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Canada-Saskatchewan Irrigation Diversification Centre

Potato Fertilization

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Canada

Fertilization – What does the potato crop need?

Nutrient uptake and removal by crops

(lb/ac)

Crop	Yield	Uptake				Removal			
		N	P_2O_5	K_2O	S	N	P_2O_5	K_2O	S
Potato	**15 ton/ac**	**171**	**50**	**223**	**14**	**96**	**27**	**162**	**9**
Canola	**60 bu/ac**	**191**	**88**	**139**	**33**	**116**	**63**	**31**	**19**
Wheat (CWRS)	**75 bu/ac**	**158**	**60**	**136**	**17**	**113**	**44**	**33**	**8**
Alfalfa	**4.5 ton/ac**					**261**	**62**	**270**	**27**

- High potassium need and removal
- Calcium and magnesium need also higher than for wheat/canola
- Low sensitivity to deficiencies of most micronutrients (except high to manganese and moderate to zinc)

Fertilization – What does you soil have to offer?

Irrigated soils in SK are generally:

Sufficient to high in:

- Potassium – K (with exceptions) . . .
- Sulfur – S (possible exceptions)
- Calcium - Ca
- Magnesium - Mg
- Micronutrients - Cu, Fe, Zn, Mn (?), B (by potato standards)

Deficient in:

- Nitrogen – N . . .
- Phosphorus – P . . .

Special considerations for the irrigated potato crop

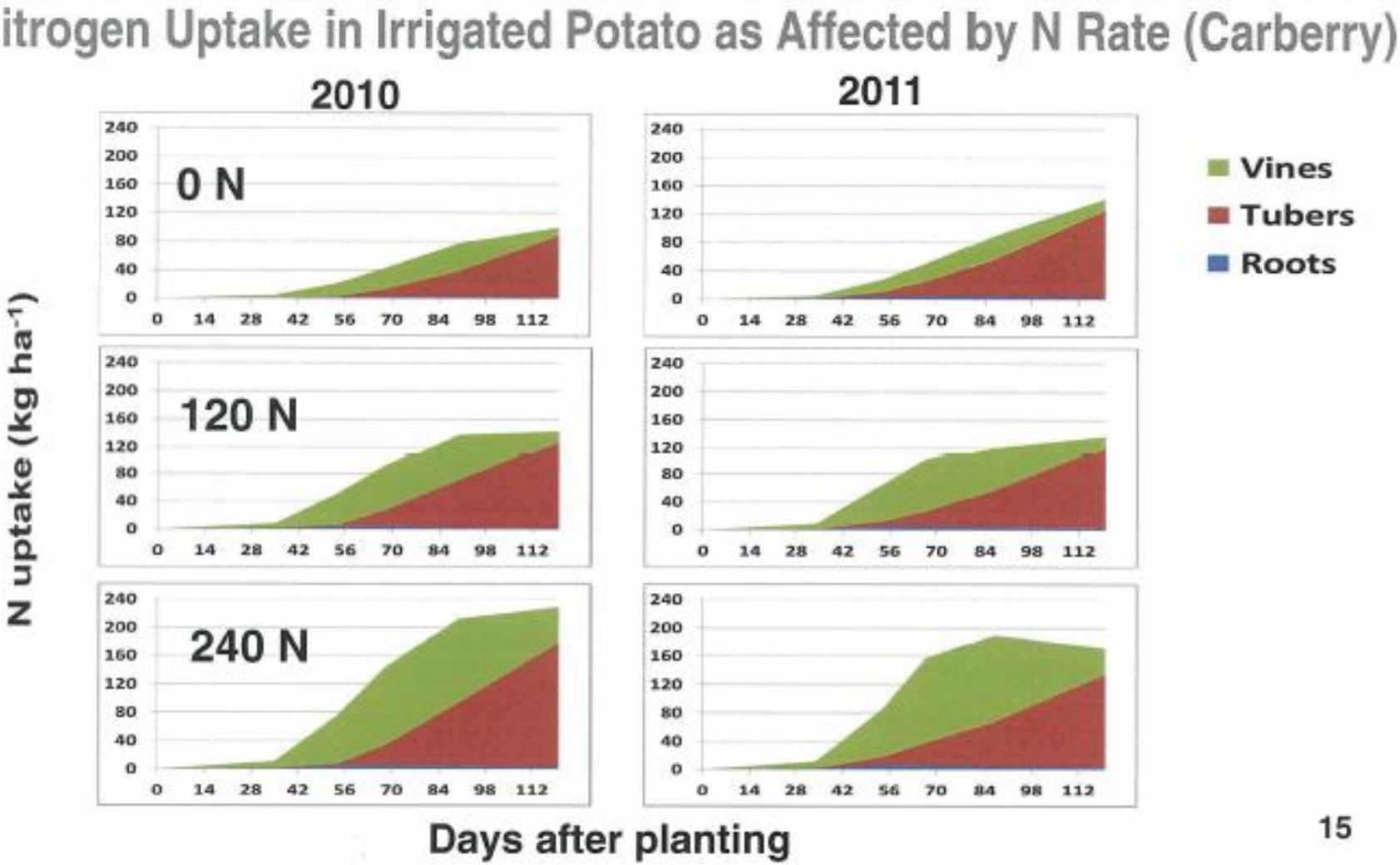
☺ Seed pieces are large (so provide nutrients)

☺ Irrigation – maintains good conditions for nutrient uptake

- important for P, K, and some micros

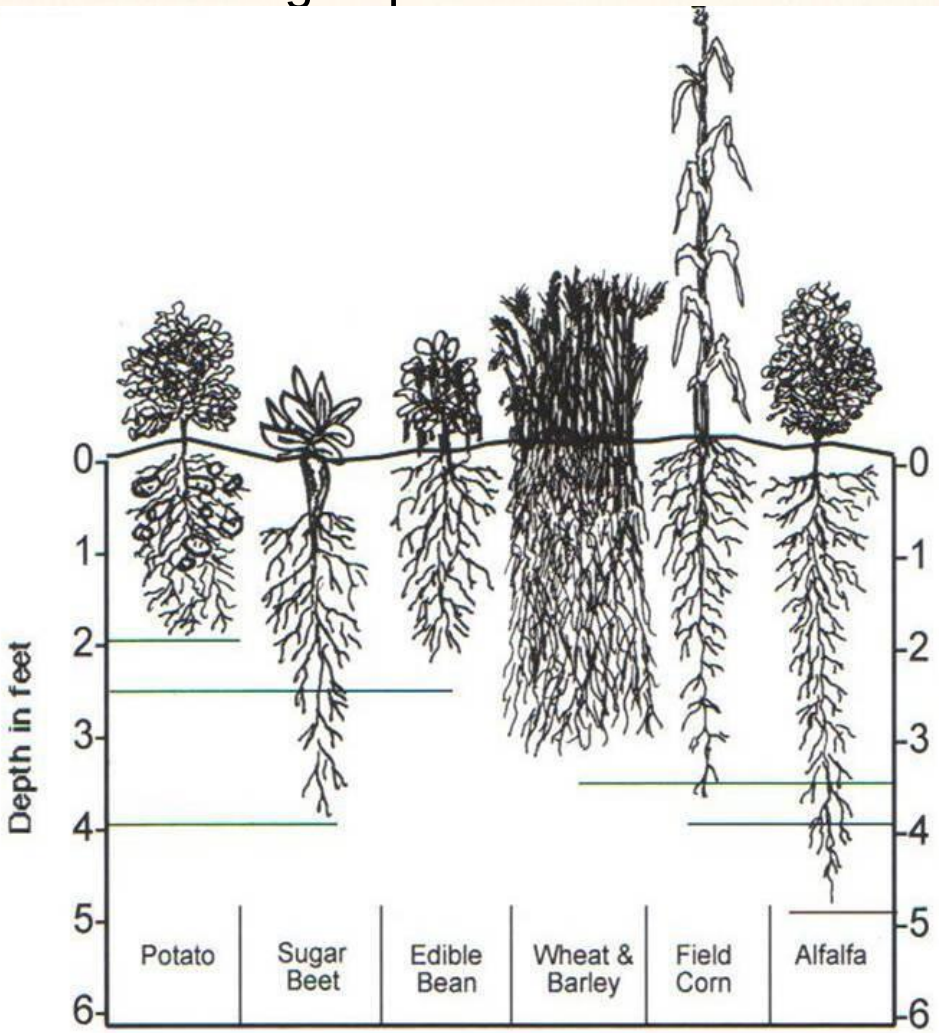
Special considerations for the irrigated potato crop

☺ Potatoes are slow starters – period of maximum demand later & extended



Special considerations for the irrigated potato crop

☹ Rooting depth less than most other field crops



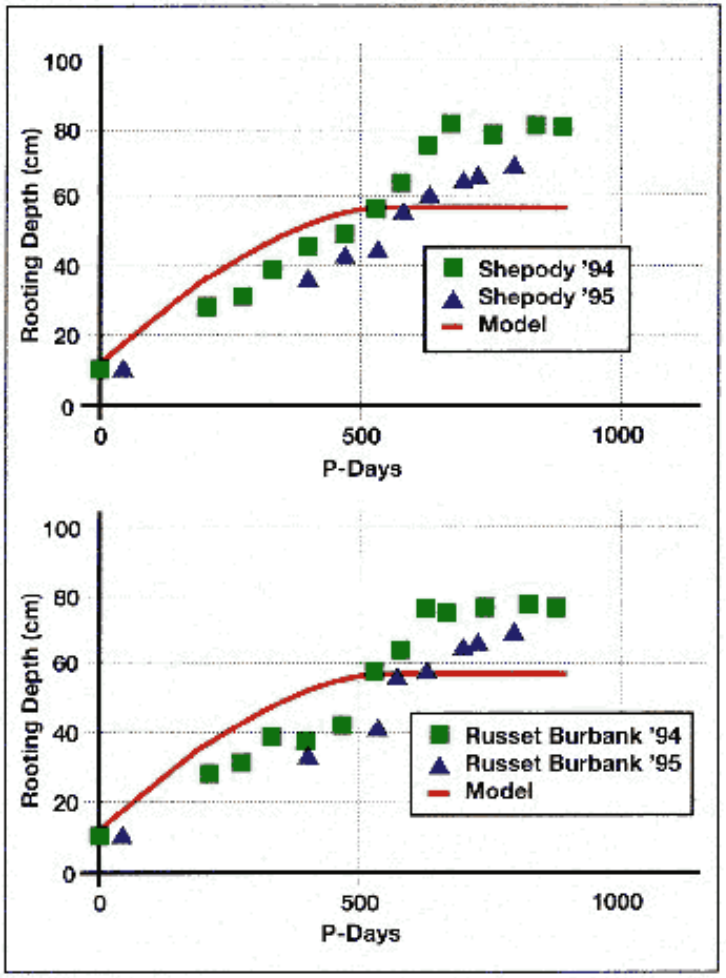


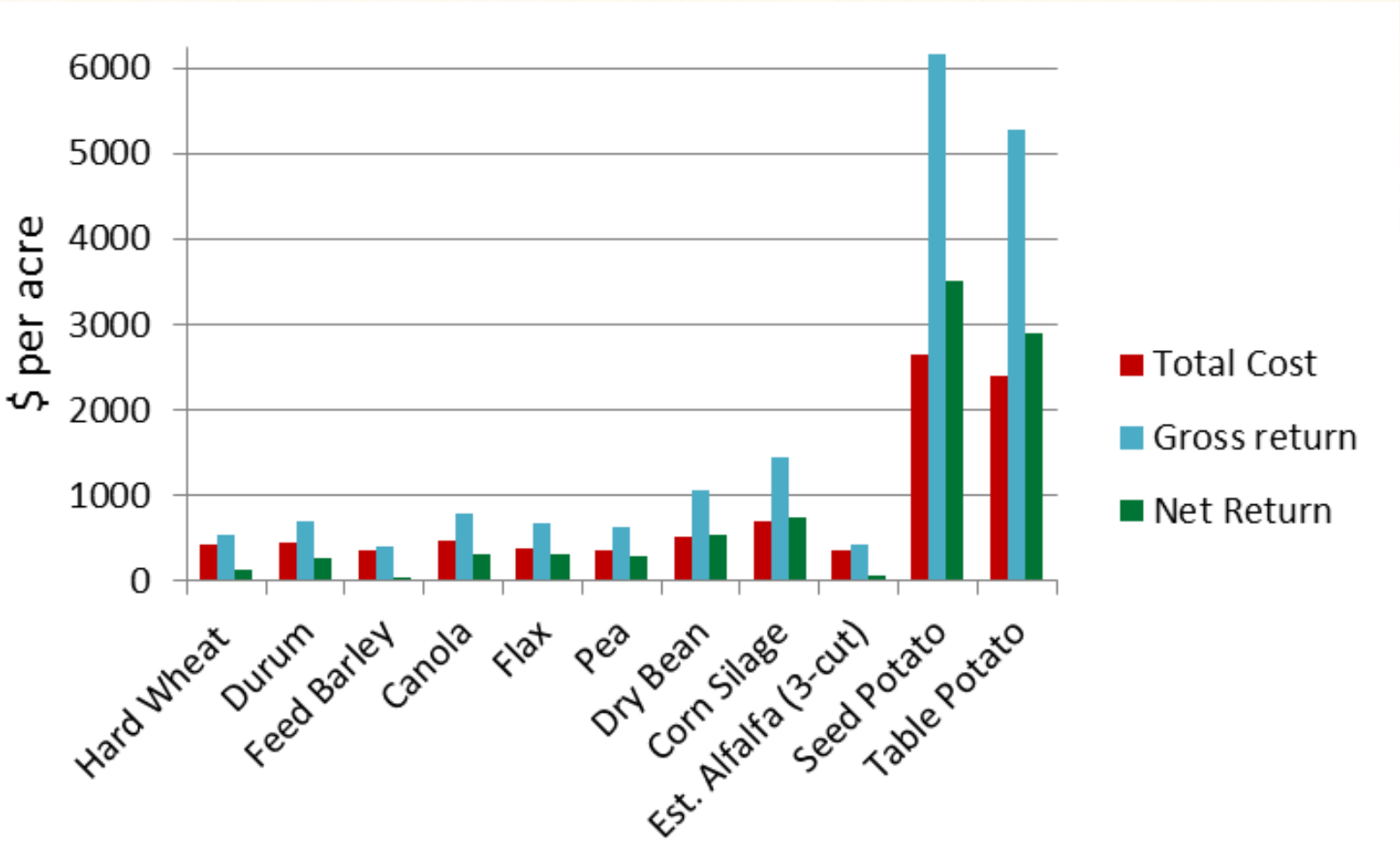
FIGURE 3. Rooting depth as a function of P-Days.

Special considerations for the irrigated potato crop

☺☹ Aggressive/frequent tillage

Special considerations for the irrigated potato crop

☺☹ Potatoes are a high-value crop



Figures from Irrigation and Agronomics Saskatchewan 2012. ICDC. *Target* yields were used.

Potassium - K

Possible responses where:

History of high K removal (esp. alfalfa)

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Potato	15 ton/ac	171	50	223	14	96	27	162	9
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Potassium - K

Possible responses where:

History of high K removal (alfalfa)

Soil *very* sandy

Soil eroded or graded

Potassium - K

The soil test for K works!

K recommended to ~300-400 lb/ac soil test K level (0-6”)

Substantial response below ~250 lb/ac K test - application rates >100 lb/ac K_2O

Labs often recommend K for potatoes at high soil test levels

K fertilizer (esp. KCl – 0-0-60) at substantial rates often reduces tuber specific gravity (dry matter content)

Phosphorus - P

P deficiency is more *the norm*, but unlikely where:

- History of high P fertilization
- History of manure application

P response less predictable, except at very low or high P test levels

Need high P_2O_5 rates at low test levels (e.g. eroded/graded areas)

At least *replacement* P_2O_5 rates (~30 lb/ac) recommended to moderately high test levels.

Low rates should be banded if possible.

Nitrogen - N

Typically need 100-150 lb/ac N; except less when:

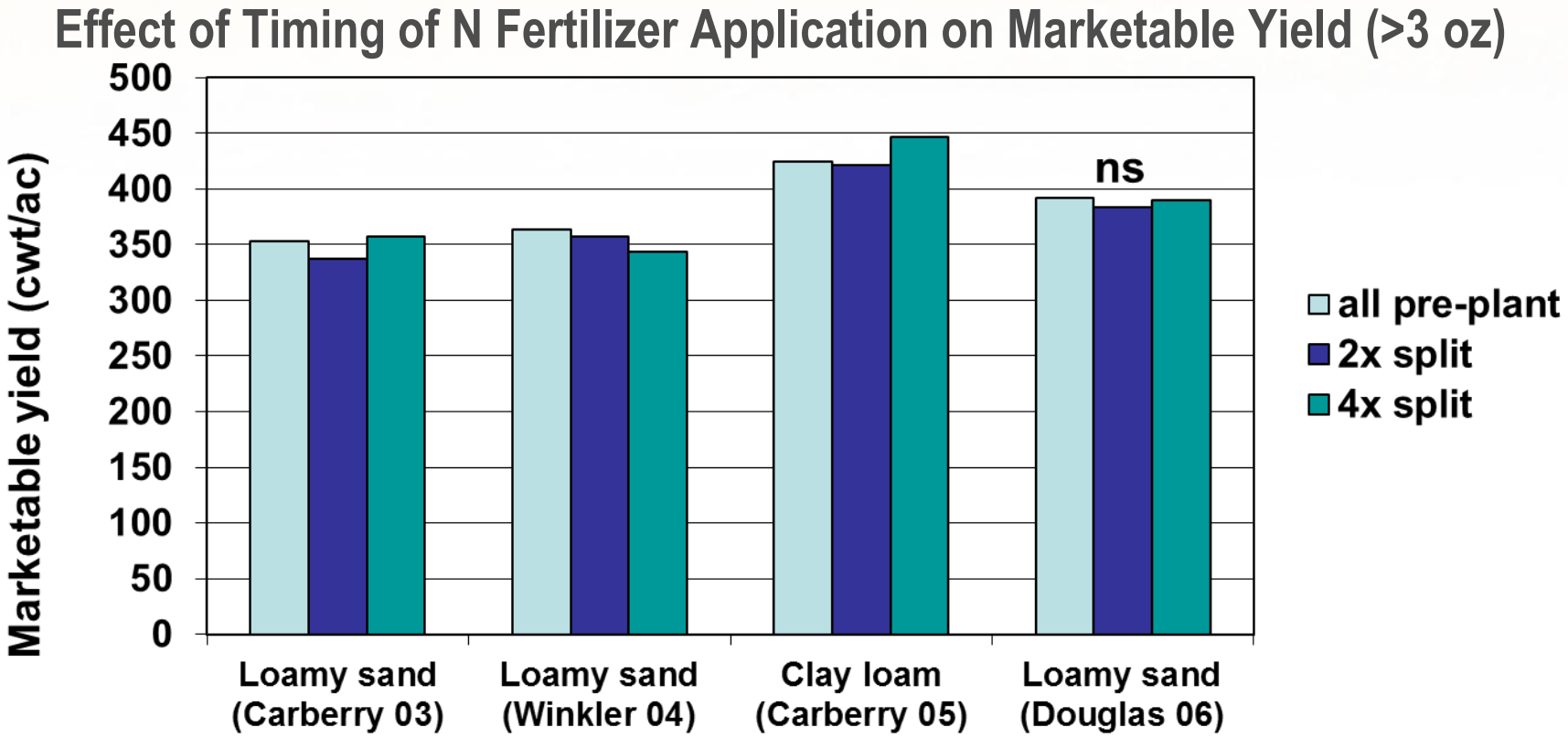
- following legume (esp. alfalfa)
- soil test high

Need ~8-10 lb of N per ton of tuber yield
(soil test + fertilizer; soil nitrate-N to 24” depth)

Nitrogen - N

Splitting of N preferred

- at hilling
- fertigation?



Spring soil test NO_3-N (kg ha^{-1} to 60 cm) = 36, 40, 54, 42 for 2003, 04, 05, 06

Nitrogen - N

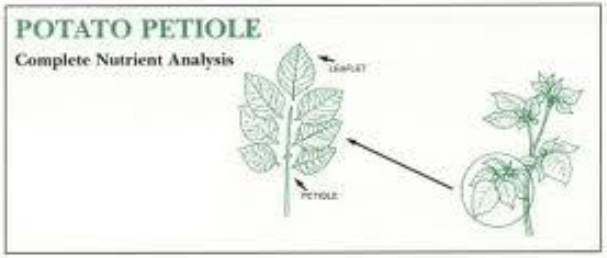
N Placement and Source

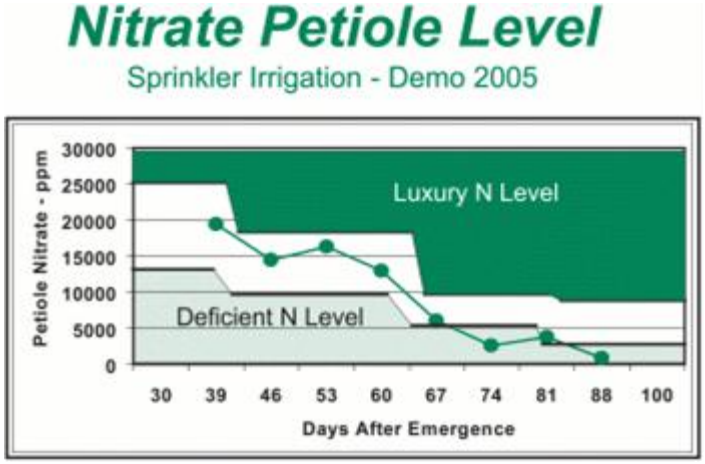
In-hill banding

Controlled/slow-release N sources may have a fit.
(coatings; urease and nitrification inhibitors)

Nitrogen - N

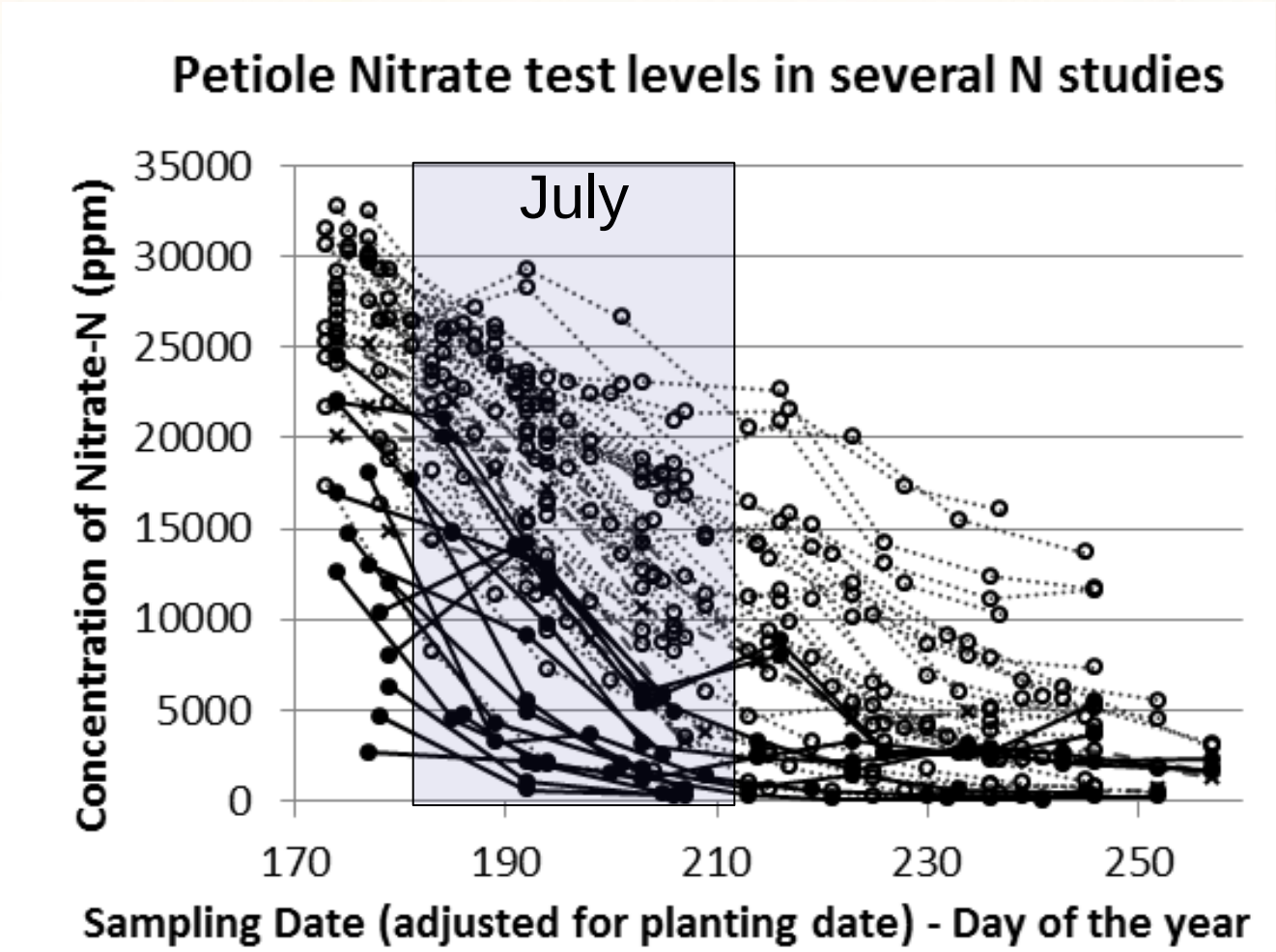
Petiole test can be helpful if unsure of sufficiency.





Nitrogen - N

Petiole test – a current work in progress.



Nitrogen - N

Negative effects of excess N:

- delayed development/maturity
- excess vines
- low tuber sg
- environment issues

(soil test!)

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