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Dry Bean Nitrogen Fertility Trial

Trial ID: 2021-DBN01 – R.M. of Norfolk Treherne

Objective: Quantify the agronomic and economic impacts of nitrogen fertilizer rates in dry beans

Summary: Nodulation declined as nitrogen rate increased. Nitrate in the top 12” was fairly stable over the season, indicating there may have been limited contribution of mineralized-N to dry bean nutrition this season. The 70 lbs N/ac treatment yielded significantly more than the 0 N control, and this increased profit/ac when the cost of N is less than \$1.00/lb and bean prices are more than 50 cents/lb. Yield of the 35 lbs N/ac treatment was similar to the yields of both the 0 N control and the 70 lbs N/ac treatment.

Trial Information

Treatment	0 vs. 35 vs. 70 lbs N/ac
Soil Texture	Clay
Previous Crop	Corn
Tillage	Conventional
Spring Soil N(0-24”) †	70 lbs/ac
Seeding Date	June 1
Variety	Vibrant
Seeding Rate	76 500 seeds/ac
Row Spacing	20”
Plant Stand @ V2	59 000 plants/ac
Harvest Date	September 10

†Collected as a composite from 0 N strips shortly after planting

Precipitation (mm)

	May	Jun	Jul	Aug	Total
Rainfall	75.5	93.3	5.2	94.4	268.4
Normal	58	77.1	76.5	58.7	270.3
% Normal	130%	121%	7%	161%	99%

Nodulation †

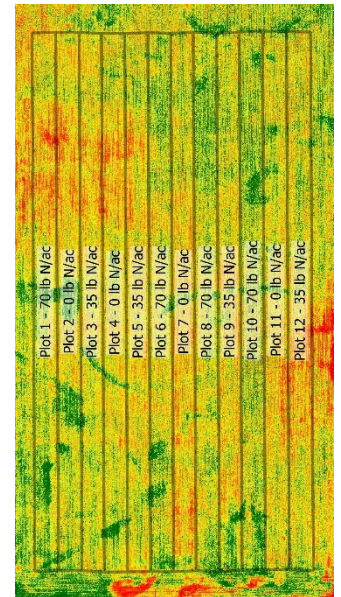
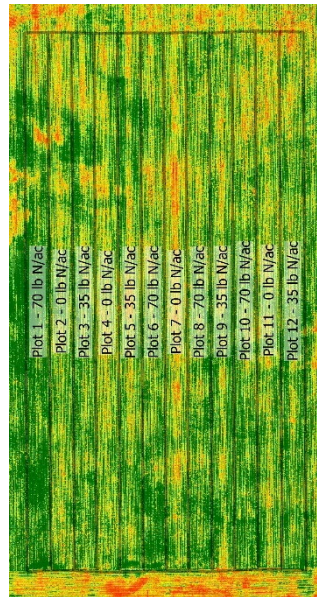
	Average Nodulation Rating @R2†
0 lb N/ac	4.0
35 lb N/ac	3.7
70 lb N/ac	2.9

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

Fall Soil Test N

Treatment	0-24” Fall Nitrate
0 lbs N/ac	39 lbs/ac
35 lbs N/ac	66 lbs/ac
70 lbs N/ac	64 lbs/ac

Field NDVI Image July 12 (Left) & Aug 13 (Right)



Visual Observations



0 lbs N/ac, July 14



70 lbs N/ac, July 14

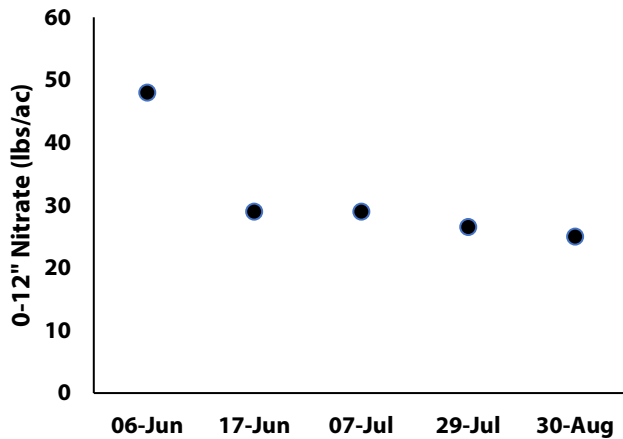
At late vegetative stages, for a period of ~10 days, the 0 N check strips were paler green than the strips that received N.

At the onset of reproductive growth, there were distinct differences in growth and vigour between pinto beans in the 0 N and 70 lbs N/ac treatments (pictured left).

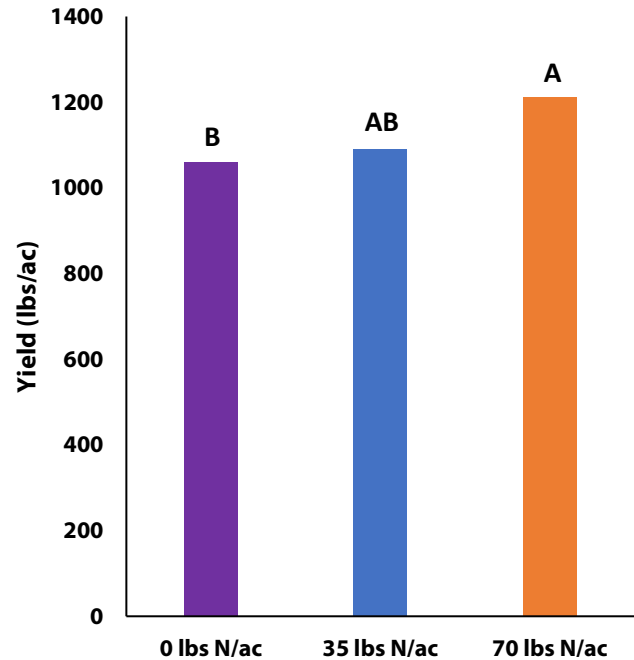


Nitrate Microplot Results

To assess nitrate dynamics through the season, we established microplots in the 0 N strips. Soil samples were collected to a depth of 12", to investigate whether significant mineralization (and associated spikes in soil nitrate) occurred through the season. After an initial decline, nitrate in the top 12" remained stable throughout the growing season, indicating mineralization was likely not a substantial contributor of N at this trial, this season.



Yield by Treatment



Overall Yield & Economics

	Cost [†]			Change in Profit/ac ^{††}	
	Mean (lbs/ac)	Long-Term Average	Current Conditions	Long-Term Average (\$0.30-0.40/lb)	Current Conditions (\$0.40-0.60/lb)
0 lbs N/ac	1060				
35 lbs N/ac	1089	\$22/ac	\$40/ac		
70 lbs N/ac	1211	\$45/ac	\$79/ac	0 lbs N/ac → 70 lbs N/ac: \$0 to \$16/ac	0 lbs N/ac → 70 lbs N/ac: -\$19 to \$11/ac
P-Value	0.0383				
CV	8.1%				
Significance	Yes	Economic	Yes	Maybe	

[†] Based on estimated urea cost of \$650/MT (long-term average) and \$1150 (current conditions)

^{††} Profit is the difference between the change in income/ac, from a significant yield difference, and the change in cost/ac with for the increase in N rate. Profit/ac is presented as a range across long-term average dry bean prices, and those more similar to current market conditions.