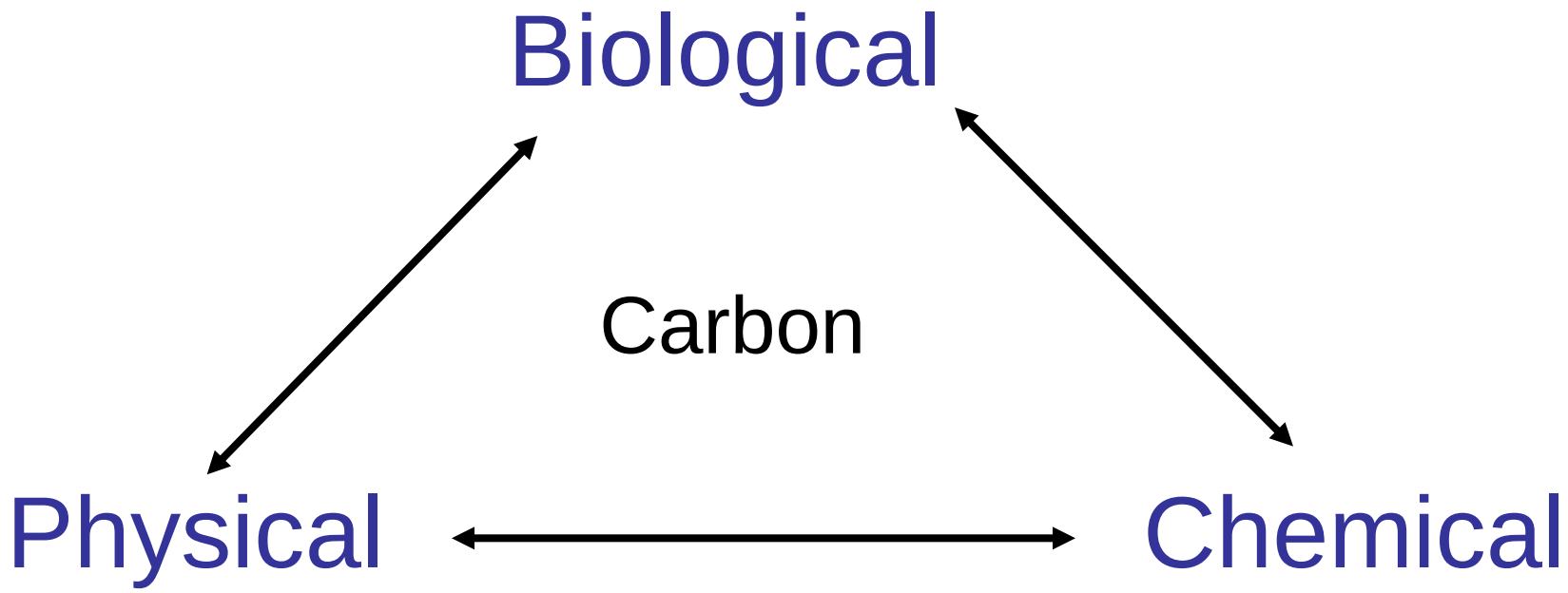
The Soil First Farming Company

Steve Townsend

Mission statement

‘Helping farmers make more profit by reducing cultivation and fertiliser costs and improving yields’

Good Soil Management



Contents

- What is wrong with current fertiliser advice
- Nutrition Strategy
- Future developments

UK perspective, Neil Fuller

What Is Wrong With Current Fertiliser Advice?

- Basis for Recommendations
- Example field?
- Type & Form of Fertiliser

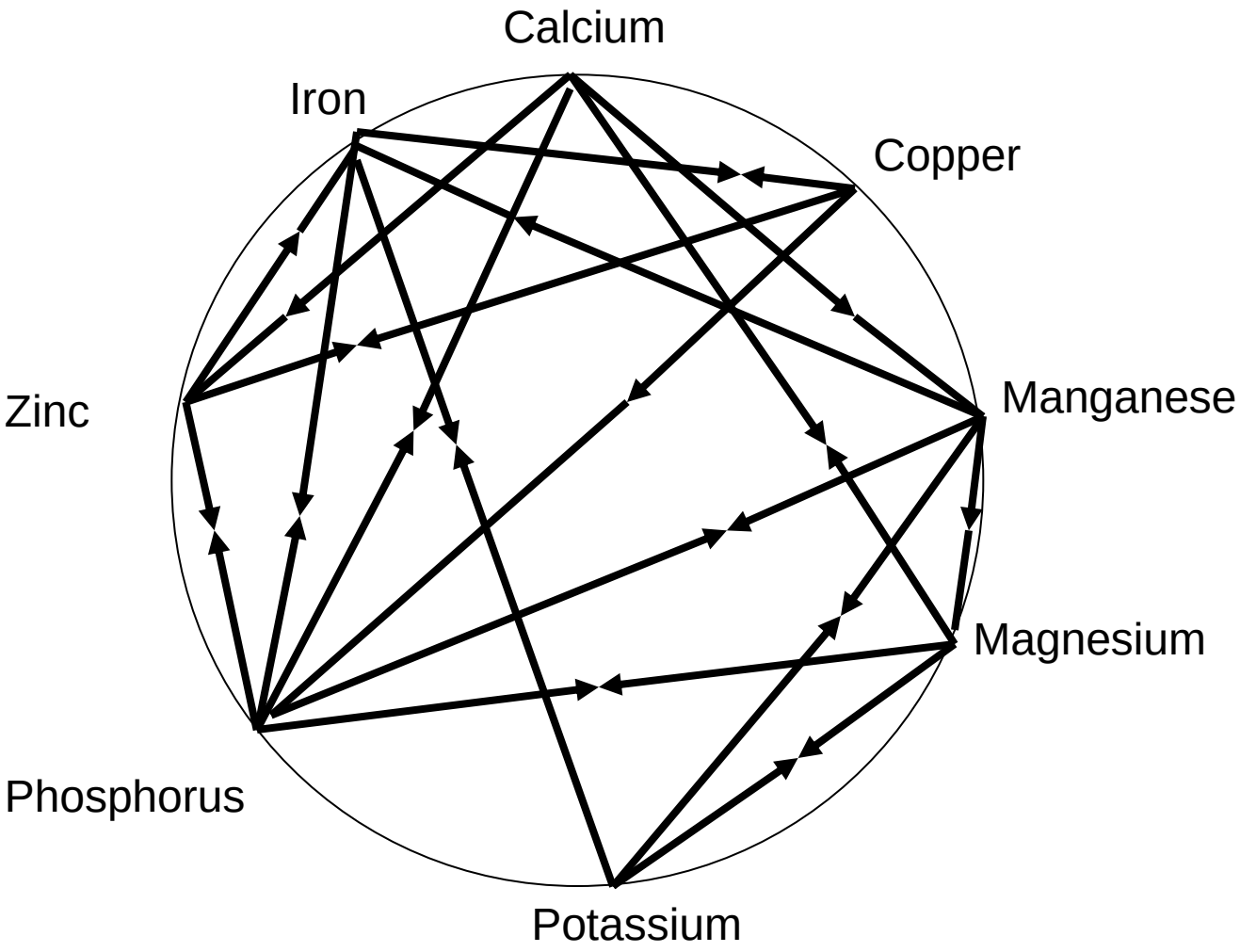
  Is it important?

Fertiliser Recommendations

- Law of the Minimum
  - Test soil…….see what is missing
  - Index system

- Law of the Maximum
  - Test soil……see what is in excess
  - Liming

Nutrient Interactions in Soil



So…

It is just about N, P, K & pH?

What can we do?

Example Field

Gallops nr Market Harborough, Midlands, UK

pH	P	K	Mg	
6.5	2-	2	4	
	16.6	170	200	mg/l

- High black grass populations
- Crops look great don't yield!
- Soil compacts easily!
- Hungry

Black grass

- Indicator of anaerobic soil conditions
- Low organic matter & low Calcium
- Gallops = pH 6.5?

pH

- What does it measure?

Hydrogen

- Neutralising values

Calcium	1.0
Magnesium	1.4
Potassium	1.7

Black grass

- Indicator of anaerobic soil conditions
- Organic matter & Calcium
- Gallops = pH 6.5?
- pH buffered by Magnesium & Potassium
  - 1.25 tne/ha lime

Example Field

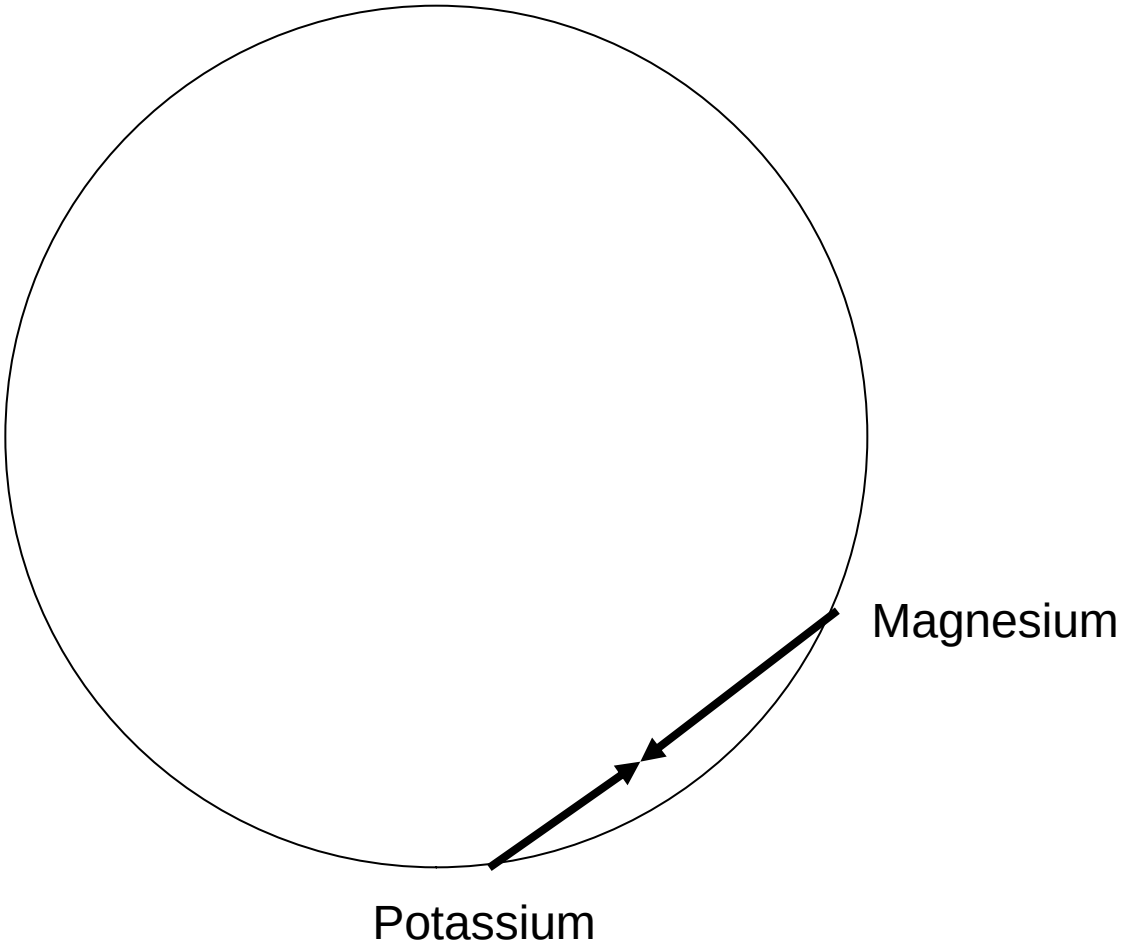
Gallops nr Market Harborough, Midlands, UK

pH	P	K	Mg	
6.5	2-	2	4	
	16.6	170	200	mg/l

- High black grass populations
- Crops look great don't yield!
- Soil compacts easily!
- Hungry

Potassium – critical for bulk yield

Nutrient Interactions in Soil



Potassium – critical for bulk yield

Hidden hunger – crops looks great don't yield!

Need…

- 175 mg/l
- x 2 magnesium level
- Timing critical
  - Stem extenstion

Example Field

Gallops nr Market Harborough, Midlands, UK

pH	P	K	Mg	
6.5	2-	2	4	
	16.6	170	200	mg/l

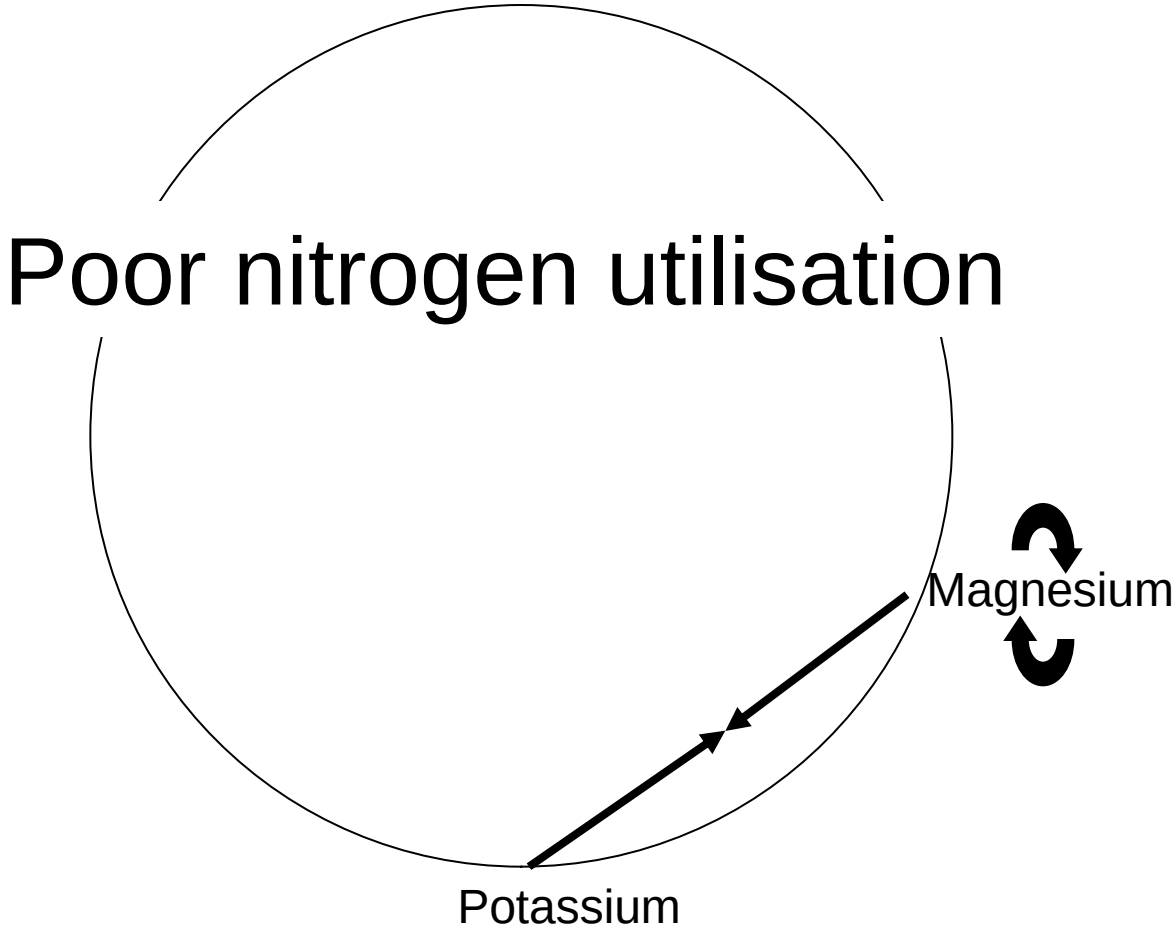
- High black grass populations
- Crops look great don't yield!
- Soil compacts easily!
- Hungry

Soil compacts easily!

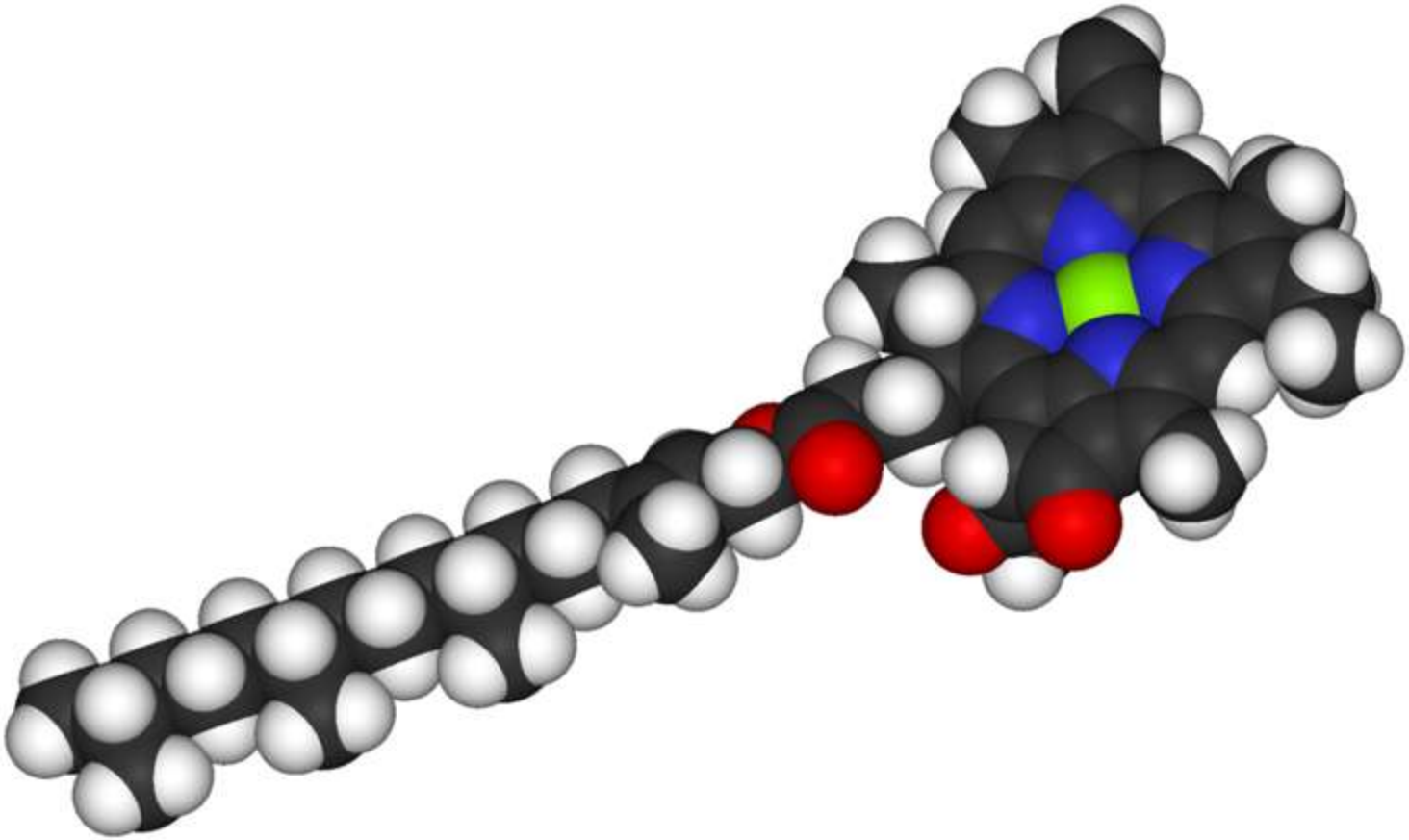
Magnesium

- Soil sticky when wet (22 H_2O)
  Rock hard when dry, large cracks
- Deflocculates the soil
- Anaerobic conditions (black grass?)
- Beware dolomitic lime (Ca:Mg ratio)

Hungry Crops



Chlorophyll



Gallops field results

- Black grass control improved
- Yield from 7.4 – 8.0 to 9.6 – 10.4 tne/ha

  (60 kg/ha K_2O + foliar Mg)
- Nitrogen from 220 kg/ha to 160 kg/ha

Type & Form of Fertilisers

- Is it important or do we just buy on Price?

- Nitrogen
  - Ammonium Nitrate or Urea?

Nitrogen

- Ammonium Nitrate or Urea?
- UK nitrogen rates based on 50% efficiency
- How can we on improve this?

Nitrogen

Improving efficiency

- Apply Nitrogen with Sulphur & Magnesium
  - K & Mn important
- Sulphur for complete amino acid product
  - 2:1 N to SO_3 ratio

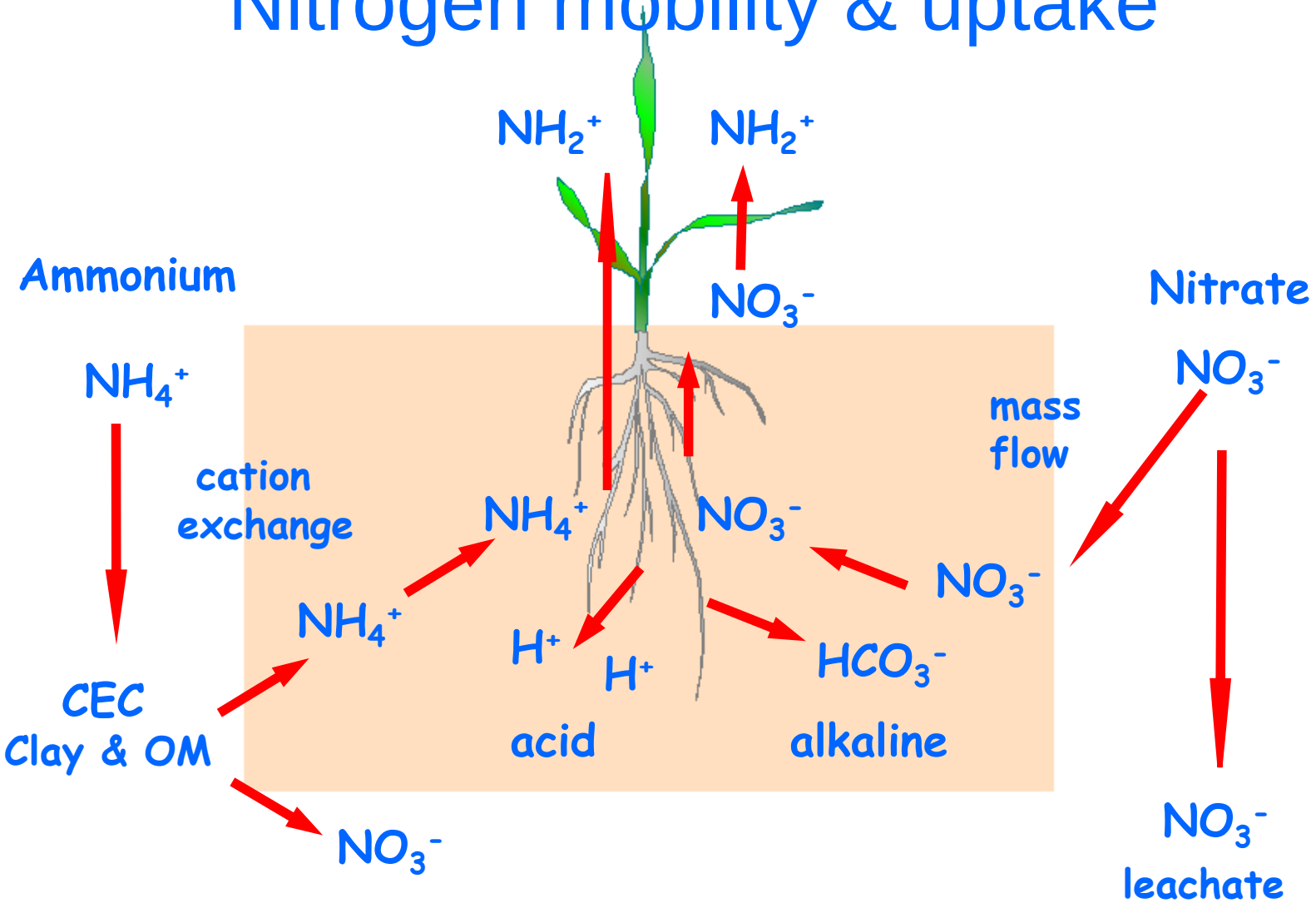
Sulphur deficiency

Nitrogen

Improving efficiency

- Apply Nitrogen with Sulphur & Magnesium
  - K & Mn important
- Sulphur for complete amino acid product
  - 2:1 N to SO_3 ratio
- Magnesium for chlorophyll
- Reduce environmental losses

Nitrogen mobility & uptake



80-180 days
10cm

Chart by permission of Neil Fuller

8-12 days
10cm

Nitrogen

Improving efficiency

- Apply Nitrogen with Sulphur & Magnesium
  - K & Mn important
- Sulphur for complete amino acid product
  - 2:1 N to SO_3 ratio
- Magnesium for chlorophyll
- Reduce environmental losses
- Application timing critical

Nitrogen rates cereals 07?

120 kg/ha

15 April

240 kg/ha

180 kg/ha

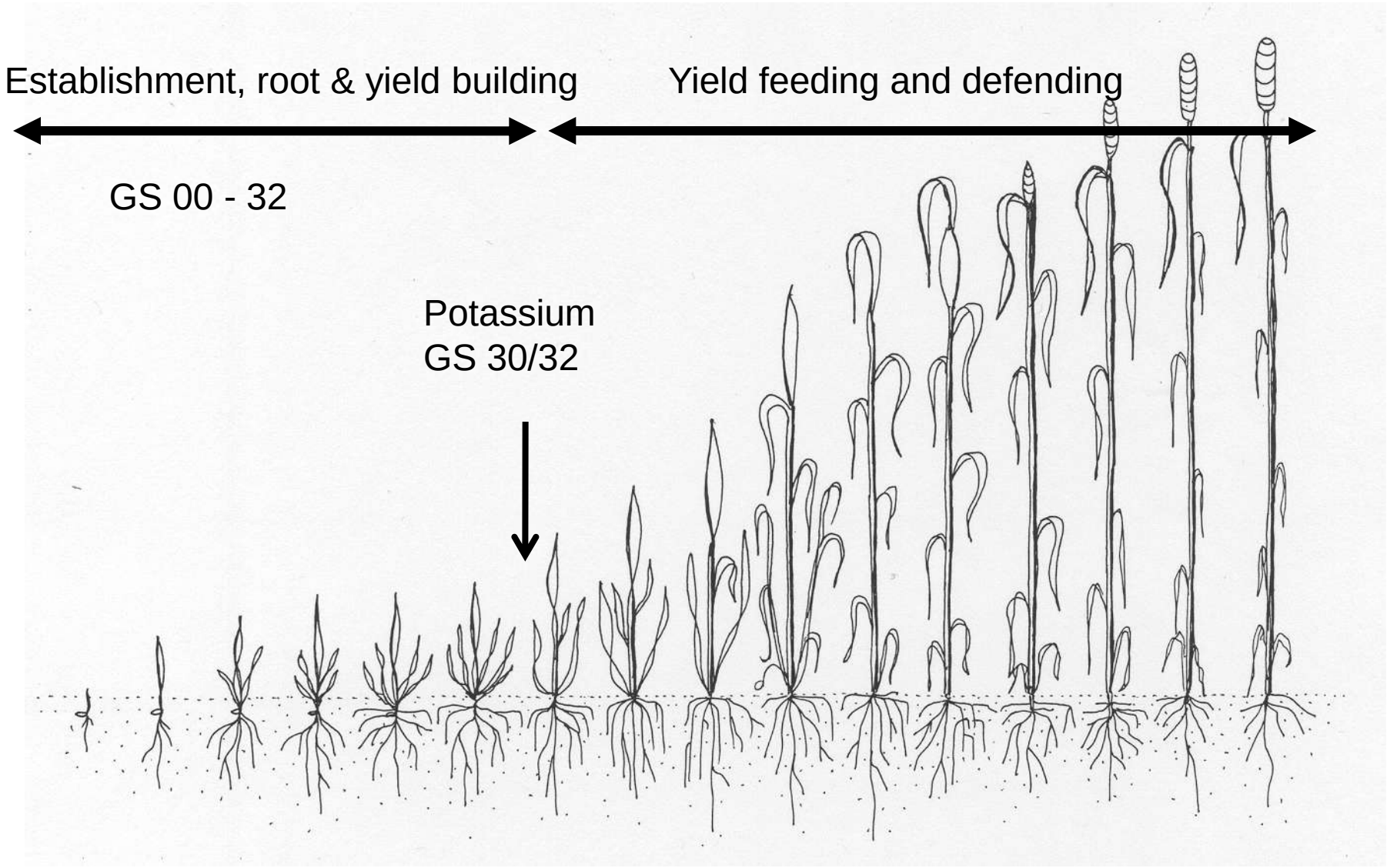
15 April

¾ N applied 6 March!

Cereal Strategy

- Complete nutrition - Major, Minor & Trace elements
- Based on 2 stages
  - Establishment, root & yield building
  - Yield feeding & defending
- 3 – 4 applications of phosphate (phosphite)

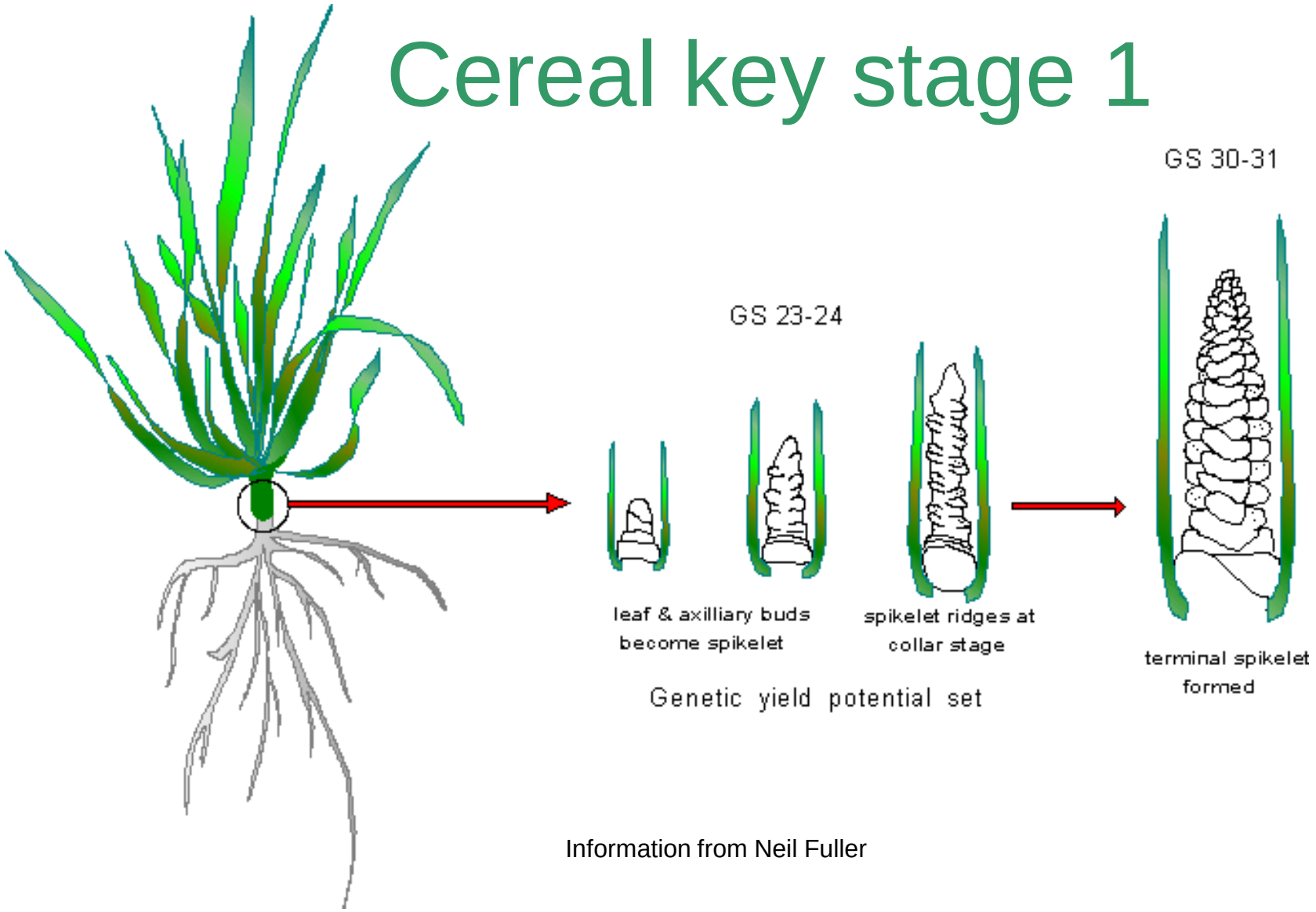
- Foliar applications whenever possible
  - T0/T1, T2 & T3



Phosphorous, Mn, Zn, Cu & B

Nitrogen, Potassium, Magnesium & Sulphur

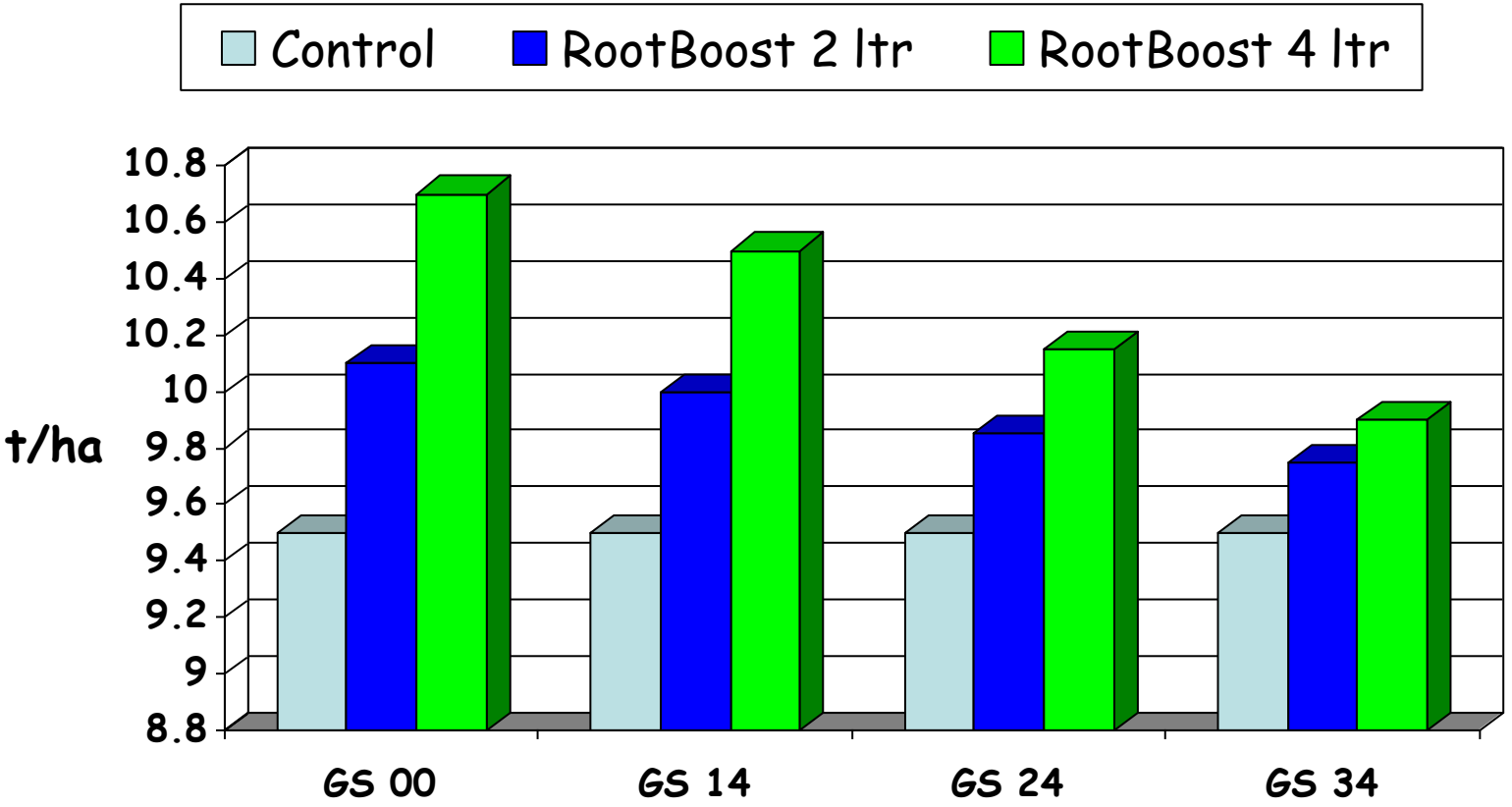
Cereal key stage 1



Information from Neil Fuller

Trials with Root Boost in W Wheat

average of 18 trial sites with Robigus, Claire, Einstein & Hereward

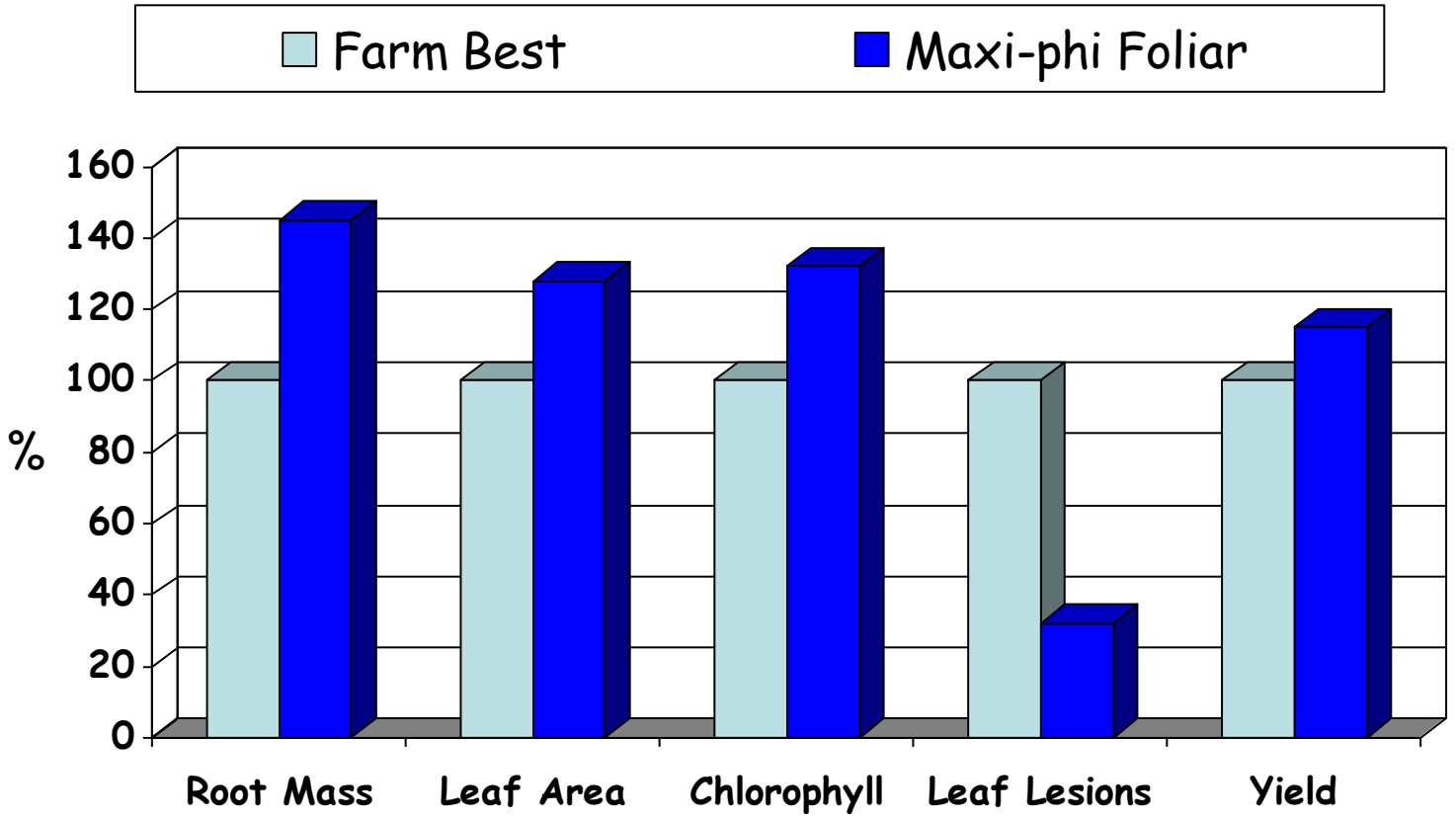


Average yield increase 12% from RootBoost at 4 ltr/ha
equivalent to 100 kg/ha MAP

Data from Neil Fuller trials

Trial investigation with W Wheat

average of 12 trials using foliar programmes on sandy loam, silt & clay loam soils

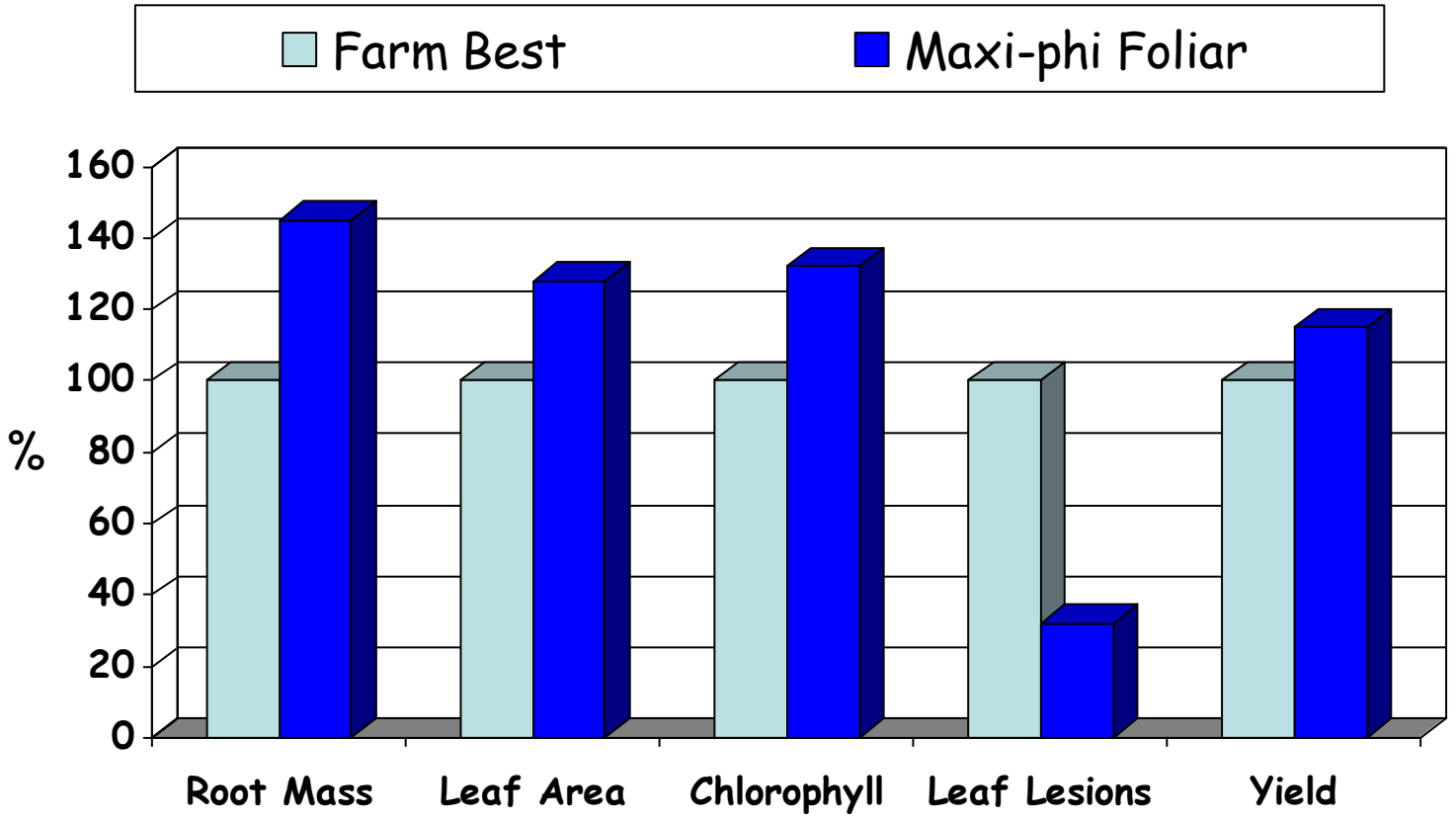


Data from Neil Fuller trials


© Soil First Farming 2011

Trial investigation with W Wheat

average of 12 trials using foliar programmes on sandy loam, silt & clay loam soils



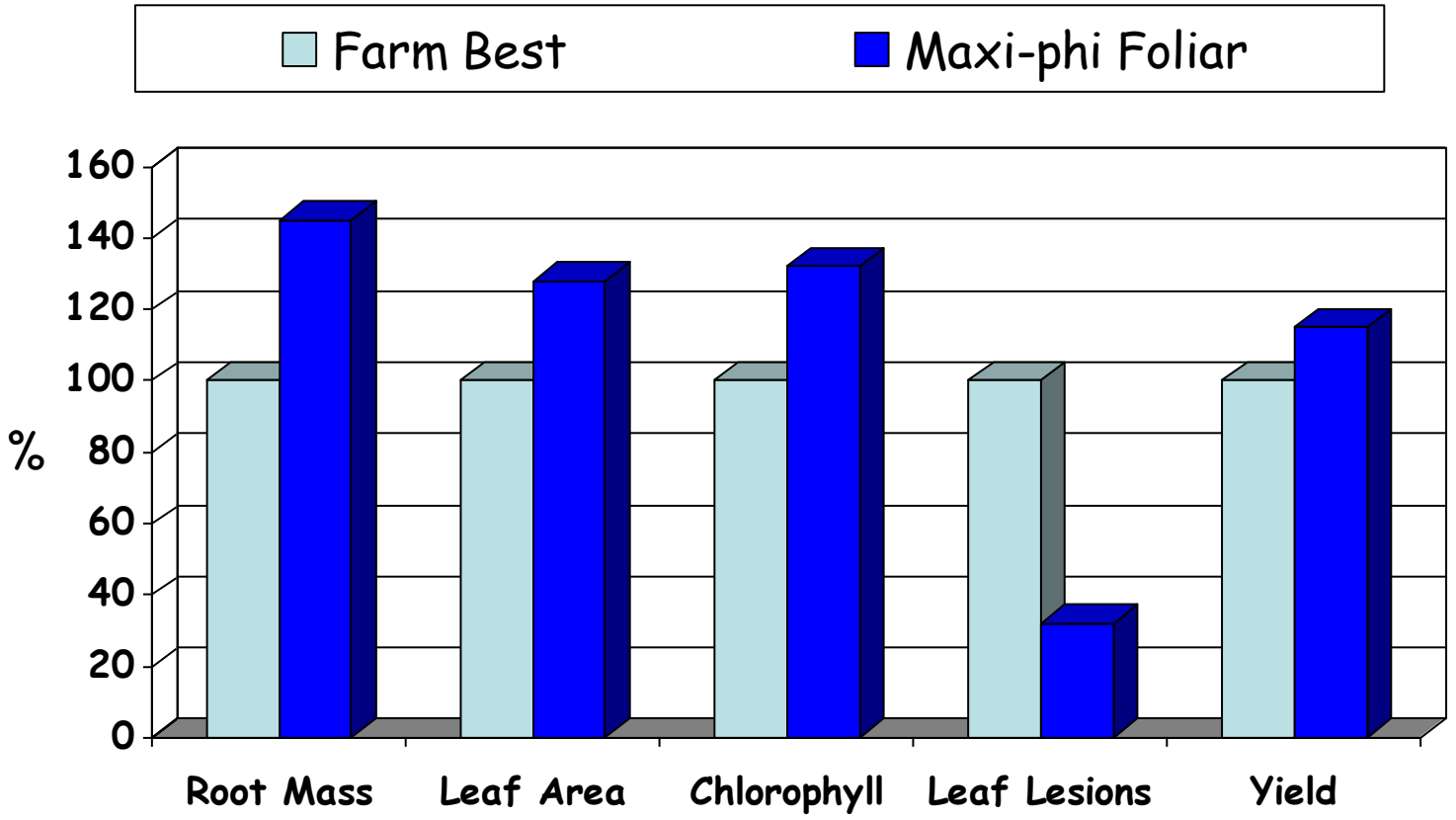

© Soil First Farming 2011


© Soil First Farming 2011


© Soil First Farming 2011

Trial investigation with W Wheat

average of 12 trials using foliar programmes on sandy loam, silt & clay loam soils



Data from Neil Fuller trials

Why less disease?

- Disease's look for free nitrogen or incomplete amino acid use in plants

  ⟶ Nitrogen management critical

Nitrogen mobility & uptake

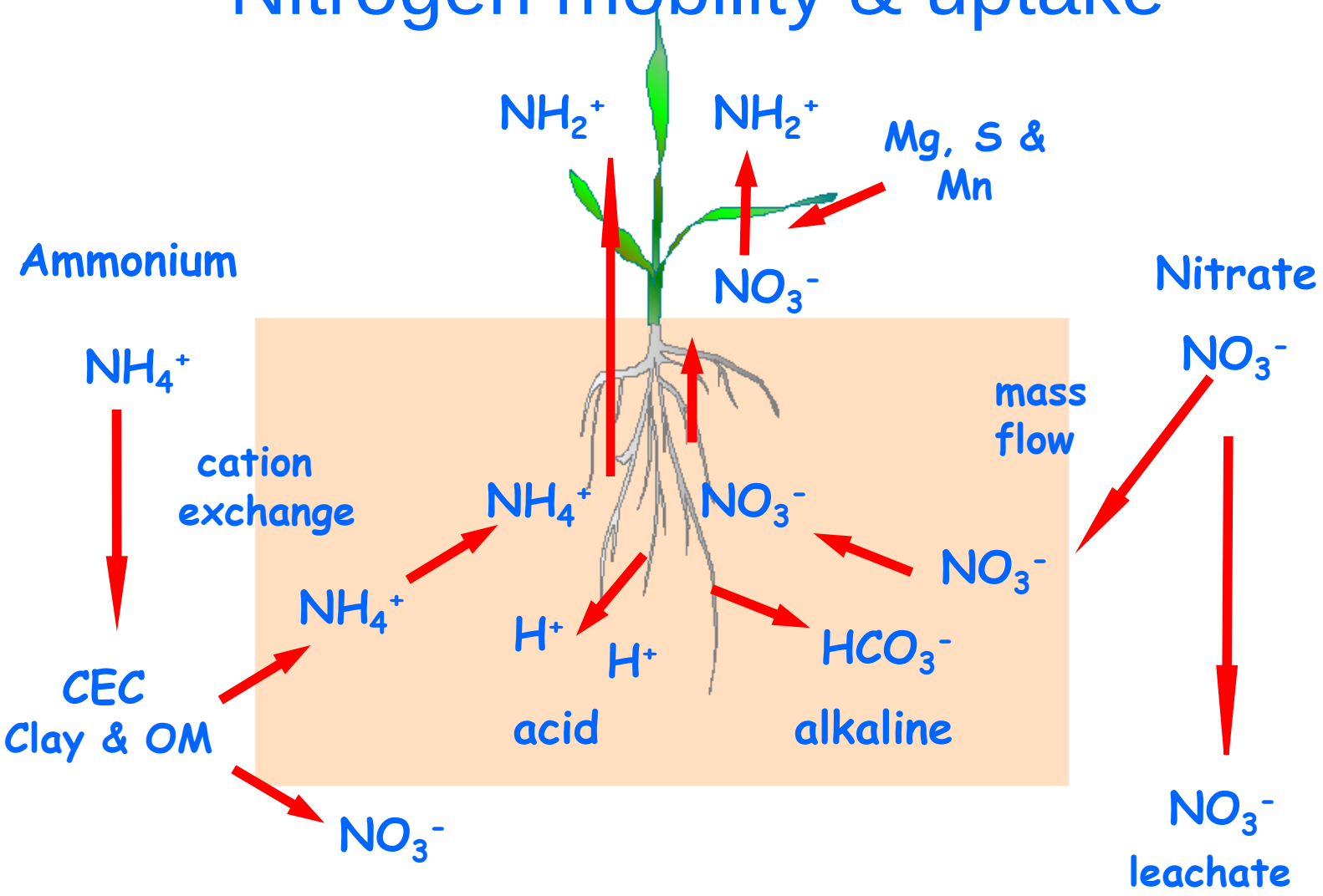


Chart by permission of Neil Fuller

Why less disease?

- Disease's look for free nitrogen or incomplete amino acid use in plants

  ⟶ Nitrogen management critical

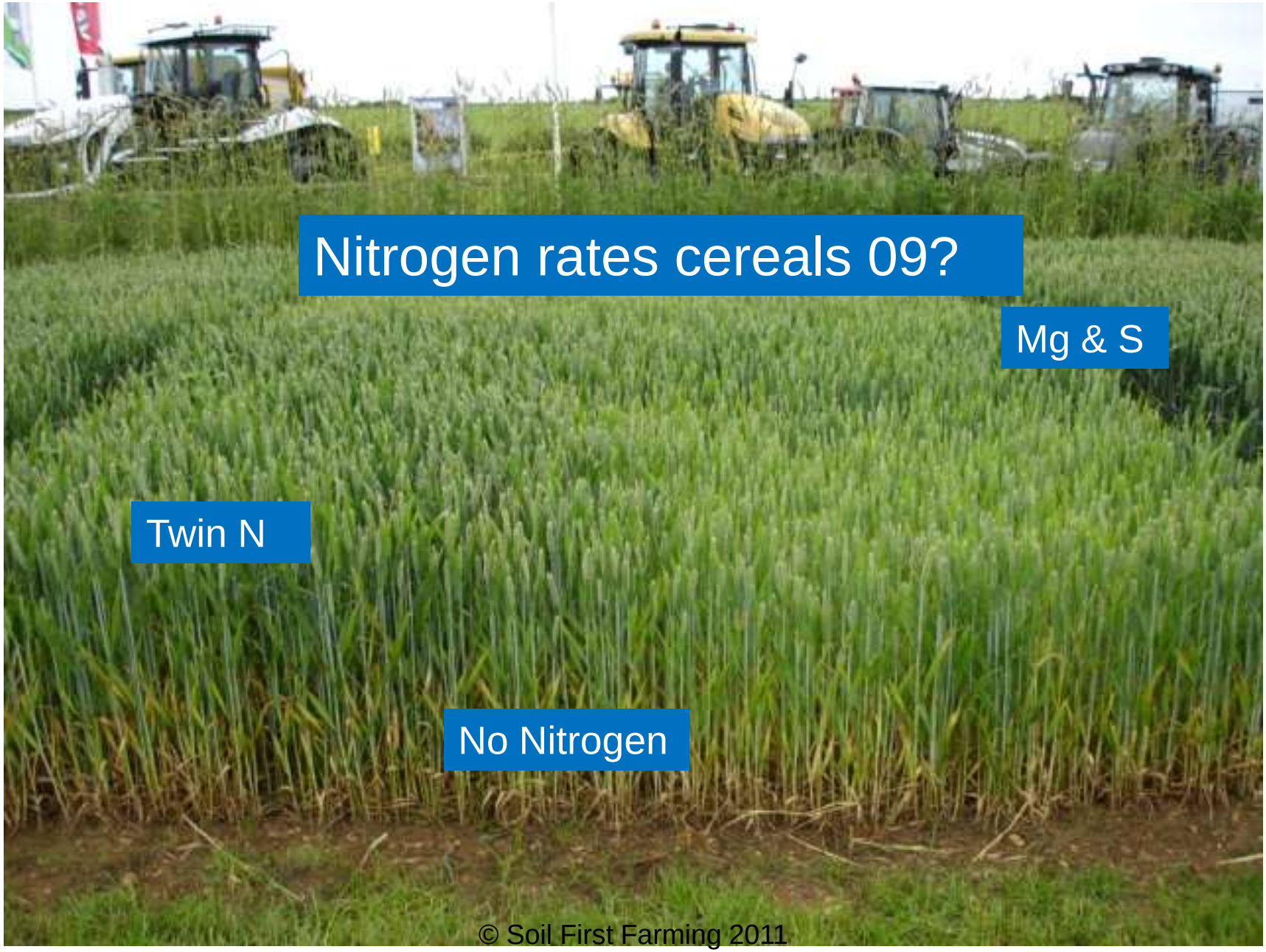
- Ensure adequate S, Mg, Mn & K

- Trace elements Mn, Zn, Cu & B enhance plants natural resistance.

- Phosphites have fungicidal properties

Future

- Continue to reduce costs & improve efficiency
- Nitrogen biggest prize
  - Foliar formulations, 3 - 8x
  - Biological N (Twin N)



Future

- Continue to reduce costs & improve efficiency
- Nitrogen biggest prize
  - Foliar formulations, 3 - 8x
  - Biological N (Twin N)
- Disease management
  - 2x trace elements
  - Focus on Cu, Mn & Zn
- Biologicals

Conclusion

- What is wrong with current fertiliser advice
- Strategy
- Future developments

Merci Beaucoup

ANALYSE REALISEE POUR :
ROUVIERE BERNARD

LE PLESSIS
35220 ST MELAINE

Echantillon N°3588901

CODE AS : 32 / 2 / AGRI : 35 / 279513 /

DISTRIBUTEUR :
SAS GAUDICHE TERDICI
LES RUES
35370 TORCE

TECHNICIEN : **Joseph BOUVIER**
ZONE : **NR0**

CODE : 200 / AS / DISTRI : 35 / 10515

BOURDOULIC

N° D'ECHANTILLON	3588901	SURFACE	
CODE PREL.	NON RENSEIGNE	N° LABORATOIRE	1766253
LONGITUDE		Echantillon reçu le	23/07/2009
LATITUDE		Rapport expédié le	11/08/2009
DATE DE PREL.	01/07/2009	DELAI	19 jours

QRRennesParc

E DU COMPLEXE ARGILO HUMIQUE

AT CEC : **9.4** meq/100g

FAIBLE | UN PEU FAIBLE | MOYENNE | ELEVEE | TRES ELEVEE

complexe argilo-humique

TYPE DE SOL

LIMON SABLEUX

Terre Fine: 3200T/ha Densité Apparente: 0

Type de sol défini selon la classification régionale établie par le COMIFER. Il détermine les seuils d'interprétation P K pour chaque classe d'exigence des cultures.

INDICE DE FERTILITE PHYSIQUE	FAIBLE	MOYEN	ELEVE
IFP* Non Calculé			

*INDICE D'ACTIVITE BIOLOGIQUE

		MAUVAIS	MOYEN
IAB*	13 / 20		

BILAN HUMIQUE		DEFICITAIRE	EQUILIBRE	EXC
en Kg d'humus/ ha/an	SANS APPORT D'EFFLUENTS	-130		
	AVEC EFFLUENTS PREVUS			

URATION CATIONS

		H+	Ca++	K+	Mg++	Na+	Taux de saturation
ON DES CATIONS DE LA CEC	ACTUELLE	< 5	88.8	4.5	9.9	1.8	>100
	OPTIMUM	< 5.0	87.8	2.7	4.5	<=5	95

RATIOS D'EQUILIBRE

OS	RESULTATS	NORMES	TROP FAIBLE	NORMAL	TROP ELEVE
gO	1.1	1.4			
gO	12.6	27.2			
O	1.55	0.80			
Zn	15.3	13.9	Non significatif		

OLUTION DU SOL ET EQUILIBRE CHIMIQUE

NORMAL | ELEVE | EXCESSIF

SOLUTION DU SOL — COMPLEXE ARGILO-HUMIQUE

Na+ Mg++ Ca++ Ca++ H+ Ca++ Ca++ Mg++ Ca++ H+ Ca++ Ca++ Ca++ H+ SO4 NO3

CEC **9.4** meq/100g

BILAN ACIDE BASE

(1) exprimés en ppm pour tous les éléments nutritifs	RESULTATS (1)	NORMES (2)	TRES FAIBLE	FAIBLE	UN PEU FAIBLE	MOYEN	ELEVE	TRES ELEVE
pH DU SOL	6.5	6.6						
pHKcl	6.1							
Acidité de réserve	Très faible							
Aluminium	<1.0							
Risque de blocage	Très faible							
MAGNESIE (MgO)	185	85 / 125						
CALCIUM (CaO)	2338	2310						

ANALYSE CHIMIQUE

	RESULTATS (1)	NORMES mini/maxi	TRES FAIBLE	FAIBLE	UN PEU FAIBLE	SATISFAISANT	ELEVE	TRES ELEVE
MATIERES ORGANIQUES (%)	2.2	2.1						
PHOSPHORE (P_2O_5)	52	50 / 80						
POTASSE (K_2O)	200	120 / 180						
SODIUM (Na_2O)	53	<110						

OLIGO-ELEMENTS

ZINC (Zn)	3.4	3.6	
MANGANESE (Mn)	65.1	14.0	
CUIVRE (Cu)	3.4	1.8	
FER (Fe)	157.4	14.4	

RAGM FA100706

Analyse de terre

PARCELLE : KERYAN

ANALYSE REALISEE POUR :
ROUVIERE BERNARD

LE PLESSIS
35220 ST MELAINE

Echantillon N°3588899

CODE AS : 32 / 2 / AGRI : 35 / 279513 /

DISTRIBUTEUR :
SAS GAUDICHE TERDICI
LES RUES
35370 TORCE

TECHNICIEN : **Joseph BOUVIER**
ZONE : **NR0**

CODE : 200 / AS / DISTRI : 35 / 10515

N° D'ECHANTILLON	3588899	SURFACE	
CODE PREL.	NON RENSEIGNE	N° LABORATOIRE	1766251
LONGITUDE		Echantillon reçu le	23/07/2009
LATITUDE		Rapport expédié le	11/08/2009
DATE DE PREL.	01/07/2009	DELAI	19 jours

QRRansPerc

TAILLE DU COMPLEXE ARGILO HUMIQUE

RESULTAT **CEC** : **5.2** meq/100g

TRES FAIBLE | FAIBLE | UN PEU FAIBLE | MOYENNE | ELEVEE | TRES ELEVE

complexe argilo-humique

TYPE DE SOL

LIMON SABLEUX

Terre Fine: 2900T/ha Densité Apparente: 0

Type de sol défini selon la classification régionale établie par le COMIFER. Il détermine les seuils d'interprétation P K pour chaque classe d'exigence des cultures.

INDICE DE FERTILITE PHYSIQUE	FAIBLE	MOYEN	ELEVE
IFP* 11 / 20			

*INDICE D'ACTIVITE BIOLOGIQUE

MAUVAIS

IAB* **17 / 20**

BILAN HUMIQUE

DEFICITAIRE

en Kg d'humus/ha/an — SANS APPORT D'EFFLUENTS : **-250** ; AVEC EFFLUENTS PREVUS :

SATURATION CATIONS

REPARTITION DES CATIONS EN % DE LA CEC	H^+	Ca^{++}	K^+	Mg^{++}	Na^+	Taux de saturation
ACTUELLE	0	>100	5.4	10.4	2.5	**>100**
OPTIMUM	0 à 5	87.9	4.9	7.2	<=5	

BILAN ACIDE BASE

(1) exprimés en ppm pour tous les éléments nutritifs	RESULTATS (1)	NORMES (2)	TRES FAIBLE	FAIBLE	UN PEU FAIBLE	MOYEN	ELE
pH DU SOL	8.0						
Calcaire total (%)	0.3						
Risque de blocage	Elevé						
MAGNESIE (MgO)	108	75 / 115					
CALCIUM (CaO)	3053	1280					

RATIOS D'EQUILIBRE

RATIOS	RESULTATS	NORMES	TROP FAIBLE	NORMAL	TROP ELEVE
K_2O/MgO	1.2	1.6			
CaO/MgO	28.3	17.1			
Cu/MO	2.42	1.00			
P_2O_5 /Zn	36.8	11.9			

ANALYSE CHIMIQUE

	RESULTATS (1)	NORMES mini/maxi	TRES FAIBLE	FAIBLE	UN PEU FAIBLE	SATISFAISANT	ELE
MATIERES ORGANIQUES (%)	1.9	2.2					
PHOSPHORE (P_2O_5)	81	50 / 80					
POTASSE (K_2O)	131	120 / 180					
SODIUM (Na_2O)	41	<60					

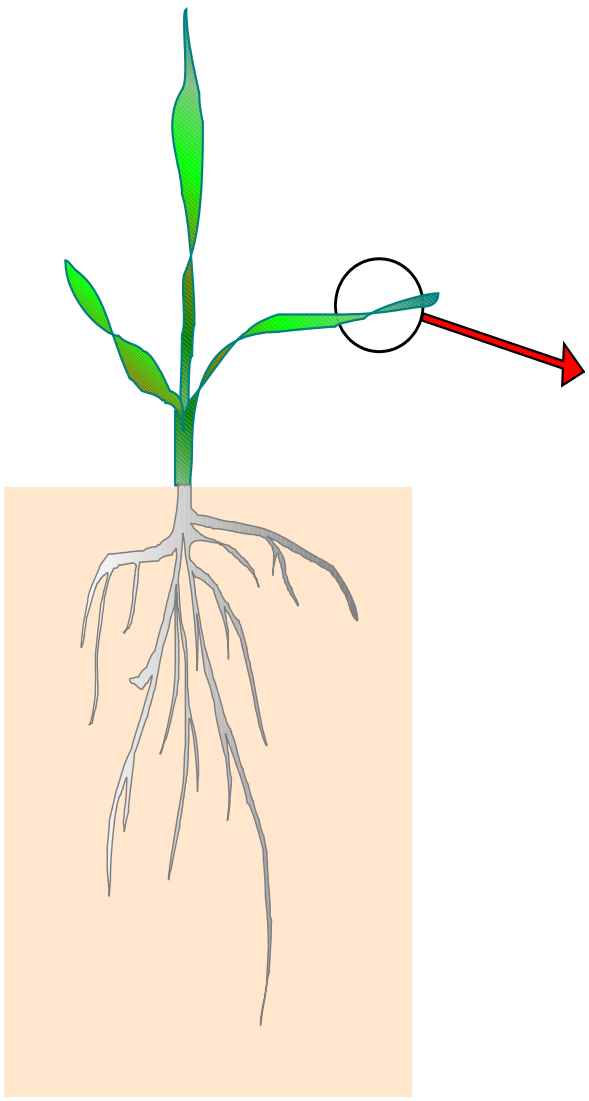
OLIGO-ELEMENTS

ZINC (Zn)	2.2	4.2
MANGANESE (Mn)		

SOLUTION DU SOL ET EQUILIBRE CHIMIQUE

FAIBLE	NORMAL	ELEVE	EXCESSIF

Phyllosphere nutrition



Organic complex
Chelate
Oxide
Sulphate

Mn.AA
Mn.EDTA
MnO
$MnSO_4$

+ Mn +

WAX (-ve)

PALLISADE (high CEC)

Mn.AA
Mn.EDTA
MnO
+ Mn +

Mn.AA
Mn.EDTA
MnO
+ Mn +

+ Mn +
AA
+ Mn +

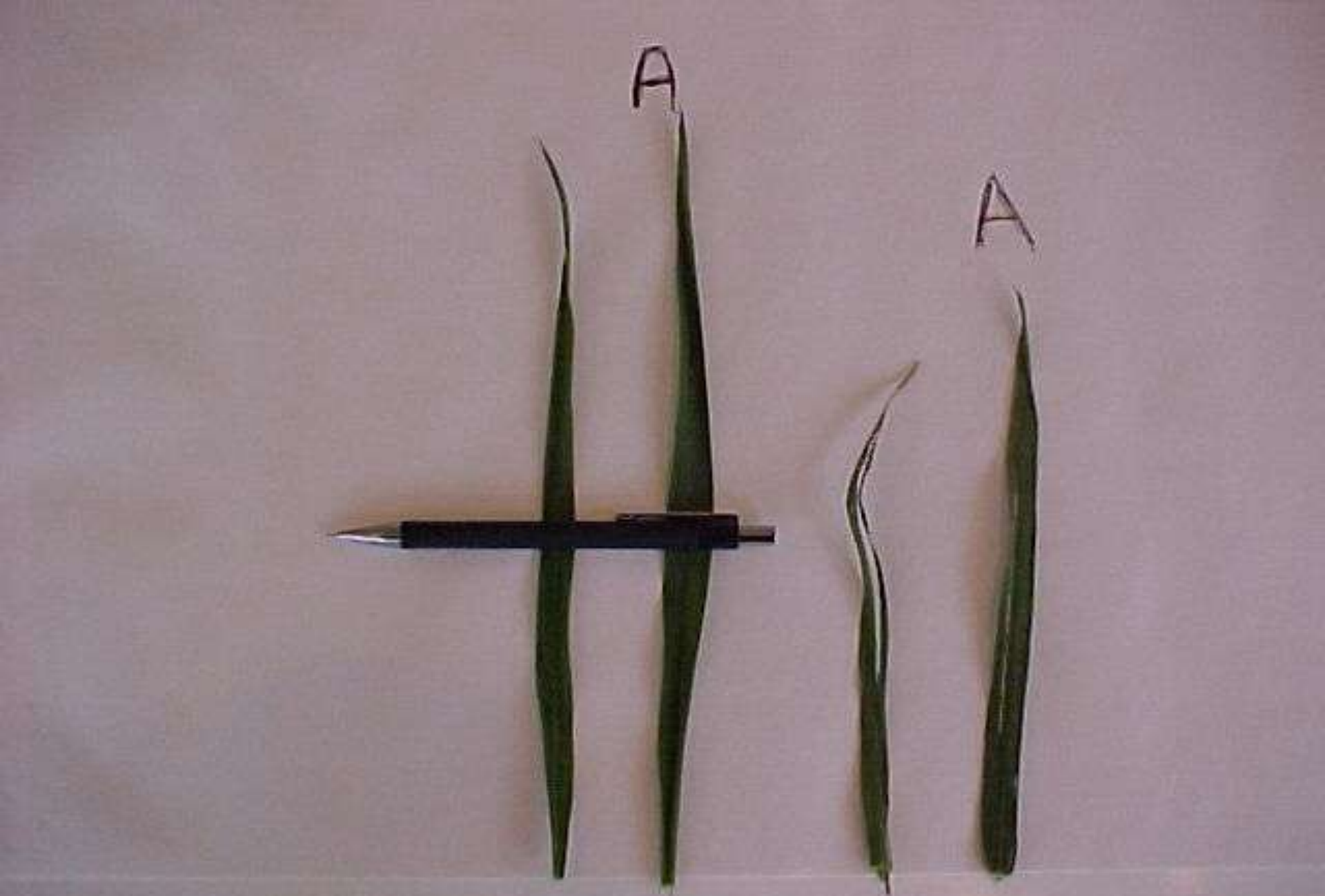
Humates
Laminarates
Lignosulphanates

EDTA

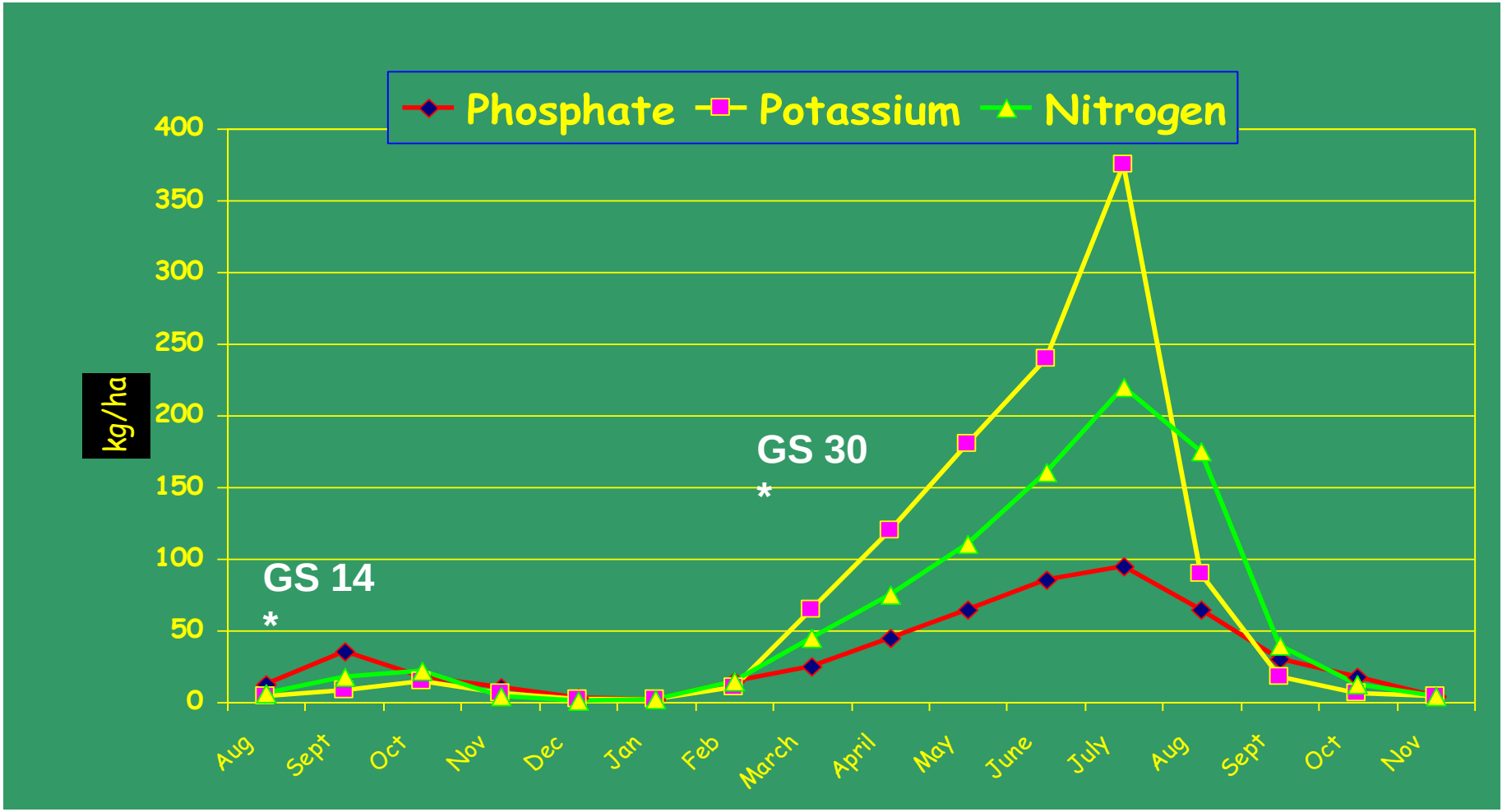
Carbonates
Nitrates (NVZ)
Phosphites

100 to 200 gm/ha

2000 to 3500 gm/ha



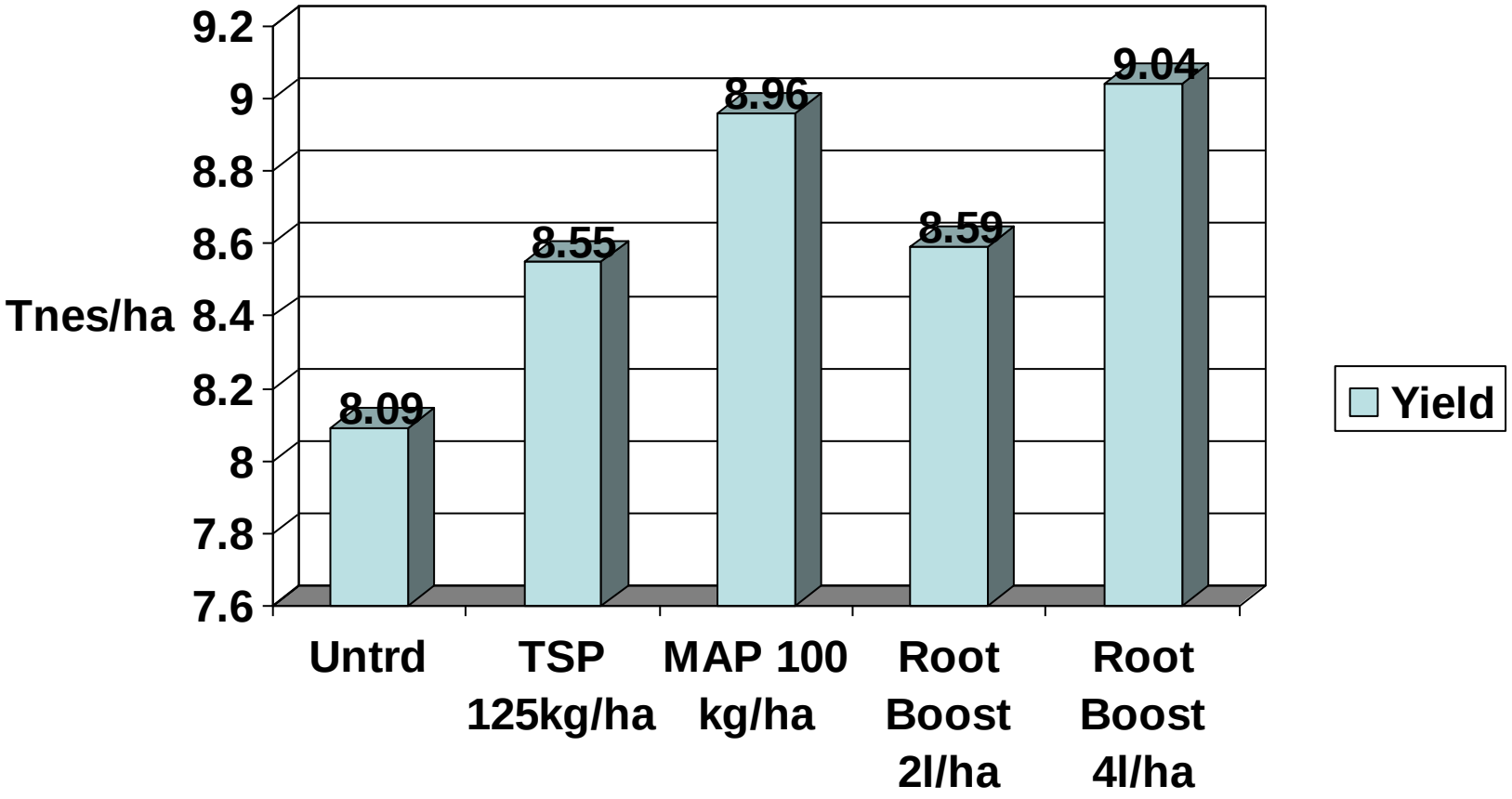
Nutrient uptake in W Wheat



TSP (46% P_2O_5)

- Soft Rock Phosphate + Acid = TSP
- $Ca_3(PO_4)_2 + H_2SO_4 = Ca(HPO_4)_2$
- Crops take up $H_2PO_4^-$ & HPO_4^{--} !

Fertiliser Evaluation
Autumn timing Winter Wheat



Treatments applied at 3-leaf stage

TSP = triple super phosphate

MAP = mon-ammonium phosphate