

Managing for fertilizer use profitability when \$ is high

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In many fields, growers and their consultants report that their residual soil nitrate values are high compared to 'normal' values.

Are these high values 'real'?

There is far more confidence from high values in a zone-tested field, than from a field composite sample.

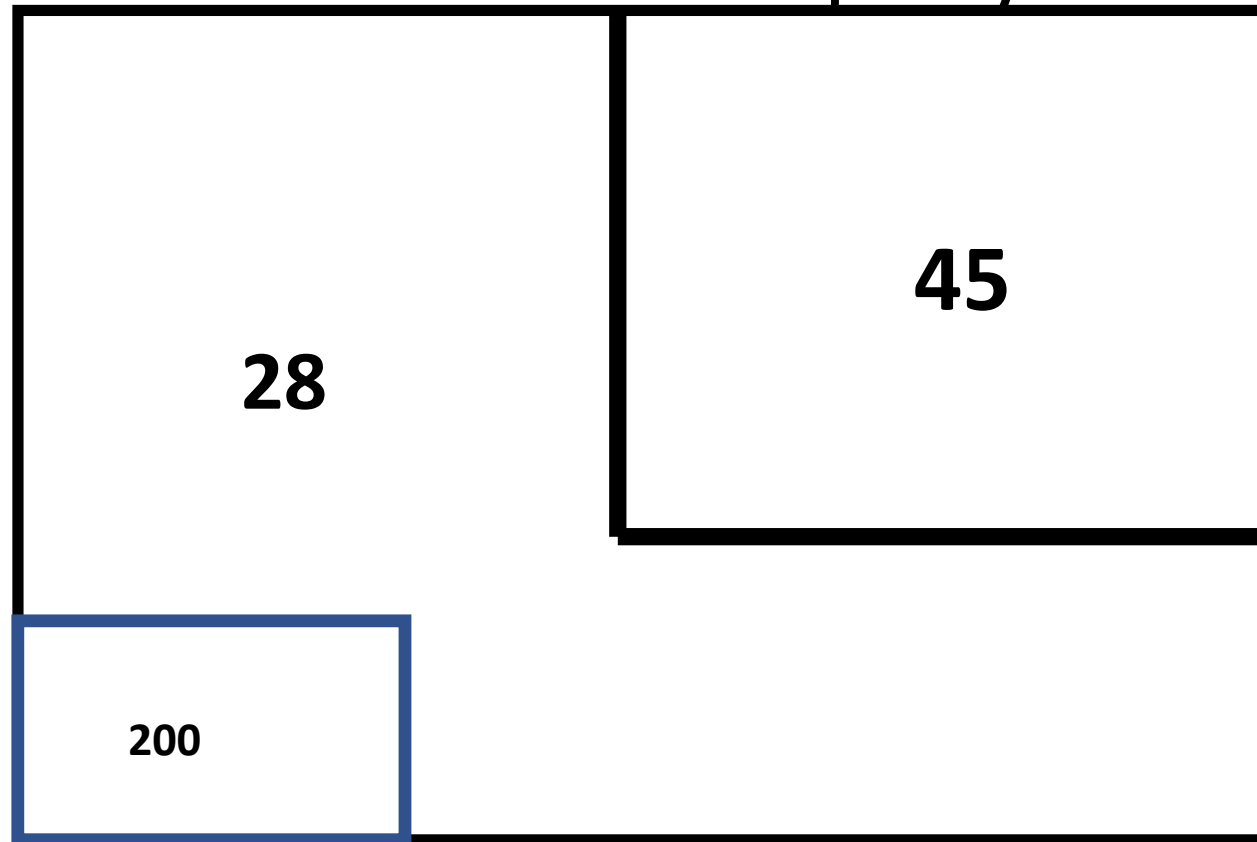
30
40
30
50
30
30
20
30
40
30
200

**Average value 48 lb nitrate-N/acre
Part of the field very over-fertilized
and 7/11 of the field under-fertilized
by 20 lb N/acre.**

There is far more confidence from high values in a zone-tested field, than from a field composite sample.

30
40
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40
30
200

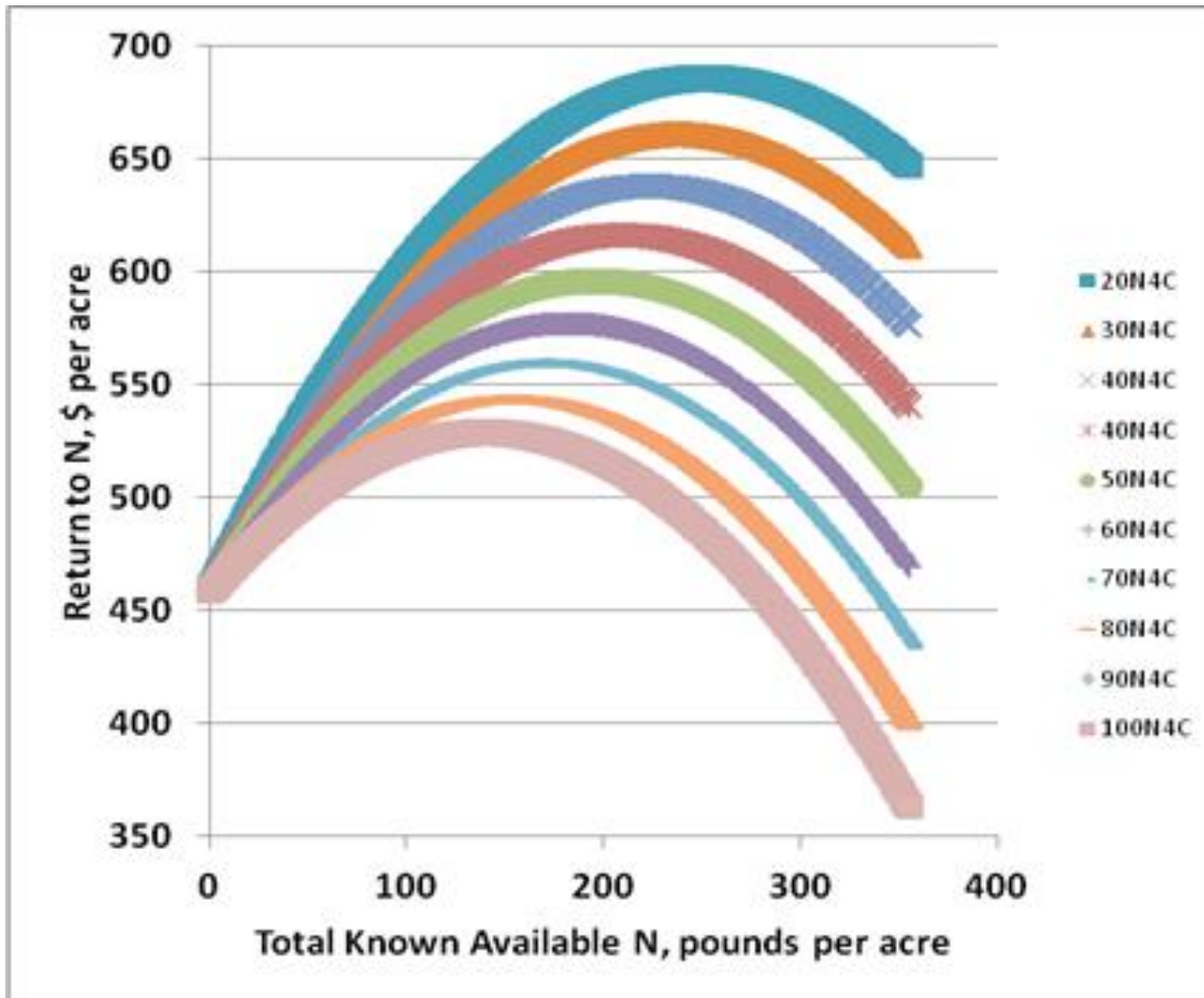
Same field sampled by zones



Soil nitrate-N is very important in producing a profitable fertilizer N rate.

Modern N fertilizer rate recommendations are designed to maximize farmer profits (not necessarily yield).

If it costs more to produce 5 bushel of greater corn yield, than why do it?



Fertilizer N recommendations are based on the \$ return to additional N applied.
 Above is Eastern North Dakota medium-textured soils from 20 cent lb N to \$1/lb N at \$4/bushel corn

Welcome to the North Dakota Wheat Nitrogen Calculator

You will need to know the location of the farm, the general productivity of the soils, the price you contract for wheat, the cost per pound of N, the soil test nitrate-N to a depth of 2-feet, and the previous crop.

Please select the location of the farm. The map of North Dakota on this site will help you determine the region of the farm. [Click on the map for a detailed view.](#)



- Eastern North Dakota
- Western North Dakota
- Langdon Region

1

Low productivity is defined in Eastern ND as historical yields below 40 bushels per acre

Medium productivity is defined in Eastern ND as historical yields from 41 to 60 bushels per acre

High productivity is defined in Eastern ND as historical yields over 60 bushels per acre

Please select the historical productivity of the farm from the options below.

- Low Productivity
- Medium Productivity
- High Productivity

2

Select Nearest Wheat Price
(\$/bushel)

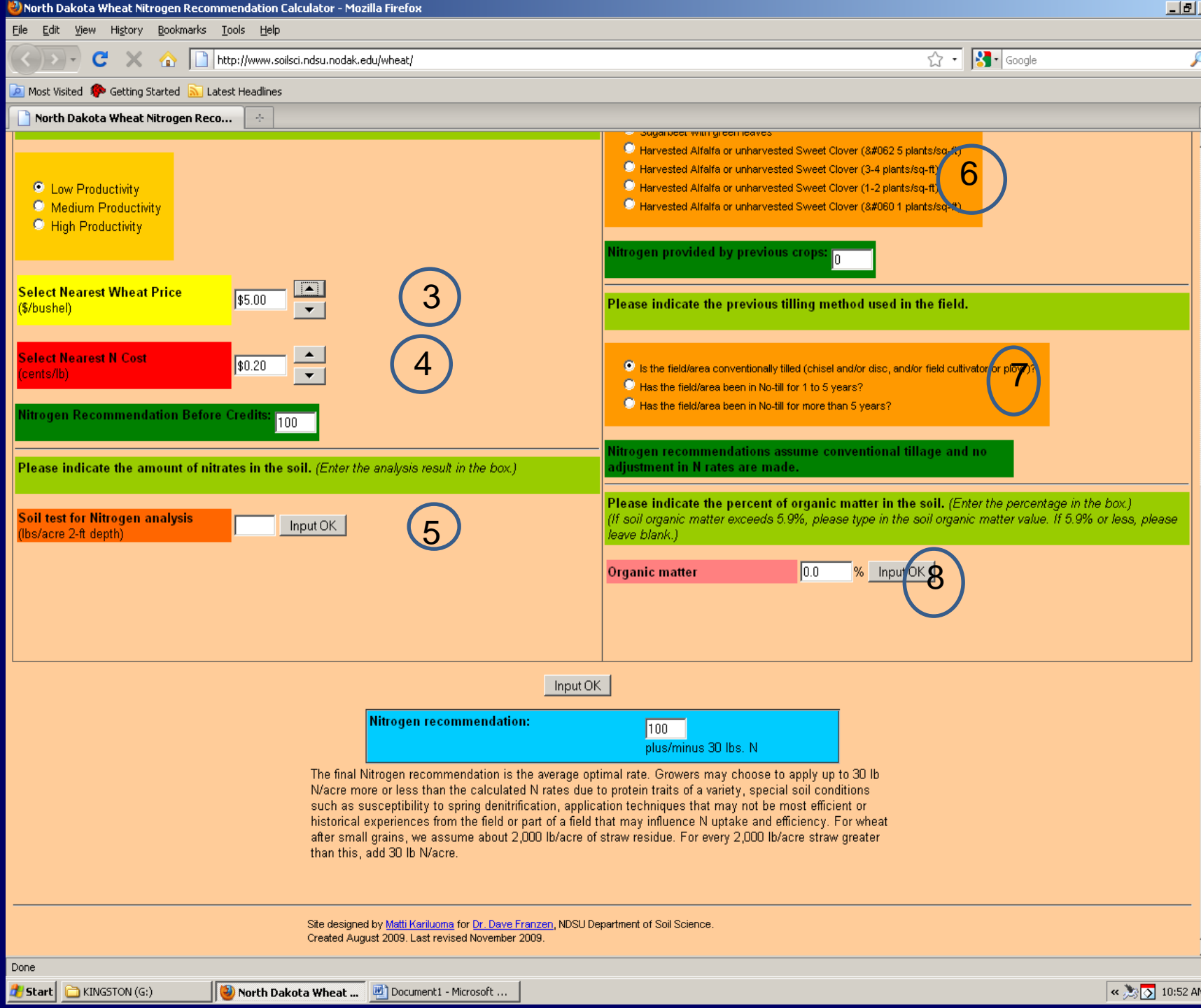
\$5.00

Please indicate the crop previously planted in the field.

- No Nitrogen-supplying crop
- Soybean, Field Pea, Dry Bean, Lentil, Chickpea, or harvested Sweet Pea
- Sugarbeet with yellow-green leaves
- Sugarbeet with green leaves
- Harvested Alfalfa or unharvested Sweet Clover (> 5 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (3-4 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (1-2 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (< 1 plants/sq-ft)

Nitrogen provided by previous crops:

Please indicate the previous tilling method used in the field.



- Low Productivity
- Medium Productivity
- High Productivity

Select Nearest Wheat Price (\$/bushel)

Select Nearest N Cost (cents/lb)

Nitrogen Recommendation Before Credits:

Please indicate the amount of nitrates in the soil. (Enter the analysis result in the box.)

Soil test for Nitrogen analysis (lbs/acre 2-ft depth)

- Sugarbeet with green leaves
- Harvested Alfalfa or unharvested Sweet Clover (> 5 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (3-4 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (1-2 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (< 1 plants/sq-ft)

Nitrogen provided by previous crops:

Please indicate the previous tilling method used in the field.

- Is the field/area conventionally tilled (chisel and/or disc, and/or field cultivator or plow)?
- Has the field/area been in No-till for 1 to 5 years?
- Has the field/area been in No-till for more than 5 years?

Nitrogen recommendations assume conventional tillage and no adjustment in N rates are made.

Please indicate the percent of organic matter in the soil. (Enter the percentage in the box.) (If soil organic matter exceeds 5.9%, please type in the soil organic matter value. If 5.9% or less, please leave blank.)

Organic matter %

Nitrogen recommendation:
plus/minus 30 lbs. N

The final Nitrogen recommendation is the average optimal rate. Growers may choose to apply up to 30 lb N/acre more or less than the calculated N rates due to protein traits of a variety, special soil conditions such as susceptibility to spring denitrification, application techniques that may not be most efficient or historical experiences from the field or part of a field that may influence N uptake and efficiency. For wheat after small grains, we assume about 2,000 lb/acre of straw residue. For every 2,000 lb/acre straw greater than this, add 30 lb N/acre.

North Dakota Sunflower Nitrogen Calculator



Select A Region From The List Below:

- Eastern North Dakota
- Western North Dakota
- Langdon Area

Select Tillage From The List Below:

- Conventional Till** (Tillage greater than 2 inch depth, thin ammonia shank or striptill shank, does not contribute to conventional till)
- Oil-Seed
 - Confection
- Long-Term No-Till** (6 years or more continuous no-till)
- Oil-Seed
 - Confection
- Short-Term No-Till** (1-5 years of continuous no-till)
- Oil-Seed
 - Confection

Select Previous Crop Credits From The List Below:

- No previous crop credits
- Soybean, Dry Bean, Field Pea, Lentils, Chickpea, Sweet Clover
- Alfalfa stand greater than 5 plants per square foot
- Alfalfa stand from 3 to 4.9 plants per square foot
- Alfalfa stand from 1 to 2.9 plants per square foot
- Alfalfa stand less than 1 plant per square foot
- Sugar beet with yellow leaves at harvest
- Sugar beet with yellow-green leaves at harvest
- Sugar beet with dark green leaves at harvest

Sunflower Price:

Price Range From: (\$0.09/lb to \$0.30/lb)
Price Increments: (\$0.03)

Nitrogen Cost:

Price Range From: (\$0.20/lb to \$1.00/lb):
Price Increments: (\$0.10)

Percent Organic Matter In The Soil:

If organic matter is greater than 5.9% additional credits are considered.
Organic Matter Percentage:

Soil Test Nitrate-N (0-2 foot depth):

Whole Numbers: Zero to No-Limit, (No Decimal Values):

Nitrogen Recommendation:

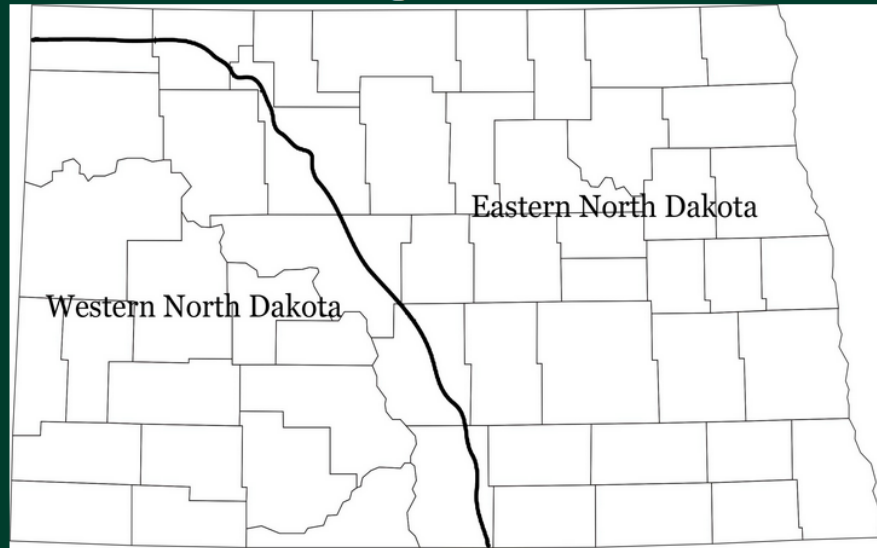
Nitrogen Recommendation Preview:
 plus or minus 20 pound N per acre.

Nitrogen Recommendation After Credits:
 plus or minus 20 pound N per acre.

The final N recommendation is an average optimal rate. Your final N rate decision may be plus or minus 20 pounds N per acre from that value depending on individual field situations. The value assumes an optimal N application and timing strategy. If these strategies are not optimal, a greater N rate may be needed. Suboptimal N application strategies include to early N application the fall prior to seeding, surface urea/UAN application or lightly incorporated urea/UAN, or shallow ammonia application. Fields that are first year sunflower, or sunflower more than 4 years after a deep rooted crop including sunflower may have have deep N, and a minimal N preplant application followed by side-dress application at V5-V8 is recommended.

Site developed by: Max McGrath, Date: Spring 2016
For: Dr. Dave Franzen, NDSU, Department of Soil Science

North Dakota Corn Nitrogen Calculator



Region:
West River:
Eastern ND:

Field Information (If in Eastern ND):
 No-Till for 6+ Years
 Irrigated Corn
 Conventional Till/Minimal No-Till
 Conventionally-Tilled
 No-Till for 1-5 years
 High-Clay Soils
 Historic Yield > 160 bu/a
 Historic Yield less than 160 bu/a
 Medium-Texture Soils
 Historic Yield > 160 bu/a
 Historic Yield less than 160 bu/a

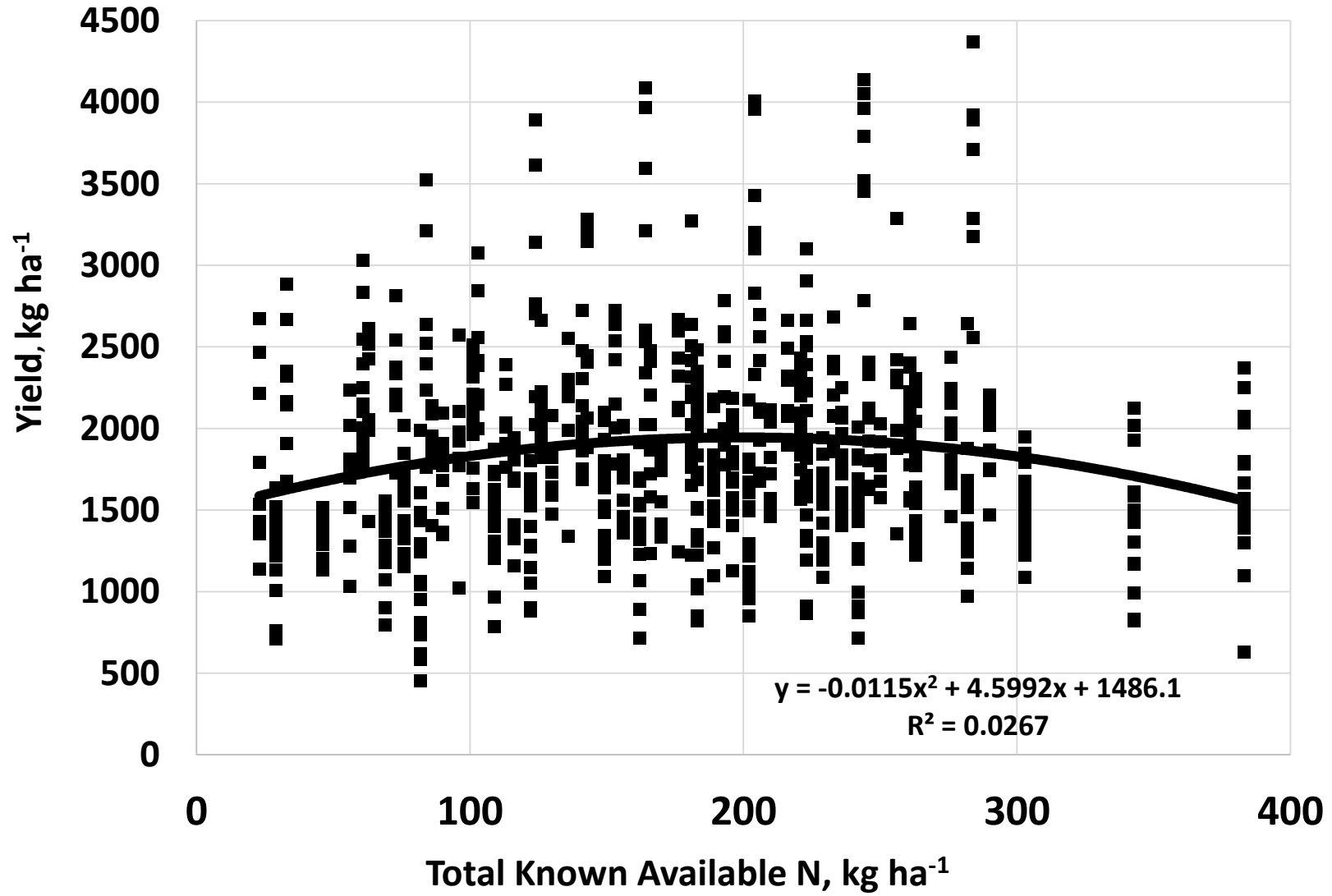
Input Nearest Corn Price (\$/Bushel):
Input Nearest Nitrogen Cost (\$/Pound):
Soil Test for Nitrogen Analysis (lbs/acre 2-ft depth):
Percent Organic Matter In Soil:

Previous Crops Planted Nitrogen Recommendation:
plus/minus 30 lbs.

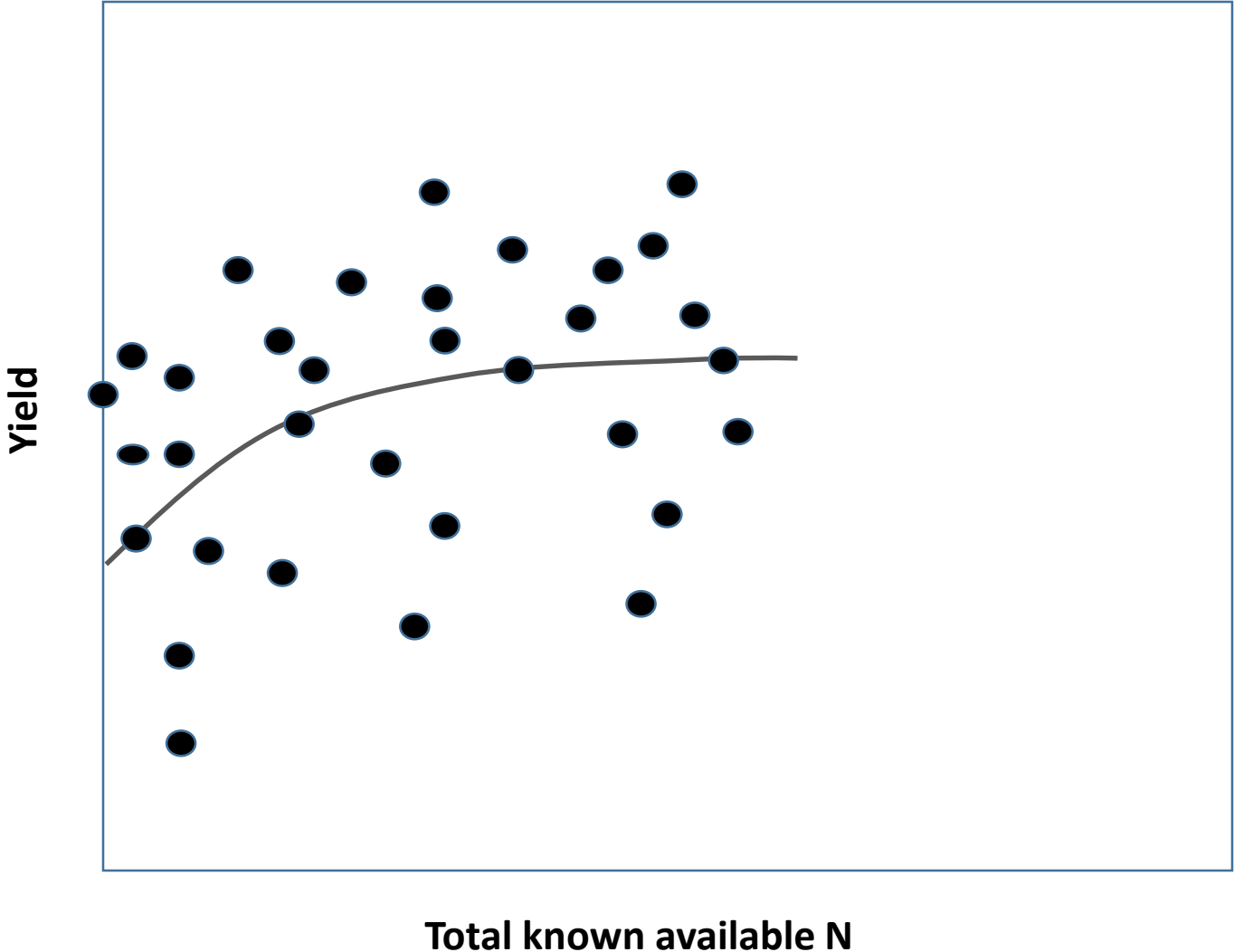
- No nitrogen-supplying crop
- Soybean, Field Pea, Dry Bean, Lentil, Chickpea or harvested Sweet Pea
- Sugarbeet with yellow-green leaves
- Sugarbeet with green leaves
- Harvested Alfalfa or unharvested Sweet Clover (>5 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (3-4 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (1-2 plants/sq-ft)
- Harvested Alfalfa or unharvested Sweet Clover (less than 1 plant/sq-ft)

The data used in development of the North Dakota Corn Nitrogen Calculator was gathered with funding from the North Dakota Corn Council, the International Plant Nutrition Institute, and Pioneer Hi-Bred, Int. Data was gathered by Dr. Dave Franzen, lead investigator, with collaboration from Roger Ashley, Greg Endres, Jasper Teboh, Lakesh Sharma, Honggang Bu, Brad Schmidt and Eric C. Schultz. Dr. John Lamb,

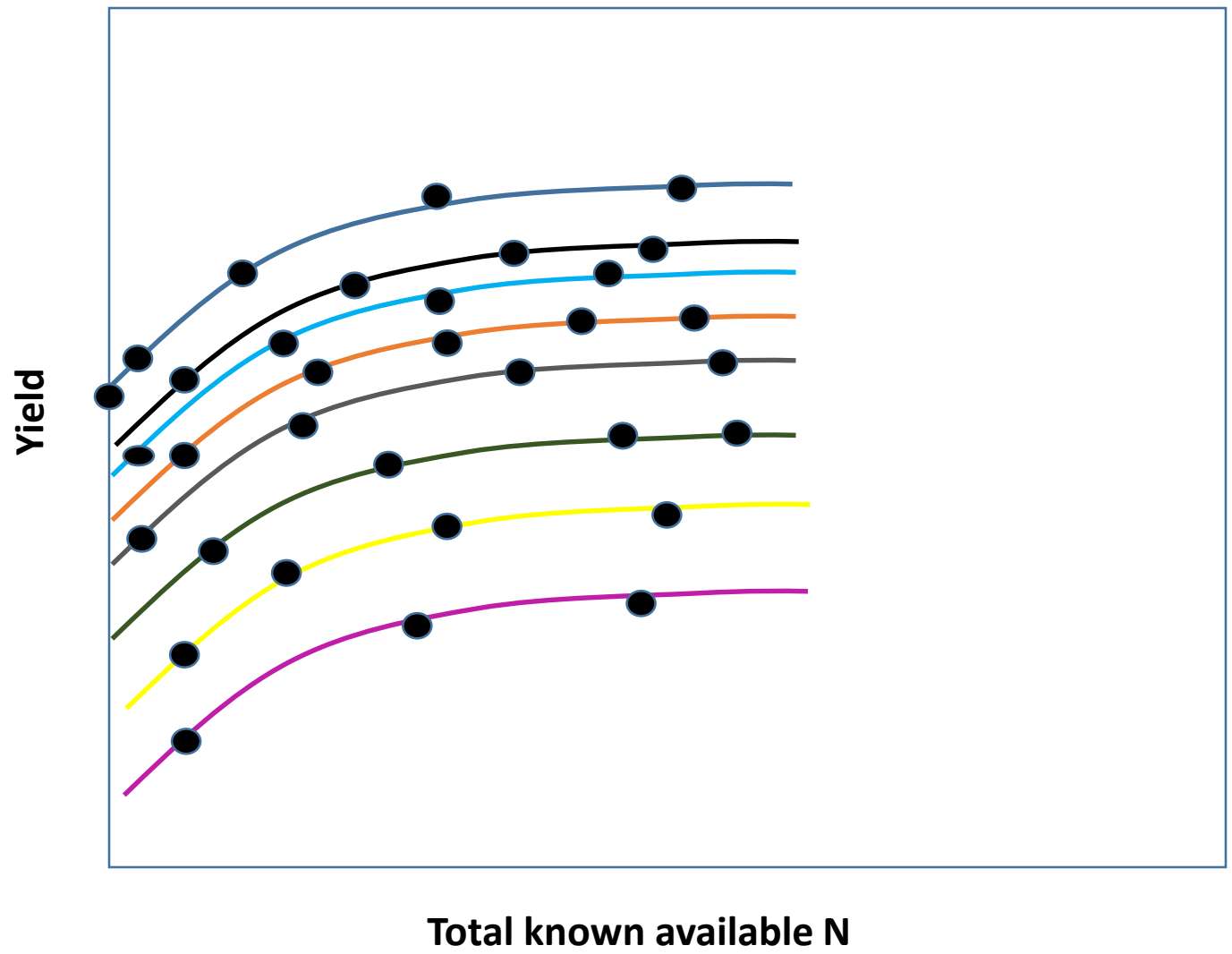
Eastern ND Sunflower Yield, 2014-2015



Example-Combining all sites with actual yield at N rate looks like this



When it really looks like this-



To get a better idea of what the data look like without showing all the curves is to *'Standardize'* the data- putting it all in the same scale

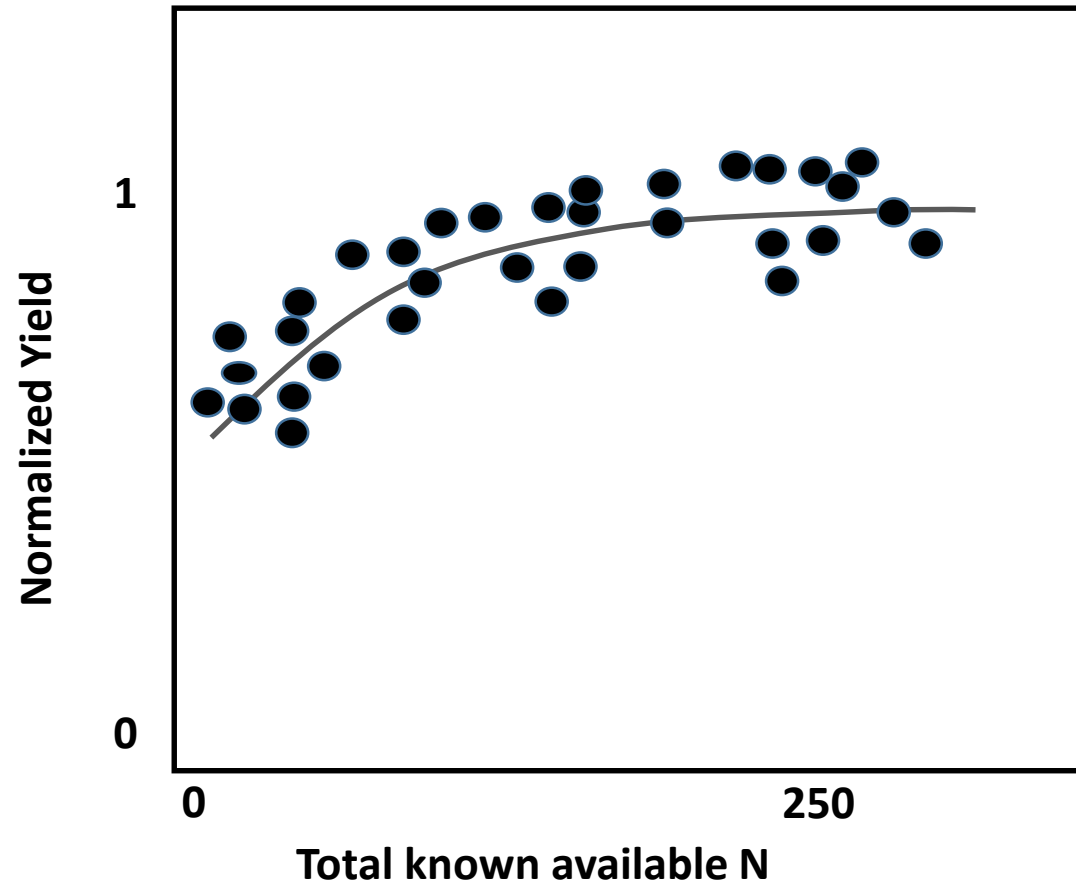
For example-

A sunflower site with high yield 4,000 pounds per acre, divide all yields by 4,000, to reach values from 0 to 1

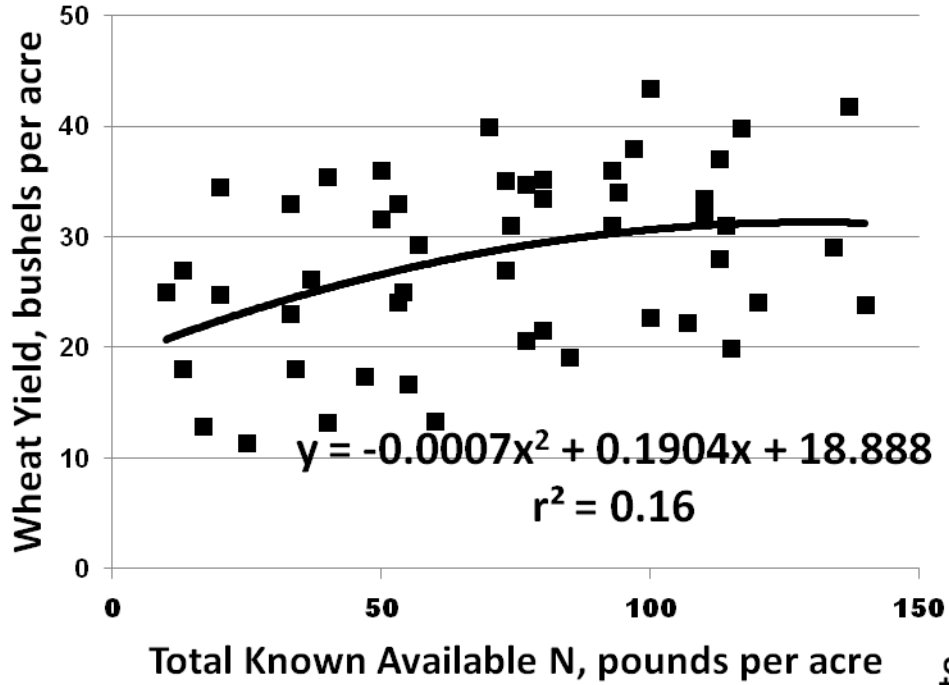
A sunflower site with high yield 1,800 pounds per acre, divide all yields by 1,800, to reach values from 0 to 1

A sunflower site with high yield 2,500 pounds per acre, divide all yields by 2,500, to reach values from 0 to 1

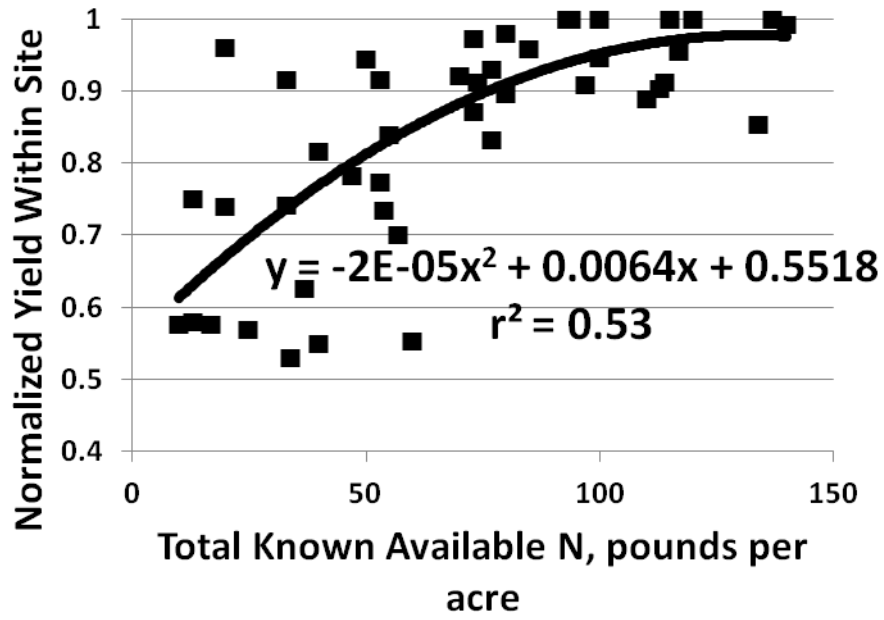
Standardizing yields at all sites end up looking like this-

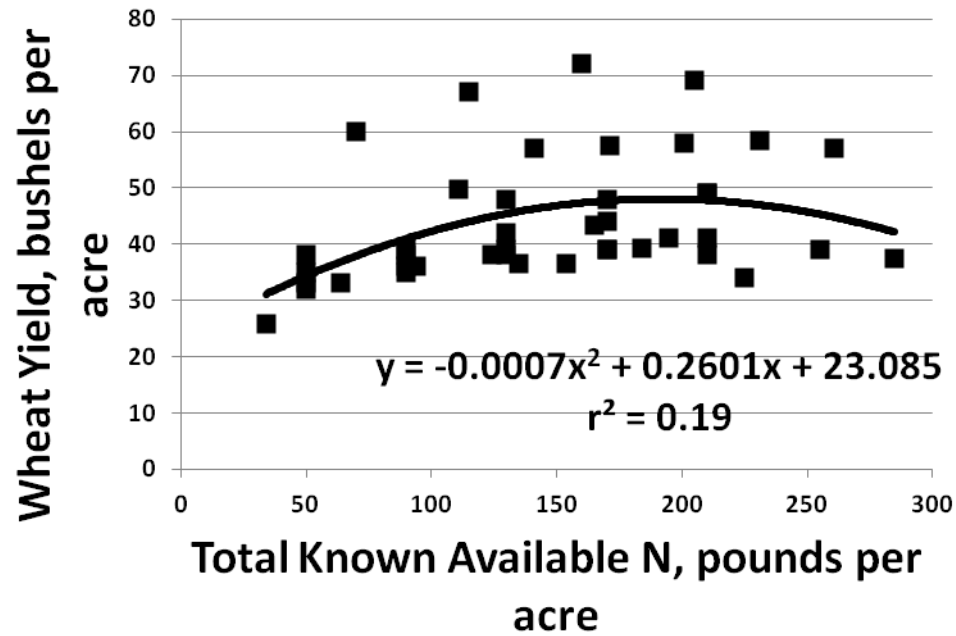


Western ND Conventional Till wheat sites raw yields



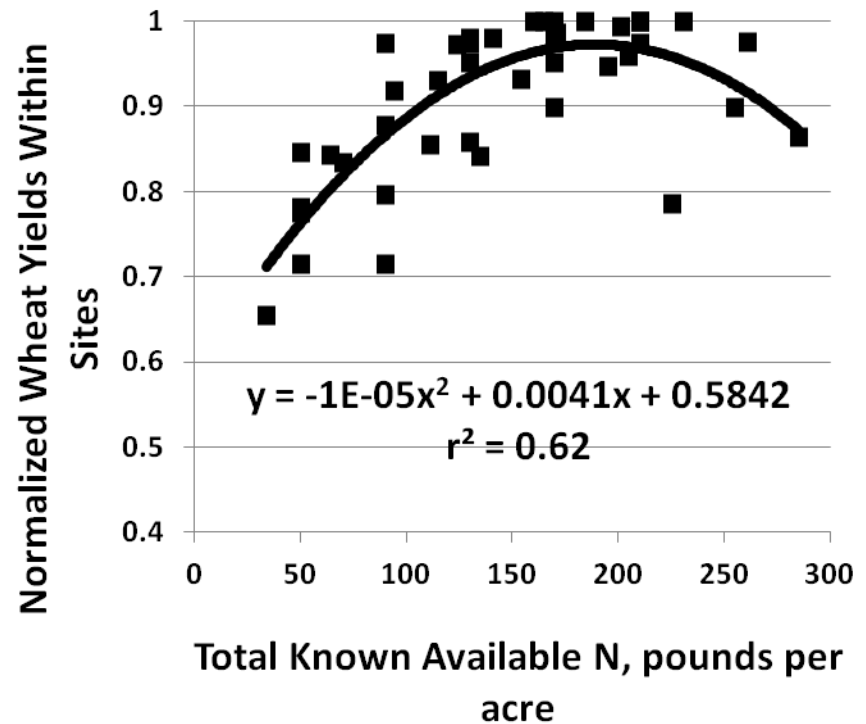
Western ND Conventional Till wheat sites, standardized yields

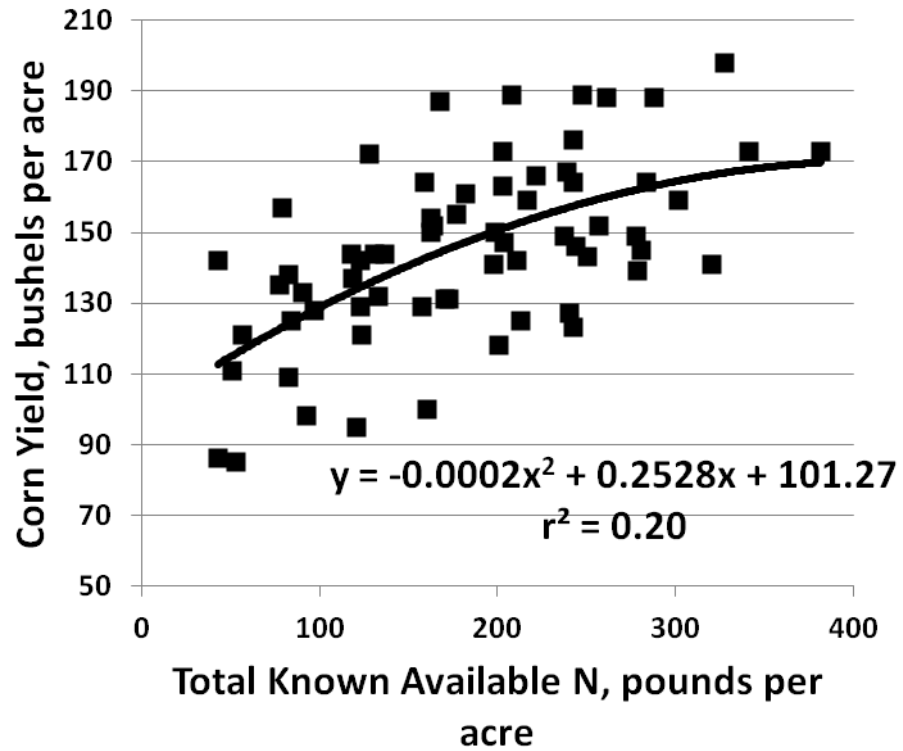




Western ND No-Till wheat sites raw yields

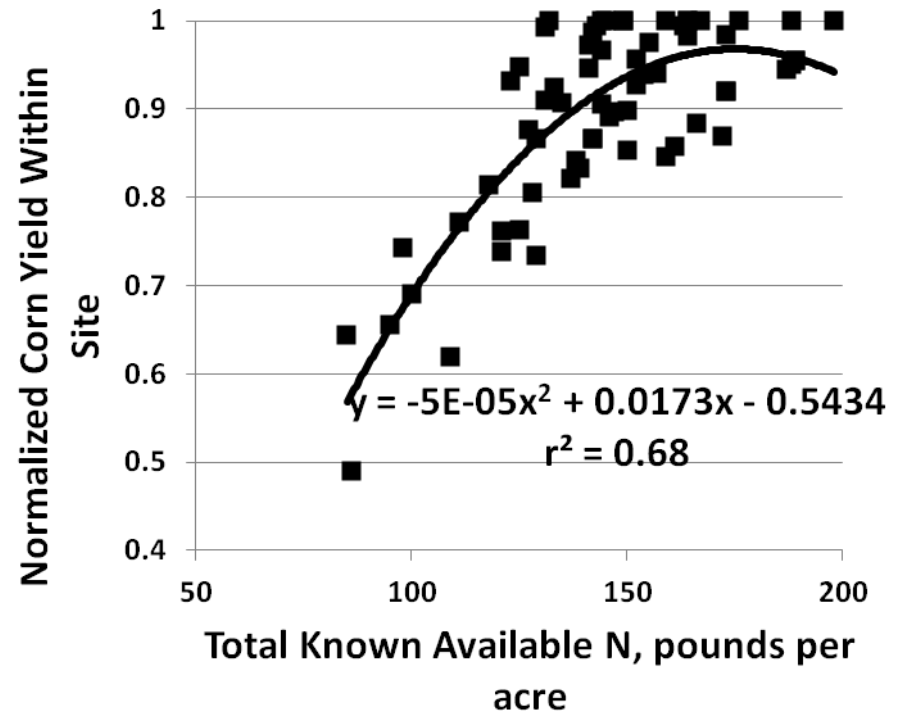
Western ND No-Till wheat sites standardized yields

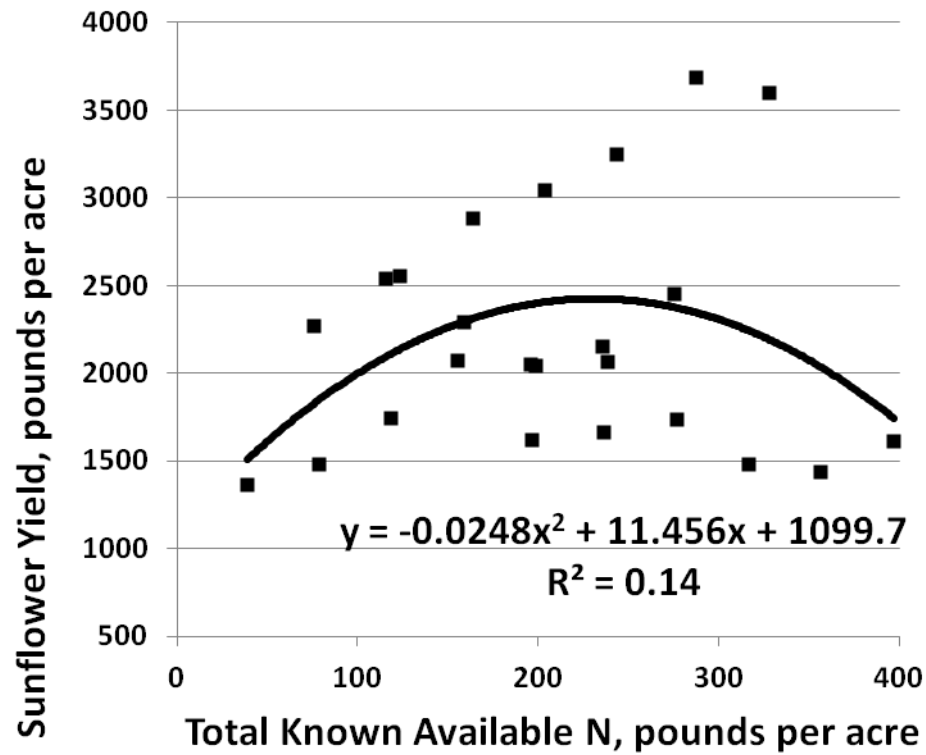




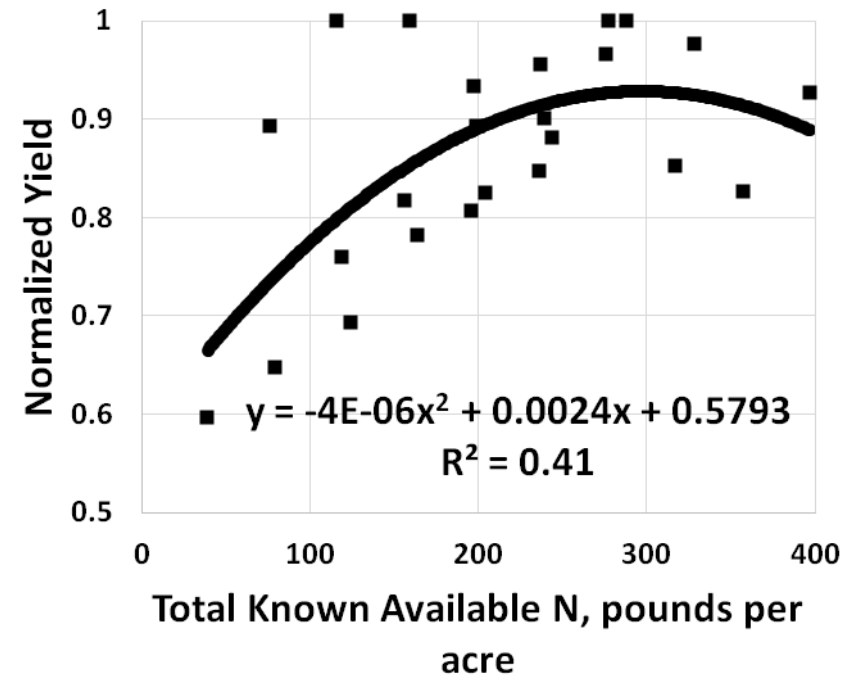
**Eastern ND no-till,
corn sites raw yields**

**Eastern ND no-till,
corn sites standardized yields**



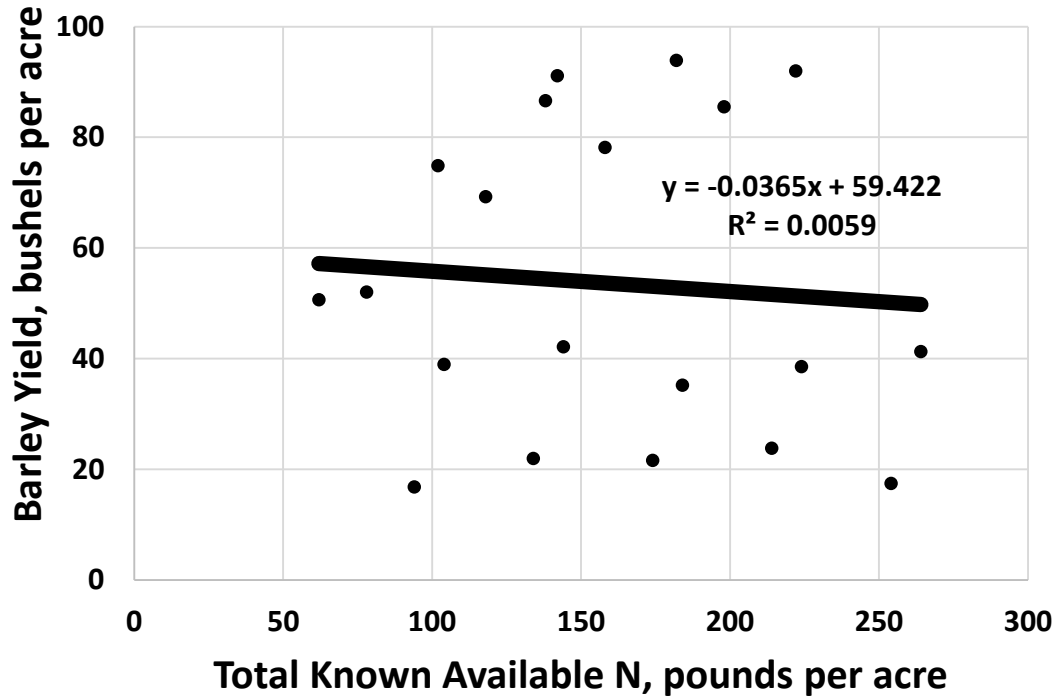


Eastern ND Conventional Till, sunflower sites raw yields

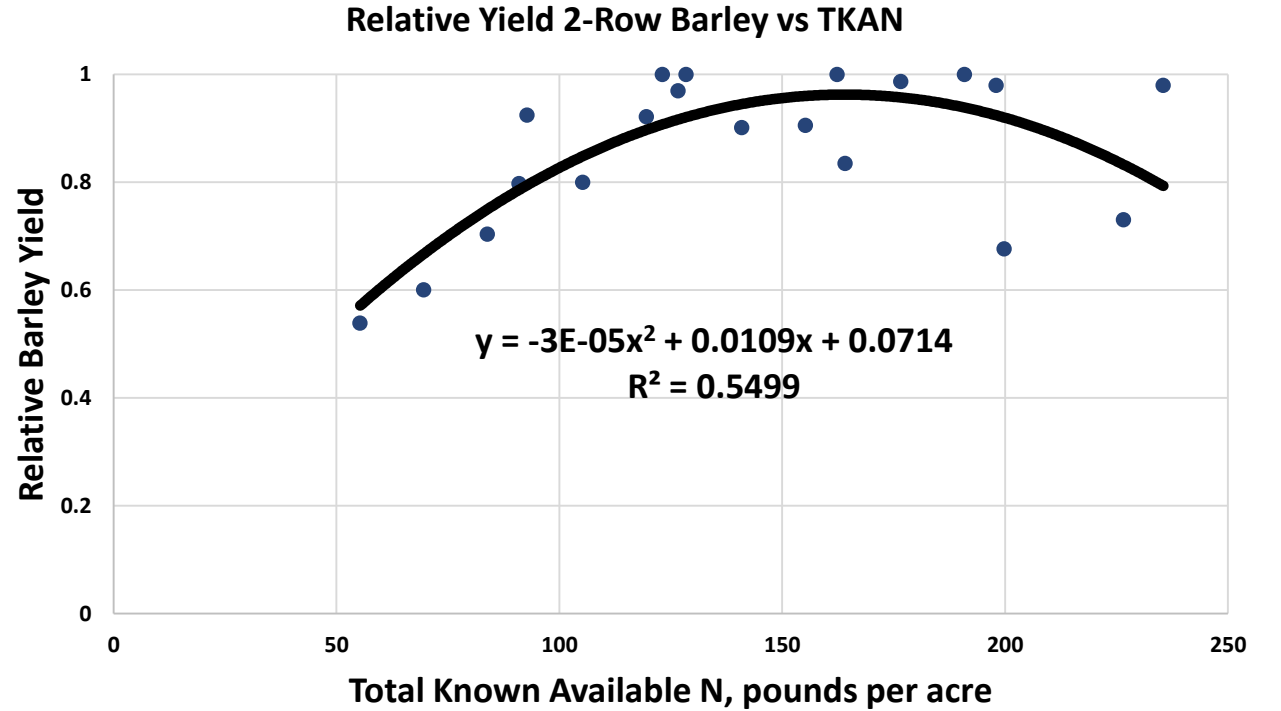


Eastern ND Conventional Till sunflower sites standardized yields

Barley Yield, vs Total Known Available N



2-Row Barley raw yields, 4 site years



2-Row Barley standardized yields, 4 site years

Low yield environment-

usually drier (sometimes excessive wetness)

Lower N use efficiency and crop uptake

Less N mineralization

High yield environment-

Moisture near ideal- not too wet or too dry

Higher N use efficiency and crop uptake

Greater N mineralization

Net result is that rate to produce economic max yield is similar in both environments.

There is a new phone app for Android phones for the 3 N calculators.

Go to app store and search for North Dakota Crop Nitrogen Calculator and follow the instructions.

It's free to download.

We also have an app for iPhones-

Go to the Iphone app store and look up North Dakota Crop Nitrogen Calculator, then follow instructions.

How about other nutrients?

The North Dakota K calculator also takes into account the cost of K fertilizer.

P fertilizer profitability also depends on P fertilizer cost relative to crop yield, but we do not have a P calculator.

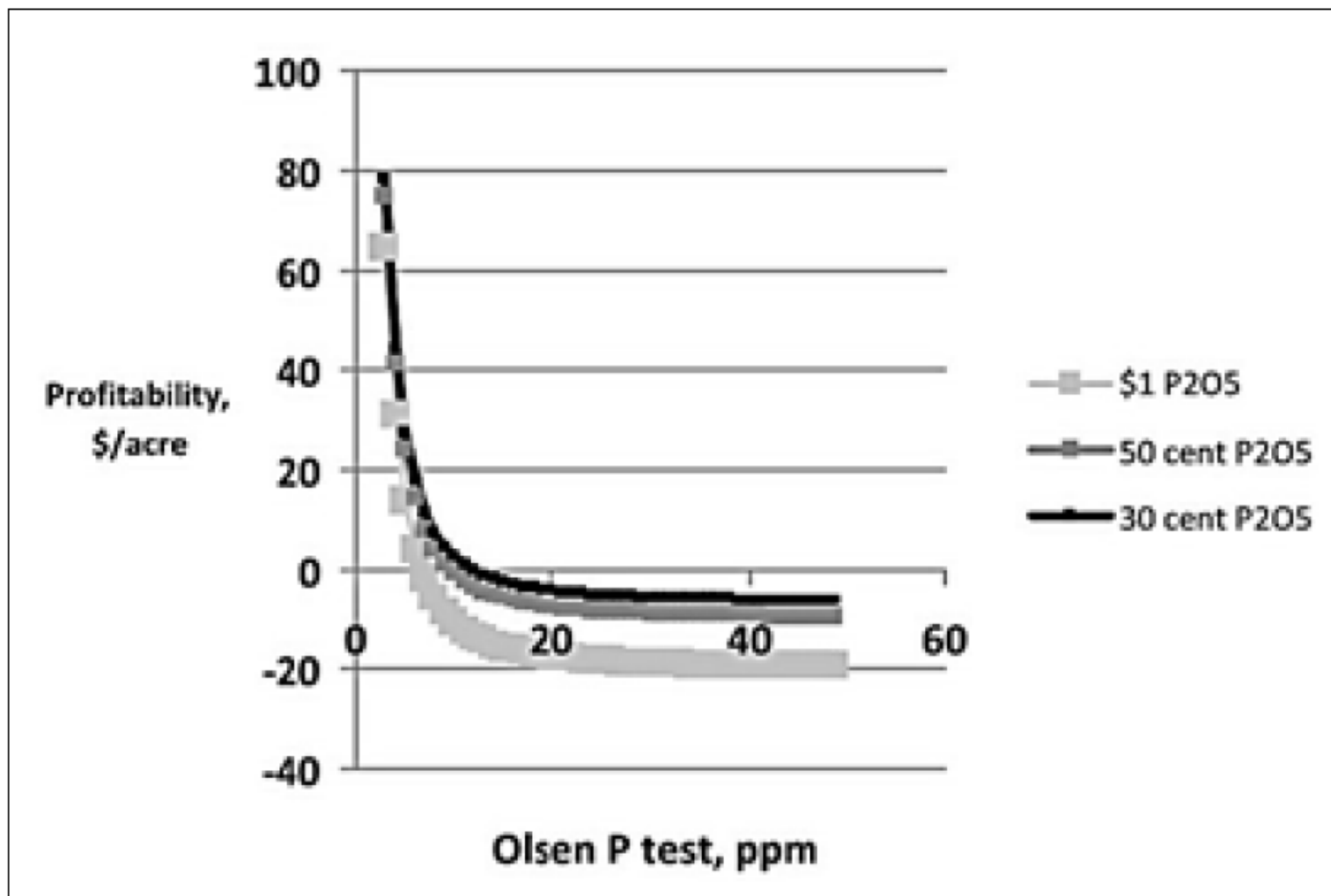


Figure 4. Profitability of using P for \$6/bushel wheat at 30 cent/pound of P_2O_5 , 50 cent/pound P_2O_5 , and \$1/pound P_2O_5 . From Halvorson (1978).

Summary of considerations for fertilization this season-

- If soil analysis of each field has not been done, make it so.**
- Zone sampling for nutrients is much more instructive than a composite soil test, and the values are much more believable.**
- Use the N calculators to determine the most profitable N rate.**
- Don't be afraid to back off broadcast P rates this year.**

Contact information-

My contact information

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for my website- search for Dave Franzen NDSU

choose 'Homepage'