Sweetpotato Research Progress Report 2010

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Sweetpotato Collaborators Trial -- 2010

Scott Stoddard, UCCE Merced County

This year's sweetpotato evaluation was with Blain Yagi, near Livingston, CA. Soil type was Hilmar sand, slightly saline-alkali.
Ground was fumigated with Telone. Field pre-irrigated, and soil moisture was excellent at planting. Cool, wet spring.
Mild summer with reduced heat units, some stand problems from lack of transplanter water.
No significant pest problems, but overall yields less than normal with the exception of Diane. Notes made 6 weeks after harvest.

Rep	Var#	Variety Name	Skin Color	Skin Text	Flesh color	Eyes	Lents	Shape	Shape Uniform	Overall App	Comments	notes on culls
1	1	California	Rose-Cu	5	3	9	7	3, 4, 7	3	6	RC, some veins, lumps	RC, RKN
2		Beauregard	Rose-Cu	7	3	9	7		3	5		cuts, shape
1	2	B63	Rose-Cu	5	2.5	7	7	3,5	5	7	light orange flesh, mottled	RC, RKN
2			Cu	9	3	9	5		7	6		
1	3	"Old" Covington	Rose	7	3	9	5	3,5	7	8	SF, dark lents	
2			Rose	7	4	9	5		7	8		
1	4	Covington	Cu	9	3	7	7	2,6	9	8	Nice shape, color. Very pretty	dark
2			Rose-Cu	7	4	7	7	2,6,8	7	9	YCR very distinct	lenticles
1	5	Evangeline	Rose	5	3	9	5	3,4	5	6	Good flesh color and consistancy	RKN, air
2			deep rose	7	4	9	5		7	7	Some veins, lumps	cracking
1	6	L-05-111	Rose-Cu	7	2.5	7	5	3,5,8	7	7	light orange flesh, YCR.	RC, RKN
2			Cu	5	3	5	7		5	8	good skin color	
1	7	L-05-29	buff	5	1	9	5	4,8	9	5	off color, mottling w/some pink	long, veins
2			buff/tan	7	1	9	5		8	5	long, veins, obvious lents	
1	8	O'Henry	white/	7	1	7	7	3,5	7	5	some veins, RC, RKN	cuts, shape
2			cream	7	1	5	7	2,5	8	6	dark spots	RKN
1	9	L-07-146	Red	7	4	9	5	3,6,7	5	5	good color, squiggly shape	long
2			Red	9	4.5	7	5		5	4	some staining	veins
1	10	Diane	Rose-red	7	4	7	5	3,5	7	8	Long, but good shape and color	cuts
2			red	9	5	5	5		7	7		long
1	11	L-04-175	maroon	7	5	7	5	1,2,5	5	6	chunky, smooth skin, good flesh	veins, RKN
2			maroon	5	5	5	5		5	3	some veins, skinning and dings	scurf
1	12	L-05-24	red-Cu	5	4	5	5	5,8	7	6	Veins, skin color varies rose to red	veins
2			Red	3	4	3	3		7	4	dark lenticles	RKN
1	13	B14	Rose-Cu	5	3	5	5	2,3	5	5	mottled flesh, funny shape	RC
2			Cu	7	3	7	5		7	5	flesh color not consistant	RKN

Skin color:
cream (Hanna)
Tan
copper (Jewel)
Rose (Beau)
Purple (Garnet)

Skin Texture:
1 = very rough
3 = moderately rough
5 = moderately smooth
7 = smooth
9 = very smooth

Flesh Color:
0 = white
1 = cream
2 = yellow
3 = orange
4 = deep orange
5 = very deep orange

Eyes:
1 = very deep
3 = deep
5 = moderate
7 = shallow
9 = very shallow

Lenticels:
1 = very prominent
3 = prominent
5 = moderate
7 = few
9 = none

Shape:
1 = round
2 = round-elliptical
3 = elliptic
4 = long elliptic
5 = ovoid
6 = blocky
7 = irregular
8 = asymmetric

Shape Uniformity:
1 = very poor
3 = poor
5 = moderate
7 = good
9 = excellent

Overall Appearance:
1 = very poor
3 = poor
5 = moderate
7 = good
9 = excellent

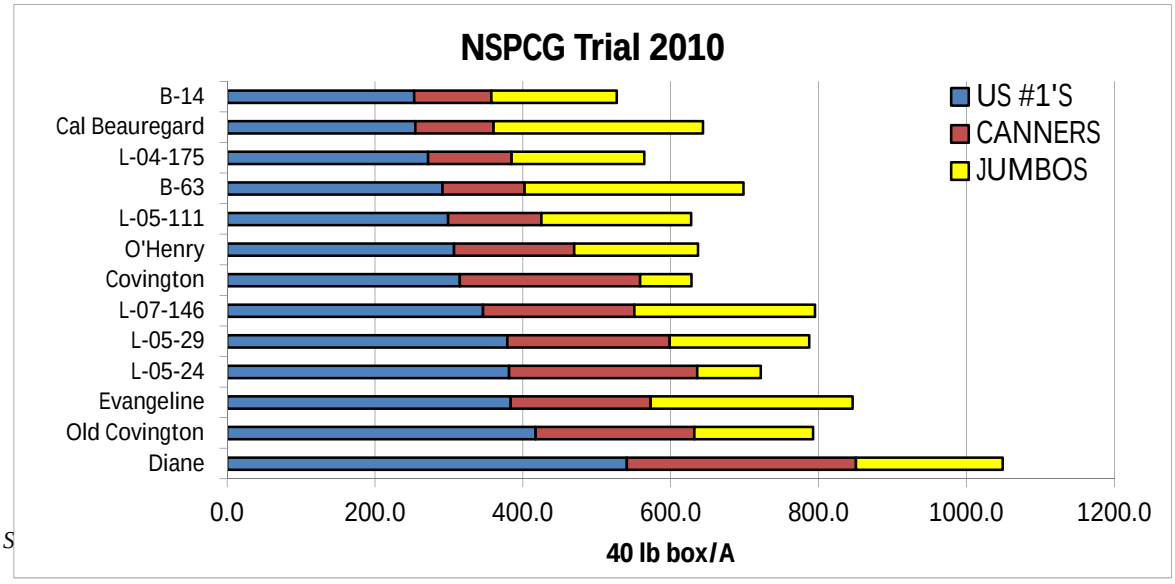
All ratings made on #1 roots.
YCR = yellow cortical ring
RC = Russet Crack
RKN = root knot nematode
Culls = main reason for culls

NATIONAL SWEETPOTATO COLLABORATORS SUMMARY OF DATA
2010

STATE AND LOCATION REPORTING: Livingston, CA
DATE TRANSPLANTED: 5/27/2010. DATE HARVESTED: 10/22/2010. No. GROWING DAYS: 148
DISTANCE BETEEN ROWS (in): 40. DISTANCE IN ROW (in): 12
PLOT SIZE: NO. OF ROWS: 2 LENGTH (ft): 45 NO. OF REPS: 4
IRRIGATION: pre irrigate + drip irrigation. 1.5 to 2 inches per week during summer, total 30".
FERTILIZER: 3 tons compost, 500 lbs K2SO4 pre plant, CAN17 drip. About 150-60-375 NPK.

			40 lb box/A					%	%
	SELECTION	CLASS	US #1'S	CANNERS	JUMBOS	MKT YIELD	BINS/A	US #1'S	CULLS
10	Diane	Red	540.6	309.8	198.4	1048.9	47.7	51.7	8.1
3	Old Covington	yam	417.3	214.7	160.5	792.5	36.0	52.6	0.3
5	Evangeline	yam	383.6	189.3	273.1	845.9	38.4	45.4	8.0
12	L-05-24	Red	381.3	254.5	86.0	721.8	32.8	51.9	10.3
7	L-05-29	sweet	379.0	219.6	188.7	787.4	35.8	47.8	14.7
9	L-07-146	Red	346.0	204.8	244.2	795.0	36.1	43.5	25.4
4	Covington	yam	314.7	243.9	69.4	628.0	28.5	49.3	0.0
8	O'Henry	sweet	306.8	162.7	167.5	637.0	29.0	48.4	11.9
6	L-05-111	yam	299.0	126.1	202.5	627.6	28.5	47.4	24.2
2	B-63	yam	291.3	110.9	296.0	698.3	31.7	41.6	18.9
11	L-04-175	Red	271.9	112.9	179.3	564.1	25.6	48.2	15.1
1	Cal Beauregard	yam	254.6	105.8	283.2	643.5	29.3	39.2	29.6
13	B-14	yam	252.9	104.5	169.5	526.9	23.9	46.6	37.9
	Average		341.5	181.5	193.7	716.7	32.6	47.2	15.7
	LSD 0.05		116.7	46.6	90.7	140.7	6.4	ns	9.5
	CV, %		23.8	17.9	32.6	13.7	13.7	16.2	42.3

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 size requirements of above grades, but are marketable quality.
Mkt Yield	Total marketable yield is the sum of the above three categories.
bins/A	bins/A are estimated based on market box yield assuming 22 boxes (17.6 Bu) per bin.
% 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.
LSD 0.05	Least significant difference. Means separated by less than this amt are not significantly different (ns).
CV, %	Coefficient of variation, a measure of variability in the experiment.
L-05-24	Only 3 reps planted



SCORE SHEET FOR EVALUATION OF SWEETPOTATO SPROUT PRODUCTION

Date bedded:	3/1/10	Location:	Yagi Bros Farms Livingston, CA		
Date Evaluated:	4/6/10	Type of bed:	hot bed		
Evaluated by:	S. 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)
1	Cal Beauregard	yes	3	3	3		
2	B-63		4	3	4		
3	Old Covington		4	3	4		
4	Covington						D&S beds, not evaluated
5	Evangeline		1	2	1		
6	L-05-111		3	3	2		
7	L-05-29		4	3	3		
8	O'Henry		3	4	2		
9	L-07-146		4	3	4		
10	Diane		4	4	5		
11	L-04-175		1	1	1		
12	L-05-24		2	2	2		
13	B-14		4	3	4		

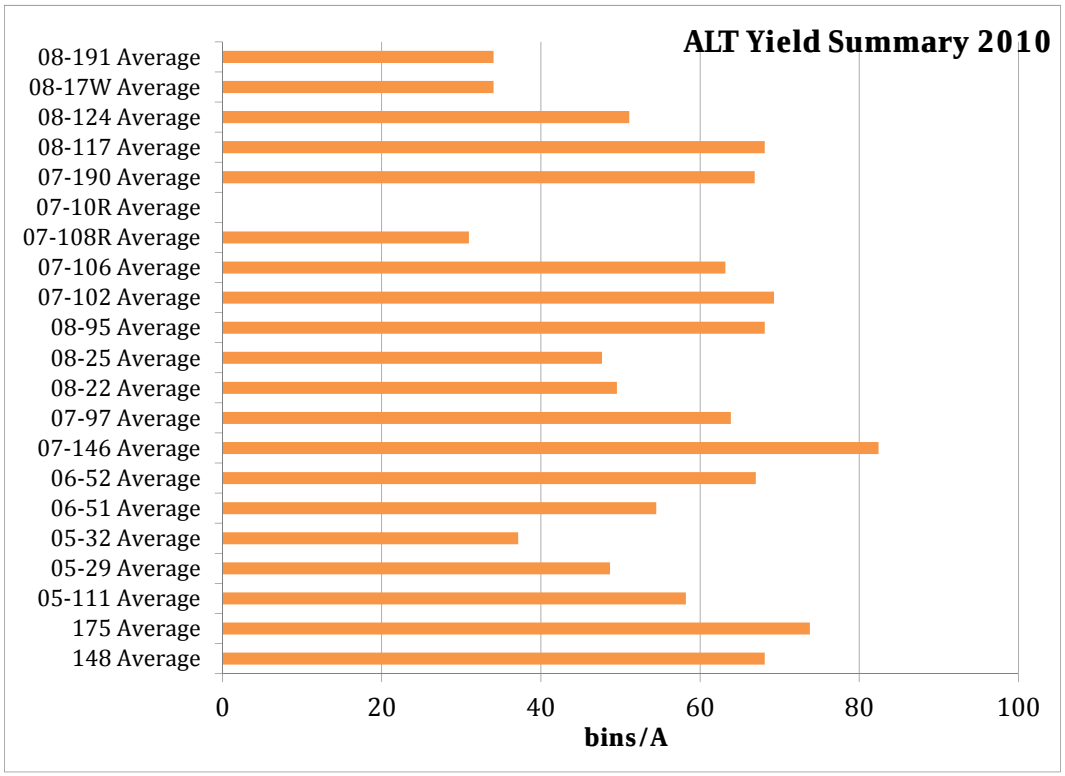
(1)	Plant production rated from 1 – 5 based on observation during pulling season. A rating of 1 indicates low plant production, while 5 indicates good plant production.
(2)	Uniformity of emergence rated from 1 - 5. One (1) indcates poor uniformity while 5 indicates the highest degree of uniformity of 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. Mostly not applicable as beds were disced shortly after transplanting.
(5)	Notes on size of root, decay in beds, etc.

Sweetpotato ALT -- 2010

Scott Stoddard, UCCE Merced County

This year's sweetpotato ALT evaluation was with Dave Souza, near Atwater CA. Corner of Atwater Jordan and White Crane Rds. Ground was fumigated with Telone. Field pre-irrigated, and soil moisture was excellent at planting. Cool, wet spring. Transplanted June 2, harvested on Oct 29, 2010. Root evaluation on Dec 2.
Drip irrigation, 12" plant spacing. 1 row plots. Not all plots replicated, and no statistical analysis of yields.

Variety Name	Skin Color	Skin Text	Flesh color	Eyes	Lents	Shape	Shape Uniform	Overall App	Comments	noles on culls	for 2011
08-124	Rose-Red	9	5	Shallow	5	2	7	9	Nice Shape, Color, Flesh		keep
08-25	Red	5	3	Shallow	5	3	6	6	Rough Skin		keep
08-48W	Red	3	3	Shallow	5	4	6	3	Very Rough, RC, skinny		drop
07-10R	Deep Red	4	5	Shallow	7	2	5	4	RC, Rough,Dirty		drop
08-17W	Purple	5	0	5	7	3.6	5	5	Spots,Mishapen,Rough Skin		drop
07-106	Red	8	5	7	5	3	7	8	Nice,Good Color Flesh		keep
06-51	Rose	9	3	5	9	6	7	8	Well Tanned. Nice		drop
07-108R	Purple	1	0	7	5	4	5	1	Veins,Long, Rough	rough	drop
08-117	Red	9	4	9	5	3	7	8	Lents prominent, nice color		keep
Cov.	CU- Rose	9	3	8	5	6	7	8	Grooves		keep
Evangeline	Rose-CU	9	4	9	7	2	8	8	Cracks		keep
06-52	Orange	9	3	5	7	2	7	9	Smooth, good Shape, color		keep, REP
175	Red	7	5	7	7	2	9	7	Some Veins,	veins	VT at FPS
08-191	Tan	7	3	7	5	3	7	6	Dark Spots		drop
05-32	Cu	5	3	7	5	3	5	5	scrapes	shape, cracks	drop
05-111	Cu	7	3	6	5	3	7	6	like Beauregard		Collaborators
07-146	Red	7	5	7	7	3	5	7			Collaborators
148	Rose-Red	6	4	5	7	3	7	8	some horizontal striations		keep for horticulture
05-29	Tan	8	1	5	7	4	7	7	Rose, Tan-Long	veins	not in ALT
08-22	Red	6	4	7	3	3	5	8	Deep Red		keep
07-97	Cu	9	2.5	5	7	3	5	8	lt orange flesh		drop
07-190	Red	Smooth	4	7	5	3	8	8	Nice		keep - REP
07-190R	Red	Smooth	4	7	7	3	8	8	Nice		same as 190
08-95	Red	Smooth	4	7	7	3	7	7	Looks Good		keep
107-102R	Red	Smooth	4	5	5	8	7	7	Nice color, some veins	cracks	drop



Covington Plant Spacing Trial 2010

Scott Stoddard, Farm Advisor
UC Cooperative Extension Merced County

As part of the Specialty Crops Research Initiative (SCRI) with LSU, I investigated the impact of plant spacing on the growth and root development of the variety Covington under different plant spacings. Trial was designated as Site 2, and was conducted with Aaron Silva in a commercial field located south of Westside Blvd, between Dwight and Lincoln. Covington was planted at 9", 12", and 18" on May 27, 2010 using 2-row, 50 foot plots. Soil temperature sensors were established in one plot at 2", 6", and 12" within 2 days of transplanting.

At each location, destructive plant sampling to look at root development occurred at 30 days after transplanting. Soil samplings have been taken for fertility analysis and nematode determination; leaf and petiole samples were taken around 60 days after transplanting. Harvest was done with a standard 2-row harvester on October 28, 2010.

Results: There was no difference in the root counts at 30 days, which average 5.4 potential storage roots for all plant spacings. Soil and plant sampling results are shown in Tables 2 & 3. Soil K was low at sampling time, but levels within the plant in July were sufficient. Yield and yield break down are shown in Figures 1 and 2. Spacing had a significant impact on the total yield and size distribution, with best yields occurring at 12". Mediums declined and jumbos increased as plant spacing increased, as would be expected.

This research will continue in 2011.

Table 1. Covington sweetpotato plant spacing trial 2010
SCRI site #1, Westside Blvd, between Dwight and Lincoln

		950 lb bin wt							
treatment (in)	plants/A	#1's	Med	Jumbo	TMY	#1 %	% Med	% Jumbo	culls %
9	15684	22.75	13.06	3.04	38.85	58.5%	33.7%	7.8%	17.8%
12	12705	23.57	11.04	6.51	41.13	57.3%	26.9%	15.8%	17.9%
18	8787	18.14	6.54	9.23	33.92	53.5%	19.5%	27.0%	25.8%
LSD 0.05	1562	2.50	2.10	3.40	4.80	ns	3.3	7.5	ns
CV, %	7.3	6.70	12.00	31.00	7.30	6.8	7.1	25.8	30.8
Variety:	Covington								
Plant date:	27-May-10								
Harvest date:	28-Oct-10								
days:	154								

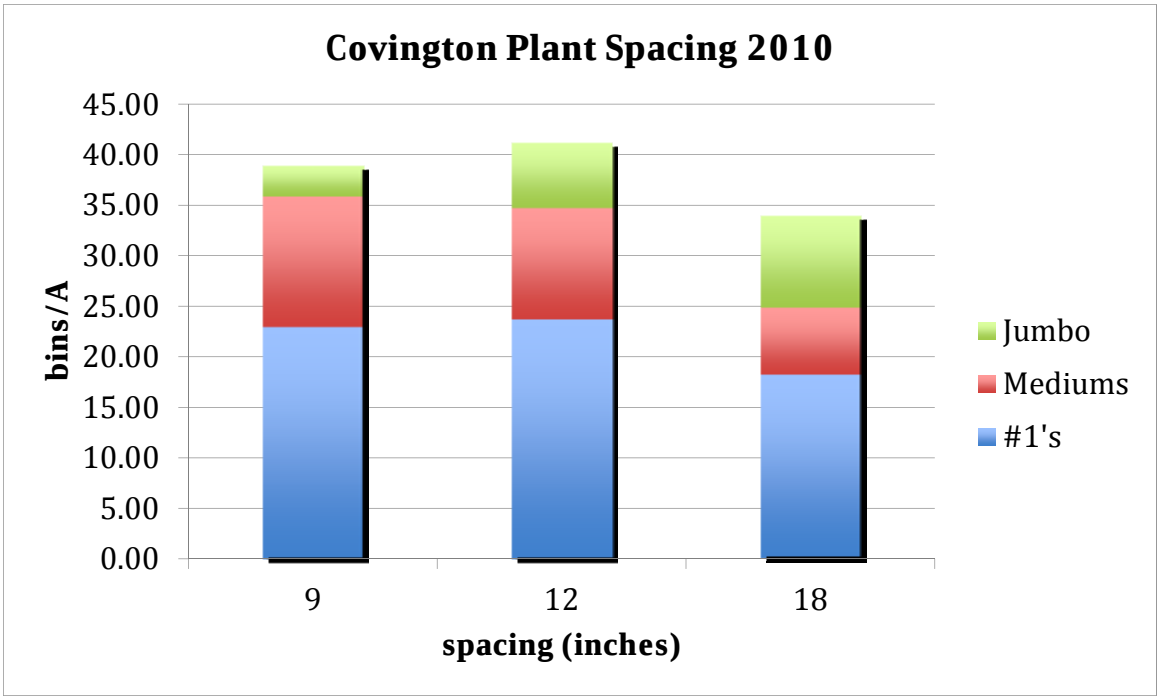


Figure 1. Plant spacing has a significant affect on yield and size distribution of Covington sweetpotato roots.

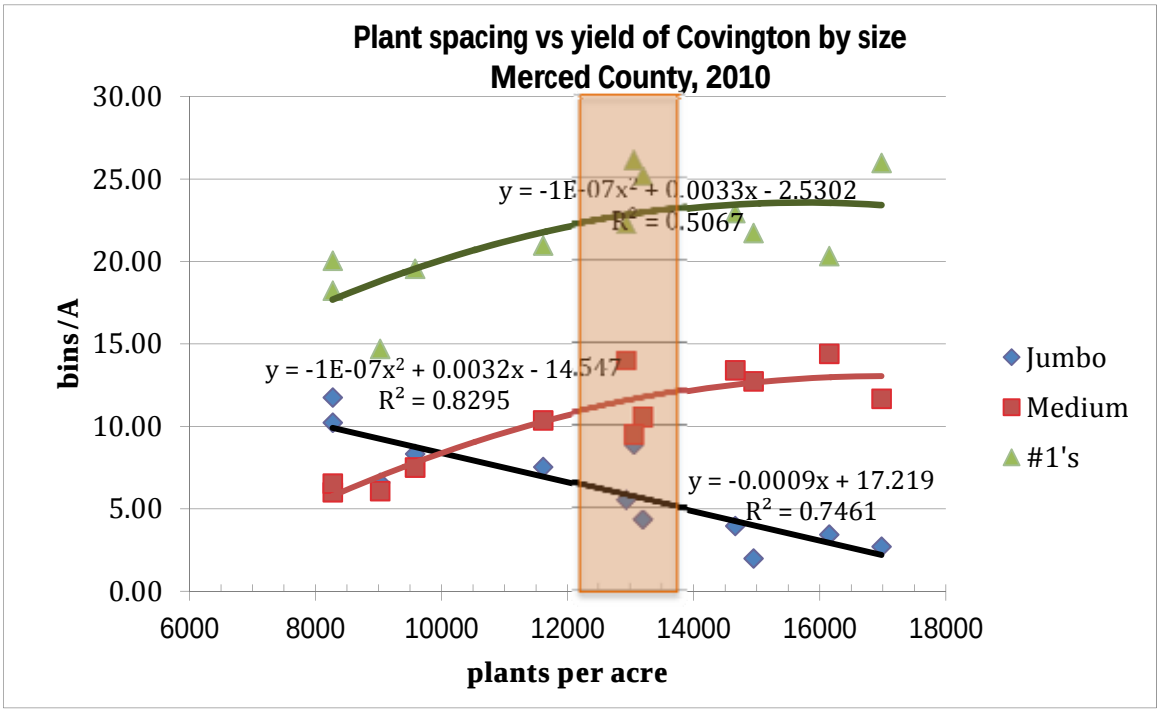


Figure 2. Relationship of sweetpotato root yield by size and number of plants per acre. The shaded bar represents typical plant spacing of 12" (~ 13,000 plants per acre). As the number of plants per acre increases, jumbo-sized roots decrease, while #1's and mediums increase.

Dual Magnum Herbicide On Sweetpotatoes 2010

Scott Stoddard, UCCE Merced County

Location: South of Atwater-Jordan between Dwight and Sultana Rds.
Cooperator: Paul Espinola.

Objective: Evaluate weed control (especially yellow nutsedge) and crop safety from different rates of Dual Magnum herbicide on sweetpotatoes. Dual Magnum received a Section 24(c) Special Local Need Label for control of yellow nutsedge in sweetpotatoes in 2010.

Treatments:

1	UTC
2	2/3 pint Dual Magnum
3	1.0 pint Dual Magnum
4	1.33 pints Dual Magnum/A
5	Devrinol, 4 lbs/A
6	Valor, 1.5 oz/A

Treatments applied 6/3/2010 except #6. Used back pack sprayer and 40 gpa equivalent.
Incorporated with light disc & ring roller 3 - 4" deep before bedding.
O'Henry variety transplanted June 7
Treatment #6 applied June 15 down middle of bed, only water incorporated with drip tape.

Plots: 20 ft (3 beds) x 43' 7", 4 reps (= 0.08 acre)
Weed control and harvest data from center bed
Weed and crop ratings on June 28 and July 7, 2010
Harvest: 4-Nov-10

Results

This test plot was located in a commercial field with heavy yellow nutsedge (*Cyperus esculentus*) pressure that had been sprayed once with Roundup, then cultivated. Application of Dual Magnum (S-metolachlor) and Devrinol (napropamide) were made to the test plot area using a backpack sprayer, then mechanically incorporated with a light disc before bedding. Valor (flumioxizin) herbicide was applied as a directed spray with a backpack sprayer down the center of the bed one week after transplanting and was incorporated only with the water from the drip tape (no mechanical incorporation nor overhead irrigation was used). The area was then transplanted and no further hand weeding or cultivation was performed until after the last rating on July 7. Weed and crop ratings are shown in Table 1. Ratings were made from the center of each plot (middle bed) by evaluating the amount of yellow nutsedge, grasses, broadleaf weeds, and sweetpotato phytotoxicity on a subjective scale, where 0 = no weeds or crop phytotoxicity, and 10 would equal 100% weeds and crop death. At harvest, the middle bed was separated by the harvest crew into #1's, mediums, and jumbos. All the herbicide treatments significantly reduced the number of weeds at this location; Dual Magnum provided better control of yellow nutsedge than Valor or Devrinol (Figure 1). Some phytotoxicity was noted however, which increased as the rate increased for Dual Magnum. Total yields were similar across treatments, but Dual Magnum resulted in significant fewer #1's at the highest rate (Table 2).

Table 1. Weed and crop phytotoxicity ratings, Dual Magnum herbicide trial in sweetpotatoes 2010.

		28-Jun				7-Jul			
plot	treatment	Nutsedge	Grass	Broadleaf	Crop Phyto.	Nutsedge	Grass	Broadleaf	Crop Phyto.
1	UTC	3.75	6.50	2.75	0.00	4.25	8.75	4.00	0.00
2	2/3 pint Dual Magnum	1.50	3.00	1.75	0.75	1.75	4.50	1.75	3.25
3	1.0 pint Dual Magnum	1.75	3.00	1.50	1.50	1.75	3.50	2.25	3.75
4	1.33 pints Dual Magnum/A	1.75	2.75	1.75	1.50	1.50	3.00	1.75	3.75
5	Devrinol, 4 lbs/A	2.50	3.75	2.25	0.25	2.50	3.25	2.00	3.50
6	Valor, 1.5 oz/A	2.00	2.25	0.75	1.75	3.25	2.50	0.75	1.50
	Average	2.21	3.54	1.79	0.96	2.50	4.25	2.08	2.63
	LSD 0.05	1.4	1.2	0.8	1.0	1.5	1.3	0.9	1.9
	CV,%	40.7	21.6	29.7	66.7	40.4	20.8	29.1	48.3

Weed and crop ratings made on date indicated using 0 - 10 scale, where 0 = no weeds or phyto and 10 = 100% weeds/phyto.
LSD 0.05 = Least Significant Difference at the 95% confidence level. Means within a column separated by less than this amount are not significantly different. NS = not significant.
CV = coefficient of variation

Table 2. Yield results as affected by herbicide treatment, 2010.

		boxes per acre				1000 lb		
plot	treatment	#1's	Med	Jumbo	TMY box	TMY bins/A	No. 1's %	Culls %
1	UTC	824.4	139.6	238.4	1202.5	48.1	68.3%	4.8%
2	2/3 pint Dual Magnum	692.5	143.0	283.1	1118.6	44.7	61.8%	4.8%
3	1.0 pint Dual Magnum	706.4	149.9	276.3	1132.7	45.3	61.8%	6.5%
4	1.33 pints Dual Magnum/A	588.8	144.8	373.8	1107.4	44.3	53.6%	5.5%
5	Devrinol, 4 lbs/A	750.5	145.6	281.1	1177.2	47.1	63.5%	5.5%
6	Valor, 1.5 oz/A	849.6	163.8	205.1	1218.6	48.7	69.6%	6.3%
	Average	735.38	147.81	276.31	1159.49	46.38	63.1%	5.6%
	LSD 0.05	115.6	NS	87.7	NS	NS	6.2	NS
	CV,%	15.5	21.6	31.4	10.6	10.6	9.7	64.8

TMY = Total Marketable Yield, sum of #1's, mediums, and jumbos.
No. 1's % = % of TMY that is from #1 size roots.
Culls = % of total root yield that were culled.
LSD 0.05 = Least Significant Difference at the 95% confidence level. Means within a column separated by less than this amount are not significantly different. NS = not significant.
CV = coefficient of variation

Sample Type: SOIL Date Sampled: Spring 2010 Grower/Location/Project: Dual Magnum on sweetpotatoes

SAMPLE	DESC	NO3-N ppm	Olsen-P ppm	X-K ppm	X-K meq/100g	X-Na ppm	X-Na meq/100g	X-Ca meq/100g	X-Mg meq/100g	(estimated) meq/100g	OM (LOI) %	pH
10	SP Dual Magnum trial	2.97	13.0	47	0.12	5	0.02	2.34	0.41	2.90	0.71	7.20
10 dup		3.05	12.7	50	0.13	6	0.03	2.40	0.42	2.98	0.72	7.19

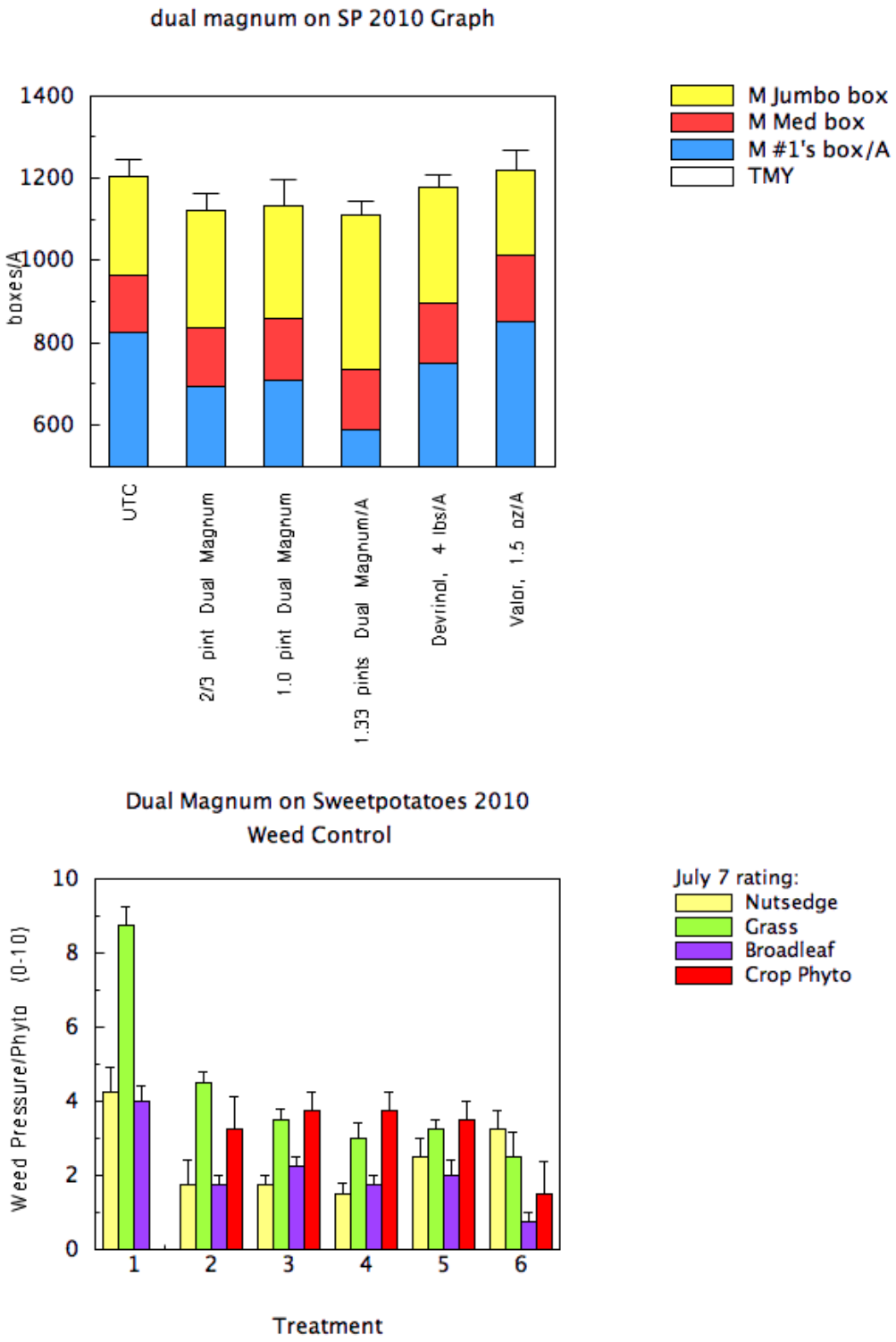


Figure 1. Dual Magnum herbicide significantly reduced the amount of all weeds in this test plot as compared to the untreated control, but had similar performance compared to Devrinol and Valor (above). Higher rates of Dual Magnum also resulted in decreased #1 production, but total root yield was similar across all treatments (top).

Figure 2. July 7 weed pressure was dominated by grasses at this location.

METHYL BROMIDE ALTERNATIVES SHOW GOOD POTENTIAL FOR SWEETPOTATO HOTBEDS

C.S. Stoddard*, M.Davis[1], A. Ploeg[2], J. Stapleton[3]

*UC Cooperative Extension, Merced, CA; [1]UCCE Plant Pathology, UC Davis; [2]UCCE Nematology Specialist, UC Riverside; [3]UCCE IPM Plant Pathologist, Kearney Agriculture Center.

MeBr is currently allowed under a Critical Use Exemption (CUE) with the U.S. EPA, but this is likely to end soon and effective alternatives are needed. This year marks the end of a three-year USDA-ARS sponsored project that evaluated fumigation, herbicide, and fungicide alternatives in a commercial hotbed operation.

Alternative fumigants were evaluated using a randomized block split-plot design with three replications. Main plots consisted of six fumigation treatments: 1) untreated control; 2) MeBr + Pic 53/47% at 350 lbs/A; 3) Pic-Chlor 60 (1,3-D + Pic) at 45 gallons/A; 4) metam sodium 40 gallons/A + 1,3-D 12 gallons/A shanked, incorporated, and rolled; 5) Pic only at 150 lbs/A; 6) flat solarization. Split-plot treatments include two different fungicides and herbicides: Devrinol (napropamide) 4 lbs/A; Valor (flumioxizin) 1.0 oz/A; Valor at 1.5 oz/A; Botran (dichloro nitroaniline) 3.5 lbs per 14 gallons per 1000 sq ft; Mertect (thiabendizole) 30 fl oz per 14 gallons per 1000 sq ft; untreated control. Split plots were 8 ft x 12.5 ft (100 ft^2).

Fumigation and solarization treatments were installed in the summer and fall of 2007 - 09; herbicide and fungicide applications were made after bedding in spring of 2008 – 2010. Plots were evaluated for weed pressure, nematodes, root rotting caused by *Pythium* fungi, and plant production.

Results.
In each of the three years, nematodes were sampled by taking a 500 cc soil sample from each of the main plots in February before the beds were installed and again at plant harvest in May. No root knot nematodes (*Meloidogyne incognita)* or other plant parasitic nematodes were found at any sampling event. Similar to nematodes, the soil analysis for potential root rotting pathogens showed no significant differences among treatments in any year (Table 1).

Initial weed pressure was not that high in the area where these hotbeds were located, probably because it had been previously fumigated with MeBr, but weed pressure and diversity increased as the trial progressed. Significant differences occurred between the main plot treatments, with greatest number of weeds in the untreated (UTC) and solarization treatments. These treatments also required the most hand weeding time, averaging 97 and 78 seconds per 100 ft^2 (Figure 1). Significant differences were also noted between the split plot treatments for weed control. Application of either herbicide significantly reduced weed pressure as compared to not treating, with Valor having the greatest efficacy on the weeds present at this location (puncture vine, malva, pigweed, mustard, and barnyard grass dominated). However, Valor caused some noticeable crop phytotoxicity in each year of this trial. A reduction in plant production was noticed in 2009, but this was not seen in 2008 or 2010. No significant impact on plant production was noted in 2010 from either the herbicide or fumigation treatments as compared to the untreated control (Figure 2). Root yield at the end of the season was measured to determine if

there were any "carry over" effects from the any of the treatments on the ability of the plants to set roots. No differences were seen between the treatments for total yield or size.

Results in 2010 closely resemble what was observed in the first two years of this trial: weeds are the main pest issue sweetpotato growers must contend with in the hotbed area. Nematodes are a non-issue, probably because the amount of time in the hotbeds is not long enough for nematode populations to increase to levels that could damage plants or be transported to the field. Thus, the Telone + Vapam treatment has been the most effective and economical alternative to MeBr. Unfortunately, solarization has not been that effective in controlling weeds, probably a result of the length of time between treatment in the summer and bedding the following spring. The use of pre-plant herbicides Devrinol or Valor significantly improved weed control, especially in the Pic only, solarization, and untreated alternatives.

This research suggests that MeBr is not necessary for sweetpotato hotbeds in California, and that weed control can be obtained by judicious use of fumigation alternatives such as Telone, metam, or the combination thereof, or no fumigants at all when herbicides are used. Further work is planned to verify these results, which were done at one location, with additional commercial growers.

Table 1. Nematode, Pythium, weed counts, plant production, and yield from the 3rd year of the trial (ending 2010).

	Nematodes (RKN/100 g)		non parasitic	Pythium	Weeds #/plot	Crop Phyto (0-10)	Weed time, May 5	plant counts	Root Yield
Main plot treatments:	16-Feb	29-Apr	29-Apr	cfu/g soil	6-Apr	6-Apr	secs per 2 men/plot	#/4 sq ft	lbs/A
1 UTC	0	0	969	2.8	35.0	1.4	97	151	56,451
2 MeBr + Pic, 350 lbs/A	0	0	562	2.2	6.3	0.9	30	160	54,877
3 PicChlor 60, 45 gpa	0	0	927	2.0	7.9	1.3	32	151	52,583
4 Vapam 40 gpa + Telone 12 gp	0	0	513	0.9	9.1	0.6	39	166	55,412
5 Pic only, 150 lbs/A	0	0	332	2.4	9.1	0.7	32	172	57,275
6 Solarization	0	0	310	2.7	21.4	0.9	73	147	56,298
p value	---	---	0.15	0.83	0.03	0.02	0.04	0.30	0.39
LSD 0.05	---	---	NS	NS	17.4	0.5	46.8	NS	NS
CV	---	---	85%	132%	95.2%	85.0%	60.0%	16.7%	9.7%
Split plot treatments:									
1	UTC			2.3	24.3	0.1	78	146	53,739
2	Devrinol 4 lbs/A			----	6.6	0.2	37	166	56,425
3	Valor (Chateau) 1.5 oz/A			----	0.6	2.7	18	162	53,255
4	Botran 3.5 lbs/1000 sq ft/10 gals			2.1	30.4	0.2	79	164	55,768
5	Mertect 30 fl oz/1000 sq ft/10 gal			1.9	26.3	0.1	73	147	58,754
6	Valor 1.0 oz/A			----	0.6	2.5	19	163	54,955
	p value			0.76	0.000	0.000	0.000	0.07	0.04
	LSD 0.05			NS	17.4	0.5	20.3	NS	3577
	CV			89%	95.2%	85.0%	60.0%	16.7%	9.7%
p value, Main plot x split plot interaction				----	0.03	NS	0.004	NS	NS

Main plot treatments applied on July 2 and Dec 9, 2009. Split plot treatments applied February 25 (fungicides) and March 10 (herbicides), 2010. Split plot treatments are 100 sq ft.

Nematodes (RKN - root knot nematode) and Pythium were determined within main plot treatments only.

Weed counts include broadleaf, grass, and yellow nutsedge. Broadleaf weeds include puncture vine, malva, pigweed, mustard, nightshade, filleree.

Weeding times measured using 2 or 3 man hoeing crew on May 5, 2010.

Plant counts taken at hotbed harvest on June 1, 2010.

Root harvest on Oct 21, 2010, is the total marketable yield (sum of #1's, mediums, and jumbos).

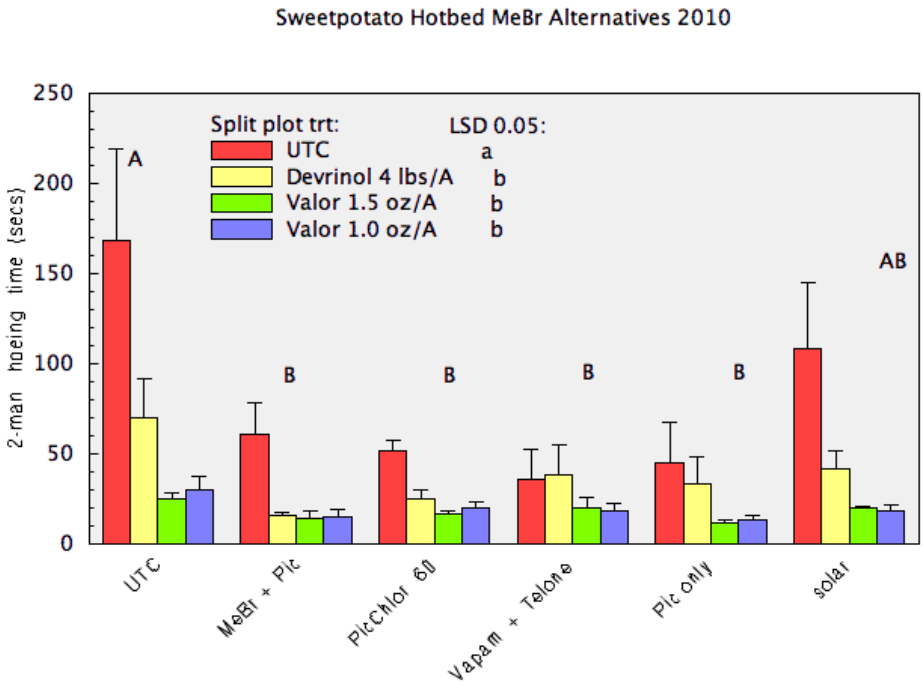


Figure 1. Hand weeding times, spring 2010, for each main plot fumigation treatment and the herbicide split-plot treatments.

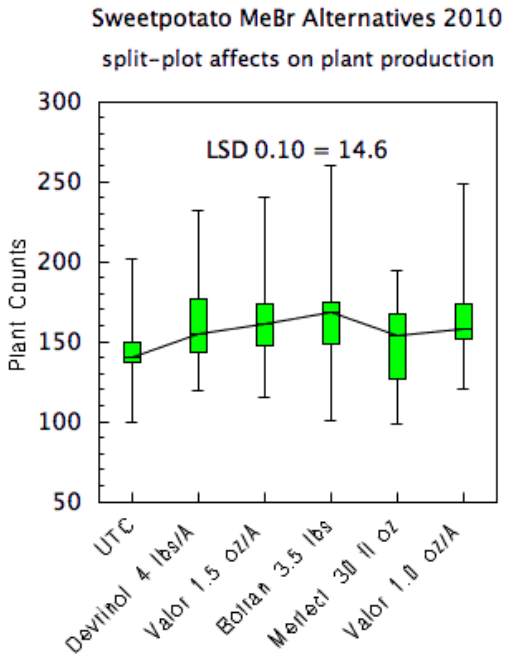


Figure 2. Sweetpotato hotbed plant production 2010 as affected by split-plot treatment. While both rates of Valor showed similar early season plant phytotoxicity symptoms, there was no significant reduction in plant counts.

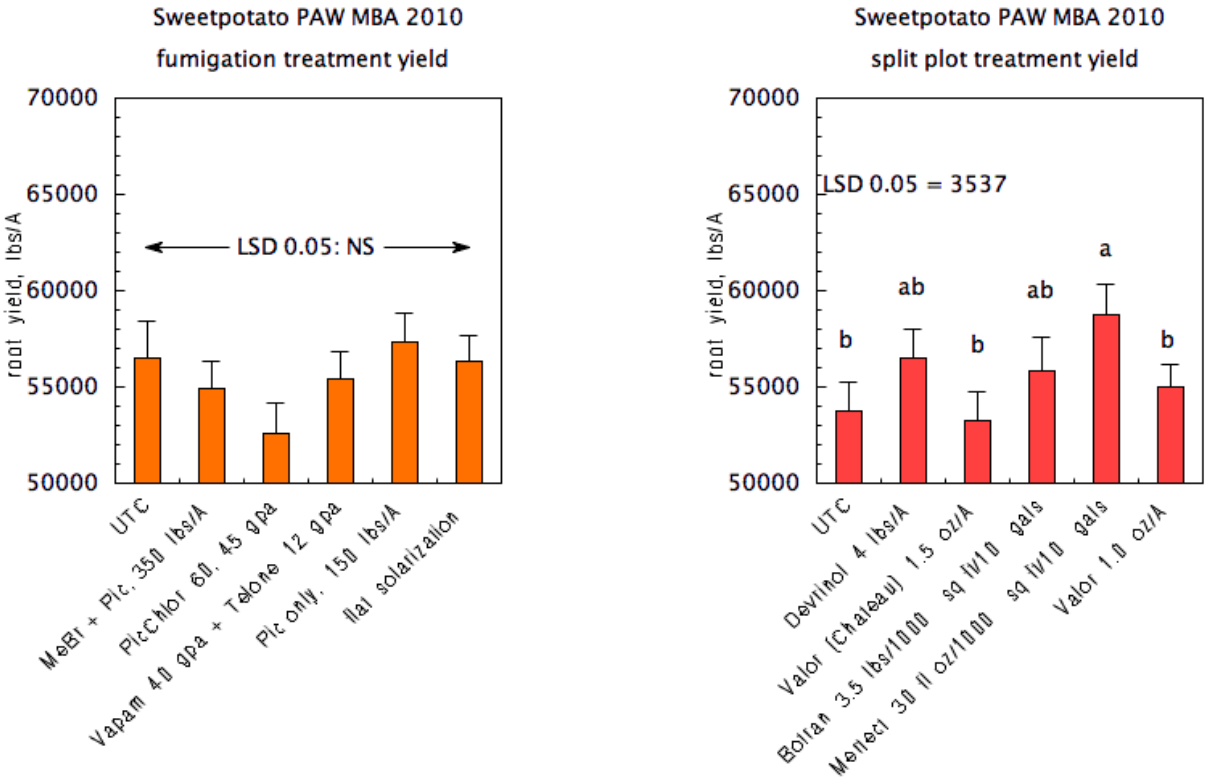


Figure 3. Root yields as affected by main fumigation treatment (left) were not significantly different. Some differences were observed between the split plot (right) treatments, but these were not consistent year to year.

Figure 3. Telone and metam application (left). Treatments were evaluated by sampling for disease and nematodes and taking plant counts at harvest (right).

Sweetpotato Nematocide Trial 2010

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This on-farm trail was conducted to evaluate the efficacy of the experimental pesticide MCW-2 (MANA Chemical) on production and quality of sweetpotatoes. The variety was O'Henry, a tan-skin, white-flesh variety with no resistance to root knot nematode (RKN) (*Meloidogyne incognita*), grown under conditions typical for commercial production in this area. The previous crop was sweetpotatoes. The plot area was located within the confines of a small buffer zone, where no fumigant had been applied (the rest of the field was fumigated with Telone 1,3-D at 12 gallons per acre). MCW treatments were applied by hand using a back-pack sprayer at the equivalent rate of 100 gallons water per acre. Metam sodium (Vapam) was applied at 75 gallons per acre in 350 gallons of water per acre equivalent. Granular Mocap was used and applied using a granular fertilzer spreader. Plots were 4 rows wide by 50 feet long, and were treated about 2 weeks prior to transplanting and incorporated with a spring-tooth harrow. Additionally, the field trial area received about 0.4" of rain the day of application on April 28. Plots were sampled for RKN on May 2, May 20, and Oct 20, 2010, and harvest took place on Nov 5. At harvest, roots were weighed and graded into #1, medium, and jumbo size categories to estimate impacts of various treatments on yield and quality. Results are summarized in the following tables. There were almost no RKN found at the spring sampling events, but very high numbers were observed in all the treatments except Telone and Vapam. Nonetheless, there was a significant yield response to all the treatments as compared to the untreated control, except the lowest rate of MCW-2 at 0.5 gallons/A. Best total marketable yields were observed in the Telone, MCW-2, and Mocap treatments. In addition to reduced yield, the untreated control also had the greatest percentage of culled roots. Some post-plant phytotoxicity was observed in the MCW-2 2 gallon/A rate, but this was no longer observed by the end of the season.

Table 1. Nematode sampling results, 2010

		RKN, #/500 cc soil		
plot	treatment	2-May	20-May	20-Oct
1	UTC	234	0	5508
2	MCW-2, 0.5 gpa	---	0	7776
3	MCW-2, 0.75 gpa	---	0	6804
4	MCW-2, 1.0 gpa	---	4	7128
5	MCW-2, 2.0 gpa	---	0	3078
6	Mocap-G 15% at 54 lbs/A	---	0	6318
7	MeloCon WG 6 lbs/A PPI	---	0	6642
8	metam sodium, 75 gpa	---	0	162
9	Telone 12 gpa	0	0	4

May 2, May 20, Oct 20. 0 - 12". 4 cores per plot, middle bed, composite sample
No statistical analysis.

Table 2. Sweetpotato nematicide trial 2010

plot	treatment	boxes/A #1's	Med	Jumbo	TMY	TMY bins	#1's %	culls %	% #1 yld vs UTC
9	Telone 12 gpa	485.2	256.7	82.4	824.3	34.706	58.8%	20.6%	42%
4	MCW-2, 1.0 GPA	459.8	220.3	67.7	747.9	31.488	61.5%	17.5%	35%
6	Mocap-G 15% at 54 lbs/A	459.8	233.2	81.7	774.8	32.623	59.3%	20.2%	35%
8	metam sodium, 75 gpa	433.7	221.6	56.6	711.9	29.973	60.9%	17.5%	27%
3	MCW-2, 0.75 GPA	424.7	233.5	103.0	761.2	32.052	56.1%	16.6%	24%
5	MCW-2, 2.0 GPA	417.2	191.4	112.8	721.3	30.371	58.8%	13.9%	22%
7	MeloCon WG 6 lbs/A PPI	393.9	220.9	104.1	718.9	30.268	54.5%	19.9%	15%
1	UTC	341.3	159.8	40.9	542.0	22.820	62.8%	33.9%	0%
2	MCW-2, 0.5 gpa	302.5	190.0	85.1	577.5	24.315	52.2%	25.3%	-11%
	Average	413.1	214.1	81.6	708.9	29.846	58.3%	20.6%	
	LSD 0.05	91.1	56.4	NS	123	5.202	NS	10.6	
	CV, %	15.1	18	48.7	11.9	11.9	10.6	35.2	

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 size requirements of above grades, but are marketable quality.
Mkt Yield	Total marketable yield is the sum of the above three categories.
bins/A	bins/A are estimated based on market box yield assuming 22 boxes (17.6 Bu) per bin.
% 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.
LSD 0.05	Least significant difference. Means separated by less than this amt are not significantly different (ns).
CV, %	Coefficient of variation, a measure of variability in the experiment.

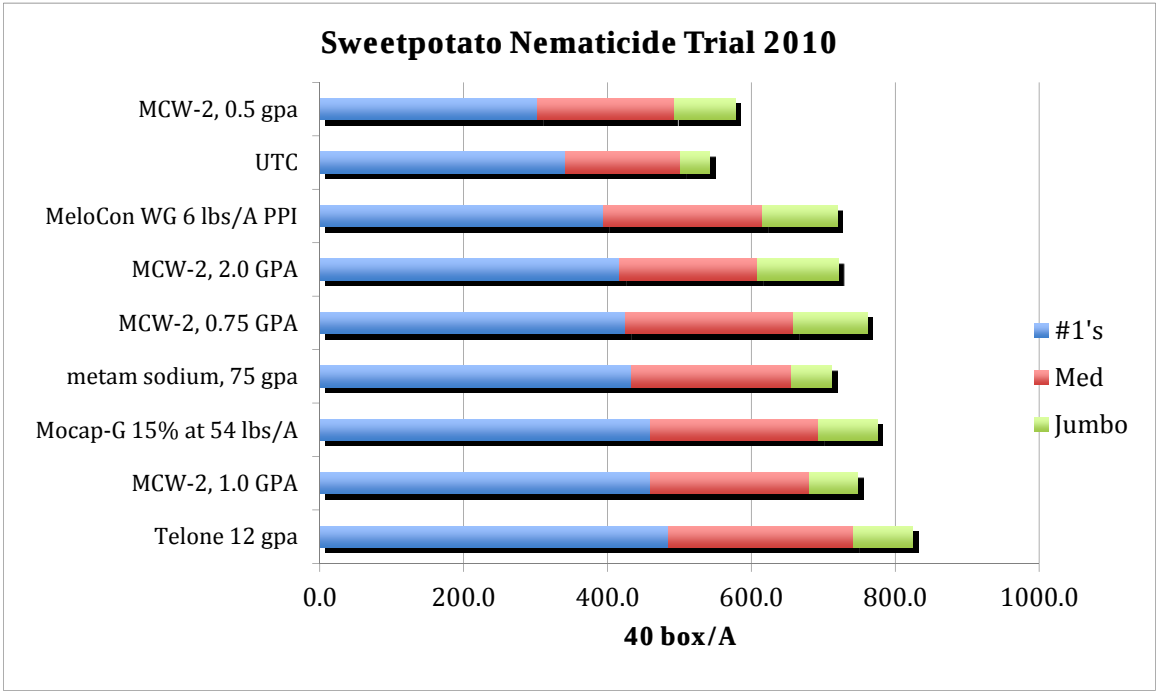


Table 3. Background and trial information.

Location: east of Sultana Rd, about 1/2 mile north of Hwy 140; 38 ft from fence
Plot Size: 12.5 ft wide x 50 ft long (625 sq ft) = 0.057 A per treatment

treatments:	my rate (all 4 plots):	
1. Untreated control (UTC)	0.0	
2. MCW-2, 0.5 GPA	109.4	ml
3. MCW-2, 0.75 GPA	164.2	ml
4. MCW-2, 1.0 GPA	218.0	ml
5. MCW-2, 2.0 GPA	436.0	ml
6. Mocap-G 15% at 54 lbs per acre	1400.0	g
7. MeloCon WG 6 lbs/A PPI + 4 weeks	155.0	g
2nd app 4 weeks after transplanting banded under drip tape		
8. Metam sodium, 75 GPA	15.9	L
9. Telone 12 GPA	Simplot applied	

All treatments broadcast and incorporated 4/28/10
8015 nozzles @ 12.5 psi, 20 psi for MeloCon
3 gallons water/2 plots except for #2, which used 3 gals/4 plots
Treatment #8 used 20 gals/4 plots, hose end sprayer
Received 0.4" of rain on day of application.
Note: 2nd app of MeloCon not applied

Transplant date: mid May
Variety: O'Henry
Harvest date: 11/5/10
MCW treatments crop destruct. Roots weighed but not harvested.

Nematode Sampling: May 2, May 20. 0 - 12". 4 cores per plot, middle bed, composite sample
20-Oct-10
visual rating of plants for phyto on July
Field ratings: 8
root sampling for gall formation on July 20

Sweetpotato Irrigation Trial 2010

Scott Stoddard
UCCE Merced County

Objective: Evaluate the impact of different irrigation amounts on sweetpotato yield and root size; determine the optimal and minimum water requirements for the crop.

Cooperator: Bob Weimer

Location: NW corner of Sultana and Longview Rds

Variety: Beauregard

Transplanted: 1-Jun-10

Harvest: 8-Nov-10 growing days: 160

Fertilizer: 5 injections, weekly, starting July 10. Total 150 lbs N/acre from CN17

Treatments: begin 6-Jul-10 end: October 26

1	40%	All treatments full irrigation for the first month
2	60%	then %of Et x Kc
3	80%	
4	100%	Et from the Merced CIMIS station
5	120%	Kc values begin at 0.4, increase to 1.15, then down to 0.65
6	100% no Kc	
7	Grower*	

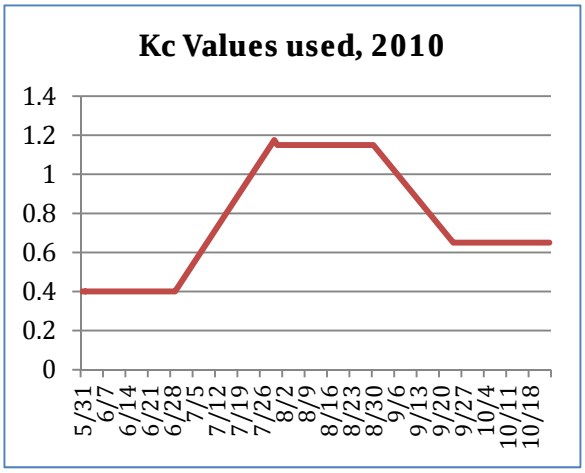
plot size: one bed (2 rows) x 125 ft to the north, 140 ft to the south. 4 reps.

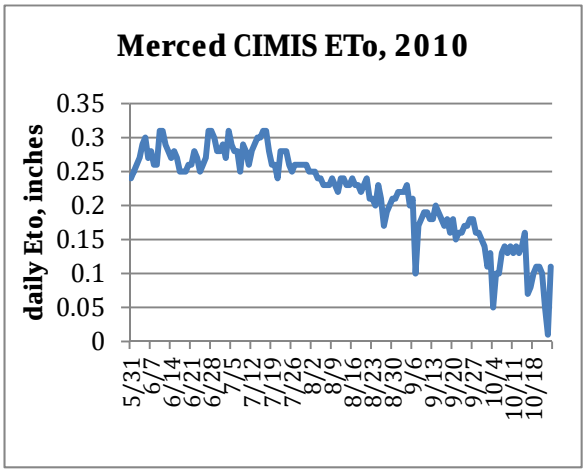
The years 2008 – 10 marked three consecutive years of drought in central California, which resulted in irrigation restrictions for most growers. The main reason for this trial was to determine the amount of water needed to produce sweetpotatoes with drip irrigation by imposing different deficit irrigation treatments ranging from 40% to 120% of crop evaporation in 20% increments (40%, 60%, 80%, 100%, 120%). Crop evaporation was determined from the equation:

Etc = Eto x Kc

where Etc is the evapotranspiration of the crop, Eto is reference evaporation using the Merced CIMIS station, and Kc is the crop coefficient.

Additionally, a 100% of Eto with no Kc factor was also evaluated. Since Kc values for sweetpotatoes are not determined for California growing conditions, a generic crop coefficient curve was utilized, beginning at 0.4, peaking at 1.15, and then declining to 0.65 for the last month of the growing season.





After transplanting, the crop was irrigated fully for the first month to establish the root system before imposing the irrigation treatments. Irrigation amounts were controlled through the use of battery operated timers attached to a 6-port irrigation manifold. Drip lines were then attached to the sub-mains coming off the manifold in a randomized block design with 4 replications. In-line water meters were used to determine flow rates for the individual treatments and adjust the time accordingly to apply the amount of water estimated for the following week. The timers, and therefore the amount of water, were adjusted weekly until the system was removed in late fall.

Moisture sensors were installed in one area of the plot (not replicated) with the grower's irrigation system at depths of 2, 6, 12, and 24 inches. Results are shown in Figure 1. Soil moisture ranged from 0.25 – 0.10 m^3/m^3 during most of this trial except for the 2" depth, which represents no deficit irrigation.

Weekly water application amounts are shown in Figure 2, and the total water applied in Figure 3. Application rates ranged from 14.7 acre-inches to 33.9. The early July spike in water application indicates leaking lines that were then fixed. Furthermore, because of an error in the spreadsheet for calculating run times, there was little separation between the 100% treatments (with and without the Kc factor). This was fixed late in the season, but the total applied water was very similar between the two.

Yield results are shown in Table 1. In general, the more water that was applied, up to 100% of Etc, the better the yield. Deficit irrigation had the greatest impact on jumbos – the weight of jumbos in the 40% treatment was about half (11.5 bins) that of the 100% water application (19.7 bins). These results suggest that sweetpotatoes require about 2.5 acre-ft of water for maximum production, but that increase the amount of water beyond this is not beneficial.

Additional research is planned in 2011.

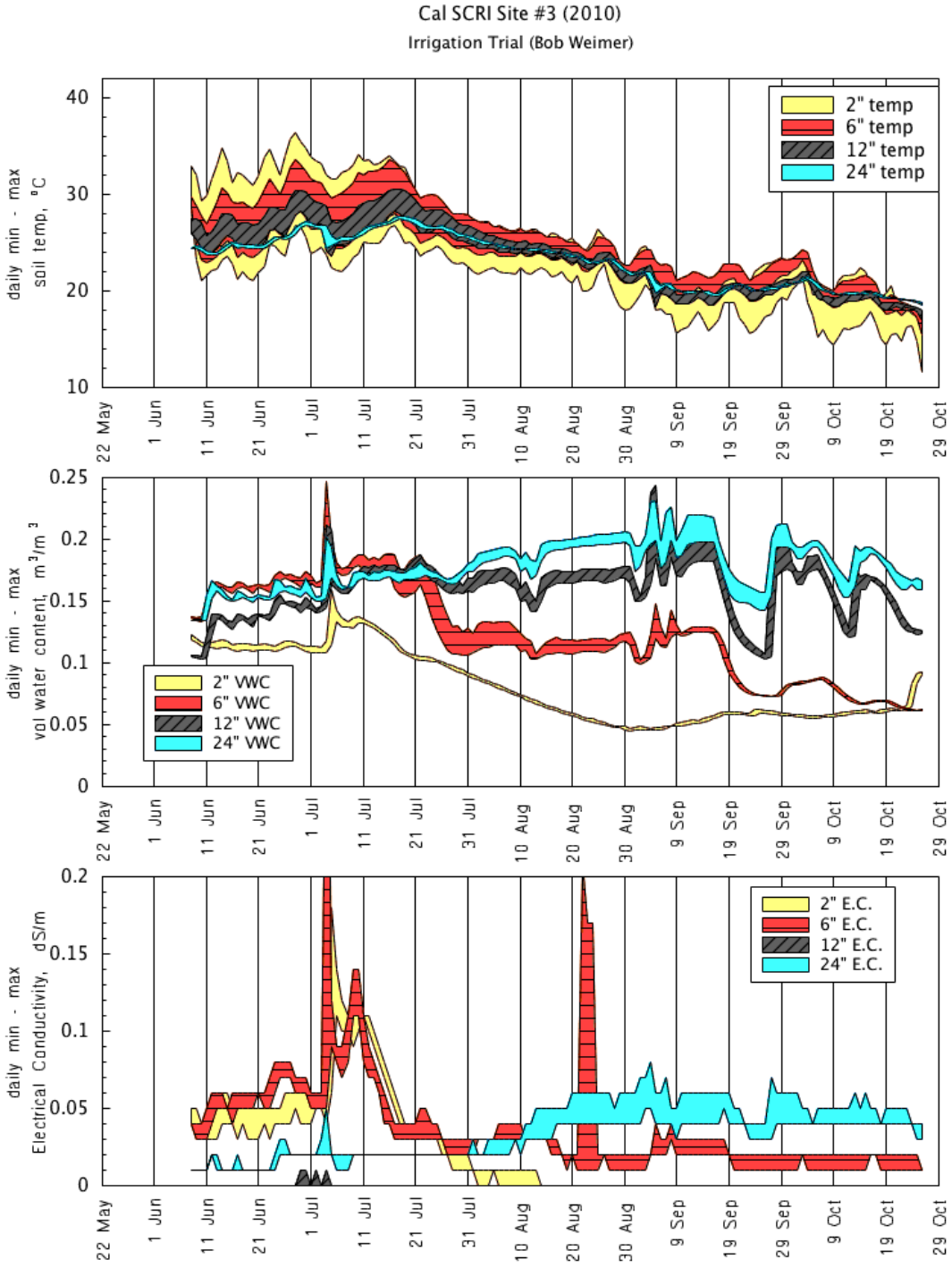


Figure 1. Sweetpotato irrigation trial 2010 soil temperature, moisture, and electrical conductivity at 4 different depths. All three charts show the daily minimum to maximum changes over the course of the season.

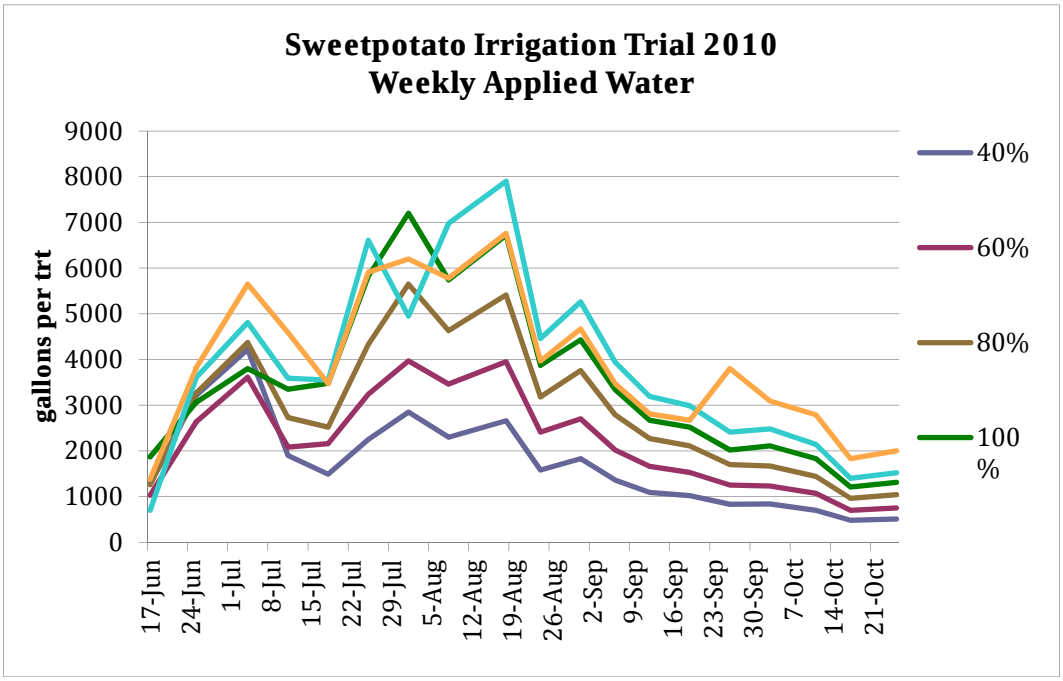


Figure 2. Weekly irrigation water applied after starting irrigation deficit treatments.

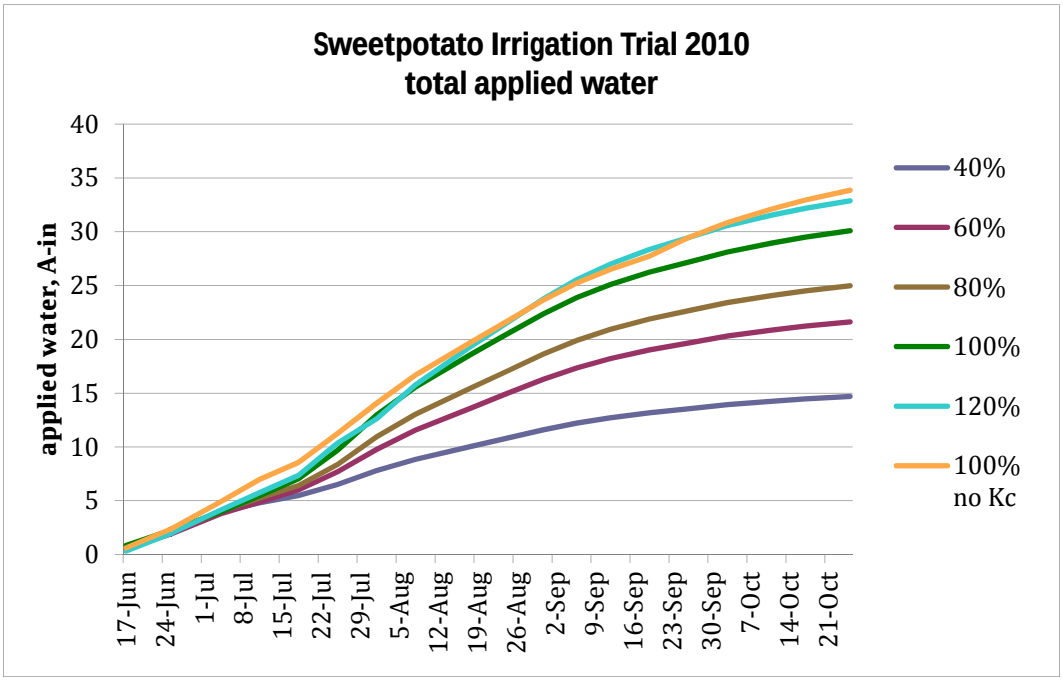


Figure 3. Total water application for the 2010 season for each of the irrigation treatments.

Table 1. Sweetpotato Irrigation Trial 2010
SCRI site #3 (Sultana and Longview)

Treatment	Actual applied A-in	bins/A (1000 lbs) #1's	Jumbos	Mediums	TMY	culls %	#1's %
40%	14.7	21.388	11.472	6.011	38.872	10.9%	58.7%
60%	21.6	30.942	12.643	6.886	50.471	8.6%	61.4%
80%	25	30.581	17.000	6.609	54.190	11.2%	56.8%
100%	30.1	36.620	19.715	8.163	64.498	6.4%	56.6%
120%	32.9	32.403	17.761	8.153	58.317	8.4%	55.7%
100% no Kc	33.9	32.955	14.141	6.802	53.897	8.0%	60.0%
Grower*	---	31.374	23.677	6.964	62.014	17.2%	51.0%
	LSD 0.05	8.0	6.8	NS	10.8	4.8	NS
	CV, %	17.4	27.4	18.2	13.3	31.7	13.0

* Grower plots outside of treatment area, shown for comparison, are not included in statistical analyes.
LSD 0.05 = least significant difference at the 95% confidence level. Values less than this amount are not significantly different (ns).
CV % = coefficient of variation

Storage Building Monitoring 2009 - 10
Various cooperators

Sweetpotatoes store best when the temperature is between 55 - 60° F and >85% relative humidity. Keeping storage buildings in these zones is critical for successful long-term storage, regardless of the variety. Last winter, I placed temperature and relative humidity monitors in 14 standard storage buildings of various ages in order to determine how well these two important factors were being maintained. Monitoring began in December and continued until mid June. In general, temperatures were managed fairly well and had less deviation from the target than relative humidity. Only one shed maintained both good RH and temperature for the duration. Most started well and then degraded as the outside temps increased through the spring. Examples are shown in Figures 1 – 3, and a monthly summary is shown in Tables 1 & 2. Average June storage temps were 72 ° F and 62% relative humidity – not good parameters to be able to store sweetpotatoes through the summer.

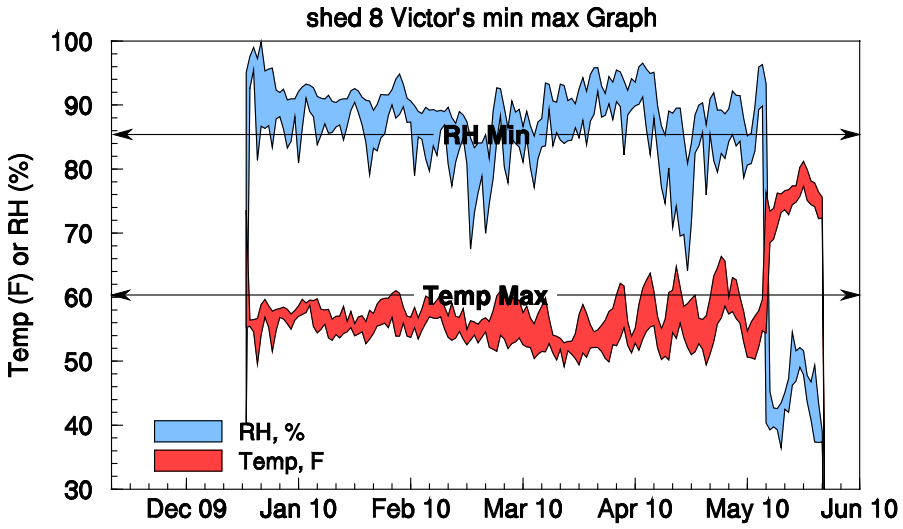


Figure 1. An example of a shed maintaining good relative humidity (top line) and temperature (bottom line) from December through mid-May, 2010.

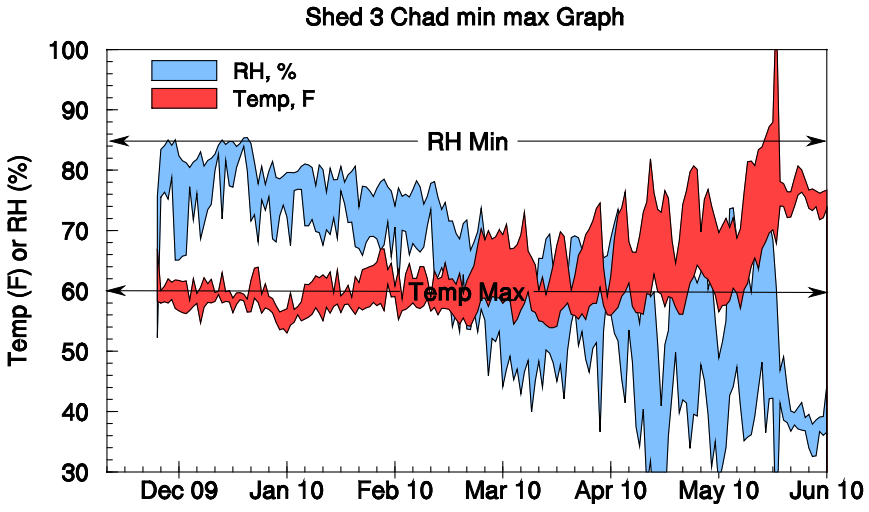


Figure 2. Typical storage conditions of most sheds monitored last winter: initial relative humidity and temperature are good, but RH drops and temps increase significantly in March. Variability also increases.

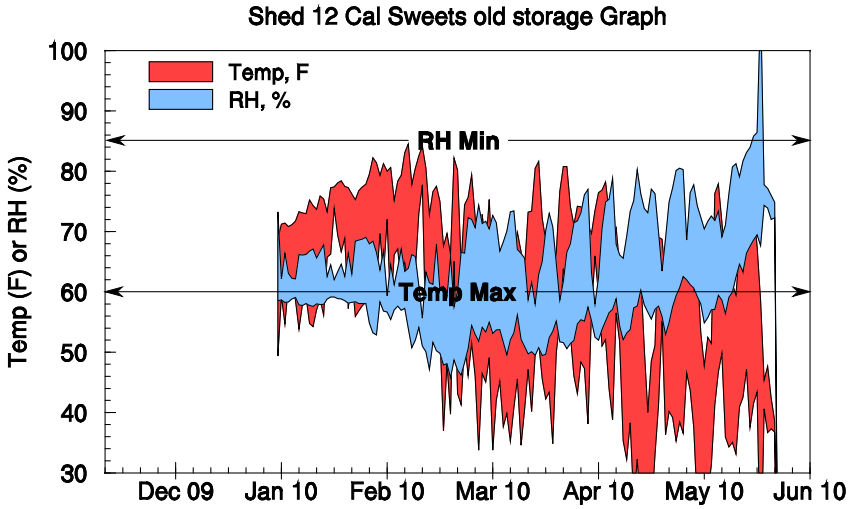


Figure 3. An example of a shed with poor storage conditions throughout the winter and spring. High variability, and rarely within proper storage parameters. This was a short-term shed, where product was being moved around frequently and doors were left open for extended periods.

Winter 2009-10 Sweetpotato Storage Shed Monitoring Project

Table 1. Temperature and temp variability

			Monthly Average Temps and Temp Variability (standard deviation)															
			Dec-09		Jan-10		Feb-10		Mar-10		Apr-10		May-10		Jun-10		Average	
Site	Cooperator	Location	Temp (F)	Std Dev	Temp (F)	Std Dev	Temp (F)	Std Dev	Temp (F)	Std Dev	Temp (F)	Std Dev	Temp (F)	Std Dev	Temp (F)	Std Dev	Temp (F)	Std Dev
1	Yagi	Seed room	54.3	1.9	64.5	5.7	67.8	1.7	65.4	2.0	67.2	2.2	70.7	3.2	76.3	1.6	66.6	2.6
2	Dave Souza	Cressey Ranch	63.1	2.2	66.1	1.1	67.0	2.7	59.3	2.2	---	---	---	---	---	---	63.9	2.1
3	Bob Chad	Dwight & Walnut	58.8	0.6	58.1	1.4	59.7	1.3	60.9	2.4	61.3	3.1	66.5	3.0	76.0	2.6	63.0	2.1
4	Bob Weimer	Longview	56.5	0.5	55.8	0.8	58.5	1.4	59.0	1.2	57.1	2.1	59.4	2.8	---	---	57.7	1.5
5	LFA	Livingston	---	---	54.8	1.1	57.1	1.2	56.8	2.7	58.2	3.2	63.4	2.9	71.6	3.2	60.3	2.4
6	Quail H	Room 31	---	---	58.0	1.2	58.3	1.5	59.5	1.1	60.5	2.3	61.9	3.4	65.7	5.1	60.7	2.4
7	Doreva	New shed	---	---	59.9	1.4	60.5	1.0	58.6	1.4	59.1	1.7	61.1	3.5	---	---	59.8	1.8
8	Victors	behind office	---	---	57.1	1.0	56.5	1.1	55.5	1.2	54.6	2.3	57.2	2.9	---	---	56.2	1.7
9	Bob Weimer	Steinberg	---	---	64.2	0.7	63.5	2.4	59.5	2.1	59.2	2.2	61.8	3.2	74.2	2.6	63.7	2.2
10	Classic Yam	Bldg #4	---	---	62.0	1.0	60.5	0.8	60.5	1.2	61.6	1.1	63.0	2.5	---	---	61.5	1.3
11	Garcia	Westside bldg 1	---	---	59.2	4.0	55.9	1.3	57.2	2.2	57.9	2.4	60.5	2.3	69.2	3.6	60.0	2.6
12	Cal Sweets	old shed	---	---	60.6	0.5	60.1	1.3	57.9	3.4	59.6	3.8	65.8	3.0	75.3	2.6	63.2	2.4
13	Cal Sweets	new shed	---	---	59.4	0.7	59.3	1.4	57.2	1.4	59.4	1.7	60.7	2.8	70.9	3.3	61.2	1.9
14	AV Thomas	shed #16	---	---	57.3	1.8	57.2	1.2	57.4	2.8	58.7	1.7	62.7	3.2	72.4	2.8	61.0	2.3
		Average	58.2	1.3	59.8	1.6	60.1	1.5	58.9	2.0	59.6	2.3	62.7	3.0	72.4	3.0	61.3	2.1

Table 2. Relative humidity and variability

			Monthly Average Relative Humidity (RH) and RH Variability (standard deviation)															
			Dec-09		Jan-10		Feb-10		Mar-10		Apr-10		May-10		Jun-10		Average	
Site	Cooperator	Location	RH (%)	Std Dev	RH (%)	Std Dev	RH (%)	Std Dev	RH (%)	Std Dev	RH (%)	Std Dev	RH (%)	Std Dev	RH (%)	Std Dev	RH (%)	Std Dev
1	Yagi	Seed room	93.4	4.1	97.3	2.5	91.3	3.9	74.8	6.9	66.7	8.2	54.2	5.4	43.6	4.2	74.5	5.0
2	Dave Souza	Cressey Ranch	90.7	3.7	87.7	2.5	85.2	2.9	76.4	5.8	---	---	---	---	---	---	85.0	3.7
3	Bob Chad	Dwight & Walnut	78.0	3.0	78.9	3.2	73.8	1.8	62.0	7.0	58.1	5.0	48.6	7.3	53.7	3.7	64.7	4.4
4	Bob Weimer	Longview	74.2	4.7	79.8	1.7	80.5	1.8	74.3	3.6	76.3	3.6	73.0	7.2	---	---	76.4	3.8
5	LFA	Livingston	---	---	84.3	2.8	81.2	3.8	72.0	5.1	73.3	4.7	64.3	5.8	64.4	3.6	73.3	4.3
6	Quail H	Room 31	---	---	76.5	3.0	76.7	3.2	70.7	5.6	64.3	7.3	63.6	16.2	81.5	8.9	72.2	7.4
7	Doreva	New shed	---	---	81.9	3.4	79.6	2.9	68.8	5.1	68.6	6.1	65.6	12.3	---	---	72.9	6.0
8	Victors	behind office	---	---	90.7	2.8	88.9	1.9	84.9	3.4	89.9	2.9	84.5	4.8	---	---	87.8	3.2
9	Bob Weimer	Steinberg	---	---	72.7	2.0	75.0	2.5	71.8	4.0	69.3	3.8	63.0	6.8	57.0	2.1	68.1	3.5
10	Classic Yam	Bldg #4	---	---	71.6	2.5	74.5	3.8	69.1	4.2	71.8	5.1	69.4	5.8	---	---	71.3	4.3
11	Garcia	Westside bldg 1	---	---	74.6	3.4	79.8	3.8	75.5	5.5	72.7	4.5	72.1	6.0	80.8	9.8	75.9	5.5
12	Cal Sweets	old shed	---	---	67.1	1.6	72.2	2.9	61.0	8.7	60.9	7.0	47.8	8.8	53.1	4.3	60.4	5.6
13	Cal Sweets	new shed	---	---	81.1	1.6	78.7	2.8	76.1	4.4	73.4	4.2	68.5	6.7	68.2	6.8	74.3	4.4
14	AV Thomas	shed #16	---	---	71.3	3.0	74.4	4.0	64.3	8.4	71.8	8.0	57.7	9.9	58.0	4.7	66.3	6.3
		Average	84.1	3.9	79.7	2.6	79.4	3.0	71.6	5.6	70.5	5.4	64.0	7.9	62.3	5.3	73.1	4.8

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