Corn Tissue Sampling Project
Date of Sampling Comparison

1) Show plant nutrient concentrations changes on 2 irrigated corn fields from V5 - VT

2) Consider how the plant nutrient concentrations change through the season on sites with low, medium and high P & K soil test levels.

3) Give a perspective of “Percentage” and “ppm”

4) Plant nutrient sufficiency ranges for corn – need for new research?

Richard Jenny
Agronomist
Agvise Laboratories
Benson, MN

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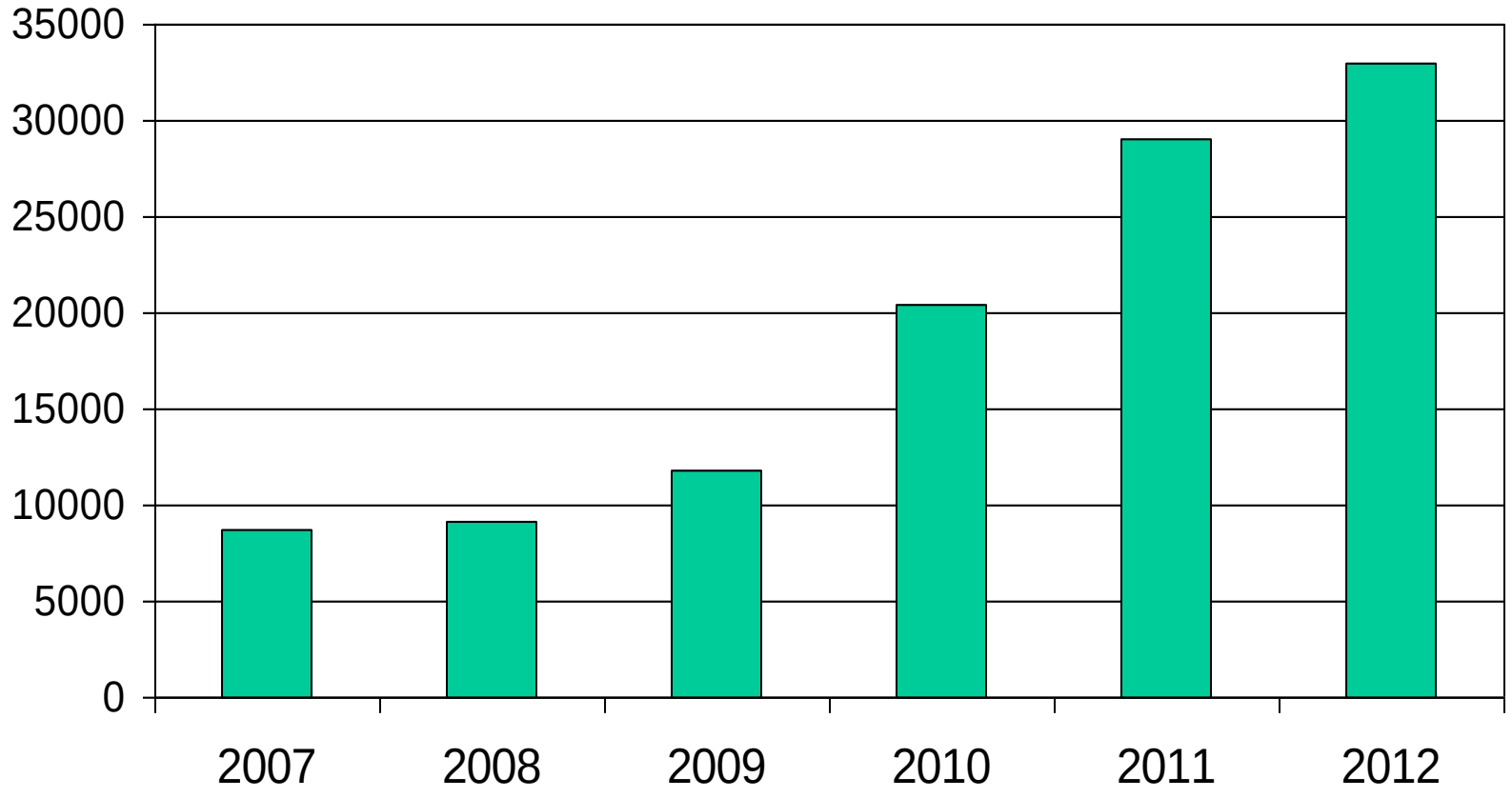
Plant Tissue Sample Volume

Northwood + Benson Labs
2007 - 2012



Nutrient Concentration Perspective

Percent & ppm

Percent:	**N, P, K, S, Ca, Mg**
ppm:	**Zn, Fe, Mn, Cu, B**

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Nutrient Concentration Perspective
Ex: 10,000 lbs of corn leaves

85% Water (8,500 lbs)
15% Dry matter (1,500 lbs)

Nutrient	Weight lbs
*C - H - O ~ 94%	1410
N @ 3%	45
P @ 0.3%	4.5
K @ 2%	30
S @ 0.2%	3
Ca @ 0.25%	3.75
Mg @ 0.25%	3.75

*C – H – O = Carbon, Hydrogen, Oxygen

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Nutrient Concentration Perspective

Ex: 10,000 lbs of corn leaves

85% Water (8,500 lbs)
15% Dry matter (1,500 lbs)

Nutrient	Weight lbs	Weight onces	Weight coins
B @ 5 ppm	0.0075	0.12 oz	1.5 dimes
Cu @ 10 ppm	0.015	0.24 oz	3 dimes
Zn @ 20 ppm	0.03	0.48 oz	6 dimes
Mn @ 50 ppm	0.075	1.2 oz	6 quarters
Fe @ 200 ppm	0.3	4.8 oz	24 quarters

1 oz = 28.375 grams
1 dime = 2.26 grams
1 quarter = 5.62 grams

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Corn Tissue Sampling Project
Date of Sampling Comparison

Cooperator: Chris Goulet, Brent Huebner Morris, MN

1) 2 Fields : Irrigated, corn-on-corn 5 yrs, good moisture conditions existed.
2) 6 Sampling points (3 per field) – tissue and soil
    a) Each field was grid soil sampled prior to fertilizer application
        a) Field A in Fall 2010
        b) Field B in Fall 2011
    b) 2 Low, 2 Medium & 2 High points were identified (P & K)
3) Tissue samples collected in 2012 (13 sample dates)
    a) V5 – V8: June 6, 8, 11, 13, 15, 17, 19, 21
    b) VT : July 9, 11, 13, 15, 17
    c) All leaf samples
    d) Leaves collected across 24 planter rows
4) VR Fertilizer applied with strip tillage prior to planting

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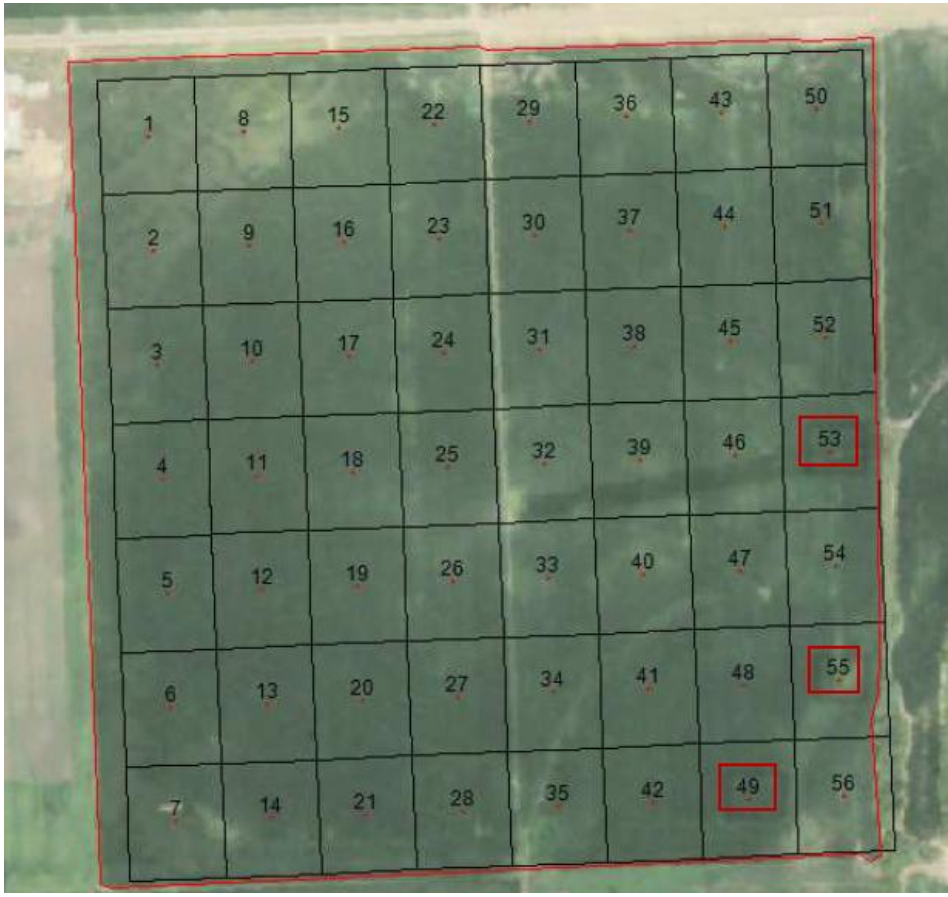
Field Images – Morris, MN

96 Day Triple Pro
Channel 19606
Yielded ~ 200 – 220 bu/a
Field A



92 Day Triple Pro
Channel 19209
Yielded ~ 200 – 220 bu/a
Field B

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Grid Soil Test Data

Low, Medium, High (P & K)

	Field A			Field B		
	Low	Medium	High	Low	Medium	High
P ppm	6 (Olsen)	10 (Bray1)	30 (Bray1)	5 (Olsen)	10 (Olsen)	40 (Bray1)
K ppm	103	117	198	114	124	198
Zn ppm	1.64	1.2	3	1	1.9	2
S lb/a	20	22	22			
B ppm	0.3	0.3	0.4			
pH	7.5	7.1	6.8	7.5	7.2	6.6
OM %	2.2	2.1	3.7	3.7	5.1	6.2

***Soil Sampled prior to VRT application**
Field A in Fall 2010
Field B in Fall 2011
Planted: Spring 2012

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Fertilizer Applied 2012

	Fertilizer Applied					
	Field A			Field B		
	Low	Med	High	Low	Med	High
N (Planting Strip-Till)	69	77	69	80	76	65
N (Sidedress UAN early June)	77	76	86	104	109	122
N (Pivot UAN end of July)	35	35	35	35	35	35
Total N Applied	181	188	190	219	220	222
P_2O_5 (Planting Strip-Till)	71	76	23	94	68	0
K_2O (Planting Strip-Till)	42	40	26	58	56	45
Zn (Planting Strip-Till) 9% chelate	2 pt	2 pt	2 pt	3 pt	3 pt	3 pt
Mg (Planting Strip-Till) chelate	1 pt	1 pt	1 pt	1 pt	1 pt	1 pt

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Interesting Side Note:
Effects of fertilizer on soil test values

	Sampled in the Strip-Till band					
	Field A			Field B		
	Low	Med	High	Low	Med	High
P-B1 ppm	72	76	91		48	28
P-O ppm				56		
K ppm	147	238	329	131	157	244
Zn ppm	2.79	2.03	3.66	2.35	3.18	1.69
S lb/a	28	20	26	24	22	16
B ppm	0.33	0.29	0.34	0.49	0.56	0.54

***Soil sampled after VRT fertilizer application in the strip till band.**

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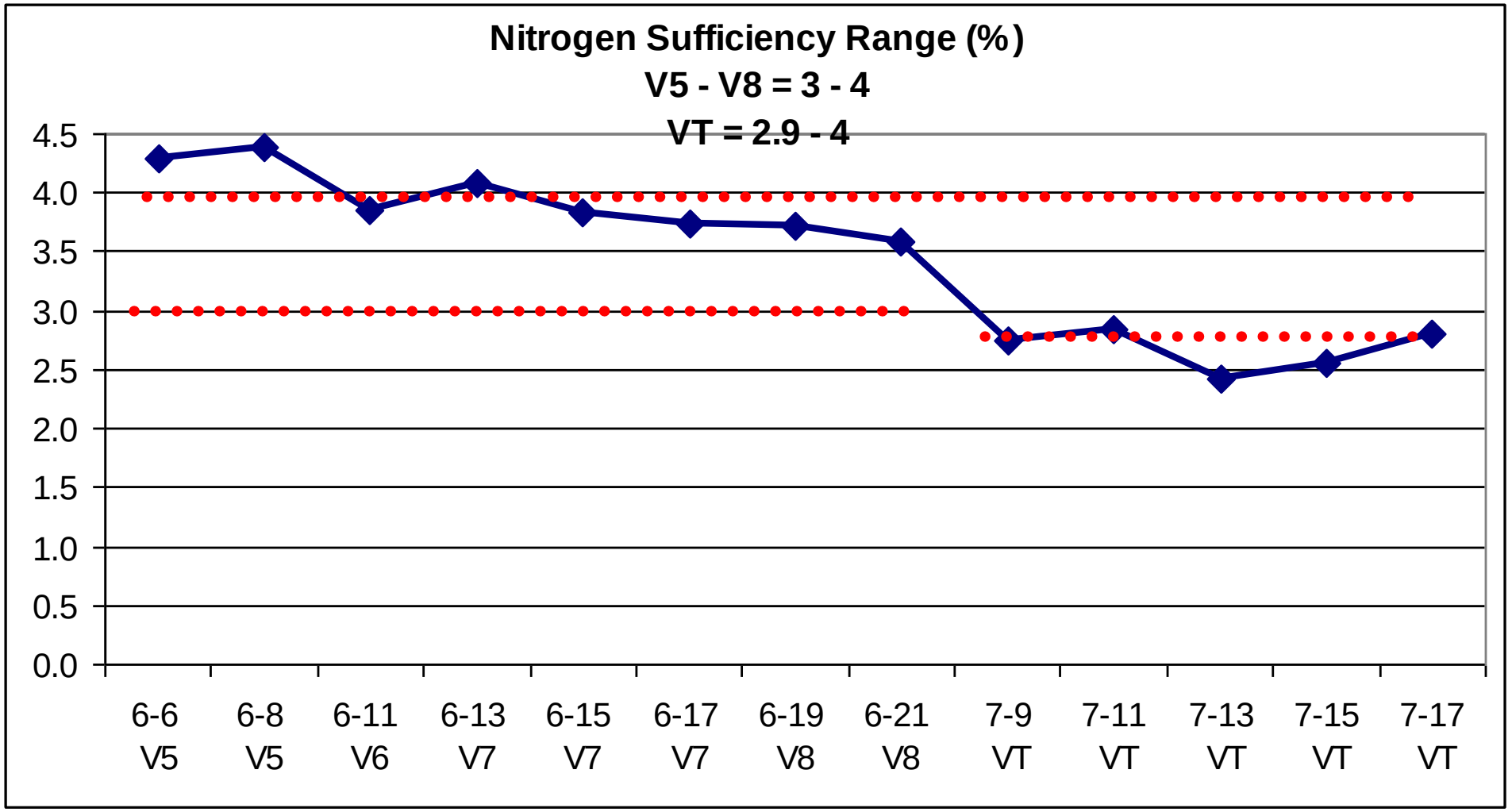
Tissue Test Results Based on Date of Sampling



Average of all 6 tissue samples (3 from each field) on each sample date.

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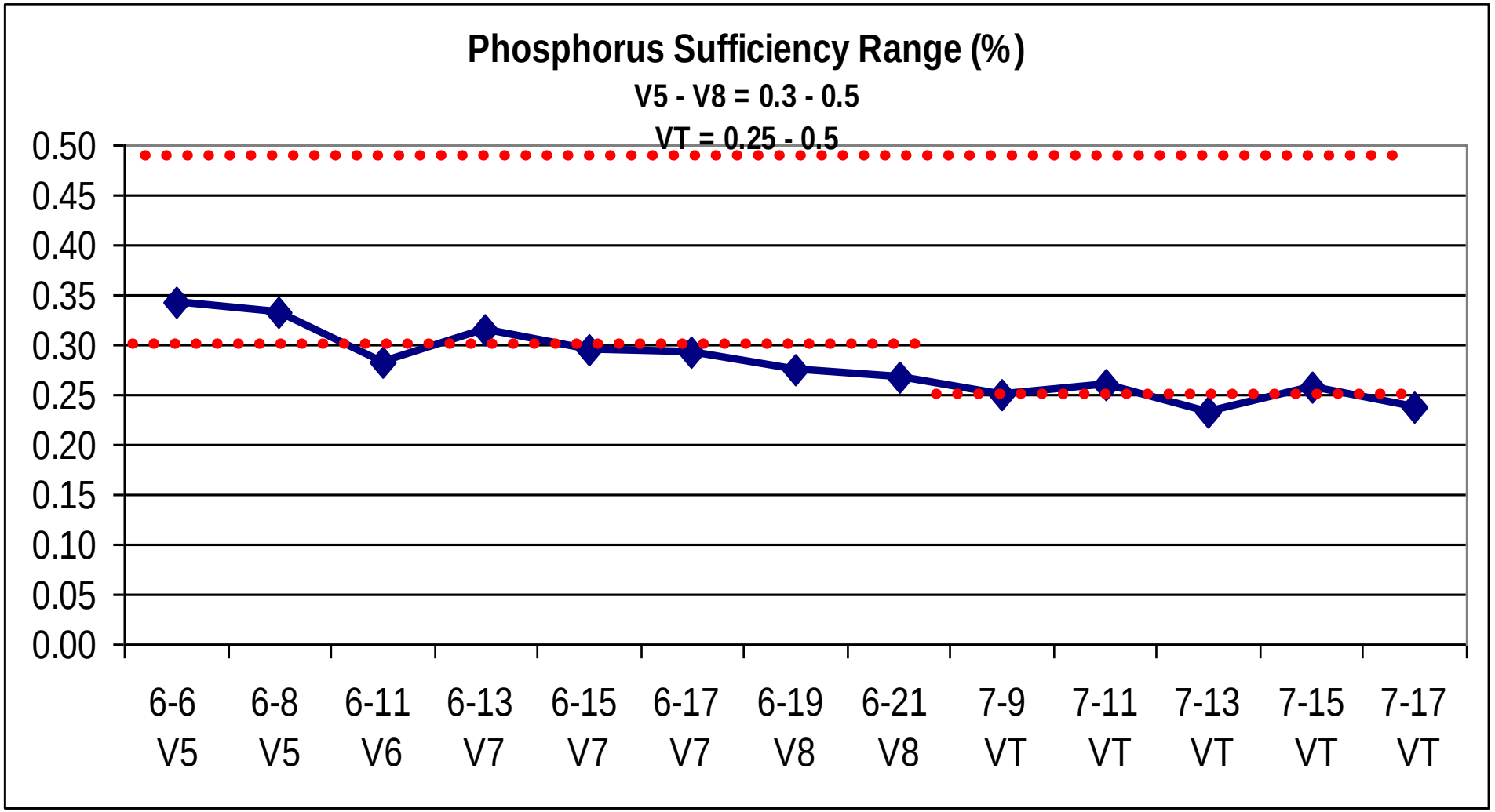

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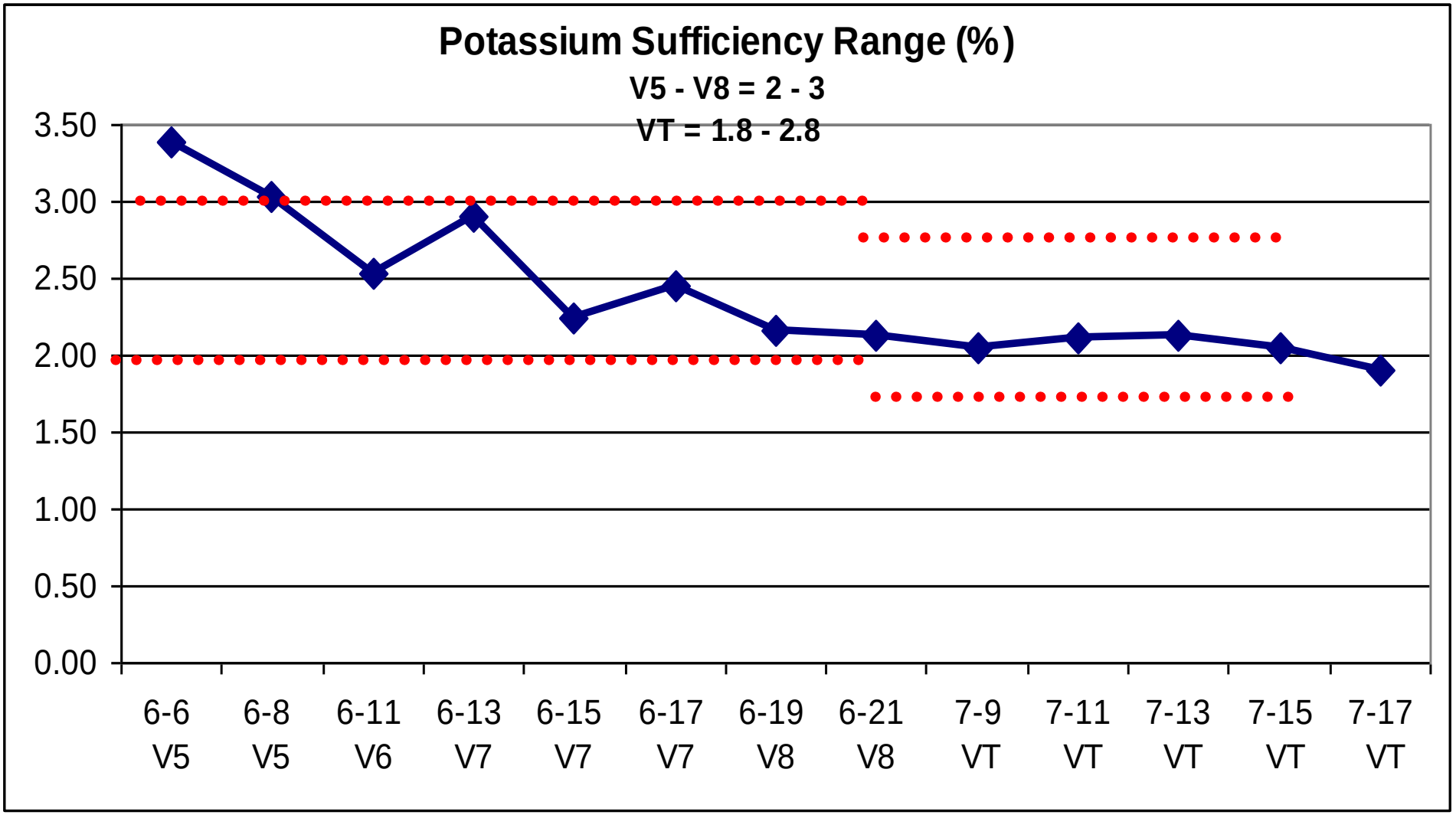

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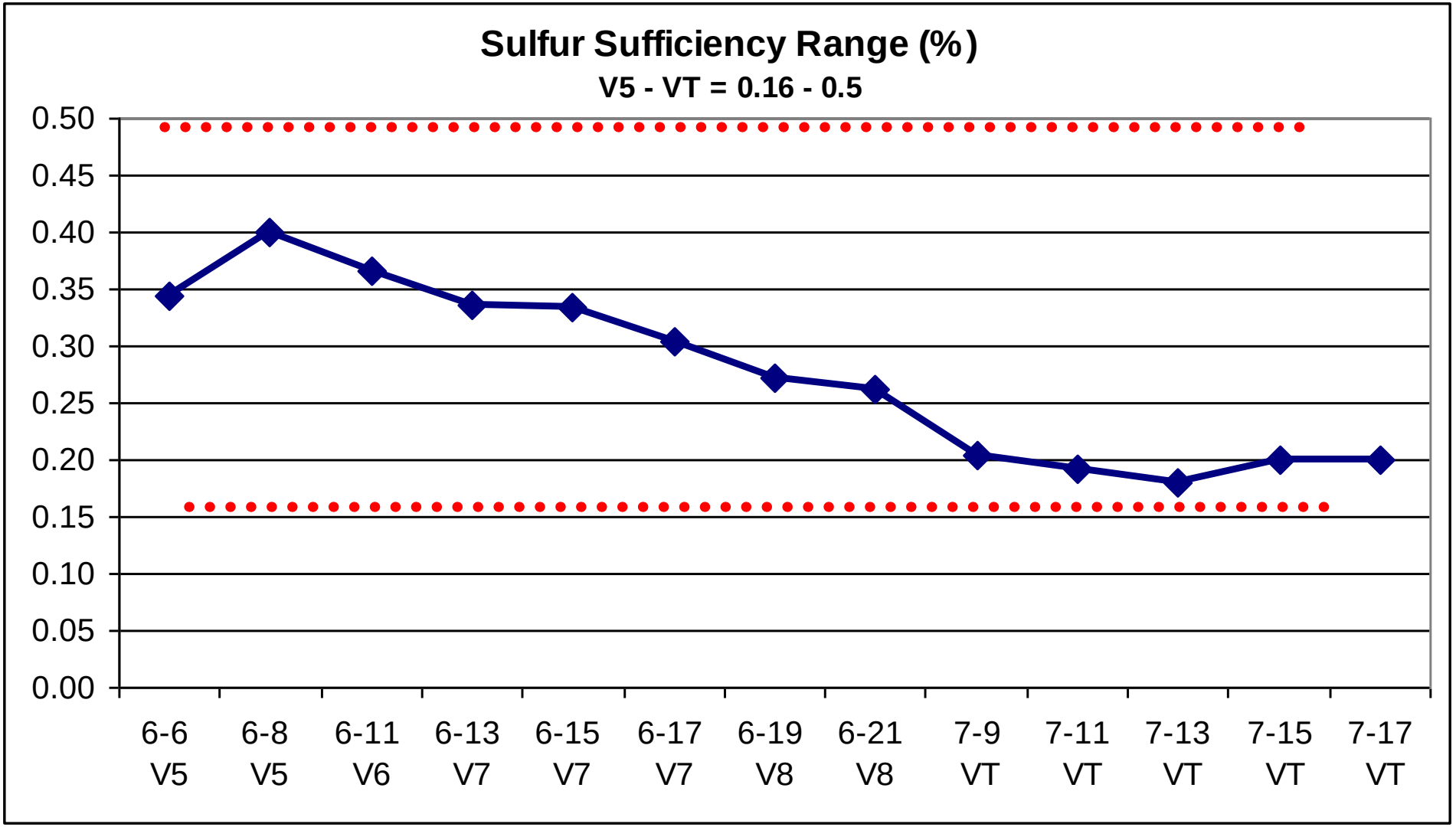

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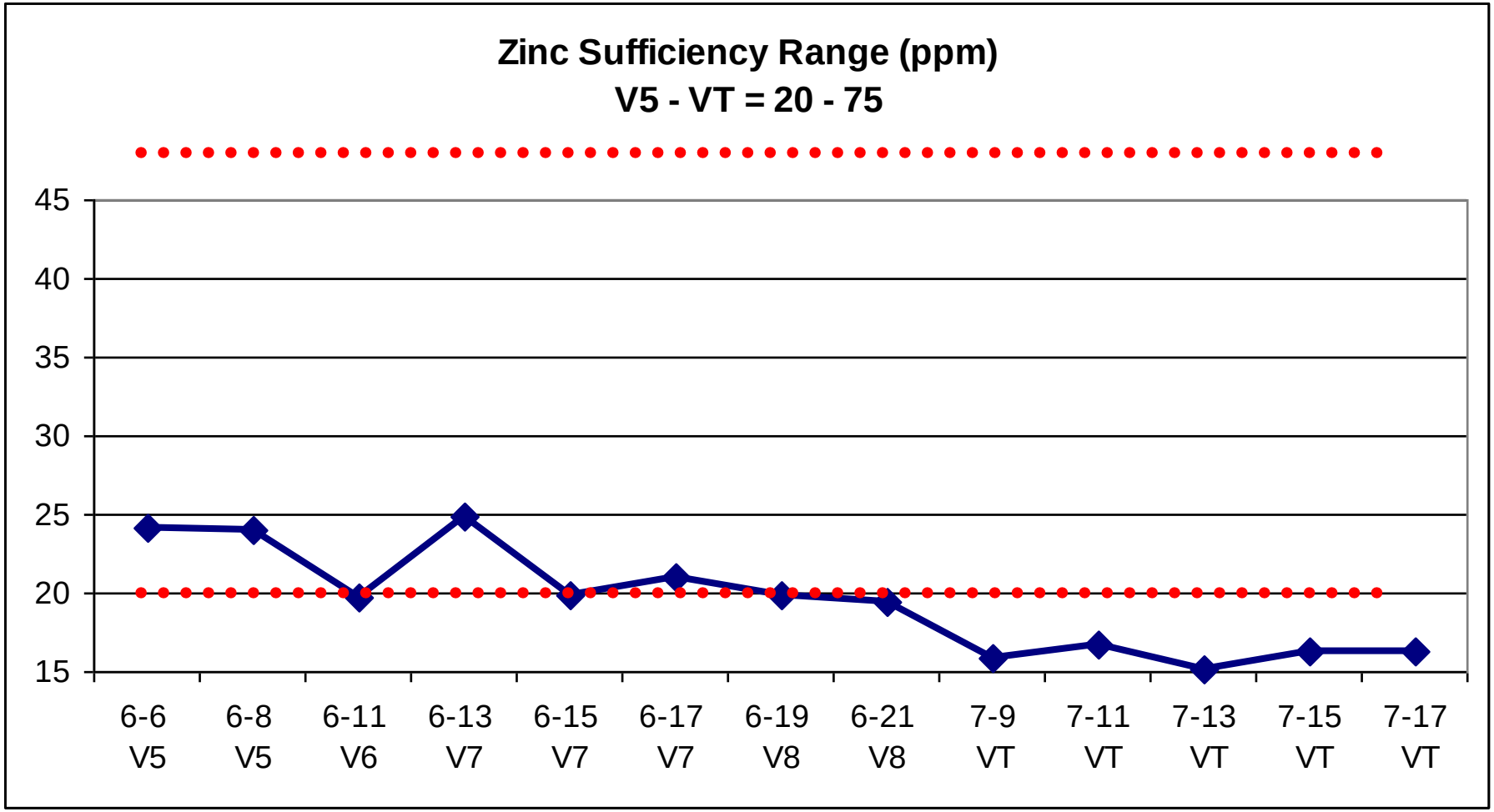

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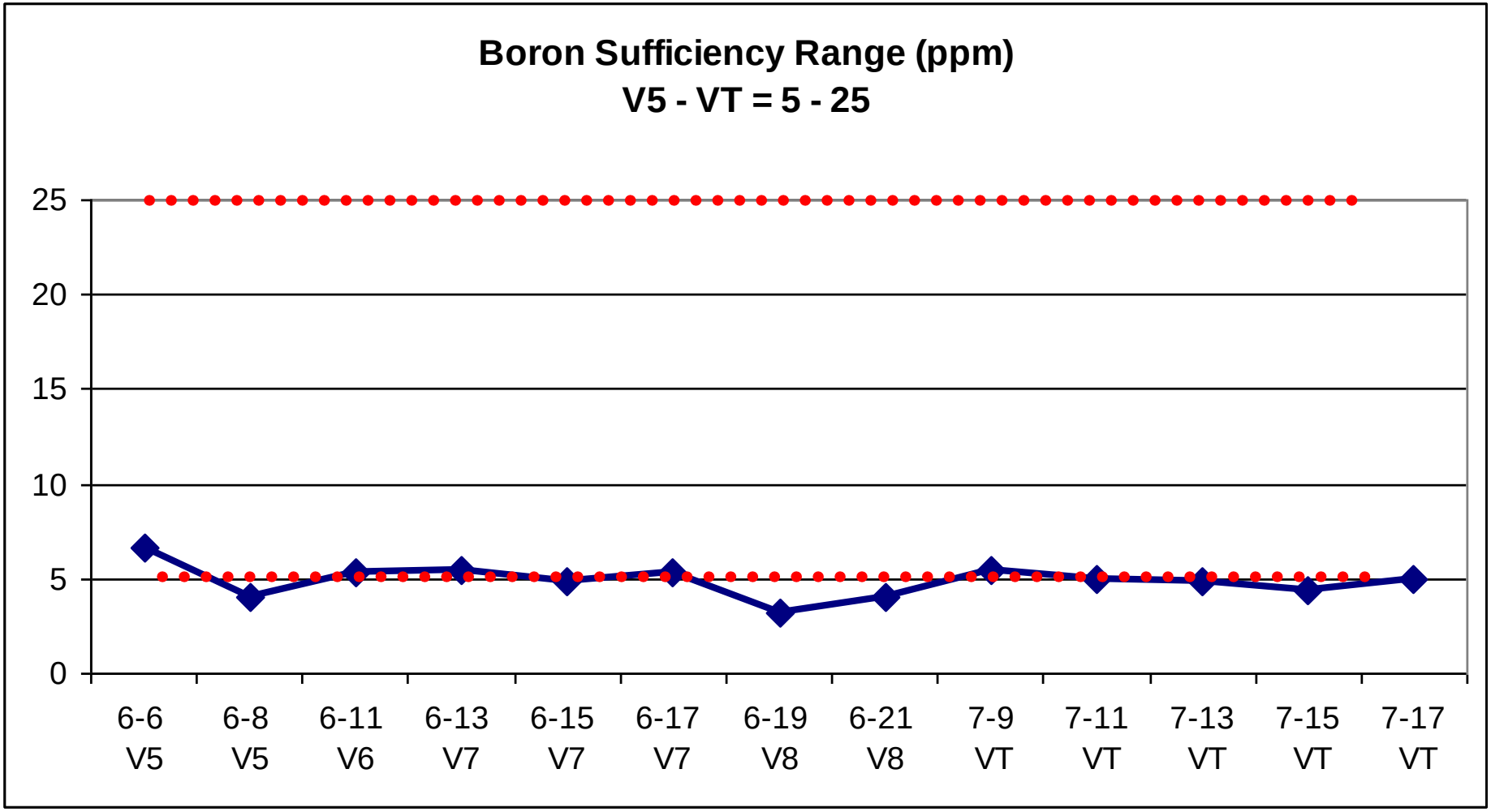

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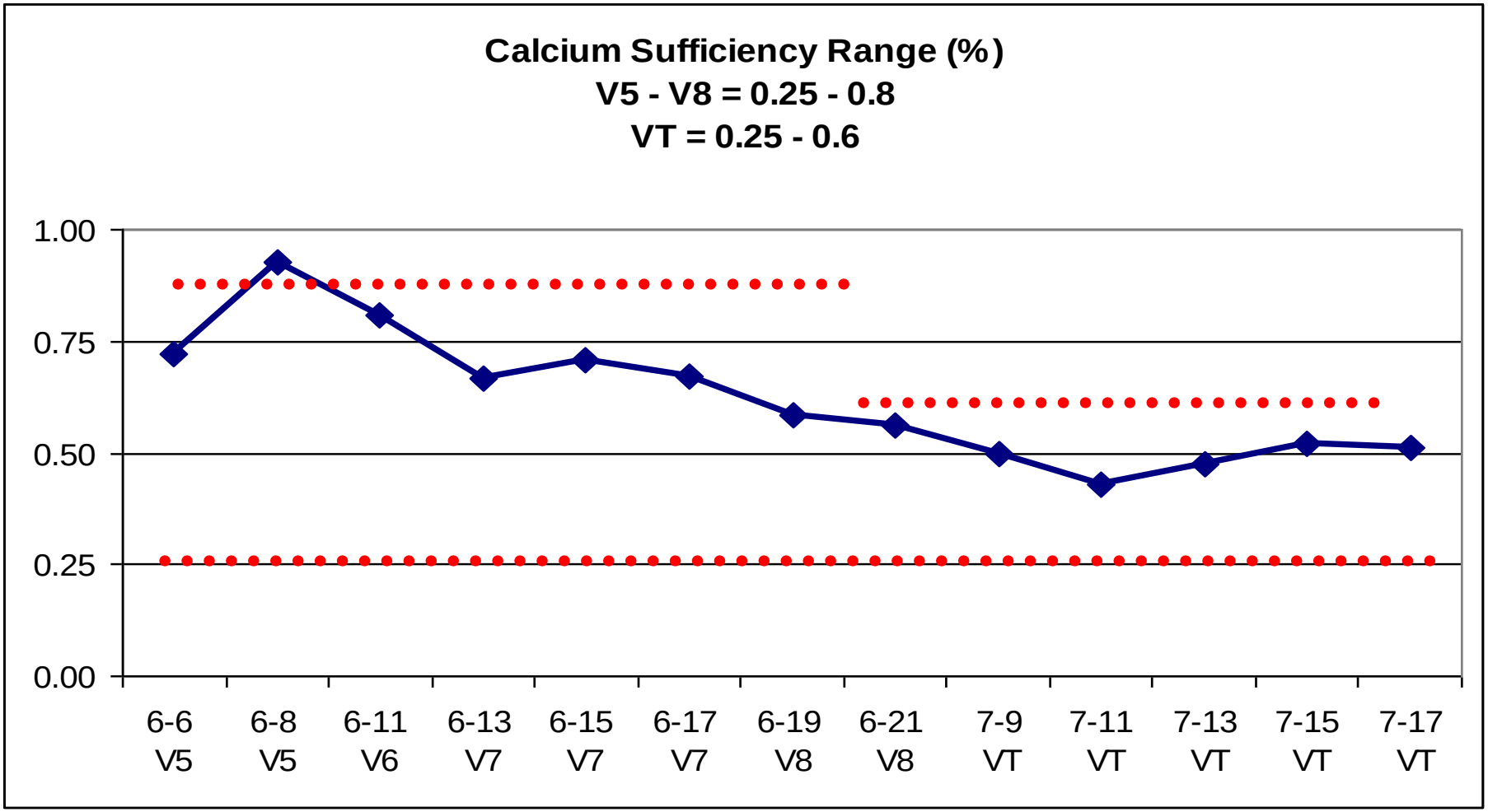

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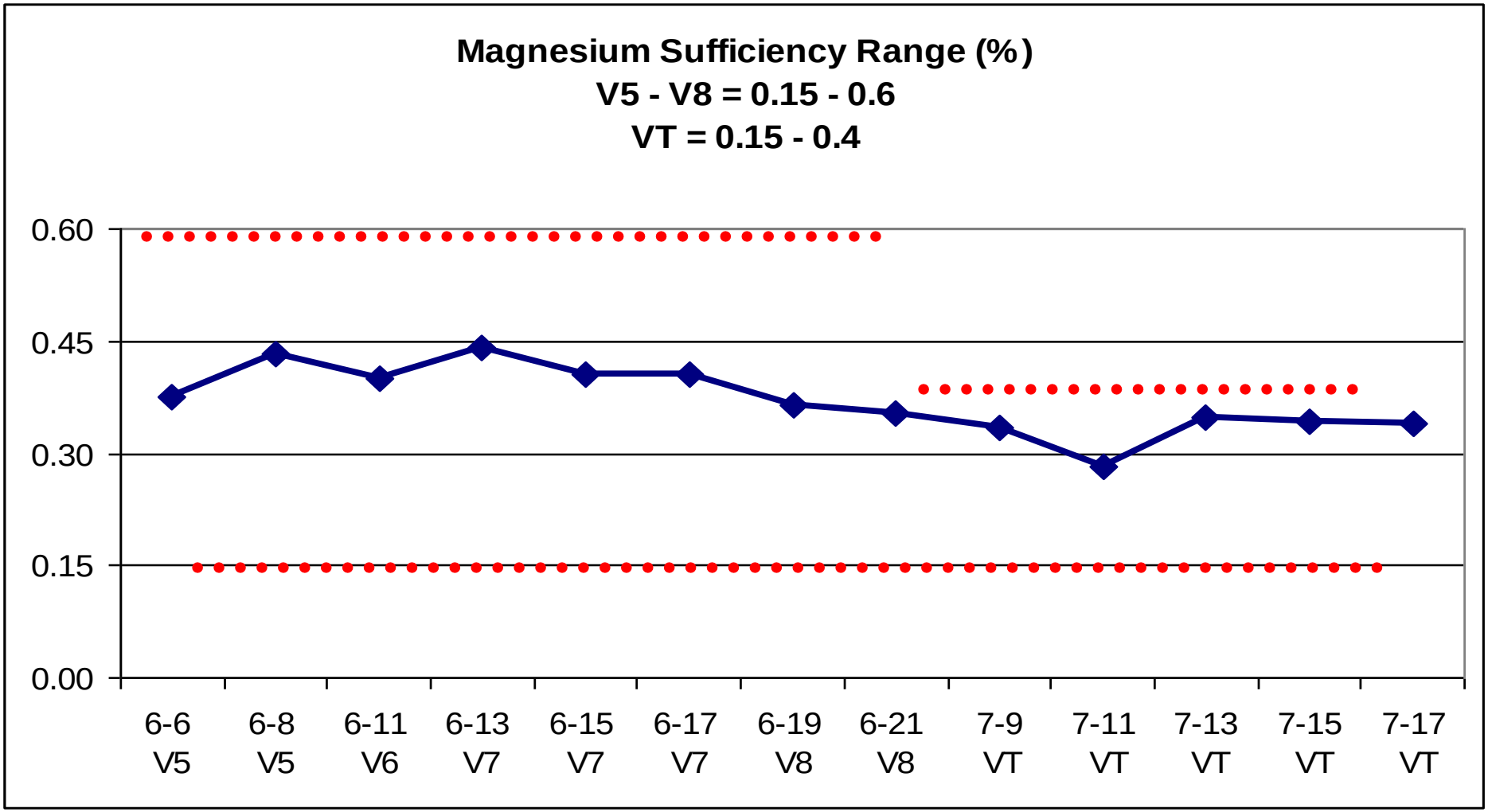

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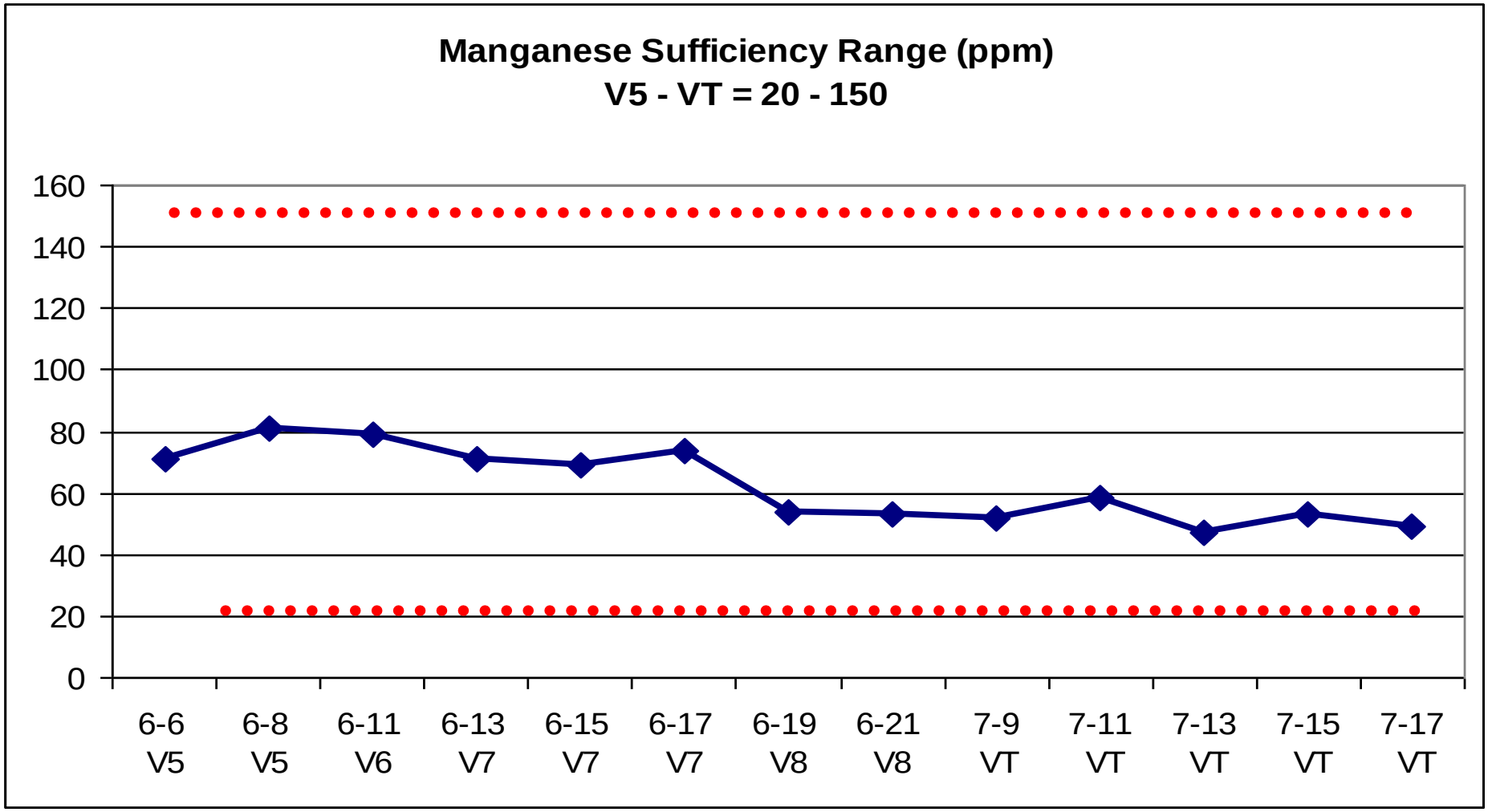

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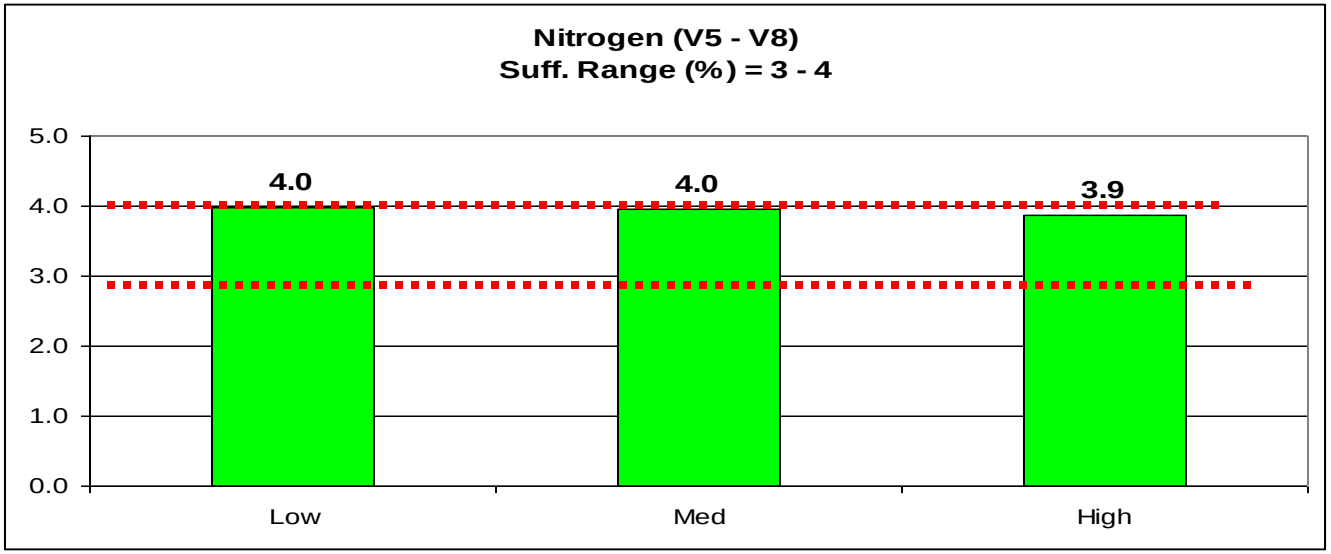
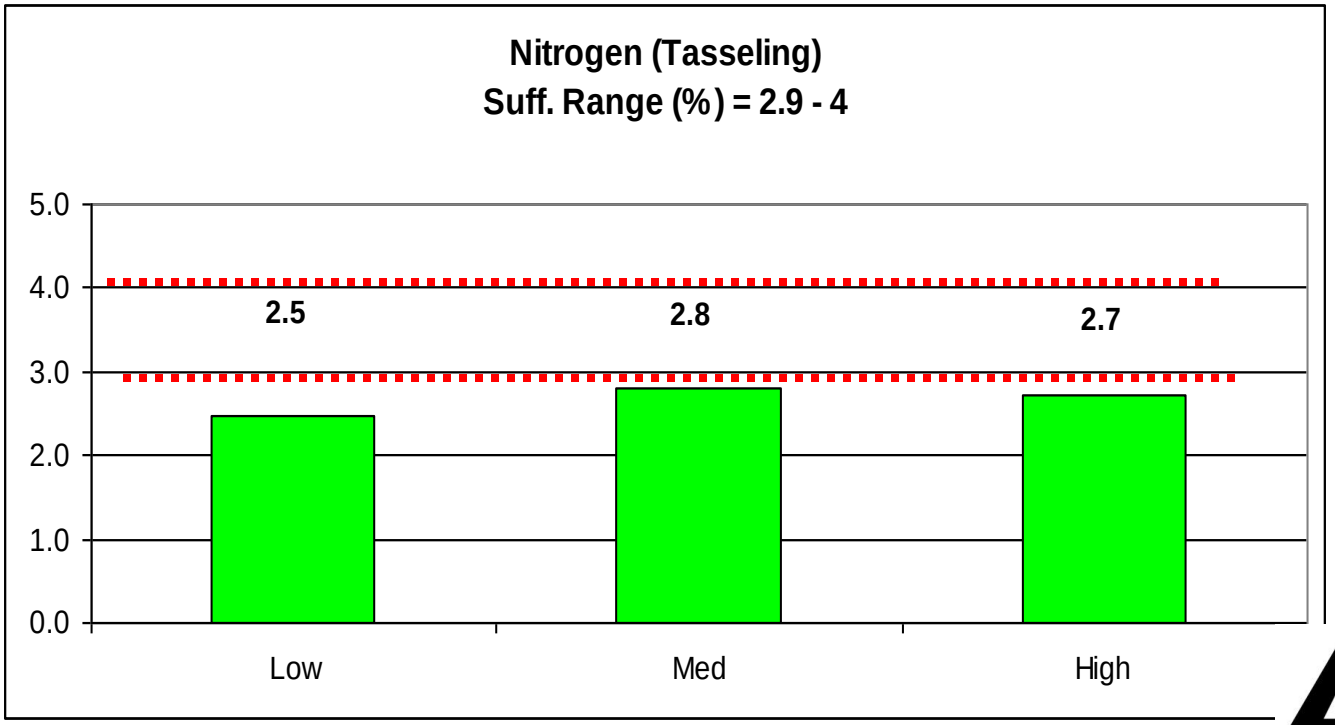
Tissue Test Results Based on Low, Medium or High Soil Tests (P&K)





Average of low, medium and high sites from both fields.

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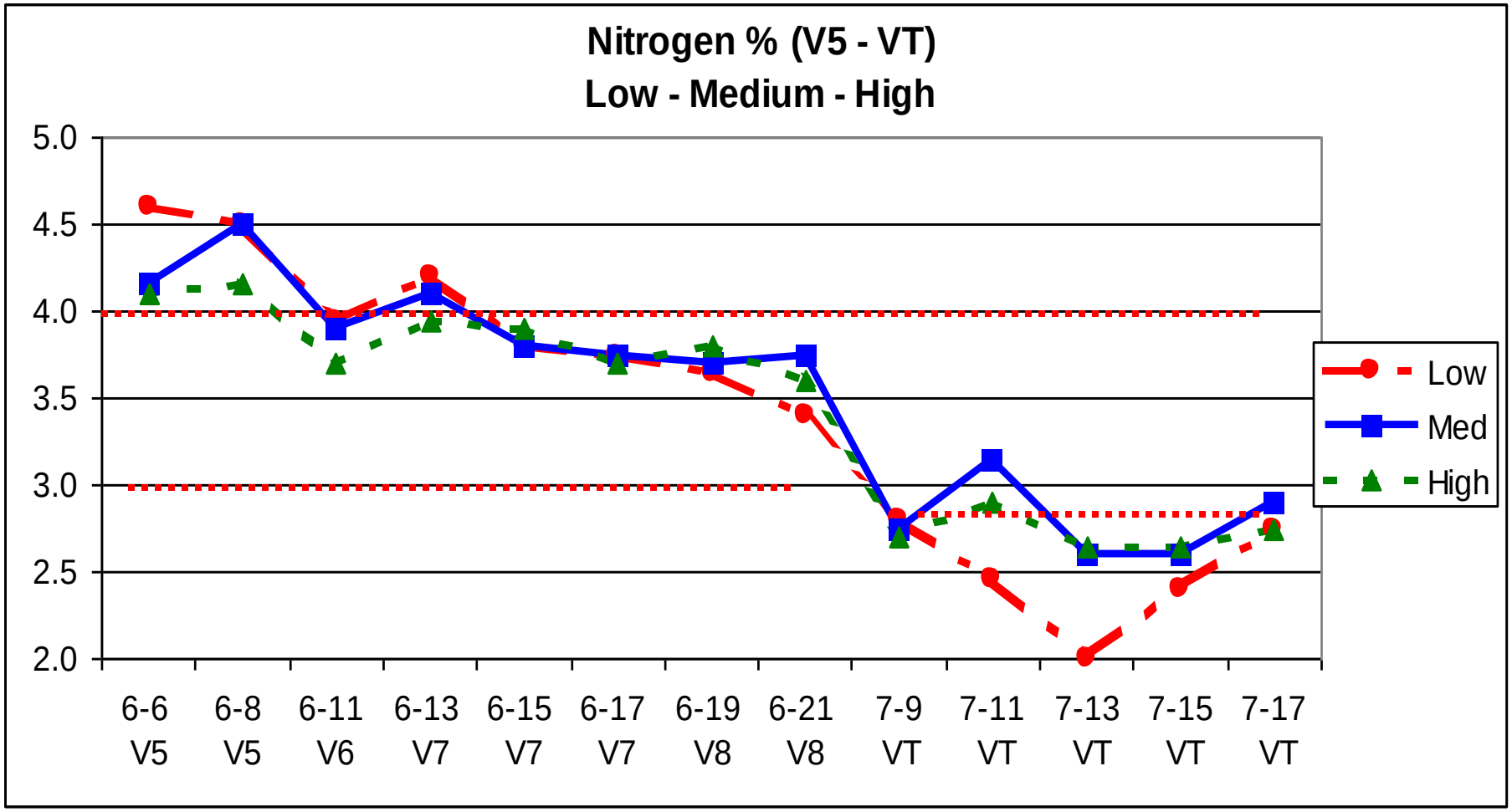

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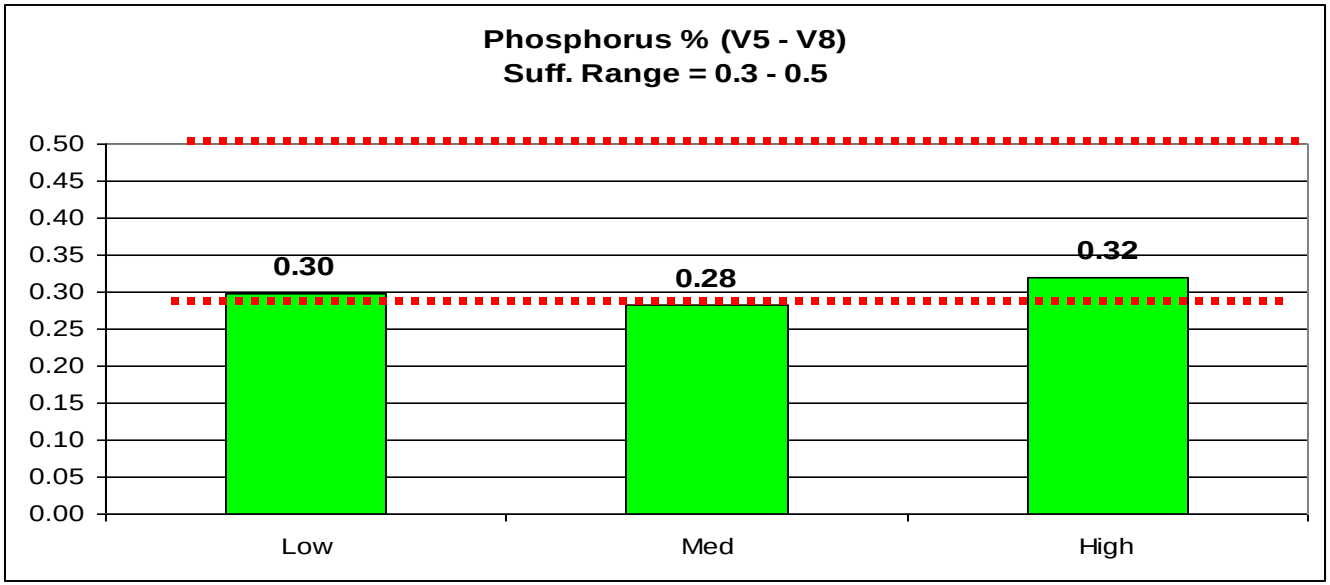

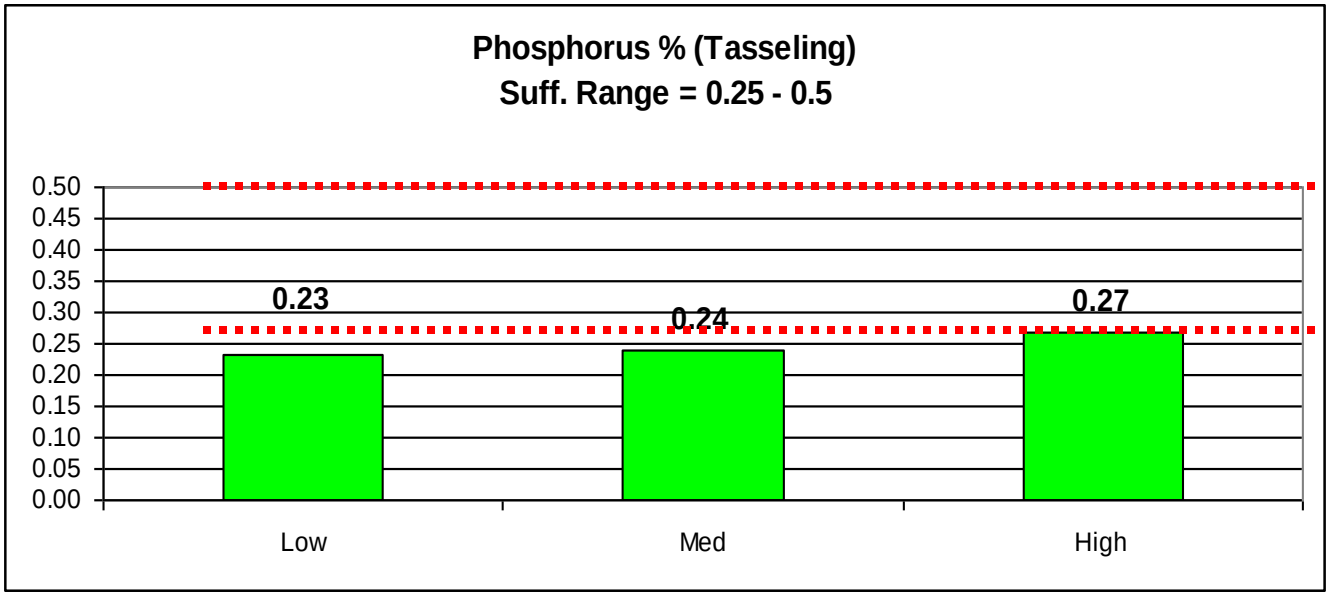

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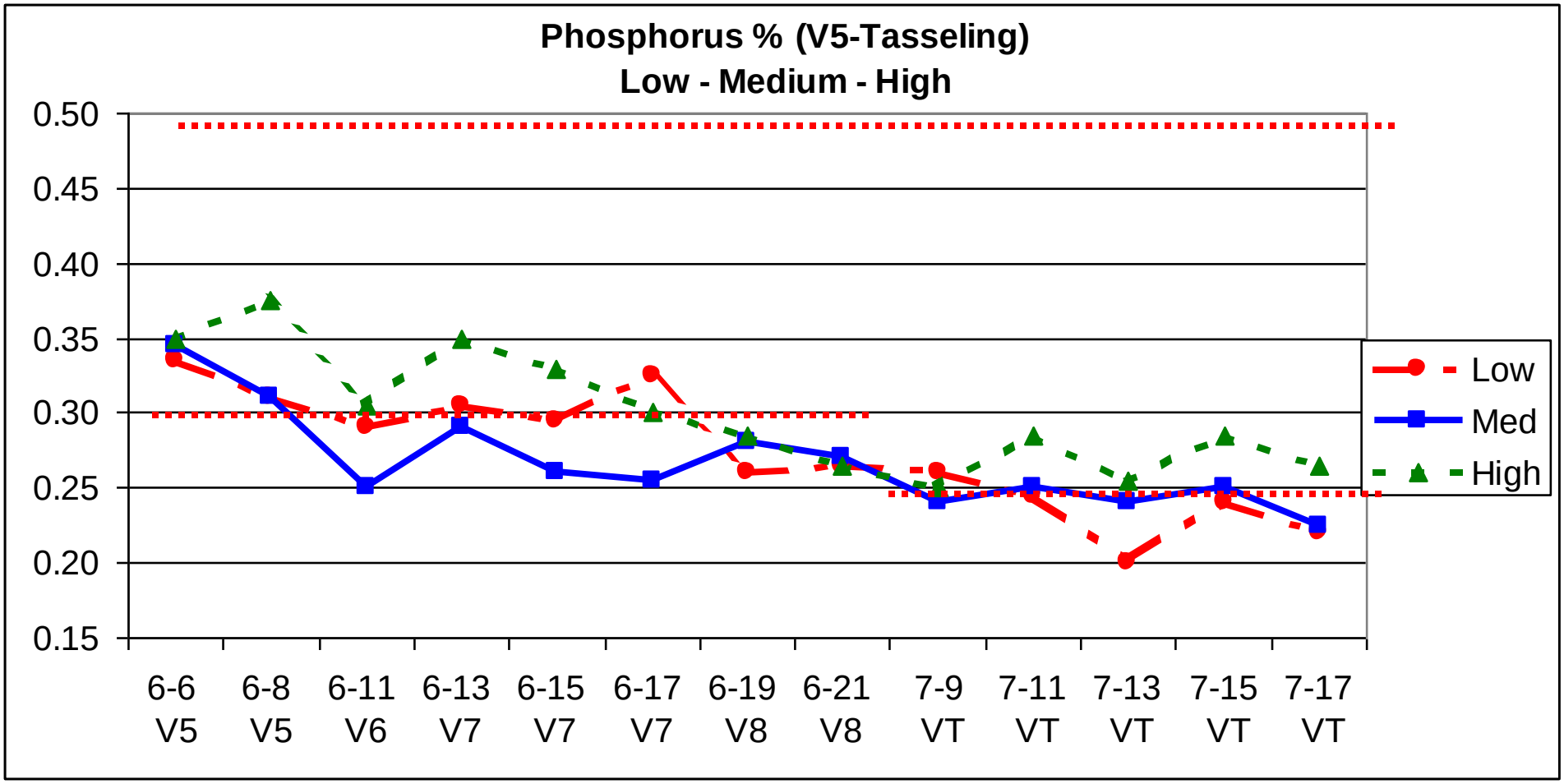

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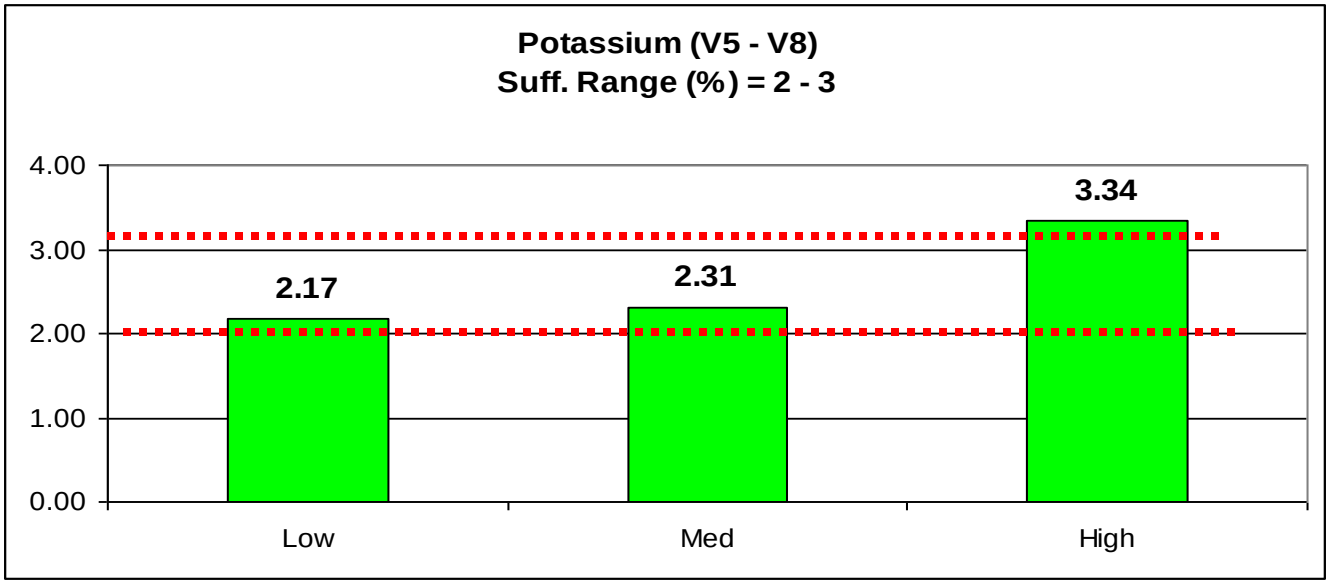

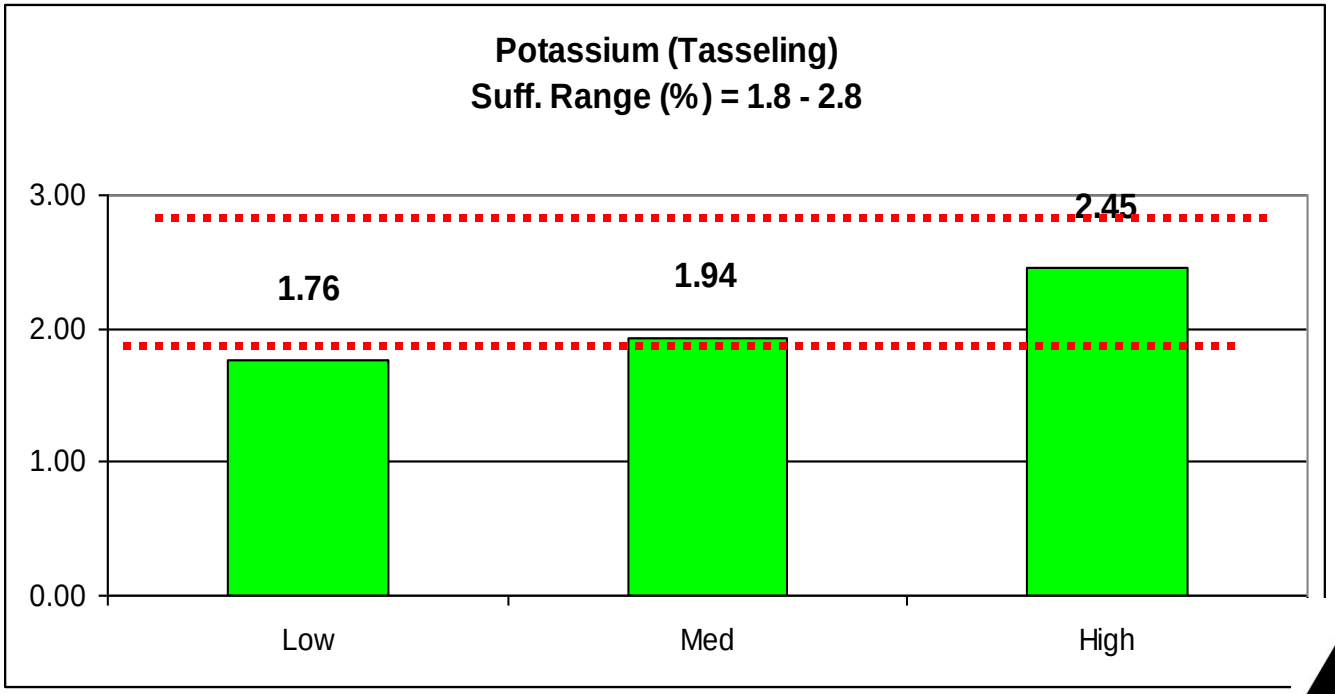

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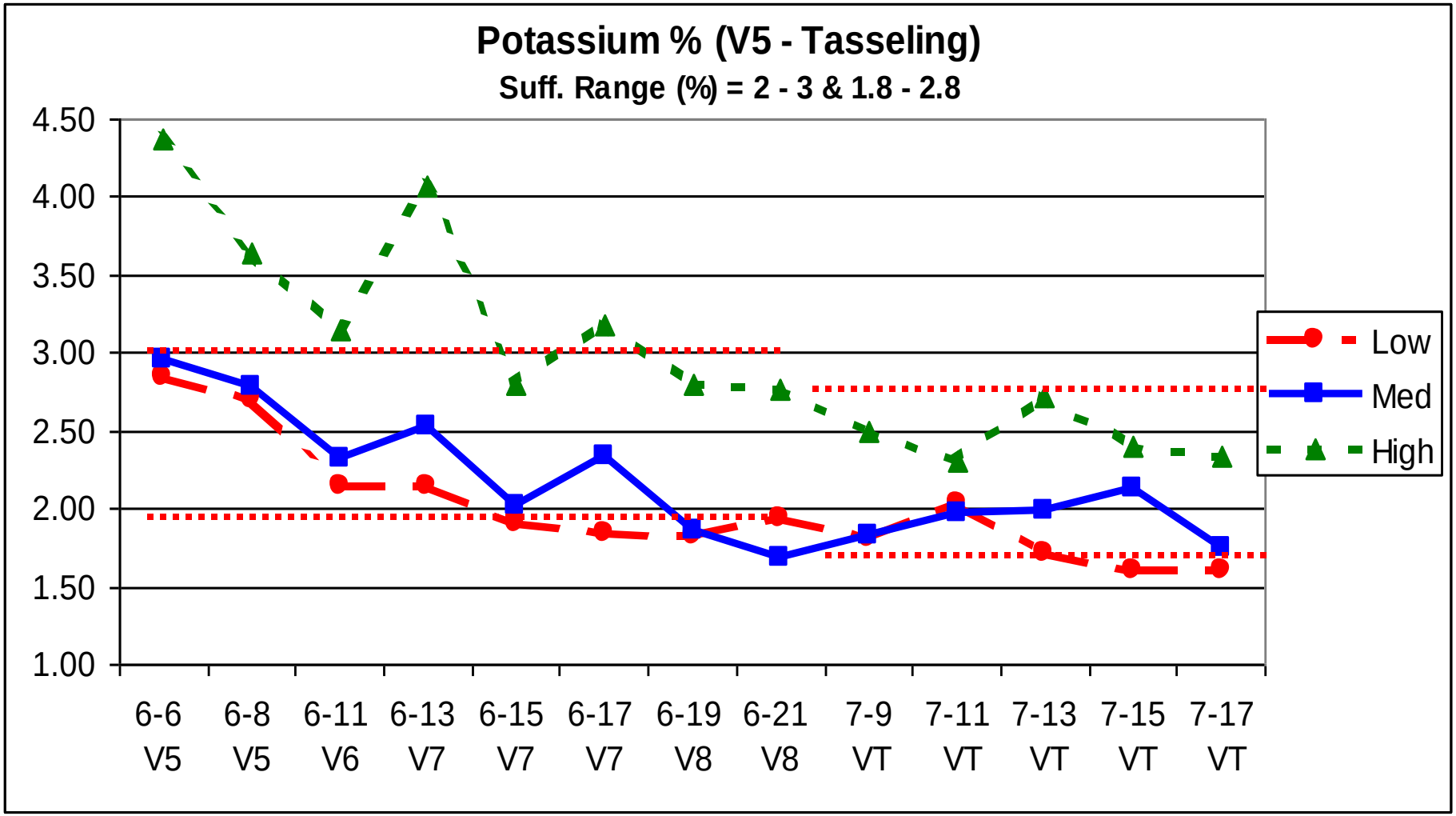

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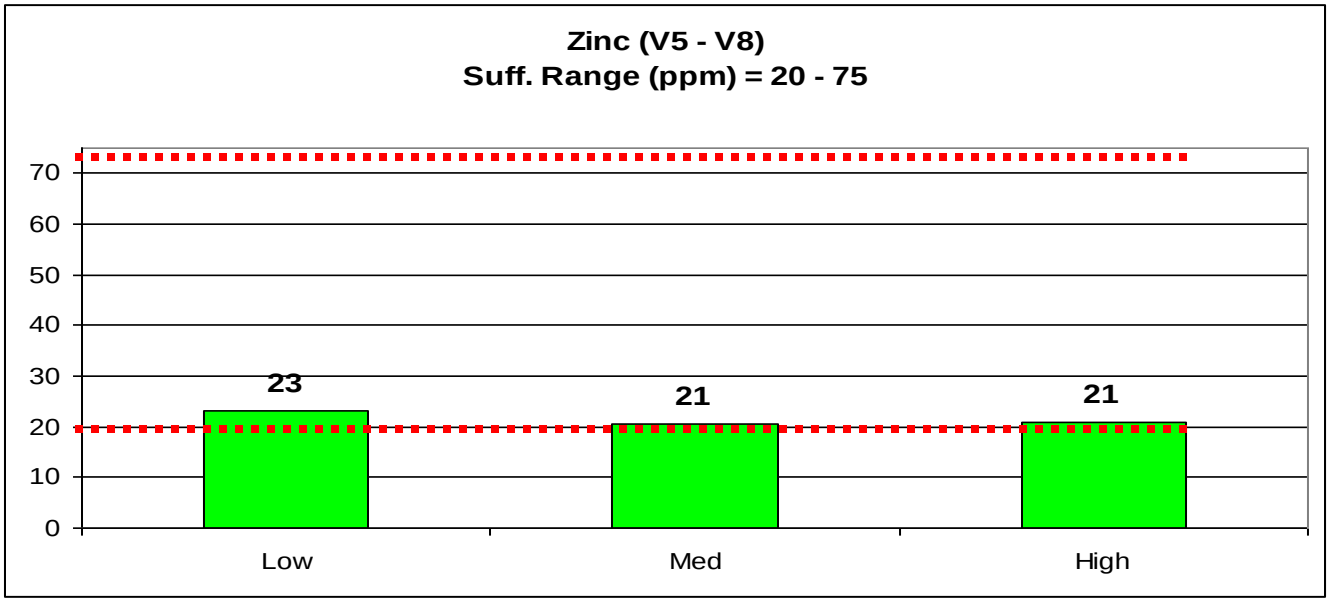

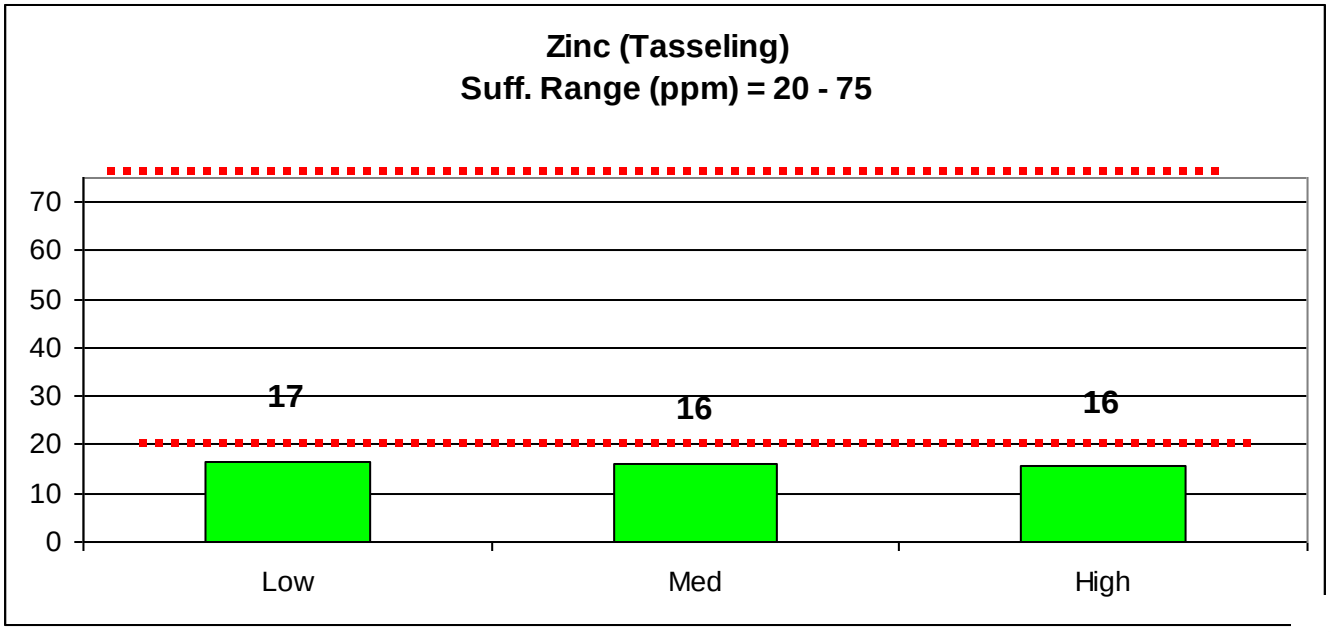

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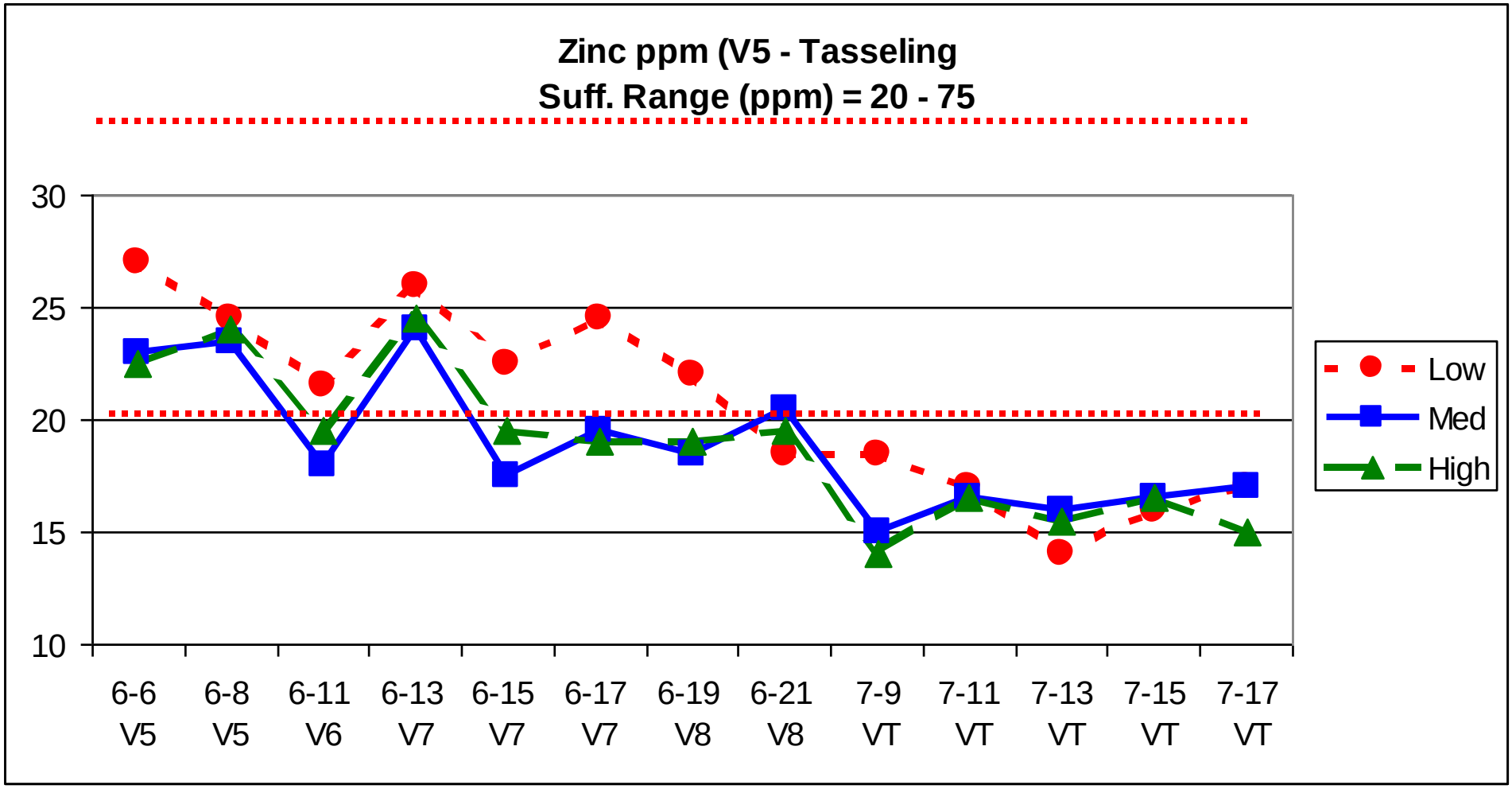

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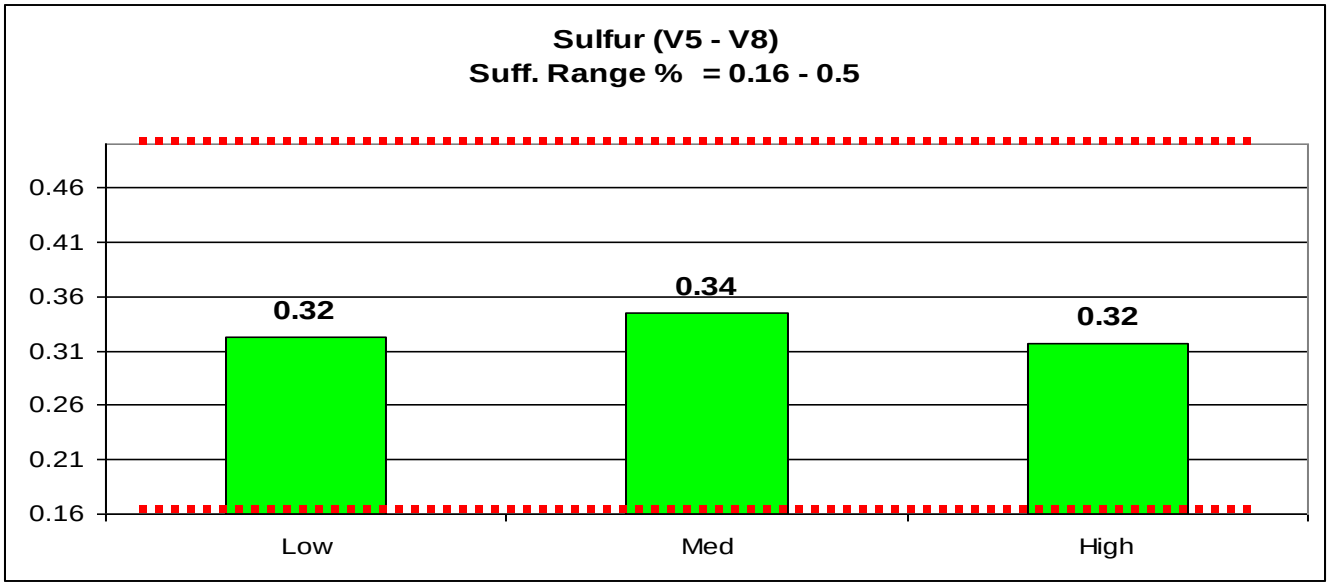

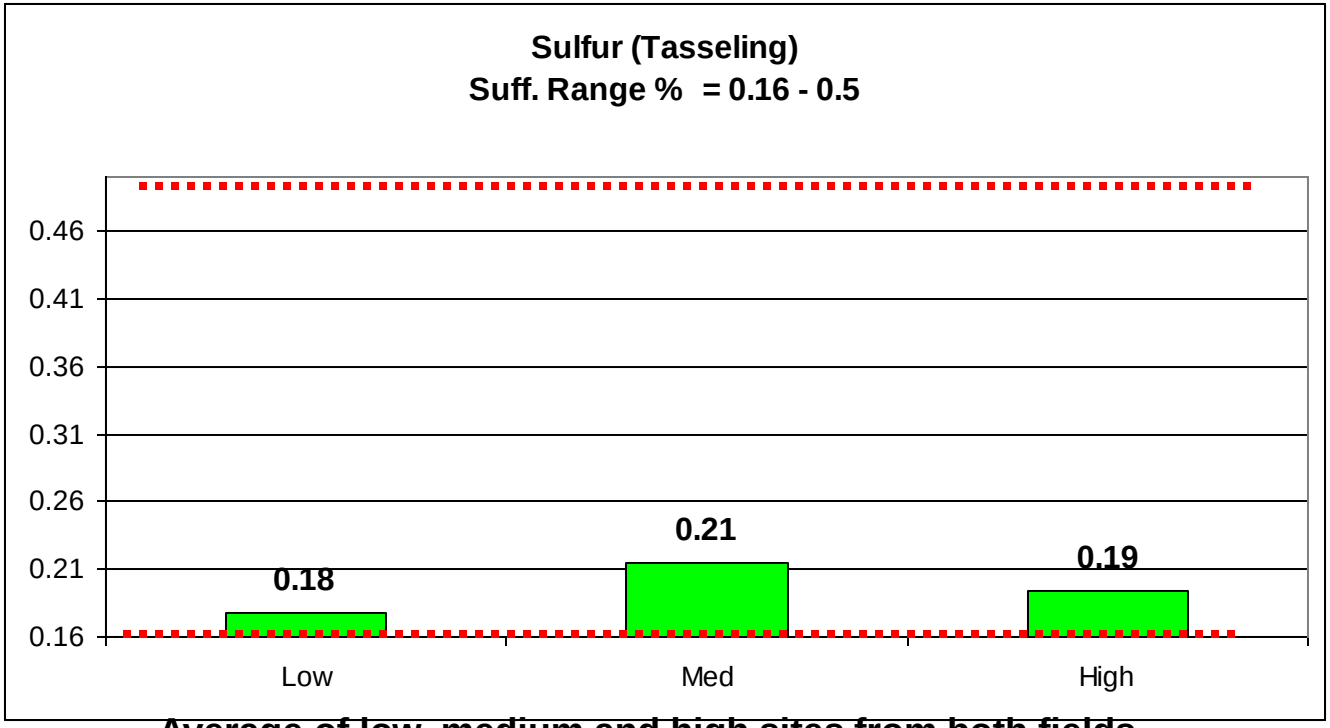

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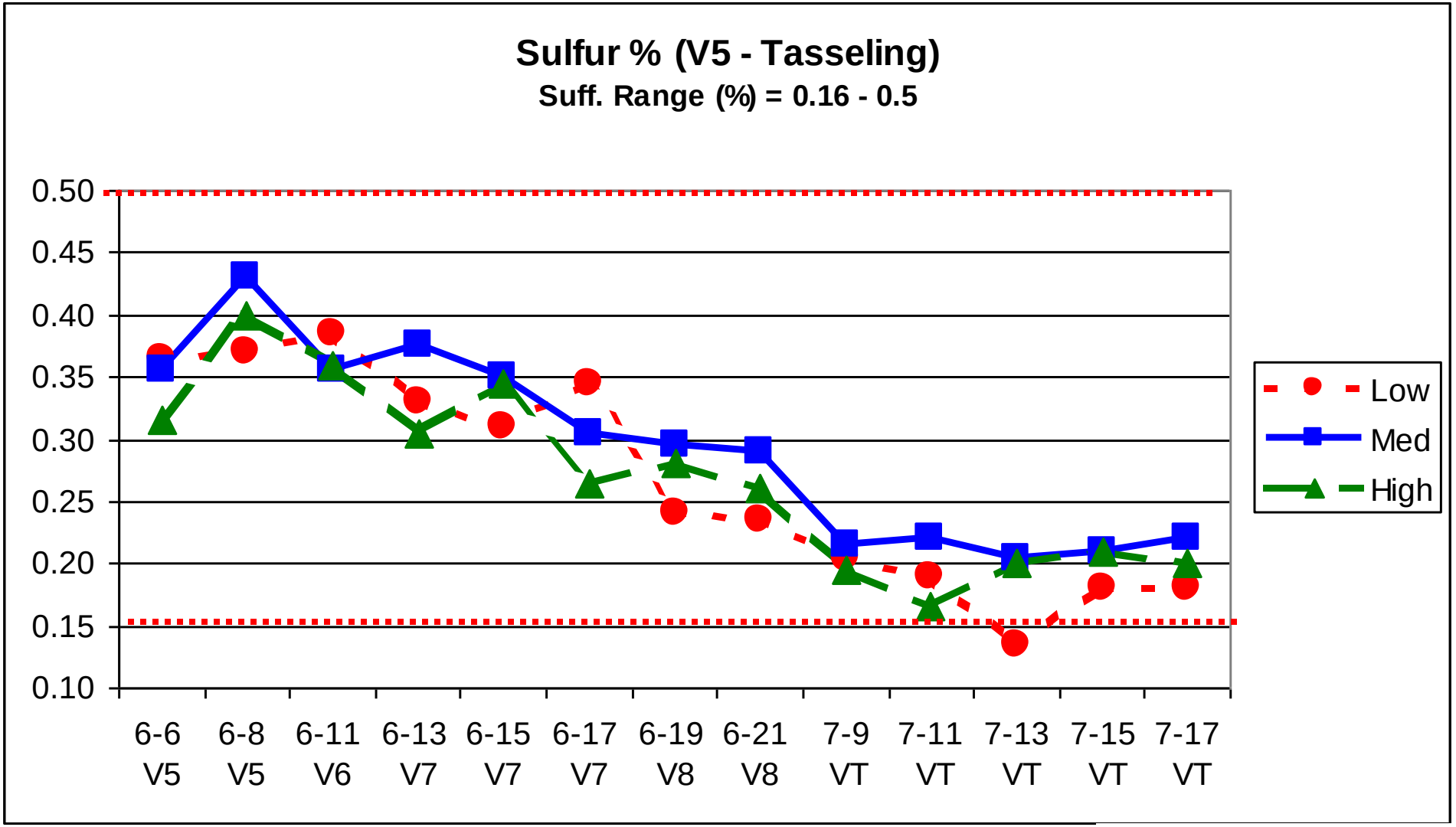

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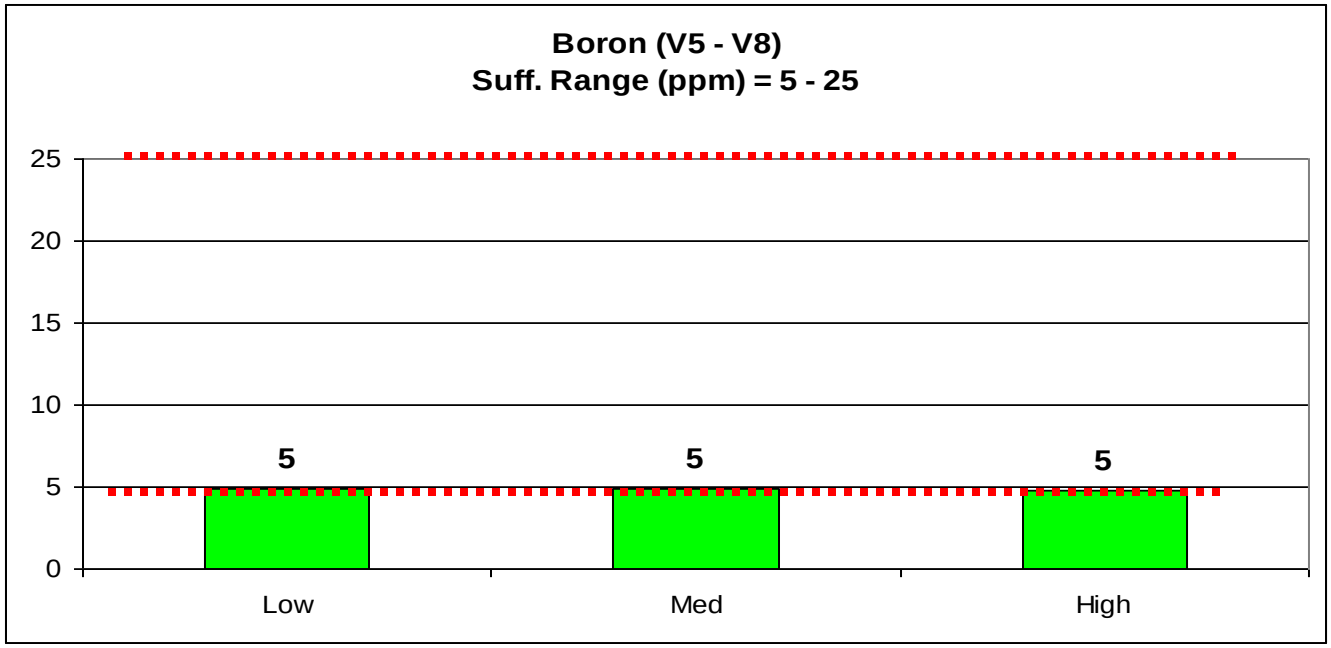

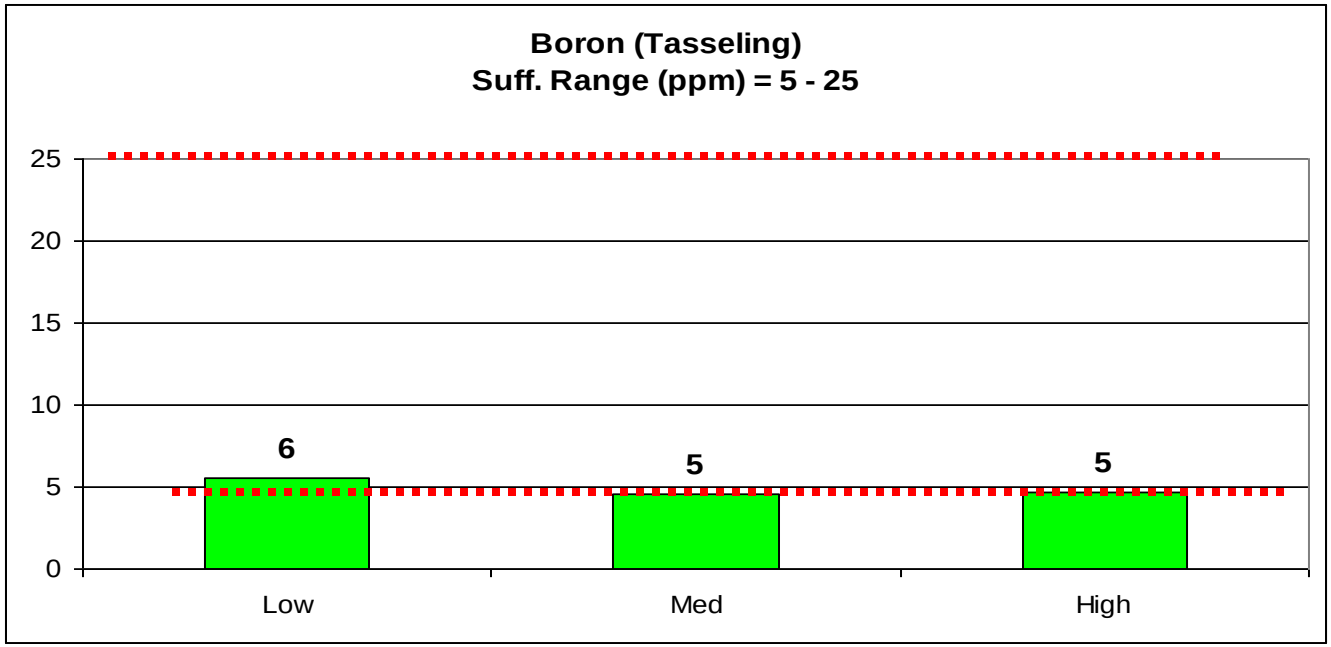

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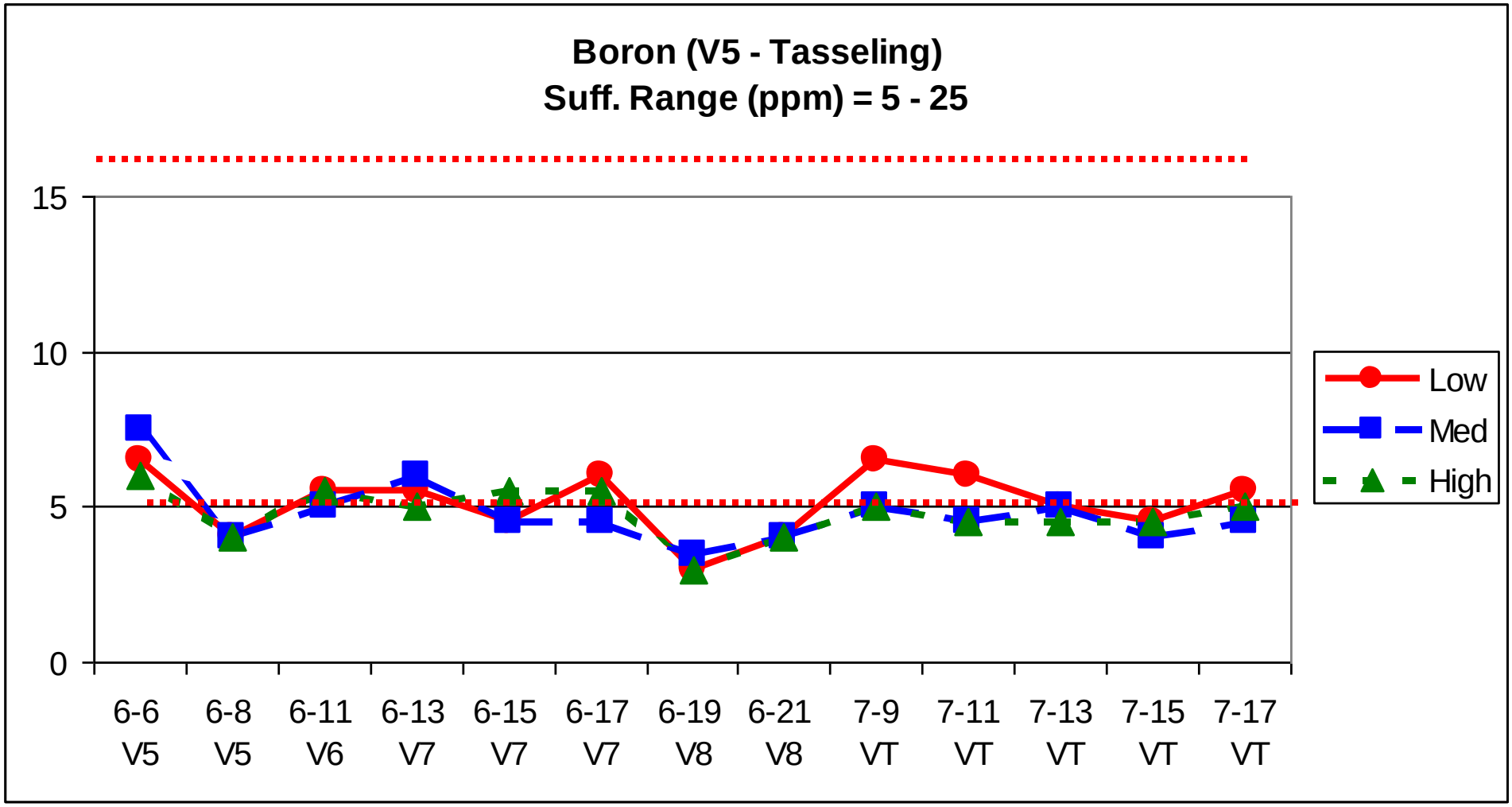

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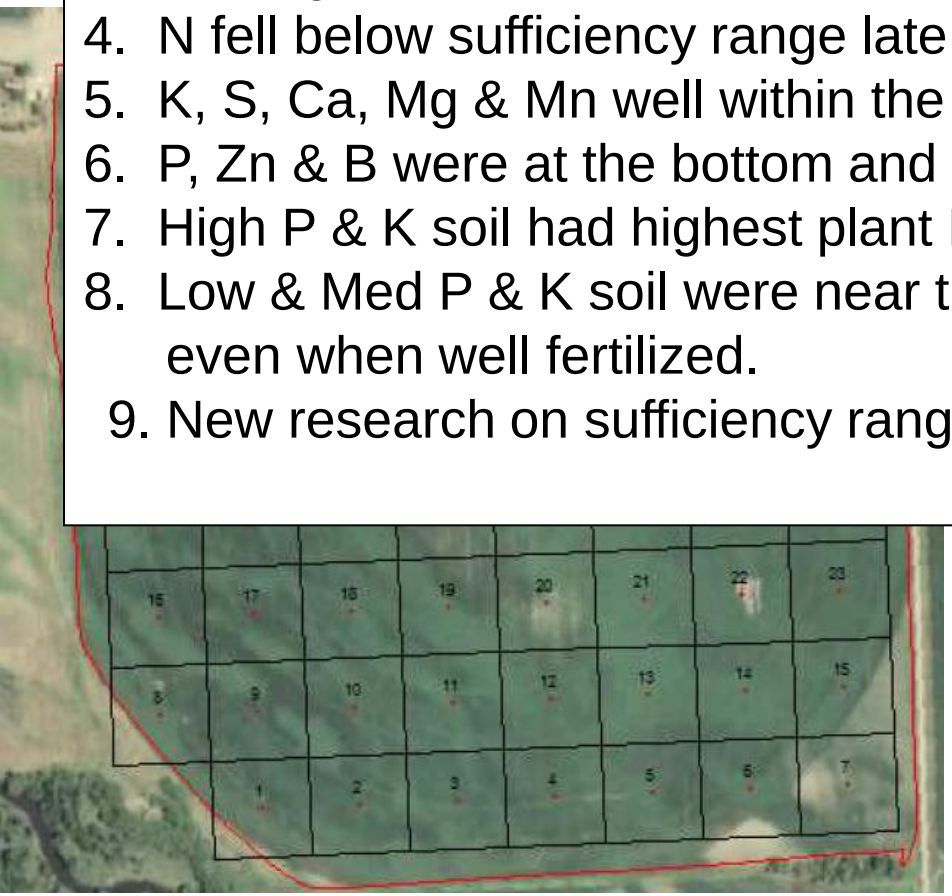
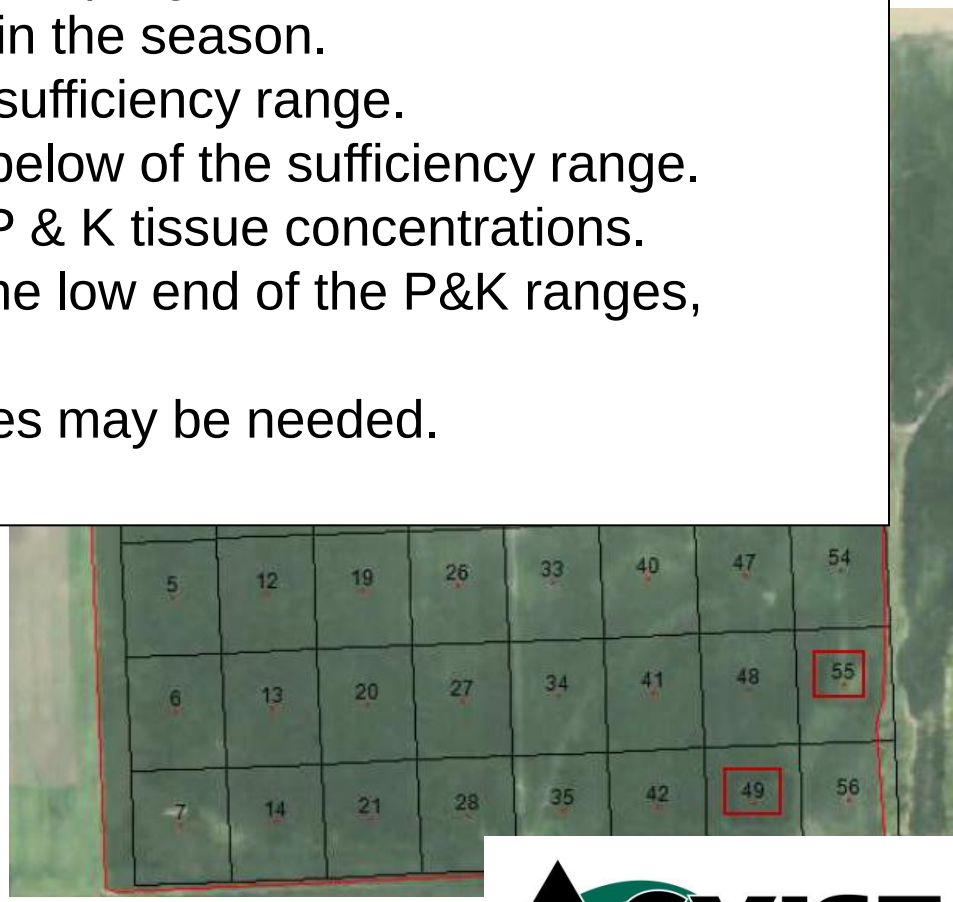
Summary: Time of Sampling Comparison

1. Tracked nutrients in well fertilized corn from V5 through VT.
2. Plant tissue nutrient concentrations declined for most nutrients as the season progressed; N, P, K, S, Zn, Ca, Mn, Cu.
3. B & Mg did not decline as the season progressed.
4. N fell below sufficiency range late in the season.
5. K, S, Ca, Mg & Mn well within the sufficiency range.
6. P, Zn & B were at the bottom and below of the sufficiency range.
7. High P & K soil had highest plant P & K tissue concentrations.
8. Low & Med P & K soil were near the low end of the P&K ranges, even when well fertilized.
9. New research on sufficiency ranges may be needed.





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Thank You

Have a Successful 2013

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