

The ADAS Nutrition Challenge: Testing forward thinking nutrient management strategies

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Objective

The ADAS Nutrition Challenge is an annual trial, open to entries from farmers and industry. The aim is to test a range of spring nutrition management strategies to identify novel ways to maximise winter feed wheat yield while minimizing input costs and improving fertilizer use efficiency.

Methods

The small plot trial includes 4 replicates per treatment and plots of 2 x 24 m in a fully randomised block design.

To design their spring nutrition program, entrants were provided with soil analysis details (e.g. P, K, Mg, pH), grain nutrient analysis for the previous crop, spring SMN, crop N content, any autumn fertiliser application details, variety and the standard RB209 recommendation for the field.

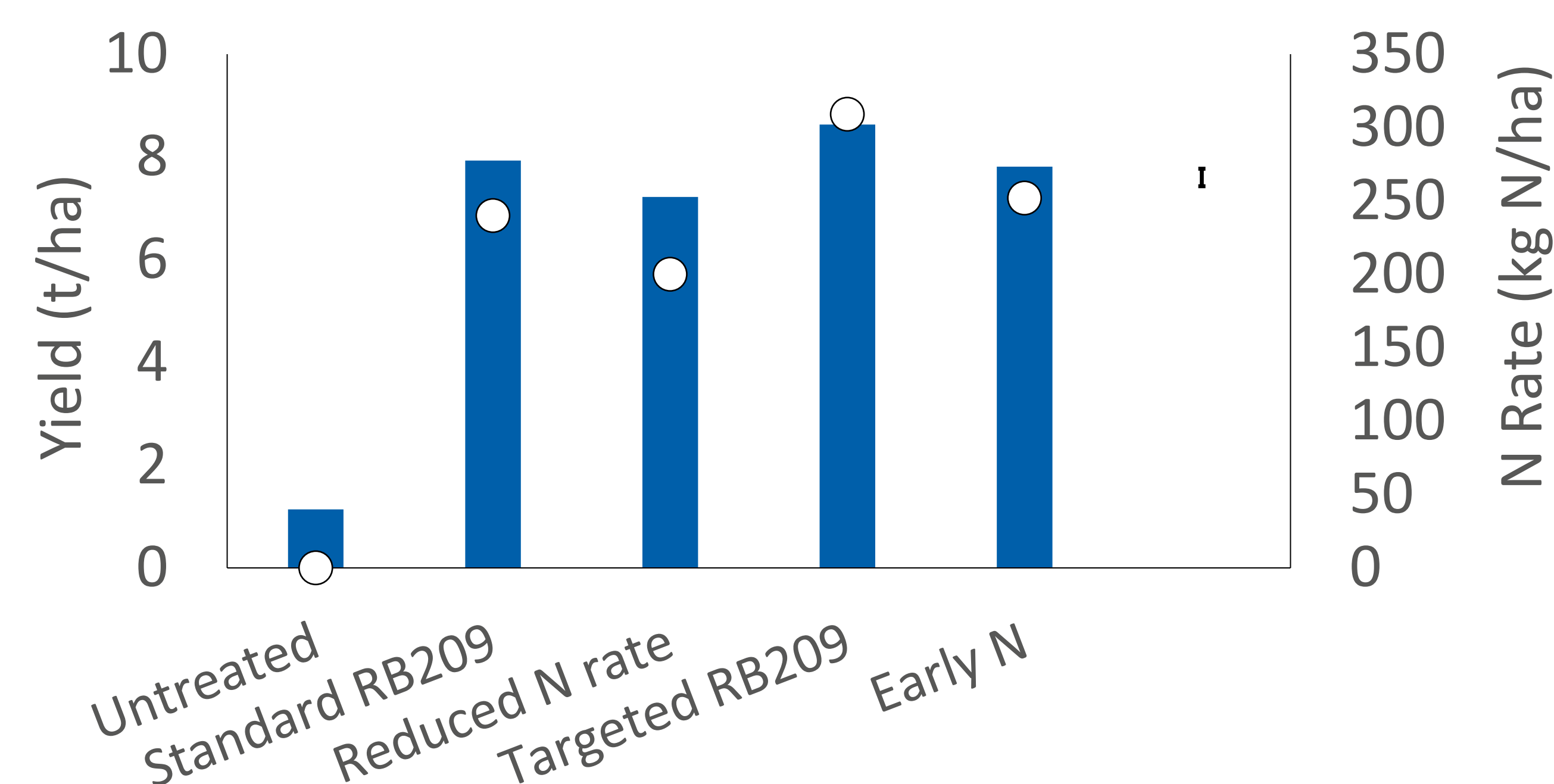
Selected treatments are described below. The application timings, N, P & S inputs differed by treatment, e.g. the Early N strategy applied all N by 25th March.

Treatment	14 th March (GS23)	25 th March (GS24)	8 th April (GS26)	31 st May (GS50)	Total
Nil N	-	-	-	-	-
Reduced N	AS: 40 N, 114 SO ₃	-	AN: 80 N	AN: 80 N	200 N 114 SO ₃
Standard RB209 (default soil & standard yield)	AS: 40 N, 114 SO ₃	-	AN: 100 N	AN: 100 N	240 N 114 SO ₃
Early N	AN: 40 N DAP: 18 N, 46 P ₂ O ₅	Liquid NS + inhibitor* 212 N, 76 SO ₃	-	B: 1 L	270 N 76 SO ₃ 46 P ₂ O ₅
Targeted RB209 (measured soil & expected yield)	AS: 21 N, 60 SO ₃ DAP: 18 N, 46 P ₂ O ₅	Urea + inhibitor** 90 N	Urea + Inhibitor** 90 N	AN: 90 N	309 N 60 SO ₃ 46 P ₂ O ₅

*nitrification inhibitor; **urease inhibitor; AS = Ammonium Sulphate, AN = Ammonium Nitrate, DAP = Diammonium Phosphate

Results

In 2024 the Targeted RB209 entry achieved the highest yield (8.63 t/ha) and gross margin over fertilizer costs (£1164/ha), though the gross margin was not significantly greater than that of the Standard RB209 treatment.



Untreated & entrant plots in the 2024 Nutrition Challenge

Treatment	Gross Margin (£/ha)	NUE (kg/kg)
Untreated	205	50.1
Standard RB209	1144	26.0
Reduced N Rate	1058	28.0
Targeted RB209	1164	22.4
Early N timing	934	22.9
P	<0.001	<0.001
SED	30.3	2.95
LSD	61.4	5.98

Conclusions

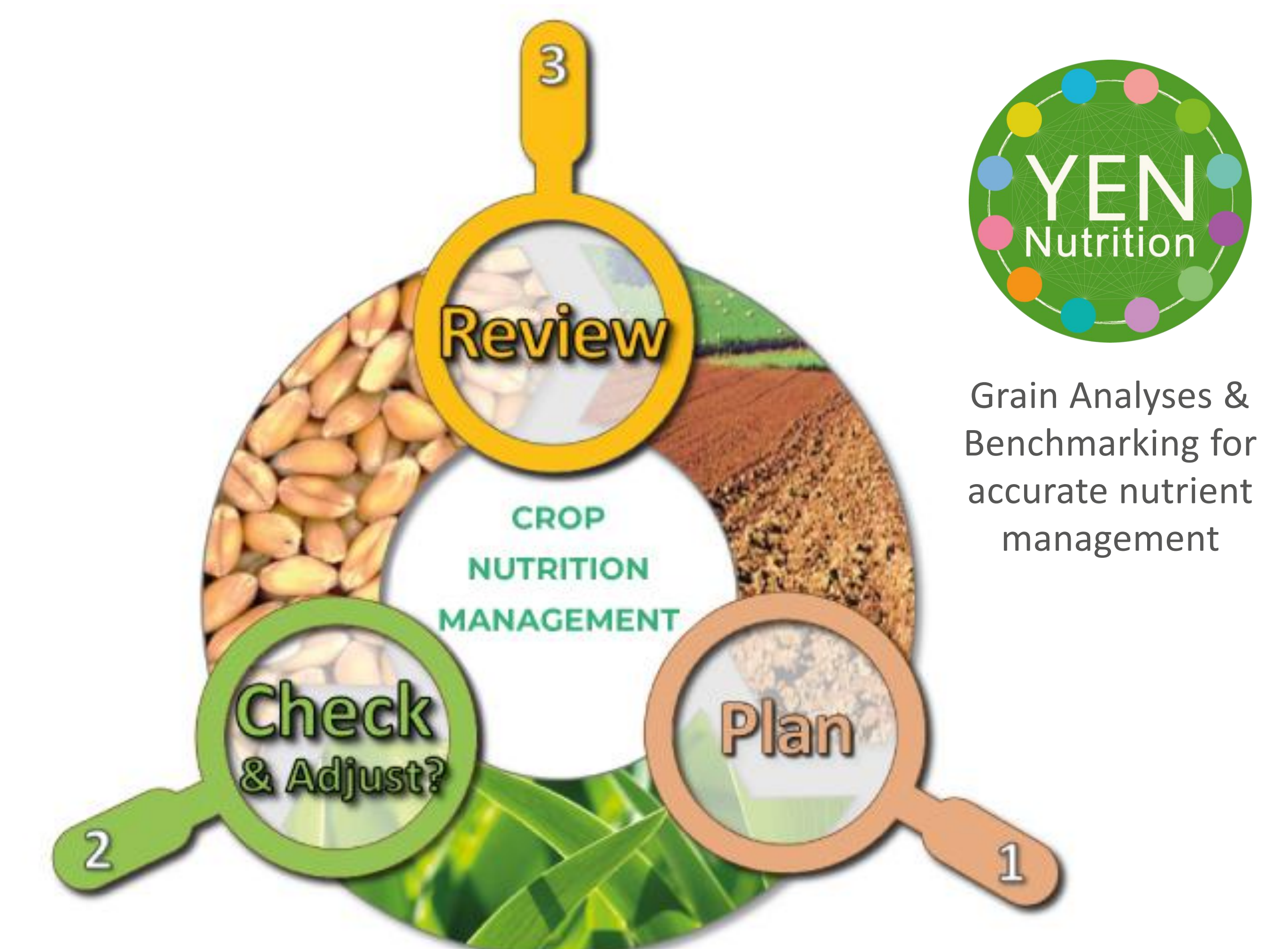
The Targeted RB209 entry followed the 3-step checking approach, developed in the NUTRI-CHECK NET project.

Highest gross margin & yield, highest N input and lowest NUE was achieved by the Targeted RB209 entry.

Yields were lower than usual in 2024 due to a very wet winter and spring, as demonstrated by the Standard RB209 yielding 2.15 t/ha lower than in 2023.

YEN Nutrition grain analysis of the Standard RB209 entry showed grain N% was 1.73% and S was 0.10% (below the critical thresholds of 1.9% and 0.12% respectively).

These findings highlight the challenge to balance high yields and nutrient inputs during unpredictable springs.



The NUTRI-CHECK NET 3-step checking approach

