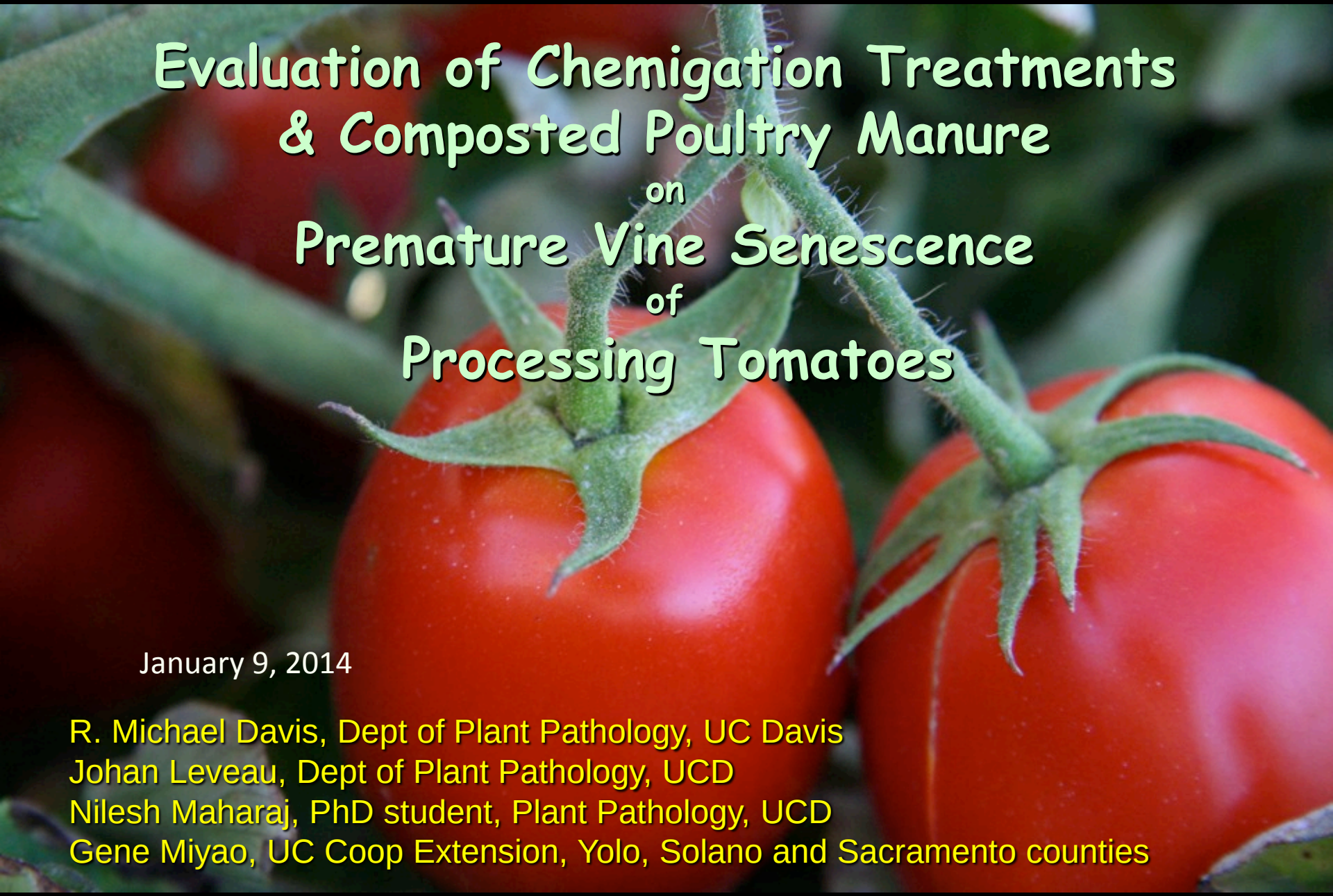

Evaluation of Chemigation Treatments & Composted Poultry Manure on Premature Vine Senescence of Processing Tomatoes

January 9, 2014

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Situation/Issues:

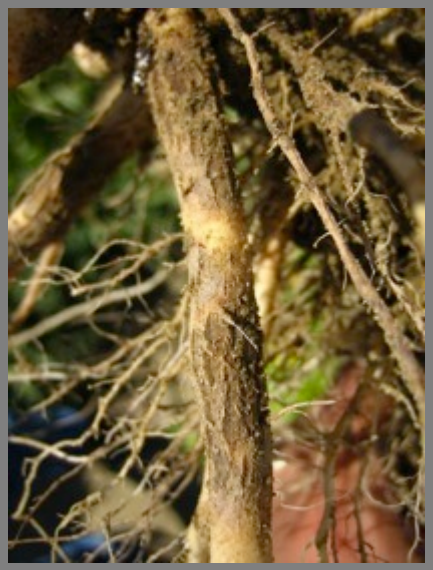
- Buried drip irrigation continues to increase
- Rotations to tomato are more concentrated
- Incidence of soilborne pathogens is increasing

California Tomato Research Institute

Verticillium

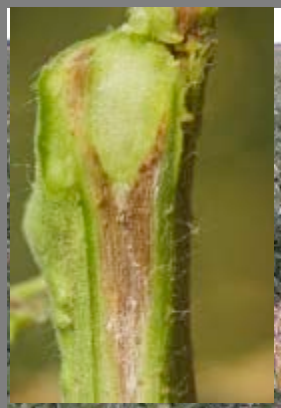
Southern blight

Phytophthora root rot



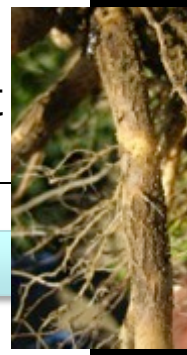
Corky roots

Fusarium crown & root rot



Fusarium wilt

	2011	Woodland Field			Dixon Field		
	Chemigation Treatment	Yield tons/A	Vert %	Fusarium %	Yield tons/A	Vert %	Corky root severity
1	Control	34 b	20	21	46	50	89
2	Vapam 15 gal	35 b	15	28			
3	Tenet	34 b	18	22	48	45	86
4	Vapam + Tenet	34 b	19	26			
5	Quadris + Ridomil	33 b	17	27	47	34	84
6	Vapam + Quad + Ridomil	36 b	15	33			
7	Serenade Soil	38 b	18	22	45	47	89
8	Serenade + Quad + Rid				46	47	88
9	Vapam + Serenade	36 b	13	25			
10	Chicken manure	**45 a**	15	19	**52**	48	89
11	Tenet + Serenade				46	49	90
12	SoilGard				44	45	93
			NS	NS	NS	NS	NS



Fusarium crown & root rot
Forl

2012 Treatments

Control
Quadris + Ridomil
Vapam highest rate (15 gal in 2011)
Serenade soil
Actinovate *Streptomyces*
Chicken manure - 10 tons
Chicken manure - 20 tons
Potassium - high rate

chems & biologicals multiple apps	2011 #1	2011 #2	2012 #1	2012 #2
		Yield (tons/A)		
Control	34 b	46	39 b	43
Vapam/Kpam 15 gal	35 b		44 b	40
Tenet	34 b	48		
Vapam + Tenet	34 b			
Quadris + Ridomil	33 b	47	40 b	43
Vapam + Quad + Ridomil	36 b			
Serenade Soil	38 b	45	40 b	41
Serenade + Quad + Rid		46		
Vapam + Serenade	36 b		42 b	38
Chicken manure 10 tons	45 a	52	56 a	55
Chicken manure 20 tons			61 a	40
Tenet + Serenade		46		
SoilGard		44		
Potassium			38 b	41
Actinovate			38 b	
		NS		NS

Sustaining Plant Health with Composted Poultry Manure


Chemigation and composts, JH Meek and Sons, Woodland, 2013

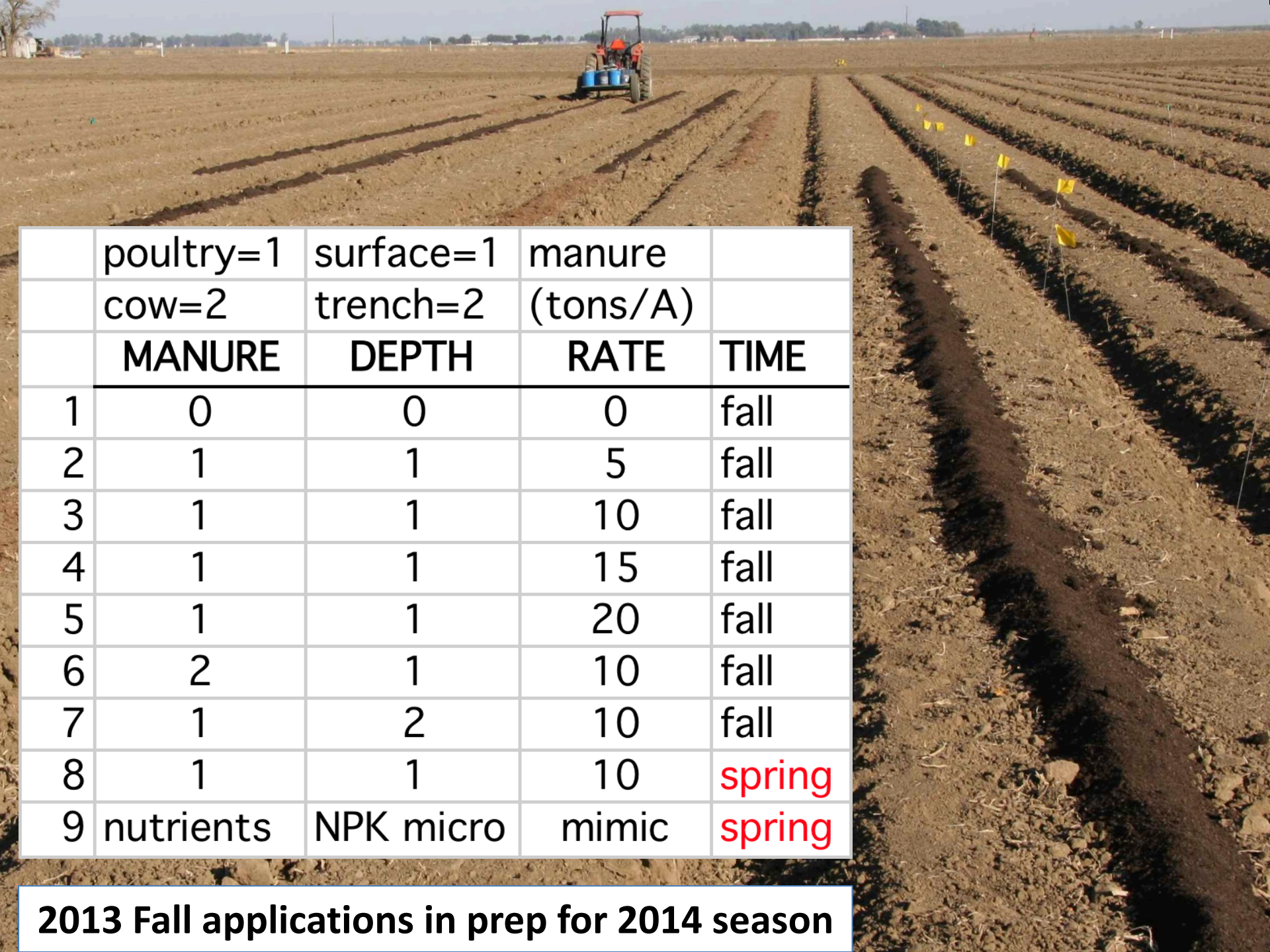
Chemigation and composts, JH Meek and Sons, Woodland, 2013

	treatment	15-Aug yield tons		Brix	7-Aug necrosis
1	Manure 10 tons	71.2	a	5.1	28
2	nutrients (compost mimic)	68.0	a	5.0	18
3	manure 5 tons	64.3	b	5.0	25
4	nutrients luxury	61.9	bc	5.4	13
5	vermicompost	60.4	cd	4.8	32
6	Regalia @ 1 gpa	58.2	d	4.9	39
7	JH BioTech Promot	57.8	d	5.1	39
8	LH Organics Soil Sytem 1	57.4	d	4.9	39
9	Non treated	57.0	d	4.8	39
	LSD@5% (*probability*)	3.5		0.3	13
	% CV	4		4	29

Chemigation and composts, JH Meek and Sons, Woodland, 2013

	treatment	15-Aug yield ton	7-Aug
1	Manure 10 tons	71.2	
2	nutrients (compost mimic)	68.0	
3	manure 5 tons	64.3	
4	nutrients luxury	61.9	
5	vermicompost	60.4	
6	Regalia @ 1 gpa	58.2	
7	JH BioTech Promot	57.8	
8	LH Organics Soil Sytem 1	57.4	
9	Non treated	57.0	
	LSD@5% (*probability*)	3.5	
	% CV	4	

CLASS COMPARISONS	Yield
I. biologicals vs	57.8
nontreated control	57.0
Probability	NS
II. composts vs	65.3
nontreated control	57.0
Probability	0.000
III. composts vs	65.3
supplemental fertilizers	64.9
Probability	0.03
IV manure rate: probability	
linear	0.00
quadratic	NS



	poultry=1	surface=1	manure	
	cow=2	trench=2	(tons/A)	
	MANURE	DEPTH	RATE	TIME
1	0	0	0	fall
2	1	1	5	fall
3	1	1	10	fall
4	1	1	15	fall
5	1	1	20	fall
6	2	1	10	fall
7	1	2	10	fall
8	1	1	10	spring
9	nutrients	NPK micro	mimic	spring

2013 Fall applications in prep for 2014 season

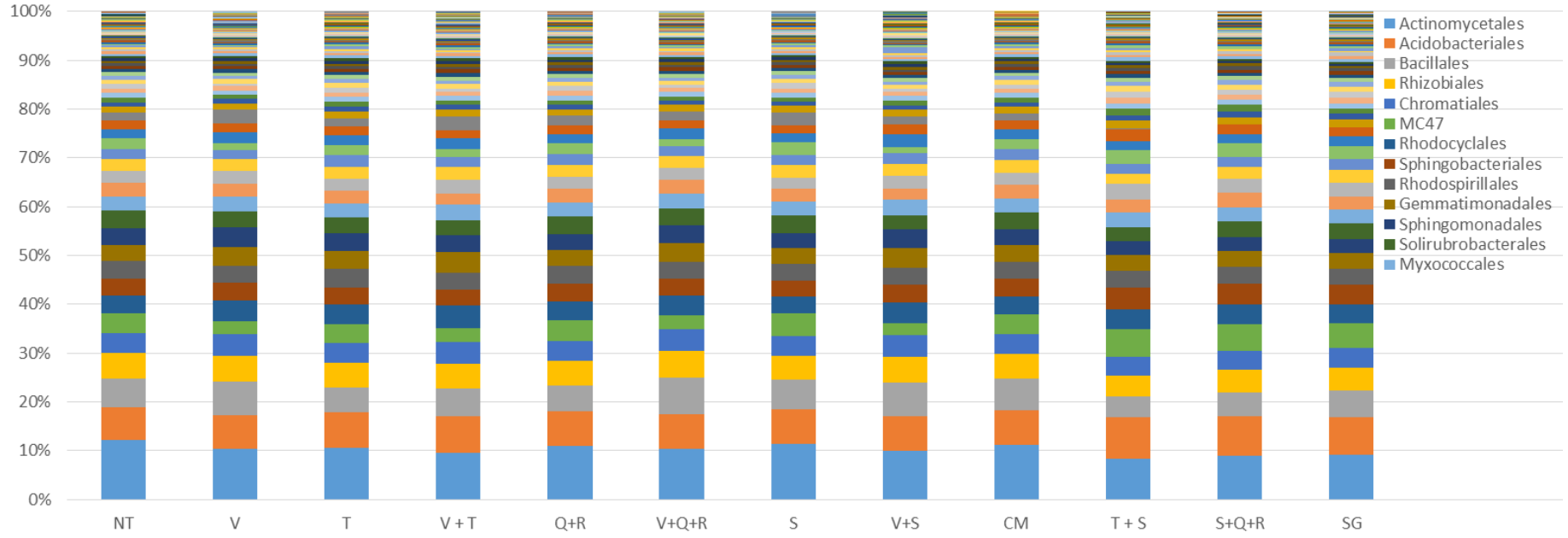
Verticillium wilt

Verticillium dahliae

photo: UC Statewide IPM Project

Impact of Management: chemicals/biologicals

soil microbiota of processing tomatoes, 2011 field study

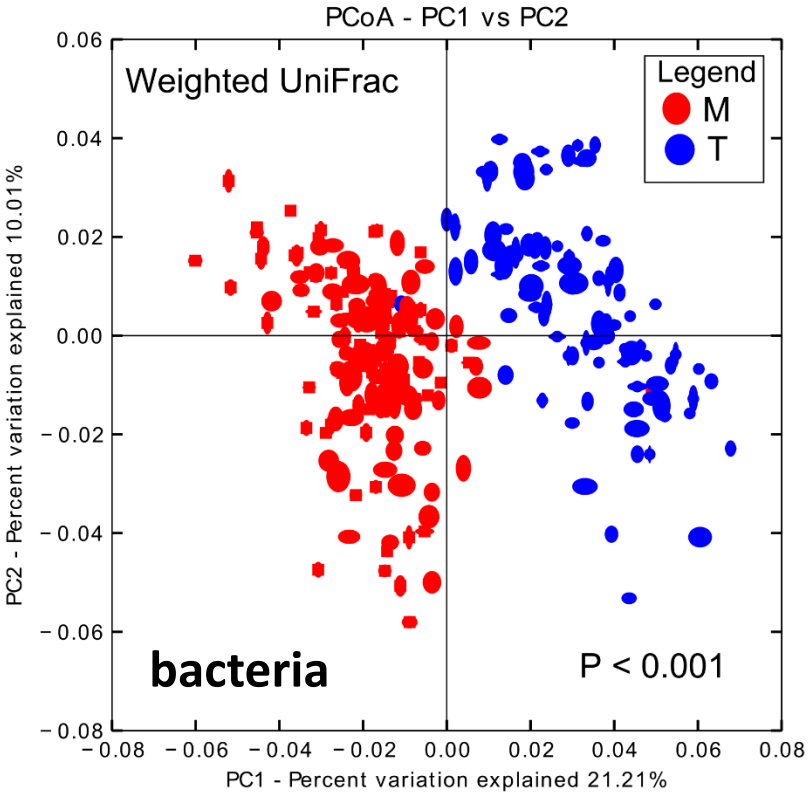


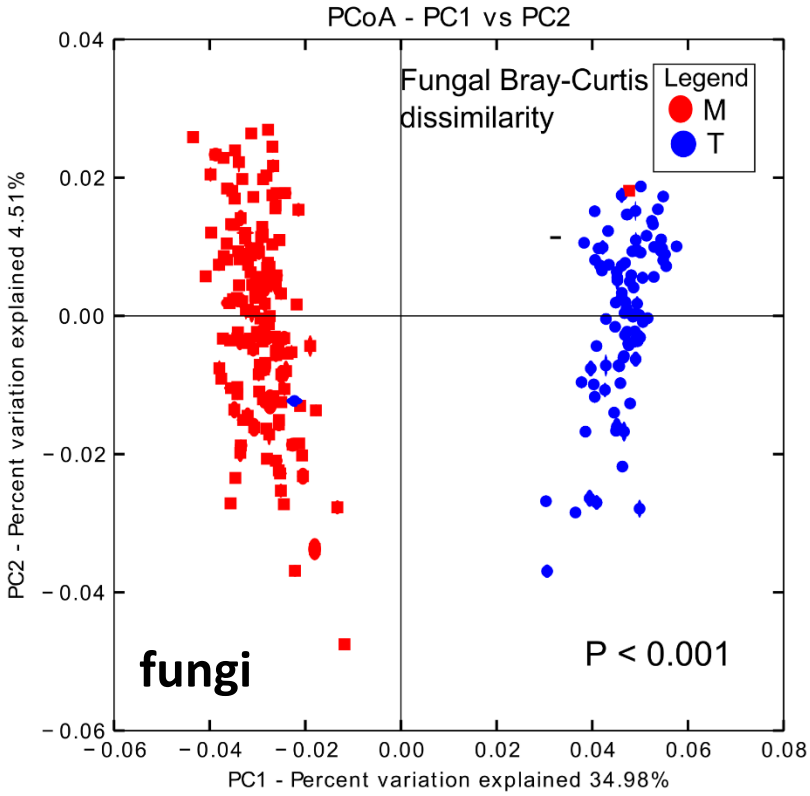
NT	nontreated
V	Vapam
Q	Quadris
R	Ridomil Gold
S	Serenade Soil (*Bacillus*)
T	Tenet (*Trichoderma*)
SG	SoilGard (*Gliocadium*)
CM	composted chicken manure

Johan Leveau, Professor
Dept Plant Pathology, UCD

IMPACT OF LOCATION

SOIL MICROBIOTA OF PROCESSING TOMATOES, 2011



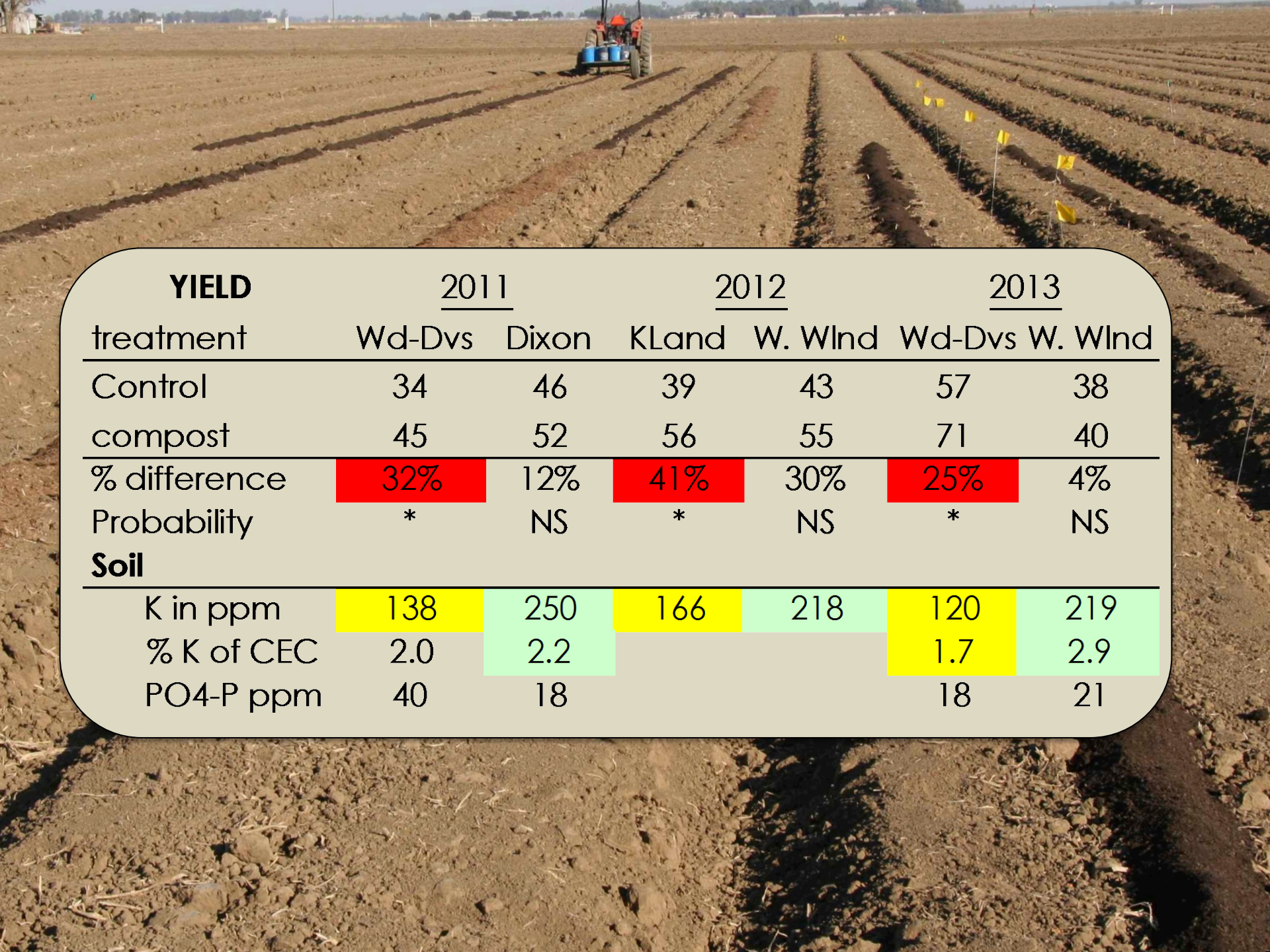


Meek (shop) Woodland: Yolo silt loam

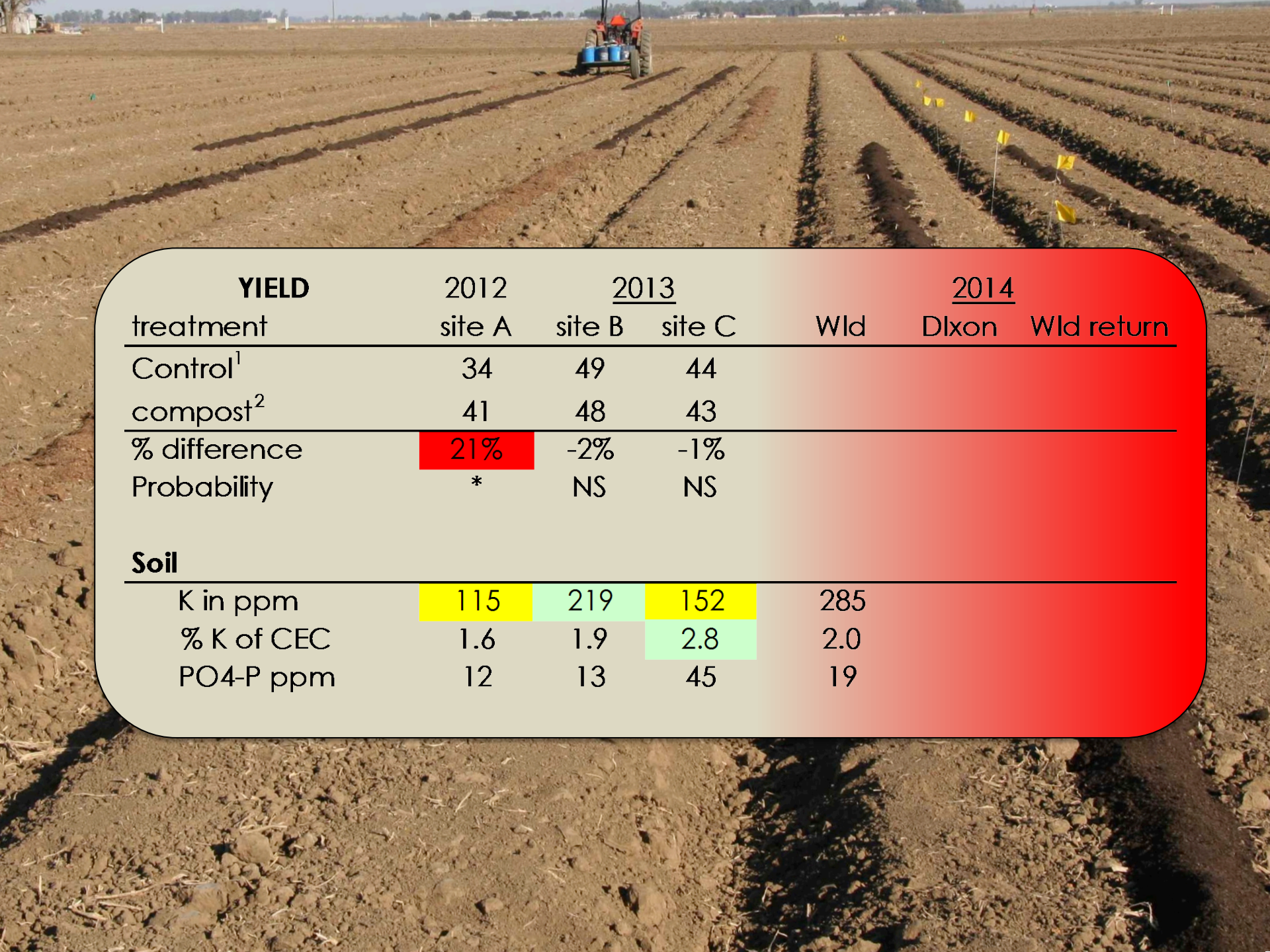
Timothy-Viguie (shop) Dixon: Yolo silty clay loam

both sites had tomatoes the previous year

Johan Leveau, Professor
Dept Plant Pathology, UCD



YIELD	2011		2012		2013	
treatment	Wd-Dvs	Dixon	KLand	W. Wlnd	Wd-Dvs	W. Wlnd
Control	34	46	39	43	57	38
compost	45	52	56	55	71	40
% difference	32%	12%	41%	30%	25%	4%
Probability	*	NS	*	NS	*	NS
Soil						
K in ppm	138	250	166	218	120	219
% K of CEC	2.0	2.2			1.7	2.9
PO4-P ppm	40	18			18	21



YIELD	2012	2013		2014		
treatment	site A	site B	site C	Wld	DIxon	Wld return
Control[1]	34	49	44			
compost[2]	41	48	43			
% difference	21%	-2%	-1%			
Probability	*	NS	NS			
Soil						
K in ppm	115	219	152	285		
% K of CEC	1.6	1.9	2.8	2.0		
PO4-P ppm	12	13	45	19		

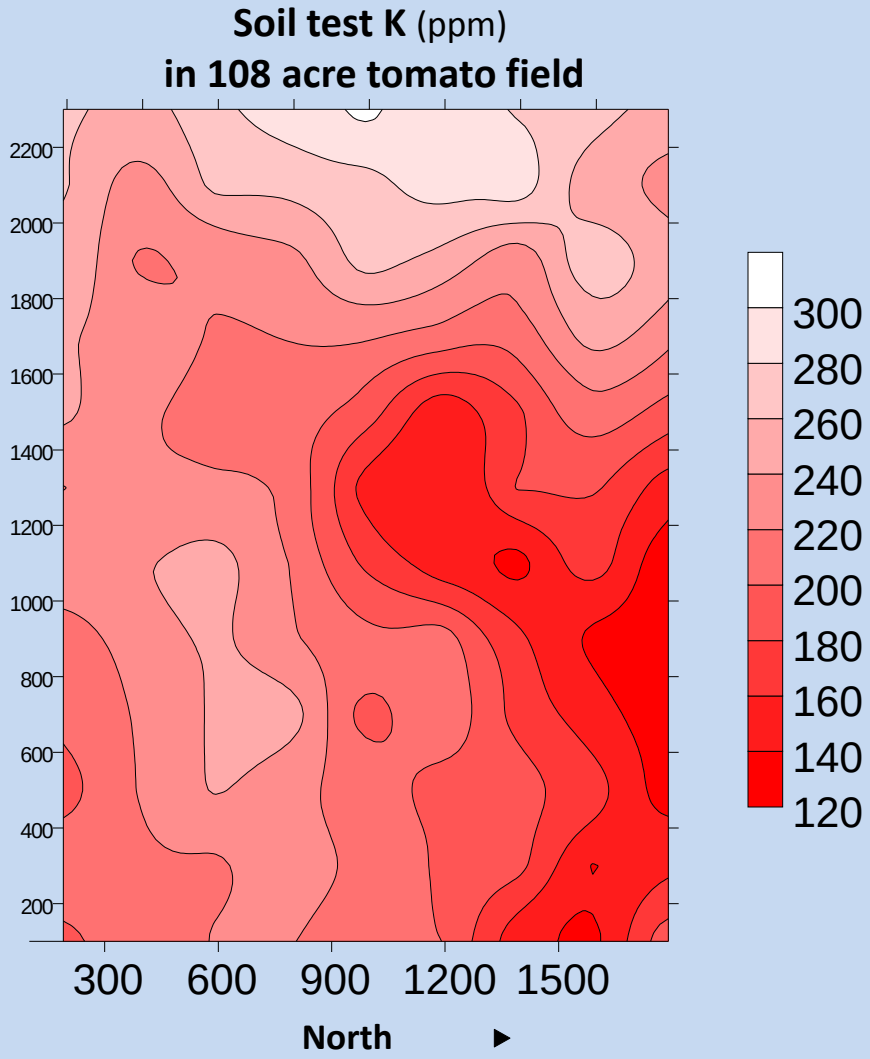
Yield increase from compost may be related to a potassium (K) response

Evaluation of K from soil:

less than ~180 ppm K (ammonium acetate extraction method)

< 2% K of the cation exchange capacity (CEC)

Spatial variability is REAL!



derived from 200 x 200 ft grid samples

Unpublished data, Pettygrove, Plant et al. 1997

Progress Report Summary: Disease Control Evaluations for 'vine decline'

- ✓ No demonstrated effectiveness of chemicals & biologicals through drip irrigation... yet.
- ✓ *Value of composted chicken manure...*
  ...may be related to fertilizer K response?

MOVEMENT OF *FUSARIUM OXYSPORUM* VIA EQUIPMENT

Fusarium wilt, race 3

Gene Miyao, UC Farm Advisor
Mike Davis, Plant Pathologist, UC Davis

UNIVERSITY of CALIFORNIA

Fusarium wilt, race 3


Fusarium wilt, race 3


FUSARIUM WILT

Fusarium wilt: ‘Mechanical spread’

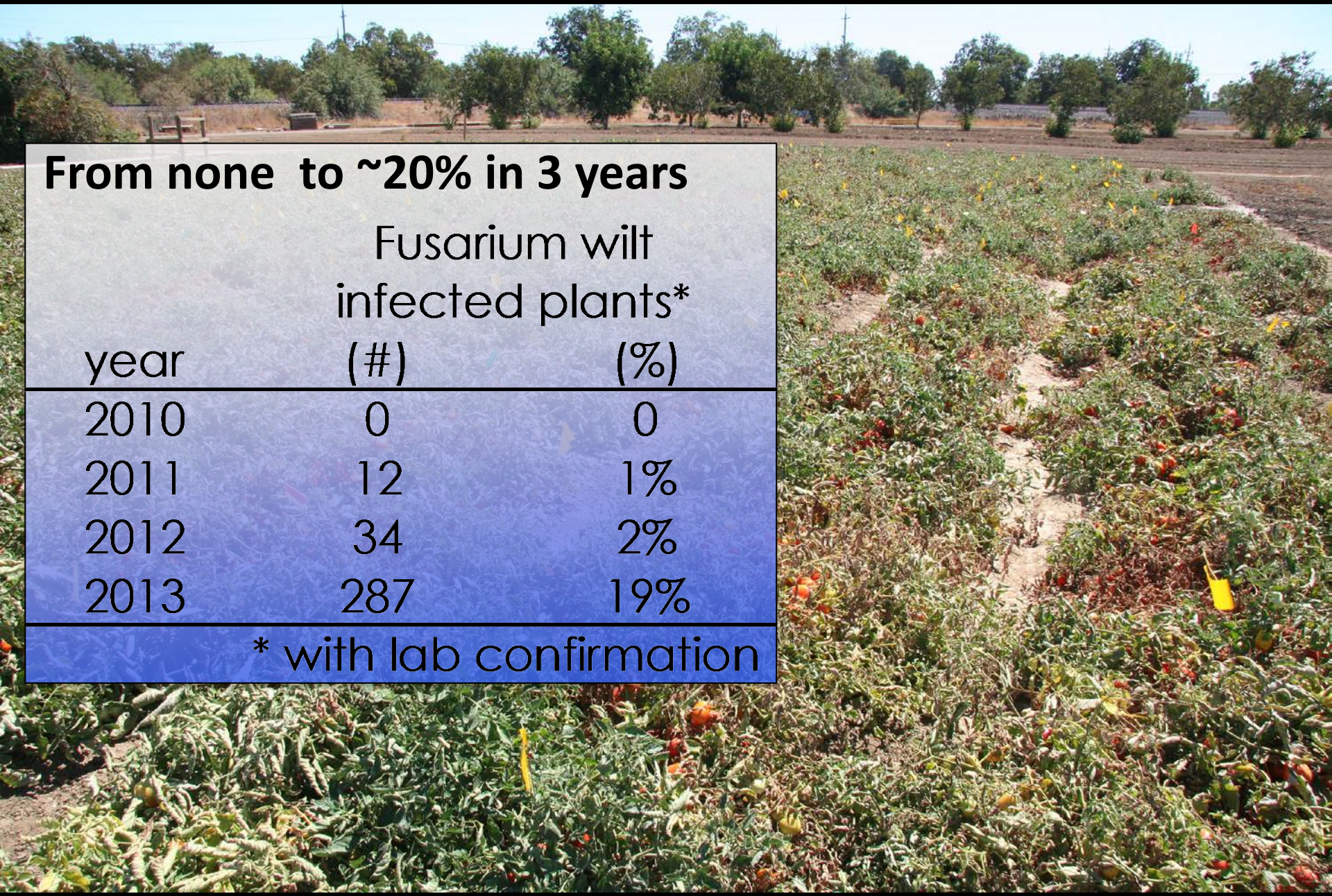
moving infected stem pieces...

...moving infested soil

California Tomato Research Institute

1st Year 2011

Fusarium wilt: ‘Mechanical spread’



From none to ~20% in 3 years

year	Fusarium wilt infected plants* (#)	(%)
2010	0	0
2011	12	1%
2012	34	2%
2013	287	19%

* with lab confirmation

Summary:

Spread of *Fusarium oxysporum* with infected plant tissue

- ✓ Fusarium easily established
- ✓ Fusarium can spread quickly & remains long-lived in soil

The End