Sweetpotato Research Progress Report 2013

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Sweetpotato Collaborators Trial -- 2013

Scott Stoddard, UCCE Merced County

This year's sweetpotato evaluation was with Quail H Farms, south of Livingston, CA. Soil type was Delhi sand, slightly saline.
Conventional field, fumigated with Telone prior to planting. Drip irrigated, one irrigation sensor at field site.
Dry winter and spring, also windy conditions after trasnplanting that caused some stand loss.
One row plots, machine harvested and sorted by grower crew. Very few culls this year.

Rep	Var#	Variety Name	Skin Color	Skin Text	Flesh color	Eyes	Lents	Shape	Shape Uniform	Overall App	Comments	notes on culls
1	1	Covington	Rose-Cu	7	3	7	5	2,6	9	8	Typical Cov color variation per root	
2											mild fluting, YCR. Nice looking	
1	2	Cal 8x G1	Rose	8	3	7	7	2,6,8	5	7	slight YCR, good skin set,	cuts
2											shape variable	
1	3	B63 G3	faded	5	3	6	5	2,6,8	5	6	Russet Crack starting, skin rough	
2			Rose Cu								YCR, color fading and dull	
1	4	B14 G3/G4	faded	6	3	6	5	2,6,8	6	6	same as #3, little more lumpy	cuts
2			Rose Cu									RC
1	5	175 G1	maroon	8	4	9	7	5,6	7	7	a few veins, not quite as red as	
2											Diane. Chunky.	
1	6	175 G2	maroon	8	5	9	7	5,6	7	7	good flesh color, some veins	
2											smooth skin	
1	7	Diane	red	7	4	9	7	3,4	8	8	good skin color and shape	cuts
2												
1	8	L-07-146	red	7	4	8	5	3,6,8	5	5	prominent lenticles, variable shape	cuts
2											good skin color	
1	9	L-05-111	Rose-Cu	7	3	7	7	3,5,6	5	7	rough skin, RC, some lumps	
2			faded	6							variable shape, rosy skin	
1	10	NC-87-847	buff/tan	7	2.5	5	5	3,6	7	7	yellow/orange flesh, chunky, little	
2											lumpy, eyes & lents, grooving, veins	
1	11	NC-07-364	Red	8	4	7	5	3,6	8	8	Excellent shape, color, skin texture	cuts
2											very smooth still after 1 month storage	
1	12	LSU52 G1	Orange	9	3.5	9	7	3,5	7	8	a few roots with veins, looks good	cracks
2											Cracking in a few	cuts

Skin color:	Skin Texture:	Flesh Color:	Eyes:	Lenticels:
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-elliptical	3 = poor	3 = poor	**All ratings made on #1 roots.**
3 = elliptic	5 = moderate	5 = moderate	**YCR = yellow cortical ring**
4 = long elliptic	7 = good	7 = good	**RC = Russet Crack**
5 = ovoid	9 = excellent	9 = excellent	**RKN = root knot nematode**
6 = blocky			**Culls = main reason for culls**
7 = irregular			
8 = asymmetric			

NATIONAL SWEETPOTATO COLLABORATORS SUMMARY OF DATA
2013

STATE AND LOCATION REPORTING: Livingston, CA
DATE TRANSPLANTED: 5/29/2013. DATE HARVESTED: 10/11/2013. No. GROWING DAYS: 135
DISTANCE BETEEN ROWS (in): 40. DISTANCE IN ROW (in): 10
PLOT SIZE: NO. OF ROWS: 1 LENGTH (ft): 50 NO. OF REPS: 4
IRRIGATION: drip irrigation. 1.5 to 2 inches per week during summer, total 30".
FERTILIZER: PPI 60 gpa 8-8-8 followed by drip applied 10-0-10. About 125-50-125 N-P2O5-K2O.

			--------	40 lb box/A		--------		%	%
	SELECTION	CLASS	US #1'S	CANNERS	JUMBOS	MKT YIELD	BINS/A	US #1'S	CULLS
1	Covington	yam	698.7	285.5	156.6	1140.8	42.0	61.3%	1.1%
9	L-05-111	yam	643.7	183.1	356.6	1183.4	43.5	54.9%	5.0%
2	Cal Bx G1	yam	619.2	171.1	146.5	936.9	34.5	66.9%	6.6%
7	Diane	red	618.1	223.9	115.4	957.4	35.2	64.4%	9.1%
12	LSU52 G1	yam	607.0	228.5	222.0	1057.4	38.9	57.4%	2.2%
11	NC 07-364	red	567.9	121.0	87.8	776.7	28.6	73.6%	2.8%
4	B14 G3&G4	yam	519.6	148.9	301.5	970.1	35.7	55.4%	11.1%
5	175 G1	red	515.4	144.8	148.5	808.7	29.8	63.5%	2.1%
3	B63 G3	yam	506.3	130.5	272.7	909.5	33.5	56.2%	9.9%
8	L-07-146	red	480.9	126.7	98.5	706.1	26.0	68.5%	20.4%
6	175 G2	red	437.5	128.1	164.6	730.1	26.9	60.8%	5.1%
10	NC 07-847	sweet	397.6	155.3	133.9	686.7	25.3	57.9%	1.4%
	Average		551.0	170.6	183.7	905.3	33.3	61.7%	6.4%
	LSD 0.05		144.8	37.2	159.2	268.7	9.9	9.4%	6.3%
	CV, %		18.3	15.1	60.2	20.6	20.6	10.5	68.5

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 23 boxes (18.4 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 amount are not significantly different (ns).
CV, %	Coefficient of variation, a measure of variability in the experiment.

SCORE SHEET FOR EVALUATION OF SWEETPOTATO SPROUT PRODUCTION - NSPCG TRIAL

Date bedded: 3/5/13 Location: Quail H Farms
Livingston, CA
Date Evaluated: 4/24/13 Type of bed: cold bed, drip irrigated
Evaluated by: S. Stoddard Botran & Devrinol at bedding

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)
Covington	no	5	4	3	5	
Cal Bx	no	4	4	2	5	few plants
B63 G3	no	4	3	2	5	
B14 mixed gen	no	5	5	3	5	trimmed a lot
L-175 G1	no	3	3	1	4	slightly trimmed
L-175 G2	no	2	2	1	3	some rot under tape
Diane	no	5	5	3	5	best overall
L-07-146	no	5	4	3	5	
L-05-111	no	4	4	2	5	
NC -07-847	no	5	4	3	5	
NC-07-364	no	5	3	2	4	
LSU52	no	2	2	1	3	small, slow, eratic

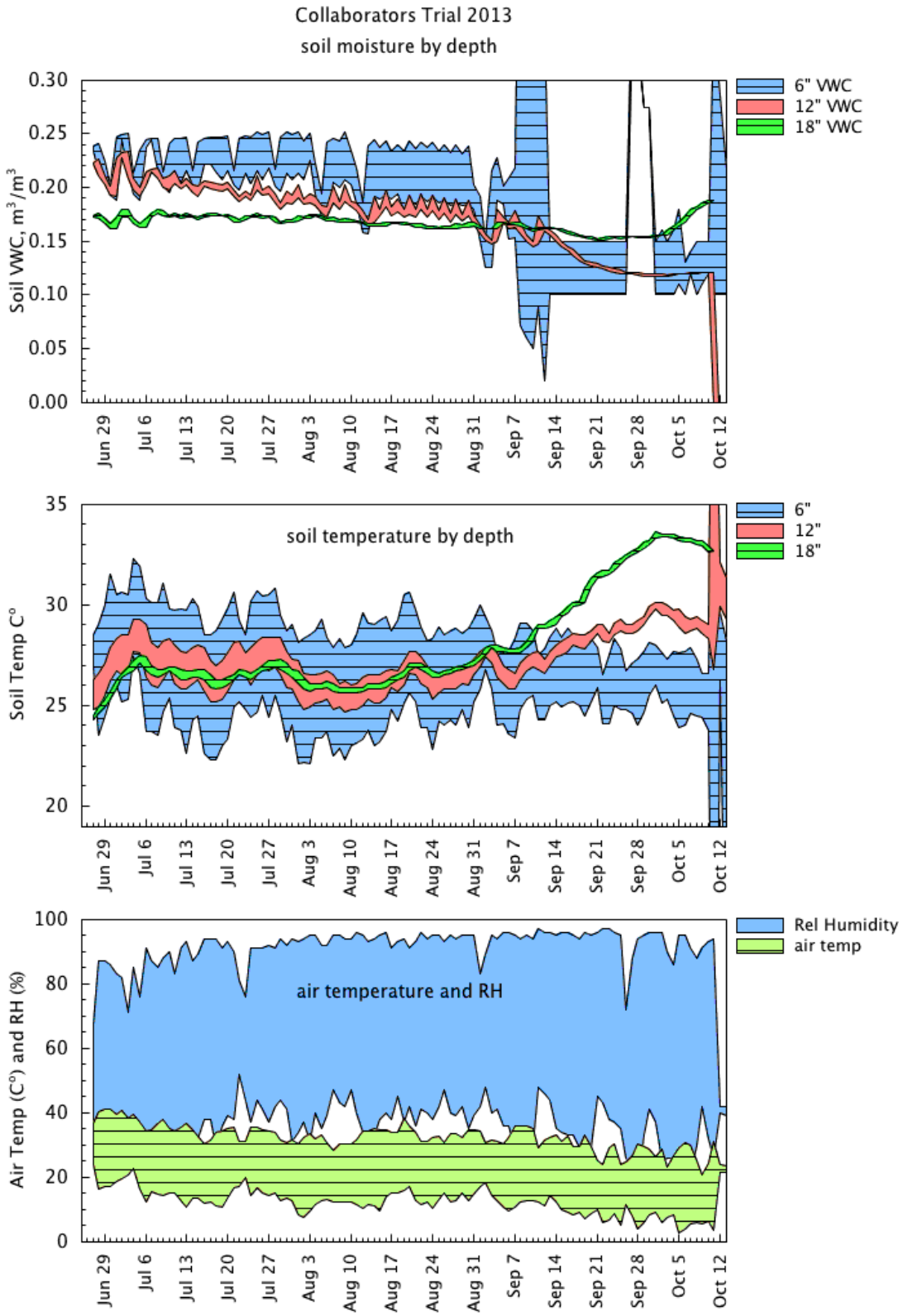
(1) Plant production rated from 1 – 5 based on observation during pulling season. A rating of 1 indicates low plant production, while 5 indicates good plant production.

(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.


Collaborators Trial 2013
soil moisture by depth
Soil VWC, m³/m³
0.30
0.25
0.20
0.15
0.10
0.05
0.00
6" VWC
12" VWC
18" VWC
Jun 29
Jul 6
Jul 13
Jul 20
Jul 27
Aug 3
Aug 10
Aug 17
Aug 24
Aug 31
Sep 7
Sep 14
Sep 21
Sep 28
Oct 5
Oct 12
soil temperature by depth
Soil Temp C°
35
30
25
20
6"
12"
18"
air temperature and RH
Air Temp (C°) and RH (%)
100
80
60
40
20
0
Rel Humidity
air temp

Sweetpotato ALT 2013
Scott Stoddard, Farm Advisor

The ALT in 2013 was conducted with Dave Souza at two locations due to receiving plants from NC State and LSU:
LSU lines at SE corner of Dwight and Rose, south side of field near almonds. Planted on June 3,
25 plant plots, 12" spacing, 1-row, drip irrigation. Second location was with 10 new lines from NCSU,
Central & Atwater Jordan, N field, west of yellow house. Planted on Aug 7,
100 plant plots, 9" spacing, 1-row, drip irrigation. LSU lines harvested Oct 16, NCSU lines on Oct 30, 2013.

	Bucket Yield				Harvest notes	status
Variety	#1's	Jumbo	Medium	Total		2014
175 G2				4	Variable set, okay shape. 7	REP
B63 G1				6	Rosy Cu. Lots of jumbos.	NSPCG
L-05-111				4.5	Rosy Cu. Jumbos. (Orleans)	NSPCG
L-07-102				4	Purple, some striping. Good shape. In Red Yam trial.	DROP
L-07-146				6	Crazy long & squiggly	DROP
L-08-117				1.5	Poor yield and set. Also in Red Yam Trial. 5	DROP
L-09-149				5	2nd year. Good purple color, fusiform shape. Sets high. Splitting scars. 7	move to rep
L-11-03				2 to 3	Deep red, below avg yield. Good shape, uniform. Some air cracks. Stored poorly. 3	drop
L-11-119				5.5	Red, good shape. Early sprouting. 7	KEEP
L-11-140				3	Excellent shape, nice purple red color. 7	KEEP
L-11-18				3	Small reddish purple, veins. 1	drop
L-11-121				4	Yam. Variable shape, pimples, rot. 3	drop
L-11-26				5	Big yld, red, lots of shapes. 3	drop
L-11-34				3.5	Chunky red, variable shape. 5	drop
L-11-35				3	Purple. Nice long shape. Orange flesh. 3	drop
L-11-40				3	Red-purple. Variable shape & color. Pimples. 5	drop
L-11-48				4	light red	drop
L-11-168				4	Purple-red skin, white flesh. Variable shape, rough skin.	drop
L-12-125				5	Purple, veins, lumpy. 2	drop
L-12-15				8	Lots of jumbos. Purple skin, deep orange flesh. Lents, e	KEEP
L-12-163				3	Round, small, purple. Rough. 3	drop
L-12-164				3.5	Rose/red skin, rough, avg yld, good shape. 2	drop
L-12-18				4	Red. Grooves, lumps, pimples. 4	drop
L-12-34				4	Very dark pruple, orange flesh. Holds dirt, long. 3	drop
L-12-36				1	Low yield. Purple, good shape. Stored well. 7	KEEP
L-12-50w				5	Yam, tan. nice shape, but yellow/orange flesh. Eyes. 7	drop
L-12-52				5	Reddish purple, good shape, looks nice. Keeper. 8	KEEP
L-12-55				3.5	crazy shape, lumpy. 1	drop
L-12-83				5	Purple. Variable shape. Rough dkin. 5	drop
L-12-9				5	Yam. Orange/orange. Rough skin. 3	drop
L-12-97				2.5	Purple red. Good shape. Don likes. 6	KEEP
LSU52					no sample. Good yld, shape, and color	REP
NC-05-257				3	Deep red, some veins, mostly small. Good shape	REP
NC-07-847				4.5	Sweet. 1/2 jumbos. 6	drop

ALT 2013 location #2. NCSU entries

Variety	Bucket Yield #1's	Jumbo	Medium	Total	Harvest notes	status 2014
NC-08-553	2	2	2	6	Jersey type. Nice tan color. White flesh. Variable shape. Little too long and skinny. Lots of latex.	**KEEP**
NC-10-104	4	4	2.5	10.5	Nice red. Smooth skin, good shape, good production. Very pretty. Good flesh color. Keep all.	**KEEP**
Covington	5	2	4	11	Very rosy. Good set, good production.	**REP**
Covington	5	5	3	13	Typical fluting, good skin color and production. Field went about 55 bins/A.	**REP**
NC-10-118	5	9	2.5	16.5	Red. Mostly smooth, some with rough skin. Variable shape and size, but lots of jumbos. Pimpling	**drop**
NC-08-036	4	4	3.5	11.5	Red. Mostly smooth but shape somewhat variable. Lots of pears.	**KEEP**
NC-09-411	3	2	2.5	7.5	Yam. Rosy skin color. Mostly mediums, light set. Deep eyes.	**drop**
NC-09-707	3.5	5	5	13.5	Japanese. Maroon skin, white flesh. Lots of jumbos, some veins. Variable set, shape, and size.	**KEEP**
NC-10-421	6	3	2	11	Red. Mostly smooth, long shape, light set. Deep orange flesh. Yld fine.	**KEEP**
NC-10-280	2	1	3.5	6.5	Deep red. Mostly smooth skin, long but small. Low yield. Orange flesh with yellow speckling, fruity flavor, latex. Pimpling.	**drop**
NC-10-375	3	0.5	1	4.5	Light red. Small, veins, poor set. Orange flesh with yellow speckling. Some sprouts.	**drop**
NC-09-122	2	4	4.5	10.5	Maroon. Long, veins. Latex. Deep orange flesh, poor production.	**drop**

SCORE SHEET FOR EVALUATION OF SWEETPOTATO SPROUT PRODUCTION - ALT 2013

Date beddec 2/28/13 Location: D&S Farms
Atwater, CA
Date Evaluate 4/16/13 Type of bed: cold bed, sprinkler irrigated
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	L-08-117	yes	5	4	3	good	good production
2	L-04-175 G1	yes	2	2	2	3	some rot
3	L-07-102	yes	5	5	3	good	excellent
4	L-09-149	yes	3	3	2	ok	clumpy
5	NC-87-847	yes	4	3	3	ok	purple new growth
6	L-11-03	yes	2	2	1	ok	clumpy
7	L-04-175 G0	yes	2	1	1	some rot	clumpy
8	L-08-117	yes	4	3	3	ok	emergence low
9	L-11-68	yes	5	5	3	ok	lots of plants
10	NC-05-257	yes	4	3	2	good	red stems green lvs
11							
12							

(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 farm 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.

Red Yam Trial 2013

Scott Stoddard, Farm Advisor
UCCE Merced County

The objective of the red yam trial is to evaluate red skin lines, especially L-04-175 (now named "Burgundy"), in replicated plots. Plot size was 1 row x 60 feet, and replicated 4 times in a commercial field. In 2013, this was done with Dave Souza near Arena and Magnolia Rds. Also included this year was an evaluation of new and old seed of LSU52, and vine cuttings of LSU52. The plots were transplanted May 29 on 9" plant spacing and harvested September 23.

Results:

The varieties in the trial in 2013 are listed in Table 1. No significant differences were observed for #1's or mediums between the red yams, but L-04-175 had significantly more jumbos than all the other varieties except L-07-102. L-04-175 had the highest total marketable yield in the trial, estimated at > 48 bins per acre, but Diane had the highest yield of #1's, around 588 boxes (Table 1). Root quality was excellent for all cultivars, with very few culls in any of the plots.

Old LSU52 (G7) was compared to new, virus tested seed (G1) at this location as well. There were no statistical differences between either seed source for any size category. Total marketable yield was 37 – 41 bins per acre. Where vine cuttings were used to establish the plots, however, a large yield increase was observed, especially for jumbos (Table 1). LSU52 appears to be much more virus tolerant than 175. Further testing of this variety, which has excellent disease resistance and attractive roots, is planned for 2014.

L-04-175 has been tested extensively in Merced County, in both replicated plots and strip trials. A summary of results from 2007 – 2013 are shown in Tables 2 – 3. This variety usually had significantly greater total yield than Diane, especially when virus-tested plants were used after 2009. Overall, G0 plants had highest No. 1's and total yield and lowest cull% (Table 3), but G1 and old 175 seed were very similar. While not shown in Table 3, color and shape were better with G1 seed as compared to old seed. Across all locations #1's averaged ~47%, but at one location was only 22%. 175 grows fast and jumbos easily. This variety should probably be grown on 9 – 10" plant spacing with expected harvest of 90 – 110 days.

L-04-175 has twice the sucrose and ½ the maltose of Beauregard, which gives it very good flavor. In the bake and microwave sensory evaluation trial conducted at Mississippi State, 175 was the only entry of 9 (including Covington, Beauregard, L-06-52, Orleans, O'Henry, & Bonita) that had acceptable scores on sweetness and flavor in the microwave tests. In the baked test, it was ranked second. In the insect screening trial done at the USDA ARS Charleston South Carolina Station, 175 ranked second behind the highly resistant check cultivar "Ruddy" in the level of uninjured roots from the WDS (wireworm, Diabrotica, and Systena) complex, at 69% uninjured roots.

Despite these positive characteristics, it is unlikely that 175 will achieve commercial success in California or the U.S. Yields are too variable, especially when compared to the resilient cultivar Diane. Furthermore, its tendency to jumbo and become bally is a major limitation. All of the other experimental lines evaluated in the Red Yam trial in 2013 will be dropped in favor of new material from the ALT. Diane and 175 will remain in the Red Yam Trial for comparison.

L-04-175 has been officially released by LSU and named "Burgundy" in reference to its skin color. This cultivar is patented and requires a license to grow.

Table 1. Yield results of varieties in the "red yam" trial, Merced County 2013.

	variety	40 lb box/A No. 1's	Meds	Jumbos	TMY box/A	Market bins/A	No. 1's #1%	Culls cull%
1	175 G1 (bed)	485.1	183.3	639.4	1307.8	48.1	37.1%	0.1%
2	Red Rose (D&S)	482.3	246.6	289.8	1018.7	37.5	47.3%	0.7%
3	Diane	587.5	288.1	300.0	1175.6	43.3	50.0%	1.8%
4	L-08-117	433.9	272.4	170.2	876.4	32.3	49.5%	0.3%
5	L-07-102	480.5	205.9	581.5	1267.9	46.7	37.9%	0.4%
6	LSU52 G1	322.9	144.4	534.1	1001.5	36.9	32.2%	2.9%
7	LSU52 G7	400.4	227.1	498.9	1126.5	41.5	35.5%	0.8%
8	LSU52 G1 vine cut	703.9	260.5	1019.6	1984.0	73.0	35.5%	0.2%
	Red average	493.8	239.3	396.2	1129.3	41.6	44.4%	0.7%
	LSD 0.05	ns	ns	242.0	208.3	7.7	ns	---
	CV, %	23.4	23.4	39.7	12.0	12.0	24.4	---
	LSU52 average	475.8	210.7	684.2	1370.7	50.4	34.4%	1.3%
	LSD 0.05	125	82.5	427.5	526	19.4	ns	---
	CV%	15.3	22.6	36.1	22.2	22.2	16.6	---

TMY	Total marketable yield is the sum of #1's, jumbos, and mediums.
bins/A	bins/A are estimated assuming 1000 lb 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 amount are not significantly different (ns).
CV, %	Coefficient of variation, a measure of variability in the experiment.

Table 2. L-04-175 yield summary (2007 - 13) from plots in the ALT, Collaborators Trial, or Red Yam Trial.

	SELECTION	Trial	US #1'S	CANNERS	JUMBOS	MKT YIELD	BINS/A	% US #1'S	% CULLS
			-------	40 lb box/A		-------			
2007									
*	L-04-175	ALT	392.8	143.7	374.6	911.0	32.1	43.1%	1.0%
*	L-04-148	ALT	546.2	89.1	160.0	795.4	28.0	68.7	0.0
*	L-04-178	ALT	398.8	124.6	265.0	788.4	27.8	50.6	4.5
	* not replicated								
2008									
	L-04-175 (Red)		349.6	118.2	469.5	937.3	33.0	37.7%	25.2%
	L-04-148 (Red)		472.6	295.4	147.3	915.3	32.2	52.0	18.1
	Diane (Red)		422.1	260.2	361.2	1043.5	36.7	40.6%	13.3%
	LSD 0.05	*red yam*	ns	62.0	134.0	ns	ns	ns	8.3
2009									
	L-04-175	red	568.2	123.2	505.4	1196.8	42.1	48.6%	5.1%
	L-04-148	red	523.2	290.3	362.1	1175.5	41.4	44.4	5.1
	Diane	red	494.9	181.4	479.1	1155.4	40.7	42.6%	16.4%
	LSD 0.05	*Collaborators*	NS	123.1	NS	NS	NS	NS	7.2
2010									
	L-04-175		271.9	112.9	179.3	564.1	19.9	48.2%	15.1%
	Cal Beauregard		254.6	105.8	283.2	643.5	22.7	39.2%	29.6%
	Diane	*Collaborators*	540.6	309.8	198.4	1048.9	36.9	51.7%	81.4%
	LSD 0.05		116.7	46.6	90.7	140.7	6.39	ns	9.5%
2011	175 G0		903.1	482.4	1001.7	2387.2	84.0	38.3%	0.0%
	Diane	*red*	1105.2	484.9	395.9	1986.0	69.9	55.8%	0.3%
	175 vs Diane comparison								
	t-test 0.05		**	ns	*	*	*	**	ns
	**, * Significanly different at p = 0.01 and 0.05 respectively								
	B14 G2		402.2	230.4	703.7	1336.2	47.0	29.7%	9.2%
	175 G0		890.0	428.8	674.3	1993.1	70.2	44.5%	0.7%
	LSD 0.05	*red yam*	143.7	93.9	160.9	247.2	10.9	9.2	11.5
	Diane		180.6	391.3	119.1	691.0	24.3	25.2%	7.6%
	175 G0		492.4	244.3	175.6	912.3	32.1	53.4%	0.0%
	LSD 0.05		70.5	83.1	81.4	138.6	6.1	9.8	10.5
		Collaborators Trial							
2012									
	175 G0		675.2	277.4	919.5	1872.1	65.9	36.2%	0.1%
	175 G1		333.4	198.7	996.6	1528.7	53.8	22.2%	0.5%
	Diane (G1)		446.9	469.7	407.1	1323.6	46.6	33.8%	0.9%
	LSD 0.05	*red yam trial*	111	60	192	229	8.1	5.3	---
	LSU 175 G0		457.4	180.3	34.7	672.3	23.7	68.2%	3.6%
	LSU 175 G1		293.8	135.8	69.3	499.0	17.6	58.6%	12.2%
	Diane		358.6	185.0	7.3	550.9	19.4	65.3%	14.4%
		Collaborators							
	LSD 0.05	*Trial*	99.6	57.9	43.5	147.6	5.2	9.3%	11.7%
	175 G0		587	203	560	1351	47.6	47.2%	2.8%
	175 G1		349	147	481	977	34.4	42.2%	7.7%
	t-test 0.05	*Strip trials*	**	*	ns	*	*	ns	**
	**, * Significanly different at p = 0.01 and 0.05 respectively								
2013									
	175 G1 (bed)		485.1	183.3	639.4	1307.8	48.1	37.1%	0.1%
	Diane		587.5	288.1	300.0	1175.6	43.3	50.0%	1.8%
	LSD 0.05	*red yam trial*	146.25	78	261.5	447.5	16.468	0.217	---
	175 G1		515.4	144.8	148.5	808.7	29.8	63.5%	2.1%
	Diane		618.1	223.9	115.4	957.4	35.2	64.4%	9.1%
	Covington		698.7	285.5	156.6	1140.8	42.0	61.3%	1.1%
		Collaborators							
	LSD 0.05	*Trial*	144.8	37.2	159.2	268.7	9.9	9.4%	6.3%

Table 3. Yield summary for L-04-175 red yam, Merced County all locations 2007 - 2013.

		40 lb box/A			TMY	Market	No. 1's	Culls	site
Selection		No. 1's	Meds	Jumbos	box/A	bins/A	#1%	cull%	n
L-04-175 old		395.6	124.5	382.2	902.3	31.8	44.4%	11.6%	11
L-04 -175 G1		395.4	161.9	466.9	1024.2	36.7	44.7%	4.5%	15
L-04-175 G0		667.5	302.7	560.9	1531.3	53.9	47.9%	1.2%	24
Diane (mix G)	Standard	528.3	310.5	264.8	1103.6	39.2	47.7%	16.1%	12

Figure 1. Upper left: 175 interior flesh color is deep orange throughout; above: foliage is lacy with a hint of silver; left: samples from the Red Yam Trial.

L-06-52 Plant Spacing Trial

Scott Stoddard, Farm Advisor
UCCE Merced County

Replicated trials over the past 3 years with L-06-52 have shown this variety to have potentially good yields but with a corresponding high jumbo count. Therefore, a trial was initiated to evaluate the impact of plant spacing on the growth and root development of this variety. Both Covington and Beauregard were used for comparison, and was conducted with Aaron Silva in a commercial field located west of Atwater on the corner of Central and Fruitland Rds. The varieties were planted at 9", 12", and 18" on June 10, 2013 using 2-row, 80 foot plots, and replicated 4 times. Harvest was done with a standard 1-row harvester on October 22, 2013.

Results: Due to planting skips and losses to wind and heat, the actual stand count achieved in this trial was not as tight as desired: the 9" spacing had an actual plant stand equivalent to 12", 12" was closer to 15", and 18" was equivalent to 20". As a result, the entire plot area had elevated jumbo yields regardless of variety or plant spacing. Yields are shown in Table 1 for both the main effects of variety and plant spacing. Spacing had a significant impact on #1's and mediums, but not jumbos or total yield. Mediums declined and jumbos increased as plant spacing increased, as would be expected. Highest #1 yield and %#1's occurred with the 9" spacing. When averaged across all of the plant spacing treatments, Covington had significantly more #1's, less jumbos, and more mediums than Beauregard or L-06-52. The lowest #1 count occurred with LSU52, with only 22%. The variety x spacing interaction was not significant for any size category, indicating that the varieties responded similarly to differences in plant spacing (Figure 1).

Table 1. Sweetpotato spacing trial results, Merced County 2013.

Variety	Spacing inches	plants/A	TMY lbs/A	40 lb box/A No. 1's	Jumbos	Mediums	TMY box/A	Market bins/A	No. 1's #1%	Culls cull%
Bx			44375	278	721	111	1109	40.8	24.3	22.7
Covington			41092	372	483	172	1027	37.8	36.2	14.5
LSU52			42521	229	728	106	1063	39.1	21.9	13.4
	LSD 0.05	ns		93.3	160.8	28.1	ns	ns	5.44	4.6
	9	13301	43023	330	579	167	1076	39.6	31.1	17.5
	12	10743	42504	282	670	111	1063	39.1	26.3	17.1
	18	7957	42886	235	740	96.7	1072	39.4	21.7	16.2
	LSD 0.05	861 ns		81.6	ns	24.6	ns	ns	4.8	ns
Variety x spacing interaction LSD 0.05				ns	ns	ns	ns	ns	ns	ns
	CV%	9.7	25.3	41.8	30.6	28.6	25.3	25.3	26.2	34.7

TMY = Total marketable yield, the sum of #1's, Jumbos, and Mediums.
Market bins = Total marketable yield in bins per acre, at 23 boxes/bin.
LSD = Least significant difference at the 95% confidence level. Means within a column less than this amount are not significantly different. NS = not significant.
CV% = coefficient of variation, a measure of variability in the experiment.

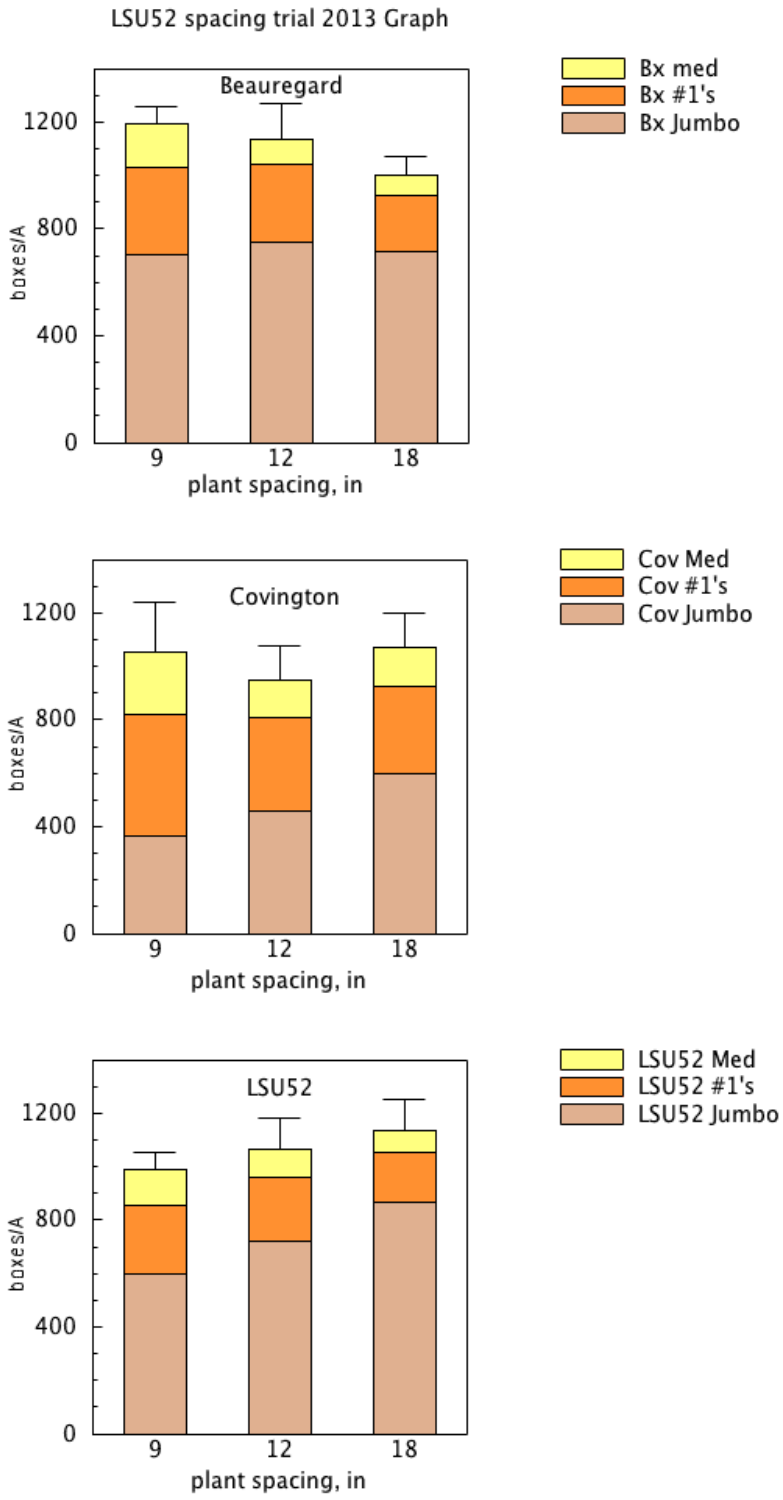


Figure 1. The effect of plant spacing on Beauregard (top), Covington (center), and LSU52 size distribution.

Dual Magnum Herbicide Trial 2013

Scott Stoddard, Farm Advisor
UCCE Merced County

Objective: evaluate different rates of Dual Magnum and other herbicides on the control of yellow nutsedge and root development of sweetpotatoes.

Background:

Cooperator:	Nathan Mininger
Location:	Pepper field, off Collier Rd and near McConnell Park
Variety:	175 (red yam)
Transplant:	6-Jun-13
Harvest:	16-Oct-13
days:	132

Treatments:	1	UTC
	2	Dual Magnum 2/3 pint/A
	3	Dual Magnum 1.0 pint/A
	4	Dual Magnum 1.33 pint/A
	5	Valor 2.0 oz
	6	Command 1.3 pints/A
	7	Command 1.3 pints/A + Dual Magnum 2/3 pint/A
	8	Roundup post 2%
	9	Devrinol 4 lbs/A + 2.0 pints Dual Magnum

All treatments applied on June 3 and incorporated in top of beds on June 4.

All herbicides applied pre-plant to beds using a backpack sprayer and incorporated with a rake to a depth of about 2 inches.
No weed evaluations made (field kept clean with cultivation and hand hoeing).
Roundup applied to the whole field in early July.
Devrinol through the drip system after transplanting.

Summary. No weeds to evaluate all season long. Harvest data show no significant difference in any size category except mediums. Results are shown in Table 1 and Figure 1 below.

Acknowledgements:
Many thanks to Nathan Mininger and Nolan Mininger for their help and cooperation with this test.

Table 1. L-04-175 sweetpotato yield as affected by herbicide treatment, Merced County 2013.

treatment	lbs per acre #1's	Jumbo	Mediums	bins/A TMY	% #1's	lbs Culls
1	22,532	3237.6	3891.6	30.9	76.0%	5239.0
2	20,864	3793.5	3924.3	29.8	72.1%	4301.7
3	23,619	4033.3	4178.7	33.2	74.6%	4310.9
4	22,165	4542.0	4360.4	32.4	71.4%	4251.4
5	22,074	3368.4	4316.8	31.0	74.1%	5294.6
6	24,135	3728.1	3401.1	32.6	77.4%	4242.2
7	24,887	2910.5	4676.5	33.8	76.3%	4733.4
8	22,892	2975.9	4545.7	31.7	75.2%	4566.0
9	20,668	3891.6	3237.6	29.0	73.4%	5562.7
Mean	22,648	3609.0	4059.2	31.6	74.5%	4722.4
LSD 0.05	ns	ns	976	ns	ns	ns
CV, %	18.8	48.9	25.6	16.4	7.7	28.1

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.

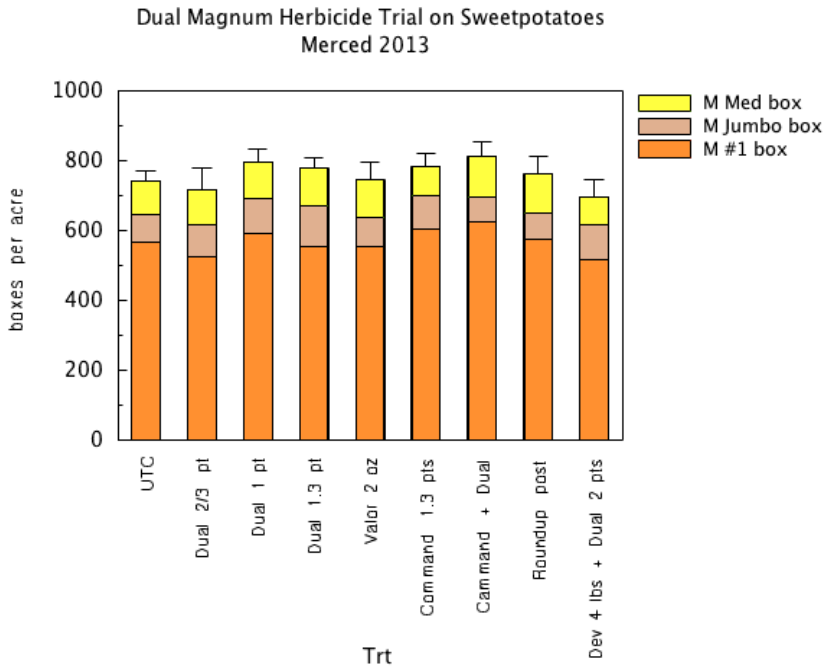


Figure 1. Yield results, Dual Magnum herbicide trial, Merced County 2013.

Sweetpotato Irrigation Trial 2013

Scott Stoddard, UCCE Merced Co

Cooperator:	Bob Weimer			
Location:	NW corner of Sultana and Longview Rds			
Variety:	LSU52			
Transplanted:	3-Jun-13			
Harvest:	6-Nov-13	growing days:	156	
Fertilizer:	10 tons/A compost, then N through the drip tape			
Treatments:	begin	25-Jun-13	end:	10/9/13
	1	75%	L	All treatments full irrigation for the first month
	2	75%	H	then %of Et x Kc
	3	100%	L	
	4	100%	H	Et from the Merced CIMIS station
	5	125%	L	Kc values begin at 0.4, increase to 1.15, then down to 0.65
	6	125	H	L = 50 lbs N from CAN17
	7	Grower*		H = 90 lbs N from CAN17
				Compost: 10 tons at 2.1% N = 420 lbs N x 25% avail = ~100

All treatments full irrigation for the first month, then % of Et x Kc.
irrigation treatments begin June 25.
Et from the Merced CIMIS station.
Kc values begin at 0.4, increase to 1.15, then down to 0.65.
Plots 1 bed (2 rows) by 75 or 125 ft, 4 reps
Watermark sensors at 12" in rep 1, at 18" in rep 3
Decagon sensors in plot #304 at 6, 12, and 18" depth.
Drip Tape: John Deere Ro-Drip

A continuation of work started in 2010, except that the objective was to evaluate the N x irrigation interaction using 3 ETc rates and 2 N rates. Crop water needs were 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.

Since Kc values for sweetpotatoes are not determined for California growing conditions, a generic crop coefficient curve was utilized for treatments 1 - 6, beginning at 0.4, peaking at 1.15, and then declining to 0.65 for the last month of the growing season (Figure 1).

After transplanting, the drip lines were installed one week later and grower irrigated for the first week. On June 18 the plot area was attached to the treatment manifold and all treatments were irrigated for 3 hours one time until June 25 to establish the root system. After July, irrigation amounts were controlled through the use of battery operated timers attached to a 6-port irrigation manifold (Figure 2). 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. For this trial, calculated application times were extended by 15% to account for system inefficiency and leaching.

Decagon temperature and moisture sensors were installed in one area of the plot (not replicated) under treatments #3 and #4 (100% Et) at depths of 6, 12, and 18 inches. Watermark soil moisture monitors were also installed under treatments 1, 2, 5, and 6 in reps 1 and 3 at 12" and 18" depth. Results are shown in Figures 3, 4 5, and 6. One Decagon unit became inoperative in early

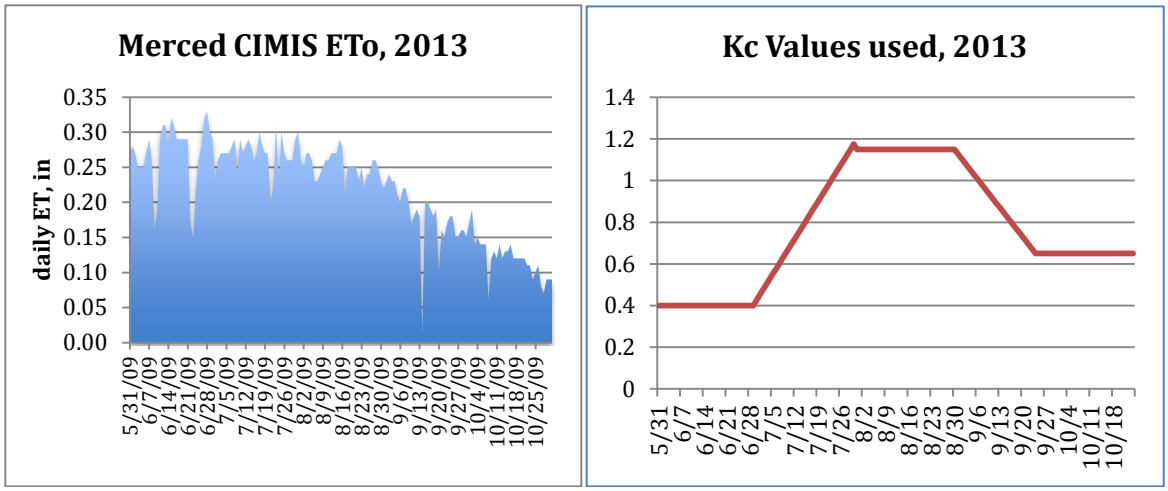


Figure 1. Kc values followed a general curve shown above, and were multiplied by the reference evapotranspiration (ETo, left) to calculate the amount of water to apply each week.

September as a result of poor battery contact – a continual problem that has occurred every year with these data loggers and the primary reason Watermarks are also used. Nevertheless, both data loggers show soil moisture levels dropping to extremely dry conditions by early to mid-September, which corresponds to when the crop coefficient (Kc) was reduced below 0.8. This suggests that deficit irrigation began too early, as daily highs were still above 30° C (about 90° F). The Watermark sensors showed similar patterns, except that overly dry conditions (>25 KPa) were already present in treatments #1 and #2 by the end of August (Figures 5 & 6).

For this location, soil moisture should be around 20% volumetrically, or less than 25 Bars using Watermarks (soil tension).

Weekly water application amounts are shown in Figure 6, and the total water applied in Figure 7. Application rates ranged from 22 to almost 37 acre-inches. Mid season water in treatment 5 (125%) was excessive due to a leak from gophers chewing on the tape that wasn't fixed for several days. Gopher damage caused additional damage in September.

Yield results are shown in Table 1 and in Figure 8. In general, the more water and nitrogen that was applied, up to 125% of ETc, the better the yield. The 75% low N treatment had significantly less yield than all the other treatments. The N rate x ETc rate interaction was significant only for #1's (Table 1). This occurred because #1 yield increased as ETc increased, but #1 yield did not increase as N rate increased.

A comparison of applied water to total marketable yield (TMY) from 2010 – 2013 is shown in Figure 9. In order to remove year-to-year variability, plot yields are shown as a percentage of the 100% ETc treatment within each year. 100% relative yield occurred around 29 - 30 inches of applied water, and declined about 20% with 20 inches of water. However, TMY does not tell the whole story, as sweetpotatoes respond to deficit irrigation by sizing differently. Figure 9 also shows the 2010 – 13 average root size to different amounts of applied water by category (#1's, Jumbos, and Mediums). Both medium and #1's have 100% relative yield near 30 inches of water, but #1's declined by 20% at 20 inches of water while mediums had only a 10% decline. Jumbos, however, declined 40%. Sweetpotatoes respond to deficit irrigation by growing slower, which results in far less jumbos as compared to the other size categories.

Table 1. Sweetpotato irrigation trial yield results, Merced County 2013.

Treatment		40 lb box/A No. 1's	Jumbos	Medium	TMY box/A	Market bins/A	No. 1's #1%	Culls cull%
1	75% Et	469.9	102.7	235.6	808.2	29.7	58.0%	6.6%
2	75% Et	660.9	141.8	256.1	1058.8	39.0	62.6%	6.2%
3	100% Et	729.1	173.5	281.8	1184.3	43.6	61.5%	5.6%
4	100% Et	633.3	273.7	266.5	1173.5	43.2	53.8%	5.0%
5	125% Et	739.8	151.1	288.5	1179.3	43.4	63.0%	3.8%
6	125% Et	824.6	226.0	307.2	1357.8	50.0	60.7%	4.9%
7	Grower §	274.9	170.3	216.2	661.5	24.3	41.7%	9.4%
	Average	618.9	177.0	264.6	1060.5	39.0	57.3%	5.9%
	LSD 0.05	120.4	83	ns	190.4	7.01	6.4	2.75
	CV%	13.1	31.6	15.1	12.1	12.1	7.5	31.2
Irrigation	75% Etc	565.4	122.2	245.9	933.5	34.4	0.6	0.1
	100% Etc	681.2	223.6	274.2	1178.9	43.4	0.6	0.1
	125% Etc	782.2	188.5	297.8	1268.5	46.7	0.6	0.0
	LSD 0.05	89.9	60.1	ns	138.6	5.11	ns	1.56
N rate	50	646.3	142.4	268.6	1057.3	38.9	0.6	0.1
	90	706.3	213.8	276.6	1196.7	44.0	0.6	0.1
	t-test	ns	**	ns	*	*	ns	ns
Irrig x N rate		**	ns	ns	ns	ns	*	ns

§ Grower plots within treatment area, shown for comparison

LSD 0.05 = least significant difference at the 95% confidence level. Values less than this amount are not significantly different (ns). *, ** = significantly different pair-wise test.

CV % = coefficient of variation

Figure 2. Irrigation control manifold.

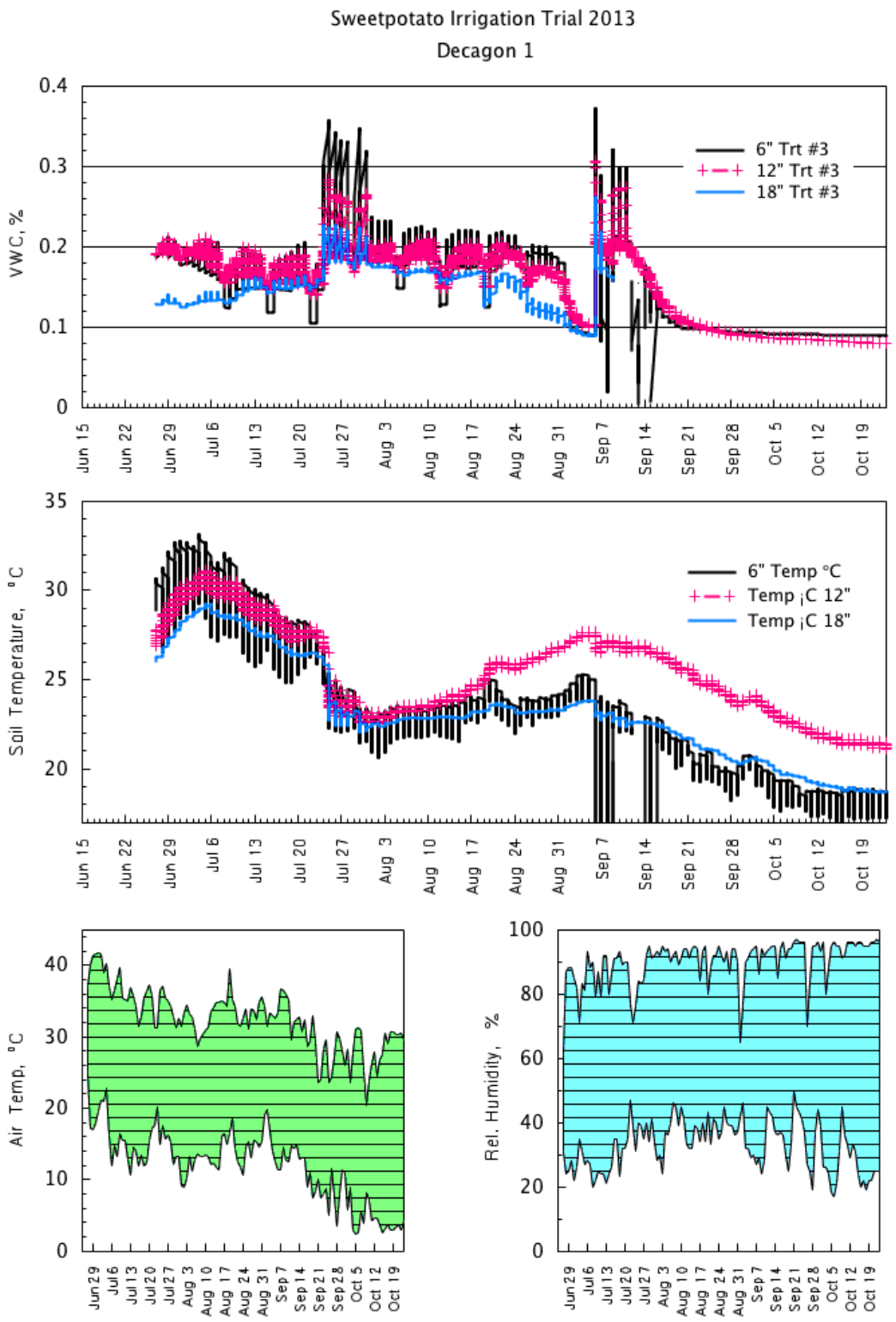


Figure 3. Soil moisture (top), temperature (middle) and air temperature and relative humidity (bottom) for treatment 3 (Decagon unit). Note soil moisture is volumetric waterholding capacity (VWC), which is expressed as a percent. Sandy soils typically range from 0.1 (10%) to 0.3 (30%).

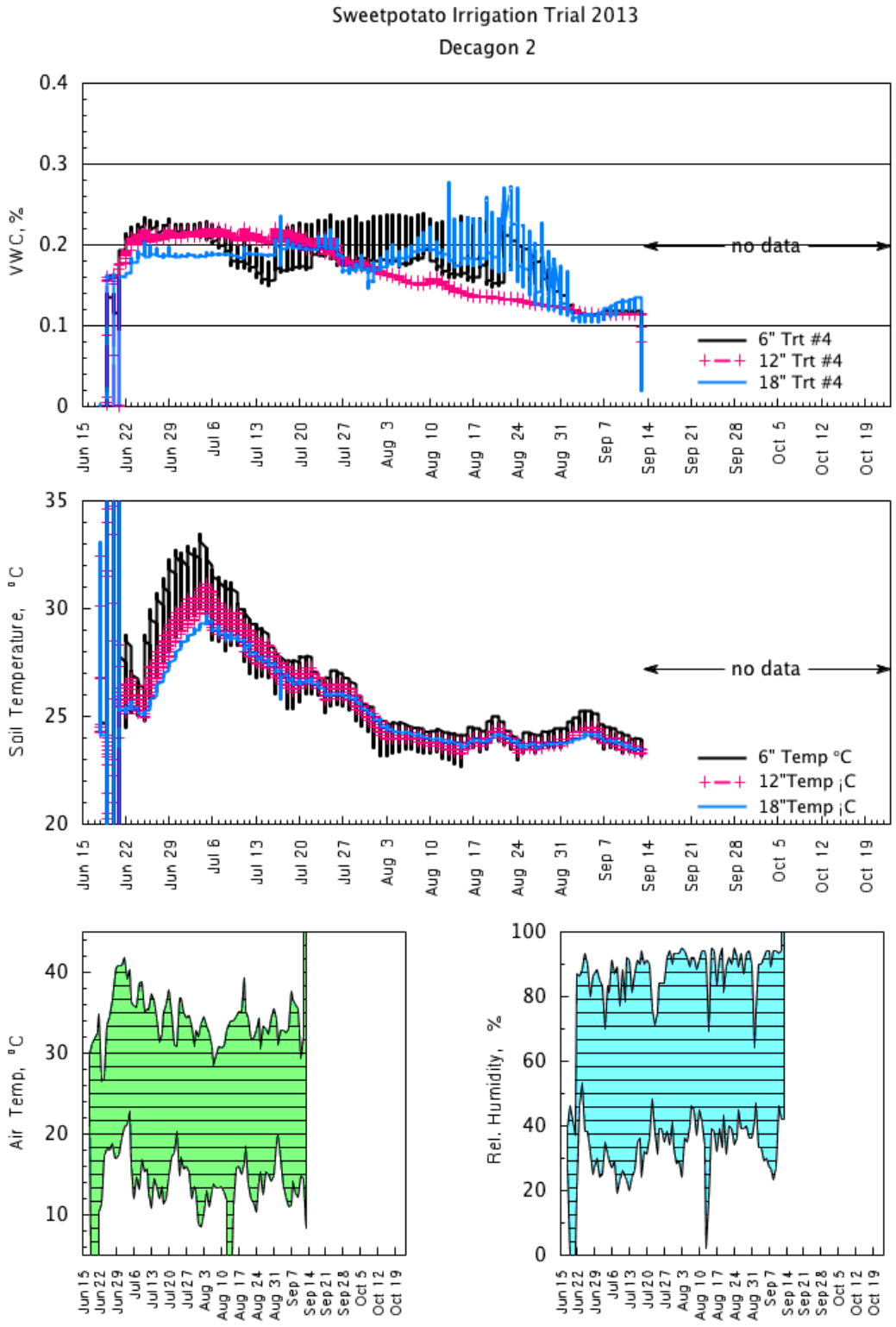


Figure 4. Soil moisture (top), temperature (middle) and air temperature and relative humidity (bottom) for treatment 4 (Decagon unit). This unit became inoperative after Sept 14.

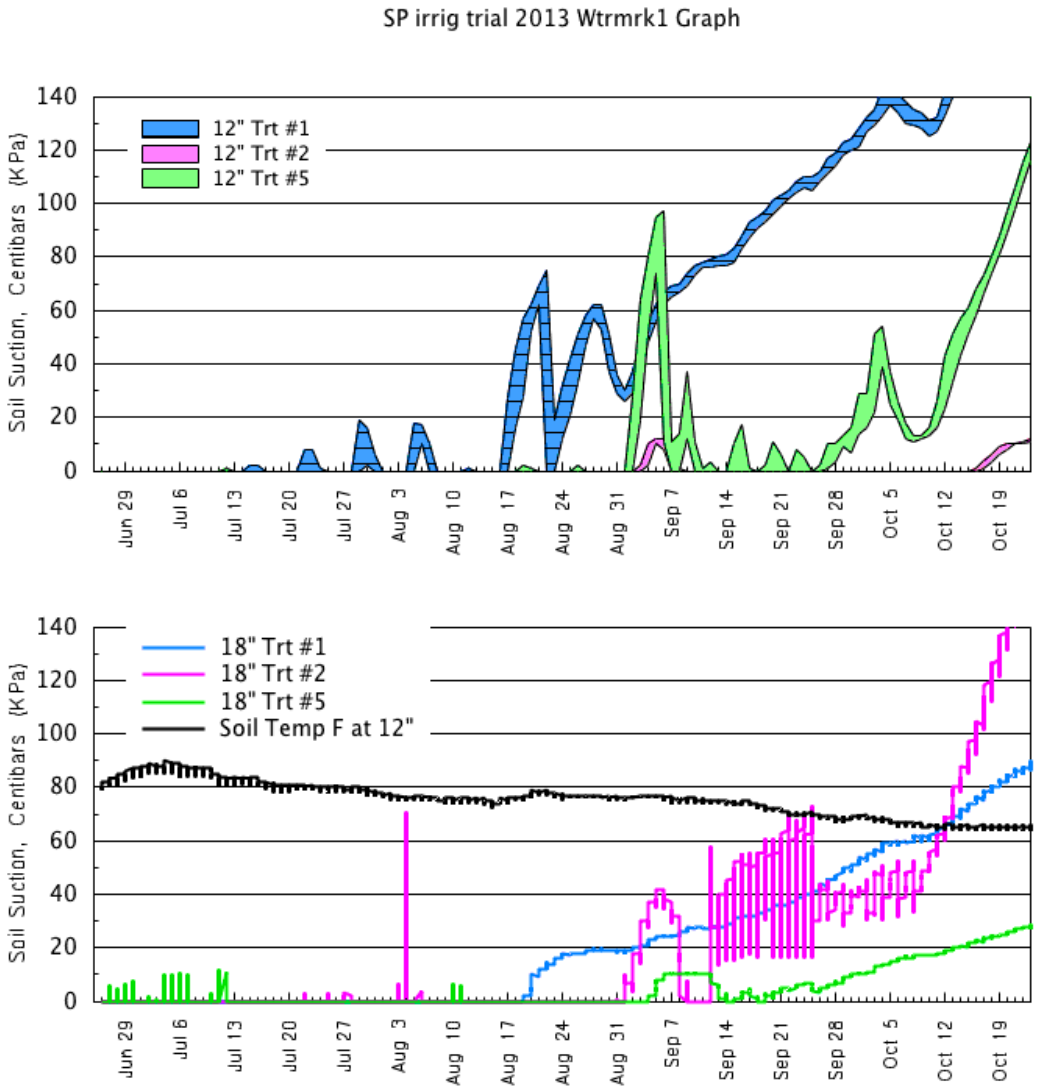


Figure 5. Soil moisture at 12" (top) and 18" (bottom) for treatments 1, 2, and 5 (Watermark sensors). Note soil moisture is expressed as soil tension, or centibars. In sandy soils, values above 25 would indicate dry conditions.

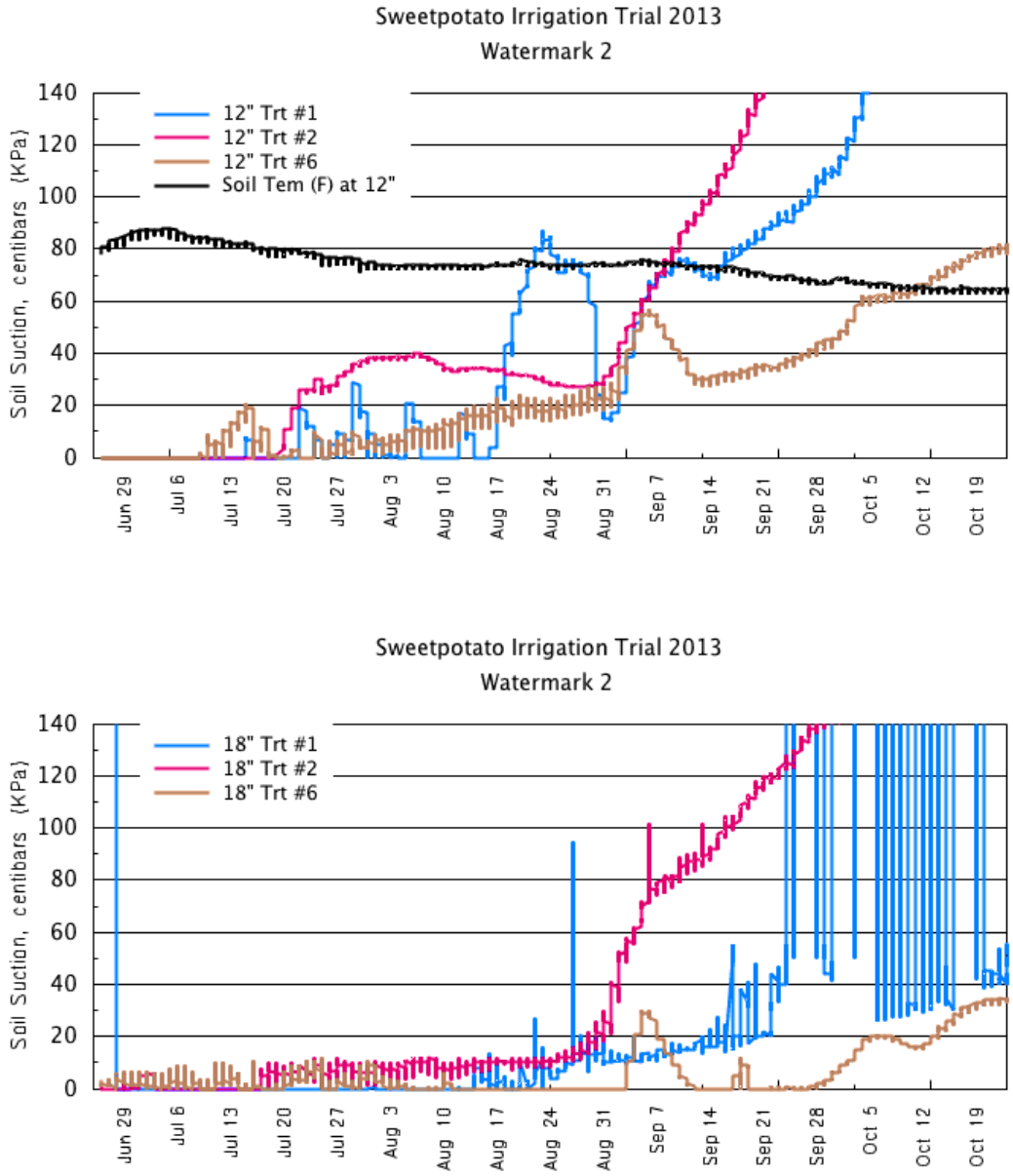


Figure 5. Soil moisture at 12" (top) and 18" (bottom) for treatments 1, 2, and 6 (Watermark sensors). Note soil moisture is expressed as soil tension, or centibars. In sandy soils, values above 25 would indicate dry conditions. The sensor in treatment 1 at 18" had a bad connection, resulting in erroneous data towards the end of the season.

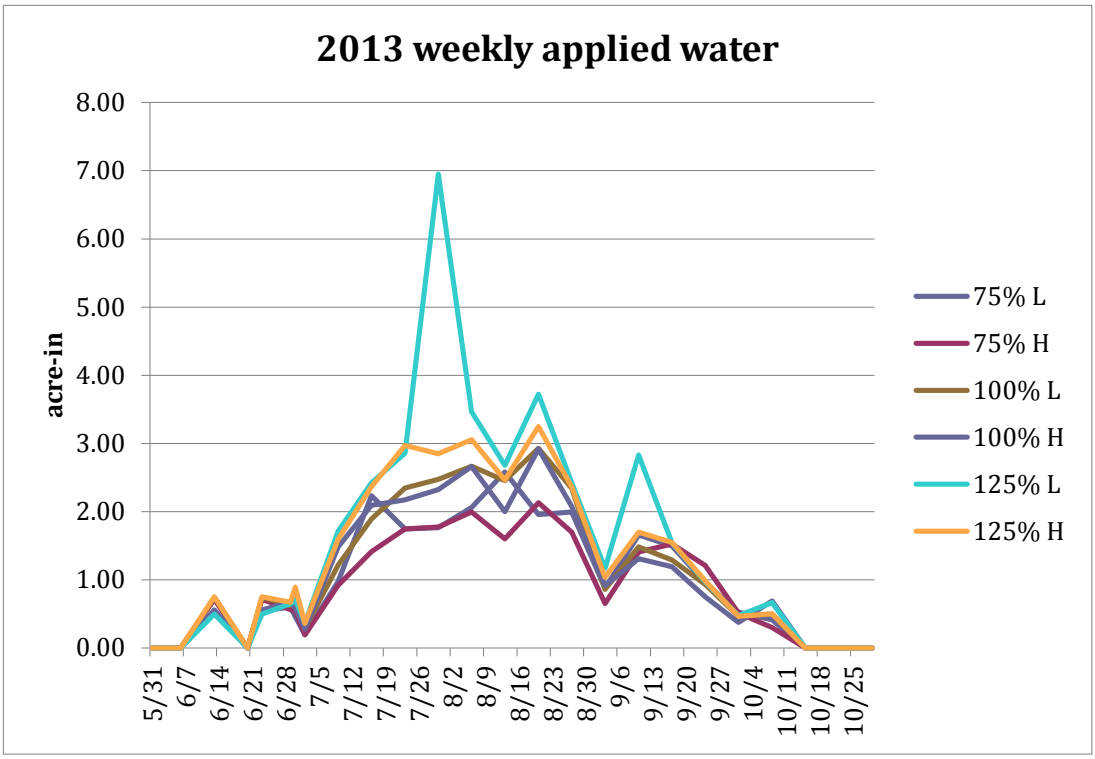


Figure 6. 2013 weekly irrigation water applied after starting irrigation deficit treatments. The large spike of water that occurred in late July was the result of a large leak from gophers.

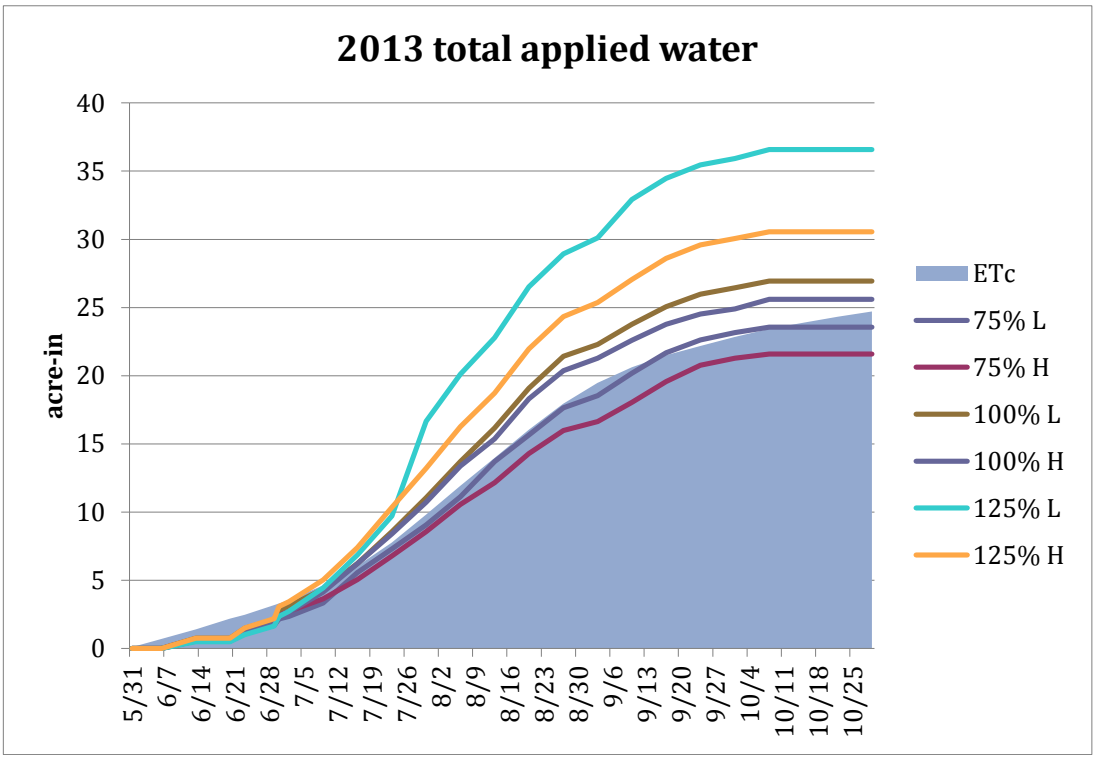


Figure 7. Total water application for the 2013 season for each of the irrigation treatments.

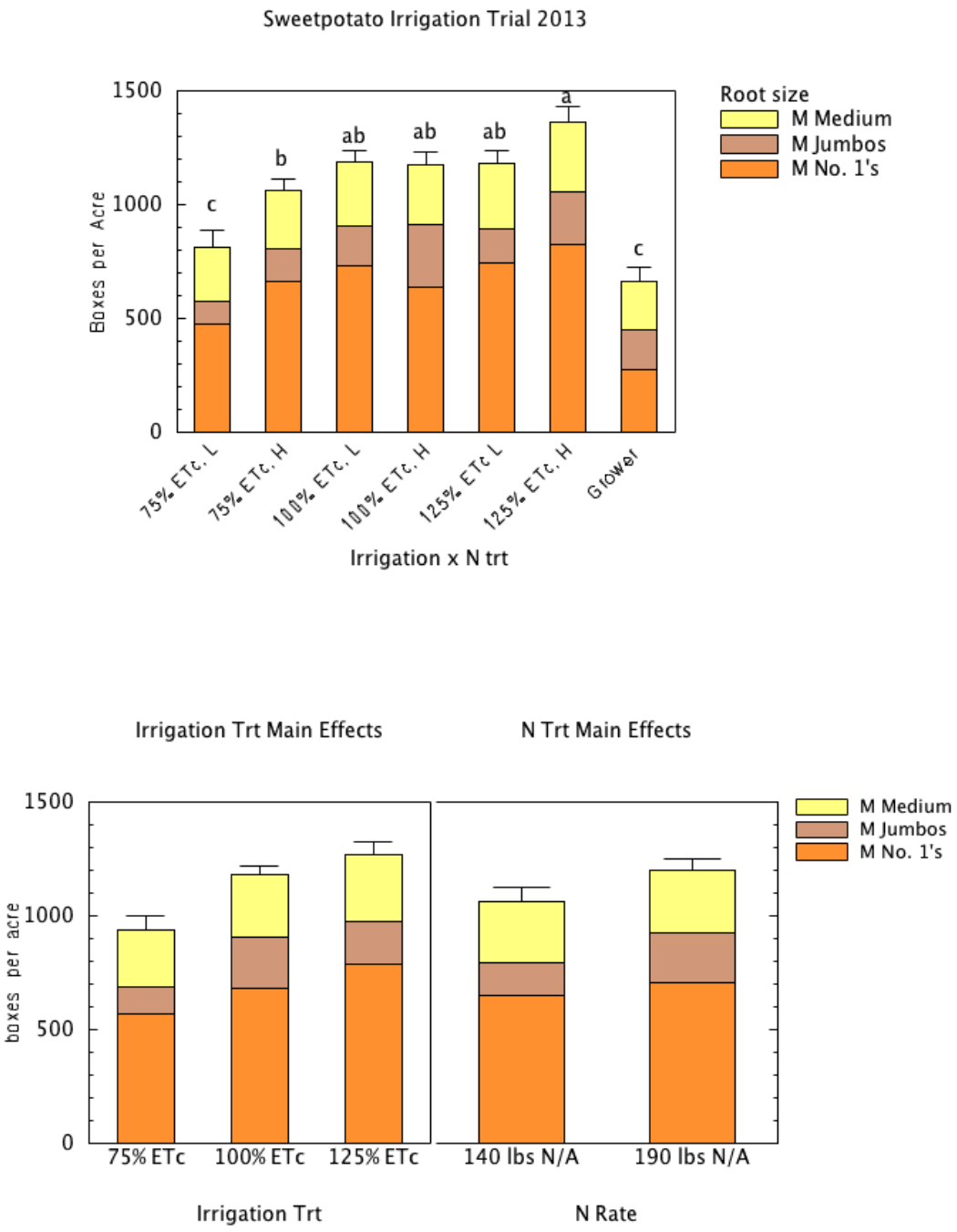


Figure 8. Significant yield differences were observed between treatments (top; grower shown for comparison). The main effects of irrigation and N treatment also significantly increased yield (bottom).

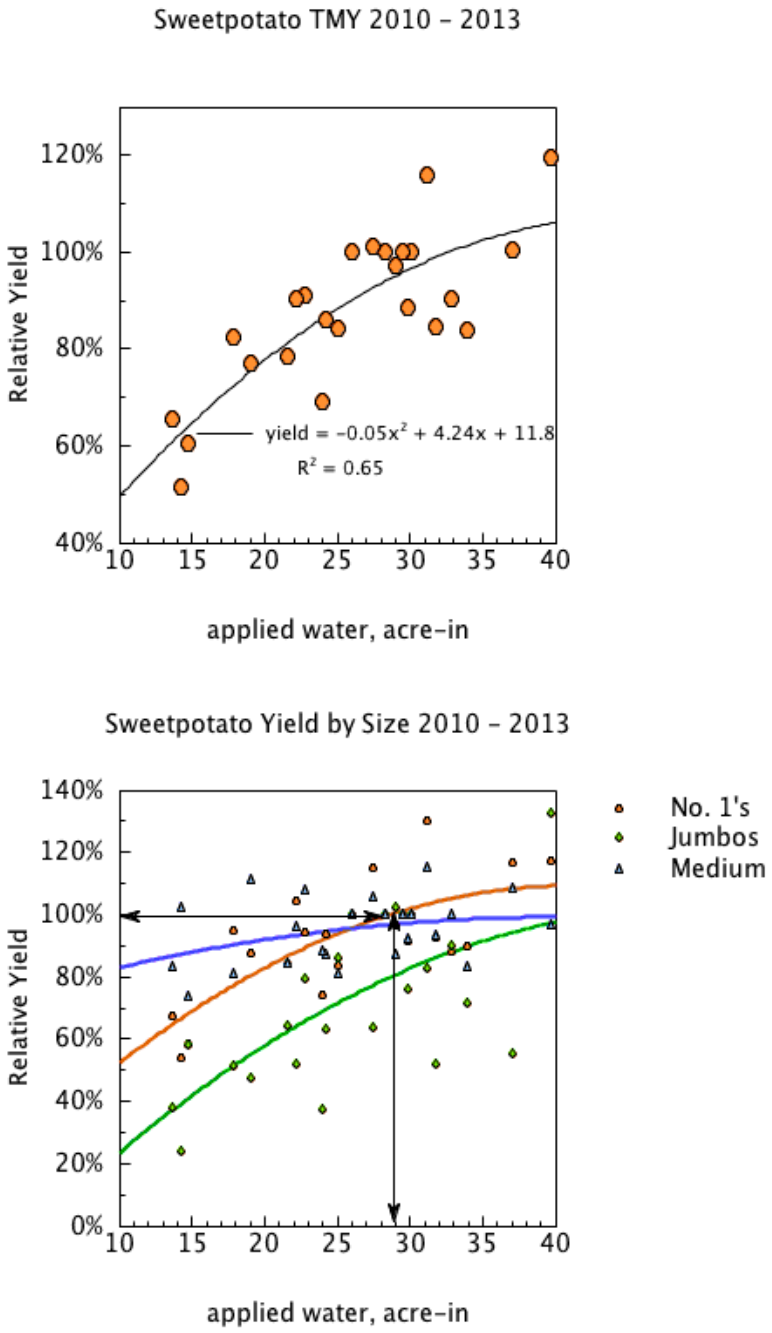


Figure 9. Relative total marketable yield (TMY) of sweetpotatoes showed a significant decline in response to reduced water (top); jumbo root production declines faster than #1s, while mediums show almost no change (bottom). Lines with arrows illustrate 100% relative yield for No. 1's occurred at approximately 29 acre-inches applied water.

Acknowledgements:

Many thanks to the many cooperators, including growers, PCA's, Agriculture Commissioner, and company development reps, for help with conducting these projects. Special thanks to the following for putting in extra time and trouble:

- Jack Smith and Adam Shaner, Quail-H Farms. Collaborators Trial and SCRI cooperator.
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- Aaron Silva, STS Farms. L-06-52 plant spacing trial and SCRI cooperator.
- Bob Weimer, Weimer Farms. Irrigation trial and SCRI cooperator.
- Nathan and Nolan Mininger, Mininger Farms. Dual Magnum herbicide trial.