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Trial type: N timings
Farm location: West Sussex

Crop: Winter wheat
Variety: Skyfall

This trial was part of the AICC Crop Nutrition Club 2023, which has been run in conjunction with the Farm-PEP project led by ADAS. This report contains the results of a winter wheat trial testing the effects of different timings of Nutrino Pro foliar N at T2 and T3 versus no inclusion.

Treatments

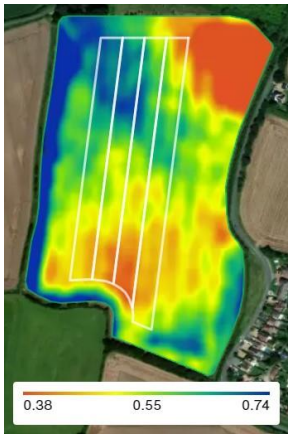
	T2 spray	**T3 spray**
Treatment 1	T2 fungicide	T3 fungicide + Nutrino
Treatment 2 (control)	T2 fungicide	T3 fungicide
Treatment 3	T2 fungicide + Nutrino	T3 fungicide + Nutrino

The trial was well designed with two replicate tramlines of each treatment, and placed in a reasonably even field.

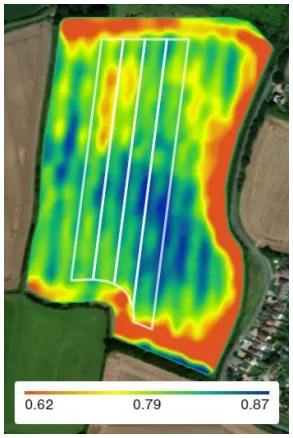
Satellite imagery

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.

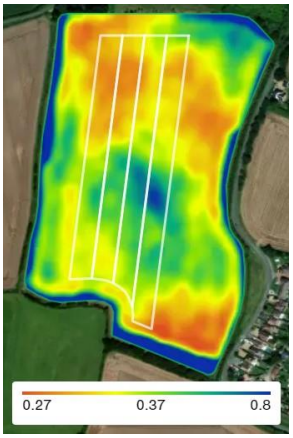
Prior to the trial starting, the main variation in the field ran across the tramlines so should not have biased the treatment comparison. The central placement of the trial avoided areas of high variation in the northeast corner (shown in red) and west edge (shown in blue). There were no visible differences in NDVI between treatments.



NDVI before treatments (02 Mar)



NDVI after treatments (25 Jun)



NDVI pre-harvest (10 Jul)

Agronomics analysis

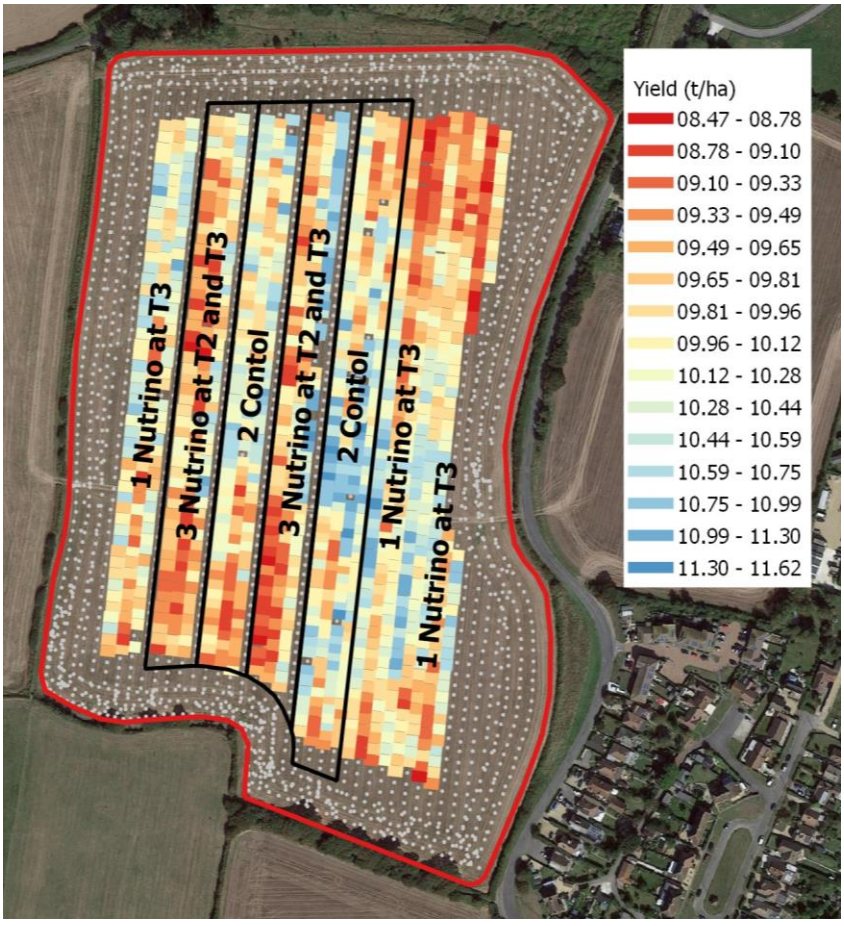
The yield data were analysed using the ADAS Agronomics approach. First the data were cleaned to remove headlands and locally extreme data points, and to correct any offset created by changes in combine direction. Then a model of underlying variation was applied to the data to account for spatial variation 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.

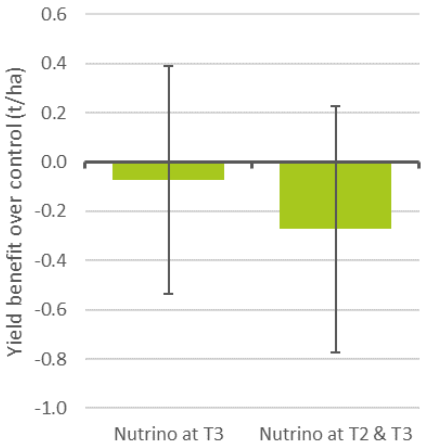
Yield results

The average measured yield of the control treatment was **10.12 t/ha**, according to yield map data. This is likely to be a little higher than the true average due to the exclusion of headlands from the analysis.

Using the Agronomics analysis to fit a statistical model to the data, we estimate that Nutrino Pro added at T3 (treatment 1) reduced yield by **0.07 t/ha**, relative to the control, and that Nutrino Pro applied at T2 and T3 (treatment 3) reduced yield by **0.27 t/ha**. However, this is not certain; according to the statistical model, the estimated yield effects could have been the result of underlying soil variation.

The absence of any real yield effect from the Nutrino treatments is consistent with the lack of visible NDVI effects. If the farm standard N rate was sufficient, there may have been little scope for yield improvement from additional late foliar N.





Error bars show 95% confidence intervals

Relative likelihood of a yield effect of different sizes from the treatment 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 control	Nutrino at T3 Probability	Nutrino at T2 & T3 Probability
greater than 0.2 t/ha yield benefit	12 % (unlikely)	3 % (very unlikely)
greater than 0.0 t/ha yield benefit	38 % (about as likely as not)	14 % (unlikely)
greater than 0.0 t/ha yield loss	62 % (about as likely as not)	86 % (likely)
greater than 0.2 t/ha yield loss	30 % (unlikely)	61 % (about as likely as not)
greater than 0.4 t/ha yield loss	8 % (very unlikely)	31% (unlikely)
greater than 0.6 t/ha yield loss	1 % (very unlikely)	10% (unlikely)

Considering treatment effects on gross margin: worked example

Imagine that the Nutrino Pro treatment at T3 costs £40/ha more than the farm standard, and the grain price is £200/t. To improve gross margin in this scenario, the yield benefit would need to be at least 40/200 = 0.2 t/ha.

Reading down the table and according to the model, there was a 12% likelihood that the test treatment delivered an economic yield benefit in this scenario.