

STRATEGIC POTATO FARMS



Strategic Farm North

Results Day || 23.1.19



SPot North 2018 P, K, S Results



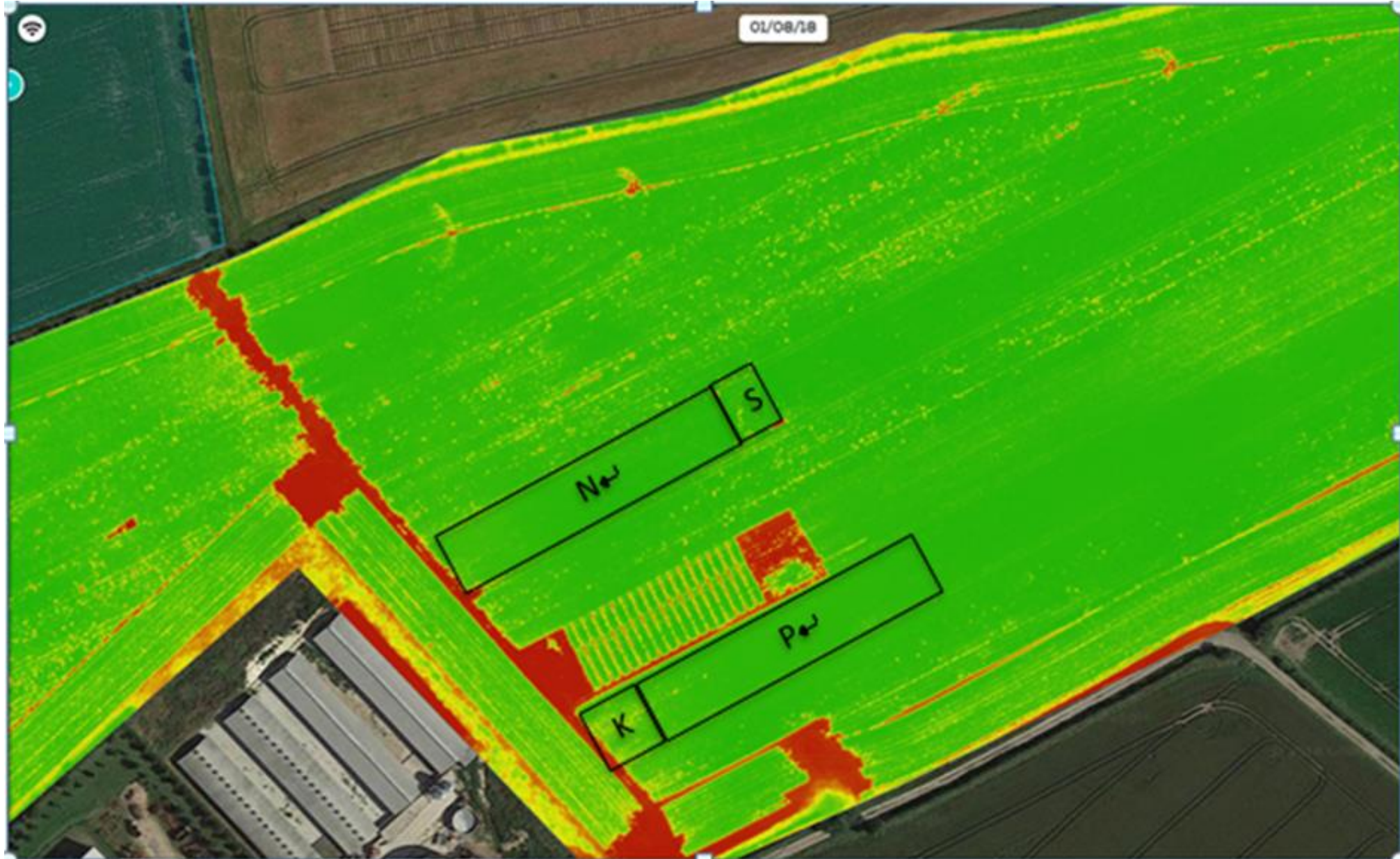
Site background

- Barn Field, Somerby Top Farm, Lincolnshire (53.5529° N, 0.3726° W)
- Sandy loam texture (78% S, 12% Z, 10% C) with high limestone content
- No PCN found in the trial area in November 2016
- Soil OM of 3.4 % (consequence of pig slurry from the site's pig unit?)
- pH 8.2
- P Index was 3- (30-31 mg/l)
- K Index 2+ (215-234 mg/l)
- Mg Index 2 (58-60 mg/l)
- SO₄ concentration very high (19.5 mg/l)

Site background

- Ploughed, ridged, destoned early May
- Planted 5 May
- Varieties
 - Maris Piper (N & S Experiments)
 - Royal (P & K Experiments)
- Emergence
 - Maris Piper 5 June
 - Royal 2 June
- Irrigation ??? mm

Any visible treatment effects on 1 August?



K Background

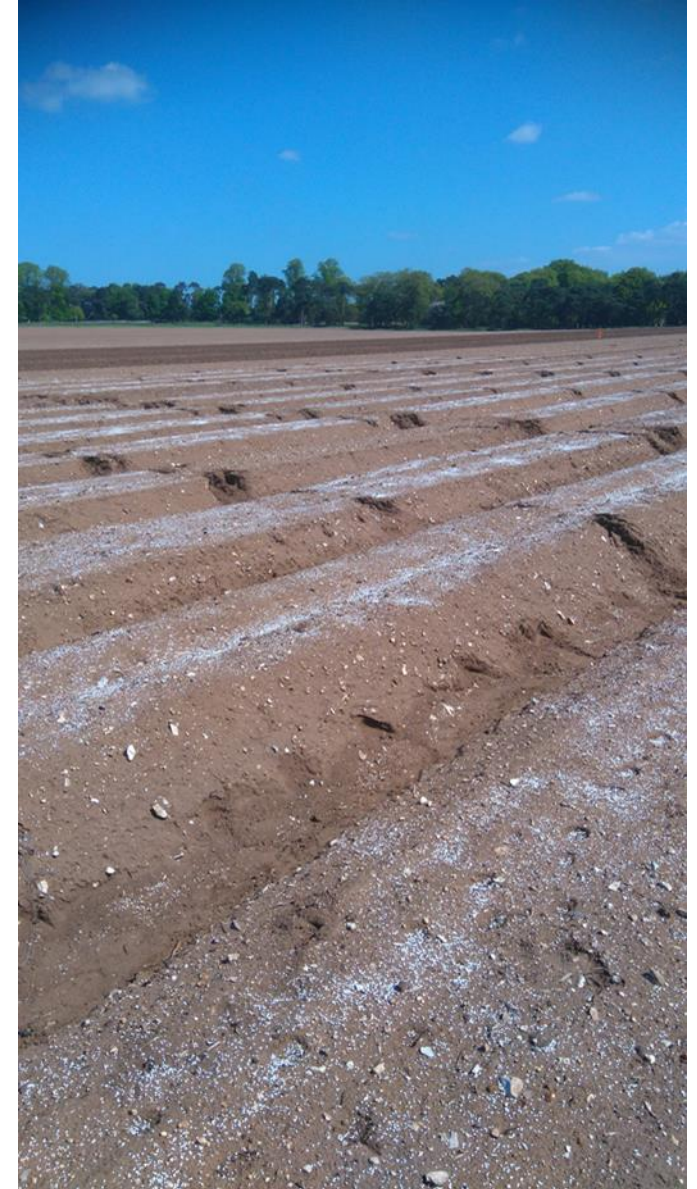
1. Allison *et al.* (2001a) found that:
 - a) Generally, K Index was a poor predictor of the probability of a yield response
 - b) No more than 210 kg K₂O/ha be applied, even on soils with Index 1 or less
 - c) When applied at the optimal rate for yield, the effects of K fertilizer on tuber DM concentration were non-significant
 - d) Exceeding the optimal K application rate caused occasional reductions in tuber DM concentration, particularly if potassium chloride (KCl) was used

K Hypotheses

1. AHDB RB209 recommended K rate for site was 300 kg K₂O/ha to balance offtake by 50 t/ha crop
2. Different K products have different effects on tuber dry matter
3. Increased K reduces tuber DM

K Treatments

- **K products:**
 - None
 - Muriate of potash (KCl)
 - Sulphate of potash (K_2SO_4)
 - ICL PotashpluS
- **K rates:**
 - 0 kg K_2O /ha
 - 100 kg K_2O /ha
 - 200 kg K_2O /ha
 - 300 kg K_2O /ha
- **3 replicate blocks**



Yields (main effects of K source and K rate)

K source / rate	Yield >40 mm (t/ha)	Total yield (t/ha)	Tuber DM (%)	DM yield (t/ha)
KCl	35.1	37.2	24.9	9.3
K ₂ SO ₄	34.5	37.0	25.1	9.3
PotashpluS	35.3	38.2	25.0	9.5
S.E. (22 D.F.)	1.46	1.39	0.15	0.37
0	34.6	36.8	25.2	9.3
100	35.2	38.0	25.1	9.6
200	35.6	37.9	24.7	9.4
300	34.4	37.1	25.0	9.3
S.E. (22 D.F.)	1.69	1.60	0.17	0.43

No effect of K source or rate on yield, and no directional effect on DM%

P Background

1. Allison *et al.* (2001b) found that:
 - a) Increases in the number of tubers in response to application of P fertilizer only occurred in soils with P Index 2 or lower and appeared to be associated with an increase in ground cover by the time of tuber initiation
 - b) Applications of foliar P had no effect on number of tubers (or yield) and the authors discouraged this practice

P Hypothesis

1. Foliar P can increase the number of tubers, even on high P Index soils

P Treatments

- No foliar P applied
- 10 l/ha MAGPHOS K applied as foliar spray in 200 l/ha 2 days prior to tuber initiation (15 June)
- 10 l/ha MAGPHOS K applied as foliar spray in 200 l/ha 2 days prior to tuber initiation (15 June) and second 10 l/ha 10 days after tuber initiation (27 June)
- 6 replicate blocks



YaraVita MAGPHOS K

YaraVita MAGPHOS K is a fully formulated liquid fertiliser containing a high concentration of phosphate together with potash and magnesium for foliar application to potatoes and other crops.

High Concentration of Phosphate with Potash and Magnesium

Contains 100% soluble plant available phosphate
Contains more magnesium than many "specific" liquid magnesium products
High quality and consistent true liquid formulation
Up to 10 times more available than soil applied phosphorus
In the preferred readily available phosphoric acid form

Widest Tank Mixability

Suitable for almost any tank mix
Gives greater flexibility in field recommendations

Excellent Plant Absorption

Rapid uptake through the leaf

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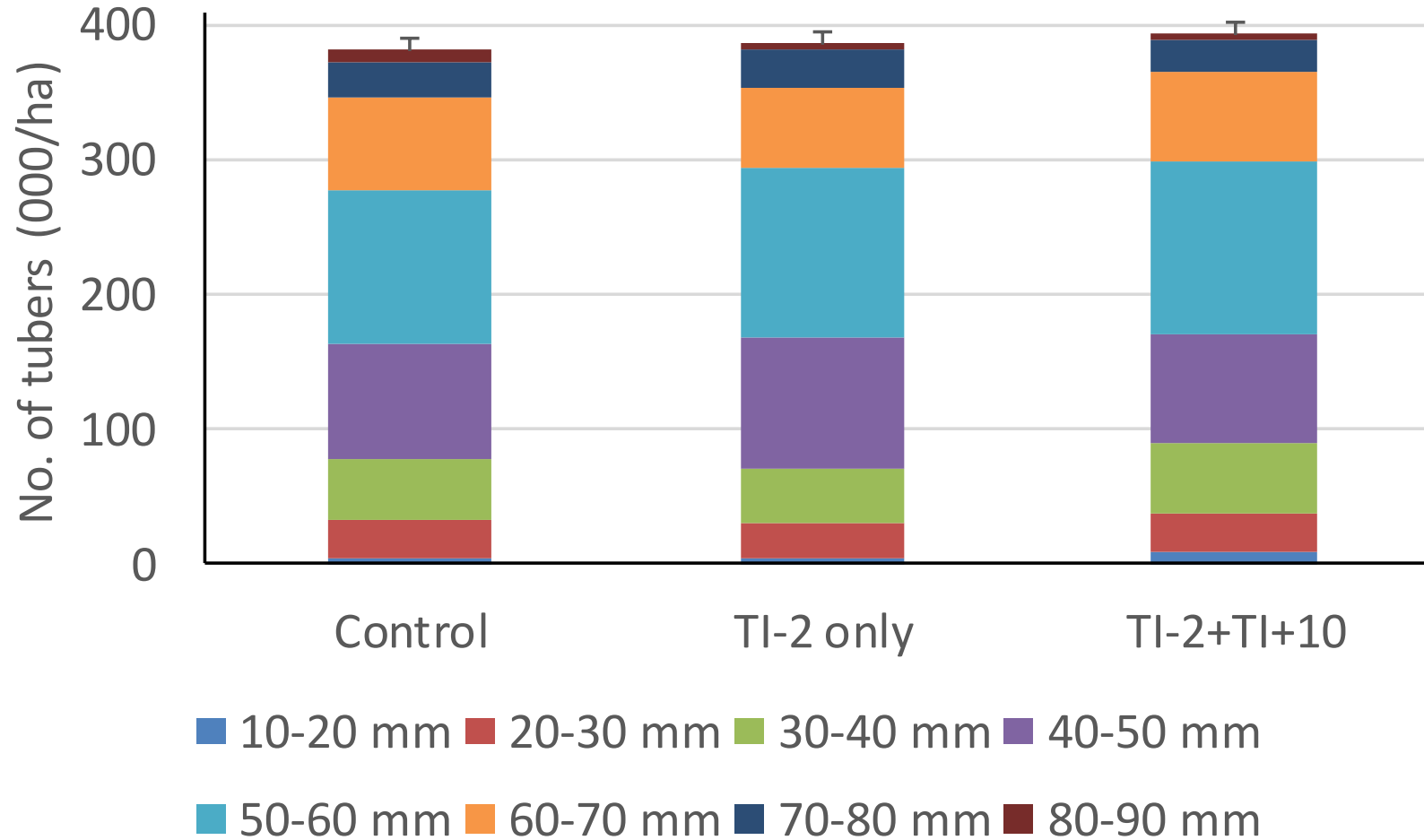
Nutrient Composition

Form: Liquid

P ₂ O ₅	440 g/l	K ₂ O	74 g/l	MgO	99 g/l
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Numbers of tubers



No effect of foliar P on number of tubers

Tuber yield

P treatment	Yield >40 mm (t/ha)	Total yield (t/ha)	Tuber DM (%)	DM yield (t/ha)
No foliar P	45.7	47.6	25.1	11.9
Foliar P at TI	45.1	46.8	24.8	11.6
Foliar P at TI and TI+10 days	44.3	46.3	25.0	11.6
S.E. (10 D.F.)	1.33	1.25	0.49	0.36

No effect of foliar P on yield

S Background

1. Previously, the supply of natural sources of S from the soil was regarded as sufficient for the potato crop
2. Significantly reduced S deposits from the atmosphere (due to a marked decline in industrial pollution), and continued use of fertiliser with low S content, S deficiency has gained increasing attention in many regions causing crops to become vulnerable to yield reductions
3. Spot North experiment is one of a series being conducted as part of a 3-year AHDB-funded project on S undertaken by NIAB CUF

S Hypotheses

1. Potato crops are responsive to S fertilizer
2. Product type influences S delivery
3. S can help control common scab

S Treatments

- No S
- 50 kg S/ha (125 kg SO_3) applied as ammonium sulphate at planting
- 50 kg S/ha applied as ICL Polysulphate at planting
- 50 kg S/ha applied as liquid sulphur at planting
- 6 replicate blocks

Petiole concentration of SO_4 (mg/l)

S treatment	mg/l
None	164
Ammonium sulphate†	173
ICL Polysulphate†	167
Liquid S†	177
S.E. (15 D.F.)	8.8

†125 kg SO_3 /ha)

No effect of S application on plant uptake?

Numbers of tubers and yields

S treatment	Total no. tubers (000/ha)	Total yield (t/ha)	Tuber DM (%)
None	324	44.0	24.2
Ammonium sulphate†	340	42.3	24.1
ICL Polysulphate†	296	41.8	24.0
Liquid S†	396	48.1	24.2
S.E. (14 D.F.)	40.5	3.06	0.22

†125 kg SO₃/ha)

No effect of S on yield

Common scab and skin finish defects

S treatment	Common scab (0=absent, 1=low, 2-medium, 3=high)	Proportion of tubers with skin finish defect (%)
None	1.67	68
Ammonium sulphate†	1.17	75
ICL Polysulphate†	1.67	83
Liquid S†	2.00	87
S.E. (15 D.F.)	0.214	9.6


†125 kg SO₃/ha)

No effect of S on skin quality?

Summary of AHDB S Project 2016-2018 (8 sites)



	Petiole SO_4 (mg S/l)	Yield (t/ha)	Tuber DM %
No S	117	62.7	22.0
With S	134	63.0	22.1
S.E.	5.4	1.50	0.09



Variety	Petiole SO_4 (mg S/l)
Innovator	123-160
VR808	68
Maris Piper	138-170
Royal	98
Russet Burbank	192

Summary

- Don't do nutrition experiments on high Index soils!
- K Index 2+
 - No effect of K source or rate on yield (or DM)
- P Index 3-
 - No effect of foliar P on number of tubers
- S soil concentration very high
 - No effect on yield or skin quality
- Optimal fertilizer for site
 - 120N, 0P, 0K, 0S

Acknowledgements

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- AHDB staff involved in the SPot North programme including: Graham Bannister and Amber Cottingham
- Branston staff for harvesting and assessing tuber quality, especially Oscar Thacker and Nick Aldrich

A vibrant landscape of a green field at sunset. A path leads from the foreground towards the horizon where the sun is setting, creating a warm glow. The sky is filled with colorful clouds. The text is overlaid in the center of the image.

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