

Soil fertility questions from growers for the 2021 season

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K-State Crop Talk Series
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Questions/topics for today

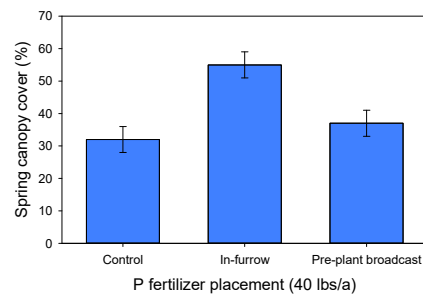
- P fertilizer placement for wheat w/seed
- Fertilizer placement for corn
- Strip-till and fertilizer placement
- The role of inhibitors for N in NW KS
- Grain protein and time for N in wheat
- Micronutrients and P sources?

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Wheat canopy cover at spring green-up with P placement 40 lbs/a

Average of 3 locations:
Soil test P values= 18, 5 and 12 ppm



In-furrow

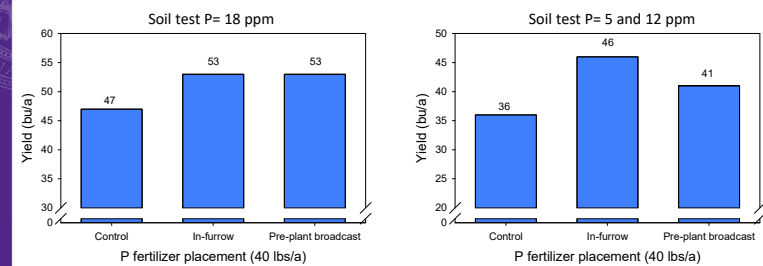
Control

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Gardner and Ruiz Diaz, 2020

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Wheat yield response with P placement 40 lbs/a

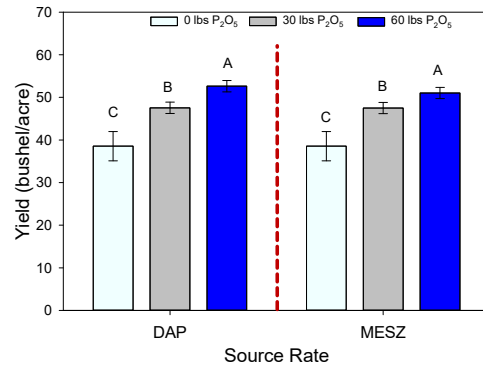


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Gardner and Ruiz Diaz, 2020

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Phosphorus rates-source with the seed



Phosphorus fertilizer placement for wheat

- Increased early growth with in-furrow
- Yield advantage with in-furrow for low soil test P
 - Similar yield when soil test P is close to optimum
- Late planting: show better response with in-furrow

Fertilizer placement with the planter in corn

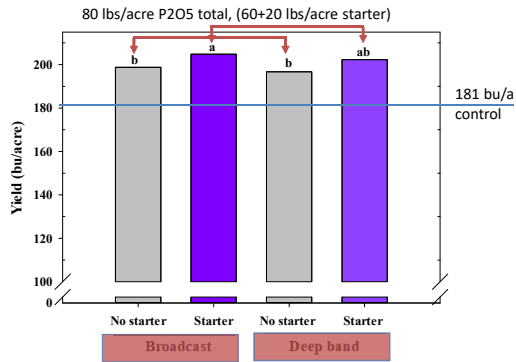
2 x 2	Dribbled	In-furrow
<ul style="list-style-type: none"> • High volumes (and N) • Corn response 	<ul style="list-style-type: none"> • High volumes (and N) • No need for 2x2 attachment • Similar corn response as 2x2 	<ul style="list-style-type: none"> • Best for low volumes • No need for 2x2 attachment

Starter N + K₂O with the seed in medium- fine texture soil – no urea

Row Spacing (in)	N + K ₂ O (lbs/acre)
30	8
20	12
15	16
12	20
10	24
6-8	30

No UAN or ATS

Corn response to P placement with the strip-till



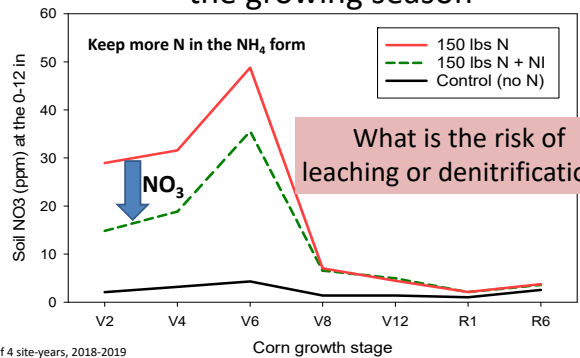
Average of 10 years

Starter fertilizer for corn

- Can be more beneficial under no-till
- In addition to P can add micros and sulfur if needed
- Dribble and 2x2 allow for higher rates, including nitrogen

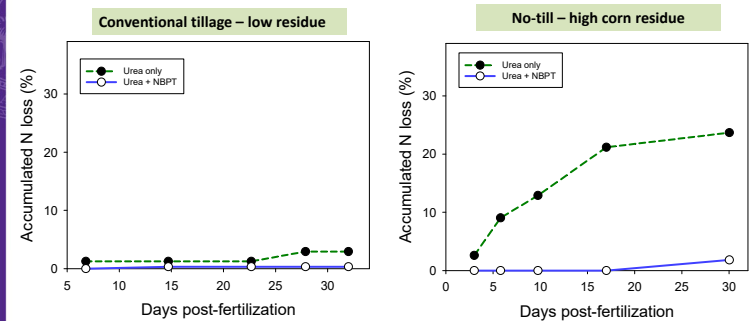
Inhibitors for nitrogen?

Soil NO₃ with nitrification inhibitor (N-serve) during the growing season



Average of 4 site-years, 2018-2019

Urea volatilization in no-till and the use of urease inhibitors (NBPT)



Perin, Ruiz Diaz, et al, Agron Journal 2020

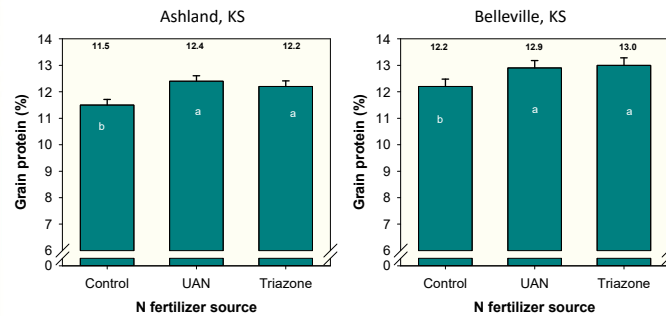
Source and placement of N in no-till dryland corn

N Source	Placement	Yield Bu/a
Ammonia	Knifed	139
UAN	Knifed	136
UAN	Bdcst	118
Urea	Bdcst	123

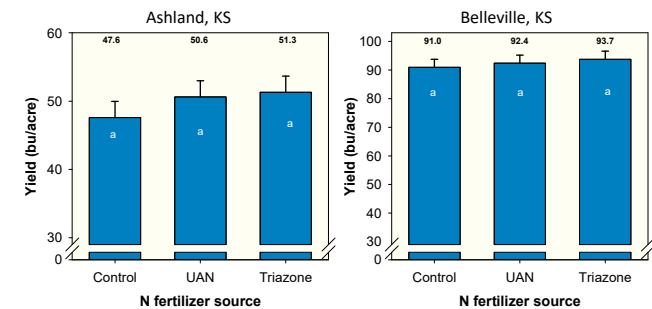
Inhibitors for nitrogen?

- What is the risk for leaching or denitrification in our soils in the NW?
- Urea on the surface in no-till may benefit from urease inhibitors:
 - Urea can also be incorporated with irrigation or rain
- Nitrogen placement, time and source are key factors

Late nitrogen with the fungicide in wheat: protein



Late nitrogen with the fungicide in wheat: yield



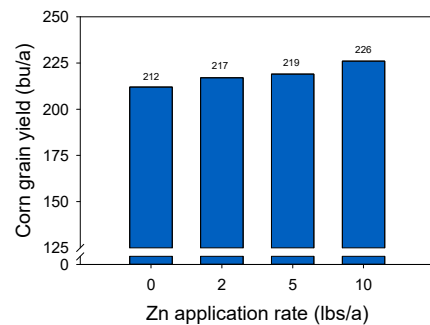
Grain protein and time for N in wheat

- First step is to meet N demands for the yield potential (soil + fertilizer N)
- Time: Split-applications and late N applications contribute with protein:
 - In many cases no additional yield response
- More intensive management for high yields AND high protein

Micronutrient application as part of your program?

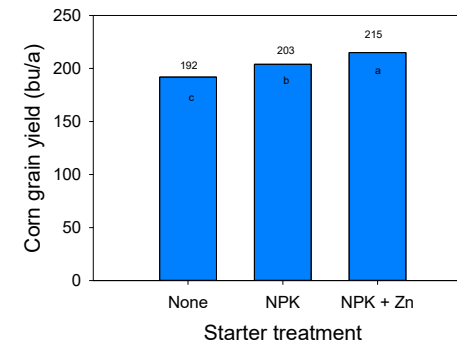
Zinc
Iron
Chloride
Other (Cu, B, Mn)
None

Zinc broadcast/incorporated in corn: low soil test Zn



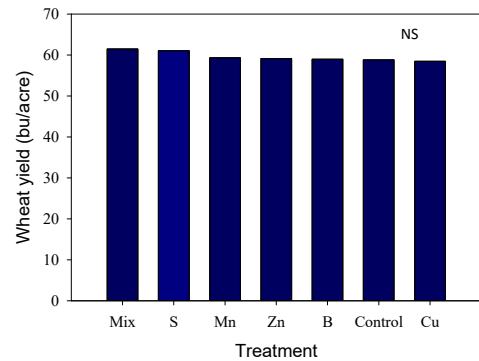
Soil Test Zn=0.3 ppm

Starter applications in corn: responsive site



Soil test critical value=
1 ppm

Micronutrients in wheat across 8 locations



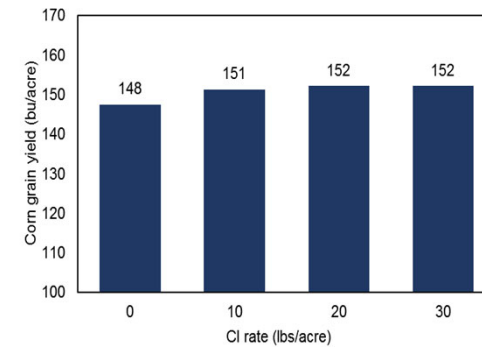
One important micro for wheat is chloride

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Mix-Cu= 3 bu/acre

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Chloride for dryland corn ?



Soil test critical value: 6 ppm

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Micronutrients

- Potential yield benefit for: Zinc, iron and chloride
- Foliar applications for most micros show very limited yield benefit
- What other main factors are limiting yields?

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P fertilizer source: Hydrolysis of polyphosphate to orthophosphate

Soil temperature (F)	24 hour Polyphosphate Hydrolysis (%)
41	30-40
68	50-60
95	80-90

Chang and Racz, 1977

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P fertilizer sources: liquid or dry?

- Agronomic response in Kansas soils is similar for all P sources
 - Key factors are soil test P levels, and fertilizer placement
- The amount of water in a fluid fertilizer is insignificant compared to the water already present in the soils
- The selection of P source should be based on adaptation to the farmer's operation and economics

Questions?



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