

Soils Program update

Szilvia Yuja

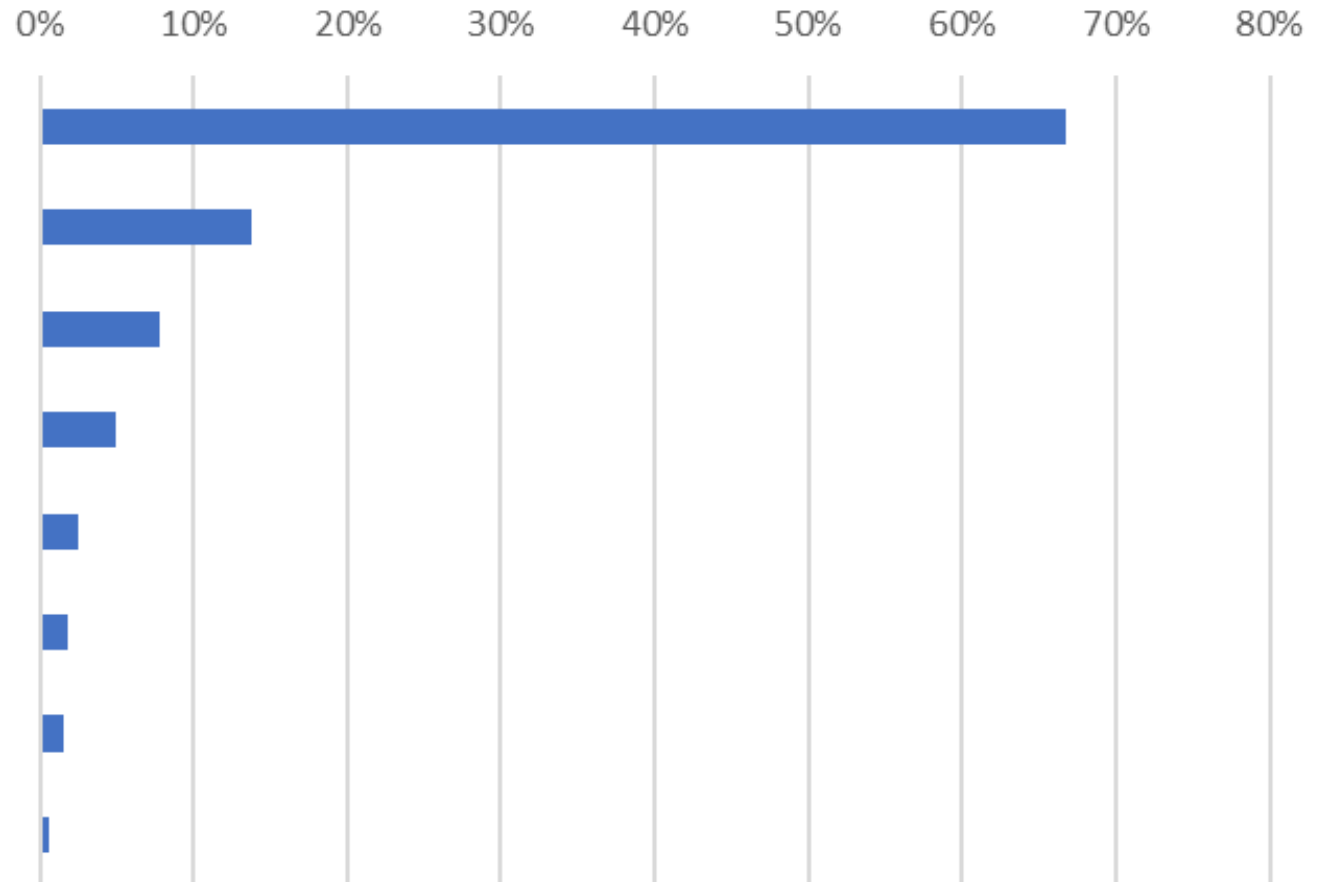
NDSU NORTH DAKOTA AGRICULTURAL
EXPERIMENT STATION



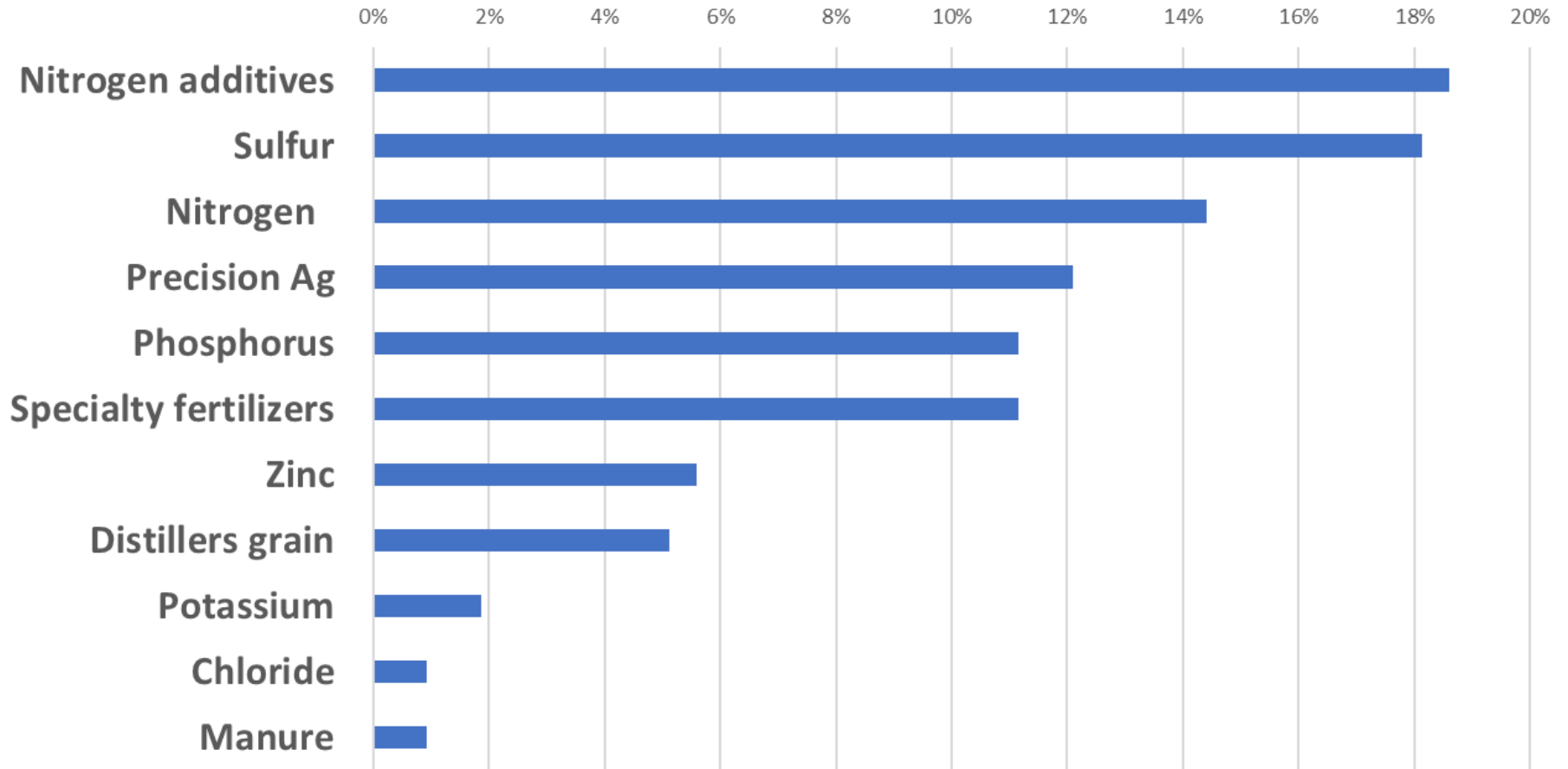
Jasper Teboh

Soil Scientist, Carrington REC

Past areas of research



Fertility trials



Nitrogen rate response at the CREC 2013 to 2018

- Dryland corn - 8 studies
- Irrigated corn - 7 studies

- Dryland wheat - 11 studies
- Irrigated wheat - 6 studies

Dryland corn - 8 studies

- N rates at maximum yield
 - Median : 88 lbs N
 - Lowest : 0 lbs N
 - Highest : 180 lbs N

- N rates at maximum ROI
 - Median : 25 lbs N
 - Lowest : 0 lbs N
 - Highest : 70 lbs N

Irrigated corn - 7 studies

- N rates at maximum yield
 - Median : 157 lbs N
 - Lowest : 90 lbs N
 - Highest : 225 lbs N

- N rates at maximum ROI
 - Median : 120 lbs N
 - Lowest : 65 lbs N
 - Highest : 180 lbs N

Dryland wheat - 11 studies

- N rates at maximum yield
 - Median : 84 lbs N
 - Lowest : 0 lbs N
 - Highest : 200 lbs N

- N rates at maximum ROI
 - Median : 40 lbs N
 - Lowest : 0 lbs N
 - Highest : 77 lbs N

Irrigated wheat - 6 studies

- N rates at maximum yield
 - Median : 145 lbs N
 - Lowest : 70 lbs N
 - Highest : 200 lbs N

- N rates at maximum ROI
 - Median : 75 lbs N
 - Lowest : 0 lbs N
 - Highest : 87 lbs N

Enhanced Efficiency Nitrogen Fertilizers

- 30 trials with products containing **NBPT**, a **urease inhibitor**
- 3 out of 21 dryland studies had positive yield response, (only 2 significant)
- 6 out of 9 irrigated studies had positive response, (only 1 significant)

Application of ESN with wheat seed

- Trial duration:
2013 – 2015
- Irrigated and
dryland sites



Sulfur

- **Corn:** Sulfur response in half of the trials (16 studies)
- **Wheat:** response in 2 out of 12 studies in (both those studies were in MN on sandy soil)
- **Barley:** 3 studies, response in 1 on a sandier soil in Eddy county
- **Soybean:** out of 2 studies, response in 1

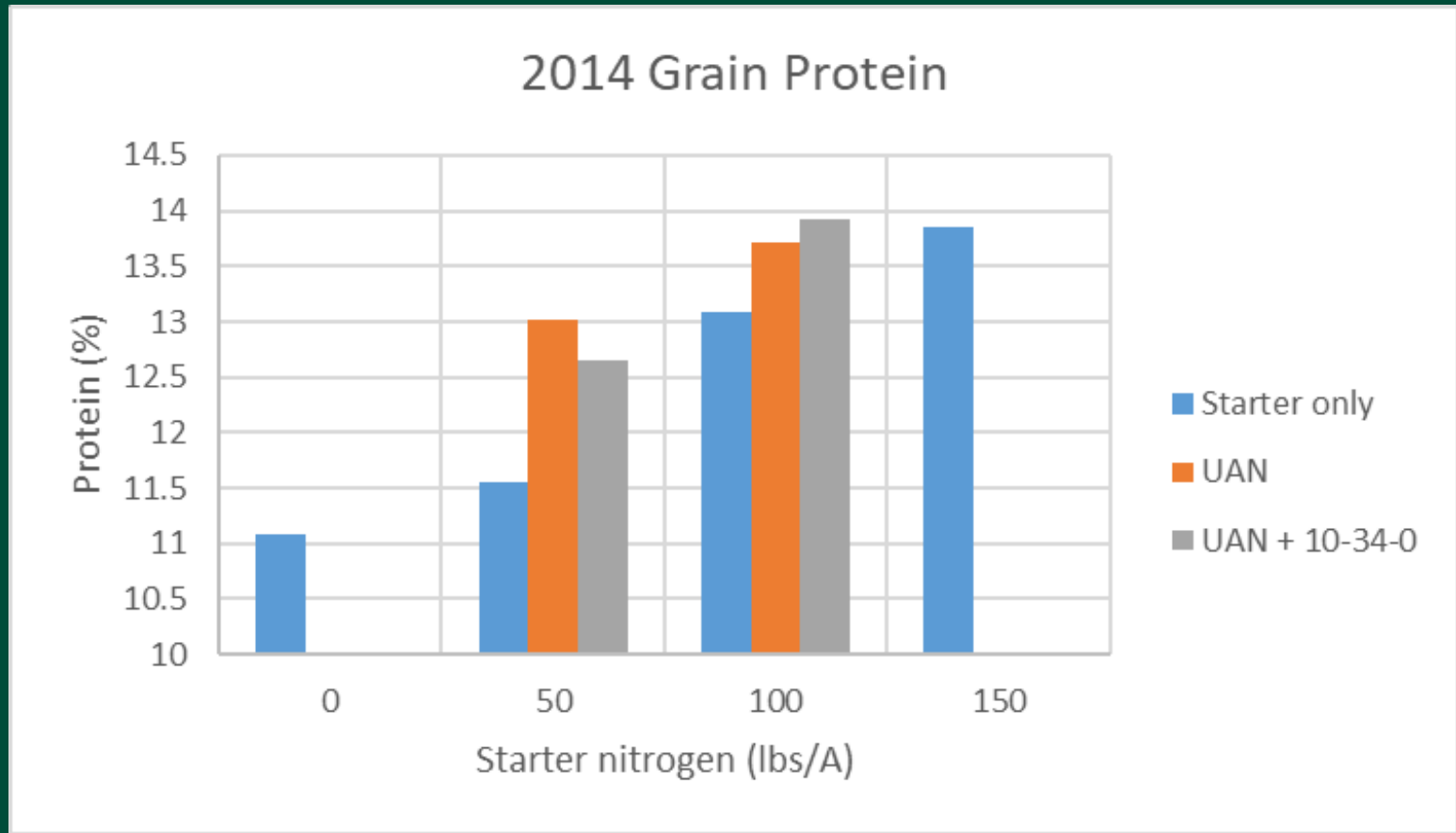


Notable trials

Post anthesis application of N to wheat heads

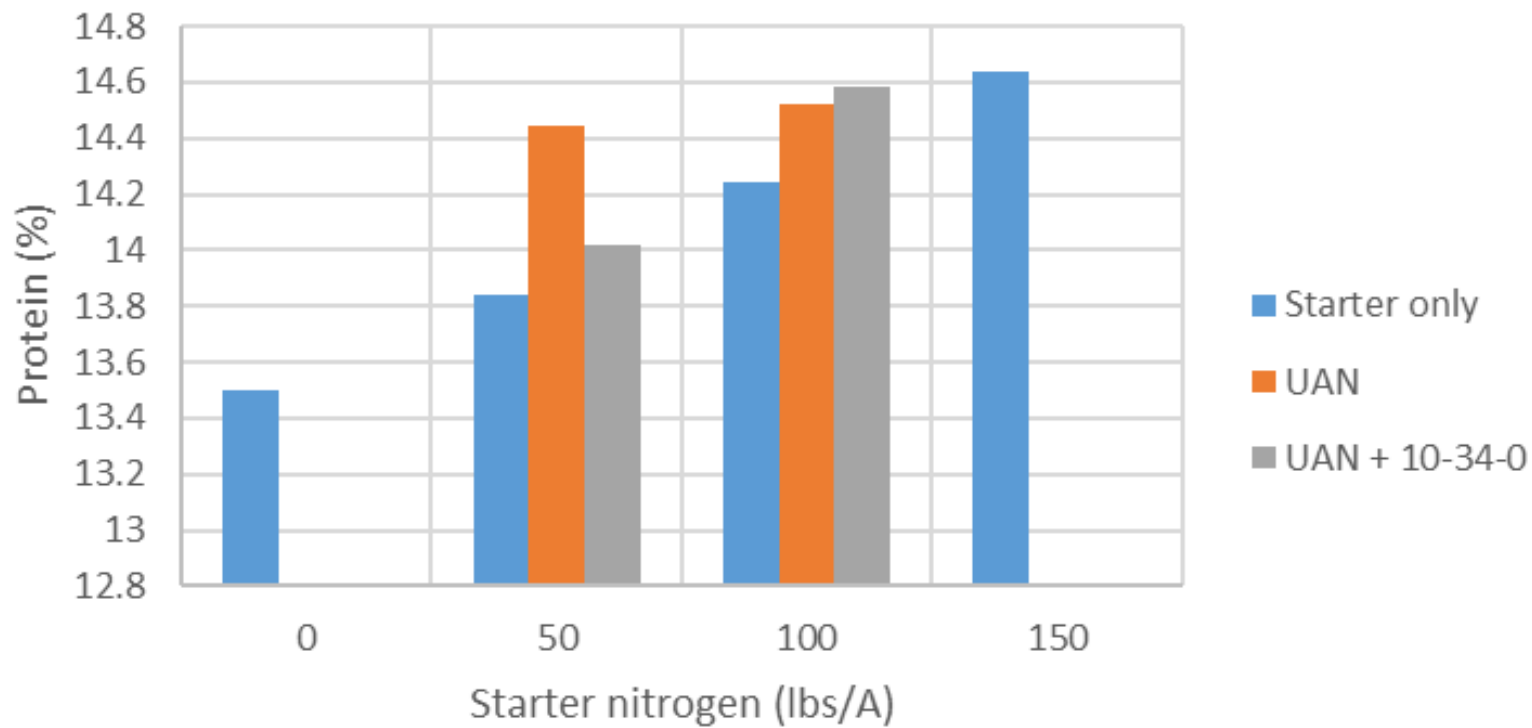
- Research at the CREC between 1988 and 1991 by Greg Endres and Blaine Schatz
- Continued by Blaine Schatz in 2012
- Continued by Jasper Teboh in 2014, 2015 and 2017

Post anthesis application of N 2014



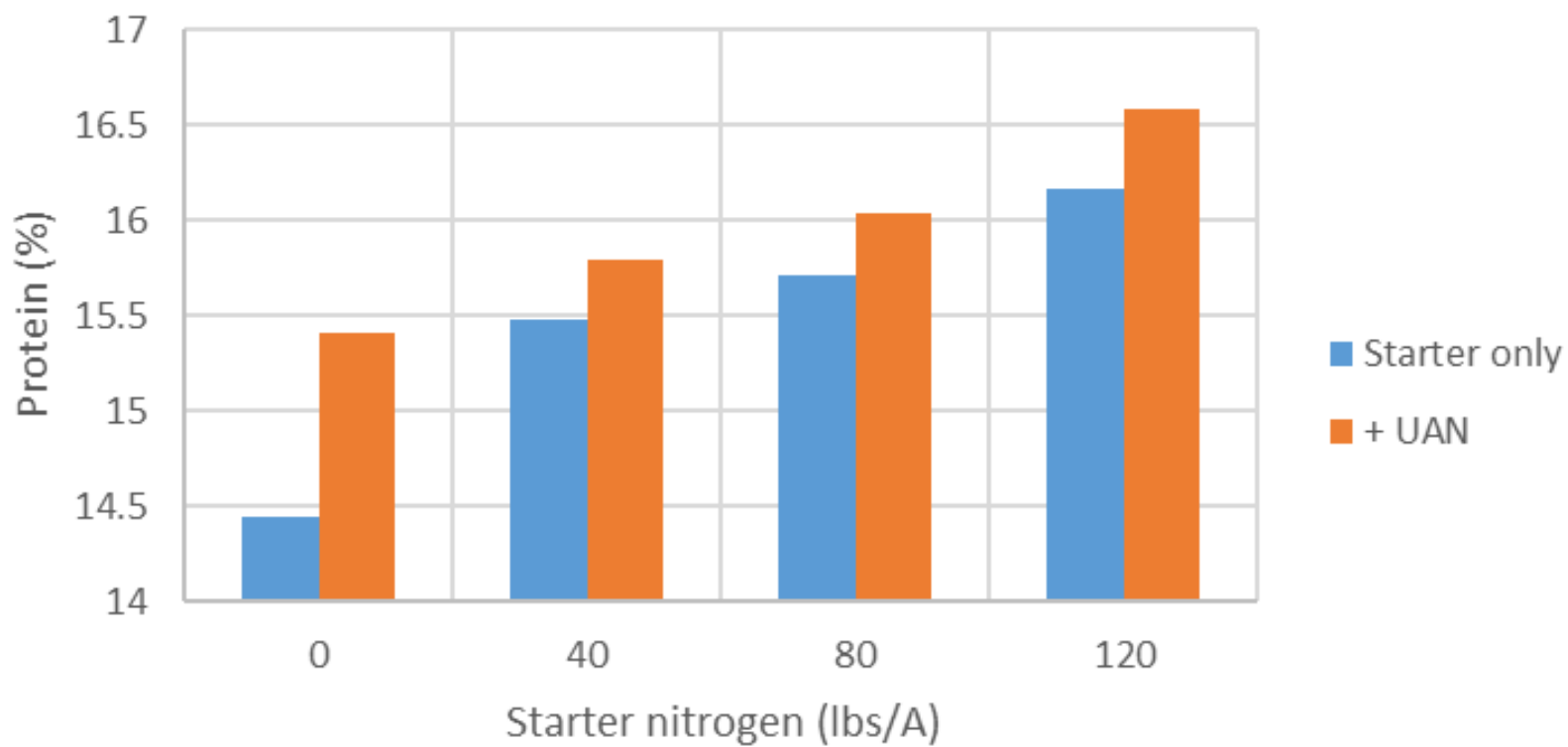
2015

2015 Grain Protein



2017

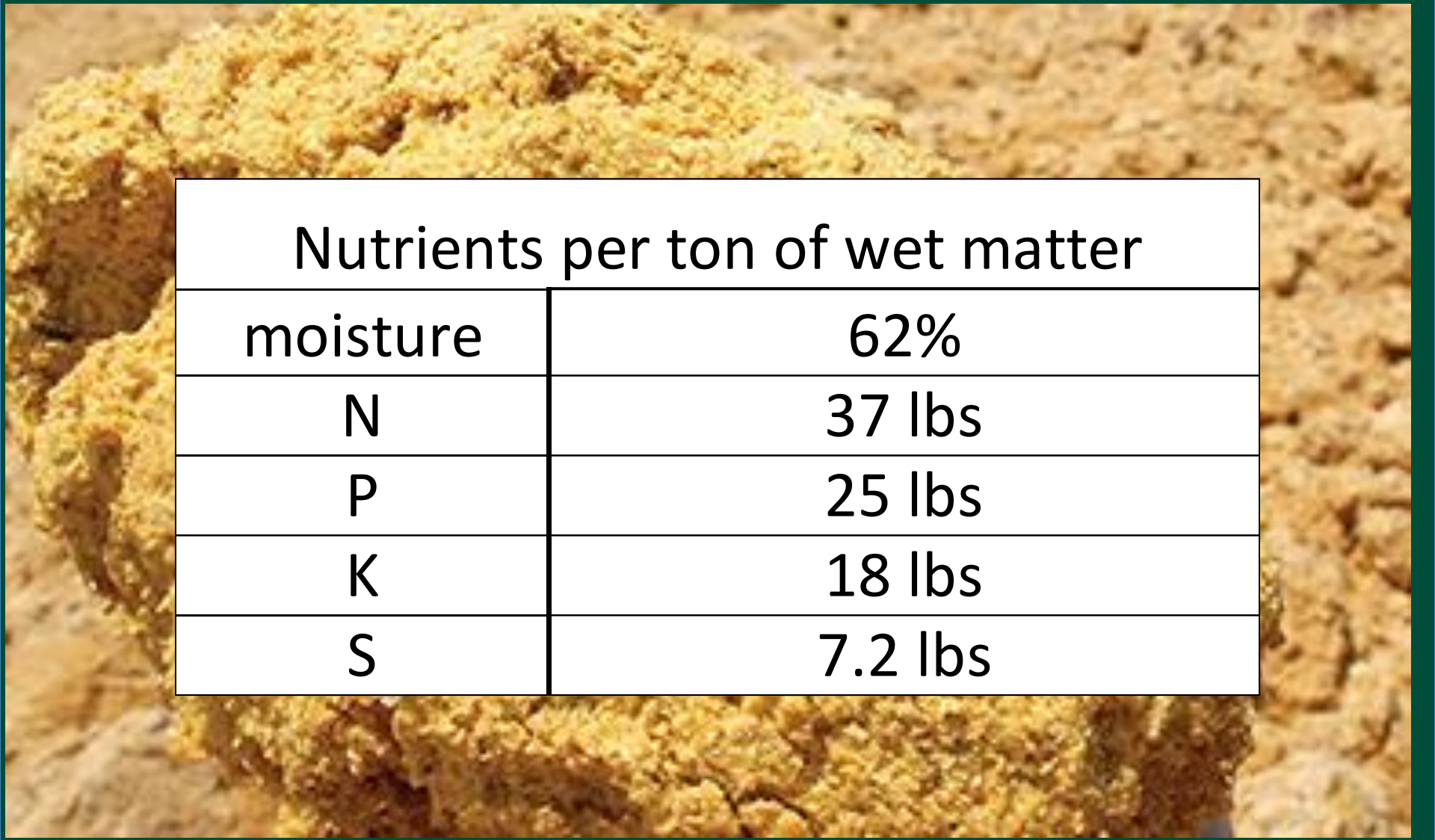
2017 Grain protein



Summary

- Post anthesis application of UAN raised wheat grain protein every year
- 10-34-0 was comparable but not superior to UAN

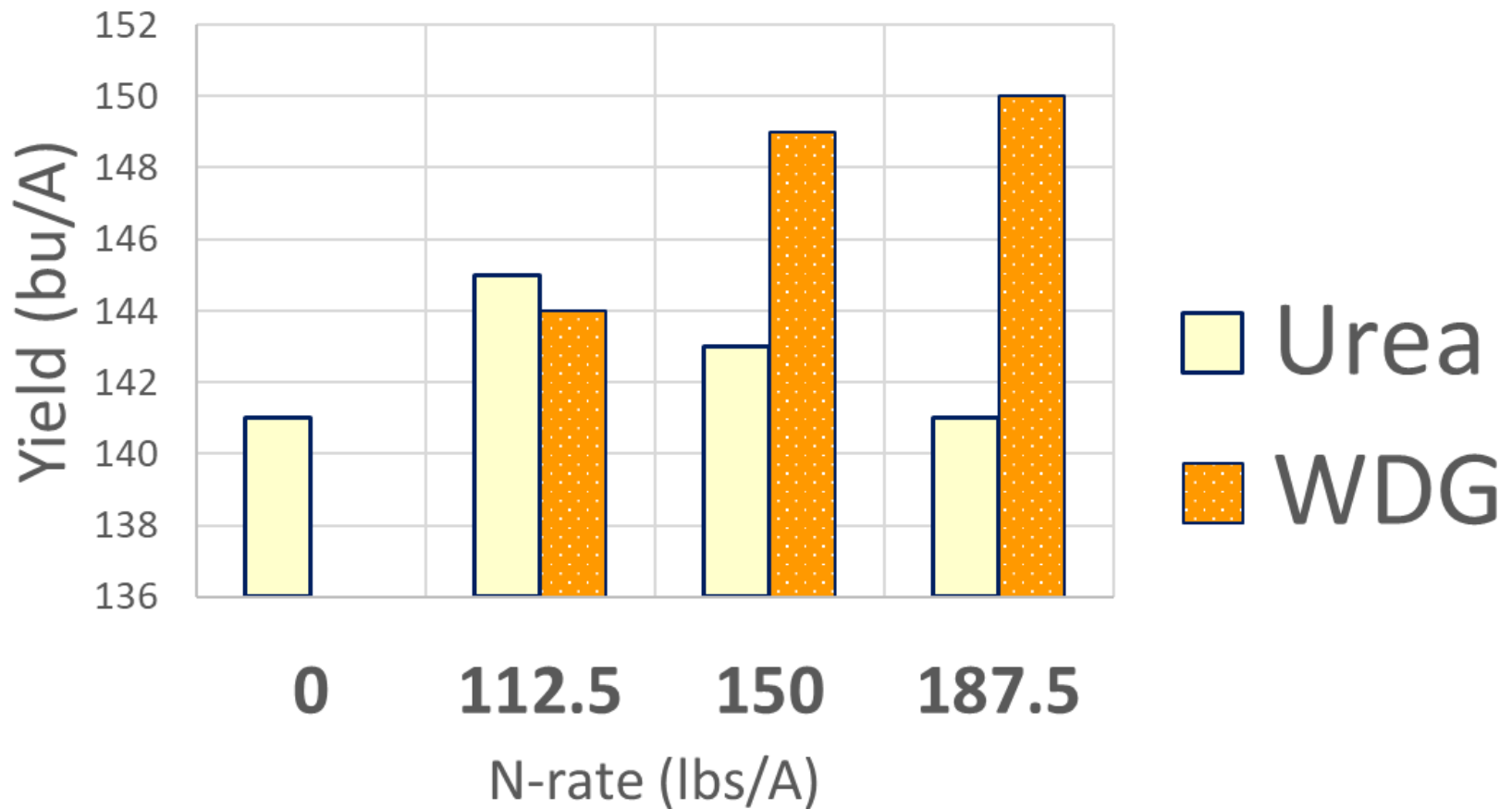
Distillers grains



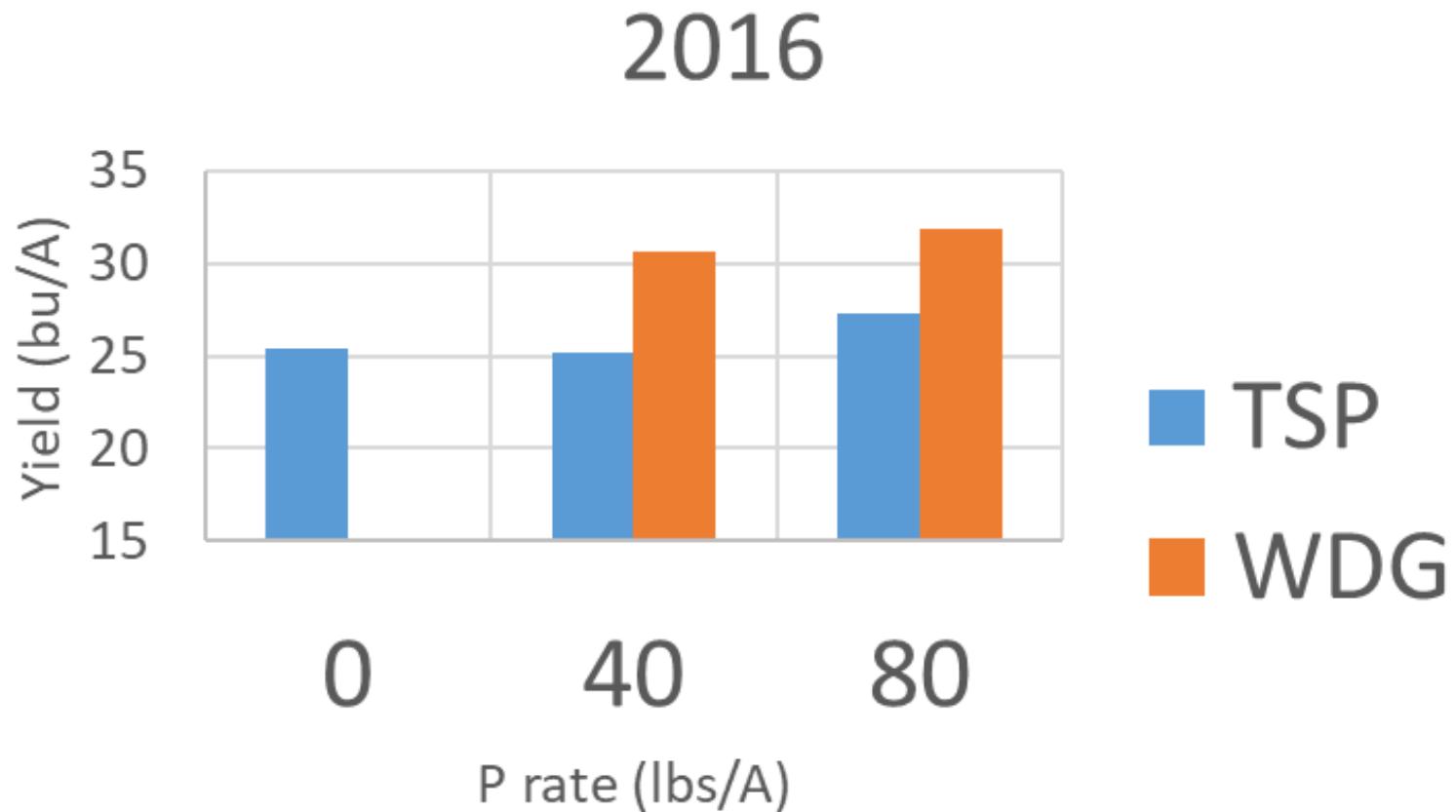
Nutrients per ton of wet matter

moisture	62%
N	37 lbs
P	25 lbs
K	18 lbs
S	7.2 lbs

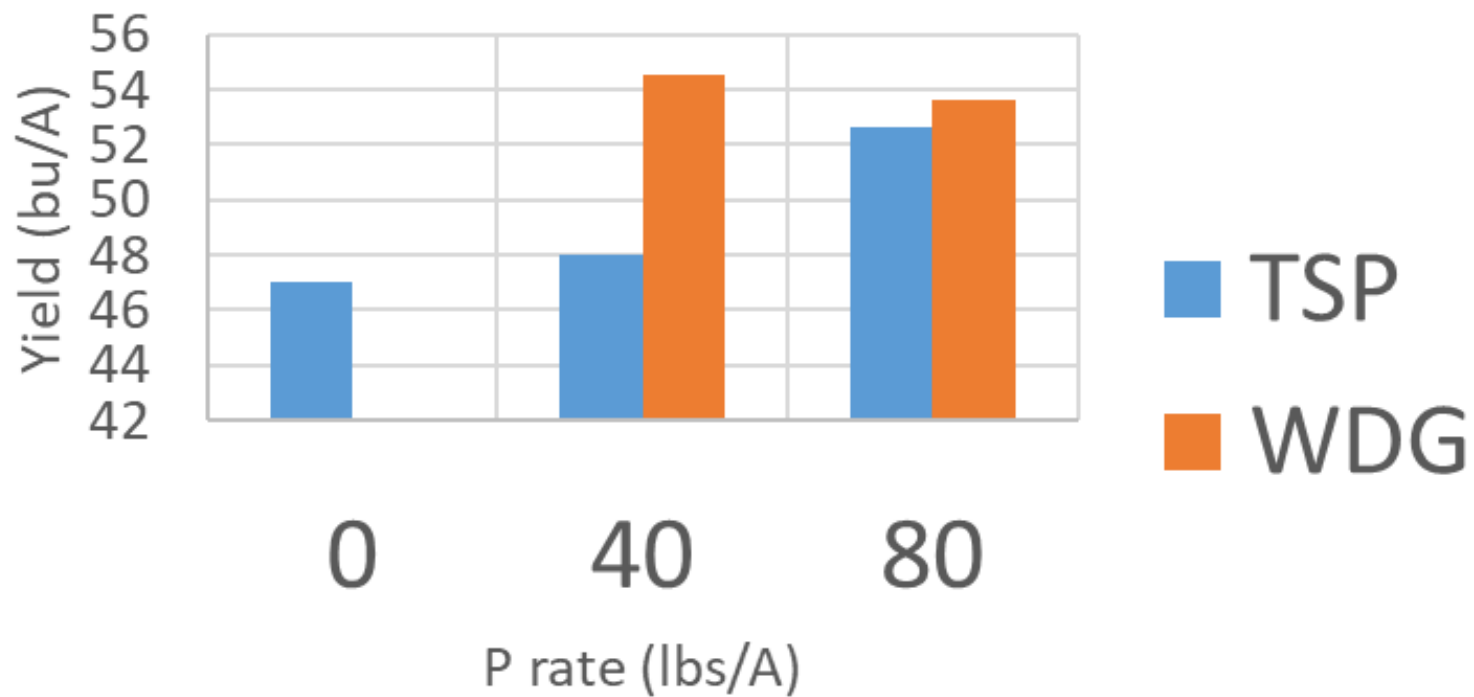
Distillers grain as a nitrogen source for corn



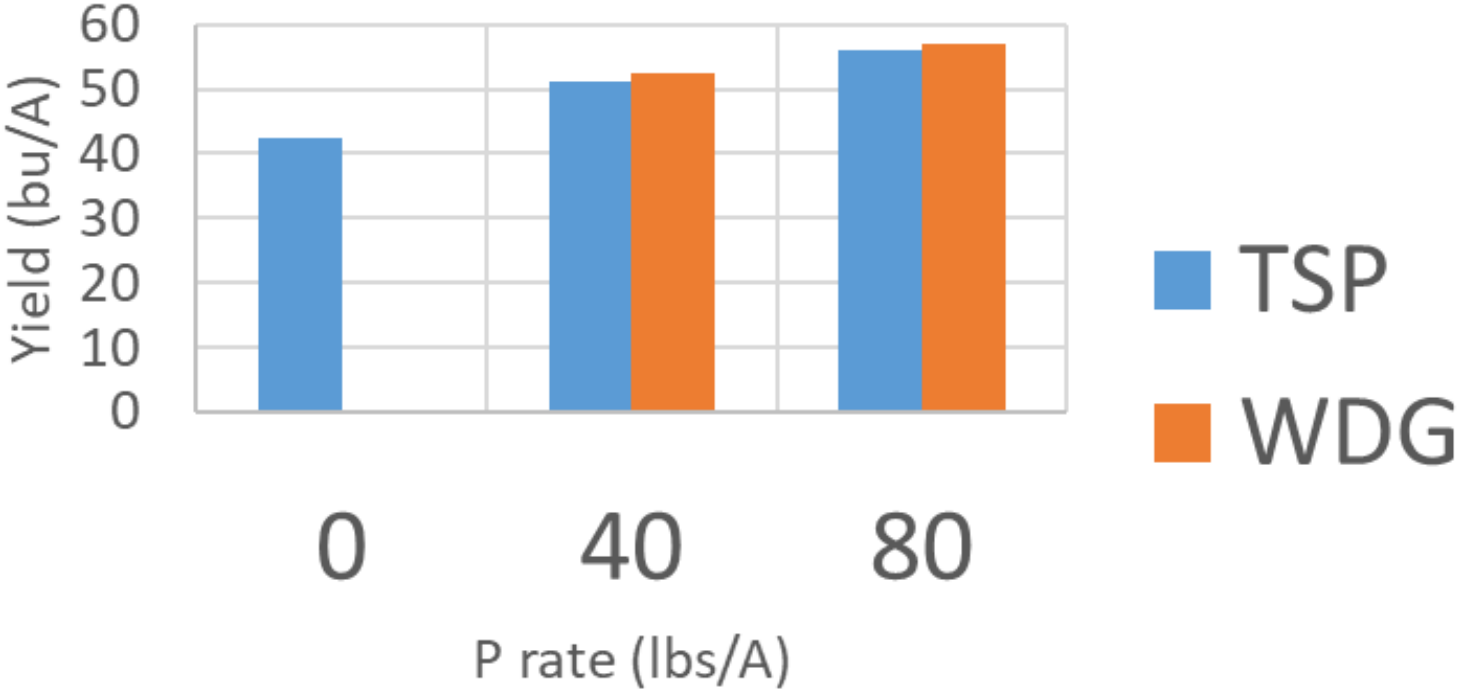
WDG for wheat as a phosphorus source



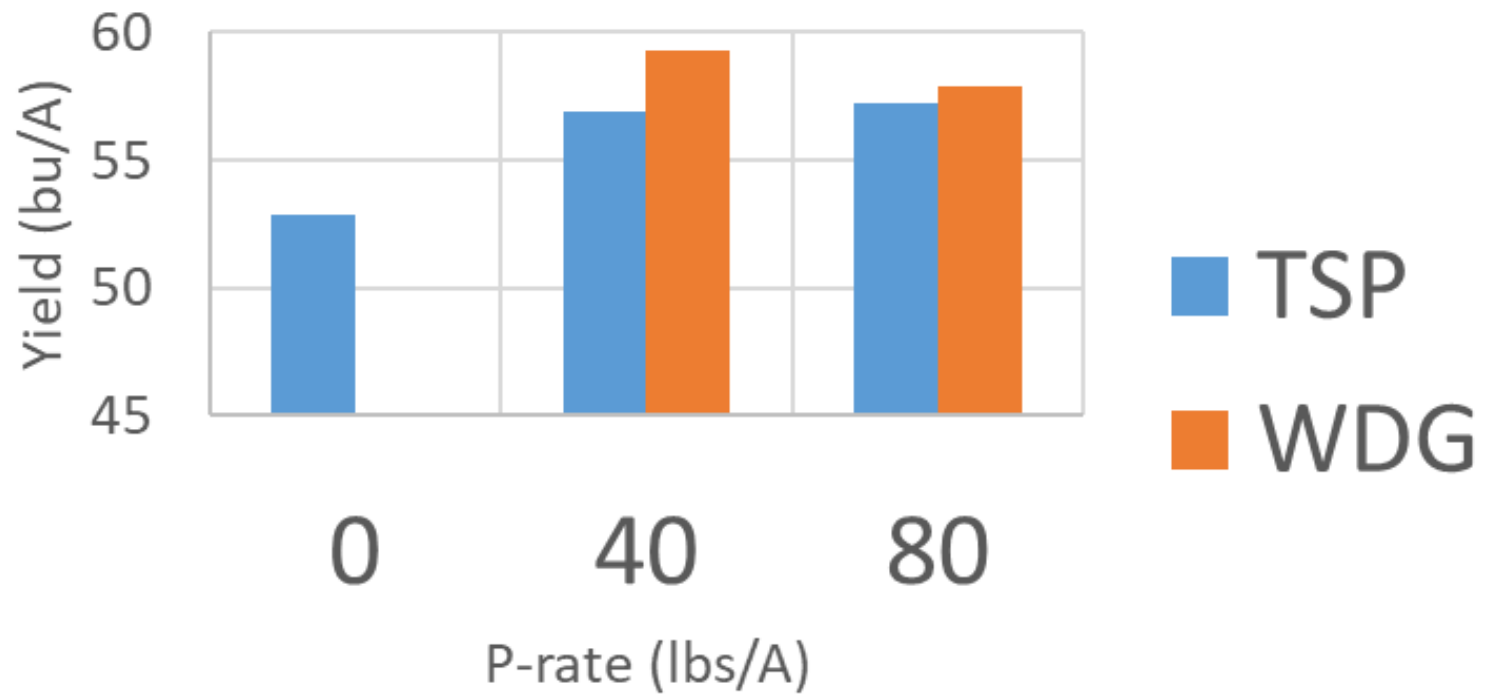
2017



2018



2019



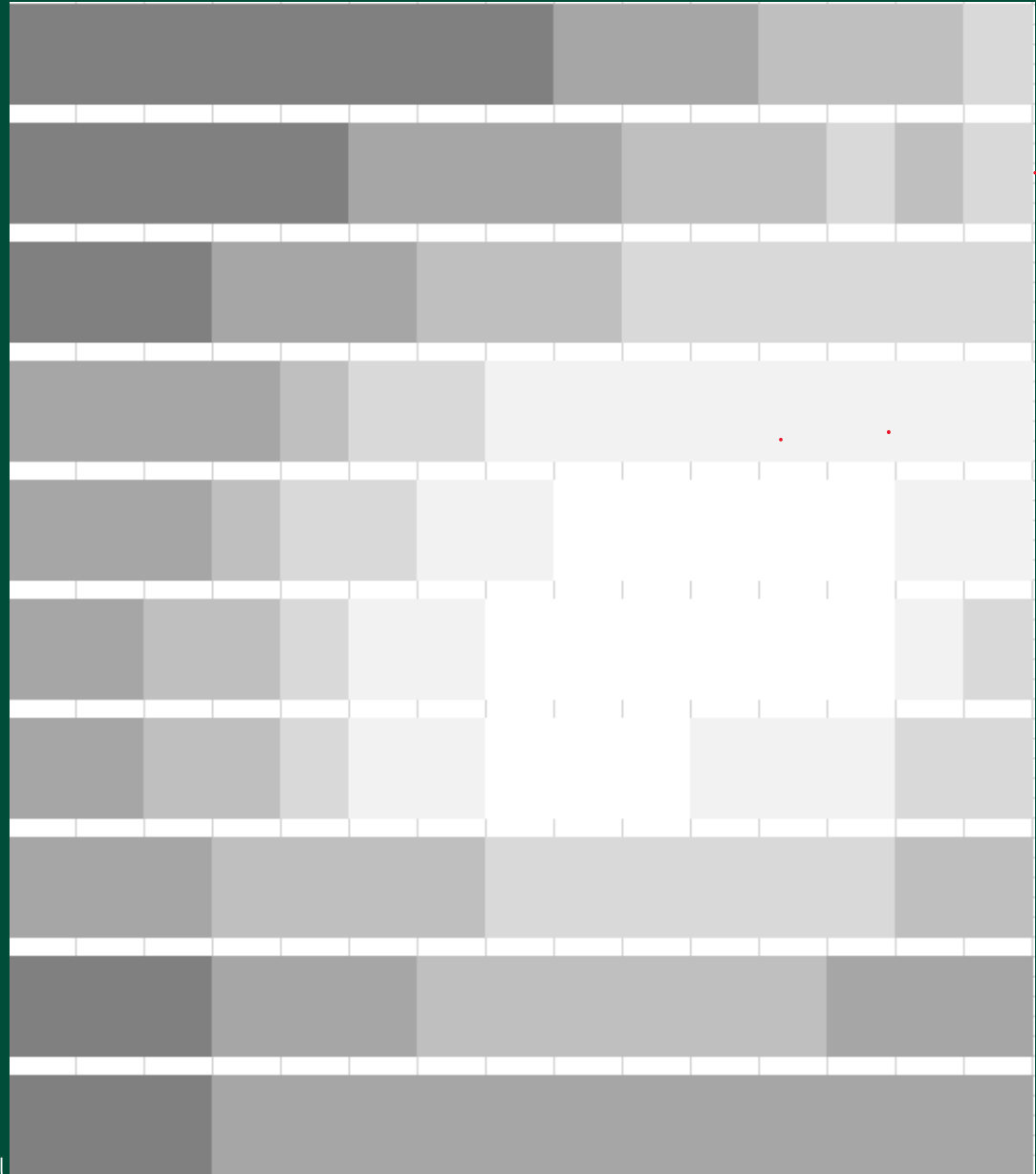
Summary

- Distillers grains is comparable or better as a Nitrogen source than urea
- It is comparable or better as Phosphorus source than triple super phosphate

Barley yield and quality on a soil gradient



- Soil map based on micro-elevation
- Difference: less than 3 ft



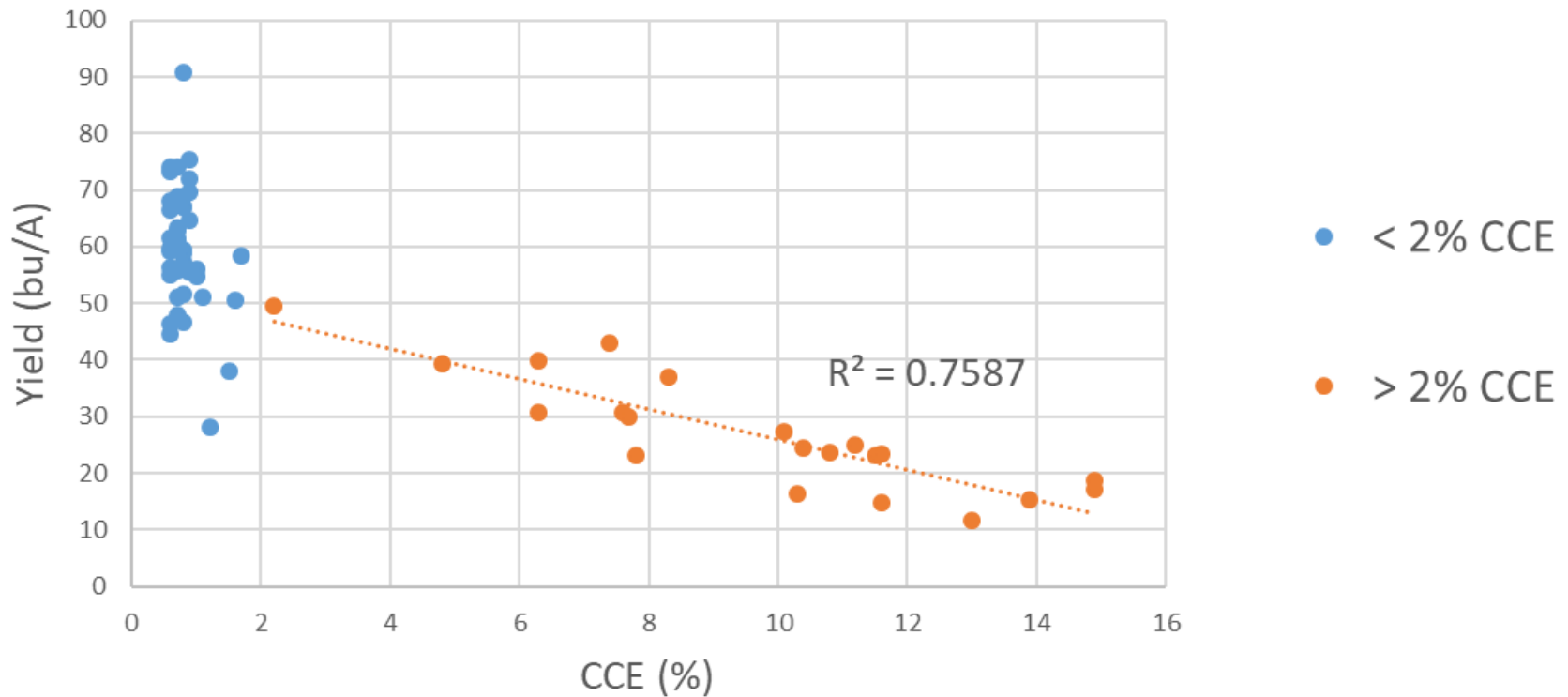
3.5 O.M.,
6.4 pH
0.8 CCE

1.1 O.M.,
8.5 pH
11.1 CCE



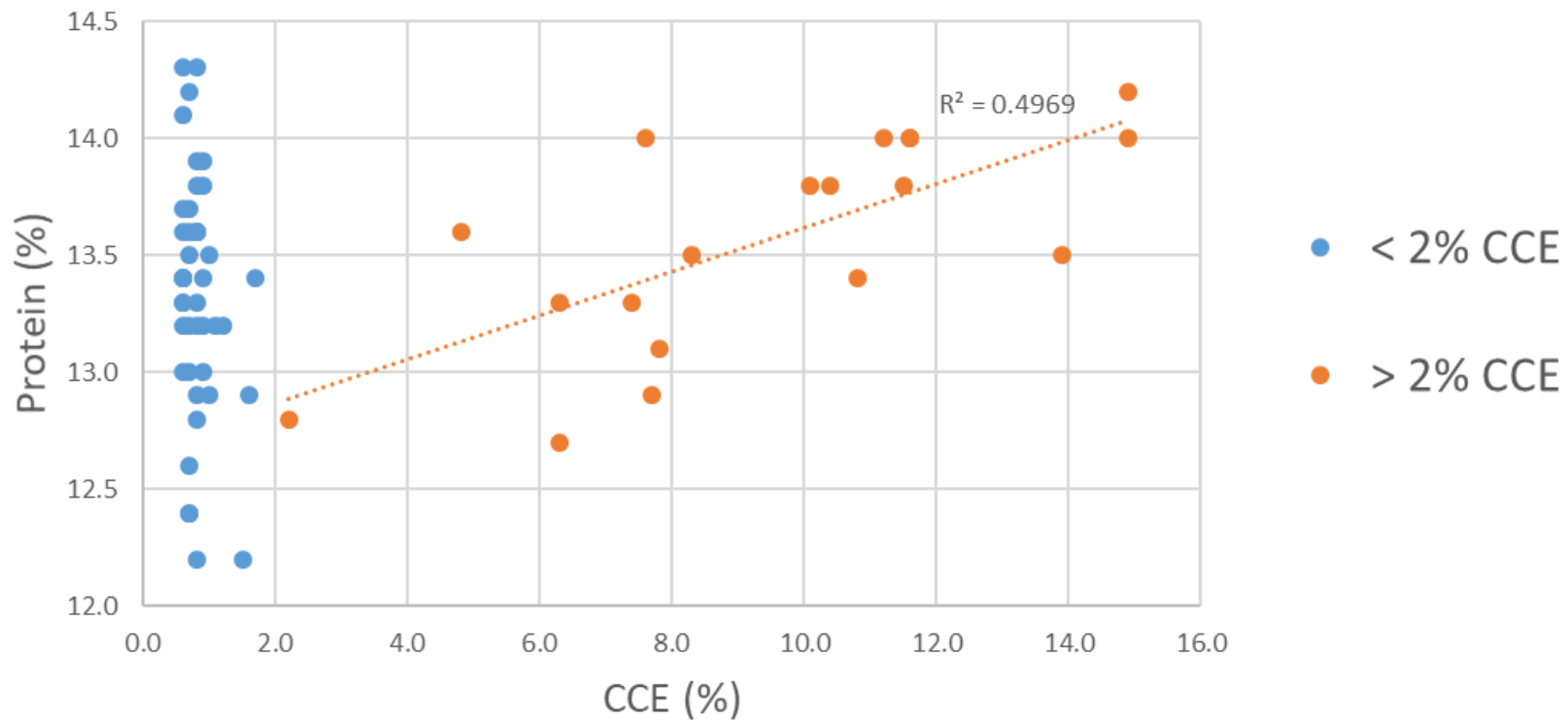
Barley gradient

Grain yield by soil CCE (2018)



Barley gradient

Grain protein by soil CCE (2018)



Rye crop water use

How much water does my rye cover crop use?

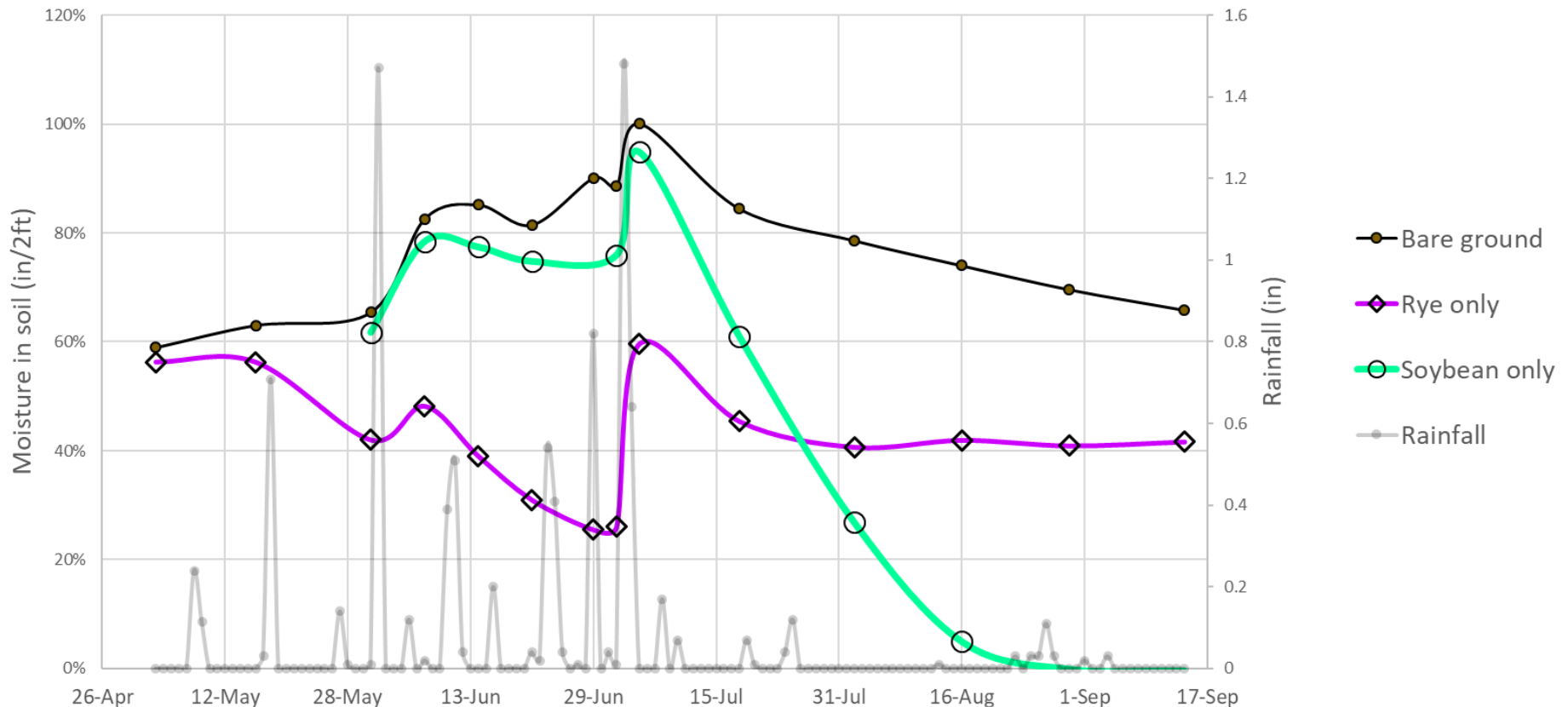
When does rye use the most water?

How long can I let the rye grow before soybean?



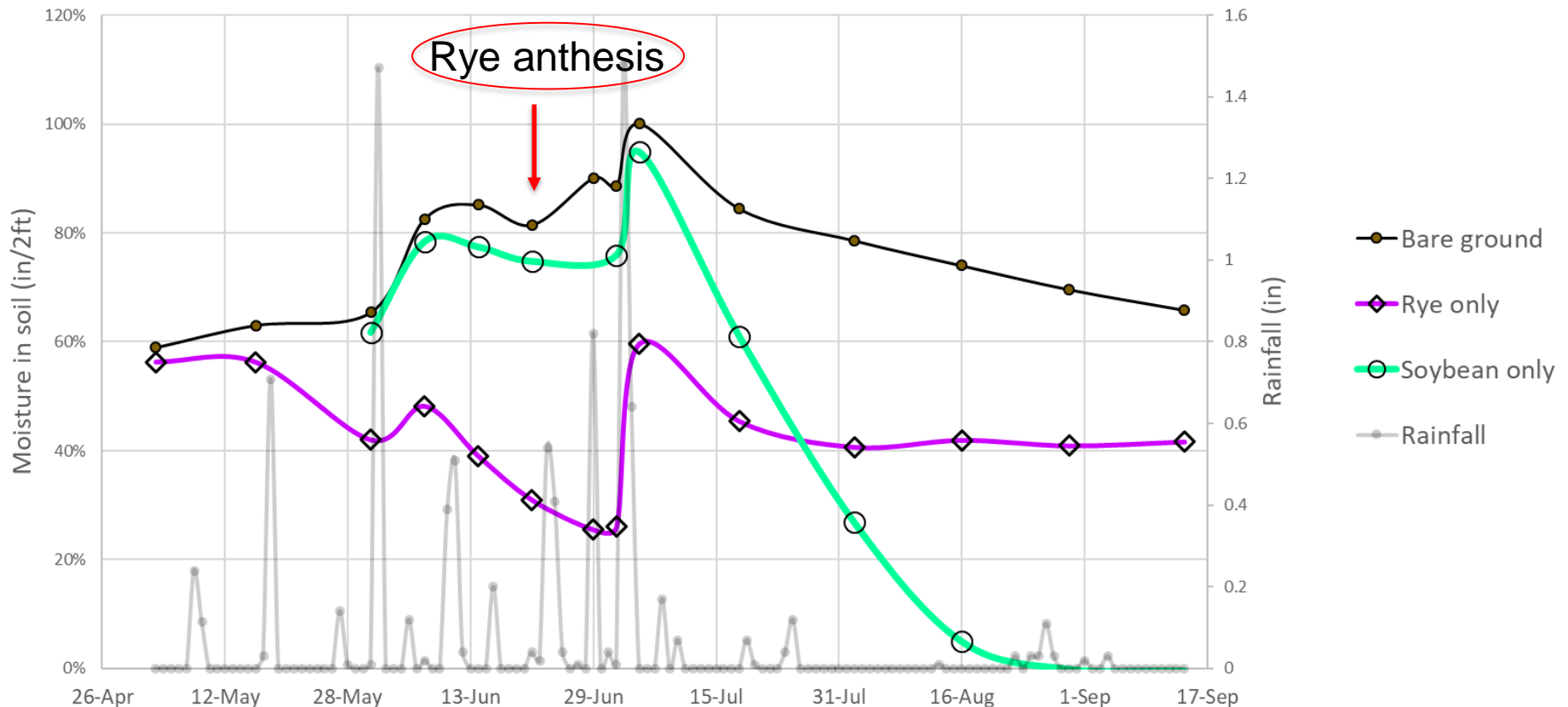
Rye crop water use

Soil moisture status comparison of bare ground, rye and soybean planted areas



Rye crop water use

Soil moisture status comparison of bare ground, rye and soybean planted areas



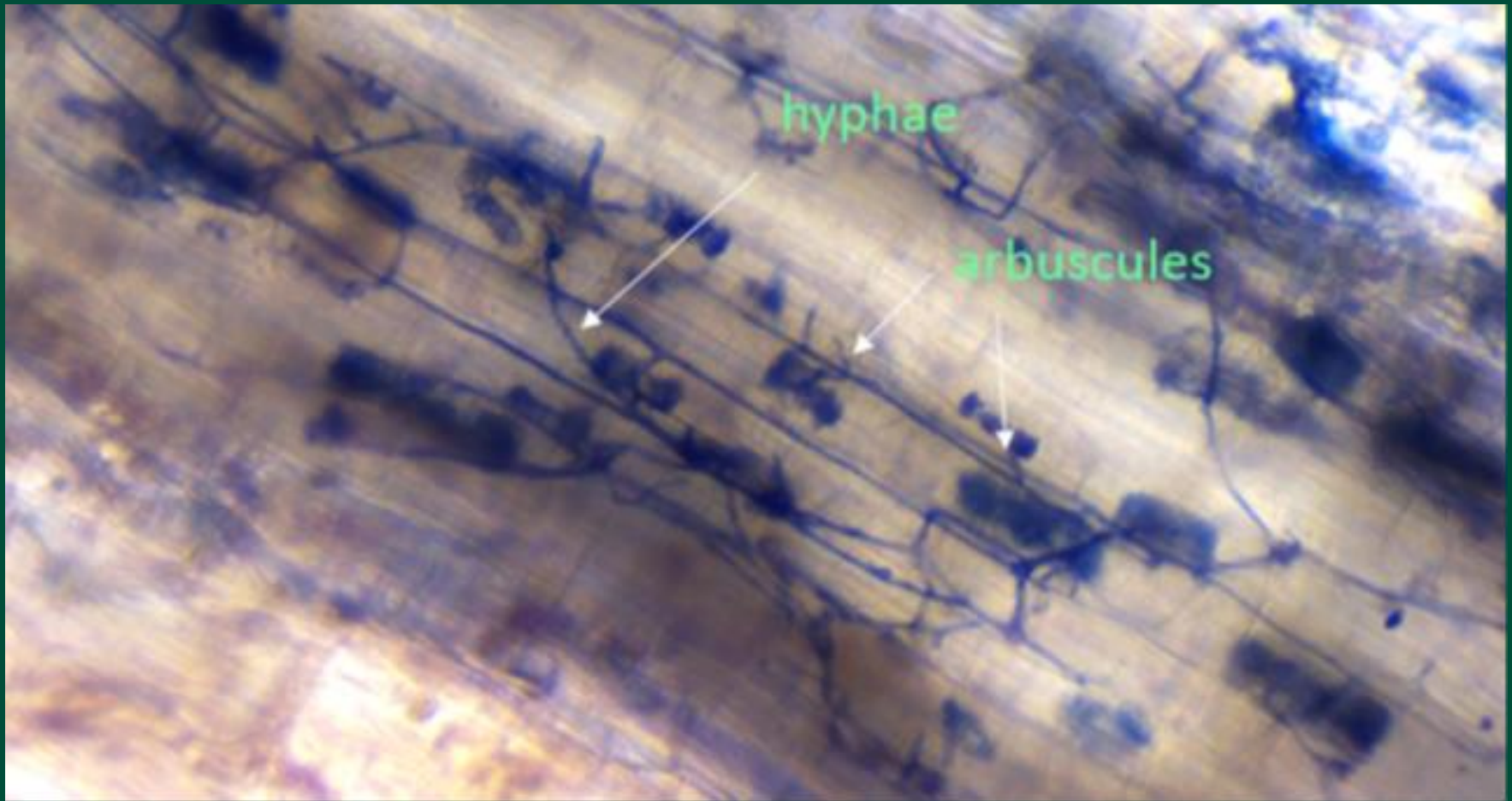
Summary

- Rye crop water use is 2 to 4 inches
- Rye can be allowed to grow up until planting without yield penalty

Recent and current projects

Mycorrhizal depletion of corn





Trial with biologicals

- Envita
- Utrisha
- Locations:
 - Absaraka,
 - Prosper,
 - Oakes
 - Carrington

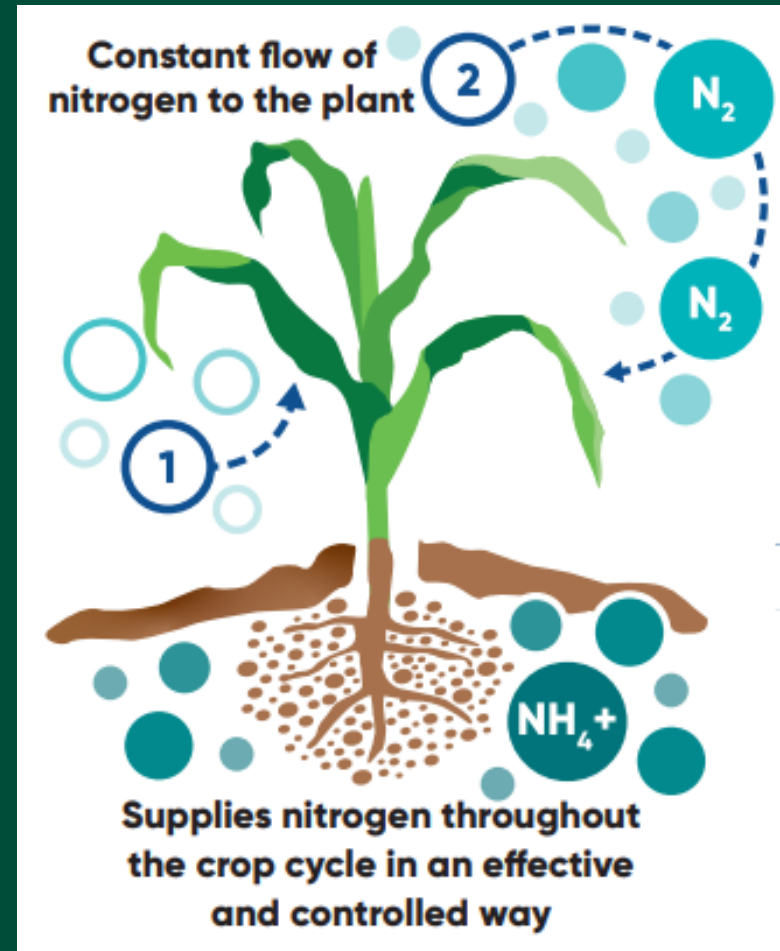
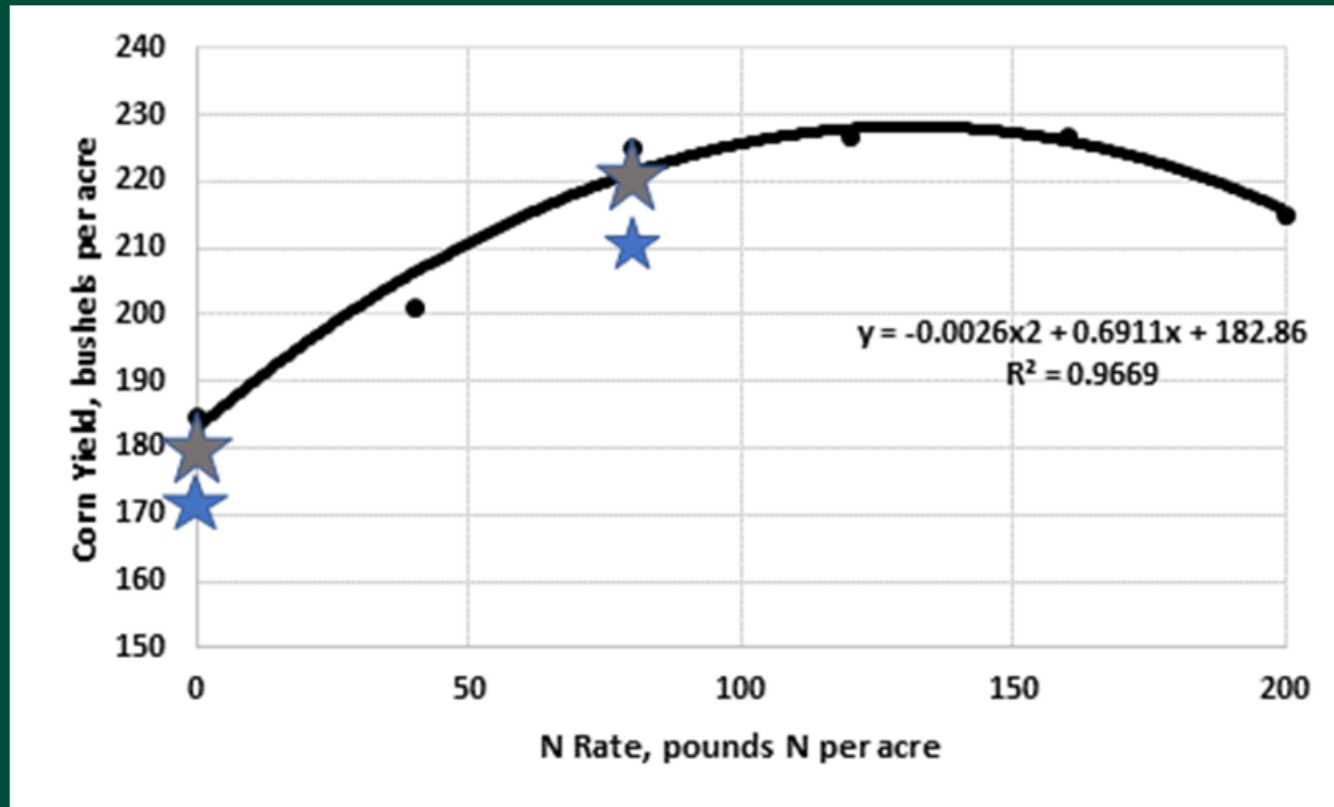


Image Source: Corteva Agriscience

Carrington



Utrisha N



Envita

Source: presentation by Dr. Dave Franzen – “What an Ag-Professional should know about the effectiveness and consistency of biologicals in aiding N nutrition of corn”

Summer 2023

Insect frass



Soybean hulls



Summer 2023

- More trials with Envita and Utrisha
- Nitrogen rate trial on the no-till field
- Cover crop trial on the CCE gradient
- Lupin phosphorus rate trial
- Soybean phosphorus rates- statewide update
- Canola fertility trials continued
- And more...

Who will be the next CREC Soil Scientist?



Seminar tomorrow at 10!

Thanks!