



# N, P, & K fertility & removal in manured San Joaquin Valley corn & wheat: Preliminary field results

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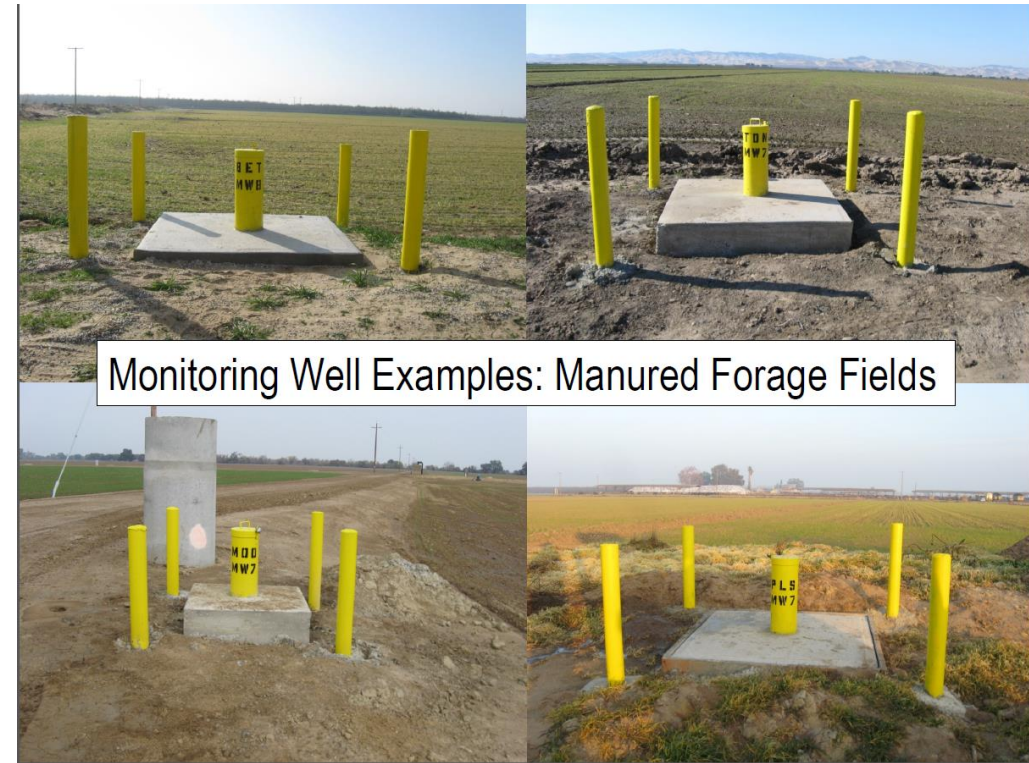
*2018 Alfalfa and Forage Field Day*

*September 19, 2018*

*Parlier, CA*

# 2013 Dairy General Order (R5-2013-0122)

- Latest iteration, includes Central Valley Dairy Representative Monitoring Program (CVDRMP) provision
- Dischargers report individually or as a representative group (over 1,100 members)
- CVDRMP to submit 6 year Summary Representative Monitoring Report (SRMR)
- SRMR will “identify mgmt. practices...protective of GW quality for the range of conditions found at participating facilities,” or “...propose solutions and upgrades that will result in compliance” (R5-2013-0122).



Slide borrowed from Veldhuis, 2012.  
Producer perspective on CVDRMP

# Focus on Crop Field Mgmt. Practices



- 5 sites from Merced through Tulare Counties
- Focus on breadth of environmental and mgmt. practice variables representative of SJV dairies
- Objectives of field studies:
  1. Evaluate surface irrigation systems
  2. Identify if/how irrigation efficiency could be improved with existing systems
  3. Evaluate N application timing with crop need and identify potential improvements
  4. Track N, P, & K inputs and outputs of specific fields





# Tulare County location: 2017-19 silage corn & wheat N, P, K studies

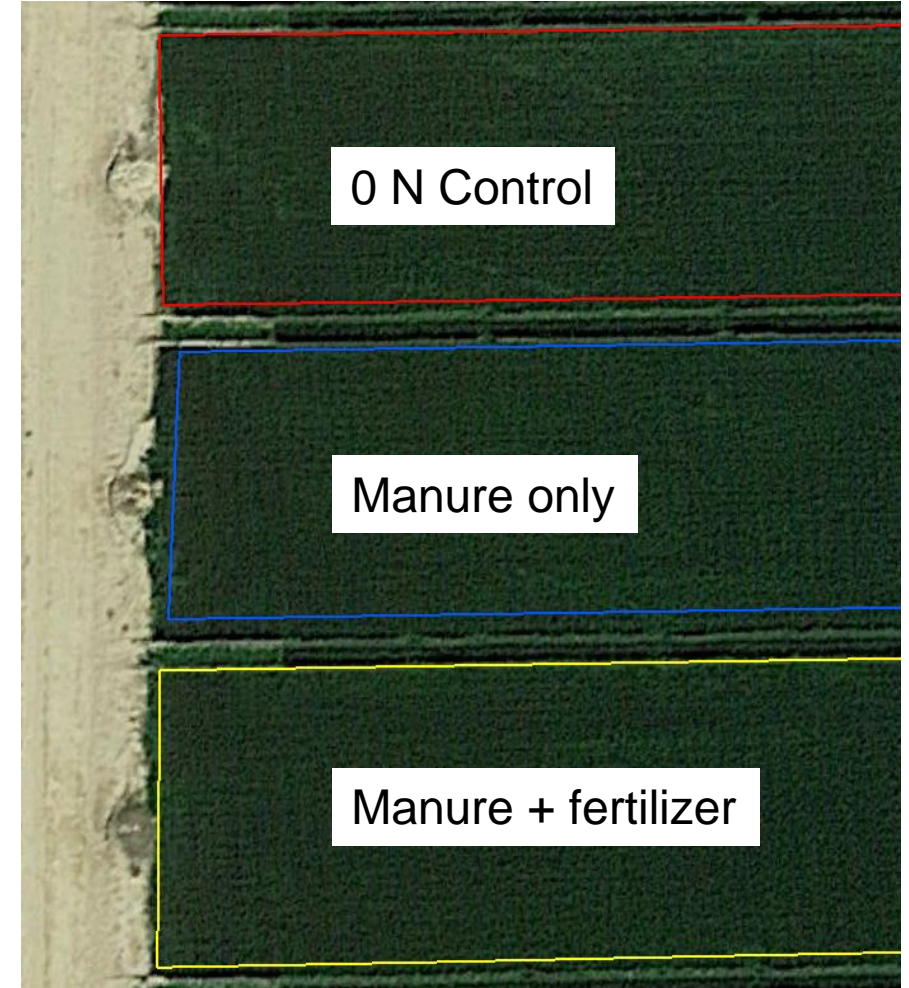
## Experimental Design

- RCBD, 4X
- Three treatments
  1. “0 N” Ctrl
  2. Manure only
  3. Manure + fertilizer

- Soil supply of nutrients
- Seasonal crop N, P, & K uptake

## Site Specifics

- Heifer ranch
- Regular manure largely from heifer corral scraping, less from pond
- GW & district irrigation
- Deep, uniform, Nord fine sandy loam

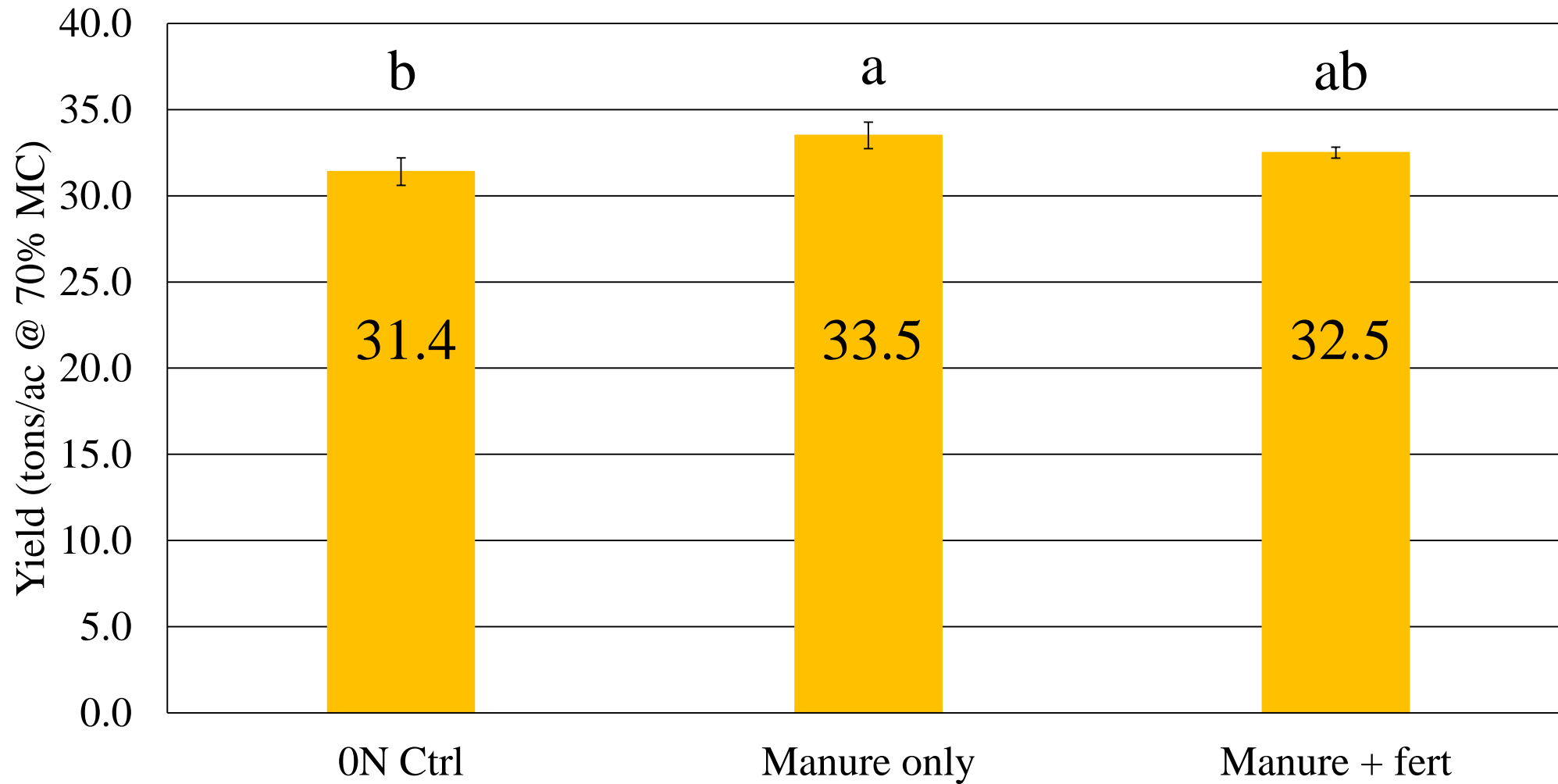




# 2017 Corn Soil and Plant Macronutrient Uptake and Availability

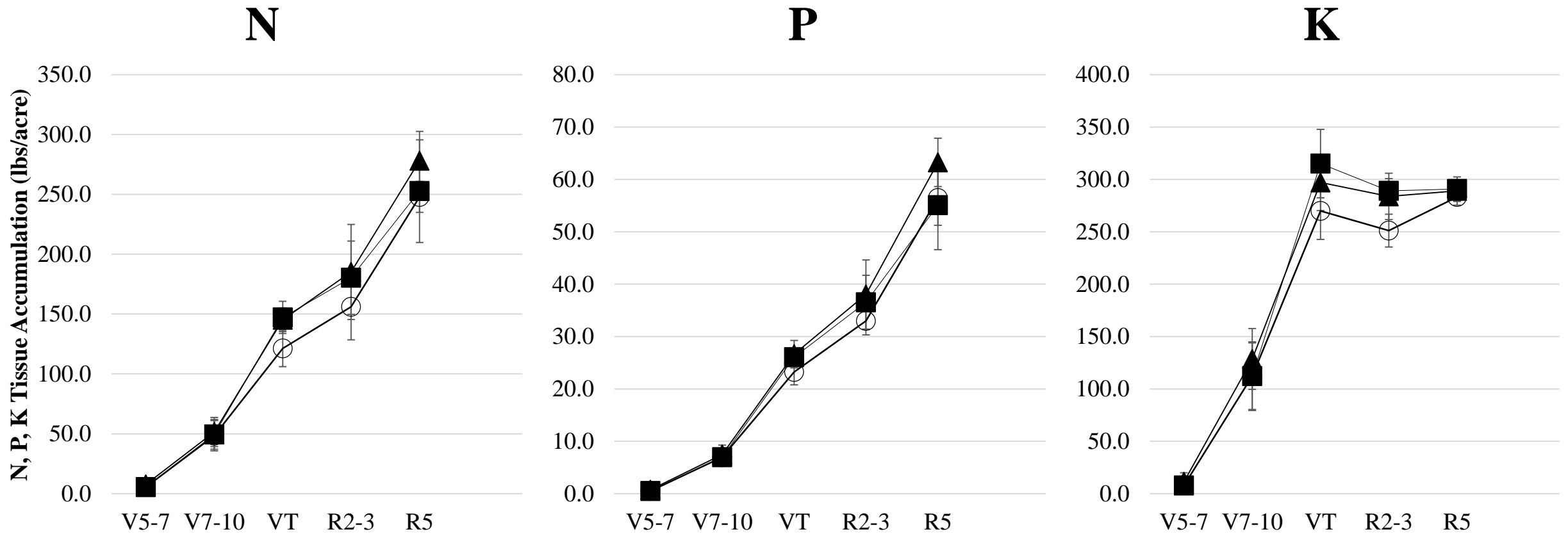


# Corn Yield Between Treatments



$F = 9.19$   
 $p = 0.008$

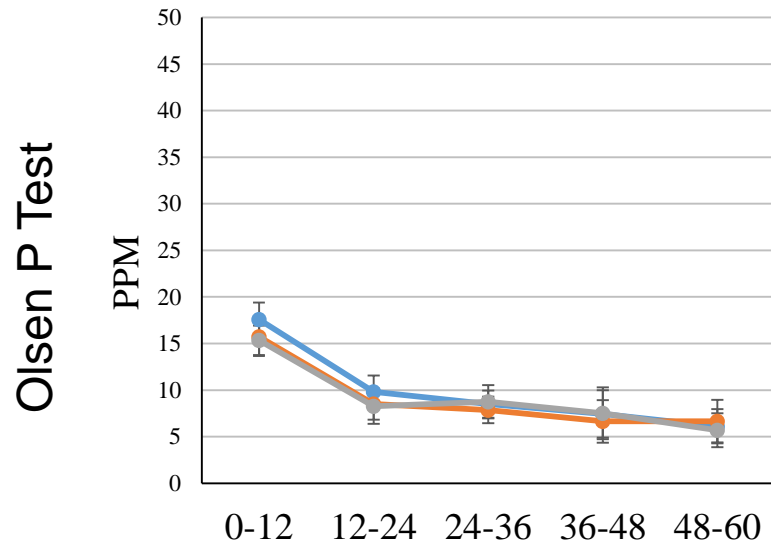
# Corn N, P, K Above-Ground Accumulation



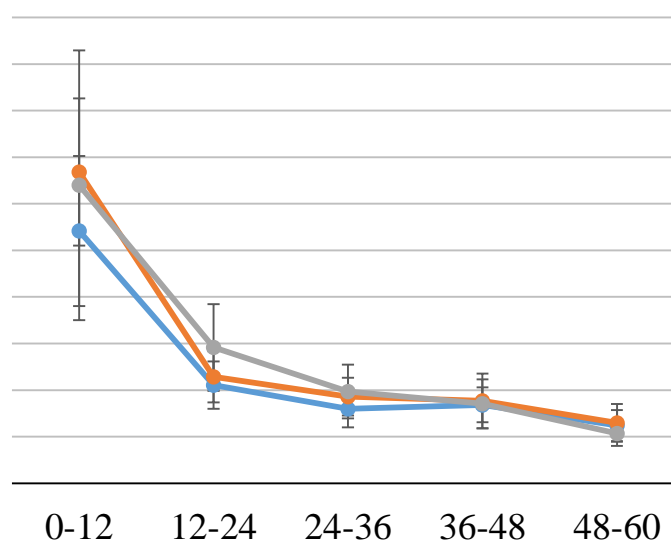
○ 0 N    ▲ M    ■ M+F



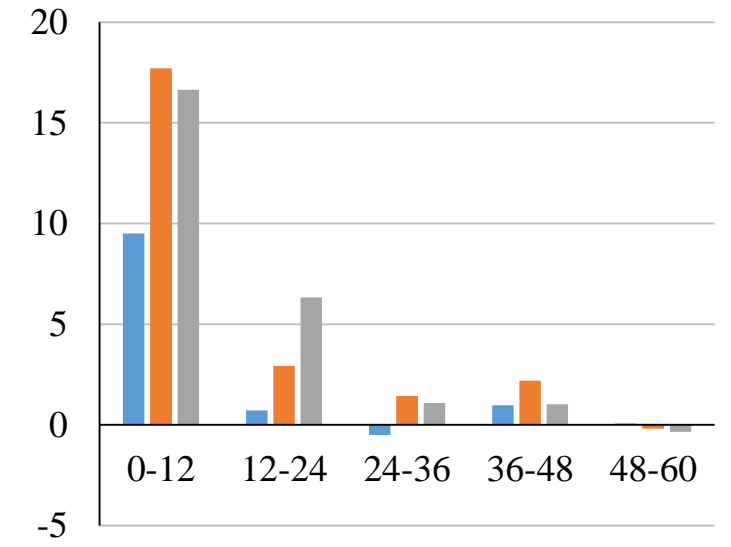
### Corn Pre-Plant



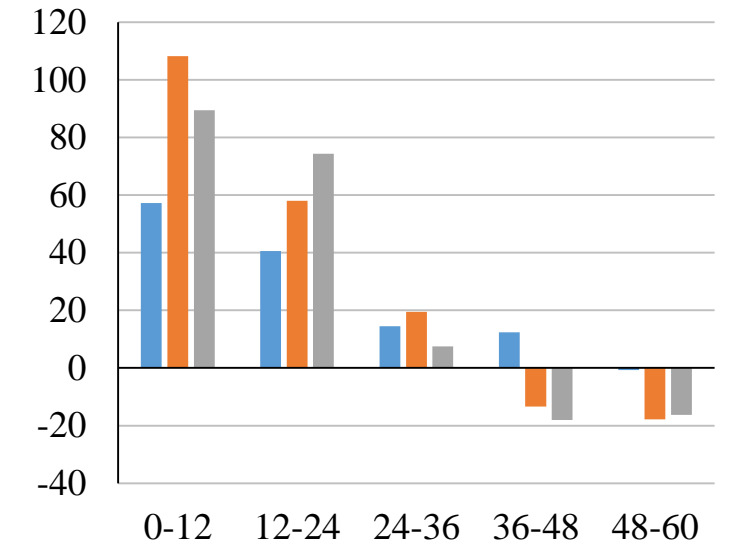
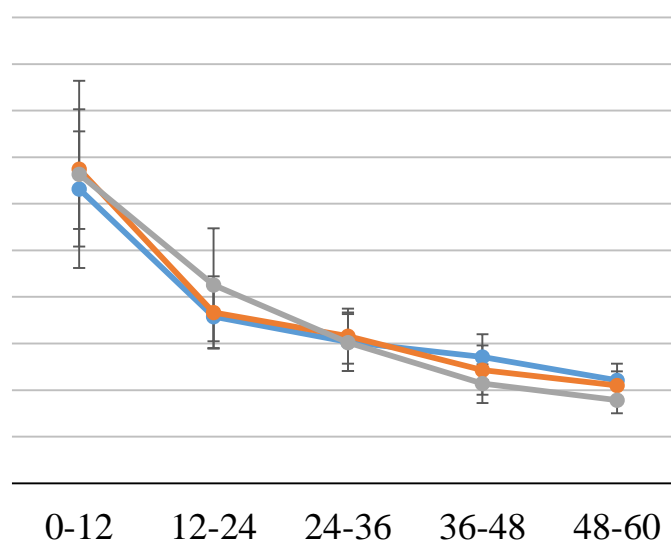
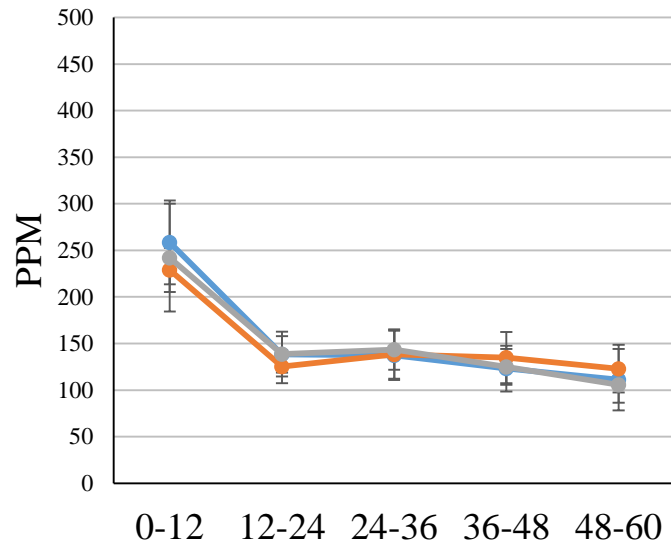
### Corn Post-Harvest



### Seasonal Difference



### X-K Test



■ ON Ctrl      ■ M Only      ■ M+F



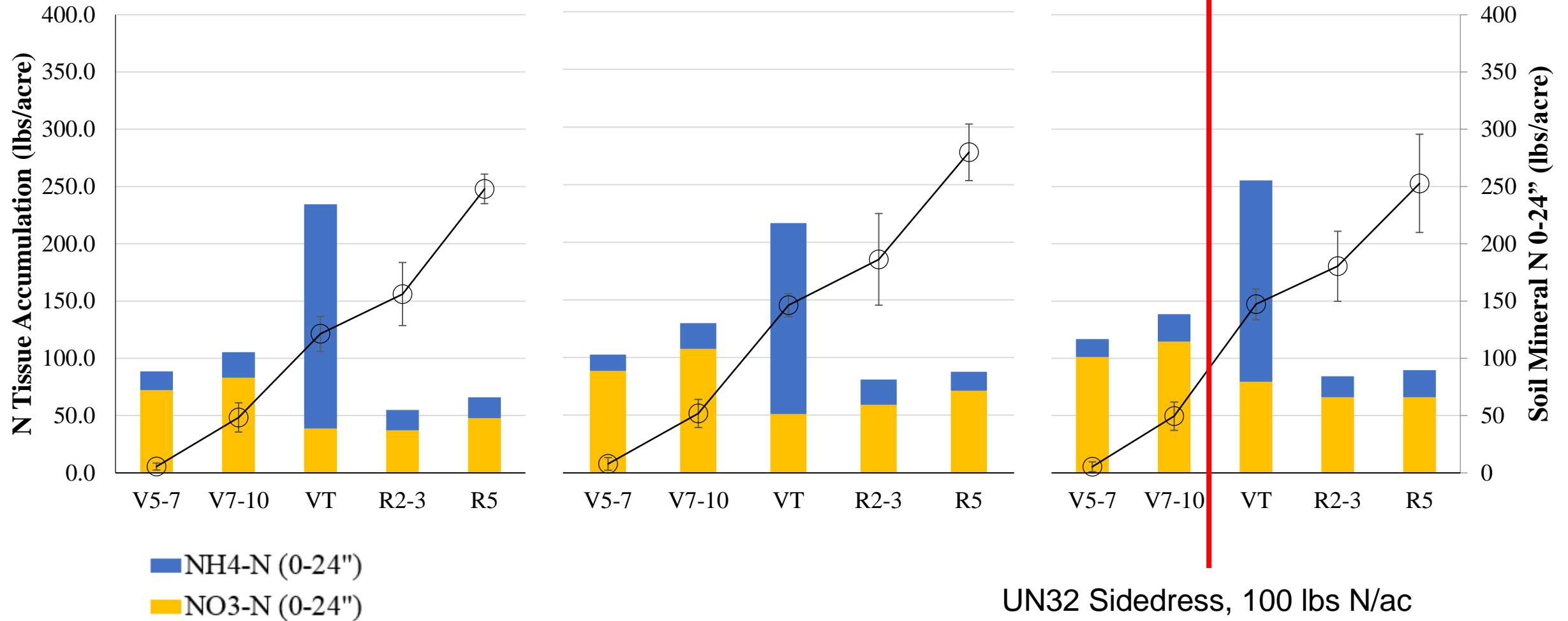


# Corn Seasonal N Accumulation and Soil Mineral N content

**0 N Ctrl**

**M Only**

**M + F**

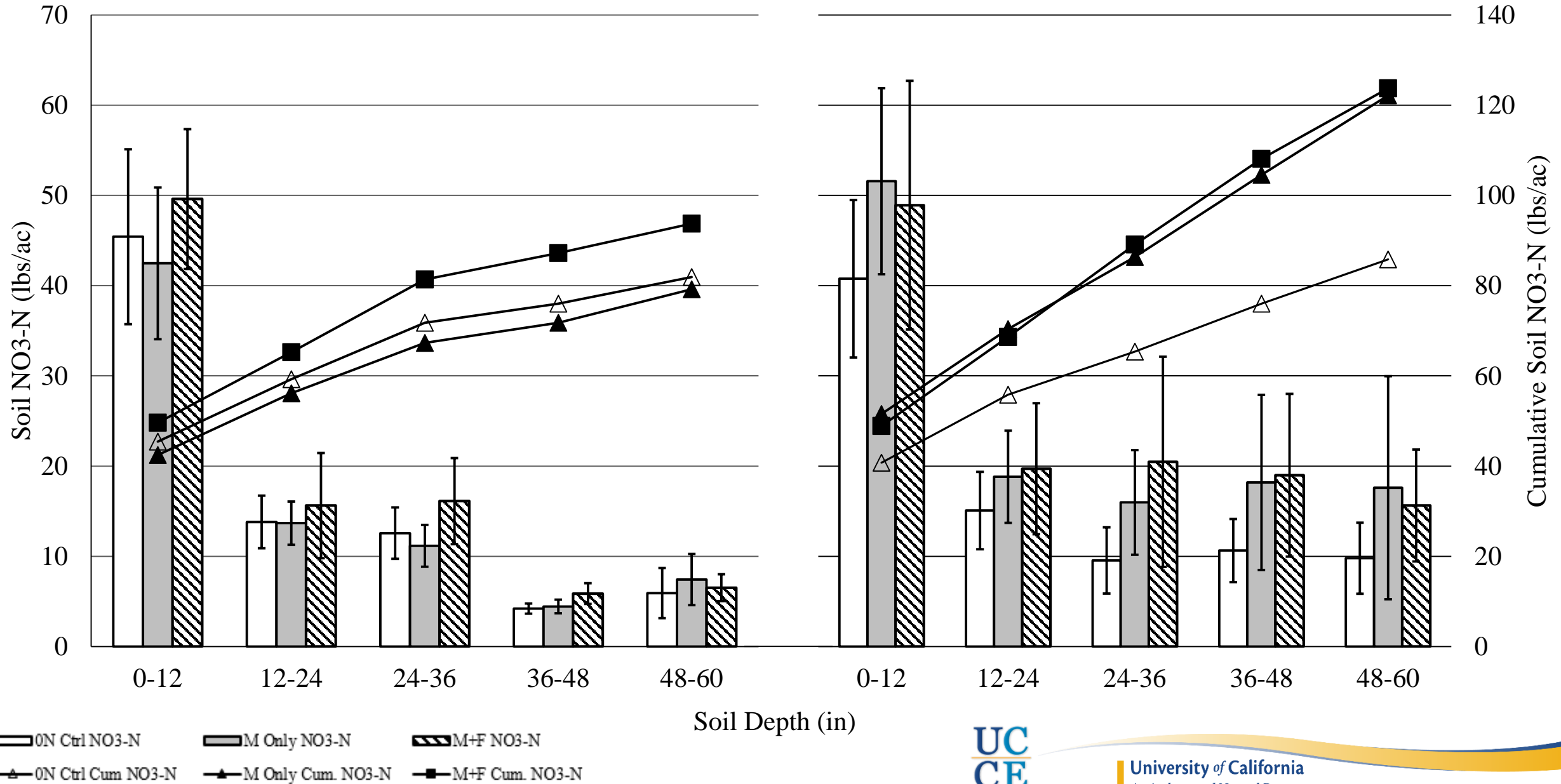


UN32 Sidedress, 100 lbs N/ac

# Seasonal Soil NO<sub>3</sub>-N Change with Depth

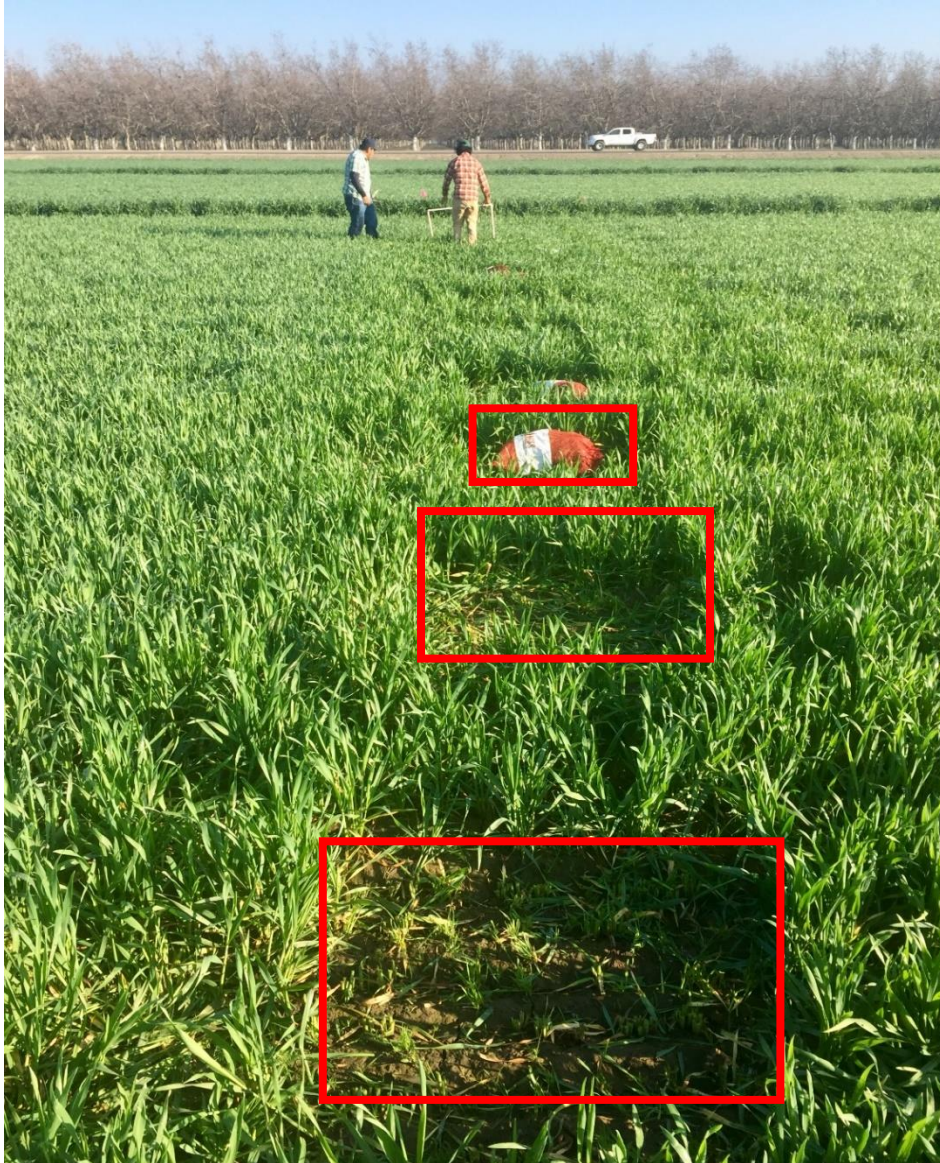
## Corn Pre-Plant

## Corn Post-Harvest/Wheat Pre-Plant



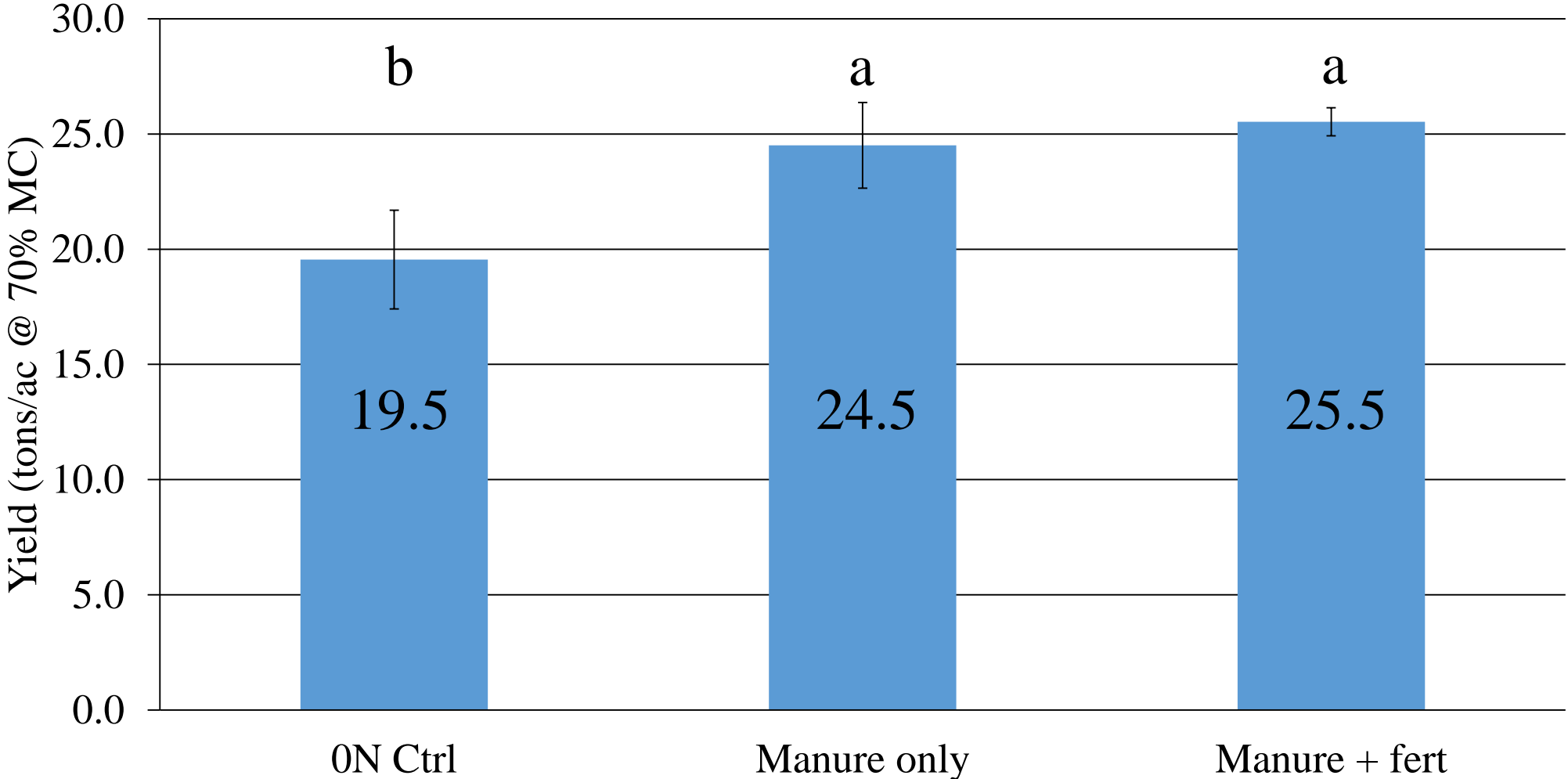


# 2017-18 Wheat Soil and Plant Macronutrient Uptake and Availability





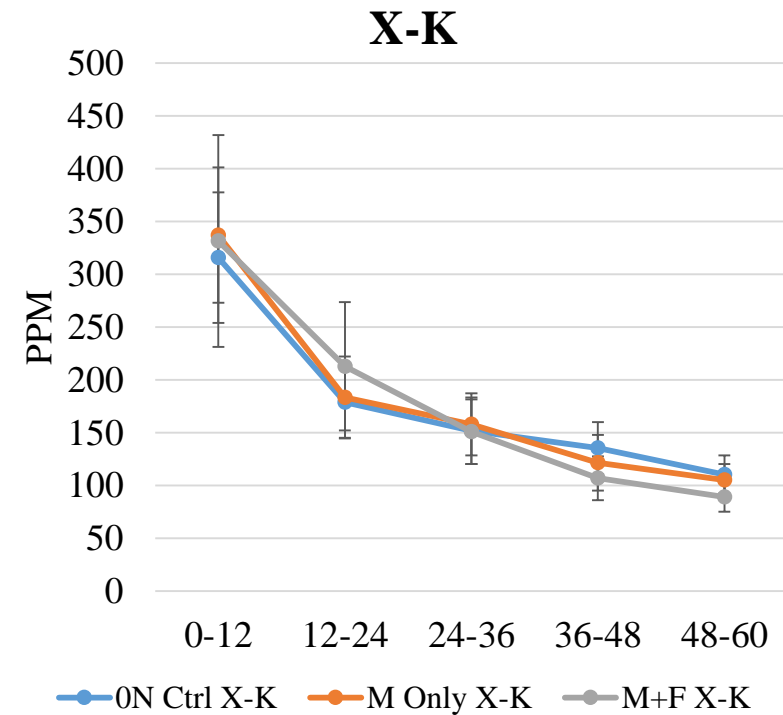
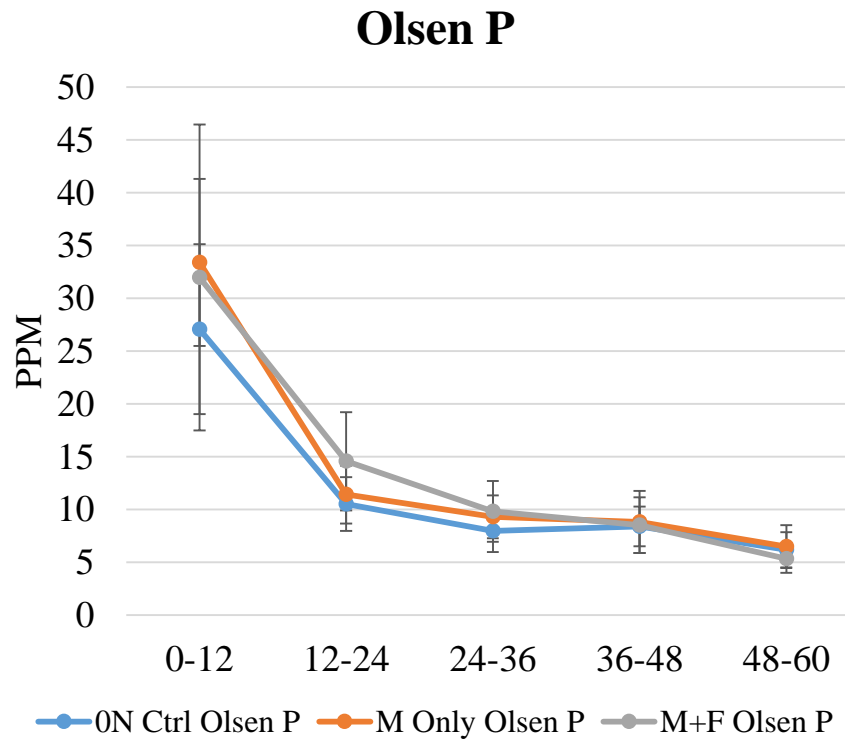
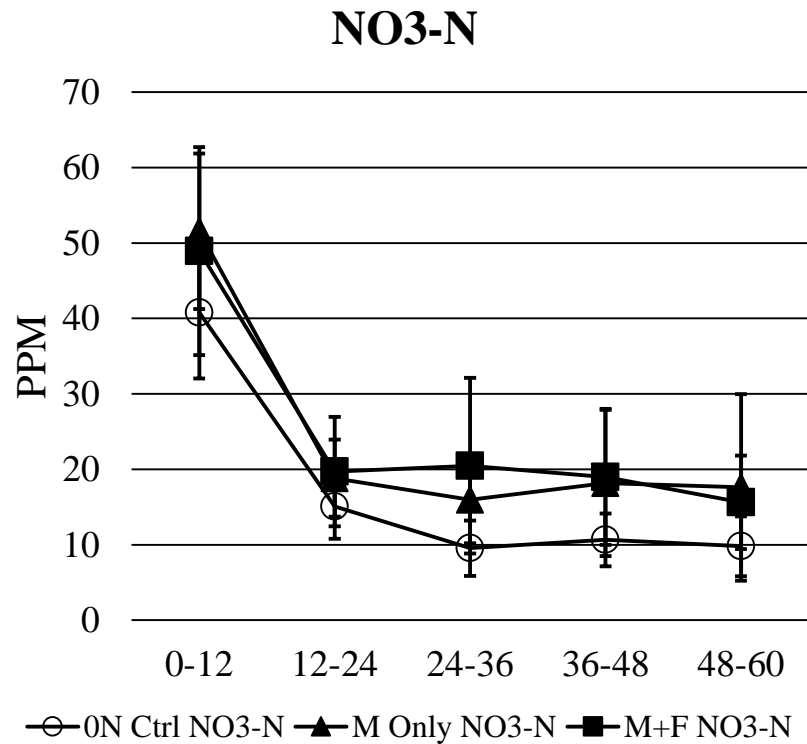
# Wheat Yield between Treatments



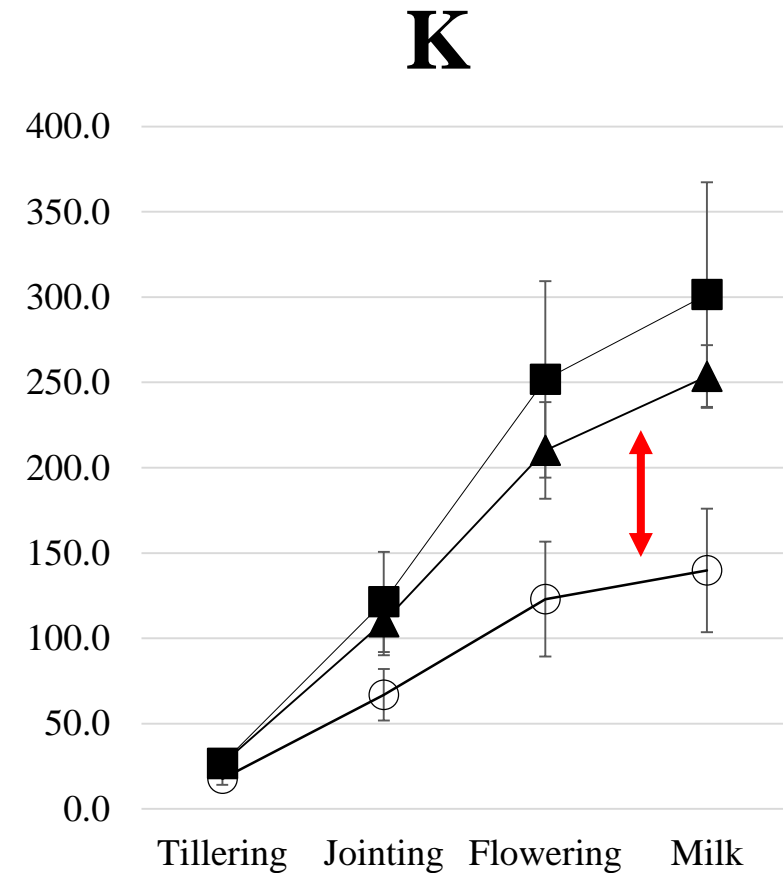
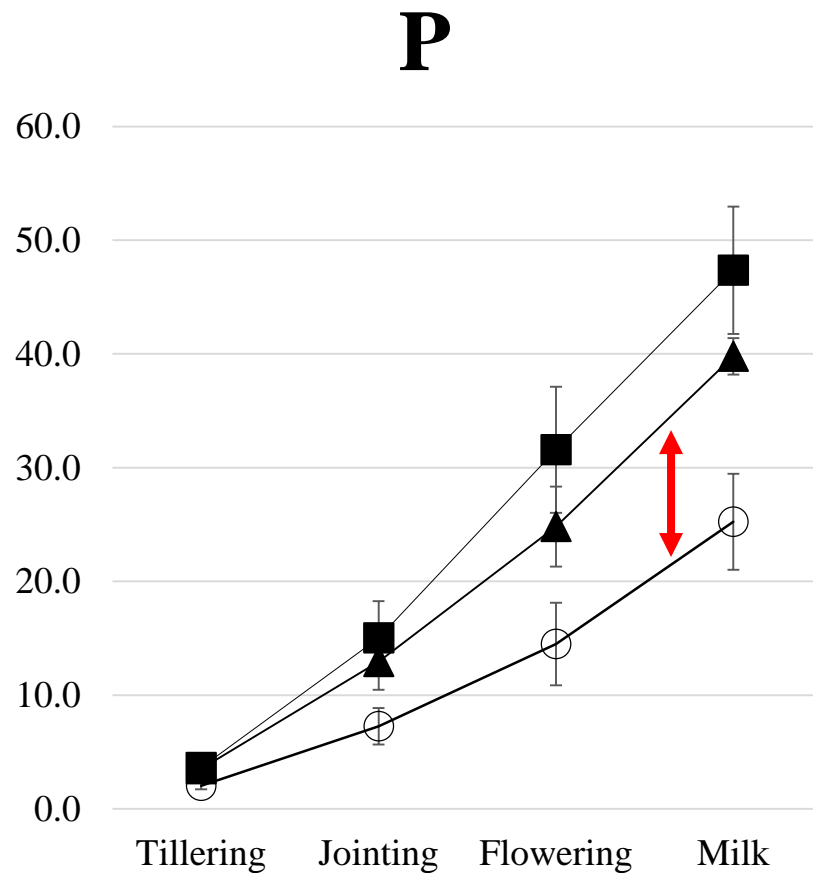
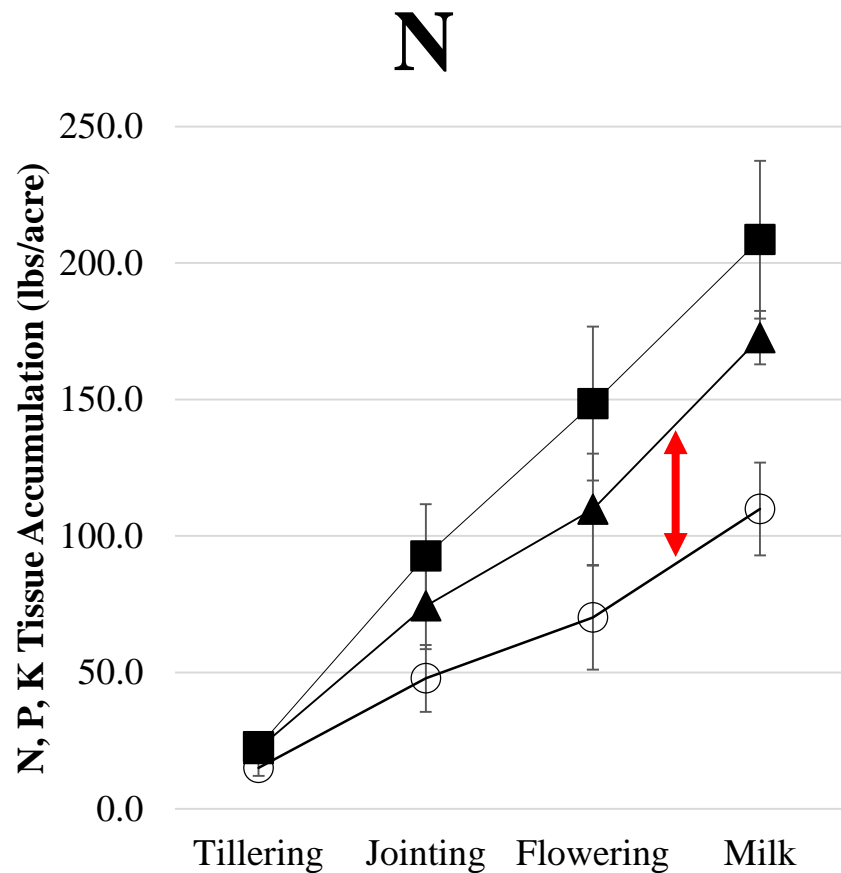
$F = 14.96$   
 $p = 0.001$



# 2017-18 Wheat Preplant Soil Macronutrient Concentrations



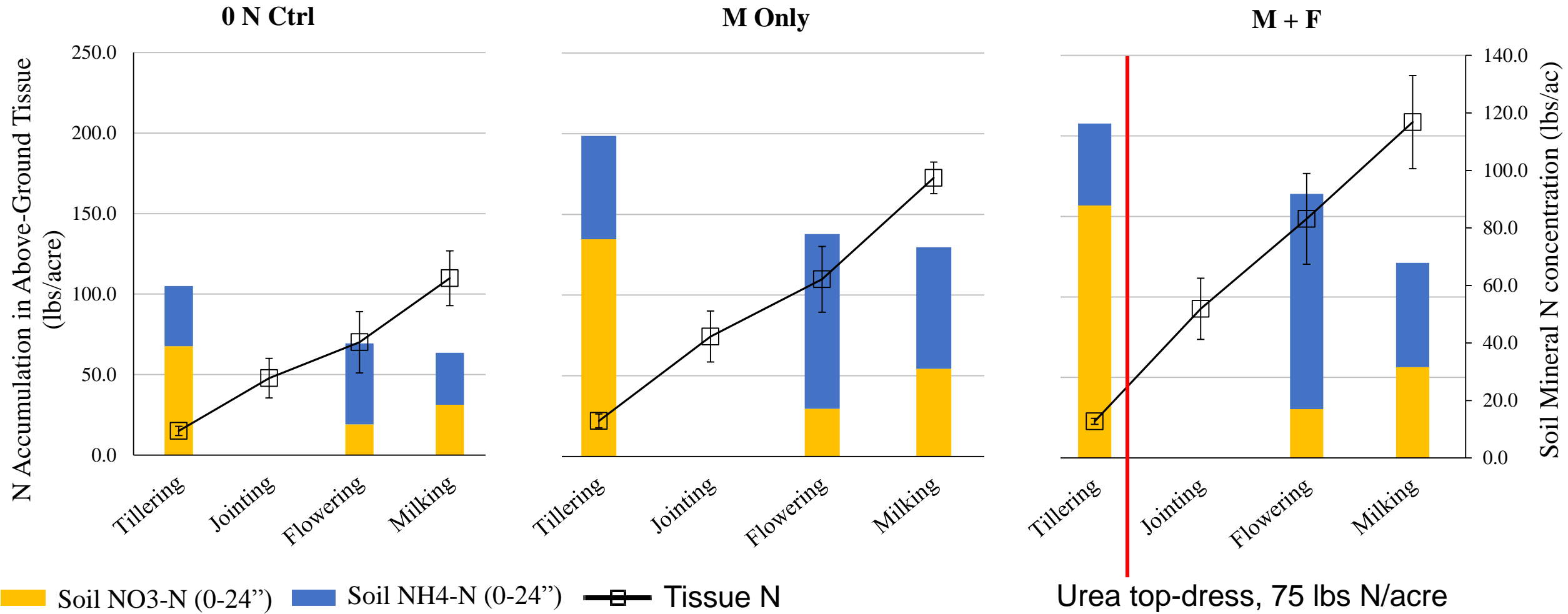
# 2017-18 Wheat N, P, K Above-Ground Accumulation



○ 0 N    ▲ M    ■ M+F



# Wheat Seasonal N Accumulation and Soil Mineral N content





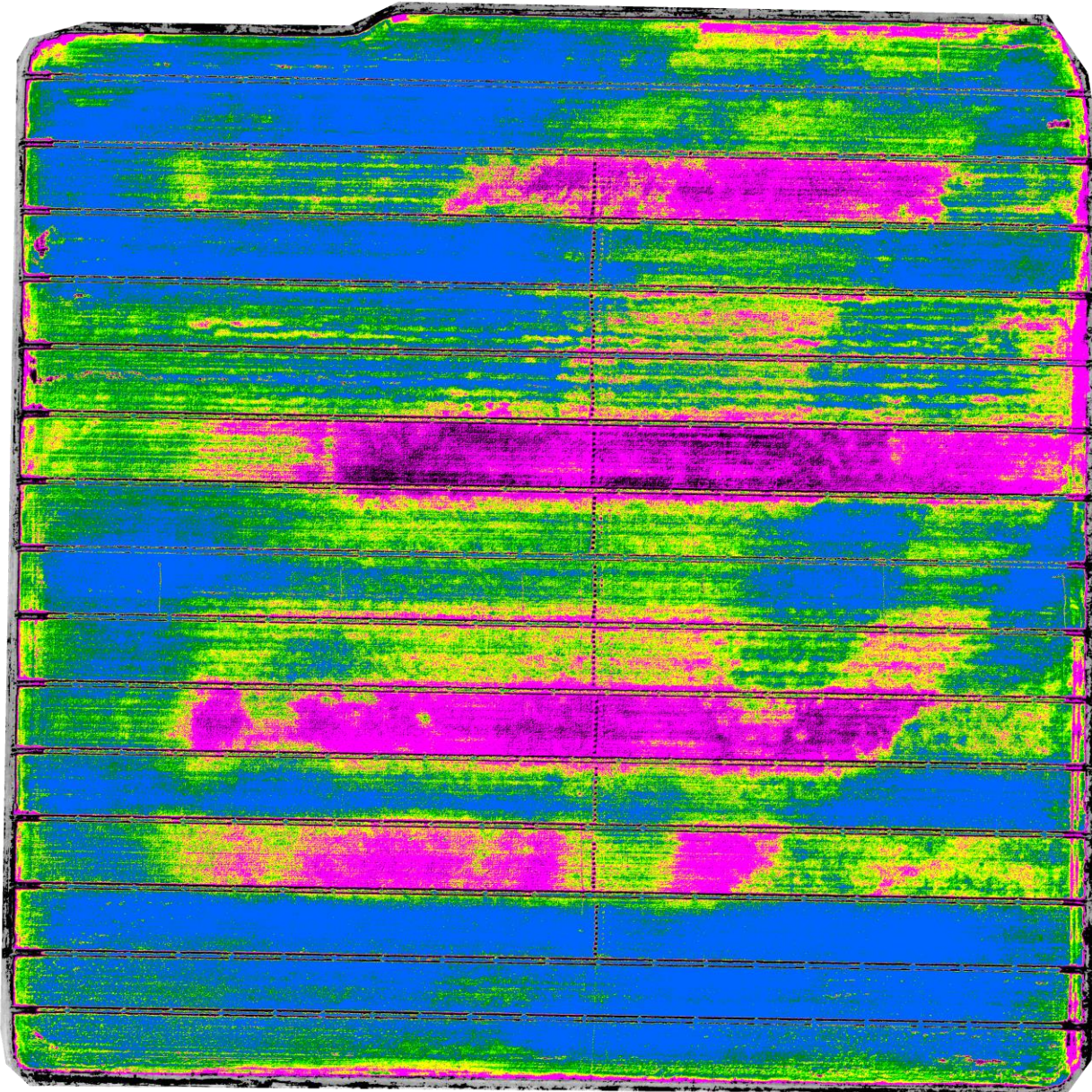
A photograph of a wheat field where the plants appear somewhat sparse and thin. The wheat heads are visible but the overall density of the crop is lower compared to the adjacent field.

0 additional nitrogen applied

A photograph of a wheat field where the plants are much denser and more lush green. The wheat heads are more numerous and appear larger, indicating a higher yield compared to the field with no additional nitrogen.

Manure + urea applied





**0 N**

M + F

M only

M only

**0 N**

M + F

M + F

M only

**0 N**

M only

**0 N**

M + F

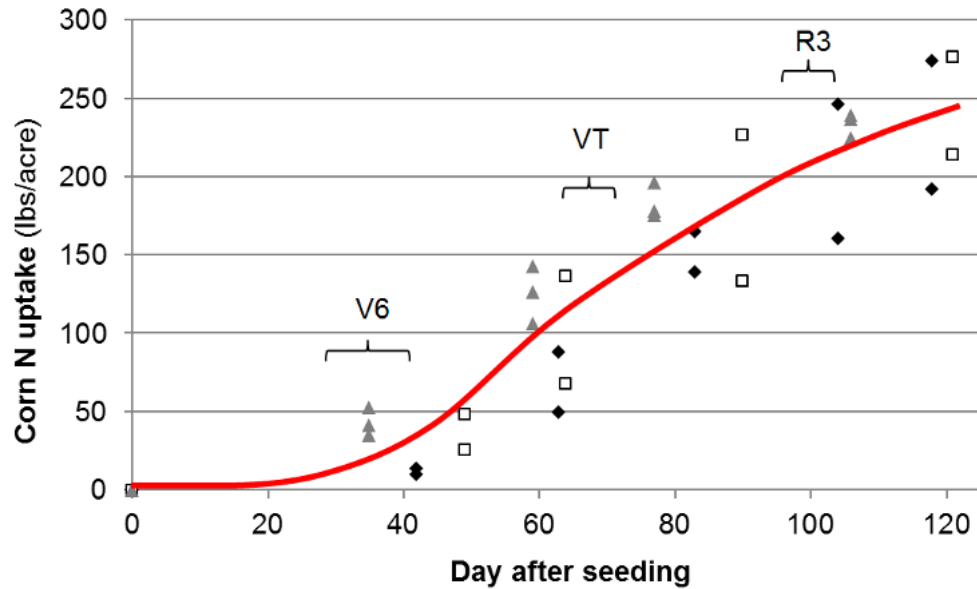
**ALL DRONE**  
SOLUTIONS

UC  
CE

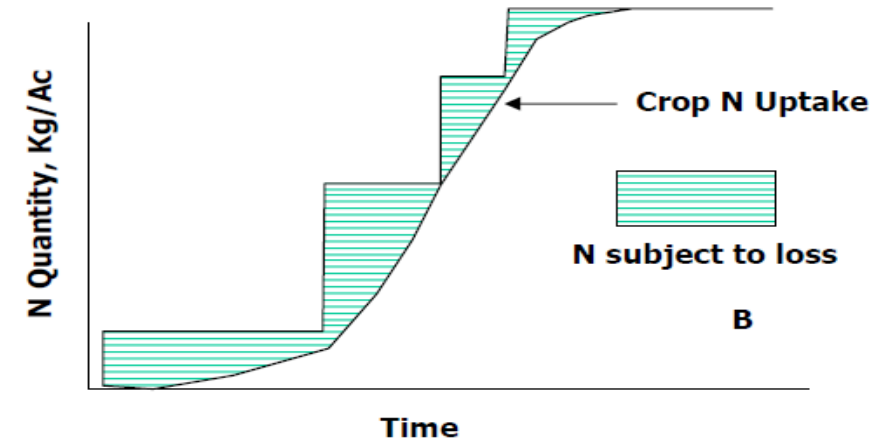
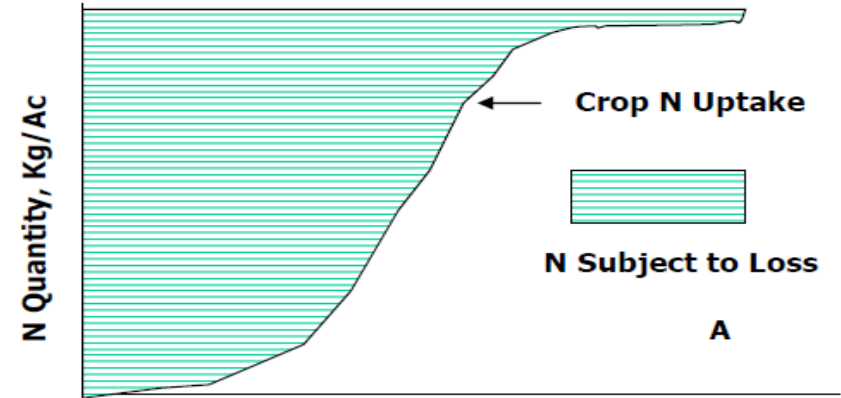
University of California  
Agriculture and Natural Resources



# Match the Supply of N to Crop Need



Geisseler et al., 2012



# Timing Manure Applications to Plant Availability

Table 1. Guidelines for animal manure N mineralization in California.

	Year 1	Year 2
	<i>- % applied organic N mineralized-</i>	
Dairy lagoon water	40-50	15
Dairy lagoon sludge and slurry; corral manure	20-30	15
Dairy mechanical screen solids	10-20	5

1. 40-70% of mineralization value will occur within the first 4-8 weeks following application (Andrews & Foster, 2007; Gale et al., 2006). It is suggested that the lower value (40%) be used for late fall or winter applications.

Pettygrove, Heinrich, and Crohn, 2009



# Questions or Suggestions?

