SWEET POTATO, n. Ipomea batatas. A tropical vine related to the morning glory, having various shaped leaves and purplish flowers; also its large, thick, sweet, tuberous root, which is cooked and eaten as a vegetable. The plant is widely cultivated in warm regions and in the United States as far north as New Jersey and west to California. Often erroneously called yam.

SWEETPOTATO RESEARCH TRIALS

2001 Research Progress Report

Bill Weir, Farm Advisor
Merced/Madera Counties

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SWEETPOTATO RESEARCH TRIALS

2001 Research Progress Report
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SWEETPOTATO COLLABORATORS VARIETY TRIAL
2001 Research Progress Report

Bill Weir, Farm Advisor
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INTRODUCTION

California does not have a sweetpotato breeding program, and because of this new varieties are introduced through collaboration with states from the southeast U.S. that do have breeding programs. These new varieties are evaluated under California conditions and management practices before they are released for general production. These new lines are evaluated not only for their yield and appearance, but also for plant production, disease and insect resistance, color, taste, and storability.

This year the Collaborators Trial included previous lines still being evaluated as well as new experimental lines from North Carolina, South Carolina, and Mississippi. This report summarizes the results of this trial in Merced County in 2001.

METHODS

Location: Tom Nakashima Farms, near corner of Walnut and Arena Rds, near Winton. Soil type is Atwater sand, 0 – 3% slope.

Experimental Design: Randomized complete block with 4 replications. One row plots, 60 plants per plot on 9" spacing (45' plot length).

Varieties:

1. Beauregard (Louisiana)
2. L94-96 (Louisiana)
3. W311 (South Carolina)
4. W328
5. W334
6. W352
7. MS I52 (Mississippi)
8. MS K39
9. W365 (South Carolina)
10. W370
11. NC 97A-04 (North Carolina)
12. 97-29 (South Carolina)
13. Patriot (South Carolina)
14. W364
15. Jewel

All varieties bedded March 19, 2001 and transplanted May 25. Because some seed was not presprouted and had poor plant production, Patriot was limited to 22 slips in only one replication and MS K39 had only 25 slips per plot (20 ft).

Fertility: Organic field. 10 tons/A manure and compost preplant incorporated. Liquid organic N through the drip lines.

Irrigation: Drip irrigated, one line for 2 rows.

Harvest: Machine dug with 2 row digger on October 10, 2001.

RESULTS

Slip production was poor for many of the new lines evaluated for the first time, especially for MS K39 and Patriot (Table 1). This may have happened because the roots were chilled in transit and were not presprouted before going into the beds.

Root descriptions at harvest are shown in Table 2. In general, most of the new lines did not look as good as Beauregard, though L94-96 is very similar in appearance and W370 had the best appearance in the group. Beauregard seed is old

and showing signs of Russet Crack disease. The one purple skinned entry had prominent veins, which reduced its appearance score.

Yield and size results are shown in Table 3 and Figure 1. NC97A-04 had the best yields, with 535 boxes/A #1 roots. This was significantly more than L94-96 and Beauregard. Beauregard yield was low because Russet Crack resulted in a very high cull rate. Both Beauregard and L94-96 seed is old and needs to be replaced with clean seed. Jewel also yielded very well this year, with 476 boxes per acre. The Jewel seed used for this trial was fairly new (about 2 years), which may explain the very high yields this year, compared to the others, for this variety.

One new line tested for the first time this year was Patriot, a potato with a level of nematode and disease resistance. Because of very poor plant production, it was not replicated, and produced only medium roots.

Table 4. Storage weight loss.

Variety	*1 month*	*2 months*	*3 months*	*Cumu-lative*
	Wt loss in storage,%			
1. Beau	2.5	1.0	1.3	4.7
2. L94-96	2.5	0.9	1.0	4.4
3. W311	2.9	1.0	0.8	4.7
4. W328	3.7	1.0	1.5	6.2
5. W334	3.4	1.4	1.4	6.2
6. W352	3.1	1.1	1.3	5.6
7. MS I52	3.2	1.3	1.2	5.7
8. MS K39	1.2	0.9	1.3	3.4
9. W365	1.7	0.7	1.0	3.4
10. W370	1.7	1.2	1.0	3.8
11. NC97A	2.3	0.9	1.1	4.3
12. 97-29	2.3	1.0	1.1	4.4
13. Patriot	3.5	1.9	1.8	7.3
14. W364	3.0	1.1	1.2	5.4
15. Jewel	1.8	1.9	1.6	5.4
Average	2.6	1.2	1.2	5.0
LSD 0.05	1.2	0.5	NS	1.5

Collaborators Trial Harvest 2001.

Weight loss in storage was also evaluated for the period from October through January (Table 4). On average, the potatoes lost 4 – 6% of their weight over a 3 month period. Some lost more or less than Beauregard during this time, but these differences were usually not significantly different.

A simple taste test was conducted on five of the new varieties, with Beauregard as the standard comparison. The potatoes were baked, then evaluated for flesh color, texture, moisture, and flavor (Table 5). L94-96, which will be available in 2002, scored slightly higher than Beauregard on the taste test. 97-29 scored significantly higher than Beauregard for most categories, while W370 was rated significantly less and rated unacceptable for eating quality. Ironically, W370 had best overall appearance in the field. 97-29 has potential to become a premium red potato, but suffers from prominent veins. This problem may be possible to overcome through seed selection.

ACKNOWLEDGEMENTS

We wish to thank Mr. Tom Nakashima and Frank for their help and cooperation with planting, harvest, and storage for this trial.

TABLE 1. SCORE SHEET FOR EVALUATION OF SWEET POTATO SPROUT PRODUCTION

Date Bedded: March 19, 2001 **Location**: Livingston, CA

Date Evaluated: April 23, 2001 **Type of Bed**: Covered hot bed

Evaluated by: Scott Stoddard

Selection	Roots Presprouted Yes/No	Plant Production 1 – 5 (1)	Uniformity of Emergence 1-5 (2)	Earliness 1-3 (3)	Root Conditions 1-5 (4)	Remarks (5)
Beauregard	Yes	4	3	2		
L94-96	Yes	4	4	2		Purple new growth
W311	Yes	3	3	2		Leaves bumpy
W328	Yes	2	2	2		
W334	Yes	5	5	3		Good stand
W352	Yes	5	4	3		
MS I52	No	2	1	1		
MS K39	No	1	1	1		3 plants
W365	No	2	1	1		Some very small leaves
W370	No	2	1	1		Leaf curl
NC97A-04	No	3	3	2		
97-29	Yes	5	4	3		
Patriot	No	0	0	0	Solid	2 plants
W364 (?)	No	3	4	1		
Jewel	Yes	4	4	2		

(1) Plant production rated from 1 – 5 based on observation during pulling season. A rating of 1 indicates low plant production, while 5 indicates good plant production.

(2) Uniformity of emergence rated from 1 – 5. One (1) indicates poor uniformity while 5 indicates the highest degree of uniformity of emergence.

(3) Earliness of plant production is rated form 1 – 3. One (1) indicated late emergence while 3 indicates early production.

(4) Root conditions six weeks after first pulling, rated 1 – 5. One (1) indicates complete rotting, while 5 indicates perfectly sound conditions. Not applicable this year as beds were disced shortly after transplanting.

(5) Notes on size of root, decay in beds, etc.

NATIONAL SWEETPOTATO COLLABORATORS TEST – 2001

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This year's sweetpotato evaluation was on Tom Nakashima's farm, near Livingston, CA. Soil type was a Atwater loamy sand, with 0 – 3% slopes. New lines from Mississippi, North Carolina, and South Carolina were not presprouted. Plant bed production was very low for Patriot and MS K39. Crop was grown organically. Disease pressure was higher than normal this year, especially for Stem Rot (*Fusarium*). Beauregard seed is old and showing symptoms of Russet Crack. Overall trial yield and quality were average to slightly below average.

Root description at harvest (all ratings made on #1 roots).

Selection	*Skin Color*	*Skin Texture*	*Flesh Color*	*Eyes*	*Lenticles*	*Shape*	*Shape Uniformity*	*Overall App*	*Comments*
1. Beauregard	Copper	6 – 7	3.5	7	5 – 7	2, 5	4 – 7	7 – 8	Skin cracking on some
2. L94-96	Copper	5 –7	3.5-4	4-7	6-8	5, 6, 7	5	7	A few veins on some
3. W311	Rose copper	6.0	3-3.5	5-8	4	4, 5, 8	5-7	5-6	veins
4. W328	Lt copper	4-6	3.5	4-5	4-7	1,2,3,5, 6	5	5-6	
5. W334	Deep copper	8-9	3-3.5	7	7	2,3,4,6, 7	4-7	5-6	Some veins, smooth
6. W352	Tan to copper	5-8	2.5	7-9	3-7	1,2,3	2-7	6	Veins
7. MS I52	Tan to copper	7-8		4-7	5-7	2,3	7	7	
8. MS K39	Copper to rose coppr	1-5	3.5	4-5	4-6	2,3,5,7	4-7	3-6	Rough skin, lots of feeder roots
9. W365	Copper	5-7	3-4	4-7	3-5	2,3,5,6	3-6	4-7	Dark raised lenticles
10. W370	Rose copper	7-9	4	6-9	5-8	3,5	4-8	7-9	Very good appearance
11. NC97A-04	Rose copper	6-7	3	5-7	5-7	2,3,5,6	6-8	6-7	Dark spots and lenticles
12. W97-29	Purple	7-8	3	4-6	5	2,3,5	5-7	5-8	Skins easily, lots of feeder roots, veins, lumpy
13. Patriot	Rose copper	5	3	3	3	3,7	3	2	Dark raised lenticles, lots of feeder roots.

Selection	*Skin Color*	*Skin Texture*	*Flesh Color*	*Eyes*	*Lenticles*	*Shape*	*Shape Uniformity*	*Overall App*	*Comments*
14. W364 (?)	Rose copper	2-5	3	5-7	4-7	1,4,5,7	4-7	3-8	Pimples, veins, skins easily
15. Jewel	Copper	5-6	3-4	1-3	3-8	6	5-7	4-8	Lumpy, fluted, classic Jewel

Skin color:	**Skin Texture:**	**Flesh Color:**	**Eyes:**	**Lenticles:**
cream (Hanna)	1 = very rough	0 = white	1 = very deep	1 = very prominent
Tan	3 = moderately rough	1 = cream	3 = deep	3 = prominent
copper (Jewel)	5 = moderately smooth	2 = yellow	5 = moderate	5 = moderate
Rose (Beau)	7 = smooth	3 = orange	7 = shallow	7 = few
Purple (Garnet)	9 = very smooth	4 = deep orange	9 = very shallow	9 = none
		5 = very deep orange		

Shape:	**Shape Uniformity:**	**Overall Appearance:**
1 = round	1 = very poor	1 = very poor
2 = round-eliptical	3 = poor	3 = poor
3 = eliptic	5 = moderate	5 = moderate
4 = long eliptic	7 = good	7 = good
5 = ovoid	9 = excellent	9 = excellent
6 = blocky		
7 = irregular		
8 = asymmetric		

All ratings made on #1 roots.

NATIONAL SWEETPOTATO COLLABORATORS SUMMARY OF DATA
2001

STATE AND LOCATION REPORTING: Livingston, CA
DATE TRANSPLANTED: May 25. DATE HARVESTED: Oct. 10. No. GROWING DAYS: 138
DISTANCE BETEEN ROWS (in): 40. DISTANCE IN ROW (in): 9
PLOT SIZE: NO. OF ROWS: 1 LENGTH (ft): 45 NO. OF REPS: 4
IRRIGATION: drip irrigation. 1.5 to 2 inches per week during summer.
FERTILIZER: Organic production field. About 200-200-300 NPK

	..... 40 lb Boxes/A				MKT YLD	%	BOX/A
SELECTION	**US #1'S**	**CANNERS**	**JUMBOS**	**MKT YIELD**	**BINS/A**	**US #1'S**	**CULLS**
NC97A-04	535.7	296.5	182.1	1014.2	40.6	52.7	164.6
Jewel	476.1	237.7	243.4	957.2	38.3	49.3	148.3
W365	435.8	244.8	93.3	773.9	31.0	56.7	207.8
W311	419.2	168.1	381.6	968.9	38.8	43.2	161.1
MS I52	408.0	162.4	215.1	785.5	31.4	51.4	182.0
W328	407.6	290.8	63.6	762.1	30.5	53.1	295.5
L94-96	402.7	251.4	37.4	691.5	27.7	58.1	242.6
W334	396.3	260.2	219.0	875.5	35.0	45.9	353.1
97-29	336.6	166.5	143.6	646.7	25.9	50.7	80.7
Beauregard	329.3	173.8	151.1	654.2	26.2	50.3	335.0
W370	284.9	466.7	7.9	759.4	30.4	39.0	238.8
W364 (?)	280.2	314.8	28.3	623.3	24.9	44.9	282.7
W352	256.8	118.6	223.9	599.4	24.0	44.1	50.5
MS K39*	184.6	57.4	85.3	327.3	13.1	58.0	261.6
Average	368.1	229.3	148.3	745.6	29.8	49.8	214.6
LSD 0.05	126.4	95.5	88.0	196.5	7.9	9.8	118.6
CV (%)	24	29.1	41.5	18.4	18.4	13.7	38.6
Patriot**	0.0	562.5	0.0	562.5	22.5	0.0	0.0

US #1's	Roots 2 to 3.5 inches in diameter, length 3 to 9 inches, well shaped and free of defects.
Canners	Roots 1 to 2 in diameter, 2 to 7 inches in length.
Jumbos	Roots that exceed the diameter and length requirements of above grades, but are of marketable quality.
Mkt Yield	Total marketable yield is the sum of the above three categories.
% US #1's	Weight of US #1's divided by total marketable yield.
Culls	Roots greater than 1" in diameter that are so misshapen or unattractive as to be unmarketable.
*	MS K39 had only enough slips for 20 foot plots.
**	Patriot had only enough slips for one replication. Data were not used in statistical analysis.

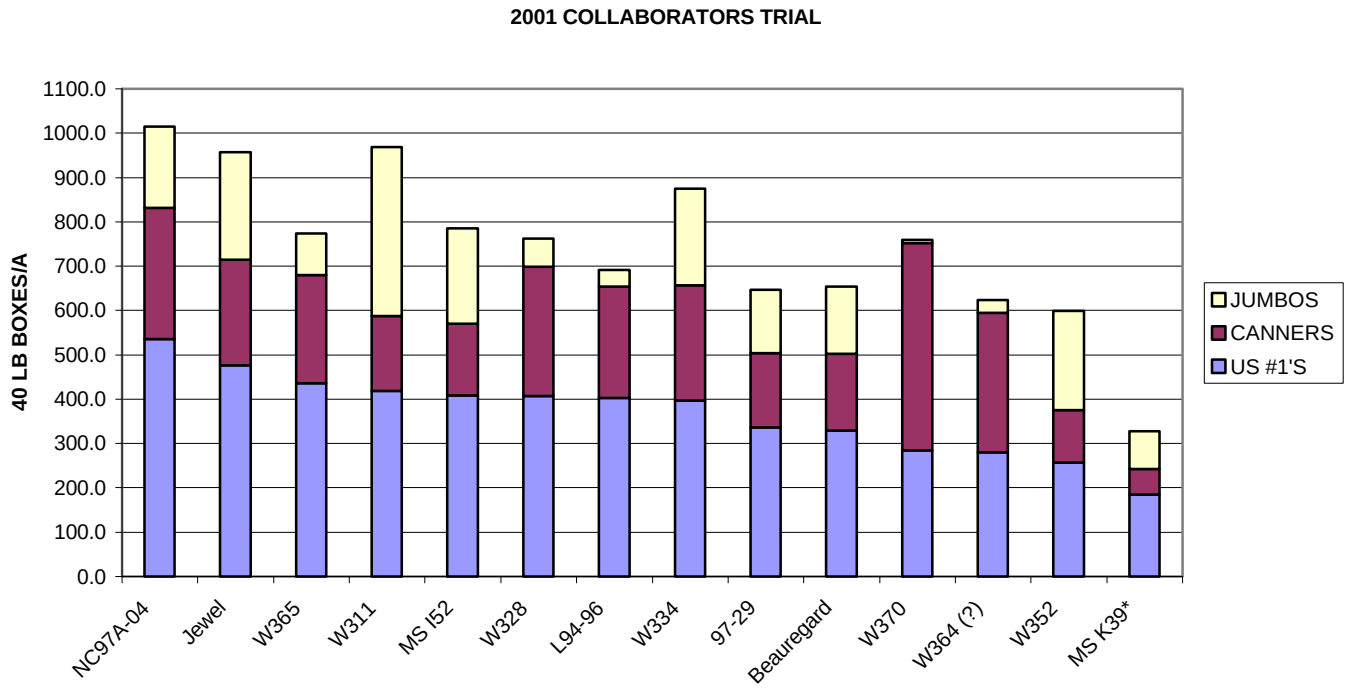

Figure 1. Yield results for the Collaborators Trial 2001, sorted by yield of US #1's. The height of each column equals the total marketable yield.

Table 5. Sweetpotato taste test results for selected lines from the 2001 Collaborators Trial.

Potato	*Flesh color*	*Texture*	*Moisture*	*Flavor*	*Total*	*95% CL*	*# of "like best" votes*
Beauregard	7.0	6.7	6.9	5.1	25.7	23 – 29	1
L94-96	8.3	6.3	7.0	6.8	28.4	25 – 32	1
MS I52	6.2	7.6	8.1	6.2	28.1	25 – 31	2
W370	4.0	5.9	4.9	3.7	18.4	15 – 22	0
NC97A-04	6.6	8.7	7.9	7.4	30.6	27 – 34	1
97-29	8.3	8.1	8.3	7.9	32.8	29 – 36	4
Average	6.7	7.2	7.2	6.2	27.3	22 – 33	
LSD 0.05	2.0	1.8	1.9	1.9	6.1		

Flesh color. 1 = light. 10 = darkest. The sample with the deepest orange is rated highest. Potatoes should be uniform and free from dark or light spots or streaks.
Texture. 1 = stringy, 10 = smooth. Texture refers to both smoothness and coarseness of the flesh, and whether fiber can be detected.
Moisture. 1 = dry, 10 = most moist.
Flavor. 1 = bland, 10 = most sweet.
95% CL = spread in the data at the 95% confidence level for 9 samples.
LSD 0.05 = Least Significant Difference at the 95% confidence level. Number of samples = 9.

EVALUATION OF GOAL HERBICIDE (OXYFLUORFEN) ON SWEETPOTATOES
2001 Research Progress Report

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INTRODUCTION

Weed control in sweetpotatoes is a serious challenge in California for three main reasons: the growth habit of "running" or "vining" obstructs bed shoulders and furrows, making mechanical cultivation difficult; the use of surface drip tape for irrigation further complicates mechanical cultivation and hand weeding; and because registered herbicides are very limited. Currently registered herbicides are limited to Devrinol (Napropamide), Dacthal (Chlorthaldimethyl), Fusilade (Flazaiflop-butyl), Poast (Sethoxydim), and Roundup (Glyphosate). Roundup use is limited to preplant burn-down applications. The fumigant Vapam (metham sodium) also has herbicidal properties. As a result, growers incur large hand weeding costs, and would greatly benefit from additional registered herbicides.

The objective of this study was to evaluate the suitability of Goal (Oxyflourfen) as a potential herbicide for sweetpotatoes in California.

METHODS

Location: South of Atwater, CA, in Merced County. Soil type is loamy sand.

Plot Layout: Randomized complete block with 4 replications. Plots were 1 bed (80") by 20 ft. Beauregard sweetpotatoes on 9" spacing transplanted May 31, 2001. Harvested October 17, 2001.

Treatments:

1. Untreated control (UTC).
2. Goal 1 pt/A 2 weeks before transplant.
3. Goal 2 pts/A 2 weeks before.
4. Goal 1 pt/A at planting over-the-top.
5. Goal 2 pts/A at planting over-the-top.
6. Goal 1 pt/A 2 weeks post transplant to clean, cultivated bed.
7. Goal 2 pts/A 2 weeks post transplant.
8. Devrinol 2 lbs/A at planting.
9. Dacthal 8 lbs/A at planting & 4 weeks post-transplant.

Goal treatments were applied by hand with a Solo backpack sprayer and incorporated only by water. The Devrinol and Dacthal were incorporated into the soil with a rake.

Weed control crop injury ratings were made four times beginning June 8, 2001. A subjective visual rating was made using a scale from 0 – 10, where 0 = none and 10 = extremely bad.

RESULTS

None of the herbicide treatments gave much control of weeds at this location this year, which was dominated by redroot pigweed. There was a slight suppression of weeds noted on the first two evaluation dates (Table 1), but these were not significantly different. At the June 19 evaluation, broadleaf weeds in the 2 week post Goal plots were significantly reduced compared to the untreated control, but this was most likely because the plots had been hand weeded the week before.

Crop phytoxicity was pronounced in the Goal treatments applied at planting and two weeks post transplant. Very little phyto was observed

for the preplant application, and there was no significant difference between the 1 and 2 pint rate (Table 1). No crop phyto was seen in the Devrinol or Dacthal treatments.

Despite the lack of weed control, significant differences existed for yield (Table 2), though overall yields were depressed in this trial. Best overall yields occurred in the Dacthal treatment, at 370 boxes/A (Figure 1). This was significantly greater than the untreated control and 2 pts of Goal applied after transplanting. There was no significant difference in the rate of Goal (1 pt vs 2 pts) on yield for #1's, Jumbos, or total marketable yield. The preplant application resulted in better yields than the other application times (significant at p=0.10, Table 3). This is understandable, considering the amount of crop damage that occurred in the over-the-top and post plant treatments.

The lack of weed control in this trial this year was surprising considering the main weed species in the field. Redroot pigweed should be controlled or suppressed by all three products in this trial. The lack of control in the Goal treatments may be partially explained by the fact that there was no water incorporation, other than the water through the drip line.

ACKNOWLEDGEMENTS

We wish to thank Mr. Jason Tucker and Mr. Lonnie Slayton with Simplot Soilbuilders for their help and cooperation with planting and harvesting this test, and to Mr. Dwain Morton with Rohm & Haas (now Dow AgroSciences) for product.

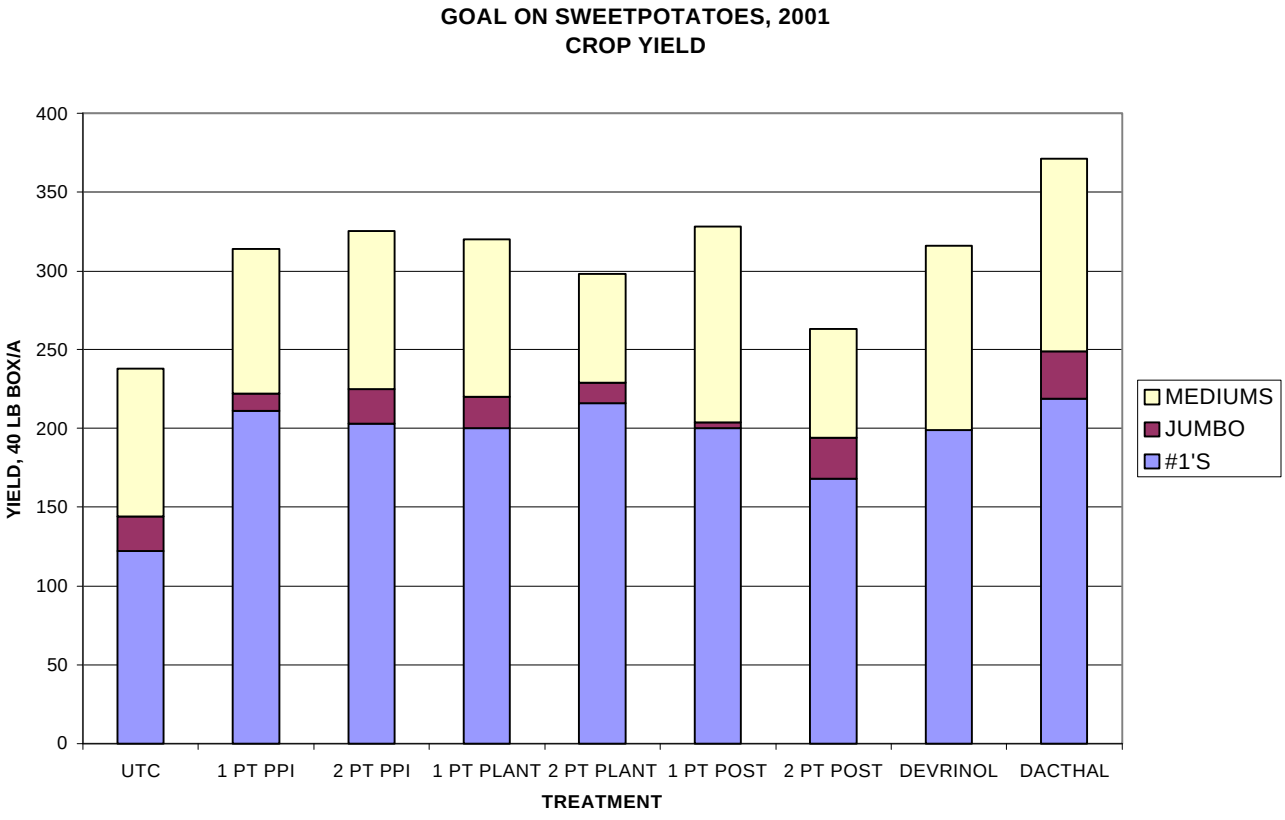

Figure 1. Yield and size of Beauregard sweetpotatoes as affected by herbicide treatment.

TITLE: GOAL HERBICIDE ON SWEETPOTATOES
MERCED, 2001

OBJECTIVE: Evaluate different timings and rates of Goal Herbicide compared to Devrinol and Dacthal**.**

SITE LOCATION & COOPERATOR: Jason Tucker. Site located about 2 miles south of Hwy 140, near McSwain Rd. Soil type is Dehi or Dello loamy sand.

TREATMENTS:

1. UTC
2. Goal 1 pt/A 2 weeks PPI
3. Goal 2 pts/A 2 weeks PPI
4. Goal 1 pt/A at planting over-the-top
5. Goal 2 pts/A at planting over-the-top
6. Goal 1 pt/A 2 weeks post transplant to clean, cultivated bed
7. Goal 2 pts/A 2 weeks post
8. Devrinol 2 lbs/A at planting and incorporated (label rate)
9. Dacthal 8 lbs/A at planting and 4 weeks later (label)

PLOT SIZE: 20 ft by 1 bed

PROTOCOL:

Host Crop and Variety: Beauregard

Planting Date: Transplanted May 31, 2001.

Fertilizer/Irrigation: Drip irrigation.

Treatments: Amounts applied, volume, date & time:

Treatments 2 & 3 applied May 16th. 6 and 12 ml Goal in 1 gallon of water for all 4 reps.

Treatments 4, 5, 8 & 9 applied May 31st. 6 and 12 ml of Goal, 11 g of Devrinol, 6 Tbls of Dacthal in 1 gal water. Hot, 95° F.

Treatments 6 & 7 applied June 14th. Treatment 9 reapplied June 29th, 2001. Same rate and volume.

Harvested: Oct 17, 2001. Machine picked and crew sorted.

CROP DESTRUCT.

MEASUREMENTS:

Growth notes: Weed and phyto evaluations made June 8th, 14th, 19th, 28th and July 13th, 2001.

Yield and Grade:

Table 1. Grass and broadleaf (BL) weed pressure and crop phytotoxicity (phyto) on sweetpotatoes as affected by herbicide treatment. Merced County 2001.

	June 8			*June 14*			*June 19*			*June 28*		
Treatment	*Grass*	*BL*	*phyto*	*Grass*	*BL*	*Phyto*	*Grass*	*BL*	*Phyto*	*Grass*	*BL*	*phyto*
1. Untreated control	0.25	2.8	0.0	0.50	4.75	0.50	1.25	6.75	0.0	1.25	8.75	0.0
2. Goal 1 pt/A 2 weeks PPI	0.0	1.8	0.3	0.25	2.75	1.50	0.25	4.75	0.25	0.75	6.75	0.0
3. Goal 2 pts 2 weeks PPI	0.1	2.1	0.0	0.50	4.00	2.25	0.25	5.25	1.50	1.00	7.75	0.5
4. Goal 1 pt/A at planting	0.0	1.6	2.0	0.25	2.75	5.25	0.0	5.00	3.50	0.25	6.75	2.0
5. Goal 2 pts/A at planting	0.0	0.6	0.8	0.25	2.50	4.75	0.0	4.00	3.50	0.25	6.00	1.5
6. Goal 1 pt 2 weeks post	*	*	*	*	*	*	0.0	1.50	7.75	0.25	4.25	4.5
7. Goal 2 pts 2 weeks post	*	*	*	*	*	*	0.0	1.75	8.50	0.00	3.25	6.0
8. Devrinol 2 lbs/A at plant	0.0	1.1	0.3	0.25	3.50	0.25	0.0	6.00	0.0	0.25	7.75	0.0
9. Dacthal 8 lbs/A at plant + 4 weeks	0.0	1.3	0.3	0.25	2.50	1.50	0.0	4.25	0.75	0.25	5.75	0.0
Average	**0**	**1.6**	**0.5**	**0.3**	**3.25**	**2.3**	**0.2**	**4.4**	**2.9**	**0.5**	**6.3**	**1.6**
LSD 0.05	**NS**	**NS**	**1.3**	**NS**	**NS**	**1.7**	**0.5**	**2.0**	**1.2**	**NS**	**2.2**	**1.6**
CV (%)	**-----**	**56**	**173**	**109**	**41**	**50**	**190**	**32**	**29**	**163**	**24**	**67**
Main effects: 1 pt Goal								**3.8**	**3.8**		**5.9**	**2.2**
2 pts Goal								**3.7**	**4.5**		**5.6**	**2.7**
F-test:								**NS**	**NS**		**NS**	**NS**
Timing: pre plant								**5.0**	**0.9**		**7.25**	**0.25**
At planting								**4.5**	**3.5**		**6.37**	**1.75**
Post plant								**1.6**	**8.1**		**3.75**	**5.25**
F-test:								******	******		******	******

Weed pressure and crop phytotoxicity given subjective reading on each of the dates above, where 0 = nothing and 10 = extremely bad. Main weed species was redroot pigweed.

* Treatments had not been made at time of evaluation.

Main effects were only evaluated for broadleaf weeds (BL) and crop phytotoxicity (phyto) after all treatments were applied. ** = significant at 95% probability level.

LSD 0.05 = least significant difference at the 95% probability level.

NS = not significant

Table 2. Effect of Goal herbicide on yield and grade of Beauregard sweetpotatoes, Merced County 2001.

Treatment	*US # 1's*	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
	40 lb Boxes/A					
1. Untreated control	122	22	94	238.1	51	66
2. Goal 1 pt/A 2 weeks PPI	211	11	92	314.2	67	75
3. Goal 2 pts/A 2 weeks PPI	203	22	100	324.6	62	57
4. Goal 1 pt/A at planting	200	20	100	319.4	62	58
5. Goal 2 pts/A at planting	216	13	69	297.7	73	79
6. Goal 1 pt 2 weeks post plant	200	4	124	328.3	61	80
7. Goal 2 pts 2 weeks post plant	168	26	69	263.3	63	57
8. Devrinol 2 lbs/A at planting	199	0	117	316.1	63	88
9. Dacthal 8 lbs/A at planting and 4 weeks later	219	30	122	370.4	59	73
Average	**193**	**16**	**99**	**308**	**62**	**70**
LSD 0.05	**50**	**NS**	**32**	**66**	**9.5**	**NS**
CV (%)	**17.7**	**111**	**22.0**	**14.7**	**10.4**	**35.0**

Table 3. Main effects of Goal application rate and timing on Beauregard sweetpotato yield and grade. Merced County, 2001.

Treatment	*US #1's*	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
	40 lb Boxes/A					
Rate:						
1 pt/A	204	12	105	307	63.5	71
2 pts/A	196	20	79	295	66	64
F-test	**NS**	**NS**	**0.01**	**NS**	**NS**	**NS**
Timing:						
2 weeks PPI	206	17	96	319	67.5	66
At planting	208	16	84	308	62.2	68
2 weeks post	184	15	97	275	64.8	69
F-test	**NS**	**NS**	**NS**	**0.08**	**NS**	**NS**
Rate x timing	**NS**	**NS**	**0.03**	**NS**	**NS**	**NS**

See text for a complete description of treatments. PPI = pre plant incorporated.

US #1's: Roots 2 – 3.5" in diameter, 3 – 9" in length, must be well shaped and free of defects. No. 1's bring the highest return to the farmer.

Mediums: Roots 1 – 2" diameter, 3 – 7" in length.

Jumbos: Roots that exceed the diameter and length requirements of the above two grades, but are of marketable quality.

% US #1's: Wt. of US #1's divided by the total marketable wt (culls not included).

Culls: Roots >1" in diameter and so misshapen or unattractive as to be unmarketable.

LSD 0.05: Least significant difference at the 95% probability level. NS = not significant.

CV Coefficient of variation, a measure of variability in the experiment.

DEVRINOL & DACTHAL EVALUATION ON SWEETPOTATOES
2001 Research Progress Report

Bill Weir, Farm Advisor
Scott Stoddard, Research Associate
Merced & Madera Counties

INTRODUCTION

Both Devrinol 50 DF (Napropamide) and Dacthal W-75 (Chlorthaldimethyl or DCPA) are registered as transplant incorporated herbicides. Devrinol may also be used at layby without incorporation. Both are safe to be sprayed directly over the top of the sweetpotato slips.

While herbicides are limited for sweetpotato production in California, few growers consistently use Devrinol or Dacthal as part of their standard weed control programs (until last year Dacthal was unavailable). Reasons for this are varied, but one common explanation is that they are not that effective, or that their effectiveness is too erratic for the cost. Therefore, the objective of this trial was to evaluate different rates and timings of Devrinol 50-DF herbicide compared to Dacthal and an untreated control.

METHODS

Location: Corner of Santa Fe and Wallace Rds, in Atwater. Soil type is Atwater loamy sand, deep over hardpan.

Treatments:

1. Untreated control (UTC)
2. Devrinol 2 lbs/A preplant incorporated (PPI)
3. Devrinol 4 lbs/A PPI
4. Devrinol 2 lbs/A at transplanting and incorporated
5. Devrinol 4 lbs/A at transplanting
6. Dacthal 8 lbs/A at planting and 4 weeks later

Pre-plant treatments were applied over the top of the beds one week before transplanting on May 18 using a Solo backpack sprayer and incorporating with a rake. Transplant treatments were applied over the top of beds and plants. Dacthal was shallow incorporated with a rake.

Plot layout: 2 rows (one bed) by 20 ft. Beauregard sweetpotatoes on 9" spacing transplanted May 30, 2001. Drip irrigated.

Harvest: Harvested with a commercial one-row digger and crew sorted, October 29, 2001.

Full plot protocol follows.

RESULTS

Grasses were the main weed problem in this field, though there were a few broadleaf weeds as well. Grass and broadleaf weed control are shown in Table 1. Grass weeds were significantly reduced in all treatments as compared to the untreated control on all evaluation dates. Devrinol applied at transplant gave slightly better control than the other treatments, and the 4 lb rate was better than the 2 lb rate. Broadleaf weeds showed a significant reduction in the plots that received herbicide on all evaluation dates except the last.

Grass control began to diminish by the last evaluation date, and the plots needed an application of Fusilade to control additional growth (Figure 1).

This trial yielded well, with 800 to 1270 boxes per acre depending on treatment. Yield and grade results are shown in Table 2. The

Devrinol at-transplant treatments had significantly higher yields of #1's as compared to the PPI and UTC. Total market yields were best for the 4 lb/A at transplant Devrinol treatment, which was significantly more than treatments 1, 2, and 3 at the 90% probability level.

While Devrinol 50-DF did not completely control all weeds in this trial, it did suppress weed growth enough to show a significant improvement in yield. The timing of application was found to be better at transplanting, and the 4 lb rate gave best results. Dacthal also provided some weed control, but it was not as good as Devrinol.

While Devrinol worked reasonably well at this location, it provided little control of weeds in the Goal trial at a different location. Thus, further review is needed to determine the best ways to use it for sweetpotato production. Growers should carefully consider whether Devrinol would be a cost effective way to reduce hand weeding expenses during the growing season.

ACKNOWLEDGEMENTS

We wish to thank Mr. Bob Weimer for his help and cooperation with this test. The help of University and County employees Larry Burrow, Matt Beene, and Mary Burroughs is especially appreciated.

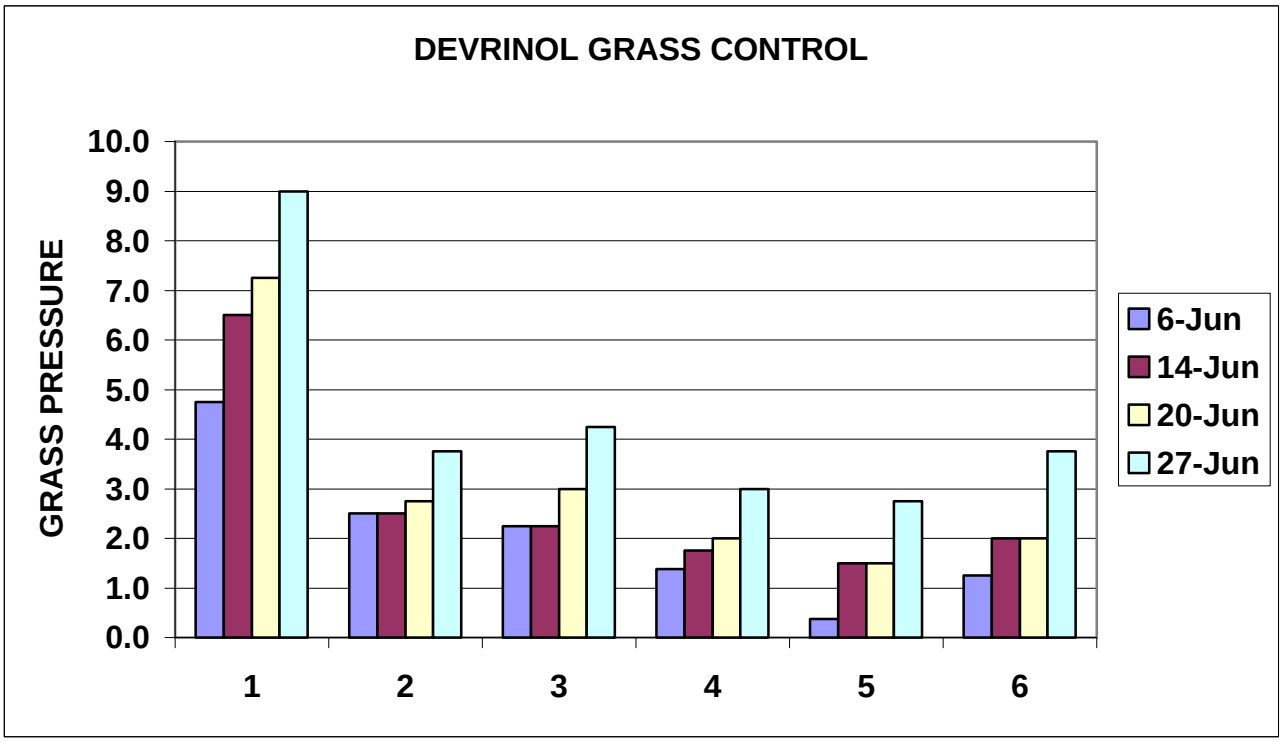

Figure 1. Grass control as affected by herbicide treatment on 4 evaluation dates.

TITLE: DEVRINOL TRIAL ON SWEETPOTATOES_
MERCED, 2001

OBJECTIVE: Evaluate Devrinol at different rates and timing compared to UTC and Dacthal.

SITE LOCATION & COOPERATOR: Bob Weimer, Weimer Farms. Near Castle AFB (Santa Fe and Wallace Rds).

TREATMENTS:

1. UTC
2. 2 lbs Devrinol/A PPI one week before transplanting
3. 4 lbs Devrinol PPI
4. 2 lbs Devrinol/A at transplanting over-the-top
5. 4 lbs Devrinol at transplanting
6. Dacthal 8 lbs/A at transplanting, incorporated, and 4 weeks later, not incorporated

PLOT SIZE: 20 ft x 2 rows (one 80" bed)

PROTOCOL:

Host Crop and Variety: Beauregard sweetpotatoes

Planting Date: May 30th, 2001. 9" spacing.

Fertilizer/Irrigation: Drip irrigation

Treatments: **Amounts applied, volume, date & time:**

Treatments 2 & 3 applied 5/18. Larry and Scott. Solo sprayer using 1 gal water. Hand incorporated with a rake. Used 11 g and 22 g of Devrinol, 6 TBLS Dacthal/4 plots.

Treatments 4, 5, 6 applied 5/31. Matt and Scott. Solo sprayer with boom over-the-top using 1 gal water. Incorporated with rake.

Plots hand weeded July 3. 2nd application of Dacthal applied.

Harvest Date and Method: October 29th, 2001. Machine harvested one row of each plot.

MEASUREMENTS:

Growth notes. Crop phyto and weed evaluations made June 6th, 14th, 20th and 27th 2001.

Yield and Grade

Quality measurements

NOTES:

Table 1. Grass and broadleaf (BL) weed pressure as affected by herbicide treatment. Merced County 2001

	June 6	*June 14*		*June 20*		*June 27*	
Treatment	*Grass*	*Grass*	*BL*	*Grass*	*BL*	*Grass*	*BL*
1. UTC	4.8	6.5	2.0	7.3	2.5	9.0	2.5
2. Devrinol 2 lbs PPI	2.5	2.5	1.0	2.8	1.3	3.8	1.8
3. Devrinol 4 lbs PPI	2.3	2.3	0.8	3.0	1.5	4.3	1.8
4. Devrinol 2 lbs post	1.4	1.8	1.0	2.0	0.8	3.0	1.8
5. Devrinol 4 lbs post	0.4	1.5	1.0	1.5	1.0	2.8	1.8
6. Dacthal 8 lbs/A	1.3	2.0	0.8	2.0	1.3	3.8	1.5
Average	**2.1**	**2.8**	**1.1**	**3.1**	**1.4**	**4.4**	**1.8**
LSD 0.05	**1.8**	**2.2**	**0.7**	**2.1**	**0.7**	**2.8**	**NS**
CV (%)	**54.3**	**52.8**	**43.5**	**45.6**	**35.0**	**42.7**	**39.0**

Weed pressure and crop phytotoxicity given subjective reading on each of the dates above, where 0 = nothing and 10 = extremely bad. Main grass weed species was barnyard grass. Main broadleaf weed species were puncture vine, pigweed, purslane, and nutsedge. Broadleaf weeds were not evaluated June 6.
Treatments were applied May 18 and May 31, 2001 and incorporated with a rake.
LSD 0.05 = Least Significant Difference at the 95% probability level. NS = not significant.
CV = coefficient of variation, a measure of variability in the experiment.

Table 2. Effect of Devrinol herbicide on yield and grade of Beauregard sweetpotatoes, Merced County 2001.

Treatment	*US # 1's*	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
	40 lb Boxes/A					
1. Untreated control	371	302	138	811	45.0	264
2. Devrinol 2 lbs/A PPI	333	308	197	838	39.2	268
3. Devrinol 4 lbs/A PPI	392	308	157	857	45.0	285
4. Devrinol 2 lbs/A at transplant	544	460	169	1174	47.8	252
5. Devrinol 4 lbs/A at transplant	603	501	166	1270	48.7	204
6. Dacthal 8 lbs/A at planting and 4 weeks later	461	308	234	1002	46.1	252
Average	**451**	**365**	**177**	**992**	**45.3**	**254**
LSD 0.05	**153**	**NS**	**NS**	**NS***	**NS**	**NS**
CV (%)	**23.0**	**44.9**	**28.5**	**24.1**	**15.8**	**58.4**

***See text for a complete description of treatments**. PPI = pre plant incorporated.

US #1's: Roots 2 – 3.5" in diameter, 3 – 9" in length, must be well shaped and free of defects. #1's bring the highest return to the farmer.

Mediums: Roots 1 – 2" diameter, 3 – 7" in length.

Jumbos: Roots that exceed the diameter and length requirements of the above two grades, but are of marketable quality.

% US #1's: Wt. of US #1's divided by the total marketable wt (culls not included).

Culls: Roots >1" in diameter and so misshapen or unattractive as to be unmarketable.

LSD 0.05: Least significant difference at the 95% probability level. NS = not significant. * 90% LSD for market yield = 297.2.

CV: Coefficient of variation, a measure of variability in the experiment.

ALION FOLIAR FERTILIZERS ON SWEETPOTATOES
2001 Research Progress Report

Bill Weir, Farm Advisor
Scott Stoddard, Research Associate
Merced & Madera Counties

INTRODUCTION

Last year we conducted a trial with Albion Metalosates foliar micronutrient fertilizers and got less than expected results because of a lack of irrigation water and problems at harvest. Therefore, the objective of the trial this year was to perform another evaluation of Albion Crop Up as a sidedress and foliar application on Beauregard sweetpotatoes.

METHODS

Treatments:

1. Untreated control (UTC)
2. 2 qts/A Crop Up foliar applied 4 & 6 weeks after transplanting
3. 200 lbs/A potassium sulfate (SOP)
4. SOP + 2 qts/A Crop Up foliar
5. SOP + 2 qts/A Crop Up as transplant drench
6. SOP + 2 qts/A Crop Up transplant drench + 2 qts/A foliar
7. SOP + 4 qts Crop Up transplant drench
8. SOP + 4 qts Crop Up transplant drench + 2 qts/A foliar

All treatments with a foliar application were treated 4 and 6 weeks after transplanting (July 2 and 17). All treatments but 1 and 2 received 200 lbs/A potassium sulfate furrowed into center of bed.

Crop Up has the following analysis:

N:	3.0%
Mg:	0.5%
S:	2.5%
B:	0.025%
Cu:	0.25%
Fe:	0.255%
Mn:	2.5%
Zn:	1.25%

Plots were transplanted May 30, 2001. Plot size was one bed (2 rows) by 30 feet. Drip irrigated. Leaf and petiole samples taken twice in July. Machine harvested and crew sorted on Nov. 1, 2001.

Full plot protocol follows after the results.

RESULTS

Early season soil samples were taken to a depth of 24". Of the micronutrients, only zinc and manganese tested medium to low (Table 1).

Leaf and petiole samples were collected taken on July 2 and July 27 to analyses. These dates correspond to the day foliar applications were first made (samples were taken prior to spraying the foliage) and 10 days after the second application. No significant differences were found at the first sampling date (Table 2). By the second sampling date, B, Cu, and Zn were significantly increased by the application of Crop Up either as a drench or foliar (Table 3). In general, foliar applications had greater effect on tissue micronutrient concentrations than did the transplant drench treatments. Regardless of treatment, all samples had high to extremely high levels of nutrients.

Yields for the various treatments are shown in Table 4. Best yields (1058 boxes/A) occurred with the combination of Crop Up drenched at 4 qts/A plus the foliar application. Lowest yields occurred in the check plot (818 boxes/A);

however, these differences were not significantly different. Yield and grade were also unaffected by the main effect of extra potassium from SOP, the foliar application of Crop Up, or transplant drenches (Table 5).

For this test, crop nutrient levels in the plants were well above published sufficiency ranges for sweetpotatoes. This field received a pre-plant NPK fertilizer blend with micros, which eliminated the need for any additional micronutrients. Foliar applications will have greater success where the fertility program is marginal and leaf samples show the need for addition nutrients.

ACKNOWLEDGEMENTS

We wish to thank Mr. Bob Weimer for his cooperation and help with planting harvesting this test, and to Mr. Ludwig Voet of Albion Labs for product.

Table 1. Spring soil sample results.

Depth	*NO_3*	*P*	*K*	*Ca*	*Mg*	*Na*	*Zn*	*Mn*	*Fe*	*Cu*	*B*	*E.C.*	*CEC*	*pH*
	ppm													
0-12”	15	100	118	344	26	20	2.4	6.6	74	1.5	0.6	0.2	2.8	5.5
12-24”	8	34	25	376	45	27	0.6	5.1	28	1.8	0.4	0.2	2.6	5.7
	L	H	L	H	M	L	M	L	VH	H	L	VL	L	

E.C. = electrical conductivity, in mmhos/cm, a measure of the salt content of the soil.
CEC = cation exchange capacity, in meq/100 g, a measure of the nutrient buffering capacity of the soil.
pH = a measure of soil acidity.

Table 2. Average sweetpotato tissue concentrations for nitrogen (N), manganese (Mn), iron (Fe), boron (B), copper (Cu) and zinc (Zn) in samples taken July 2, 2001.

Treatment	*N*	*Mn*	*Fe*	*B*	*Cu*	*Zn*
	%	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*
1. UTC	6.05	302	189	65	22	61
2. 2 qts Crop Up foliar	6.23	341	250	66	27	89
3. 200 lbs SOP only	5.98	307	211	67	24	65
4. SOP + Crop Up foliar	6.33	384	210	61	27	82
5. 2 qts Crop Up drench	6.03	299	223	66	25	67
6. 2 qts Crop Up drench + foliar	6.03	342	208	66	26	71
7. 4 qts Crop Up drench	6.28	345	200	65	27	65
8. 4 qts Crop Up drench + foliar	6.23	426	232	67	29	80
No foliar	6.1	317	211	66	25	65
Foliar Crop Up	6.2	384	217	65	27	77
F-test:		*				
Drench: 0 qts/A	6.15	345	210	64	25	73
2 qts/A	6.05	321	216	66	26	68
4 qts/A	6.25	386	216	66	28	72
Average	**6.14**	**343**	**216**	**66**	**26**	**72**
LSD 0.05	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV (%)	**4.8**	**19**	**15**	**6.5**	**14**	**21**

Table 3. Average sweetpotato tissue concentrations for nitrogen (N), manganese (Mn), iron (Fe), boron (B), copper (Cu) and zinc (Zn) in samples taken July 27, 2001.

Treatment	*N*	*Mn*	*Fe*	*B*	*Cu*	*Zn*
	%	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*
1. UTC	5.18	406	193	56	21	59
2. 2 qts Crop Up foliar	5.25	418	245	66	25	92
3. 200 lbs SOP only	4.95	370	236	60	21	52
4. SOP + Crop Up foliar	5.38	521	242	61	26	70
5. 2 qts Crop Up drench	5.30	487	282	71	26	65
6. 2 qts Crop Up drench + foliar	5.22	447	255	61	24	78
7. 4 qts Crop Up drench	5.38	374	228	57	22	60
8. 4 qts Crop Up drench + foliar	5.48	475	236	59	26	94
No foliar	5.21	410	249	63	23	59
Foliar Crop Up	5.36	481	244	61	25	80
F-test:		**			*	**
Drench: 0 qts/A	5.16	446	239	61	24	61
2 qts/A	5.26	466	268	66	25	71
4 qts/A	5.43	425	232	58	24	77
F-test:				*		
Average	**5.27**	**437**	**239**	**61**	**24**	**71**
LSD 0.05	**NS**	**NS**	**NS**	**5.5**	**2.1**	**13**
CV (%)	**5.5**	**19.5**	**15**	**11**	**14**	**25**

F-test: statistical test on whether the main effects of foliar or drench treatments are significant at the 90% (*) or 95% (**) level.
LSD 0.05 = Least Significant Difference at the 95% confidence level. Values separated by less than this amount are not significantly different. NS = not significant.
CV = coefficient of variation, a measure of the variability in the experiment.

Table 4. Effect of Metalosates Crop Up on yield and grade of Beauregard sweetpotatoes, Merced County 2001.

Treatment	*US # 1's*	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
	40 lb Boxes/A					
1. UTC	403	229	186	818	49.5	176
2. 2 qts Crop Up foliar	501	315	120	936	54.6	100
3. 200 lbs SOP only	471	419	138	1028	46.0	83
4. SOP + Crop Up foliar	441	306	186	933	47.4	147
5. 2 qts Crop Up drench	498	234	143	876	57.2	149
6. 2 qts Crop Up drench + foliar	439	309	165	913	49.6	132
7. 4 qts Crop Up drench	403	341	189	933	43.4	132
8. 4 qts Crop Up drench + foliar	533	366	159	1058	51.1	115
Average	**461**	**315**	**161**	**937**	**49.8**	**129**
LSD 0.05	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV (%)	**18**	**45**	**29**	**16**	**21**	**40**

Table 5. Main effects of SOP, foliar Crop Up, and transplant drench rate on Beauregard sweetpotato yield and grade. Merced County, 2001.

Treatment	*US #1's*	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
	40 lb Boxes/A					
No SOP	437	272	153	877	52.1	137
200 lbs SOP	470	362	162	980	46.7	115
F-test	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
No foliar	458	331	156	946	48.9	122
Foliar Crop Up	471	327	170	968	49.4	131
F-test	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Drench: 0 qts/A	456	362	162	980	46.7	115
2 qts/A	468	272	154	894	53.4	141
4 qts/A	468	354	174	996	47.2	124
F-test	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Foliar x drench	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

See text for a complete description of treatments.

US #1's: Roots 2 – 3.5" in diameter, 3 – 9" in length, must be well shaped and free of defects. No. 1's bring the highest return to the farmer.

Mediums: Roots 1 – 2" diameter, 3 – 7" in length.

Jumbos: Roots that exceed the diameter and length requirements of the above two grades, but are of marketable quality.

% US #1's: Wt. of US #1's divided by the total marketable wt (culls not included).

Culls: Roots >1" in diameter and so misshapen or unattractive as to be unmarketable.

LSD 0.05: Least significant difference at the 95% probability level. NS = not significant.

CV Coefficient of variation, a measure of variability in the experiment.

ECO SMART HERBICIDE EVALUATION
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

The objective of this trial was to evaluate post-applications of different rates of Eco Smart contact herbicide DR-A-035 to Beauregard sweetpotatoes.

METHODS

Site location was at the corner of Santa Fe and Wallace Rds, in Atwater. Host crop was Beauregard sweetpotatoes, double-row planted on 80" beds, May 30, 2001. Crop was drip irrigated. Grower's standard weed control method is mechanical cultivation, hand weeding, and Poast applied for grass control, but for this trial these methods were not used.

Treatments:

1. Untreated control (UTC)
2. DR-A-35 + surfactant at 4 gals/A
3. DR-A-35 + surfactant at 8 gals/A

Treatments were applied by hand using a Solo backpack sprayer and applied on June 6, 14, and 20, 2001. A randomized block design was employed with 4 replications, and plot size was one bed by 20 ft long. Weather conditions for the applications were warm (75° - 100° F) and sunny with moderate humidity. Both applications were made in the morning. The herbicides were post directed to the sides of the beds.

Weed control and crop phytotoxicity ratings were made post application on June 14, 19, and 21. Crop phyto only occurred on the lower, outer leaves that were next to the furrow. Since Eco Smart 035 is a contact herbicide only, only those plant parts that directly contacted the spray developed necrotic tissue. As a result, even though parts of the crop were hit with the herbicide, no loss of yield occurred.

RESULTS

Eco Smart 035 caused a significant increase in weed burn as compared to the untreated check plots on the first and last evaluation dates (Table 1.). The 8 gal/A rate caused greater tissue necrosis than the 4 gallon rate for both grass and broadleaf weeds. This affect was especially obvious on the day of application. However, the weeds and crop both continued growing after the applications. Weed pressure was highest in the untreated plots, especially grasses, but even in the 8 gallon per acre rate of Eco Smart grass weed pressure was > 35% at the last evaluation date.

Yield and grade results are shown in Table 2. While there was a slight #1 and total marketable yield increase over the check plots, this increase was not significant for size, #1 %, or culls.

Eco Smart DR-A-035 provided quick burn down of grasses (mainly Crabgrass) and broadleaf weeds in this trial. Weed pressure was less in the plots that received herbicide applications. However, since it is a contact herbicide only, the weeds grew back and had to be hand weeded. Any crop damage was minimized by using a directed spray.

ACKNOWLEDGEMENTS

Many thanks to Mr. Bob Weimer for his cooperation with this test. Also thanks to Matt Beene, Kerry Hedberg, and Larry Burrow, county agriculture technicians, for their help.

Table 1. Grass (Gr) and broadleaf (BL) weed pressure and foliage burn as affected by Eco Smart DR–A-035 herbicide on three evaluation dates.

Treatment	*%* Gr press	*June 14* *Gr. burn*	*BL burn*	*%* *Gr press*	*June 19* *Gr burn*	*%* *BL press*	*BL burn*	*%* *Gr press*	*June 27* *Gr burn*	*BL press*	*%* *BL burn*
1. UTC	58.8	0.0	0.1	85.0	3.1	25.0	0.0	91.0	0.0	32.5	0.0
2. 4 gals/A	40.0	4.1	4.0	67.5	4.1	17.5	0.5	45.0	3.2	17.5	2.8
3. 8 gals/A	32.5	8.1	6.9	42.5	5.6	10.0	1.0	37.5	5.7	12.5	3.3
Average	432.8	4.1	3.7	65.0	4.3	17.5	0.5	57.8	3.0	20.8	2.0
LSD 0.05	NS	0.9	0.8	21.8	NS	NS	NS	20.0	2.9	NS	NS
CV (%)	32	12	11	19	30	58	221	20	56	73	121

Gr press = grass pressure, measured as the % of weed coverage by grass species in the bed.
Gr burn = grass burn, or the amount of grass weed phytotoxicity caused by the treatment. 0 = nothing, 10 = completely brown and/or death.
BL press = broadleaf weed pressure, % of bed.
BL burn = amount of burn on broadleaf weeds.
Treatments were applied June 6, June 14, and June 20. Main grass weed species was barnyard grass. Main broadleaf weed species were puncture vine, pigweed, purslane, and nutsedge. Broadleaf weed pressure was very low and not evaluated June 14.

LSD 0.05 = least significant difference at the 95% probability level. NS = not significant.
CV = coefficient of variation, a measure of the amount of variability in the experiment.

Table 2. Effect of Eco Smart DR-A-035 herbicide on yield and grade of Beauregard sweetpotatoes, Merced County 2001.

Eco Smart Treatment	**US # 1's**	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
	40 lb Boxes/A					
1. Untreated control	284	346	87	717	44	241
2. 4 gals/A post	423	193	89	704	58	128
3. 8 gals/A post	345	346	123	814	41	208
Average	**351**	**295**	**100**	**745**	**48**	**192**
LSD 0.05	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV (%)	**45**	**47**	**50**	**25**	**34**	**78**

***See text for a complete description of treatments.** Treatments were applied June 6, June 14, and June 20.

US #1's: Roots 2 – 3.5" in diameter, 3 – 9" in length, must be well shaped and free of defects. #1's bring the highest return to the farmer.

Mediums: Roots 1 – 2" diameter, 3 – 7" in length.

Jumbos: Roots that exceed the diameter and length requirements of the above two grades, but are of marketable quality.

% US #1's: Wt. of US #1's divided by the total marketable wt (culls not included).

Culls: Roots >1" in diameter and so misshapen or unattractive as to be unmarketable.

LSD 0.05: Least significant difference at the 95% probability level. NS = not significant.

CV Coefficient of variation, a measure of variability in the experiment.

ECO SMART INSECTICIDE EVALUATION
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

Late season insects problems in sweetpotatoes included beet leafhoppers, aphids, leafminers, and armyworms. Aphids and leafhoppers have the potential to transmit viruses, and their control may benefit the crop. The objective of this trial was to evaluate foliar applications of different rates of Eco Smart contact insecticide DR-A-027 to Beauregard sweetpotatoes.

METHODS

Site location was at the corner of Santa Fe and Wallace Rds, in Atwater. Host crop was Beauregard sweetpotatoes, double-row planted on 80" beds, May 30, 2001. Crop was drip irrigated. Grower's standard insect control method was Lorsban incorporated at transplanting and worm sprays as needed during the growing season.

Treatments:

1. Untreated control (UTC)
2. DR-A-027 at ½ gal/A
3. DR-A-027 at 1.0 gal/A

Treatments were applied by hand using a Solo backpack sprayer and applied on Aug 16 and 24, 2001. A randomized block design was used with three replications, and plot size was one bed by 20 ft long. Weather conditions for the applications were warm (75° - 100° F) and sunny with moderate humidity. The insecticides were applied directly to the top of the beds.

Insect counts were made using a cotton sweep net for each plot after each application on Aug 20, 24, and 27. Counts are presented as number of insects per 20 sweeps. Main insects caught were leafhoppers and aphids. No crop phyto was observed.

RESULTS

Eco Smart DR-A-027 had little, if any, affect on leafhopper or aphid counts Table 1. Counts remained fairly constant at each observation. Counts were also extremely variable. While there were a lot of leafhoppers in the field, their numbers were below what most would consider a problem. No difference could be found between rates. Yields were not evaluated in this trial.

Table 1. Beat Leaf Hopper and aphid counts as affected by Eco Smart DR-A-027 insecticide treatment.

Treatment	*Aug 20* Leaf Hoppers	*Aug 24 Leaf Hoppers*	*Aphids*	*Aug 27 Leaf Hoppers*	*Aphids*
	# per 20 sweeps				
1. UTC	27	47	2	21	8
2. ½ gal/A	18	25	4	20	3
3. 1.0 gal/A	16	38	2	24	5
Average	**20**	**37**	**3**	**22**	**5**
LSD 0.10	**NS**	**NS**	**NS**	**NS**	**3**
CV (%)	**59**	**37**	**73**	**23**	**34**

Aphids were not counted on the Aug 20 evaluation.
Spray dates were Aug 16 and 24.
LSD 0.05: Least significant difference at the 95% probability level. NS = not significant.
CV Coefficient of variation, a measure of variability in the experiment.

SWEETPOTATO VIRUS TESTED SEED TRIAL
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

Viruses can infect sweetpotatoes and causes diseases such as feathery mottle, russet crack, and internal cork. The viruses reside in the roots and are passed from leaves to sucking insects, then back to other plants and infect the roots for next year's crop. Viruses may also cause a general yield and quality decline in the roots. Researchers at NCSU have found that the sweetpotato feathery mottle virus can cause roots to become skinnier.

The most effective way to control viruses in sweetpotatoes is to use slips and/or roots from virus-tested (VT) seed. VT seed is old seed that has been "cleaned up" and tested to be free of the feathery mottle virus.

Last year, we conducted this same trial and saw a significant improvement in yield with VT seed over old seed. Visual improvements were seen in Hanna and Golden Sweets. Unfortunately, the plant stand was compromised in the old seed plots, because we had to store our slips several days before planting. Therefore, this test was re-evaluated in 2001.

The objective of this trial was to compare yield and quality of VT seed to plants from "old" seed in five varieties of sweetpotatoes.

METHODS

Plot description: Plots located on corner of Wallace and Santa Fe Rds, in Atwater, CA. Soil type is Atwater sand over hardpan. Plots were one row by 40 feet, replicated 6 times. Drip irrigated.

Treatments:
Varieties:
- Beauregard
- Garnet
- Diane
- Hanna
- Golden Sweet

Seed Source:
- Old
- Virus tested (VT)

"Old" slips were cut from hotbeds where the seed had been reused for at least 10 years. The VT slips came from both G0 and G1 sources. Golden Sweet, Diane, Beaurgard came from beds with G1 seed; Garnet and Hanna came from G0 source in greenhouse.

Trial was first transplanted on May 25, 2001. VT Hannas were replanted June 8, (original plants were too short and did not take). Further, Golden Sweet and Hanna slips were replanted on June 21, because of stem rot. Field cuttings used.

Harvest: Machine dug and crew sorted, October 29, 2001.

Sampling: Tissue samples taken September 20 for virus sampling. Ten #1 roots measured for length and width ratios post harvest.

RESULTS

Averaged across all varieties, yields were significantly increased for each size class by using VT seed over old seed (Table 1). Old seed had higher #1 percentage and lower cull yields, which mainly reflects overall lower yield and especially less jumbos with old seed.

The variety by seed source interaction was significant this year for #1's, mediums, and jumbos. This indicates that using VT seed has more effect in certain varieties than others. For example, yield of #1's was significantly increased in Garnet but not the other varieties (Figure 1). However, this interaction may also be from other factors other than just seed source. Old Hanna and Golden Sweet seed had reduced stands because of stem rot, and Beauregard slips were contaminated with Jewel slips. Because of this, these data were omitted and results were evaluated using just Garnet and Diane varieties (Table 2). Using this analysis, differences from seed source were much less pronounced. Yield of Garnet was vastly improved using VT seed, while there was little difference with Diane. The high cull weight with Diane was a result of Pox.

Visual quality was most improved in Hanna and Garnet this year. There also appeared to be some improvement with Beauregard, but this was difficult to determine because of the mixed seed with Jewel. There was little visual difference with Diane and Golden Sweet.

NCSU research has shown changes in the length to width (L:W) ratio of sweetpotatoes as the seed source gets older and further from being cleaned up. The roots get skinnier (the L:W increases). In this trial, however, no significant differences were found between the L:W ratios for Garnet or Diane (Table 2).

Tissue samples were taken in September and analyzed for sweetpotato feathery mottle virus using a process called NCM-ELIZA. In general, there was as much virus in the VT plants as the old plants (Table 3), indicating that it takes only one season for the plants to become reinfected.

For three years, we have seen what first appears to be dramatic improvements from using VT seed as compared to "old" seed stock, yet we can not definitely conclude this because in each of these years poor plant stands or mixed varieties have confounded the results. We really need to start with the same plant from FPMS, take two cuttings, but clean up only one. Then make multiple cuttings from these plants for the field trial. Then the varieties will have the same genetic parent, and will be known to have virus infection (or not) from the beginning.

ACKNOWLEDGEMENTS

Many thanks to Mr. Bob Weimer for his cooperation and help with the planting and harvesting of this test, to Mr. Dave Souza and Mr. Billy Pimentel for providing us with plant material, and to Dr. Chris Clark at LSU for running the virus analysis.

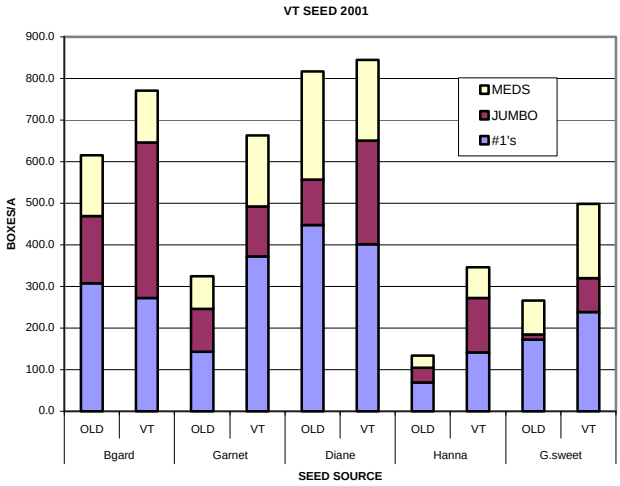

Figure 1. Variety x seed yield results.

Table 3.. NCM-ELIZA leaf tissue results from the September 2001 sampling.

Variety	*Old Seed*	*VT seed*
Beauregard	++-	+--
Garnet	+++	+--
Diane	-+-	-+-
Hanna	+++	++-
Golden Sweet	++-	++-

+ = positive reading
- = negative result.
Three reps sampled. Each plot was composite of 5 – 6 leaves.

TABLE 1. SWEETPOTATO VIRUS TESTED SEED TRIAL
SUMMARY OF DATA, 2001

COOPERATOR: Bob Weimer, Weimer Farms
LOCATION: Santa Fe and Wallace Rds, adjacent to Castle Air Park in Atwater, CA.
TRANSPLANT: 25-May-01
HARVEST: 29-Oct-01 Growing Days: 157
PLOT SIZE: 1 row (40") by 40 ft. Replicated 6 times.
TREATMENTS: Five varieties by 2 seed sources.

		40 LB BOXES/A				#1'S	CULLS	L:W
TREATMENT		**#1's**	**JUMBO**	**MEDS**	**MKT YLD**	**%**	**BOX/A**	**RATIO**
VARIETY								
Beauregard		289.7	268.2	135.4	693.3	42.6	127.0	2.82
Garnet		257.2	111.5	125.4	494.2	50.0	48.3	2.70
Diane		425.0	179.1	226.6	830.7	51.2	222.6	2.79
Hanna		105.7	83.1	51.3	240.2	46.4	123.8	2.28
Golden Sweet		205.2	46.9	130.3	382.4	56.2	77.5	3.05
Variety LSD 0.05		26.9	40.2	40.3	113.0	8.0	54.7	0.35
SEED	Old	228.0	84.4	119.3	431.7	53.0	90.6	2.73
	Virus Tested	285.1	191.1	148.3	624.5	45.5	149.1	2.73
	Seed LSD	55.0	31.8	25.7	78.8	5.8	34.7	NS
Beauregard	Old	307.2	162.0	146.8	615.9	49.9	176.7	3.04
	Virus Tested	272.3	374.4	124.0	770.7	35.3	77.3	2.61
Garnet	Old	142.4	103.5	78.6	324.5	43.9	31.4	2.66
	Virus Tested	372.1	119.5	172.2	663.8	56.0	65.2	2.76
Diane	Old	448.4	109.1	259.7	817.3	54.9	87.2	2.82
	Virus Tested	401.5	249.1	193.5	844.0	47.6	358.0	2.76
Hanna	Old	69.6	35.5	29.3	134.5	51.8	87.4	2.04
	Virus Tested	141.8	130.7	73.3	345.8	41.0	160.1	2.53
Golden Sweet	Old	172.4	12.1	82.0	266.5	64.7	70.5	3.07
	Virus Tested	238.1	81.8	178.5	498.3	47.8	84.6	3.02
Variety x Seed LSD 0.05		122.9	71.1	57.5	NS	NS	77.6	0.39
CV (%)		59.7	84.0	59.7	53.0	23.3	90.8	13.88

Note: Beauregard, Hanna, and Golden Sweet results are confounded, and results do not necessarily show true effects of seed source.

TABLE 2. SUMMARY OF DATA WITH ONLY GARNET AND DIANE.

TREATMENT		40 LB BOXES/A #1's	JUMBO	MEDS	MKT YLD	#1'S %	CULLS BOX/A	L:W RATIO
Garnet		257.2	111.5	125.4	494.2	50.0	48.3	
Diane		425.0	179.1	226.6	830.7	51.2	222.6	2.79
Variety LSD 0.05		97.4	35.8	26.0	137.0	NS	79.9	NS
	Old	295.4	106.3	169.2	570.9	48.9	59.3	2.74
	Virus Tested	386.8	184.3	182.9	754.0	50.8	211.6	2.76
	Seed LSD	NS	46.5	NS	147.1	NS	56.9	NS
Garnet	Old	142.4	103.5	78.6	324.5	43.9	31.4	2.66
	Virus Tested	372.1	119.5	172.2	663.8	56.0	65.2	2.76
Diane	Old	448.4	109.1	259.7	817.3	54.9	87.2	2.82
	Virus Tested	401.4	249.1	193.5	844.0	47.6	358.0	2.76
Variety x Seed LSD 0.05		157.7	65.8	72.4	208.0	10.3	80.4	NS
CV (%)		48.5	52.6	46.0	39.6	16.7	111.6	8.48

#1's: Roots 2 - 3.5" in diameter, 3 - 9" in length, well shaped and free of defects.
Mediums: Roots 1 - 2" in diameter, 2 - 7" in length.
Jumbos: Roots that exceed the diameter, length, and weight requirements of the above two grades and are marketable.
% #1's: weight of #1's divided by total marketable weight.
Culls: Roots greater than 1" in diameter and so misshapen or unattractive that they cannot be marketed.
L:W ratio = Length to width ratio (length in/width in), average of 10 #1 roots. Higher numbers indicate thinner roots.

LSD 0.05 = Least Significant Difference at the 95% probability level. Means separated by less than this amount are significantly different. NS = not significant.
Variety x seed LSD = least significant difference between seed source for the same variety.
CV = coefficient of variation, a measure of the variability in the experiment.

SWEETPOTATO SKIN TOUGHENING TRIAL
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

Skinning of sweetpotatoes during harvest and on the packing line is a serious problem for California producers. Not only do skinned roots have reduced marketing appeal, but they can increase moisture loss in storage and increase post-harvest diseases. To minimize skinning at harvest, the roots are carefully placed by hand into bins. Furthermore, California packing sheds go to great lengths to minimize skinning by having water-emersion bin dumps, followed by hand sorting and packing.

Despite the importance of skinning and the amount of time devoted to avoid it, little is known about how it is affected by pre-harvest field operations. Some growers may irrigate briefly to soften the soil before harvest. However, depending on the field and how a field is being picked relative to the layout of the irrigation system, this is not always possible because the irrigation tape is picked up far ahead of harvesting the crop.

Research done at LSU and NCSU has shown that certain pre-harvest treatments can have an effect on the toughness of the sweetpotato skin, and therefore reduce skinning that occurs during harvest and packing. Results there have shown significant improvements in skin set and reduction of skinning from harvest by mowing the crop 2 weeks before harvest, and by applying chemical treatments such as Prep (ethephon) or Desicate (endothall).

The objective of this trial was to evaluate the effectiveness of pre-harvest de-vining and chemical treatments on skin set and skinning problems in Hanna sweetpotatoes.

METHODS

Plot description: plots were located near the corner of Van Clief and 1st St., in Stevinson. Soil type was Hilmar loamy sand, slightly saline-alkalai. Plots were one bed wide by 25 feet long, replicated 4 times. Variety was Hanna, planted in mid-May, 2001, and drip irrigated.

Treatments:

1. Grower standard (de-vine at harvest)
2. Prep (ethephon) at 2 pts/A, foliar applied 1 week pre-harvest
3. Prep, 2 weeks pre-harvest
4. De-vine 1 week before harvest
5. De-vine 2 weeks before harvest
6. N-phuric at 20 gals/A foliar applied 1 week pre-harvest
7. N-phuric 2 weeks before harvest

Treatments applied September 7 and 14, 2001 using Solo backpack sprayer. Prep applied in 100 gallons equivalent water, N-phuric applied at 20 gallons/A equivalent water. The irrigation lines were cut and no water was applied after September 7.

Harvest: September 21, 2001 with one-row digger. Two 20 lb samples of #1 roots taken from each plot. One went to UC Davis for post harvest evaluations with Dr. Marita Cantwell and the other sample went into a commercial sweetpotato storage room.

RESULTS

An initial evaluation on the amount of skinning (for the Merced samples) from harvesting suggested that many of the treatments decreased the average number of scuffs per potato (Table 1) as compared to the grower standard. Weight

loss after about 6 weeks in storage was measured on the assumption that more scuffing would have greater moisture loss. However, weight loss was not found significantly different among treatments (Table 1).

A second scuff evaluation was performed on the potatoes stored in Merced after running them across a dry sorting line. Scores were again subjective, but were based on the number of ½ cm scuffs counted per 10 equal size potatoes. The more scuffs, the higher the scuff score. No significant differences were found, but there was a slight trend for reduced scuffing, as compared to the standard method, for some of the treatments, Lowest overall scuffing occurred with the de-vining treatments (avg. scuff score = 3.1), followed by the Prep treatments (score = 3.3). Both these valuations are "moderate".

No significant differences were found at the January weight loss evaluation, though not all treatments could be evaluated at this time.

The results for the post harvest evaluations performed by Dr. Marita Cantwell at UC Davis are shown in Table 2. The scuff score evaluation showed that many of the treatments appeared to visually reduce the amount of scuffing on the potatoes, which resulted in significantly better visual quality scores, especially for the 1 & 2 week de-vining treatments. However, when the skin toughness was measured by the amount of torque required to break the skin, the standard method of de-vining right at harvest required the most torque, at 5.0 lb-inches. This means that this treatment had on average the potatoes with the most resistance to skinning. This, along with the potato size data, suggests that we biased our potato selection, inadvertently choosing better looking potatoes for our samples from some treatments at harvest. The pre-harvest treatments essentially had little effect on the skin color after harvest (Table 2).

Prep (ethephon) helps speed natural senescence in a crop.

Our initial look to see if pre-harvest treatments could have an effect on the skin toughness of an easy skinning variety like Hanna suggests that de-vining 1 to 2 weeks before harvest may reduce skinning. Prep also shows promise, but is currently not registered for use on sweetpotatoes. However, because we may have biased the data, further evaluation is necessary. Future work may want to look at irrigation management near harvest, as well as canopy management. This is an important aspect of sweetpotato production, and should be further explored.

ACKNOWLEDGEMENTS

Many thanks to Mr. Nathan Mininger for his help with harvest and storage of this trial, and Mr. Larry Beckstead with Western Farm Service for product.

Table 1. Sweetpotato skinning evaluations and moisture loss in storage as affected by pre-harvest treatment and dry sorting line.

Pre-harvest Treatment	*Skinning, post harvest, 10/4/2001*	*Wt. loss, 11/16/2001 %*	*Scuff score, post sorting line 11/16*	*Wt. loss, 1/24/2002 %*
1. Standard	20	5.4	3.5	---
2. Prep 1 wk	23	5.0	3.4	11.5
3. Prep 2 wks	14	5.8	3.2	12.5
4. De-vine 1 wk	15	5.4	2.9	11.2
5. De-vine 2 wks	9	5.6	3.3	11.3
6. N-phuric 1 wk	9	5.2	3.7	11.3
7. N-phuric 2 wks	10	5.8	3.2	12.6
Average	14.3	5.4	3.3	---
LSD 0.05	---	NS	NS	---
CV (%)	---	9	11	---

Post harvest skinning = subjective evaluation of the number of clearly visible scuffs per 10 potatoes.
Potatoes placed into storage on October 3, 2001.
Scuff score = subjective evaluation after potatoes have gone through dry sorting line. Scuffs ½ sq. cm:

0 – 6 scuffs	= 1 (little to none)
7 – 12	= 2 (slight)
13 – 24	= 3 (moderate)
25 – 30	= 4 (moderately severe)
> 31	= 5 (severe)

LSD 0.05 = least significant difference at the 95% confidence level. NS = not significant.
CV = coefficient of variation, a measure of the variability in the experiment.

Table 2. Initial post harvest evaluations of sweetpotato roots as affected by pre-harvest treatment. Data are averages of four field reps with 20 roots each.

Pre-harvest Treatment	*Wt (g)*	*Scuff score*	*Skin test Lb-in*	*External Skin Color*			*Visual Quality*
				*L**	*Chroma*	*Hue*	
1. Std	314	2.4	5.0	64.0	23.3	70.2	6.1
2. Prep 1 wk	351	2.2	4.6	64.0	23.1	70.4	6.0
3. Prep 2 wks	335	2.0	4.4	64.4	23.2	73.3	6.4
4. De-vine 1 wk	333	2.4	4.5	64.0	23.1	73.4	6.5
5. De-vine 2 wks	307	2.1	4.4	62.2	22.0	73.1	6.6
6. N-phuric 1 wk	334	2.3	4.9	64.0	22.9	73.1	6.4
7. N-phuric 2 wks	288	2.0	4.9	64.3	23.0	73.3	6.4
Average	**323**	**2.2**	**4.7**	**63.8**	**22.9**	**72.4**	**6.3**
LSD 0.05	**38**	**0.2**	**0.2**	**0.7**	**0.5**	**0.5**	**0.2**

1. Weight to nearest gram.
2. Scuffing/damage evaluated on a 1 to 5 scale, where 1=none, 2=slight, with 1 or 2 skinned areas, 3=moderate with 3-6 skinned areas, 4=moderately severe with 7-12 areas and 5=severe with >12 skinned areas. An "area" was defined as a ½ x ½ cm extension. Several very small scuffs may be required to comprise a scuffed area.
3. Skinning test using a torquemeter. Roots measured once at the equator in a nondamaged area with a modified Halderson periderm tester fitted to a Snap-on® "Torqometer" model TQSO50FUA. The rubber tip (small end of a #2 rubber stopper) was covered with a punched piece of #400 water resistant grit paper attached with Superglu. The grit end was changed after 20 readings (each rep) and the stopper changed after 80 readings. The tip was applied to a flat area of the root with 17 pounds pressure and then rotated clockwise quickly until the skin broke. The readings were recorded as pounds-inch of torque.
4. Color values (L*a*b*) with a Minolta color meter. Measurements were made at or near the equator of the roots with 1 measurement per root. Measurements were not made in discolored, scuffed, damaged or otherwise defective areas, rather an area representing typical root color was selected. Chroma and hue were calculated as $(a^{*2} + b^{*2})^{1/2}$ and $\tan^{-1}(b^*/a^*)$.
5. Visual quality of the roots was scored on a 9 to 1 scale, where 9=excellent, 7=good, 5=fair, 3=poor and 1=unuseable. A score of 6 is considered the minimum for salability. The VQ score took into account any defects including scuffs, discolored areas, insect damage, gouged areas, broken tips, etc. It did not taken into account the size or formation of the root (i.e., long and narrow, short and wide, twisted, etc.).

DRIP IRRIGATED FERTILIZER TRIAL
2001 Research Progress Report

Bill Weir – Farm Advisor
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Merced & Madera Counties

INTRODUCTION

The use of drip irrigation for sweetpotatoes continues to increase every year since its inception back in the late 80's, and is now used on an estimated 65-75% of the production acreage. Some of the reasons for this continued growth include irrigation convenience, uniformity of application, the ability to irrigate rolling land, and the ability to spoon feed nutrients with the system through the growing season.

In 2001, we continued our evaluation of the nitrogen and potassium requirements for Beauregard sweetpotatoes. Nitrogen and potassium rates were reduced slightly based on previous years results. The objectives of this trial were:

- Determine the optimal rates of N and K fertilizer for drip irrigated Beauregards.
- Determine if drip irrigation reduces the potential for nitrate leaching.

METHODS

Plot description: This trial was located at the corner of Wallace and Santa Fe roads, in Atwater. Soil type is Atwater loamy sand, deep over hardpan. Plots were 45 ft long and 2 rows (one bed) wide, replicated 4 times. Beauregard slips were transplanted May 30, 2001 on 9" spacing using commercial 4 row transplanter.

Treatments:

Nitrogen rates:
1. 0 lbs N/A
2. 50 lbs N/A
3. 100 lbs N/A
4. 200 lbs N/A

Potash rates:
1. 0 lbs K_2O/A
2. 75 lbs K_2O/A
3. 150 lbs K_2O/A
4 300 lbs K_2O/A

No pre-plant fertilizers were applied at bedding. One day after the test was transplanted, potash was applied (as potassium sulfate) to the center of the beds, furrowed in to 6" deep. All plots received a uniform application of phosphorous at 60 lbs P_2O_5/A, applied with the potassium.

Drip lines were installed in early June, using 5 mil tape. These lines were tied off separately from the main irrigation system, and did not receive any fertilizer from the grower. The test site was usually irrigated every other day. A water meter was installed in July.

Nitrogen treatments began July 5, 2001, and were applied once every 5 – 7 days for a total of 8 applications that ended August 13. Liquid CAN17 was diluted with 20 gallons of water, then injected into the drip tube that fed all four reps simultaneously. A small battery operated piston pump was used. The N rate application schedule is shown in Table 1.

Sampling: Soil samples were taken in April and late August. The August soil sampling occurred after all nitrogen treatments had been applied. Samples were taken in each plot to three feet and divided into one-foot increments, then analyzed for N (as NO_3-N) and K. Leaf and petiole samples were taken in July, August, and September. Vine weights per 10 ft of one row were taken Sept 17. A sub sample of harvested roots were also analyzed for N and K to determine nutrient removal rates. Water samples were taken during fertilizer injection. Moisture

loss in storage measured each month on 40 lb samples from each plot.

Harvest: Machine dug and crew sorted, one row by 45 feet, on October 31 and November 1, 2001.

Table 1. N fertilizer injection schedule for 2001.

			50	*100*	*200*
App.	*Date*	*Rate*	*Lbs N per week*		
1	7/5	½ x	3.5	7.0	14.0
2	7/13	1 x	7.0	14.0	28.0
3	7/18	1 x	7.0	14.0	28.0
4	7/23	1.5 x	10.5	21.0	42.0
5	7/30	1.5 x	10.5	21.0	42.0
6	8/3	1 x	7.0	14.0	28.0
7	8/8	½ x	3.5	7.0	14.0
8	8/13	½ x	3.5	7.0	14.0

RESULTS

Leaf and petiole samples were taken in August after all fertilizer treatments were finished. Tissue NO_3-N and K were significantly increased as fertilizer rate increased (Figures 1 and 2). There was no significant nitrogen by potassium interaction.

Yield results are shown in Table 2. At the 90% confidence level, nitrogen significantly increased #1's, jumbos, and total marketable yield as compared to the treatments that did not receive any N. However, there was no significant difference between the rate of N applied. Potash did not have any significant effect on yield, and the N x K interaction was not significant for any size (Figure 3). The lack of potassium response in this trial probably occurred because the whole test site was accidentally top dressed with 150 lbs K_2O per acre mid-way through the growing season.

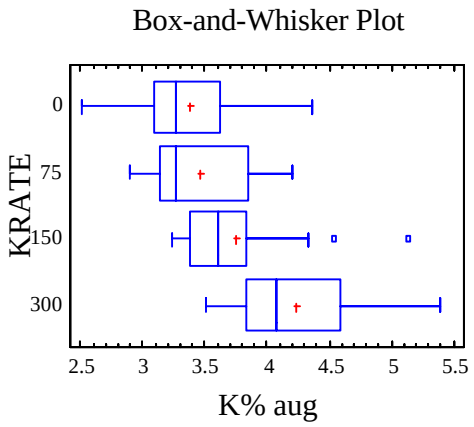

Figure 1. August leaf and petiole tissue N (as NO_3) as affected by N fertilizer rate.

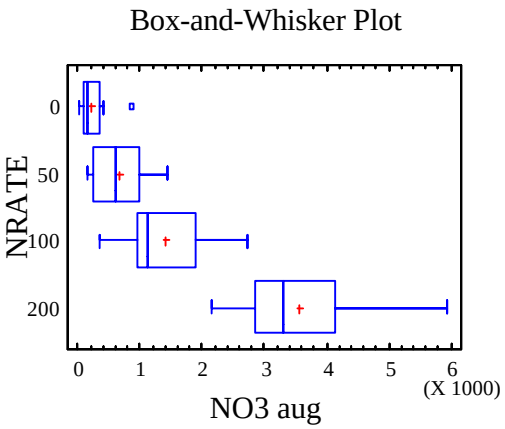

Figure 2. August leaf and petiole tissue K as affect by potash rate.

Soil samples taken in August showed increased amounts of NO_3-N and K as fertilizer rates increased (Figures 4 & 5). Greatest K was found at the 12-24" depth, while most of the N was at the surface. The amount of NO_3-N in the profile, however, was very low for the amount applied. Even at 200 lbs of N per acre, less than 4 ppm N as NO_3-N was found at a depth of 3 feet. This suggests that most of the N applied was used by the crop.

Shrinkage in storage was measured at 6 and 12 weeks. There was no significant effect from either N or K fertilizer rate on moisture loss. On average, the roots lost 3.5% of their weight in the first 6 weeks, and 2% in the second.

To help explain the lack of yield response to additional N fertilizer, a simple nitrogen balance was calculated using soil, crop, and tissue N analyses (Table 3). About 120 lbs N/A was found in the treatments receiving 50 and 100 lbs of N, and 250 lbs N/A at the 200 lb N rate. While the high rate of N only marginally increased yield as compared to the other two rates, it also resulted in increased vine weight, leaf N, root N, and the amount in the soil.

In summary, we saw a significant yield response to N, but there was no significant difference between 50 to 200 lbs of N. However, as N rates increased, more N accumulated in the leaves and roots, and vine weight also increased as N rates increased.

Thus, one of the effects of the 200 lb rate of N was thick, green vine growth. On a positive note, our research suggests that using drip irrigation in sweetpotatoes results in little build up of soil N, even at the highest fertilizer rate.

ACKNOWLEDGEMENTS

We would like to thank Mr. Bob Weimer for his cooperation and help with irrigation set-up, planting and harvesting this test. This project was funded in part by a grant from the Fertilizer Research and Education Program (FREP)., California Department of Food and Agriculture and the Fertilizer Inspection Advisory Board. FREP provides funding to conduct research and education projects to advance the environmentally safe and agronomically sound use and handling of fertilizer materials

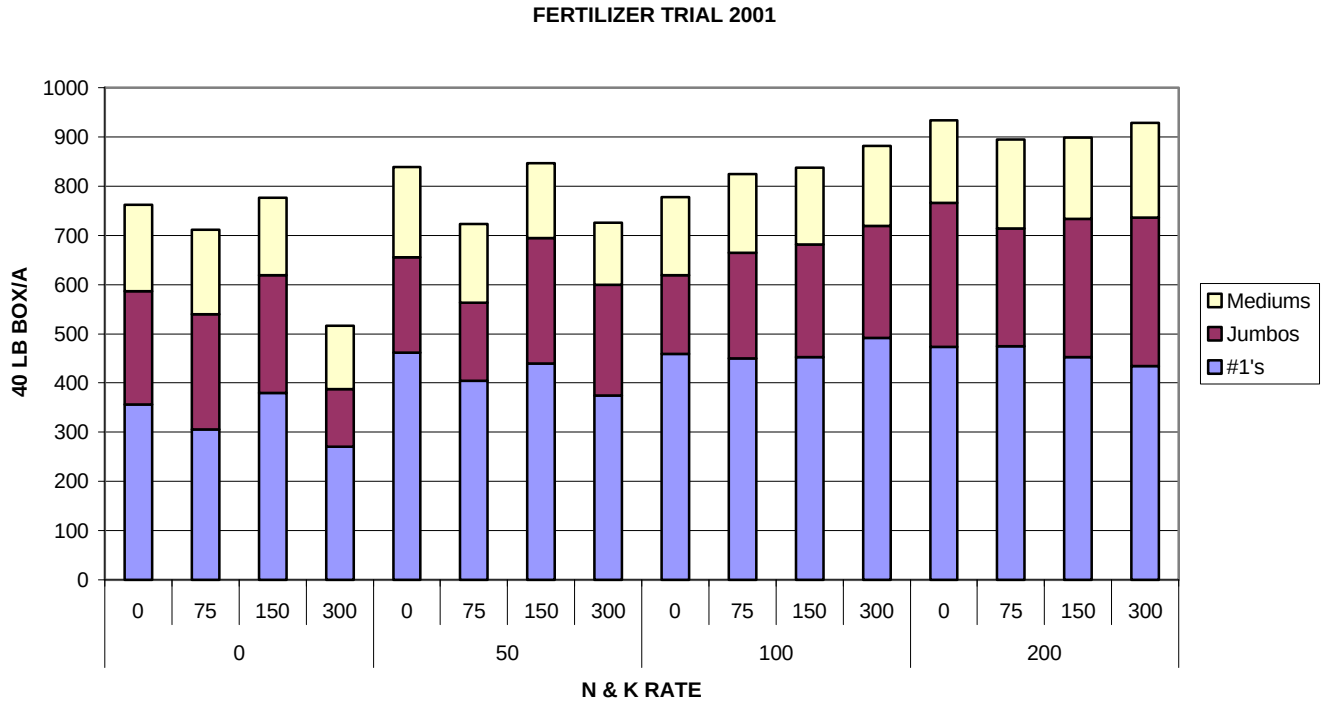

Figure 3. Sweetpotato yield and grade as affected by nitrogen (0 – 200 lbs/A) and potash (0 – 300 lbs K_2O/A) rate.

Table 2. Main effect of nitrogen and potash rate on yield and grade of Beauregard sweetpotatoes.

Treatment		*#1's*	*Jumbos*	*Mediums*	*Market Yield*	*#1's %*	*Culls Boxes/A*
N Rate		40 lb Boxes/A					
	0	328	206	158	685	48.1	107
	50	420	208	156	784	54.0	95
	100	463	209	159	830	56.0	126
	200	459	279	177	915	50.1	121
LSD 0.10		**122**	**59**	**NS**	**159**	**6.8**	**NS**
K Rate	0	437	219	171	828	53.2	105
	75	409	212	168	788	51.9	116
	150	431	251	158	833	51.4	102
	300	393	219	152	764	51.7	126
LSD 0.10		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
N x K LSD		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

US #1's: Roots 2 – 3.5" in diameter, 3 – 9" in length, must be well shaped and free of defects. #1's bring the highest return to the farmer.
Mediums: Roots 1 – 2" diameter, 3 – 7" in length.
Jumbos: Roots that exceed the diameter and length requirements of the above two grades, but are of marketable quality.
% US #1's: Wt. of US #1's divided by the total marketable wt (culls not included).
Culls: Roots >1" in diameter and so misshapen or unattractive as to be unmarketable.

LSD 0.10: Least significant difference at the 90% probability level. NS = not significant.
CV Coefficient of variation, a measure of variability in the experiment.

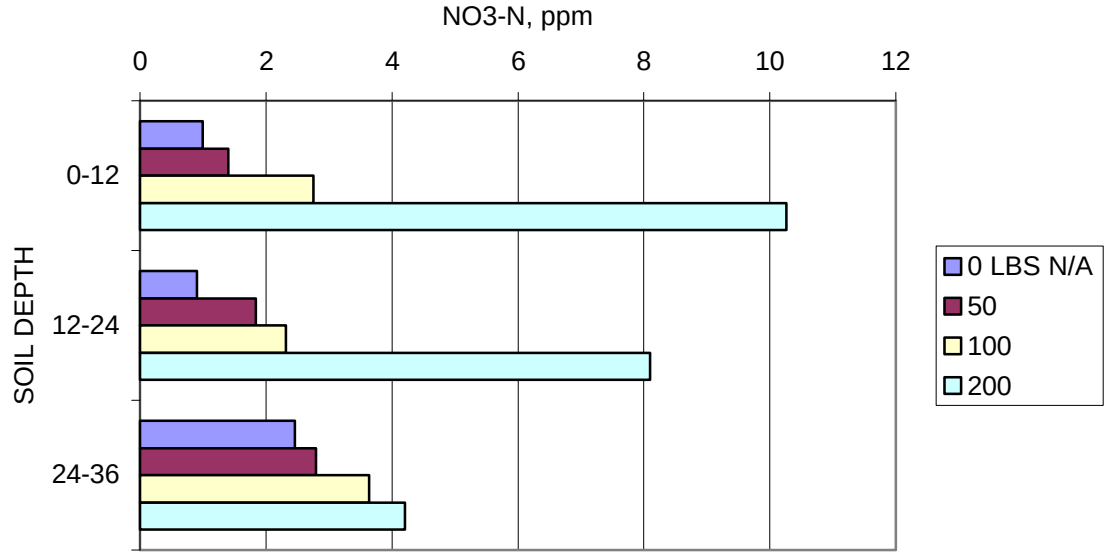

Figure 4. Average soil nitrate-nitrogen (NO_3-N) at the end of the summer for different depths and nitrogen fertilizer treatment.

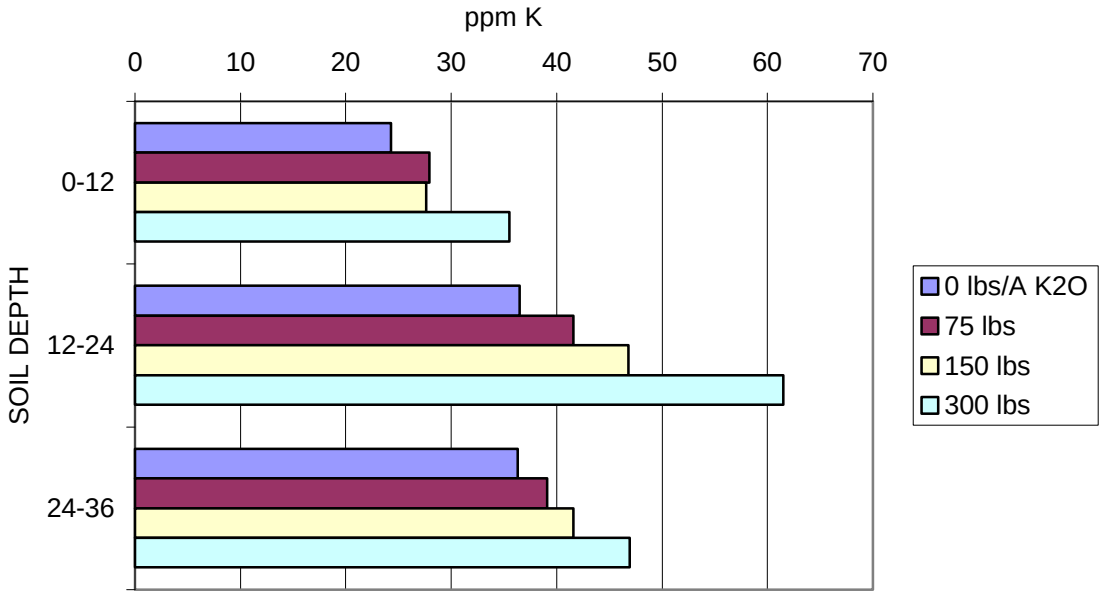

Figure 5. Average soil potassium from 0 to 3 feet as affected by potash fertilizer rate.

Table 3. Partial soil N balance based on vine weight, root yields, and soil NO_3-N in the upper three feet of the profile.

N rate	*Vine wt*[1] *Lbs/A*	*Vine N ppm*	*Vine N Lbs/A*	*Root wt*[2] *Lbs/A*	*Root N %*	*Root N Lbs/A*	*Soil N*[3] *Lbs/A*	***TOTAL N Lbs/A***
1. 0 lbs/A	2892	1375	4.6	27,400	0.85	48	18.5	**71.1**
2. 50 lbs/A	4358	4210	18.6	31,360	1.15	74	27.0	**119.6**
3. 100 lbs/A	4786	2858	13.7	33,200	1.01	69	37.3	**120.0**
4. 200 lbs/A	5293	7433	39.2	36,600	1.52	115	93.2	**247.4**
Average	4332	3969	19.0	32,200	1.13	---	44.0	---
LSD 0.05	1417	2388	11.9	6360	0.25	---	26.2	---

1. Vine weight is the total dry weight of the vine plus leaves by the end of the season (September sampling).
2. Root weight is total dry weight of roots using total marketable yield (D.M. = 20.6%).
3. Soil N is the sum of NO_3-N in the upper 3 feet of soil based on soil B.D. of 1.7, 1.6, and 1.5 g cm^{-3} for the 1st, 2nd, and 3rd foot in the profile, respectively.

SWEETPOTATO DEGREE DAY EVALUATION
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

Degree days are based on developmental thresholds, which are the upper and lower temperatures between which and organism develops. It is determined by and organism's physiology, so it is different for different plants and insects. San Jose Scale has thresholds of 51 to 90°F. Cotton has a lower threshold of 60°F, with no upper limit. Degree days, or heat units, are the total amount of heat required, between these upper and lower thresholds, for an organism to develop from one point in its life cycle to another.

Currently, there is no degree day model developed for sweetpotatoes. Such a model could be used to estimate the degree days required for seed, #1's, and jumbos for different varieties. The objective of this trial was to evaluate the feasibility of developing a degree day model for two different types of sweetpotatoes (Beauregard, short maturity, and Hanna, long maturity).

METHODS

Commercial Beauregard and Hanna fields with early, mid, and late transplant dates were used for this evaluation. Beginning about 45 days after transplanting, 5 feet of one row was dug, graded, weighed, and photographed. Vine length, number of nodes, and weight were also measured. This was repeated every 2 weeks. The Merced CIMIS station was used to determine degree days. Transplant and harvest dates are shown in Table 1.

RESULTS

Crop development appears to be independent of planting date, based on the number of degree days where maximum root size was observed for each variety(Table 2), especially for seed and #1 roots. Our data show that more DD60's are needed for late planted fields, but there are not enough sampling dates for this planting to make this conclusion. Both early and late planted fields were harvested before maximum crop development occurred.

An analysis of the combined data suggests that the use of degree days may provide some information regarding root development. In general, the highest percentage of seed roots occurred around 900 – 1000 DD 60's for both varieties. Highest #1 percentage for Beauregard occurred at around 1500 degree days, while for Hanna it was around 1750 degree days (Figures 1 & 2). Both varieties peaked at 55% #1's. Jumbos were both highest at around 1750 + DD 60's. Based on these data, the following developmental stages are suggested:

	Beauregard	Hanna
Root lengthening	400 - 500	same
Bulking	900	1000 DD
Seed	900	1000 DD
#1's	1500	1750 DD
Jumbos	>1750	>1750

Long term average temperature data can be used to estimate when a sweetpotato crop will achieve these developmental stages. Thirty year average DD 60's for the Merced area between April 1 and November 1 is 2515. This sets the limit as to the last possible transplant date in which to plant a crop and expect to achieve a reasonable harvest yield. Using DD 60 curves, estimated dates for crop development depending on transplant date are shown in Table 3.

Further work is needed to establish a larger data set, since many factors can affect root sizing. Additionally, ranges should probably be developed for the DD 60's proposed above, with statistical confidence levels.

ACKNOWLEDGEMENTS
Many thanks to Mr. Dave Souza for his help and cooperation with this study, and Larry Burrow and Matt Beene, county agriculture technicians for their help.

Table 1. Transplant and harvest dates and accumulated DD60's for Merced, 2001.

Variety		*Transplant Date*	*Harvest Date*	*Days*	*DD 60's*
Beauregard	Early	April 24	August 15	113	1600
	Mid	May 17	October 10	146	2100
	Late	June 20	October 5	107	1580
Hanna	Early	April 17	August 1	106	1399
	Mid	May 17	October 10	146	2100
	Late	June 19	October 3	105	1581

Table 2. Observed degree days (using cotton development model) in Merced in 2001 where size of sweetpotato roots were maximized for each variety.

		DD60's needed for	
Planting Date	*Seed*	*#1's*	*Jumbos*
Beauregard			
- early	938	1200 – 1450	1453
- mid	971	1223	1612
- late	1239	1464	**
Hanna			
- early	956	1207*	**
- mid	971	1405	1612
- late	1256	1482	1482

* Harvested before crop was fully mature (#1's not at potential maximum).
** Not enough data to evaluate.

Table 3. Estimated time of Beauregard and Hanna root size development at different transplant dates based on 30 year climatic data for the Merced area.

Transplant date	*Seed 900 DD 60's*	*#1's Beauregard 1500 DD 60's*	*#1' Hanna 1750 DD 60's*	*Jumbos 1800 DD 60's*
April 1	July 2	Aug 3	Aug 16	Aug 20
May 1	July 10	Aug 11	Aug 26	Aug 29
June 1	July 26	Aug 28	Sept 14	Sept 17
July 1	Aug 18	Sept 28	Oct 27	----
July 15	Sept 3	Oct 27	----	----

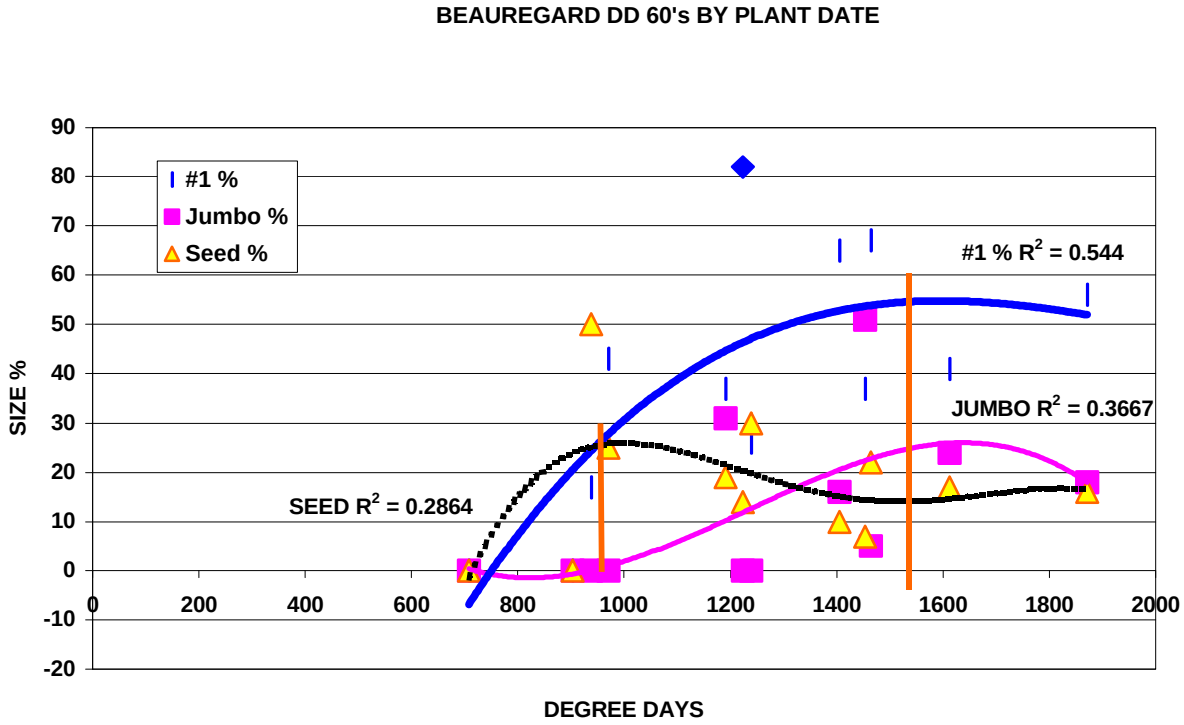

Figure 1. Size breakdown of Beauregard sweetpotato roots depending on accumulated DD 60's for 2001. Averaged across all planting dates. Vertical lines indicate where maximum seed and #1 percentages occurred. Size calculated on all harvested roots, including unmarketable.

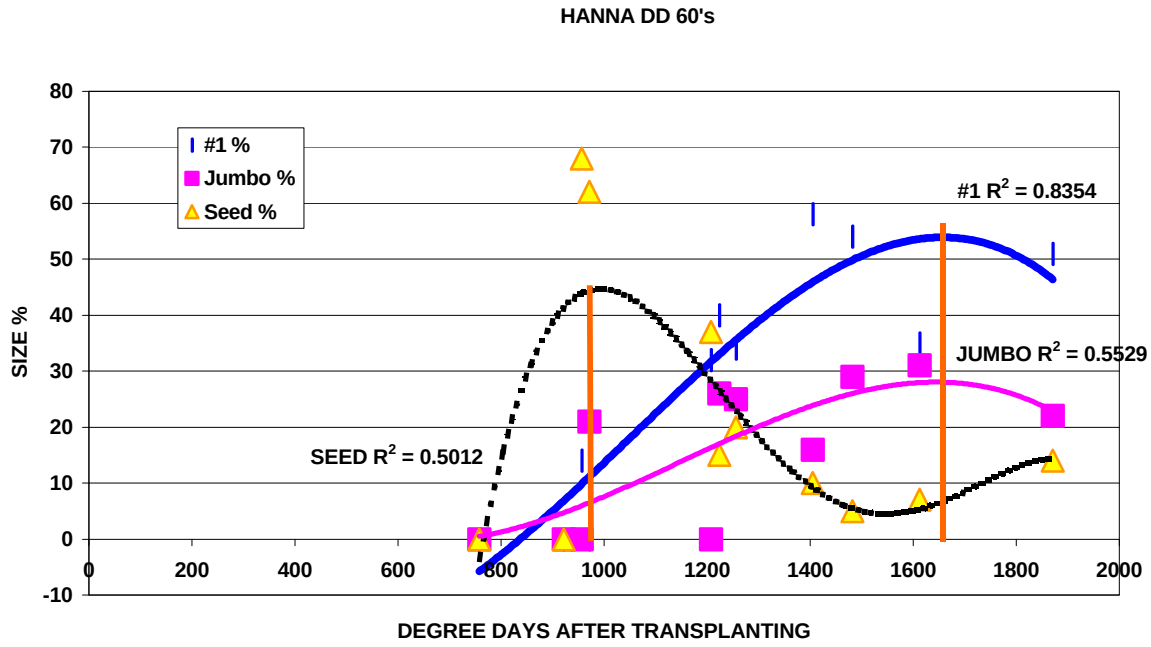

Figure 2. Size breakdown of Hanna sweetpotato roots depending on accumulated DD 60's for 2001. Vertical lines indicate where maximum seed and #1 percentages occurred.