in acceptable stunting but unacceptable chlorosis. Python was slightly inferior to FirstRate. Raptor + Basagran was completely safe 22 DAT.

Black-Eyes: No phytotoxicity was noted with either Python or Firstrate. Raptor + Basagran was also safe at 22 DAT.

Light Red Kidney Bean: Python resulted in very slight stunting and 22% chlorosis. FirstRate was completely safe as well as Raptor + Basagran.

Bush Baby Lima Bean: Python resulted in 22% stunting and 4% chlorosis. FirstRate and Raptor + Basagran were completely safe.

YIELDS: The four varieties of beans used in this trial matured at different times because of the variety planting dates. Hot weather during the season also affected crop set and maturity. Early fall rains also didn't help to mature the bush baby lima and garbanzos. Therefore, yield results will be reported only for the black-eyes and light red kidney.

Black-Eyes: There was no significant difference between the different Python and FirstRate treatments and the untreated check. Raptor + Basagran had yields significantly less than the untreated check and the other 4 treatments. FirstRate yields were slightly better than the Python and Raptor + Basagran treatments.

Light Red Kidney Bean: Yields were not significantly different between the treatments and the untreated check. However, the Python and Raptor + Basagran treatments were slightly less than the FirstRate treatment.

Results indicate pre-bloom treatments were slightly more injurious than the post bloom or pod development treatment. Although there were no significant differences between Python and FirstRate for yields, FirstRate was slightly superior.

Table I. Effect of post emergent herbicides on dry beans.

Treatment	Rate lb ai/A	Phytotoxicity ¹								Yield ²		
		Garbanzos		Black-Eyes		Light Red Kidney		Baby Lima Bean		Black-Eye	Light Red Kidney	Bush Baby Lima
		S	C	S	C	S	C	S	C			
UTC		0	0	0	0	0	0	0	0	2981 a	3291 a	1665 a
Python	0.05	23	20	18	14	22	26	25	26	2943 a	2933 a	620 b
Python	0.025	7	42	0	0	2	22	22	4	2923 a	2372 a	1297 a
FirstRate	0.016	30	32	15	19	13	18	5	8	3175 a	3649 a	1723 a
FirstRate	0.008	20	32	0	0	0	0	0	0	3272 a	3340 a	1471 a
Raptor + Basagran ³	0.032 + 0.375	8	30	8	18	5	15	6	3	2318	2730	1670
								LSD (P=.05)		502	966	604

¹Phytotoxicity = average 4 evaluations for S = stunting, C = Chlorosis. ²Yield = lbs/Acre. ³Raptor + Basagran data based on a single plot

OBJECTIVE: Evaluate several herbicide combinations for pre and post emergence weed control in garbanzos.

METHODS AND MATERIALS: The following materials were applied preemergence to weeds and garbanzos on November 22, 2005: (1) Goal Tender 4EC 0.125 lb ai/A + Sencor 75DF 0.125 lb ai/A, (2) Prowl 3.8CS 1.5 lb ai/A + Caparol 4F 1.5 lb ai/A, (3) Prowl 3.8CS 1.5 lb ai/A + Goal Tender 4EC 0.25 lb ai/A, (4) Prowl 3.8Cs 1.5 lb ai/A + Sencor 75 DF 0.25 lb ai/A, (5) Prowl 3.8CS 1.5 lb ai/A + Goal Tender 4EC 0.125 lb ai/A + Sencor 75DF 0.125 lb ai/A, (6) Prowl 3.8CS 1.5 lb ai/A followed by a post application of Raptor 1EC 0.047 lb ai/A + Crop Oil Concentrate 1.0% V/V on February 9, 2006. Sandea 75WP 0.048 lb ai/A + Crop Oil Concentrate 1.0% V/V was applied post emergent on February 9, 2006. Treatments were arranged in a randomized complete block design with 3 replicates. Plots were 5 ft. X 25 ft. Materials were applied with a CO² backpack sprayer at 35 psi in 20 gpa water. Garbanzo var. "CT San Joaquin" was planted on November 19, 2005 on the Eugene Caffese Farm, Farmington, CA. Growth stages at post application: garbanzo = 4-6 stems, 5" height, chickweed = 3" diameter, 1.0/Ft², wild mustard = 5 leaf, 0.5/Ft². Crop tolerance was evaluated on February 7 and 24 and March 23. Weed control efficacy data collected on February 24 and March 23.

RESULTS AND DISCUSSION:

Preemergence Treatments: Prowl + Goal Tender resulted in 21% stunting 77 DAT. Goal Tender + Sencor, Prowl + Caparol, Prowl + Sencor, Prowl + Goal Tender + Sencor and Prowl alone resulted in slight stunting ranging from 8 to 14%. At 94 DAT, very slight foliar injury was observed from Prowl + Caparol, Prowl + Sencor and Prowl + Goal Tender + Sencor. Excellent control of chickweed was obtained with Prowl + Caparol, Prowl + Goal Tender, Prowl + Sencor, Prowl + Goal Tender + Sencor and Prowl alone. Goal Tender + Sencor was weak on chickweed. Wild mustard control was excellent with all treatments. All treatments containing Prowl were still stunting the plants 121 DAT. Only Prowl + Caparol was showing slight foliar injury at 121 DAT. Prowl + Goal Tender + Sencor was the only treatment resulting in very slight stunting of the garbanzos at 160 DAT. Goal Tender + Sencor provided 20% control of chickweed at 160 DAT. Prowl + Caparol, Prowl + Goal Tender, Prowl + Sencor and Prowl + Goal Tender + Sencor provided excellent control of chickweed up to 160 DAT. Control was 91 to 100%. (Table I)

Postemergence Treatments: Sandea post was very injurious to the garbanzos. All plants were killed at the 160 DAT evaluation. Raptor post was also phytotoxic to the garbanzos but not as severe as Sandea. However, injury was commercially unacceptable. Raptor provided excellent control of both chickweed and wild mustard. (Table I)

Yields: Garbanzos were harvested 246 days after the pre treatment and 167 days after the post treatment by machine. Yield results indicate no significant difference between treatments. There were no plants in the Sandea plots to harvest. The low yield was due to direct harvesting being unable to pick up the lodged plants. Using the growers yield of approximately 1400 lbs/A., 50% of the test plot beans were lost during harvest. (Table I)

Table I Pre and postemergence weed control and crop tolerance in garbanzos.

Treatment	Rate ¹	Appl. Time	Garbanzo Phytotoxicity— DAT ²					Weed Control — DAT ³		Yield Lbs/ Acre
			77	94/15	121/42	121/42	160/81	Chickweed 160/81	Wild Mustard 94/15	
Goal Tender Sencor	0.125 0.125	PRE	14	0	0	0	0	20	99	581
Prowl Caparol	1.5 1.5	PRE	10	7	13	10	0	91	88	482
Prowl Goal Tender	1.5 0.25	PRE	21	0	15	0	0	91	99	784
Prowl Sencor	1.5 0.25	PRE	13	9	27	0	0	100	100	697
Prowl Goal Tender Sencor	1.5 0.125 0.125	PRE	10	9	7	0	3	100	99	610
Sandea COC	0.048 1.0% V/V	POST	0	81	100	99	100	100	60	
Prowl Raptor COC	1.5 0.047 1.0% V/V	PRE POST POST	8	68	87	85	80	80	99	668
Untreated Check			0	0	0	0	0	0	0	406
									LSD (P=.05)	297 NSD

¹Rate = lb ai/acre. ²Garbanzo phytotoxicity days after treatment pre/post = 0 none, 100 plant dead

³Weed control % days after treatment pre/post = 0 no control, 100 complete control.

OBJECTIVE: Evaluate several post emergence herbicides for weed control and crop tolerance in garbanzos.

METHODS AND MATERIALS: The following materials were applied post emergence to weeds and garbanzos on March 23, 2005: (1) Raptor 1EC 0.047 lb ai/A + Prism 0.94EC 0.1 lb ai/A, (2) Raptor 1EC 0.047 lb ai/A, (3) Osprey 4.5% WG 0.013 lb ai/A, (4) Osprey 4.5% WG 0.026 lb ai/A, (5) Python 80% WG 0.025 lb ai/A, (6) Python 80% WG 0.05 lb ai/A, (7) FirstRate 84% WG 0.008 lb ai/A, (8) FirstRate 84% WG 0.016 lb ai/A, (9) Untreated Check. NuFilm 17 at 0.25% V/V was added to all treatments. Treatments applied to 5 ft X 25 ft strips. Materials were applied with a CO² backpack sprayer at 35 psi in 20 gpa water. Garbanzo var. “CT San Joaquin” was planted on November 19, 2005 on the Eugene Caffese Farm, Farmington, CA. Growth stages prior to the post application: garbanzo = 4-6 stems, 9” height, chickweed = blooms, 4-8” height, wild mustard = blooms, 10 leaf and 7” height. Crop tolerance was evaluated on April 14 and May 1. Weed control efficacy data collected on April 14 and May 1. Plots were harvested July 26 by machine.

RESULTS AND DISCUSSION: Raptor + Prism, Raptor, Osprey and FirstRate resulted in unacceptable foliar injury 22 DAT. At 39 DAT the only material safe to garbanzos was both rates of Python. (Table I)

Python at 0.05 lb ai provided 80% control of chickweed and 90% control of wild mustard. The rest of the treatments provided no control of either weed. At 39 DAT, Python provided 30 and 80% control of chickweed and 85 and 95% control of wild mustard. Poor weed control was noted with the rest of the treatments. Python at both rates provided minimum control of annual sowthistle. (Table I)

All the treatments had yields 2 to 3 times the check. Python at the 0.05 lb rate and FirstRate at 0.008 lb ai had the best yields. The harvester was unable to pick up all plants for thrashing. An estimated 50% of the beans were lost at harvest. (Table I)

Table I Postemergence weed control and crop tolerance in garbanzos.

Treatment	Rate ¹	% Weed Control ³						
		Phytotoxicity ² — DAT		Chickweed - DAT		Wild Mustard — DAT		Yield Lb/Acre
		22	39	22	39	22	39	
Raptor + Prism	.047+0.1	50	80	0		0		662
Raptor	0.047	60	70	0		0		488
Osprey	0.013	50	60	0		0		470
Osprey	0.026	65	70	0		0		540
Python	0.025	0	0	0	30	0	85	522
Python	0.05	5	0	90	80	90	95	732
Firstrate	0.008	60	50	0		0		819
FirstRate	0.016	80	80	0		0		645
Untreated Check		0	0	0		0		314

¹Rate = lb ai/Acre, NuFilm 17 @ 0.25% V/V. ²Phytotoxicity = 0 none, 100 plant dead.

³% Weed Control = 0 no control, 100 complete control.

OBJECTIVE: Evaluate several new garbanzo varieties comparing to existing commercial varieties.

MATERIALS AND METHODS: The following varieties were direct seeded on the Eugene Caffese Farm near Farmington, CA on November 15, 2005: (1) AWF 1, (2) AWF 2, (3) AWF 3, (4) BCC Sutter, (5) BCC San Joaquin, (6) 1861 W, (7) 0147 W, (8) AF 46 A, (9) 1869 W, (10) Dylan (I604 W), (11) HB-14, (12) Sierra. Varieties were arranged in a randomized complete block design with 3 replicates. Plots were 5 ft X 25 ft with 2 rows per plot. Evaluations were made on January 17 (62 DAP), March 22 and April 14. Yields were taken July 26, 2006.

RESULTS AND DISCUSSION: Plant height measurements were taken on January 17 62 days after planting. HB-14 was the shortest and AWF 1,2,3 and BCC Sutter were the tallest. AF 46 A, HB-14 and Sierra had 20 to 30% stand reduction. (Table I)

Although HB-14 was the shortest variety, it also had the least amount of white mold. Plant Pathologist Weidong Chen (WSU) counted the diseased plants per plot infected with white mold on March 22. AWF 1 had the most which was significantly more than any of the other varieties. HB-14 had significantly the least. White mold severity was evaluated on April 14 and results indicated AWF 1, 0147 W and HB-14 to have the severest mold infections. All the varieties had some Ascochyta. The severest varieties were AWF 2, 0147 W, AF 46 A and Sierra. (Table I)

Plant height was evaluated on April 14. Varieties 1869 W, Dylan (1604 W), HB-14 and Sierra plant growth was 50% less compared to the other varieties. (Table I) Sutter had the best yield. (Table I)

Table I. Garbanzo variety evaluation in San Joaquin County.

	Plant Height IN	% Stand Reduction	White Mold Incidence # Infected Plants/Plot	White Mold Severity %	Ascochyta Severity %	Height Reduction %	Yield Lb/Acre
Variety							
AWF 1	2.0 b		12.7 a	16.7 a			1545
AWF 2	2.3 b		11.3 ab	7.7 a	75		1568
AWF 3	3.0 a		6.0 cd	8.3 a			1894
BCC Sutter	2.0 b		7.3 bcd	6.0 a			2300
BCC San Joaquin	1.3 c		4.0 cde	2.0 a			1684
1861 W	1.0 c		8.0 abc	6.0 a			1255
0147 W	1.0 c		8.0 abc	16.7 a	100		Stand Loss
AF 46 A	1.0 c	20	4.3 cde	5.0 a	90		Stand Loss
1869 W	1.0 c		7.3 bcd	13.3 a		50	Stand Loss
Dylan (I604W)	1.3 c		6.3 cd	6.0 a		50	1255
HB-14	0.5 d	22.5	1.0 e	17.7 a		50	Stand Loss
Sierra	1.0 c	30	3.0 de	1.7 a	80	50	1057
LSD (P=.05)	0.44		4.86	19.41			Mean 1566
CV	17.91		43.38	128.57			10.3