

Great Lakes
HOP & BARLEY
CONFERENCE

FEBRUARY 28TH - MARCH 21ST 2019

Western Laboratories, Inc. - Parma, Idaho

John P. Taberna
Soil Scientist & Owner



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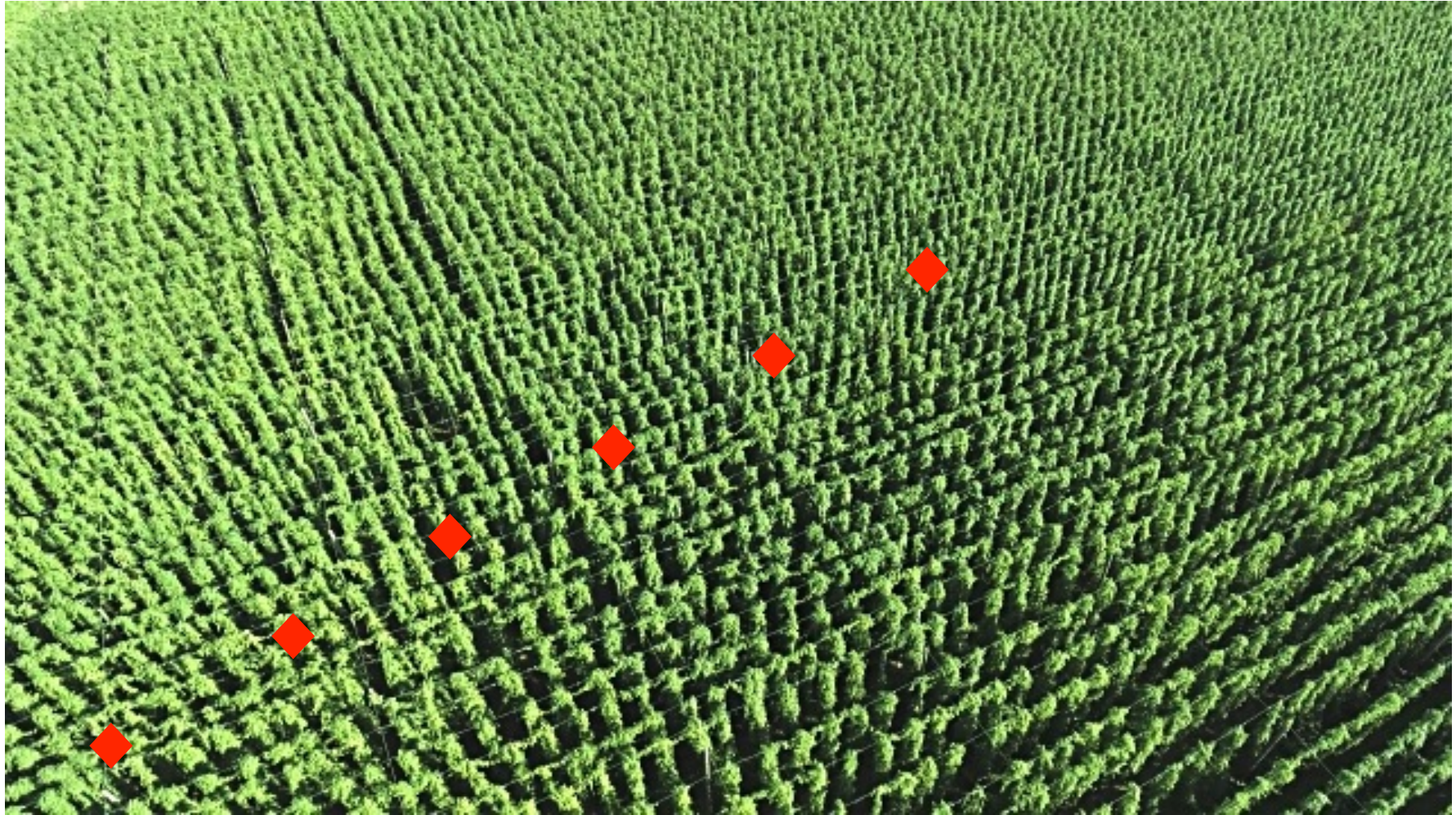
211 Hwy 95 Parma, Idaho 83660



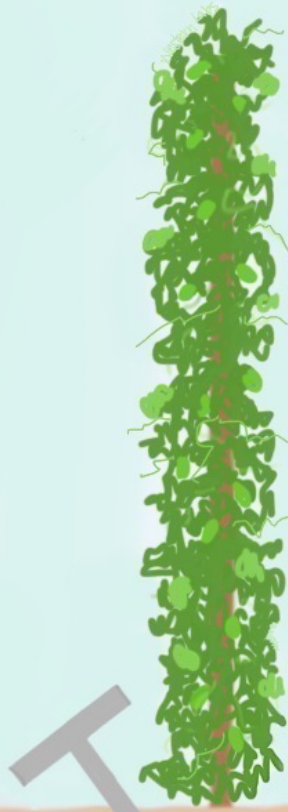
Washington

Oregon

Idaho



Collecting a Soil Sample



10-12 Inches Deep



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Methods: www.westernlaboratories.com/methods.



Dealer:

Reported: 6-2-2016

Test #: 1S

Grower:

Field ID:

Lab #:
32611

AGRICULTURAL SOIL REPORT

ELEMENT	ANSWER	INTERP	SHOULD BE	ELEMENT	ANSWER	INTERP	SHOULD BE
pH-Soil	6.8	Neutral Soil		Sulfur-ppm	15	Low	20 +
pH-SMP				Calcium-ppm	3242	Optimum	1,800 +
Soluble Salts	0.46	Optimum	< 1.5	Magnesium-ppm	403	Optimum	250 +
% Lime	0	No lime		Sodium-ppm	78	Optimum	< 225
% Organic Matter	2.22	Low		Zinc-ppm	1.8	Optimum	1.0 - 3.0
Nitrates-ppm	23	Optimum	10 - 35	Copper-ppm	0.7	Low	0.8 - 2.5
Ammonium-ppm	12	Optimum	5 +	Manganese-ppm	2	Very Low	6 - 30
Phosphorus-ppm	45	High	25 - 40	Iron-ppm	7	Very Low	25 +
Phos-ppm-Bray			50 - 100	Boron-ppm	0.2	Very Low	0.7 - 1.5
Potassium-ppm	193	Low	300 +	TBS%	84		
Texture	Sandy Loam		Water Holding Capacity/foot	1.47	Bulk Density	1.5	
Cation Exchange Capacity - CEC	11		P Index	Fertilizer Suggestions in Pounds per Acre for the whole season			
Percent Base Saturation	184			Crop	Hops	Hops	
BASES	IDEAL	YOURS		NO3 ppm	NH4 ppm		
Calcium-% of CEC	65-80	146	1 Ft	23	12		Yield Goal 8 Bales 15 Bales
Magnesium-% of CEC	10-20	30	2 Ft				Past Crop
Potassium-% of CEC	2-6	5	3 Ft				Acres
Sodium-% of CEC (ESP)	< 5	3	Total N PPM		35		Nitrogen 15 120
Hydrogen-% of CEC	< 15		Lbs N / Acre		105		Phosphate
Ratio	Ideal	Yours	Evaluation	Recommendations			
Ca:Mg	6-20:1	8 :1	OK	Add Phos for P INDEX			
Ca:K pH >7	15:1	:1		Potash	39	241	
Ca:K pH <7	10:1	17 :1	Low	P.F. Sulfur	11	46	
Ca:P pH >7	100:1	:1		Elemental Sulfur			
Ca:P pH <7	40:1	72:1	High	Watch P			
P:Zn	15:1	25 :1	High	Watch Zn			
P:Mn	4:1	23:1	High	Watch Mn	Lime		
P:Cu	25:1	64 :1	High	Watch Cu	Dolomite 0		
Zn:Cu	3:1	3 :1	High	Watch Cu	Magnesium		
Mn:Zn	3:1	1 :1	OK		Zinc	5	
Mn:Cu	7:1	3 :1	OK		Manganese	2	8
K:B	200:1	965 :1	High	Watch B	Copper		
Mg:K	2:1	2 :1	Ok		Boron	1	3

Split apply Nitrogen. Nitrogen, sulfur and boron recs are made for this year. All other nutrient recs can be split over a two-year program. Tissue and soil test in-season gives the best results.

P.F. Sulfur = Plant Food Sulfur

Elemental Sulfur = Reclamation Sulfur

*"Always practice the laws of Agronomy"
John P. Taberna, Soil Scientist*

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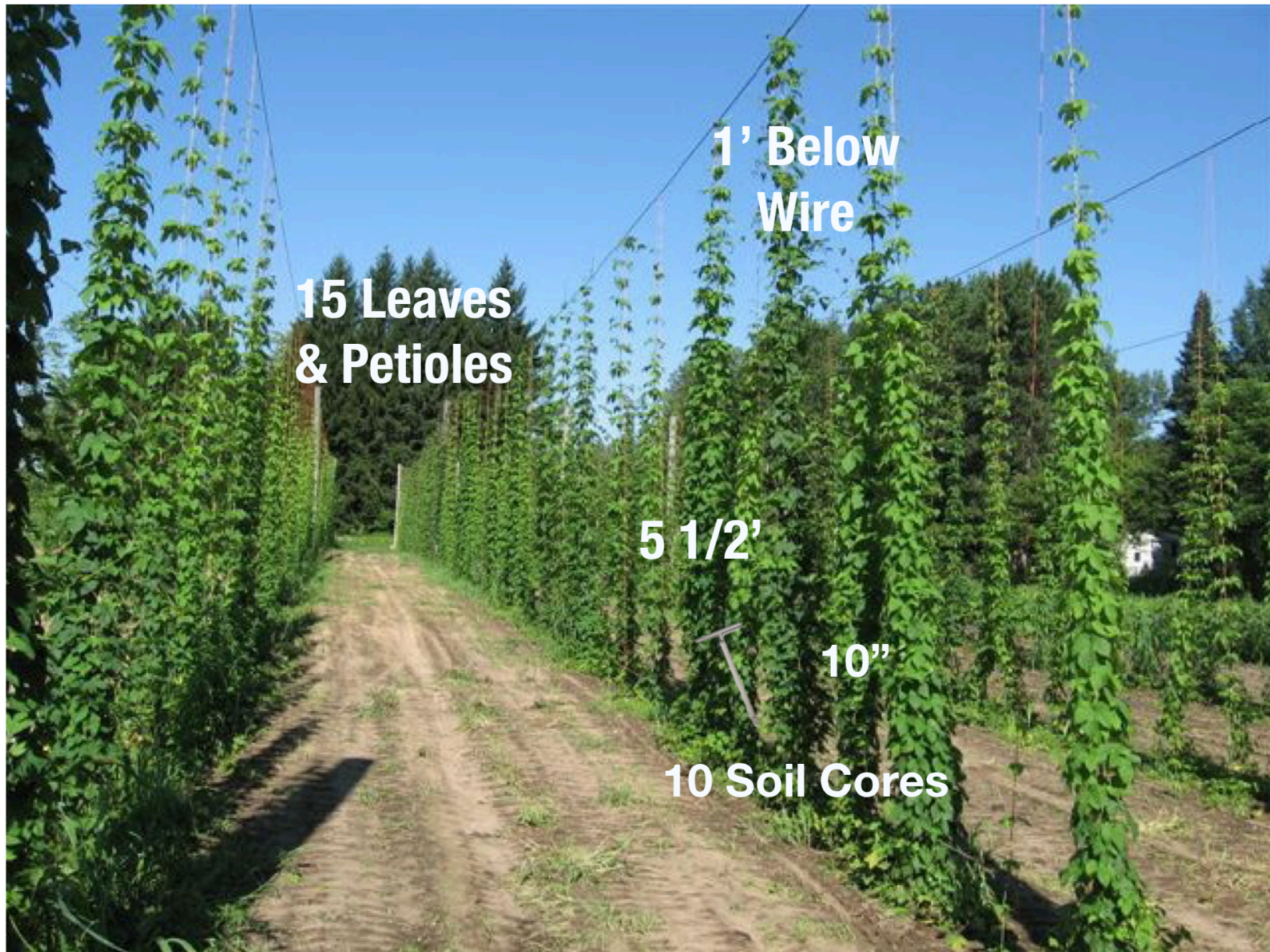
Dealer:
 Reported:
 Test #: 1S
 Grower:
 Field ID:
 Crop:



Lab #:
32611

EXTRACTABLE NUTRIENTS					SOIL SOLUTION			
ELEMENT	ANSWER	SHOULD BE	RECS	PRE-PLANT SUGGESTIONS	ELEMENT	ANSWER	SHOULD BE	ADD WEEKLY
			LBS	LBS			LBS / DAY	LBS
Phosphorus-ppm	45	25 - 40	85	56	P-lbs	0.6	2	5.0
Potassium-ppm	193	300 +	207	104	K-lbs	4	8	20
Calcium-ppm	3242	1,800 +	*	see 1	Ca-lbs	2	5	*
Magnesium-ppm	403	250 +			Mg-lbs	5	1	
			LBS	LBS			grams / DAY	OZ
Zinc-ppm	1.8	1.0 - 3.0	8	4	Zn-grams	34	40	0.2
Copper-ppm	0.7	0.8 - 2.5	1	1	Cu-grams	20	17	
Manganese-ppm	2	6 - 30	13	7	Mn-grams	11	35	0.7
Boron-ppm	0.2	0.7 - 1.5	3	3	B-grams	38	50	0.4

Area we tested







Rubbermaid

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FILL TO HERE

Dealer No: _____

Crop Advisor: _____

E-mail: _____

Grower: _____

Field ID: _____

Test No: _____ Crop: _____

Yield Goal: _____ Acres: _____

Past Crop: _____ Irrigation: _____

Concerns: _____

- | | |
|---|--------------------------------------|
| <input type="checkbox"/> Garden | <input type="checkbox"/> Lawn |
| <input type="checkbox"/> Giant Pumpkin | <input type="checkbox"/> Golf Course |
| <input type="checkbox"/> Soilless Media | <input type="checkbox"/> Nursery |

WESTERN LABS PARMA, IDAHO

Dealer _____

Grower _____

Crop Advisor _____

E-Mail _____

Test No. _____

Crop _____

Field ID _____

Irrigation: Sprinkler Furrow Drip

Hop varieties used in our research:

- . Cascade
- . Centennial
- . Chinook
- . Citra
- . Galena
- . Zeus
- . Mosaic
- . Simco
- . El Dorado
- . Crystal
- . Willamette



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Dealer:

Grower:

Variety: Hops

Field id:

SV No:

50501.2

SECRET VAULT 2016

WEEK			Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
LABORATORY NO			398	714	1159	1940	2834	3920	5017	6117	7191	8066
DATE			6/7	6/14	6/21	6/28	7/5	7/12	7/19	7/26	8/2	8/9
		IDEAL	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS
PLANT	% Nitrogen	> 4.0	5.7	5.4	5.6	4.8	4.2	3.4	3.7	3.6	3.3	3.2
SOIL SOL'N	Nitrogen-lbs	> 4.0	15	12	6	7	8	10	8	8	6	8
PLANT	% Phosphorus	>0.40	0.53	0.47	0.45	0.52	0.38	0.29	0.32	0.4	0.36	0.25
SOILSOL'N	Phosphorus-lbs	>0.85	1.00	1.50	1.80	1.70	1.20	1.60	1.00	1.50	2.00	2.40
PLANT	% Potassium	> 4.0	2.5	2.1	2.0	2.5	2.6	3.9	2.1	2.4	1.5	1.3
SOIL SOL'N	Potassium-lbs	> 5.0	5.4	4.3	6.5	4.5	4.8	5.3	4.4	6.2	7.6	8.1
PLANT	% Sulfur	>0.25	0.34	0.42	0.34	0.4	0.36	0.29	0.3	0.6	0.33	0.22
SOIL SOL'N	Sulfur-lbs	> 2.0	24.8	17.6	2.4	3.5	5.0	6.8	9.4	6.2	4.3	5.5
PLANT	% Calcium	> 2.5	1.1	1.3	2.7	3.3	3.8	2.3	2.6	2.1	1.2	1.7
SOIL SOL'N	Calcium-lbs	> 3.0	14.6	9.2	7.9	9.9	8.6	10.4	10.5	5.7	7.2	7.0
PLANT	% Magnesium	> 0.4	0.35	0.48	0.38	0.45	0.56	0.81	0.54	0.51	0.74	0.64
SOIL SOL'N	Magnesium-lbs	> 2.0	15.8	9.3	8.4	9.2	10.9	15.7	13.5	9.0	8.5	10.0
PLANT	ppm Zinc	> 60	32	30	29	32	42	37	50	69	80	100
SOIL SOL'N	Zinc-grams	> 60	94	40	27	39	54	55	90	84	75	72
PLANT	ppm Manganese	> 85	64	84	122	101	101	63	75	82	110	92
SOIL SOL'N	Manganese-grams	> 25	27	30	30	18	27	18	9	12	15	12
PLANT	ppm Copper	> 10	5	7	10	10	14	7	7	10	13	8
SOIL SOL'N	Copper-grams	> 17	12	12	3	6	9	12	12	18	27	24
PLANT	ppm Boron	> 55	33	46	58	63	52	60	50	30	45	50
SOIL SOL'N	Boron-grams	> 60	110	192	171	135	327	156	405	126	87	102

WESTERN LABORATORIES

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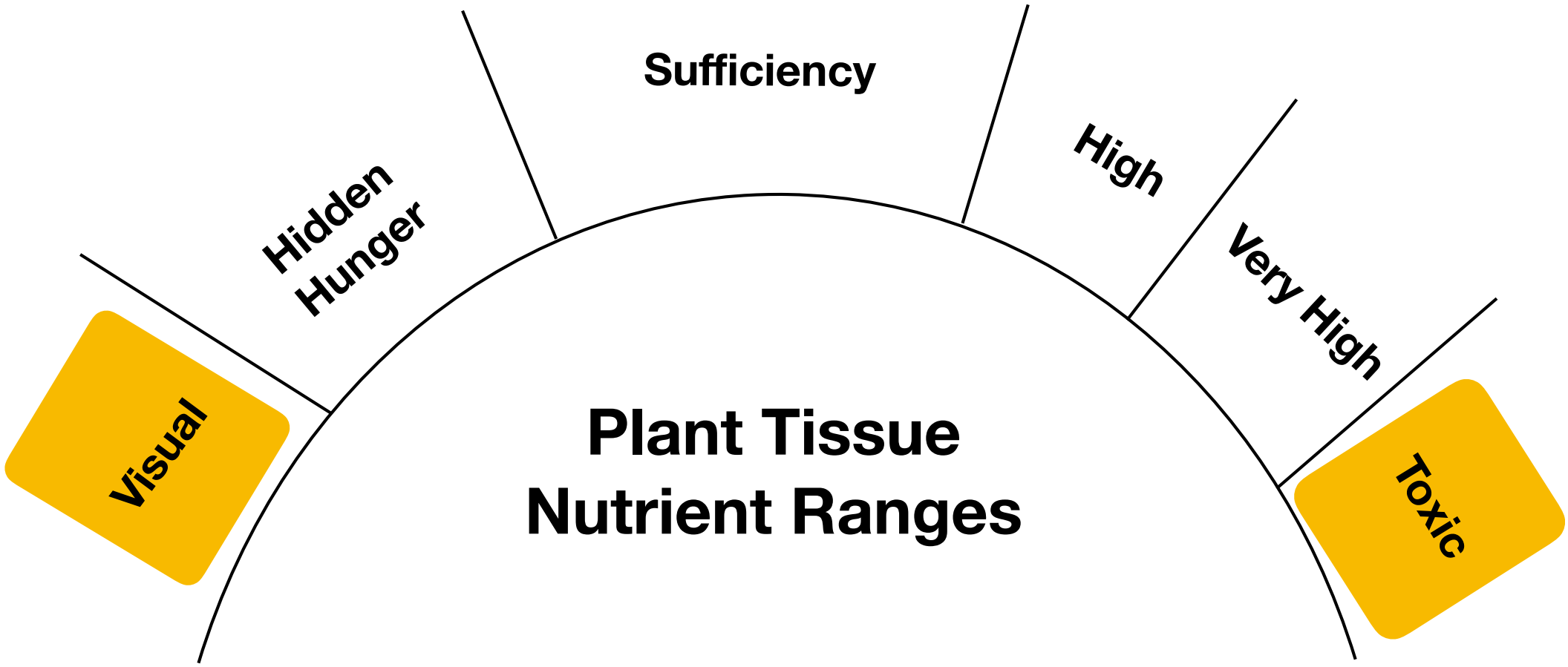
Dealer:
Grower:
Variety:
Field id:

SV No:

60251

SECRET VAULT 2018

WEEK			Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
LABORATORY NO			60	152	335	777	1456	2326	3436	4563	5534	6733
DATE			5/23	5/31	6/7	6/14	6/21	6/28	7/9	7/13	7/19	7/27
	IDEAL	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS	YOURS
PLANT	% Nitrogen	> 0.8	4.9	5.2	4.8	4.8	4.4	3.9	4.2	4.1	3.1	2.9
SOILSOL'N	Nitrogen-lbs	> 0.0	6	5	4	2	2	3	4	3	4	4
PLANT	% Phosphorus	>0.33	0.74	0.59	0.67	0.71	0.6	0.4	0.44	0.37	0.33	0.31
SOILSOL'N	Phosphorus-lbs	>0.85	6.20	5.60	4.10	3.10	2.90	2.80	2.10	1.10	1.50	1.20
PLANT	% Potassium	> 2.8	3.0	2.7	3.4	3.2	2.9	2.1	1.7	1.8	2.0	1.8
SOILSOL'N	Potassium-lbs	> 5.0	13.2	12.3	15.2	13.5	12.6	9.6	9.0	7.6	8.8	9.6
PLANT	% Sulfur	>0.23	0.43	0.3	0.41	0.38	0.29	0.26	0.28	0.28	0.29	0.25
SOILSOL'N	Sulfur-lbs	> 1.0	1.9	2.3	3.0	2.4	2.0	2.9	2.1	2.7	1.6	1.6
PLANT	% Calcium	> .6	1.8	1.7	2.1	2.2	2.5	2.7	3.3	2.3	2.8	2.7
SOILSOL'N	Calcium-lbs	> 3.0	7.5	9.6	8.3	7.0	7.6	5.9	5.7	5.4	6.2	6.7
PLANT	% Magnesium	>0.35	0.39	0.39	0.43	0.5	0.62	0.73	0.71	0.7	0.75	0.75
SOILSOL'N	Magnesium-lbs	> 1.0	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.8	0.7	0.7
PLANT	ppm Zinc	> 25	45	45	34	40	43	45	54	62	63	70
SOILSOL'N	Zinc-grams	> 30	105	96	69	84	78	69	78	63	57	51
PLANT	ppm Manganese	> 36	148	149	152	174	155	122	105	98	78	74
SOILSOL'N	Manganese-grams	> 20	27	27	33	39	45	36	54	48	54	48
PLANT	ppm Copper	> 7	23	27	20	21	17	20	15	11	14	15
SOILSOL'N	Copper-grams	> 12	39	30	36	39	45	54	39	48	48	51
PLANT	ppm Boron	> 18	31	32	29	21	25	31	37	43	52	52
SOILSOL'N	Boron-grams	> 15	18	14	17	17	21	17	20	17	14	17



Visual

**Hidden
Hunger**

Sufficiency

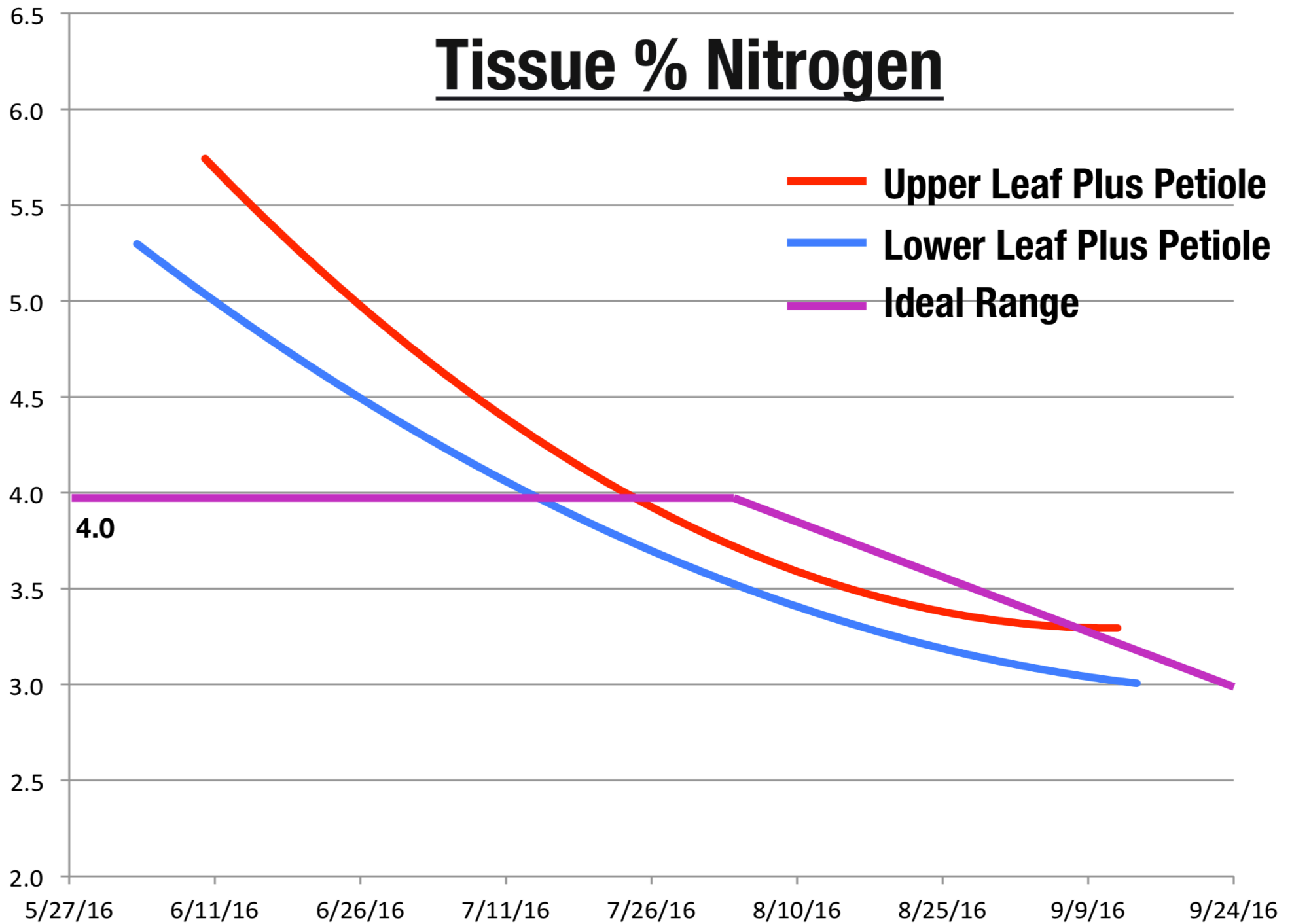
High

Very High

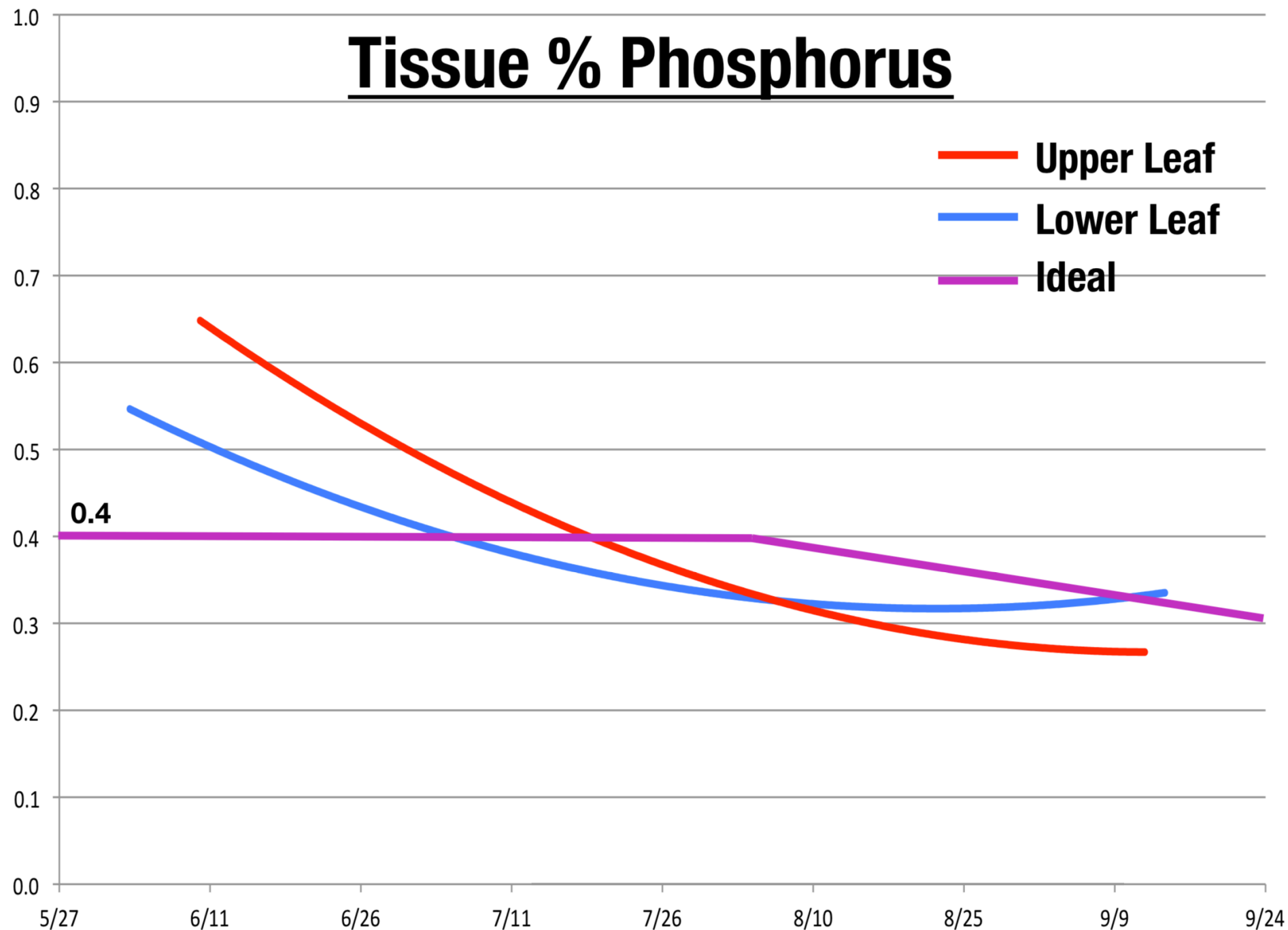
Toxic

**Plant Tissue
Nutrient Ranges**

Tissue % Nitrogen

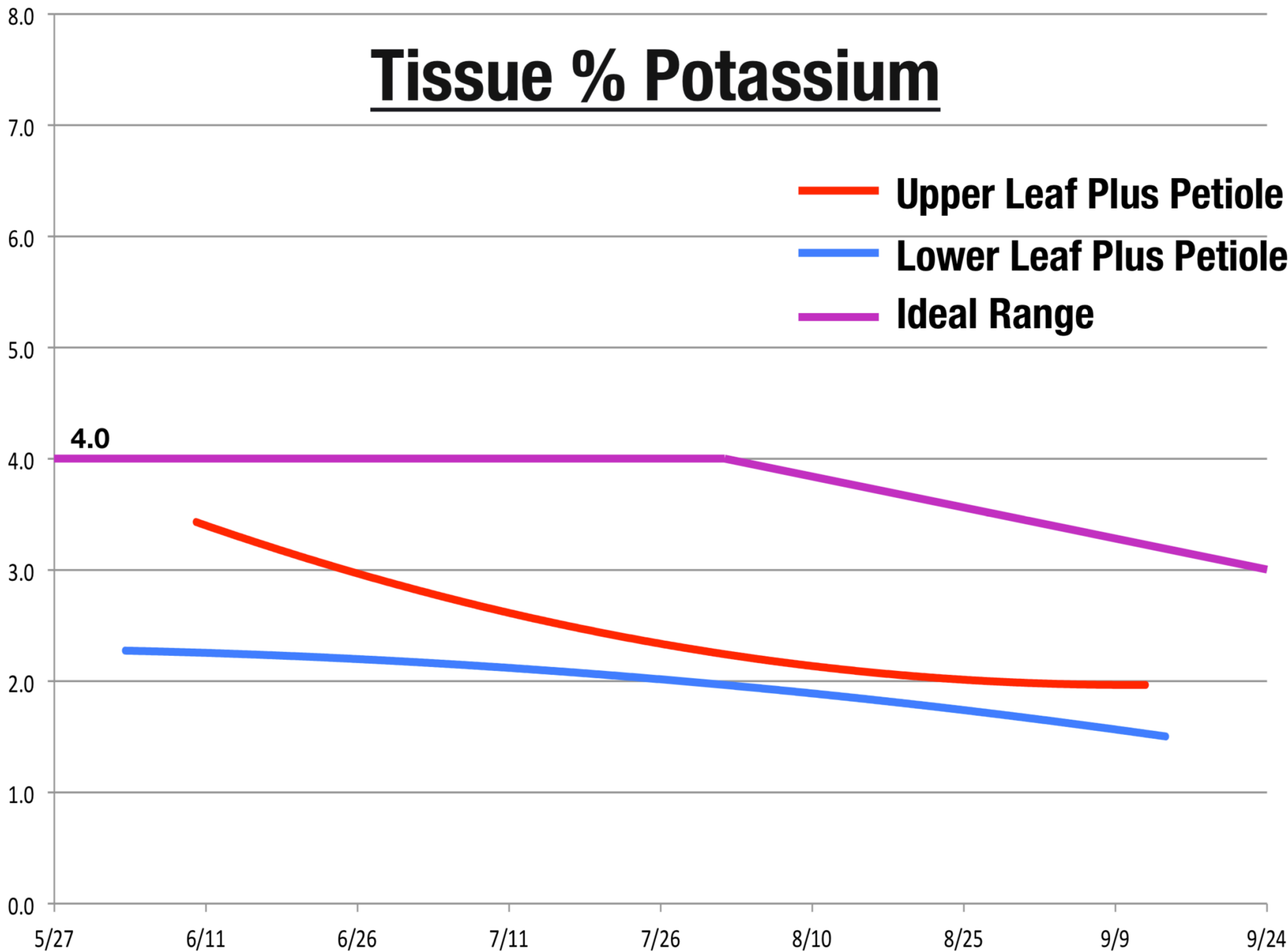


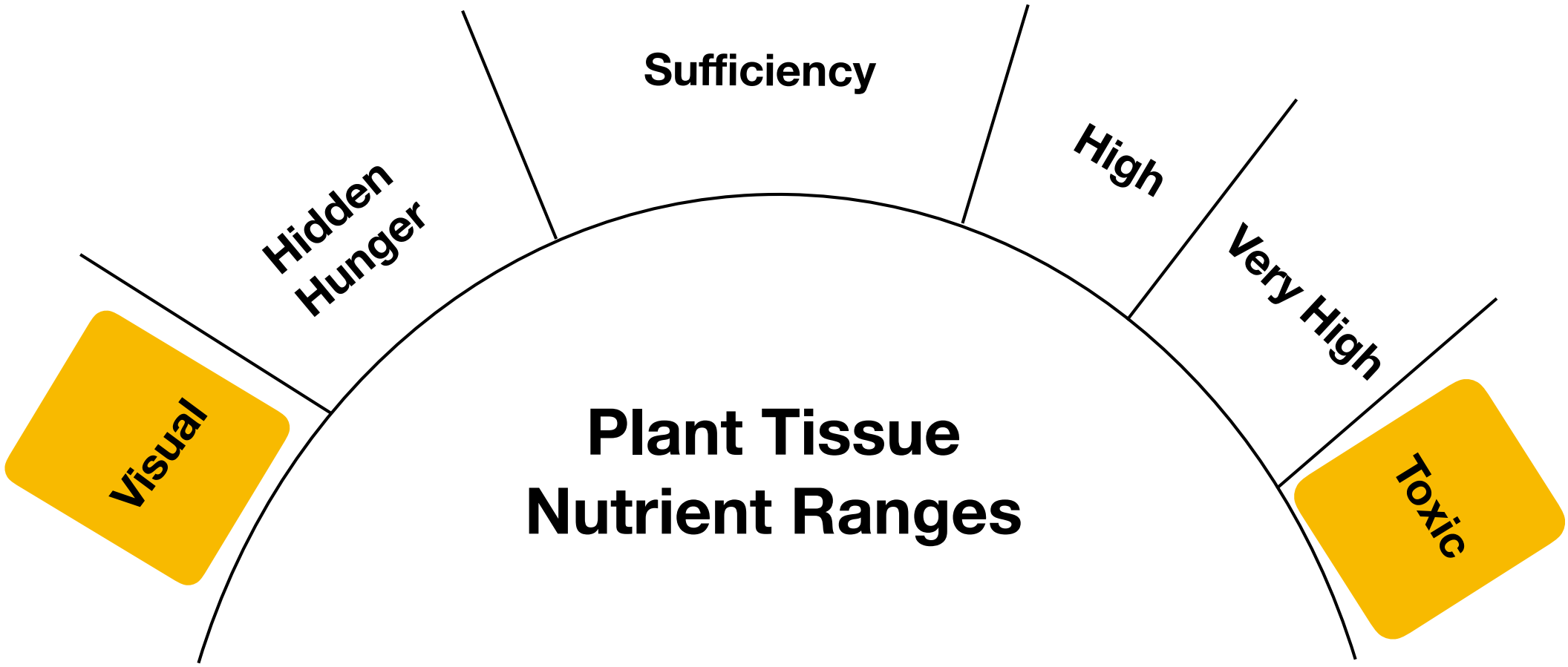
Tissue % Phosphorus



Tissue % Potassium

- Upper Leaf Plus Petiole
- Lower Leaf Plus Petiole
- Ideal Range





Visual

**Hidden
Hunger**

Sufficiency

High

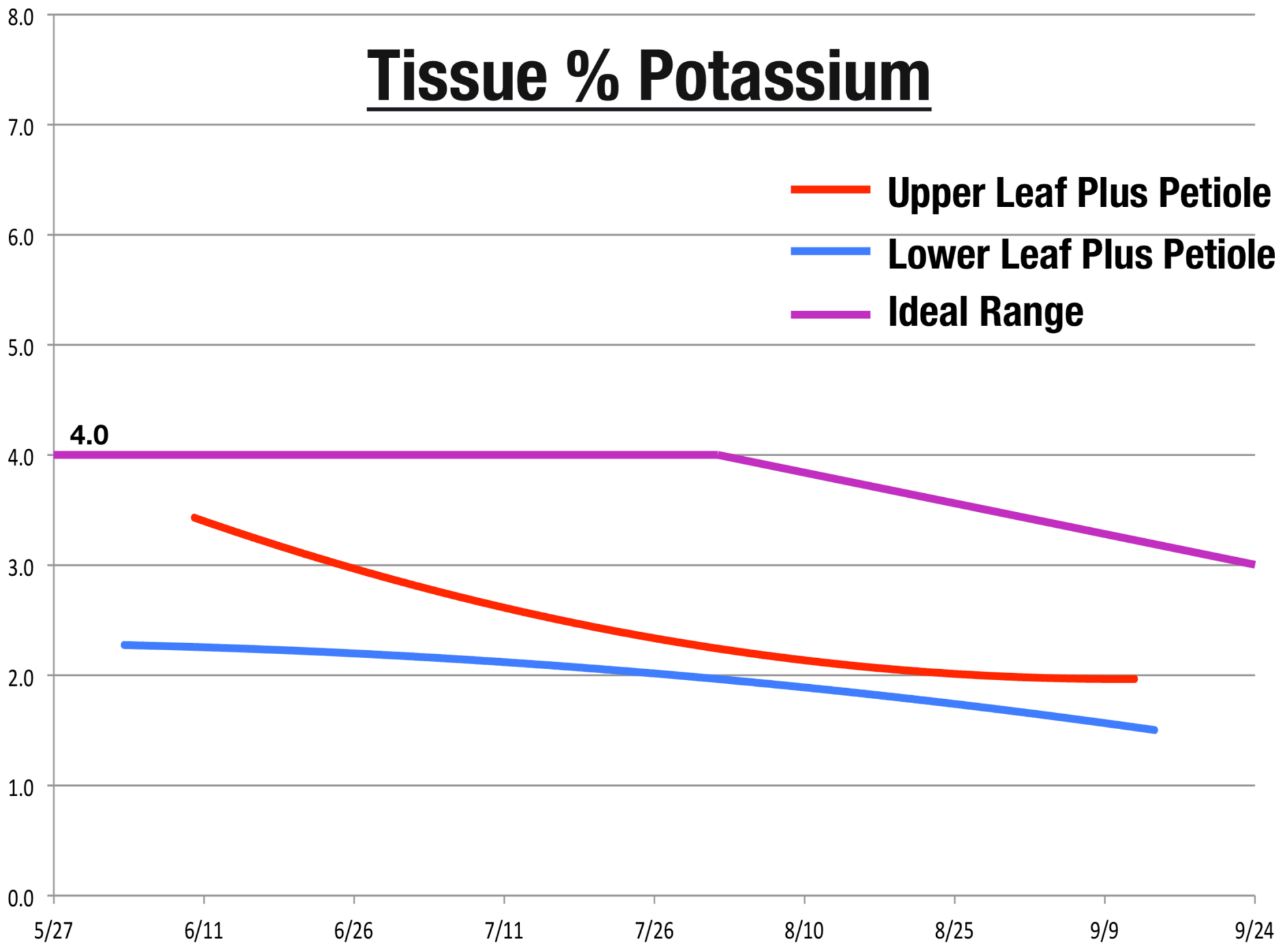
Very High

Toxic

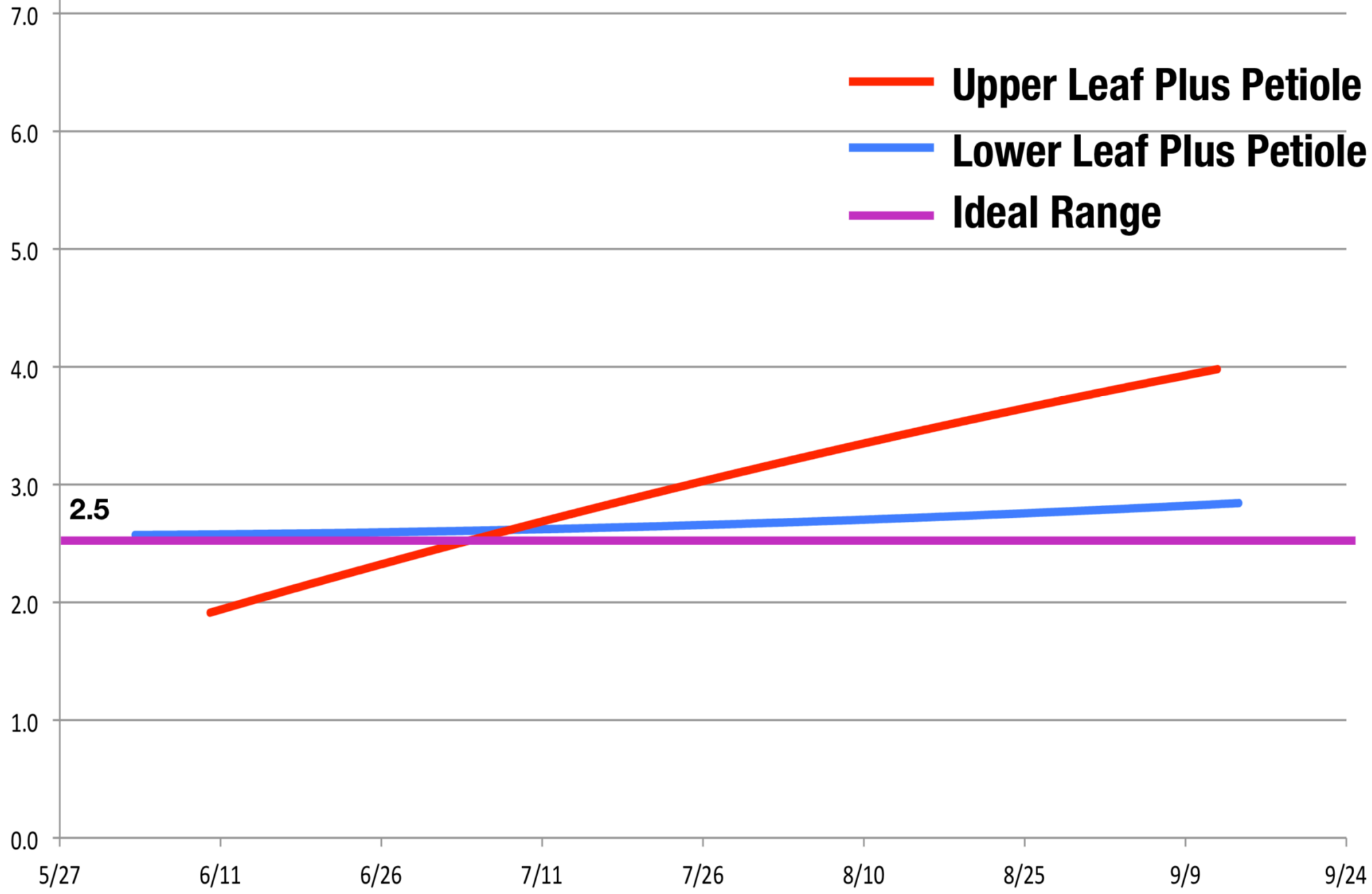
**Plant Tissue
Nutrient Ranges**

Tissue % Potassium

- Upper Leaf Plus Petiole
- Lower Leaf Plus Petiole
- Ideal Range

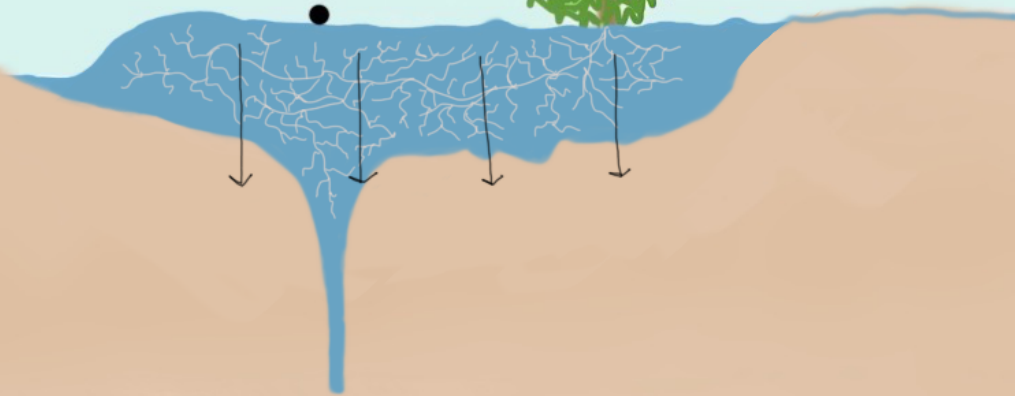


Tissue % Calcium



Gravitational Water

Drip Tape



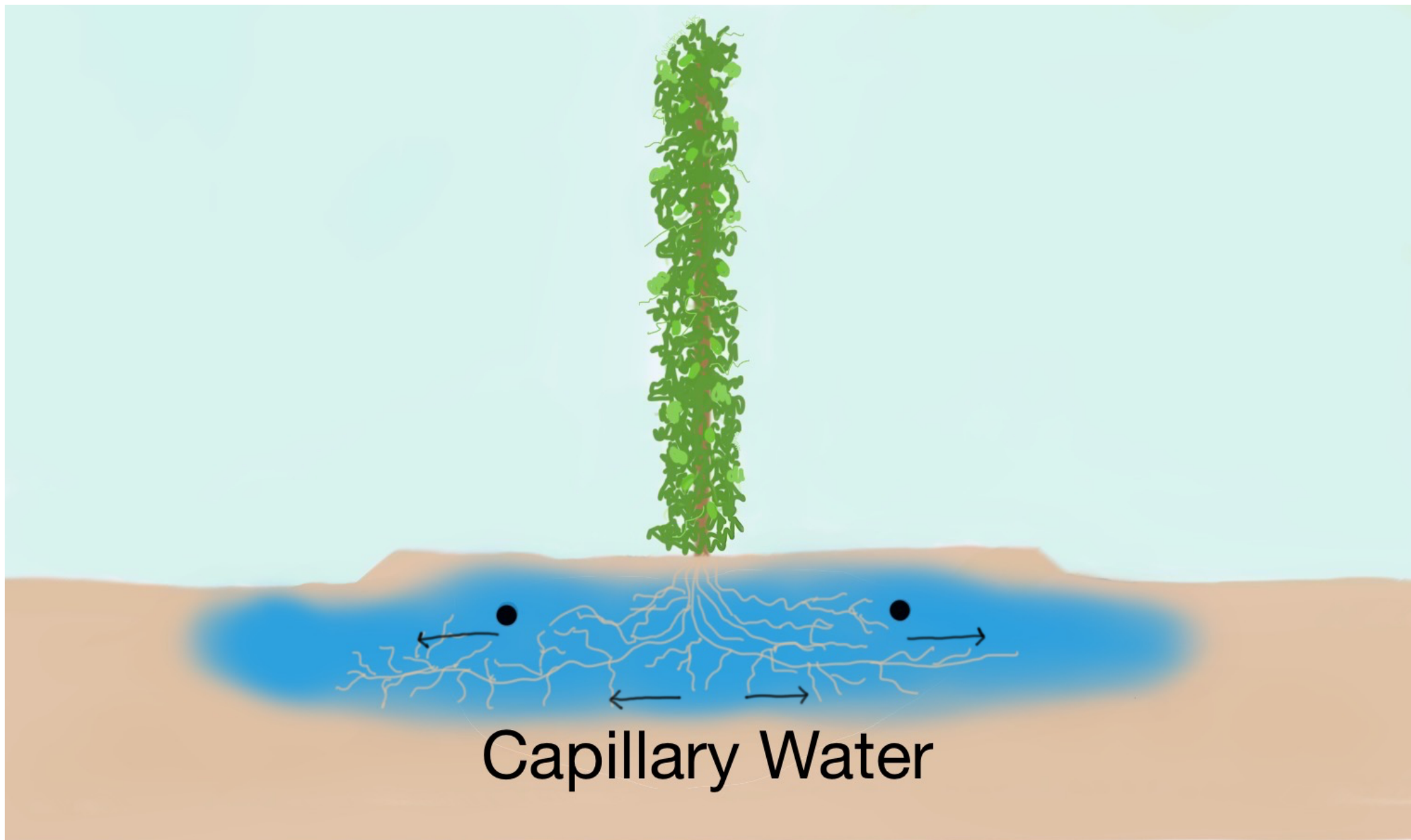
Partial Root Zone Drying Drip System in 'Autumn Rose Fuji'





**Above-Ground Full Drip System
for 'Autumn Rose Fuji'**





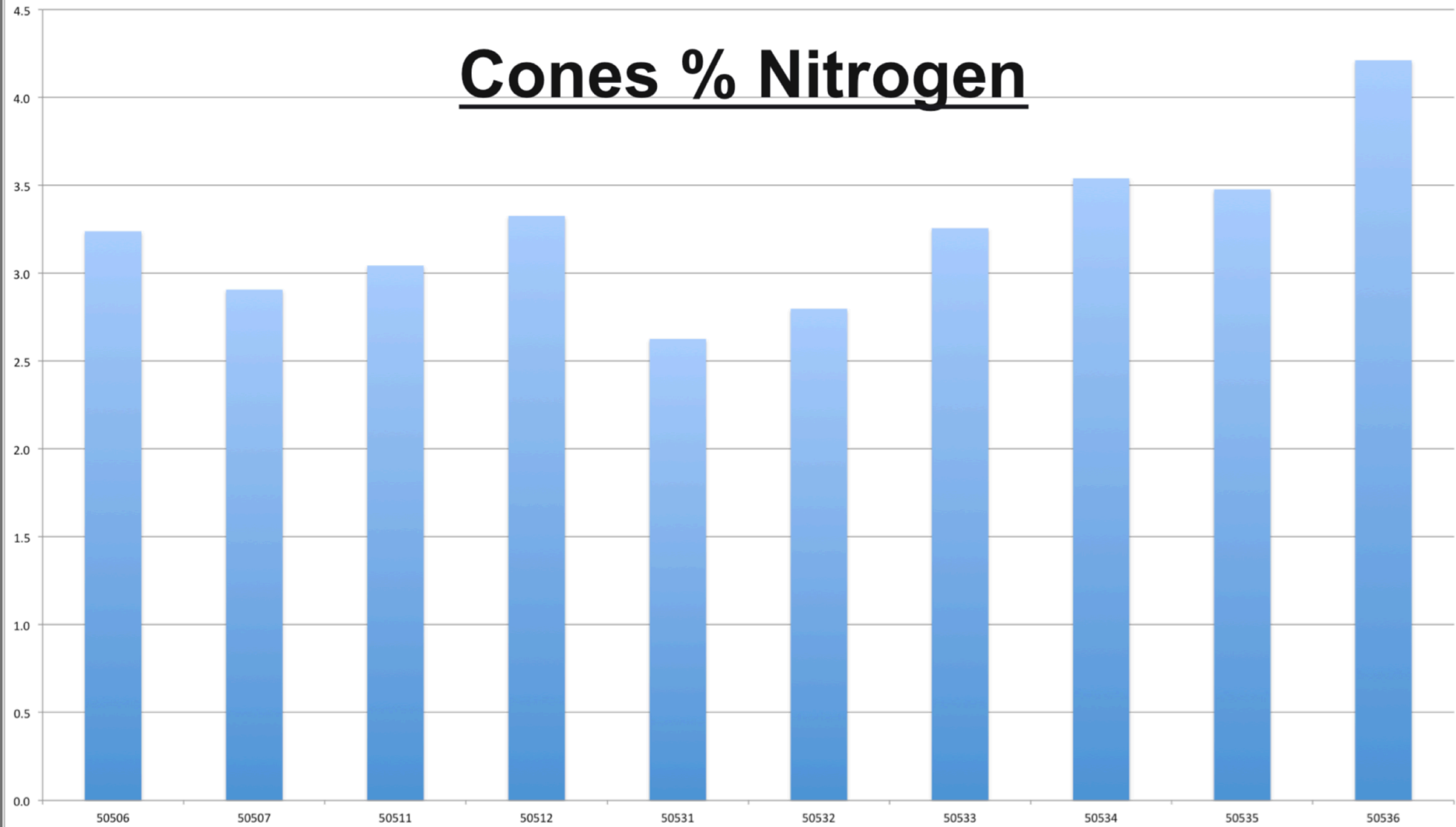
Capillary Water



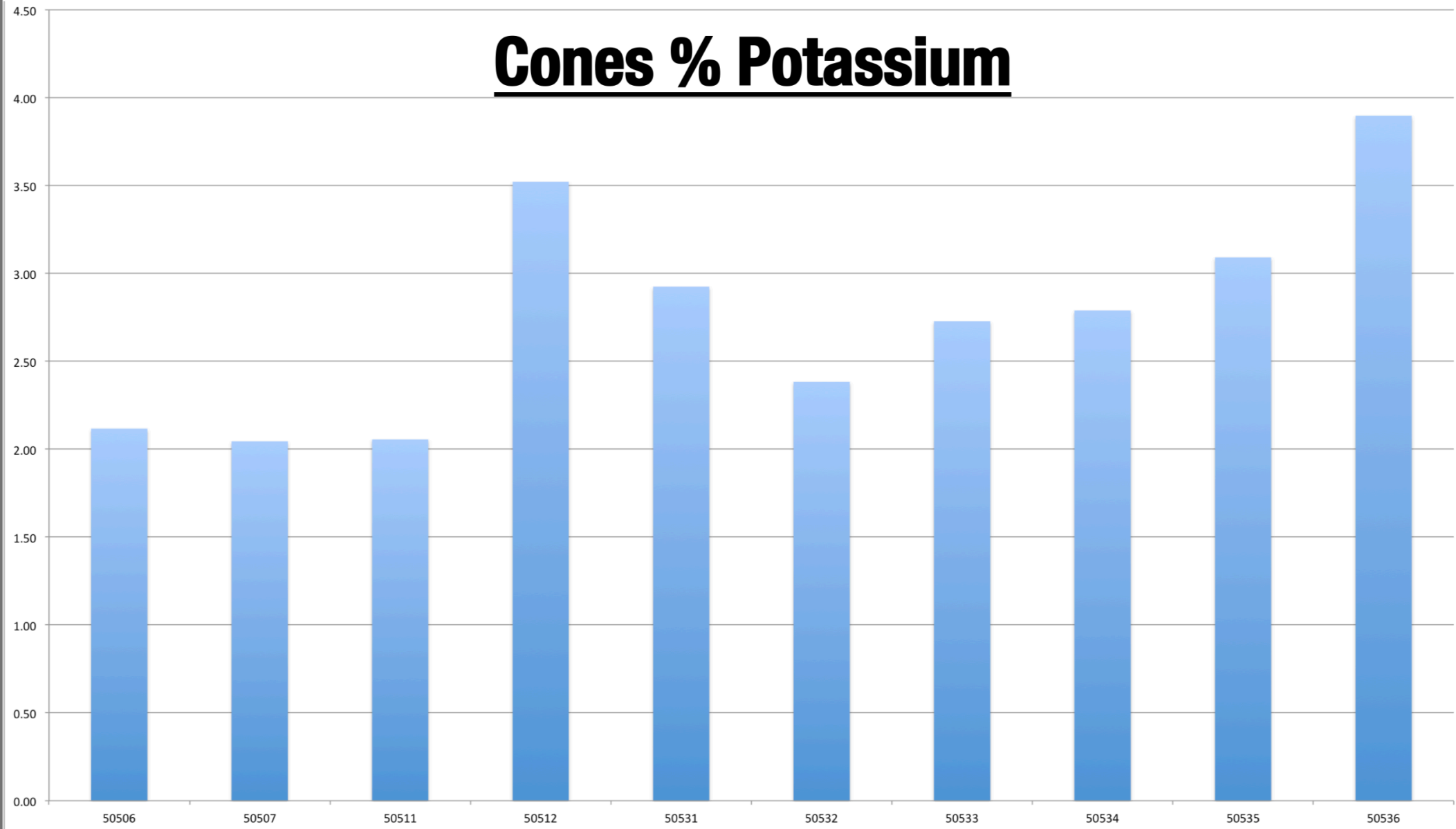


WEEK			Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
LABORATORY NO			891	1631	2529	3526	4648	5703	6836	7772	8457	
DATE			6/18	6/25	7/2	7/9	7/16	7/23	7/30	8/6	8/13	
		SUFFICIENCY RANGE	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST	YOUR TEST
PLANT	Nitrates ppm	9399	20420	19500	20523	19414	22243	19398	16449	16763	13402	
SOIL	Nitrogen lbs		17	14	16	20	15	18	18	18	15.4	
PLANT	Phosphorus %	0.20 -.55	0.69	0.41	0.38	0.46	0.5	0.34	0.36	0.48	0.42	
SOIL	Phosphorus lbs	0.60	2.60	1.50	2.00	1.40	1.70	2.30	1.40	1.80	2	
PLANT	Potassium %	7.5- 15	10.2	10.2	8.6	9.4	9.9	8.3	8.2	9.5	8.08	
SOIL	Potassium lbs	7.0	5.0	4.4	4.9	5.6	5.4	6.5	5.1	5.8	5	

Cones % Nitrogen

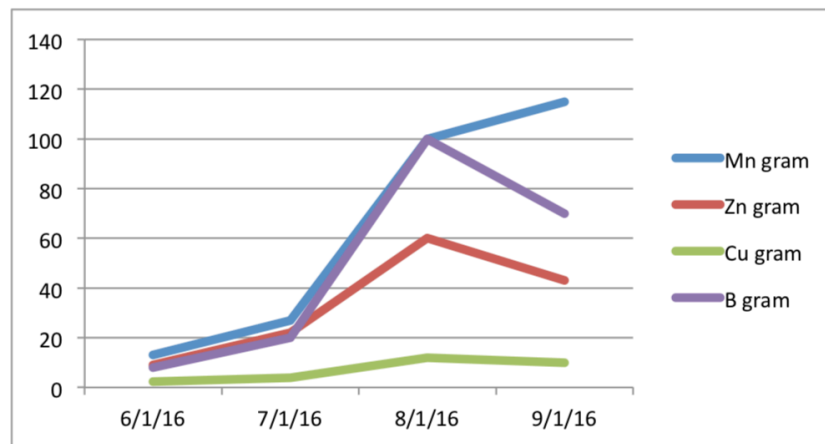
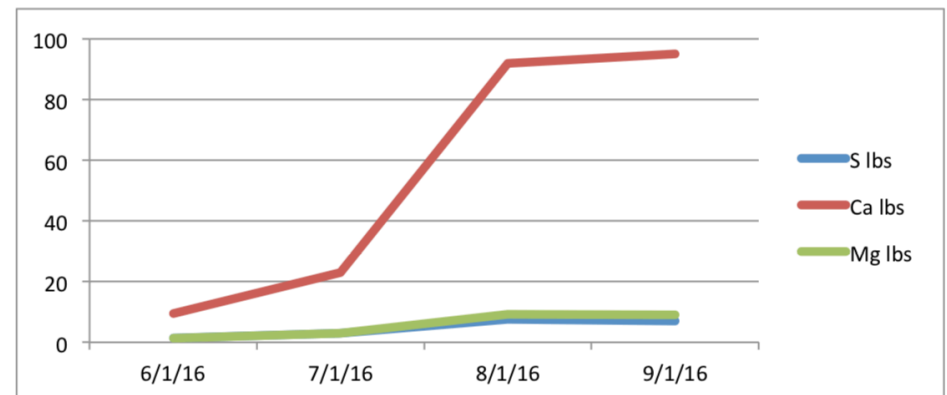
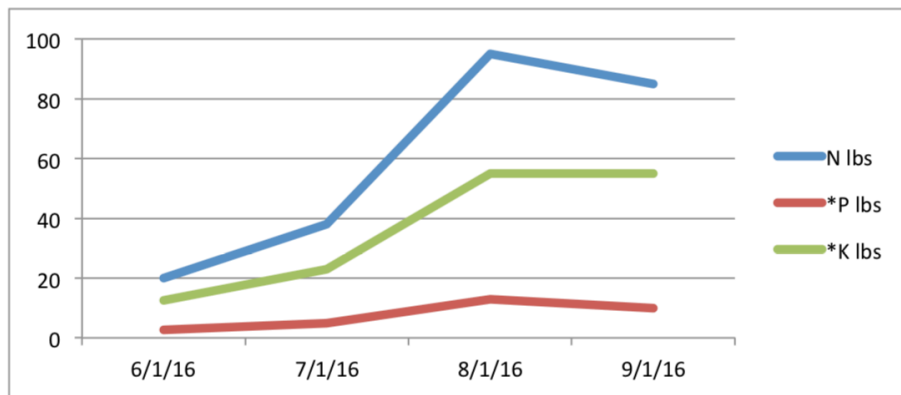


Cones % Potassium



Total Bine Analysis Per Acre

Time	Pounds*	N lbs	*P lbs	*K lbs	S lbs	Ca lbs	Mg lbs	Mn gram	Zn gram	Cu gram	B gram
6/1/16	400*	20	2.6	12.5	1.4	9.5	1.3	13	9	2.3	8
7/1/16	1800*	38	5	23	3	23	3	27	22	4	20
8/1/16	3400*	95	13	55	7.5	92	9.2	100	60	12	100
9/1/16	3300*	85	10	55	7	95	9	115	43	10	70



*Bine Weight 100% Dry Per Acre

*P x 2.3 = Pounds P205

*K x 1.2 = Pounds K2O

Nutrients Removed by Bines Sept 1st, 2016 Minus Cones on Bines Dry Matter Weight of 3400 Pounds

	POUNDS						GRAMS			
	N	P*	K*	S	Ca	Mg	Zn	Mn	Cu	B
1 Bale	6	1.1	6	0.4	2.5	0.4	5	7	1.7	4
Bine	85	10	55	7	95	9	43	115	10	70
5 Bales	30	6	30	2	13	2	25	35	10	20
Total	115	16	85	9	108	11	68	150	20	90
10 Bales	60	11	60	4	25	4	50	70	20	40
Total	145	21	115	11	120	13	93	185	30	110
15 Bales	96	17	96	7	38	7	75	105	30	60
Total	181	27	151	14	133	16	118	220	40	130
20 Bales	120	22	120	9	50	9	100	140	40	80
Total	205	32	175	16	145	18	143	255	50	150
25 Bales	150	28	150	11	63	11	125	175	50	100
Total	235	38	205	18	158	20	168	290	60	170

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Are you waterboarding your hops?

