



Evaluation of the Interaction between Potassium and Nitrogen in Corn

Nutifafa Adotey, Robert Florence, Angela McClure, Ryan Blair, Forbes Walker, Sindhu Jagadamma

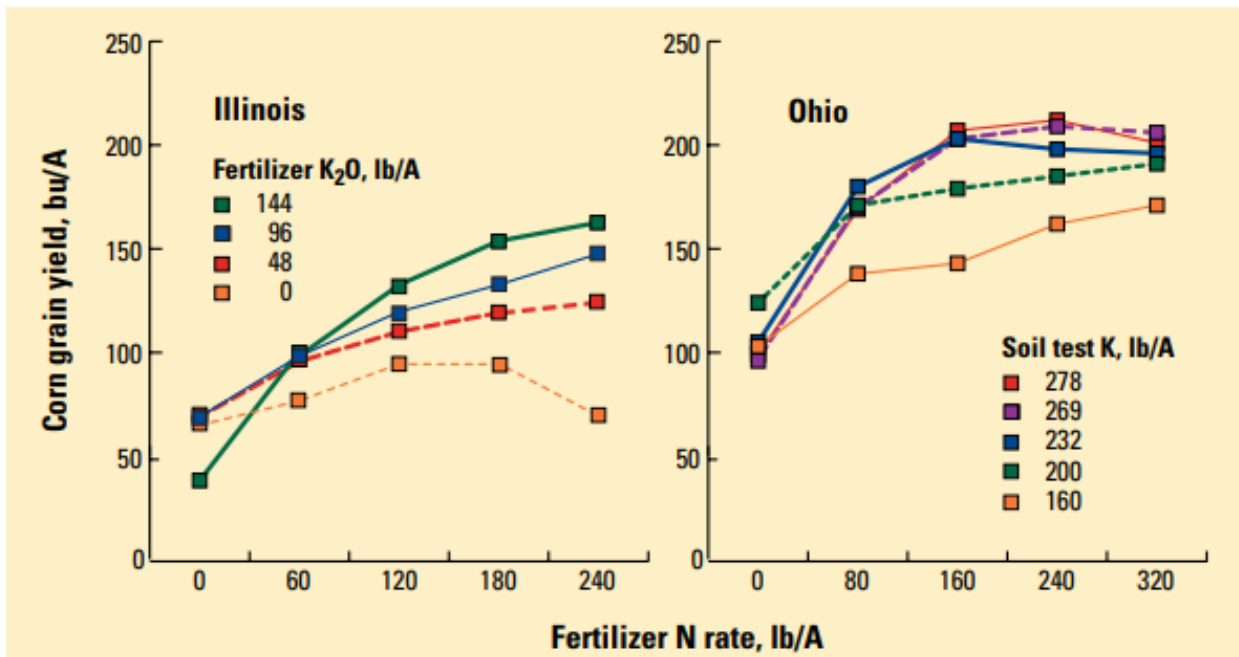
Potassium Fertilizer Recommendation

❖ UT fertilizer recommendations are based on soil test

| Yield potential (bu./ acre) | Soil Test Potassium index (lb K/ acre) | | | |
|-----------------------------|-------------------------------------------------------------------|----------------------|---------------------|---------------------|
| | Low (0 – 90) | Medium (91 – 160) | High (161 – 319) | Very High (≥320) |
| | K ₂ O equivalent fertilizer recommendation (lb / acre) | | | |
| 100 – 125 | 100 | 50 | 0 | 0 |
| 126 – 150 | 120 | 60 | 0 | 0 |
| 151 – 175 | 140 | 70 | 0 | 0 |
| 176 – 200 | 160 | 80 | 0 | 0 |
| 201 – 225 | 180 | 90 | 0 | 0 |

Nitrogen and K interactions

- ❖ “Crops respond to higher K levels when N is sufficient, and greater yield response to N fertilizer occurs when K is sufficient” - *International Plant Nutrition Institute*



Better Crops
Vol 82(3): 12 -13

Justification and objective

❖ Justification

- Current N management is to split apply a third of recommended N at planting and sidedress the remaining N
- Yield response to pre-tassel N fertilizer
- Will corn respond to higher K levels under pre-tassel N management

❖ Objectives

- Evaluate the interaction between potassium rates and nitrogen fertilizer timing on corn plant growth and yield

Trial, 2021

- ❖ **Location:** WTREC, Jackson, TN
- ❖ **Soil:** Loring silt loam
- ❖ **Design:** Split-plot
- ❖ **Main plot (N management)**
 - N1:Common practice: (67 – 157 Kg ha⁻¹)
 - N2, Modified practice: (45 - 112 - 67 Kg ha⁻¹)
- ❖ **Sub plot (K rate)**
 - 0, 44.8, 89.6, 134.4, 179.6 kg P₂O₅ ha⁻¹
- ❖ **Parameter:** Preplant soil test, Ear leaf tissue sampling; Yield

Results: Selected Soil Properties

| Depth | OM | pH | P | K | Ca | Mg |
|-------|--------------------|------------|---------------------|-------------|-------------|-------------|
| | g kg ⁻¹ | | mg kg ⁻¹ | | | |
| Mean | <u>19.8</u> | <u>6.3</u> | <u>46.2</u> | <u>44.9</u> | <u>985</u> | <u>68.7</u> |
| SD | 1.8 | 0.1 | 10.3 | 14.0 | 117 | 7.7 |
| SE | 0.3 | 0.0 | 1.6 | 2.2 | 18 | 1.2 |
| | | | | | | |
| Mean | | <u>6.6</u> | <u>40.7</u> | <u>48.6</u> | <u>1035</u> | <u>72.9</u> |
| SD | | 0.3 | 9.2 | 32.4 | 130 | 11.8 |
| SE | | 0.1 | 1.5 | 5.1 | 20 | 1.9 |

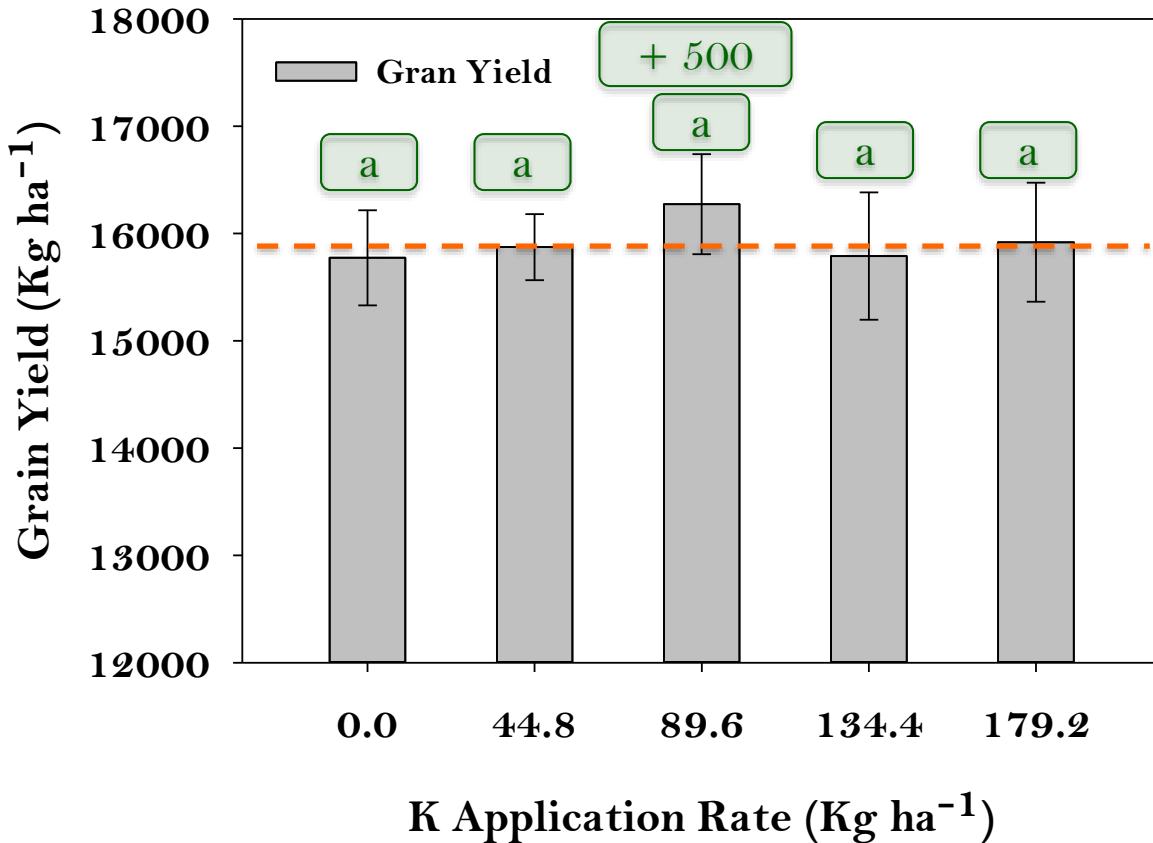
P, K, Ca, Mg - Mehlich 1 Extraction

SD, standard deviation; SE, standard error

Results: Ear Leaf N, P, K Concentrations

| Treatment | N | P | K |
|---------------------|--------------------------|-----|------|
| K rate | g kg⁻¹ | | |
| 0 | 29.8 | 2.9 | 16.8 |
| 44.8 | 32.3 | 2.9 | 15.8 |
| 89.6 | 30.7 | 2.7 | 17.9 |
| 134.4 | 29.4 | 2.8 | 17.5 |
| 179.2 | 31.1 | 2.7 | 19.5 |
| | | | |
| N management | | | |
| N1 | 30.7 | 2.8 | 17.1 |
| N2 | 30.7 | 2.8 | 17.8 |

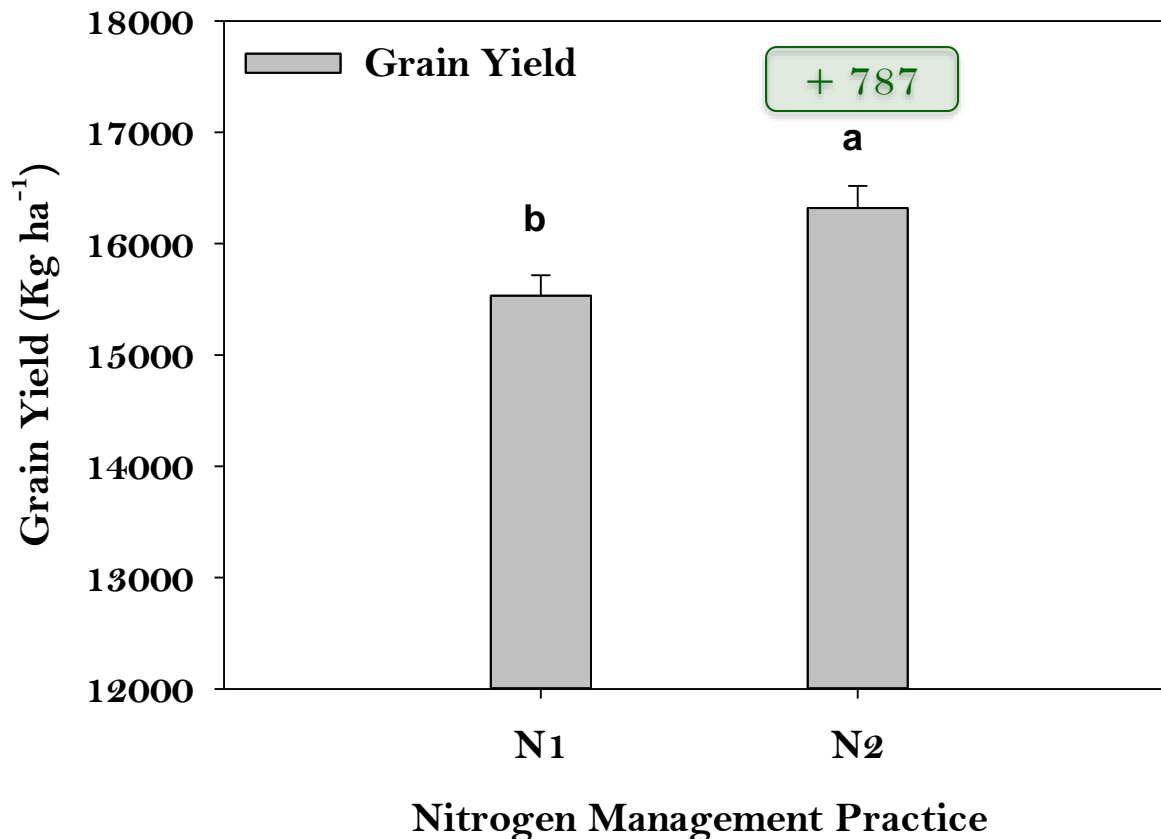
Results: Yield - Potassium Rates



The highest grain yield was observed at the 89.6 Kg ha⁻¹ rate (+500)

There was no significant difference in grain yield among rates ($P = 0.7981$)

Results: Yield - Nitrogen Management

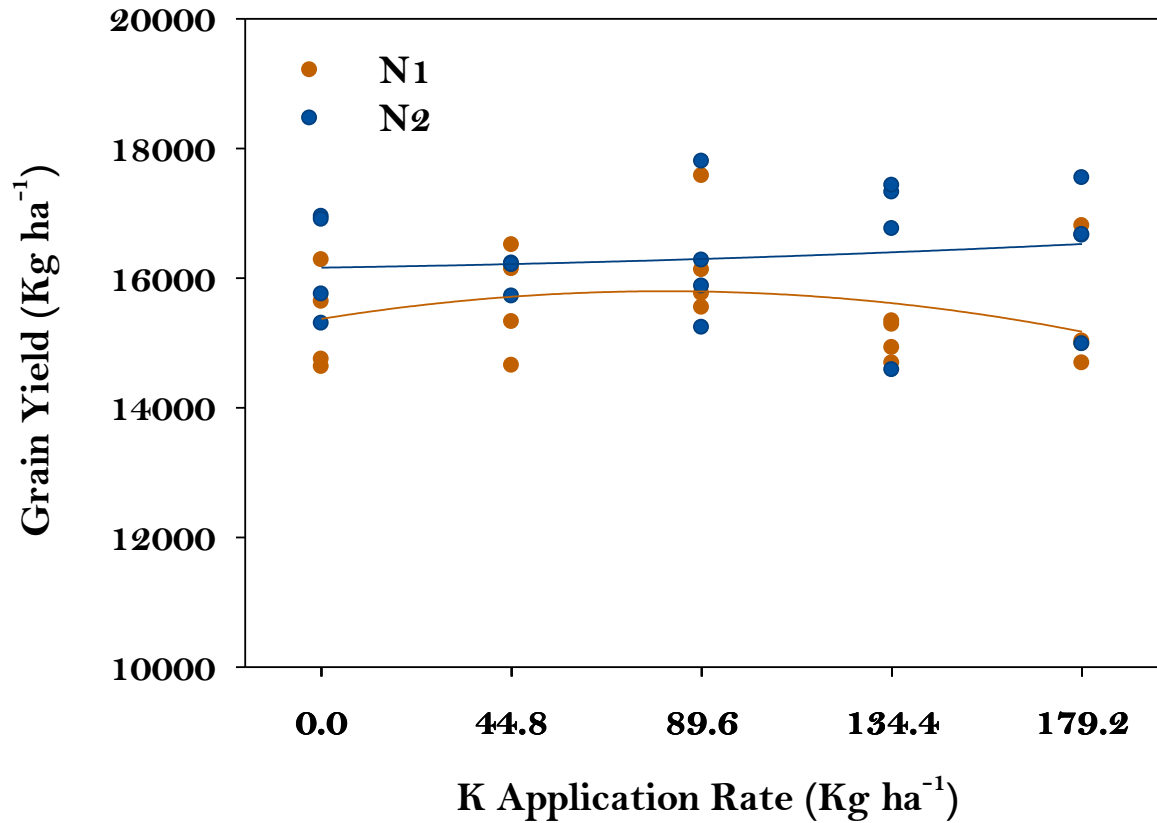


There was significant difference in grain yield among rates ($P = 0.0098$)

Preplant N fertilizer application had higher grain yield compared to current N management practice (+787)

N1, Common practice: (67 – 157 Kg ha⁻¹) N2, Modified practice: (45 - 112 - 67 Kg ha⁻¹)

Result: Yield Response



Summary

- ❖ Pre-tassel N fertilizer application increased grain yield
- ❖ Corn response to K was not observed

Acknowledgement

❖ FRST

❖ Directors and staff at WTREC

Thank You!

