**ADAS document ref: 1021801-10 (00)**
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Trial type: Utrisha N
Farm location: Sussex

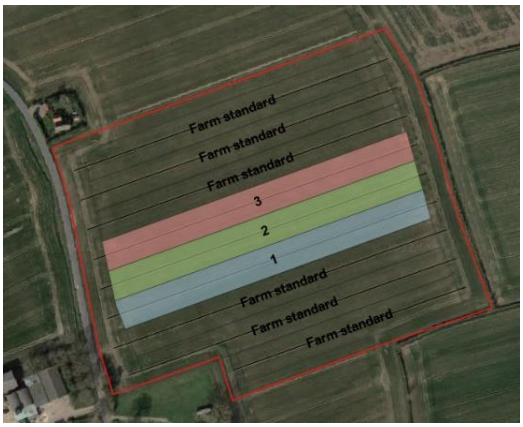
Variety: RGT Saki
Soil type: Sandy Clay Loam

This trial was part of the AICC Crop Nutrition Club 2022, which has been run in conjunction with the Farm-PEP project led by ADAS. This report contains the results of a second wheat trial testing Utrisha N.

## Treatments

Utrisha N was tested at two N rates (137 and 231 kg/ha), and compared against the same two N rates without Utrisha N.

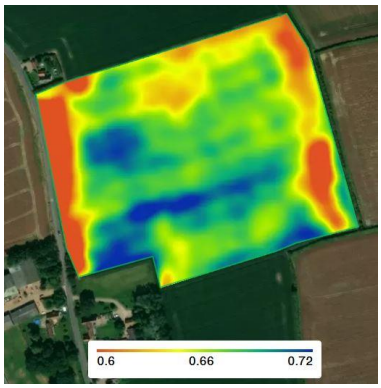
| | 1 | 2 | 3 | 4 Farm standard |
|---|---|---|---|---|
| 08/03/22 | Urea 140 kg/ha (64 kg/ha N) + Polysulphate 110 kg/ha | | | |
| 09/04/22 | Urea 160 kg/ha (73 kg/ha N) | | | |
| 05/05/22 GS37 | Utrisha N 333 g/ha | None | Utrisha N 333 g/ha | None |
| 11/05/22 GS39 | AN 273 kg/ha (94 kg/ha N) | None | None | AN 273 kg/ha (94 kg/ha N) |
| Total N (kg/ha) | 231 | 137 | 137 | 231 |



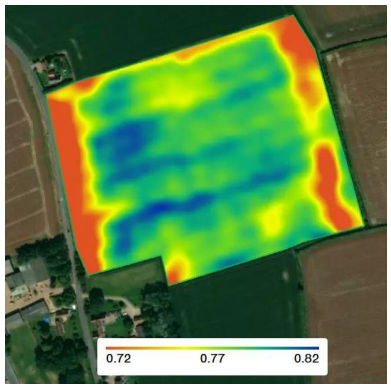

## Satellite imagery

NDVI (normalized difference vegetation index) is a spectral reflectance index which shows a combination of canopy size and greenness, on a scale from 0 to 1. NDVI images were sourced from www.datafarming.com.au, based on freely available 10m resolution data from the Sentinel 2 satellites. The scale varies between images but always runs from red (low) through orange, yellow and green to blue (high). The availability of imagery is constrained by the need for cloudless conditions.

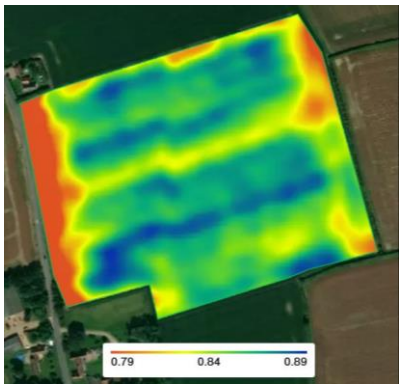
Prior to trial initiation, there was some variation running along the tramlines, with higher NDVI along the tramline used for treatment 1. Before harvest, NDVI was notable lower in treatment 3, and still highest in treatment 1.



NDVI before splits (17 Mar)



NDVI pre GS 37 (16 Apr)



NDVI pre-harvest (22 Jun)

## Agronomics analysis

The yield data were analysed using the ADAS Agronomics approach. First the data were cleaned to remove headlands, anomalous combine runs (header not full or spanning two treatment areas), and locally extreme data points, and to correct any offset created by changes in combine direction. Then a model of underlying variation was applied to the data to account for spatial variation across rows and along rows, and for the effect of the treatment. The statistical analysis led to estimates of the treatment effects and the associated standard errors. Thus, subject to the assumptions of the underlying statistical model, it was possible to calculate 95% confidence limits for the yield effects and the % probability that the yield effect was greater than any chosen threshold.

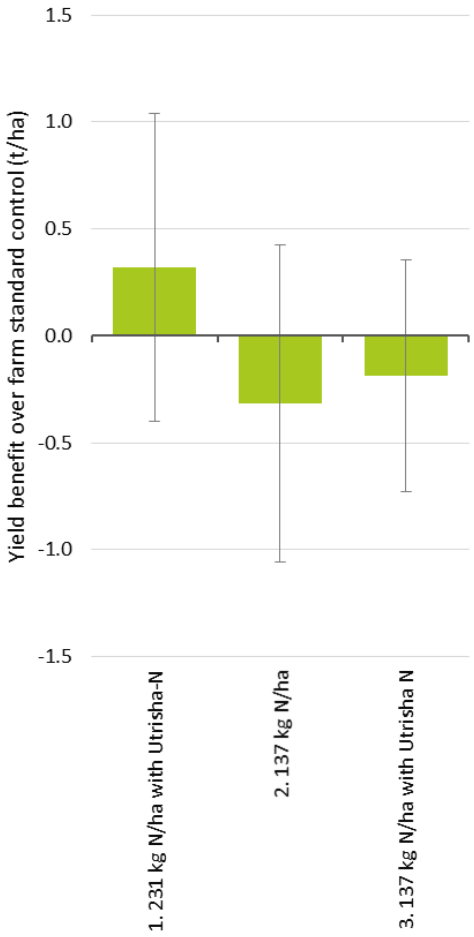
## Yield results

The average measured yield of the farm standard treatment was **11.46 t/ha**, according to yield map data. This is likely to be a little higher than the true average due the exclusion of headlands from the analysis.

Using the Agronomics analysis to fit a statistical model to the data, we estimate that adding the Utrisha N treatment at GS 37 increased yield by **0.32 t/ha ± 0.72 t/ha** (95% confidence interval), relative to the farm standard. Reducing the N rate by 94 kg N/ha reduced yield by **0.32 t/ ha ± 0.74 t/ha,** while reducing the N rate with the addition of Utrisha N only reduced yield by **0.19 t/ ha ± 0.54 t/ha**. However, measured yield values do vary across a field even when the same treatment is applied everywhere; the bounds of the confidence intervals indicate that, according to the underlying statistical model, these estimated effects could have been the result of this unexplained variation. This field had variation prior to trial initiation, which could have biased the yield result in favour of treatment 1.

There is also a concern that by applying different N rates using a solid fertiliser product and presumably a spinning disc spreader, there was probably some overlap of treatments: the extra AN application on treatments 1 and 4 will have spread slightly onto treatments 2 and 3, which will have reduced the differences in actual N rate and yield.

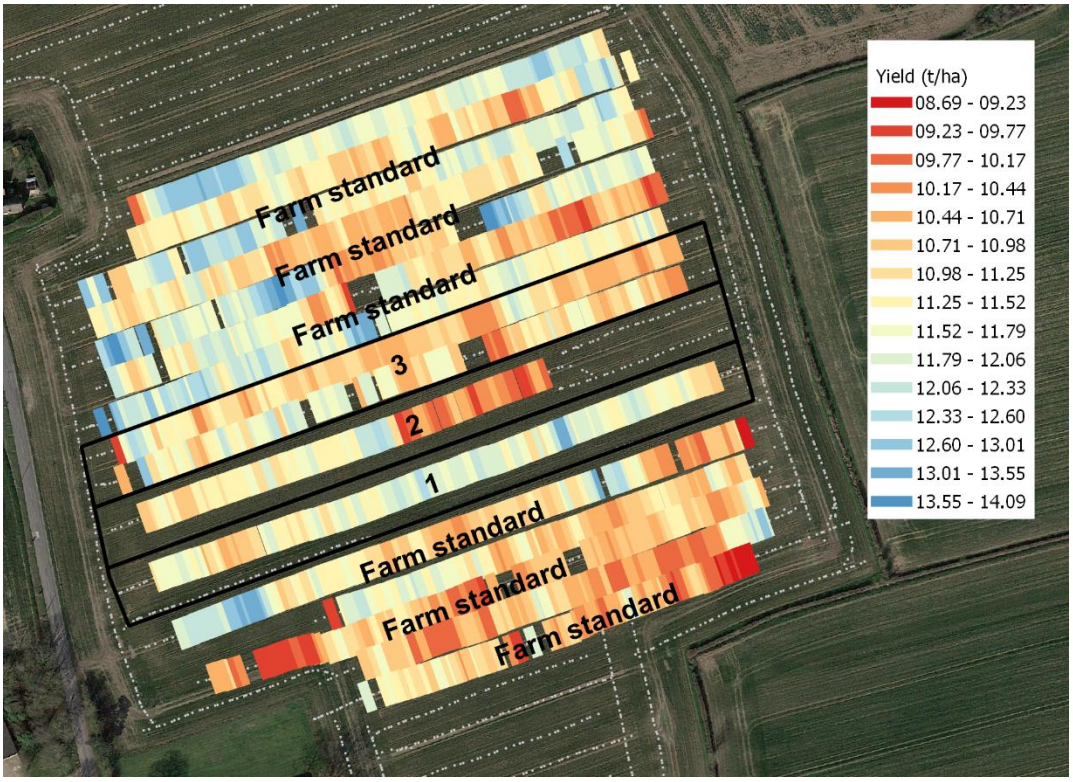
Using a current wheat price of £260/t and ammonium nitrate fertiliser at £870/t, we estimate a £172/ha increase in gross margin from cutting the N rate from 231 to 137 kg/ha. However, the prices of wheat and fertiliser continue to fluctuate, which will affect the size and direction of this benefit. Utrisha N could have had a positive effect on gross margin, depending on the product cost.




*Error bars show 95% confidence intervals*

*Relative likelihood of a yield effect of different sizes from N rate and Utrisha N programmes, according to the Agronomics analysis of this trial. Consider the relative costs of the treatment programmes to determine what yield benefit would be required for an economic benefit.*

| Yield benefit or loss relative to farm standard (231 kg N/ha) | 1. 231 kg N/ha + Utrisha N Probability | 2. 137 kg N/ha Probability | 3. 137 kg N/ha + Utrisha N Probability |
|---|---|---|---|
| > (greater than) 0.6 t/ha yield benefit | 22 % (unlikely) | 1 % (very unlikely) | <1 % (exceptionally unlikely) |
| > 0.4 t/ha yield benefit | 42 % (about as likely as not) | 3 % (very unlikely) | 2 % (very unlikely) |
| > 0.2 t/ha yield benefit | 63 % (about as likely as not) | 9 % (very unlikely) | 8 % (very unlikely) |
| > 0.0 t/ha yield benefit | 81 % (likely) | 20 % (unlikely) | 25 % (unlikely) |
| > 0.0 t/ha yield loss | 19 % (unlikely) | 80 % (likely) | 75 % (likely) |
| > 0.2 t/ha yield loss | 8 % (very unlikely) | 62 % (about as likely as not) | 48 % (about as likely as not) |
| > 0.4 t/ha yield loss | 3 % (very unlikely) | 41 % (about as likely as not) | 22 % (unlikely) |
| > 0.6 t/ha yield loss | 1 % (very unlikely) | 23 % (unlikely) | 7 % (very unlikely) |




## Future trials

The treatments were well chosen; by including all combinations of standard/low N rate and with/without Utrisha N, we can examine the effects of altering N rate and adding Utrisha N in isolation. However, when trialling solid N treatments with a spinning disc spreader, it is best to use double tramline plots so that areas of overlap can be excluded from the yield analysis.

Greater precision and confidence in the yield effects could be achieved by replicating the treatments within the field, although with double tramline plots, this would require quite a large field.