



Knowledge grows

'Max yield from the field'

Crop nutrition for maximum yield

MARK TUCKER



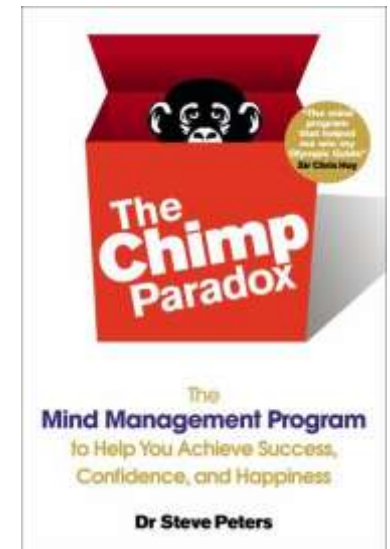
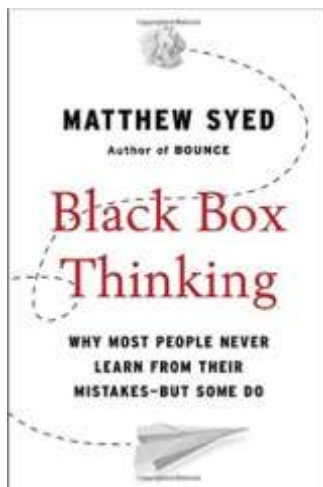
In 2012 – London Olympic Year – the Yara Conference focused on Record Breaking Crops and what is behind success !

Our approach – The aggregation of marginal gains



'you can achieve optimal performance by the aggregation of marginal gains. It means finding a 1 per cent margin for improvement in everything you do'

Dave Brailsford



From *nutrient balance* to *nutrient intensity*

..and all these are **VERY** relevant when we focus in on **Crop Nutrition.**



Year	Yield
2011	14.1 t/ha
2012	6.3 t/ha
2013	13.2 t/ha

...and then in 2015 World Records of Wheat and Oilseed.

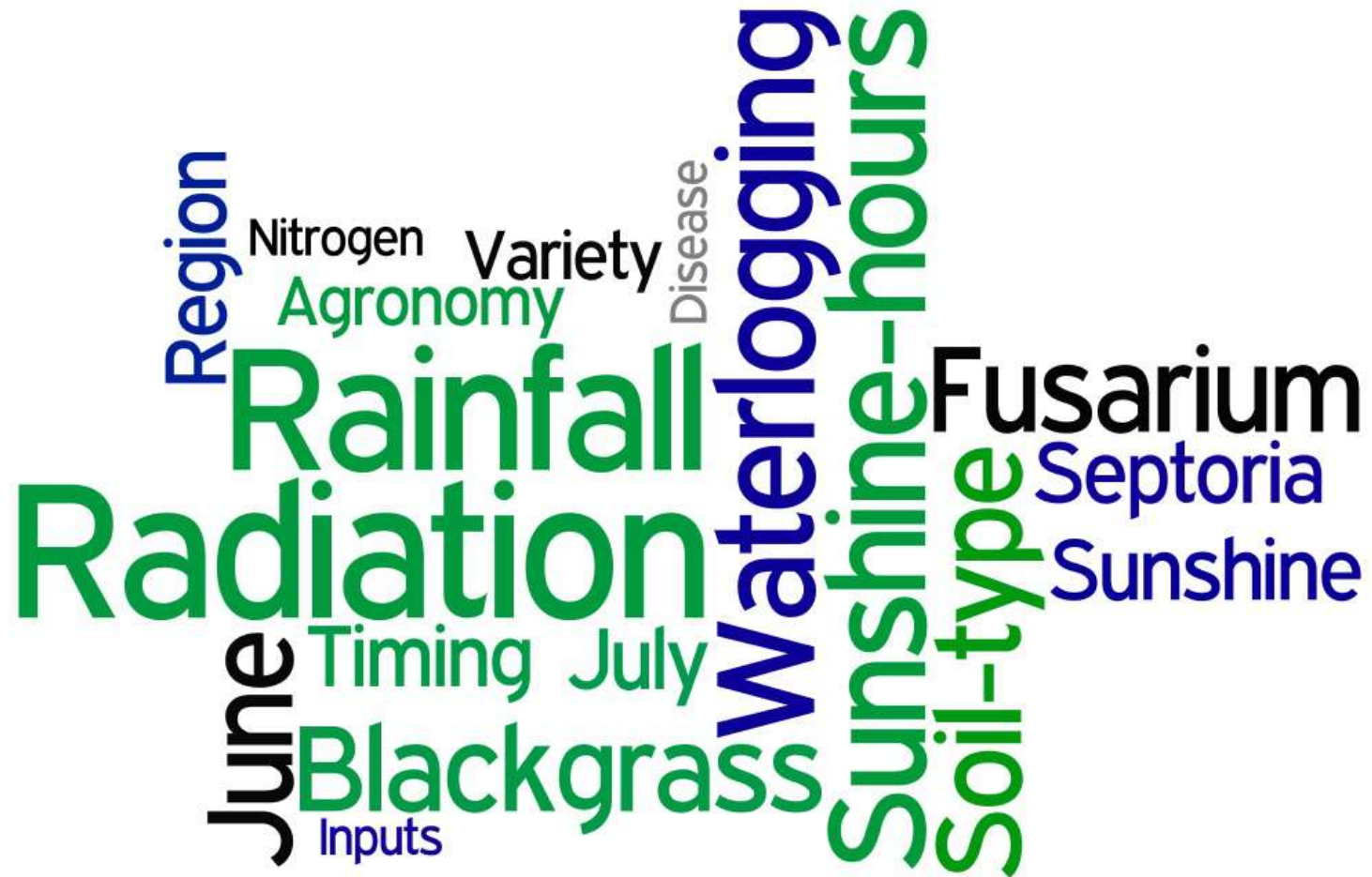
16.52
t/ha
Wheat



6.7
t/ha
Oilseed



...at the 2012 Conference Bill Clark showed this..

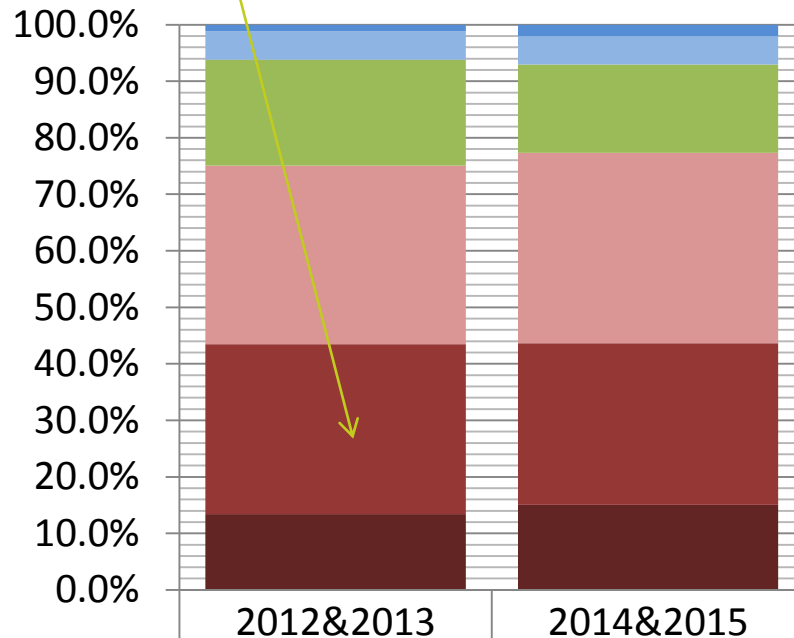


Crop Nutrition and Risk Management.

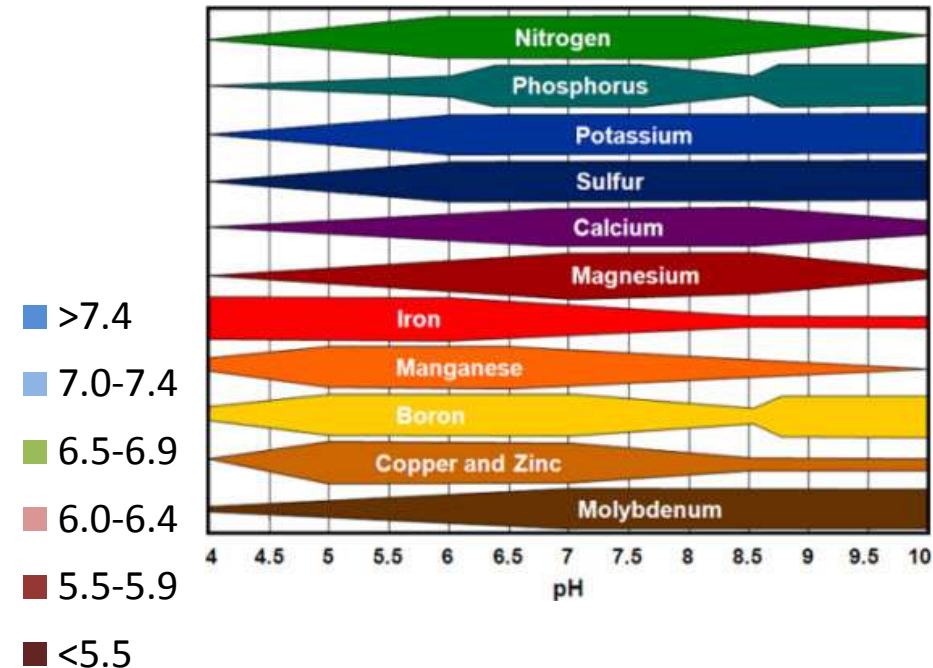
- What risks can we manage?
 - Weather
 - cannot be managed, BUT we can manage our exposure to its effect - Frost / drought / water logging / light energy
 - Nutrient supply
 - Soil pH
 - Unbalanced nutrition
 - Nutrient Use Efficiency
 - Application timing and rate to manage plant populations, grain set along the ear, grain quality, canopy size and duration – biomass is the fundamental driver of yield
 - Variable Nutrient Supply

Crop Nutrition and knowledge can help with all these elements – but to **manage** we need to **measure** !

pH ~ 40% of soils will have issues with nutrient supply that can be corrected.

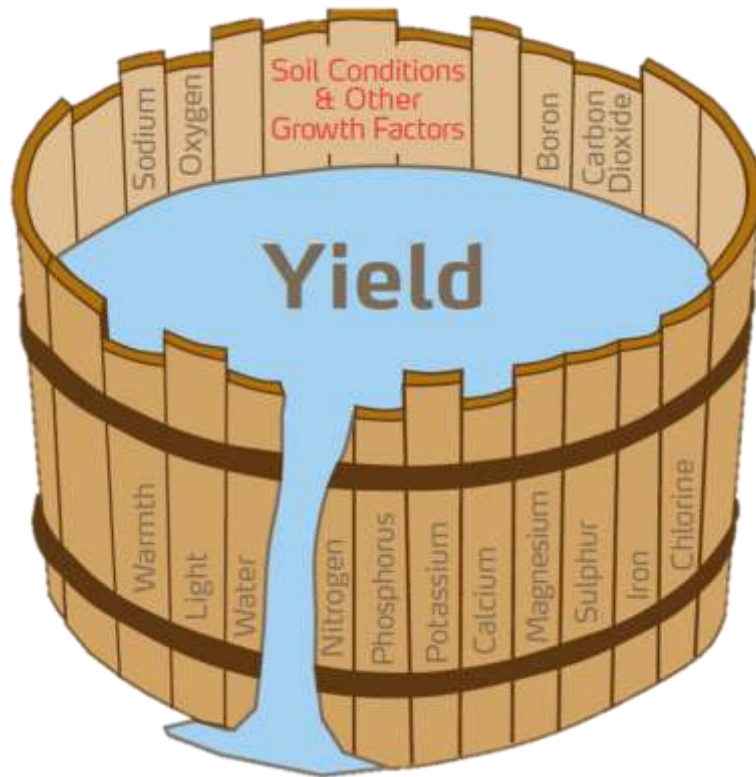


■ >7.4	1.2%	2.0%
■ 7.0-7.4	5.1%	5.1%
■ 6.5-6.9	18.7%	15.6%
■ 6.0-6.4	31.6%	33.7%
■ 5.5-5.9	30.1%	28.6%
■ <5.5	13.4%	15.0%



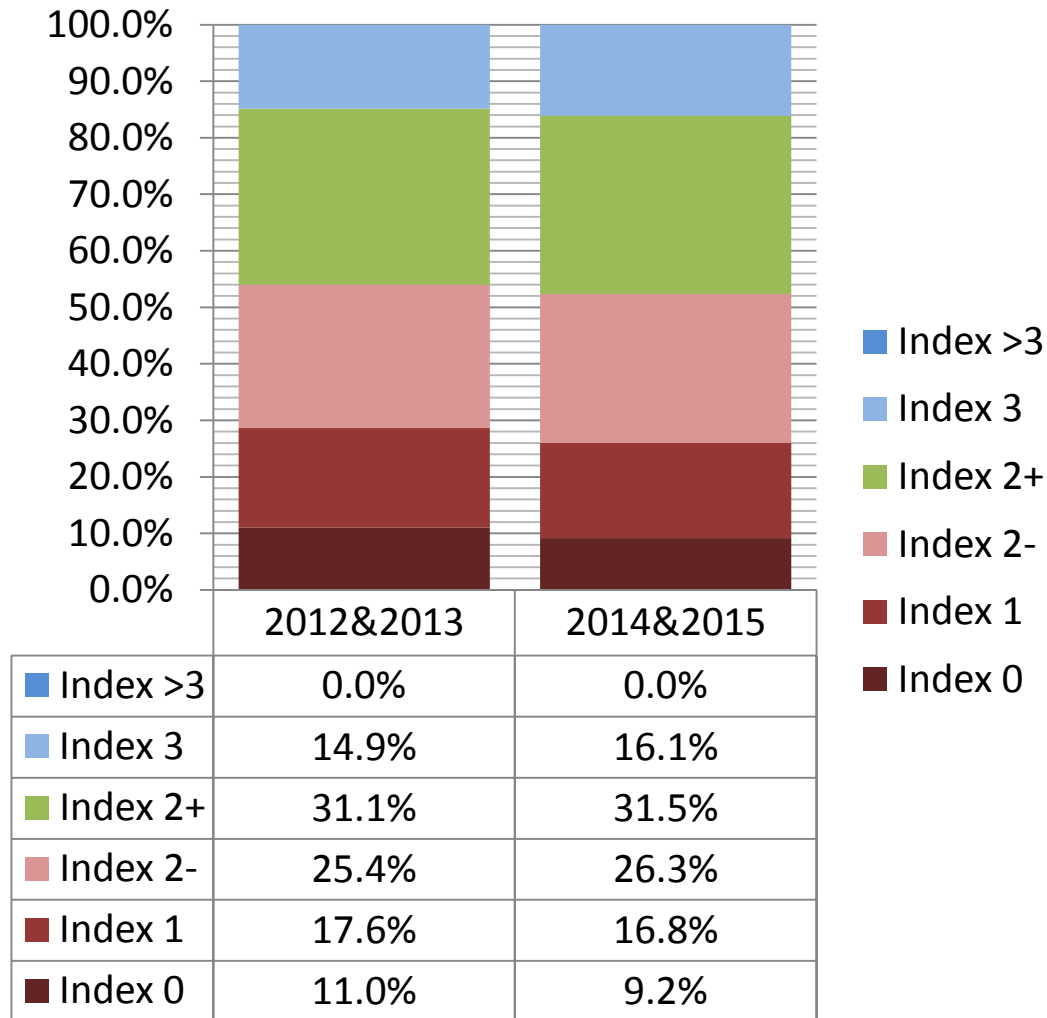
Target pH = 6.4

Balanced Nutrition = 13 minerals essential for plant growth and development.



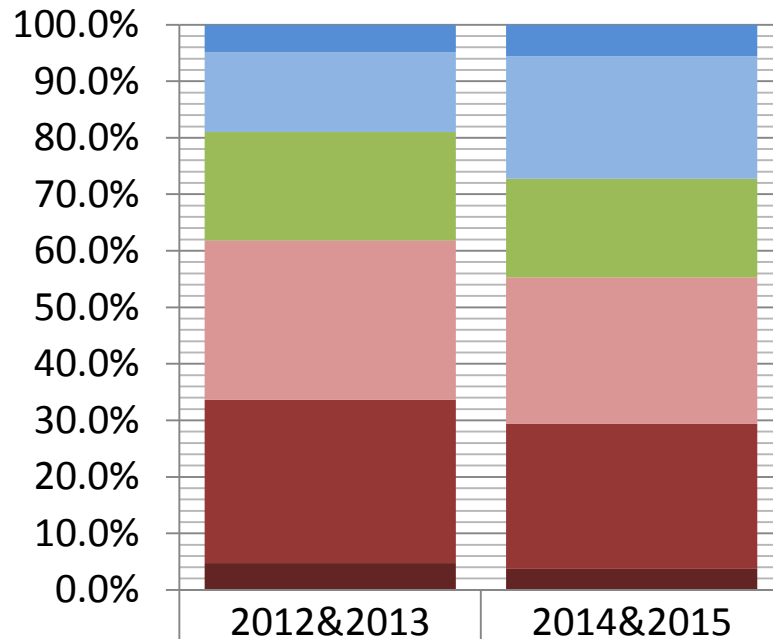
Ensure regular testing is in your nutrient strategy.

Phosphorus ~ 50% of soils at risk of P deficiency.



- Phosphorus is the most critical nutrient, being involved in the plants energy store.
- As part of risk management where soil applied P is limited or not used, foliar Phosphate is very cost effective.
- DO NOT confuse with foliar phosphite.

Potassium

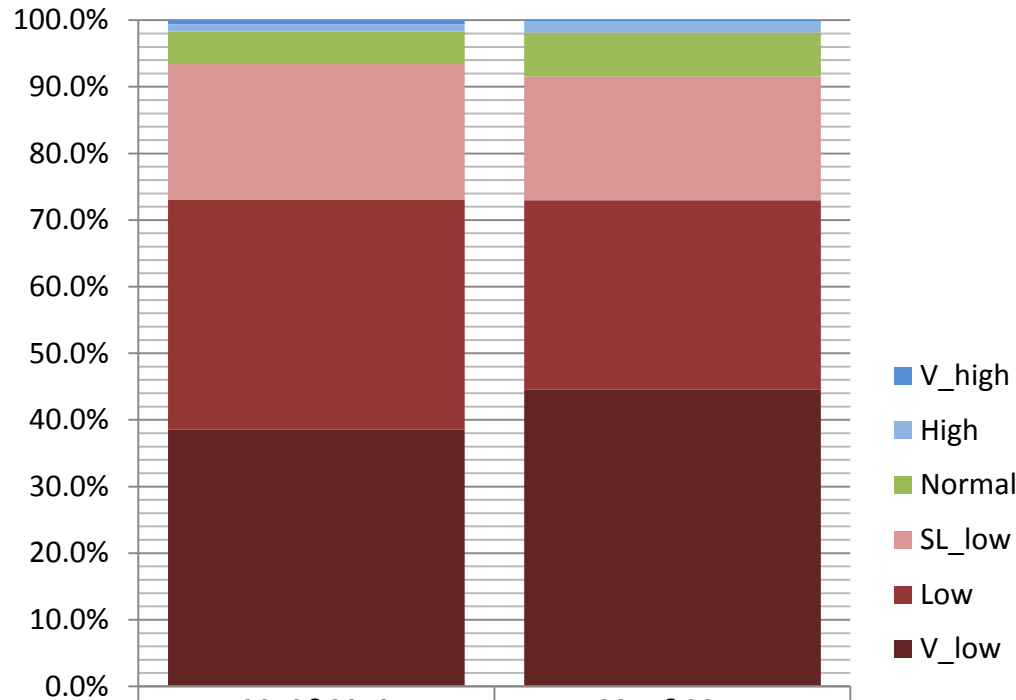


Index >3	4.9%	5.6%
Index 3	14.1%	21.6%
Index 2+	19.2%	17.4%
Index 2-	28.2%	25.9%
Index 1	28.9%	25.7%
Index 0	4.7%	3.7%

- Index >3
- Index 3
- Index 2+
- Index 2-
- Index 1
- Index 0

- Potassium is critical for plant water management, stem stiffness and thus plant architecture and radiation interception.
- At peak uptake 7-13 kg K_2O / ha / day is required.

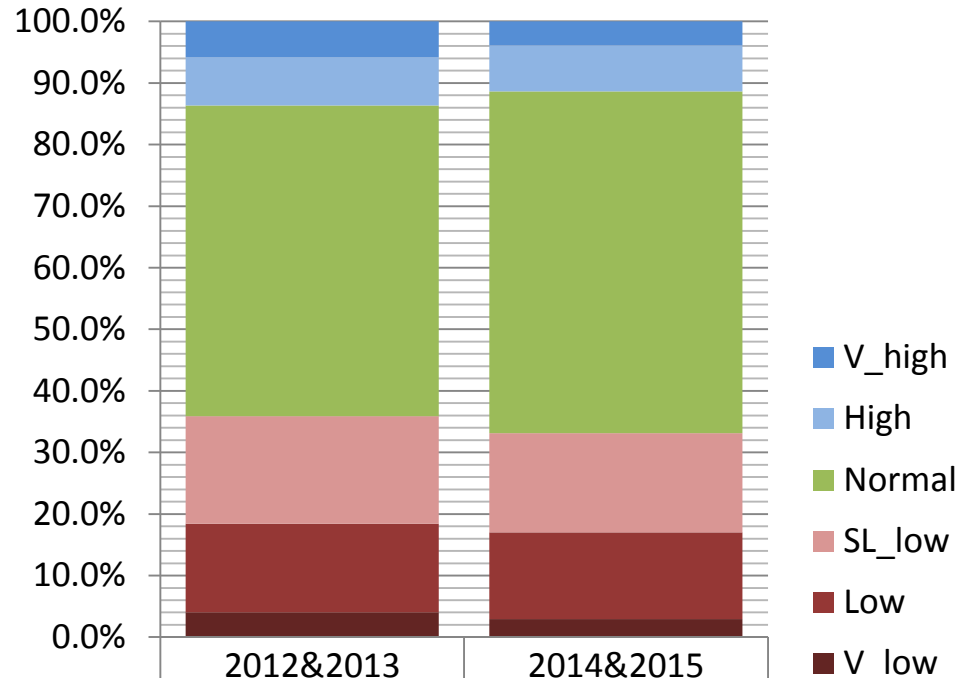
Sulphur ~ 70% of soils are low.



	2012&2013	2014&2015
V_high	0.6%	0.2%
High	1.1%	1.7%
Normal	4.8%	6.6%
SL_low	20.4%	18.6%
Low	34.4%	28.4%
V_low	38.6%	44.6%

- Sulphur is a key component of amino acids that are the basis of protein and dry matter.
- Nitrogen Use Efficiency will be compromised if sulphur is deficient.
- Soil tests are not always accurate so they should be backed up with foliar and grain analysis.

Zinc ~ 35% of soils show deficiency.

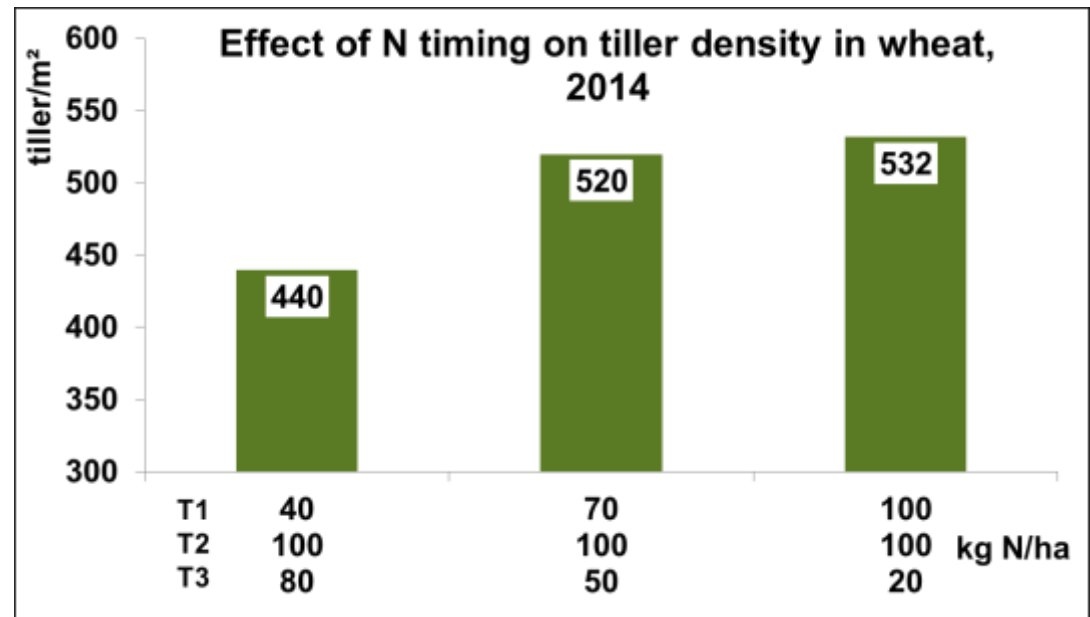


	2012&2013	2014&2015
V_high	5.8%	3.9%
High	7.9%	7.5%
Normal	50.5%	55.5%
SL_low	17.5%	16.1%
Low	14.4%	14.0%
V_low	4.0%	3.0%

- Zinc is fundamental in carbohydrate metabolism and protein synthesis.
- It plays a vital role in the plants natural defence mechanisms.
- Improves Nitrogen Use Efficiency.

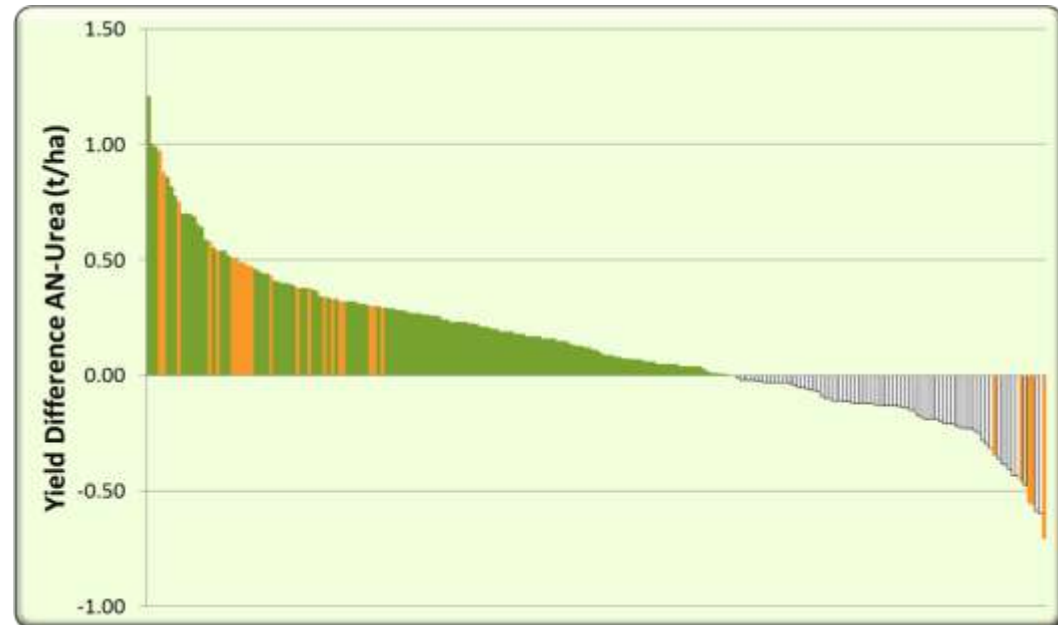
The importance of Nitrogen Timing.

- A fundamental component of yield is biomass, the Harvest Index tells us that approx. 50% will be converted to grain yield.
- The early Nitrogen applications will influence this.



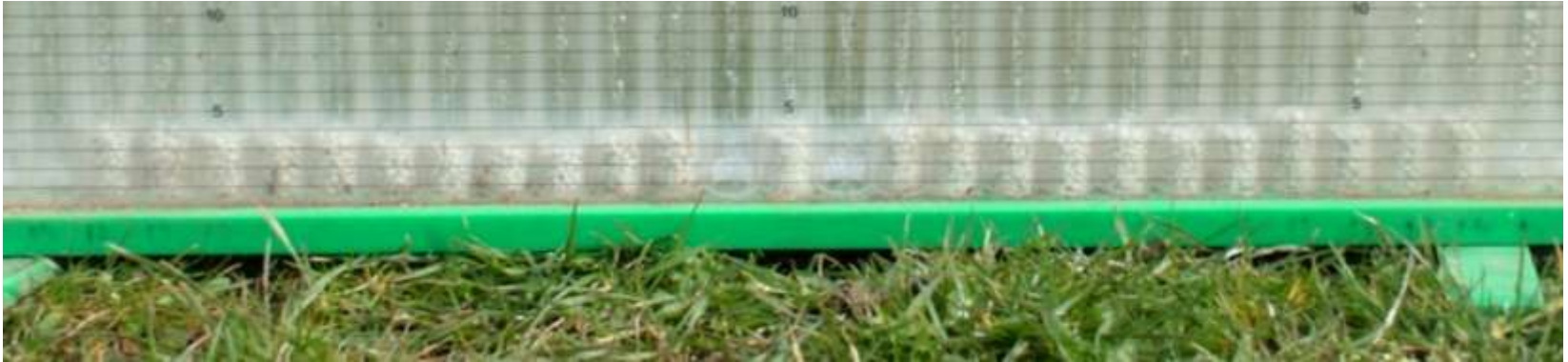
Variable / unreliable Nutrient Supply

- The nitrogen source will introduce variability
- Yara's most recent nitrogen source data (2009-14) shows a **yield penalty of 0.53t/ha** (4.6%) from the use of urea at the same rate as nitrates.
- The graph below shows the long-term trend between nitrates and urea - 237 Trials 1958-2014 (Levington Agriculture, TAG, ADAS, Yara)
 - Orange bars represent the statistically significant results

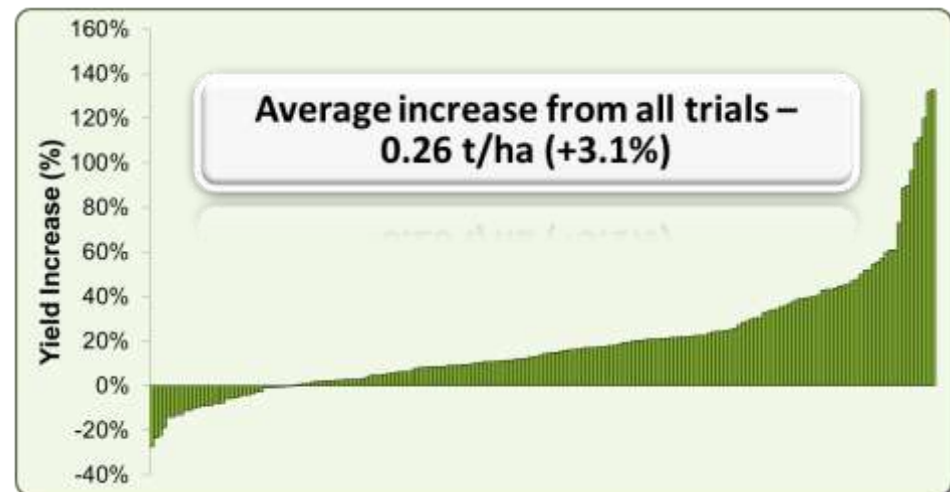


Variable / unreliable Nutrient Supply

- Invest in quality products that can be spread evenly and accurately.



- Invest in the best variable rate technology,



So where are those marginal gains?

Crop Nutrient Management Decision	% Yield Effect
Correct Nitrogen source	+ 4.6%
Optimal Nitrogen Rate	+ 4%
Spring applications of P and K	+ 3%
Applications of micronutrients	+ 3-8%
Accurate application	+ 3%
Variable N Application	+ 3%

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Thank You
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