

Effects of Seed Spacing and Nitrogen Rates on Dry Land Potato Production

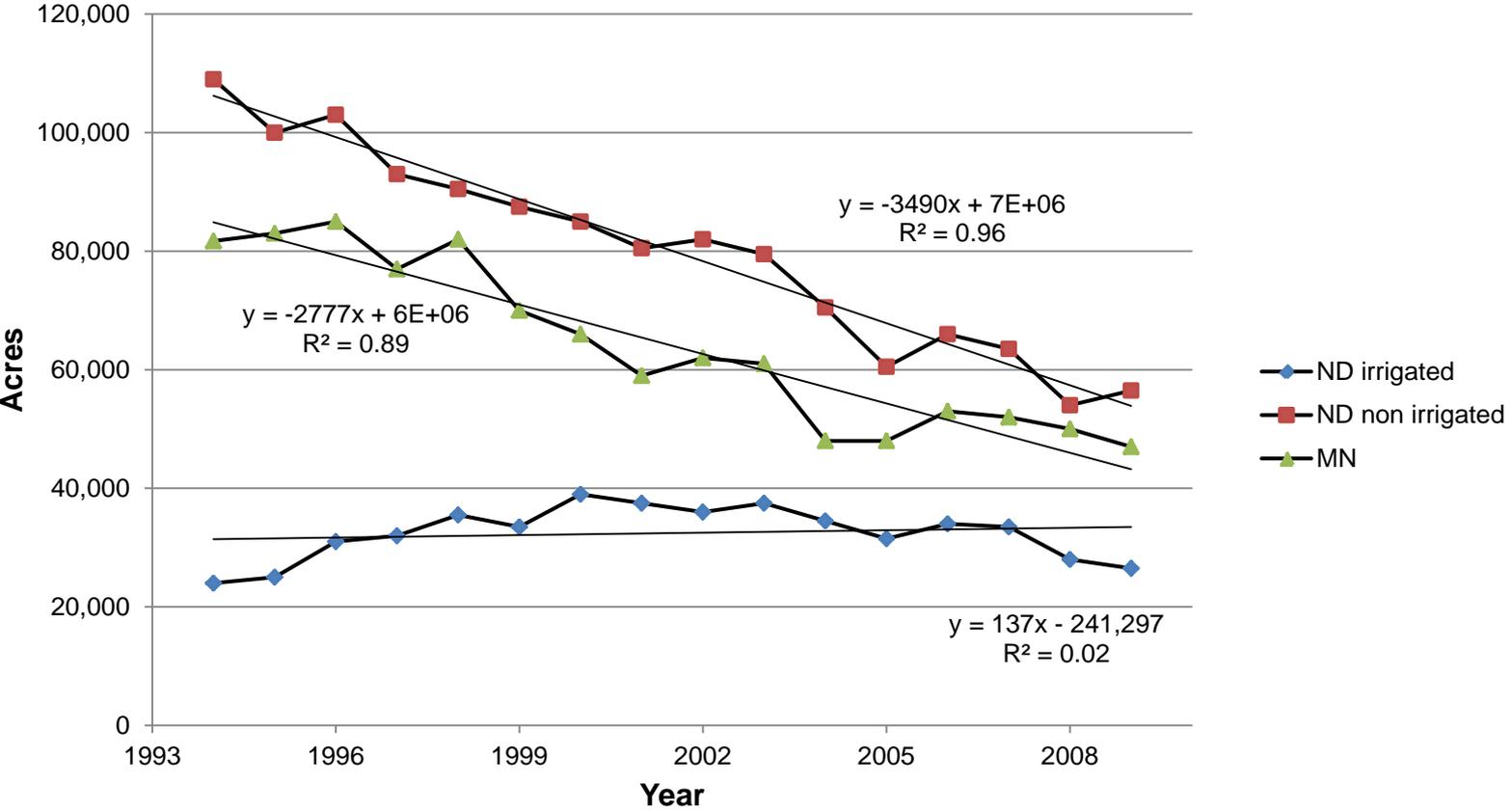
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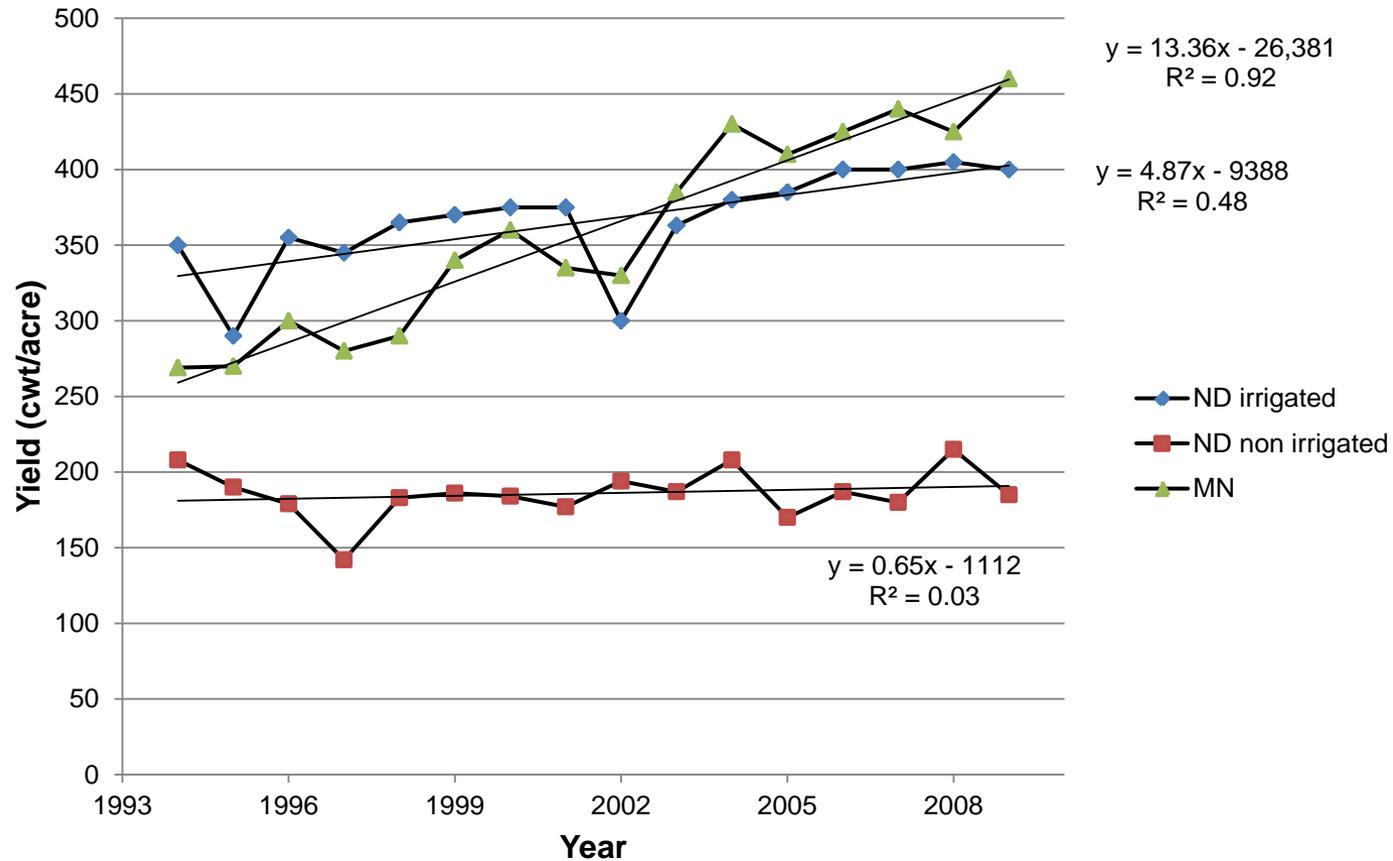
Background

- N is most abundant element after C, H, O in biomass.
- Used in proteins, amino acids, etc.
- Too little N leads to reduced growth, too much N lead to unwanted increase in shoot:root growth.
- Nitrogen needed for early crop growth to develop canopy and for tubers growth
 - 60-65% of total plant N is contained in tubers

ND and MN Potato Acres Planted



Production of Dryland Potatoes



2012 Cost of Production in SW ID

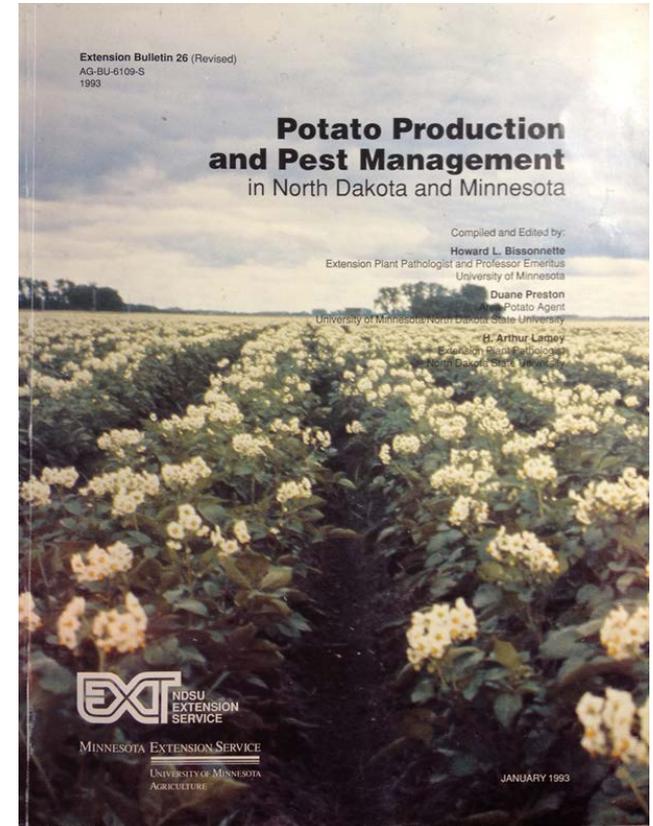
Operating Inputs	2012	% of Cost
Seed	\$370	13.0
Fertilizer	\$720	25.3
Pesticides & Chemicals	\$627	22.0
Custom & Consultants	\$337	11.8
Irrigation	\$117	4.1
Machinery	\$178	6.3
Labor	\$173	6.1
Transload	\$82	2.9
Other	\$150	5.3
Operating Interest	\$92	3.2

<http://web.cals.uidaho.edu/idaohobiz/files/2013/01/2012-Cost-of-Potato-Production-5-Year-Trends.pdf>

Nitrogen Requirement for Non-irrigated Potatoes

Nitrogen requirement for potatoes for various yield goals

Yield goal	Nitrogen required
cwt/acre	lbs/acre
200	80
250	100
300	120
350	140
400	160



Cultural Practices

- Most important and least expensive considerations that affect yield
 - Planting/harvest date
 - Crop rotations
 - Seeding rate
 - Cultivar selection
 - Fertilization



What was Done

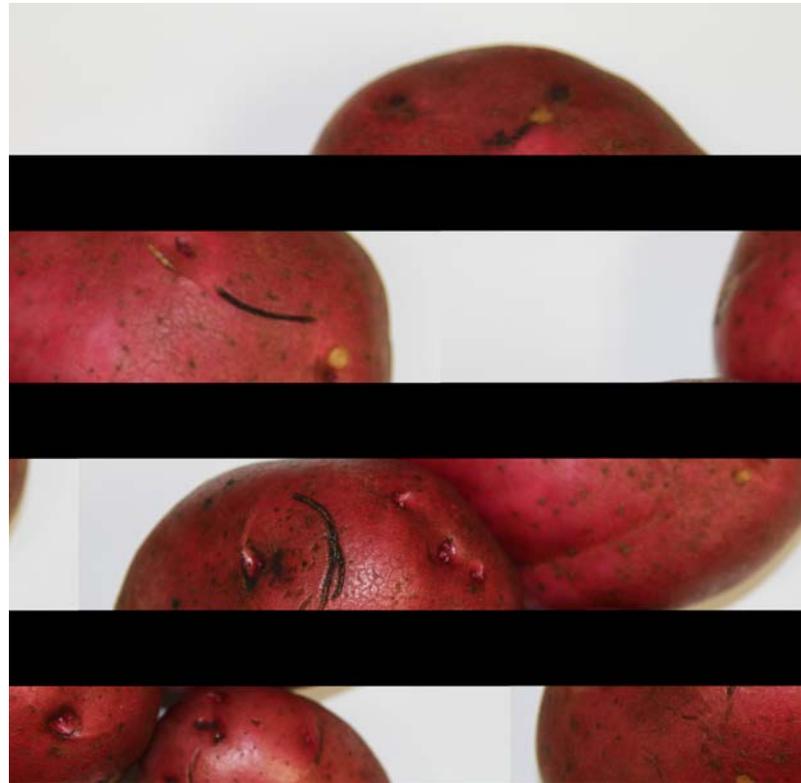
- Location: Grand Forks, ND
- RCBD with 3 replications
- Red Norland planted on 4 June 2012
- In-row spacing: 6, 9, and 12 inches
 - 36 inch-wide rows
- N rates: 80, 120, 160, 200 lb N/acre
 - ESN broadcast prior to hilling

What was Done

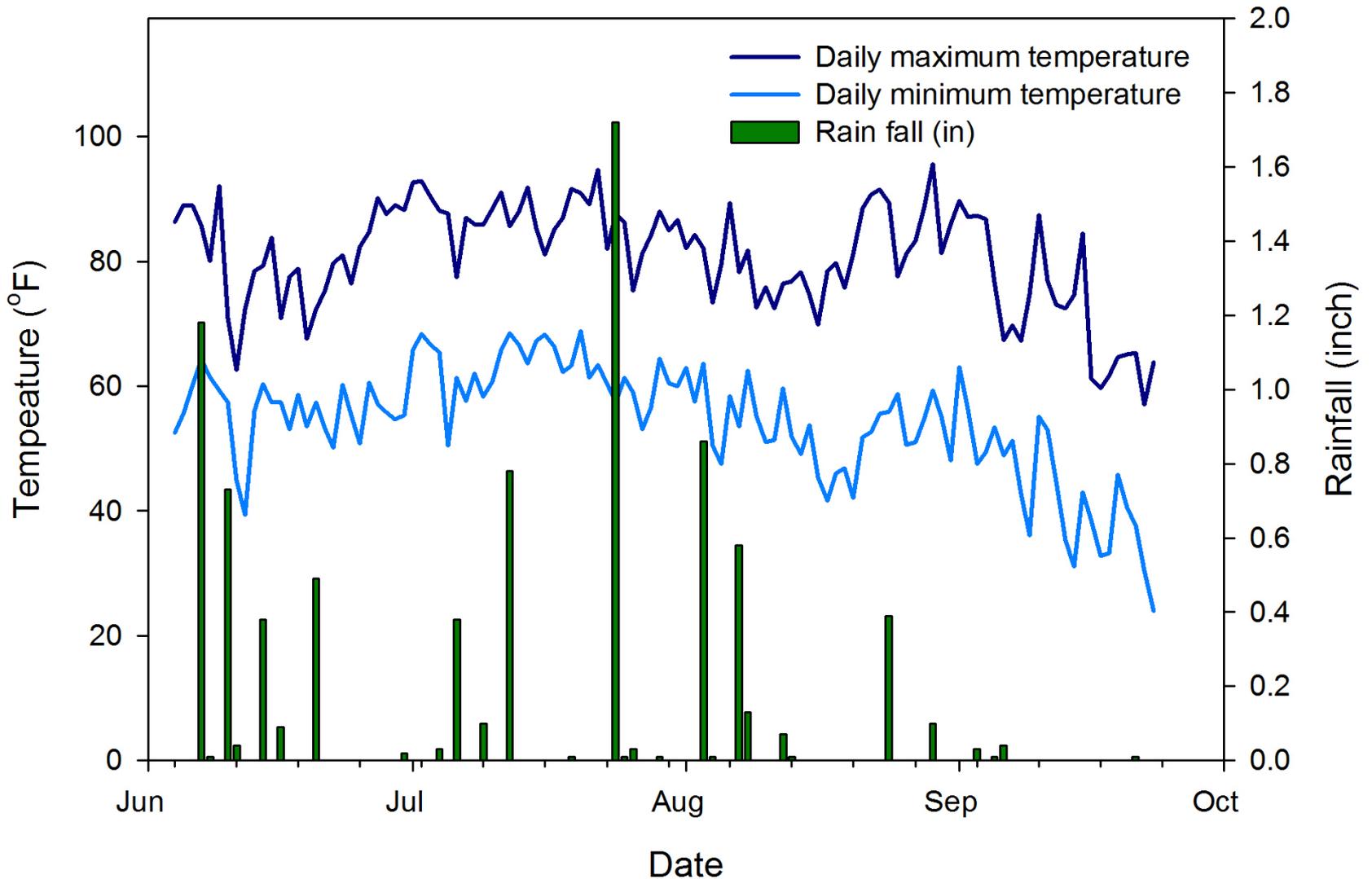
- Other fertility and pest management practices conducted according NDSU recommendations
- Vined killed by frost on 23 Sept. 2012
- Harvest: 2 center rows of each plot
- ANOVA used to determine difference between treatments ($P = 0.05$)

Sizing of Potatoes

- Potatoes sized with Kerian Speed Sizer
 - C: <1.5 in
 - B: 1.5 to 2.25 in
 - A: 2.25 to 3.5 in
 - Jumbo: >3.5



Grand Forks, ND Weather



N Rate on Yield

- Nitrogen rate only affected total yield

Table 1. Effect of nitrogen rate on tuber yield. Means followed by the same letter are not different within column ($P < 0.05$).

Nitrogen rate (lb/acre)	Yield (cwt/acre)
80	197 AB
120	205 A
160	200 AB
200	183 B

Seed Spacing

- Seed spacing affected total yield and each size of potato
 - Jumbo size was greatest at 6 and 9 inch spacing.
 - A size was highest at 9 and 12 inch spacing.
 - B and C size were maximized at 12 inch spacing.

Table 2. Effect of seeding rate on tuber yield. Means followed by the same letter are not significantly different within column (P<0.05).

Seeding rate (in)	Total yield	Jumbo size	A size	B size	C size
	cwt/acre				
6	172 B	20 AB	112 B	38 B	2 B
9	202 A	21 A	131 A	47 B	3 B
12	215 A	13 B	126 AB	72 A	4 A

Conclusions

- Dryland potatoes are affected by precipitation. At higher plant populations more water is needed for plant growth.
- The 12 inch spacing encouraged more tubers growth, causing more small sized potatoes.
- A lower tuber set from higher plant population resulted in larger sized potatoes.

Questions?



Thoughts on 2012

- Glyphosate in potatoes continues to be a problem
- Low disease pressure
- Elevated populations of many insects
 - Aster leafhoppers
 - Potato psyllids
- Harvest was challenging, but yields were high