Evaluation of Composted Poultry Manure & Potassium as Plant Nutrient Supplements in Tomatoes

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Premature vine senescence

66 days before harvest

18 days before harvest

8 days before harvest

Composted poultry manure, K applications, & chemigations

Muller Ranch, Yolo-Zamora area, 2014 (as supplements)

157 ppm @ 2.5% K

	Supplemental Treatment	yield tons/acre	vine health (% green)	Brix
1	Manure 10 tons	69.5	85	4.48
2	Manure 5 tons	68.6	82	4.40
3	Potassium fertigate	67.9	82	4.68
4	Potassium sidedress	66.6	85	4.40
5	Agrinos HYT A	65.5	72	4.30
6	Non treated	63.7	61	4.30
7	CA Soils H2H 15 fb 10 gpa	63.6	65	4.13
8	nutrients (compost mimic)	63.4	85	4.45
9	ProAg Simple Soil Solutions	62.2	65	4.30
	LSD@5%	3.3	10	0.27
	% CV	3	9	4

Composted manure, NPK and K applications, Muller Ranch, Yolo-Zamora area, 2014

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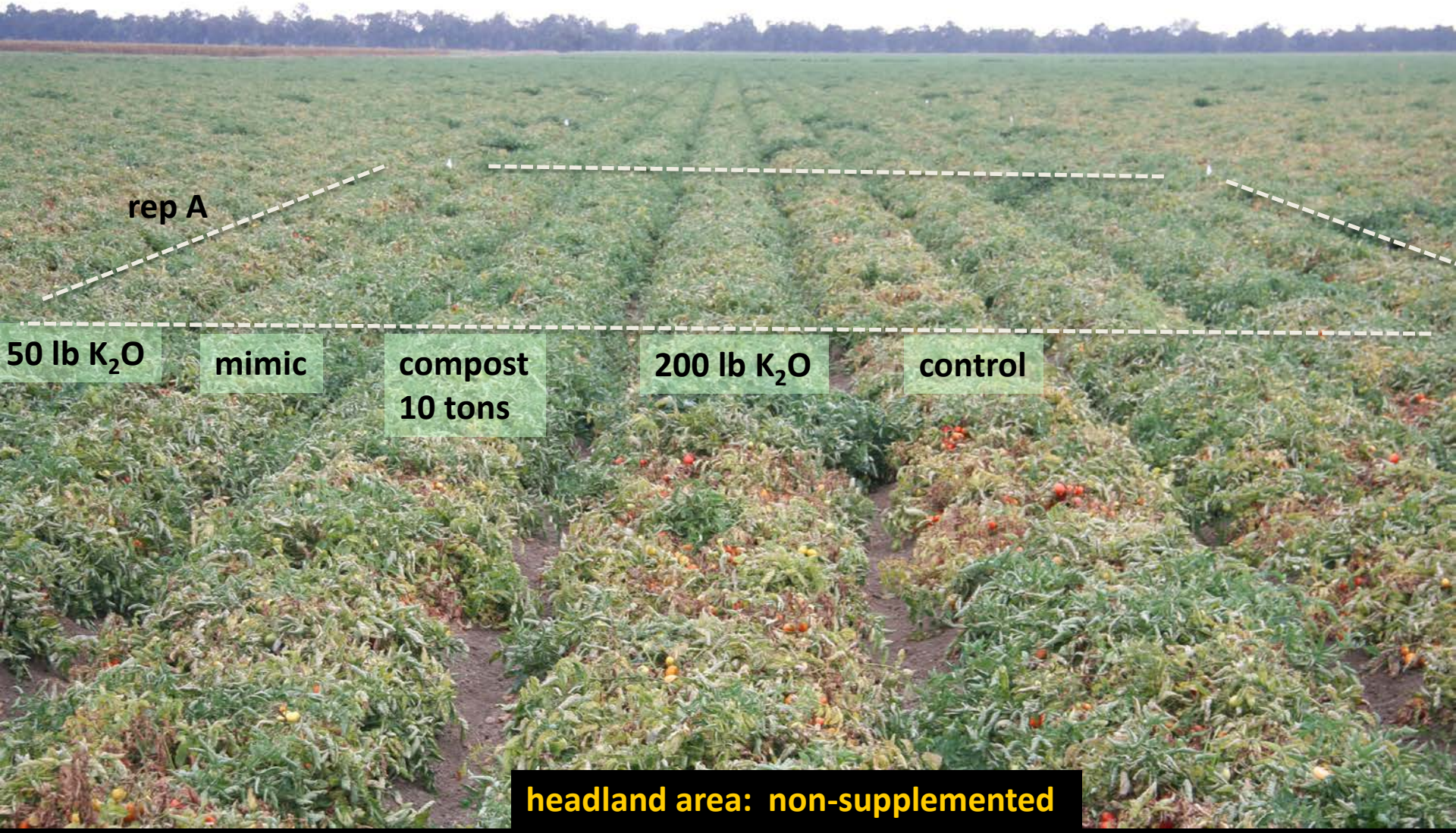
manufacturer NPK to mimic compost rates

	lbs/ton	%	available	lbs/A
N	75	3.8	20%	152
P_2O_5	48	2.4	80%	381
K_2O	58	2.9	80%	464

J.H. Meek and Sons,
Woodland, 2014




50 lb K_2O
mimic
compost
10 tons
200 lb K_2O
control

J.H. Meek and Sons,
Woodland, 2014

Composted Manure
Poultry

Potassium
Sidedressed KCl

	136 ppm K with 1.9% on the cation exchange						
		Yield				full bloom	
	treatment	tons/A		°Brix	% N	% P	% K
1	control	51.3	e	4.35	4.6	0.38	1.7
2	compost 5 tons	56.8	cd	4.40	4.8	0.40	2.0
3	compost 10 tons	62.6	a	4.63	4.9	0.43	2.3
4	NPK compost mimic	61.7	ab	4.53	4.7	0.49	2.3
5	K20 800 lbs	62.3	a	4.57	4.7	0.36	2.2
6	K20 400 lbs	59.4	abc	4.55	4.7	0.36	2.2
7	K20 200 lbs	57.9	bcd	4.53	4.5	0.37	2.0
8	K20 100 lbs	56.5	cd	4.53	4.5	0.36	1.9
9	K20 50 lbs sidedress	55.1	de	4.35	4.6	0.39	1.9
	LSD @ 5%	3.9		0.2	0.19	0.04	0.20
	% CV	5		3	3	6	7
	Class Comparisons:						
	compost rate:						
	linear probability	0.01		0.01	0.00	0.01	0.00
	quadratic	NS		NS	NS	NS	NS
	Potassium rate:						
	linear probability	0.00		0.02	0.06	NS	0.00
	quadratic	0.05		0.11	NS	NS	0.01
	Results:						
	Positive yield response to compost (rates)						
	Positive yield response to sidedressed potassium						
	Positive yield response to NPK compost mimic						
	Potassium is the common theme to the response						
	Brix improved with applications of either compost or with K						

J.H. Meek and Sons,
Woodland, 2014

Composted Manure
Poultry

Potassium
Sidedressed KCl

136 ppm K with 1.9% on the cation exchange

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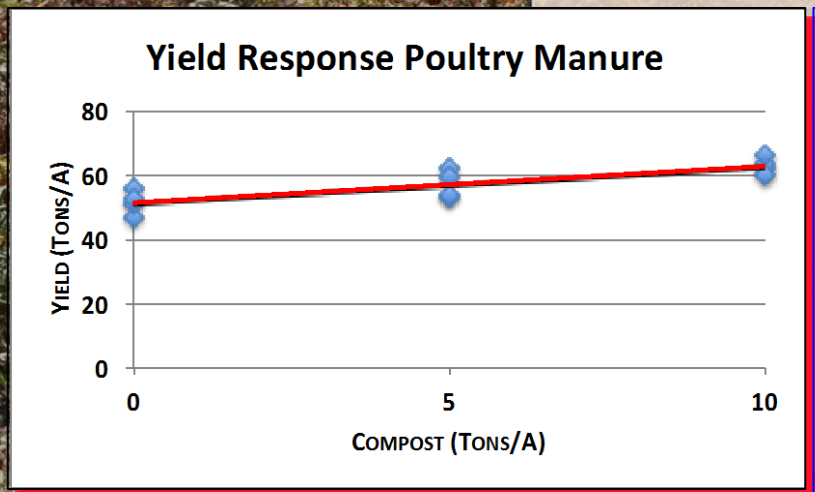
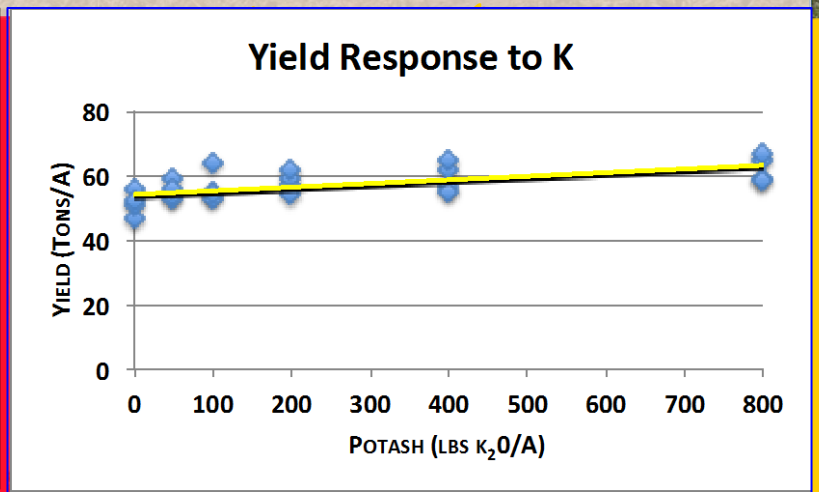
Class Comparisons:

compost rate (probability): ✔ ✔

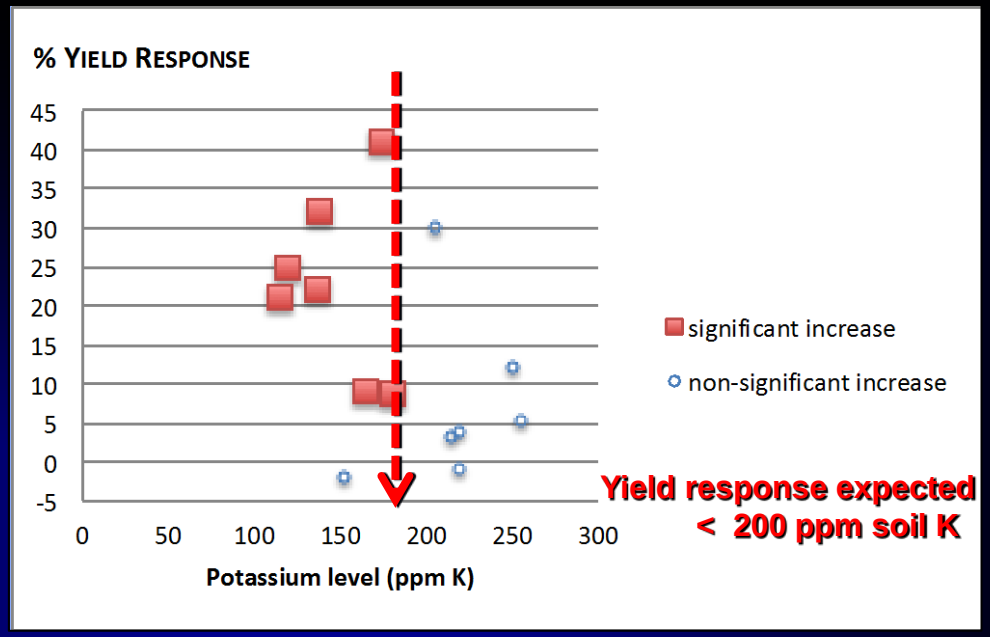




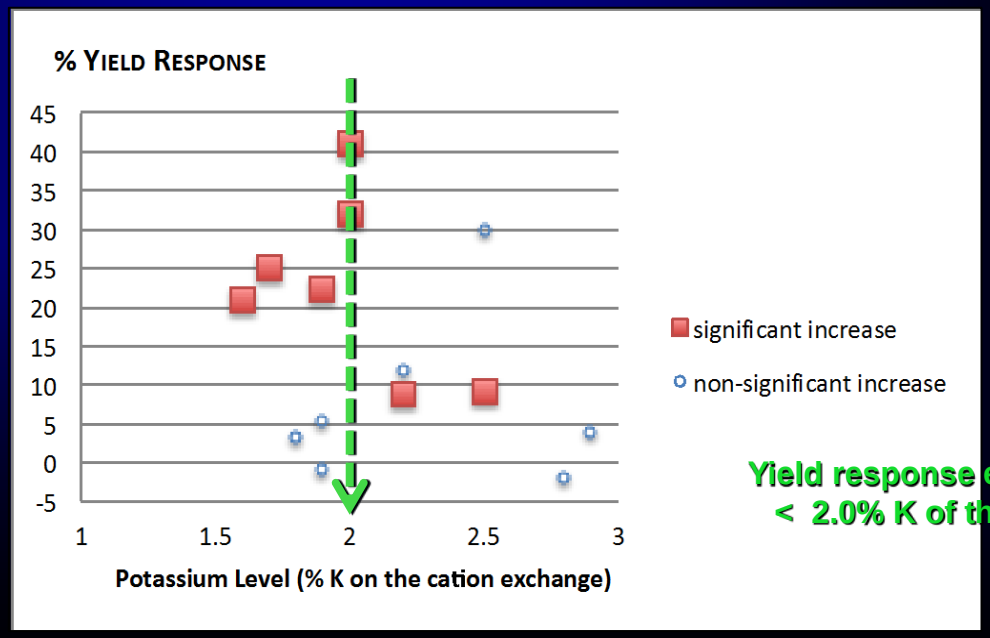
Composted poultry manure applications (supplemental) 2011-2014

soil lab determinations as:

ppm K



% K of cations



Processing tomato yield (tons/acre)

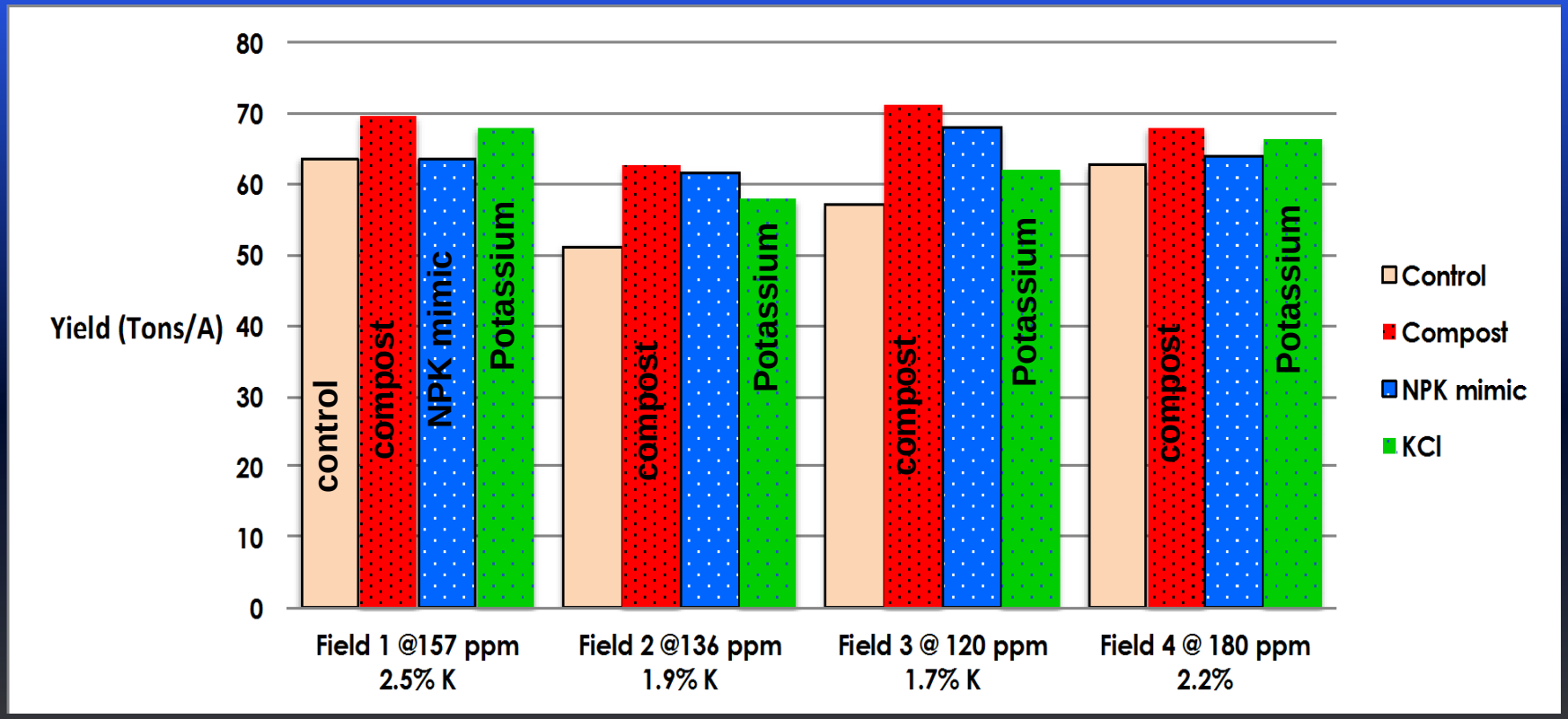
	Treatment	# sites all 7 sites		only significant 4 sites		remove 1 3 sites	LSD 1%	LSD 5%
1	Compost	**56.9**	a	**67.9**	a	**67.3**	a	a
2	NPK mimic	54.1	b	64.3	b	64.6	ab	b
3	Potassium KCl	53.8	b	63.5	b	62.0	b	b
4	Control	50.2	c	58.6	c	57.0	c	c
	LSD 1%	1.99		2.75		3.46		2.56 LSD @0.05
	CV	5		5		5		
	interaction prob	0.000		0.001		0.017		

Tissue K levels from whole leaves (% K) @ full bloom

	Treatment	# sites all 7 sites		only significant 4 sites		remove 1 3 sites	LSD 1%
1	Compost	2.470	a	2.547	a	2.575	a
2	NPK mimic	2.349	a	2.513	a	2.487	ab
3	Potassium KCl	2.366	a	2.406	a	2.337	bc
4	Control	2.234	b	2.226	b	2.191	c
	LSD 1%	0.128		0.176		0.222	
	CV	8		8		8	
	interaction prob	0.095		0.074		0.199	

Tomato yield response from 4 select fields,

Woodland area, 2013-2014



From small-scale, test plot results ...

... to grower experimental adaptive use

LIMITED INTEREST ?

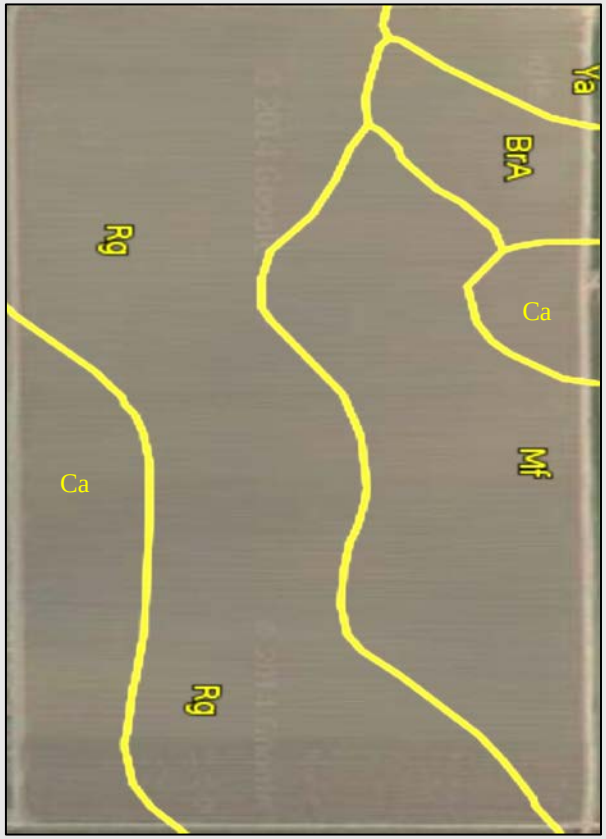
High Cost$ (w/ short supply)

Slow operation (high volume)

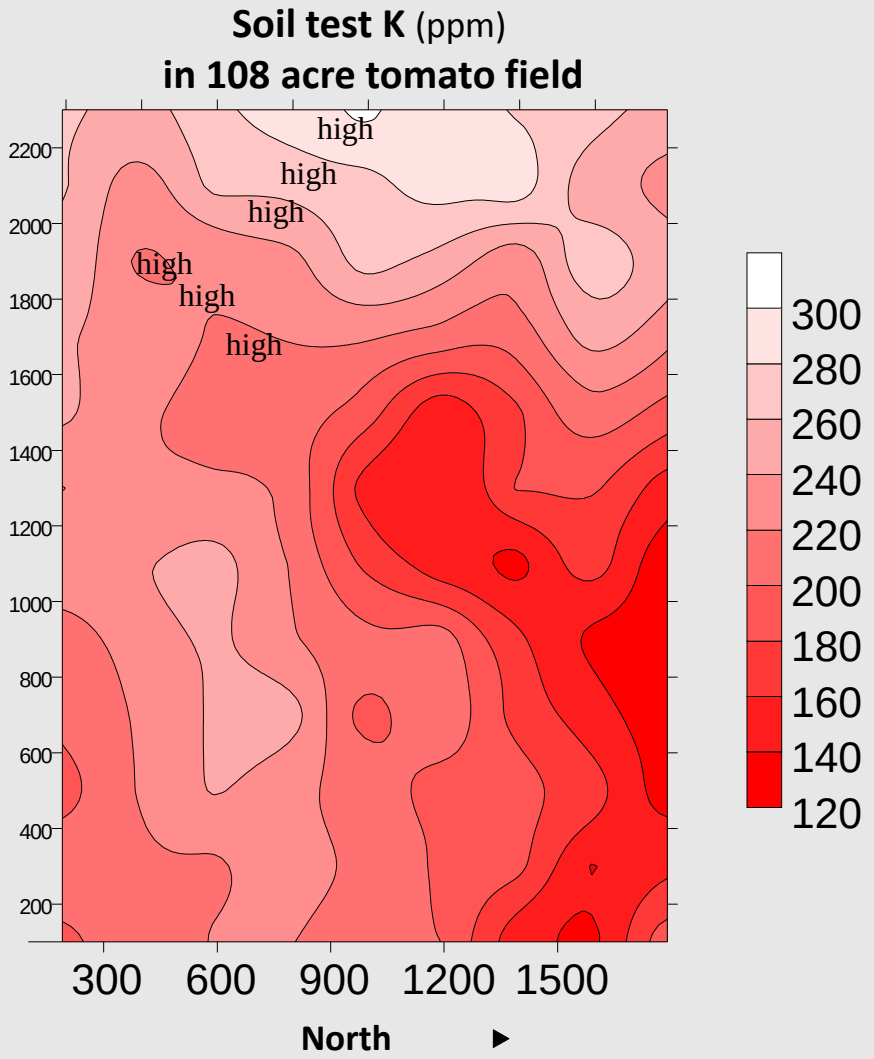
Specialized equipment

Potassium variability (in local field)

Soil Series Map @
SoilWeb



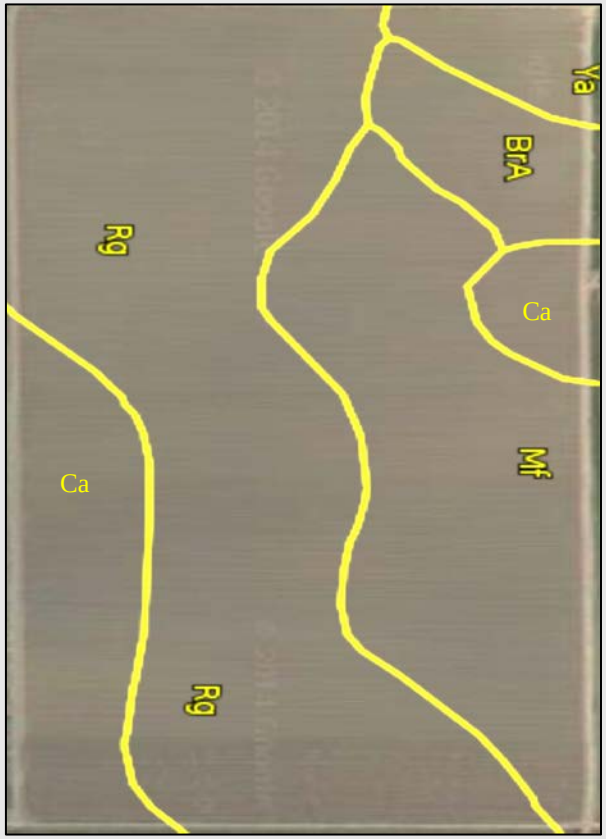
derived from 200 x 200 ft grid samples



Unpublished data, S. Pettygrove, R. Plant, et al. 1997

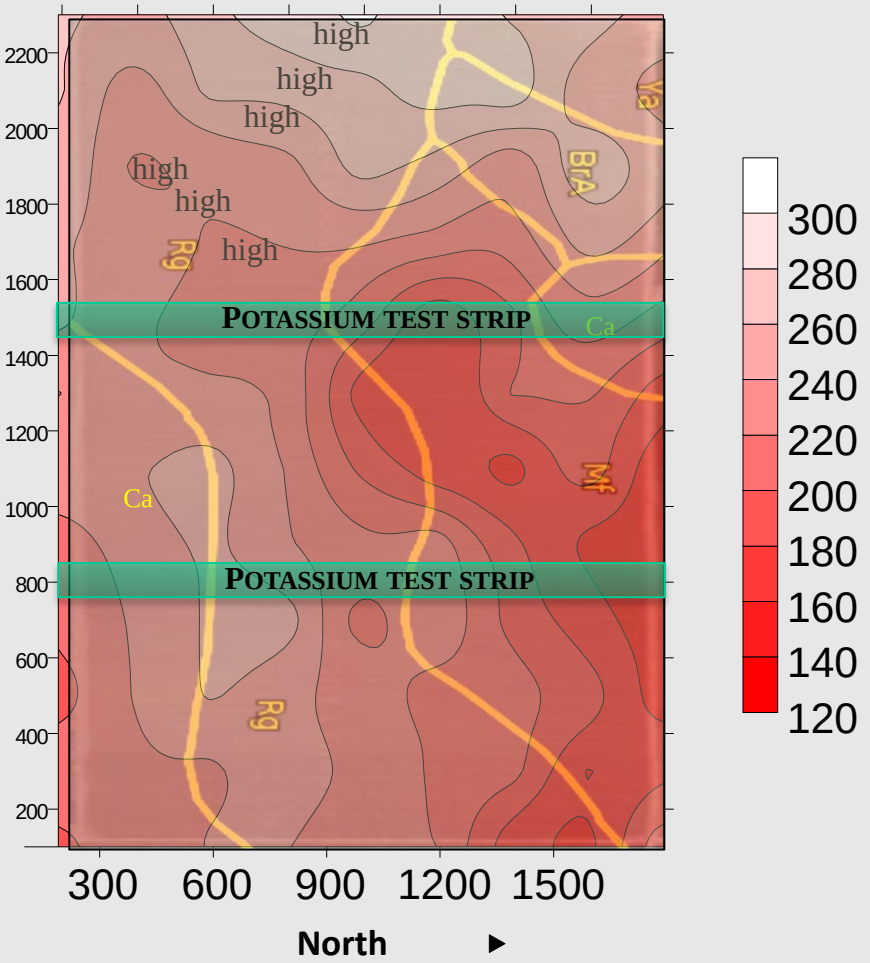
Potassium variability (in local field)

Soil Series Map @ SoilWeb



derived from 200 x 200 ft grid samples

Soil test K (ppm)
in 108 acre tomato field



Research plans for 2015

	treatments
1	non treated
2	compost 5 tons trench
3	compost 10 tons trench
4	compost 5 tons surface shallow
5	compost 10 tons surface shallow
6	NPK mimic of 10 tons compost surface
7	NPK mimic at 10 tons compost deep (sidedress)
8	K @ 50 lbs K20 sidress
9	K @ 100 lbs K20 sidress
10	K @ 200 lbs K20 sidress
11	K @ 400 lbs K20 sidress

I. Placement & rate (of compost)
II. Materials (compost vs. conventional fertilizer)
III. Rates: potassium @
- 50
- 100
- 200
- 400 lbs/acre

Year 2014 Cooperators:
Steve & Sam Meek & John Pon
Colin, Frank & Louie Muller
Bob & Bill Payne
Dustin Timothy & Dave Viguie

Research collaborators:
Johan Leveau
Nilesh Maharaj
Mark Kochi
Karina Perez
Hung Doan & many others

California Tomato Research Institute

KCl fertilizer donated by Agriform & Tremont Group

Compost: UCD Russell Ranch


~6 lbs. K2O per ton:
tomato fruit removal