On-Farm Demonstration Trial: Fertility and Soil Studies Zero Nitrogen Trials

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Objective

Determine the effects of zero and set amount of nitrogen on corn yields to define best management practices.

Introduction

Nitrogen use efficiency is a major factor causing yield variation in corn. Many farmers overuse nitrogen and do not understand the relationship between nitrogen applied and potential yields. The nitrogen use relationship within a corn plant is not linear; if you continue to add nitrogen, you will not continue to achieve larger yields. There is a point of diminishing returns that makes economic sense for farmers to determine. The purpose of these trials was to investigate what effect a low level of nitrogen has on yields, and the costs associated with lower levels.

Materials and Methods

Crop Year–2021

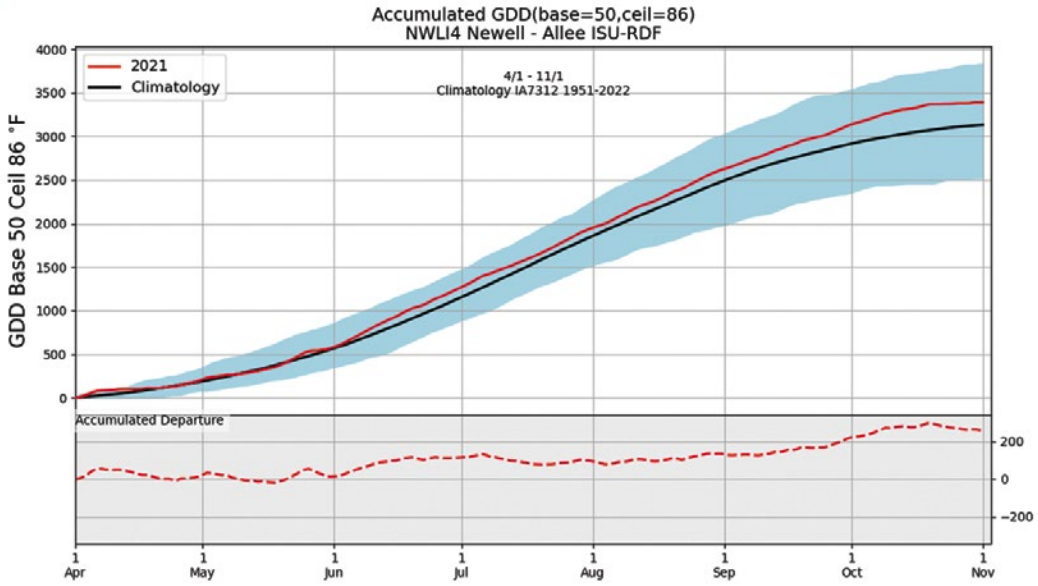
Trial	210201	210202	210203
Trial County	Buena Vista	Buena Vista	Buena Vista
Soil Type	Canisteo Clay loam 507	Canisteo Clay loam 507	Canisteo Clay loam 507
Previous Crop	Soybean (Winter Wheat CC)	Soybean (Winter Wheat CC)	Soybean (Winter Wheat CC)
Tillage	No-Till	No-Till	No-Till
Current Crop	Corn	Corn	Corn
Hybrid–Variety Number	52A18 VT2 RIB	52A18 VT2 RIB	52A18 VT2 RIB
Hybrid–Variety Company	Champion	Champion	Champion
Row Spacing	30 in.	30 in.	30 in.
Seeding Rate	33,000/ac.	33,000/ac.	33,000/ac.
Planting Date	April 30	April 30	April 30
Harvest Date	November 15	November 15	November 15
Experimental Type	On-Farm Demo	On-Farm Demo	On-Farm Demo
Replications	4	5	4
Fertilizer	100 lbs. 32% nitrogen	130 lbs. 32% nitrogen	130 lbs. 32% nitrogen
Application Dates	5/3/2021	5/3/2021	5/3/2021

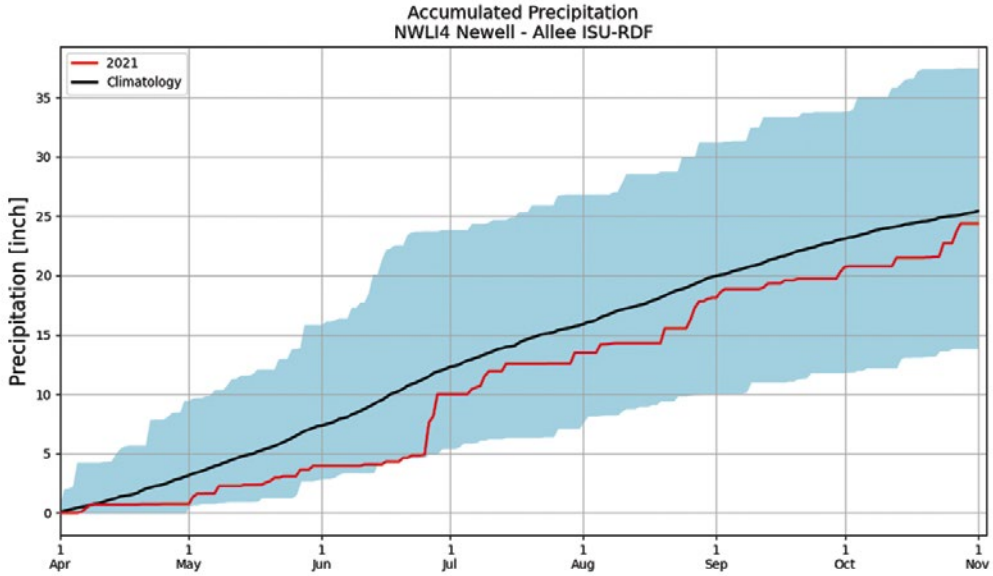
Results

Trial Number	Treatment	Yield (bu./ac.)[a]	P-value[b]	Nitrogen Cost (per acre)	Return on Treatment[c]
210201	100 lbs. Nitrogen	188.1 a	<0.01	$59.00	$793.09
	0 lbs. Nitrogen	104.6 b		$0	$471.12
210202	130 lbs. Nitrogen	153.3 a	<0.01	$76.70	$617.75
	0 lbs. Nitrogen	81.3 b		$0	$368.29
210203	130 lbs. Nitrogen	186.6 a	<0.01	$76.70	$768.60
	0 lbs. Nitrogen	124.7 b		$0	$564.89

[a]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.10.
[b]P-value = the calculated probability that the difference in yields can be attributed to the treatments and no other factors. For example, if a trial has a P-value of 0.10, there is 90% confidence the yield differences are in response to treatments. This is consistent for demonstration trials.
[c]Return on treatment based on nitrogen costs per acre, and $4.53 corn commodity prices. ((Yield x Price)-Costs). Commodity price is the 2020 national average cash price for corn.

Location Climate Analysis





Key Takeaways

- Zero nitrogen additions to corn does not equal a zero yield from the plants.
- Return on treatment was significantly greater with the addition of nitrogen fertilizer.
- Zero nitrogen rates allow farmers to determine the bottom yield levels to determine optimum economic nitrogen rates.

NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location.