

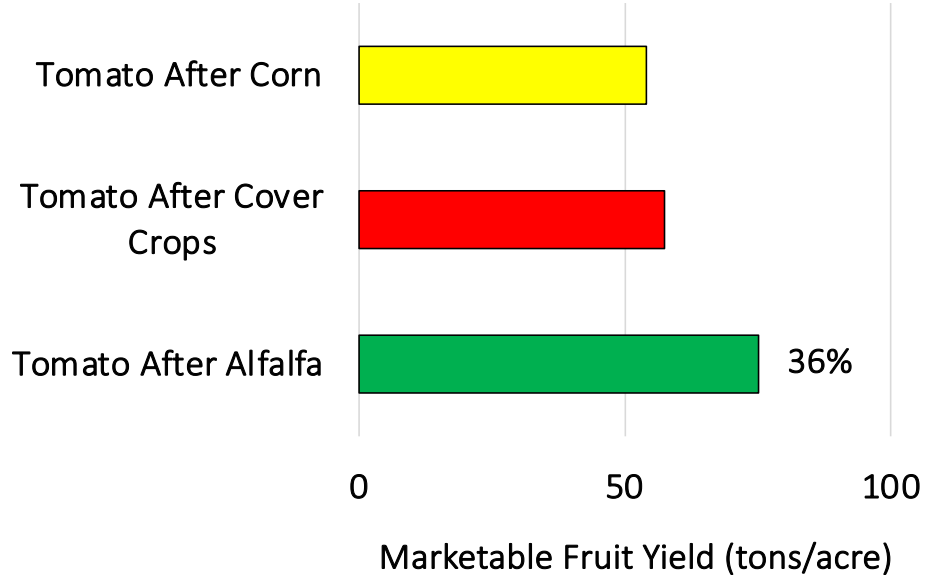
Benefits of Alfalfa in Rotation

and Potassium Fertilizer on Tomato Yields

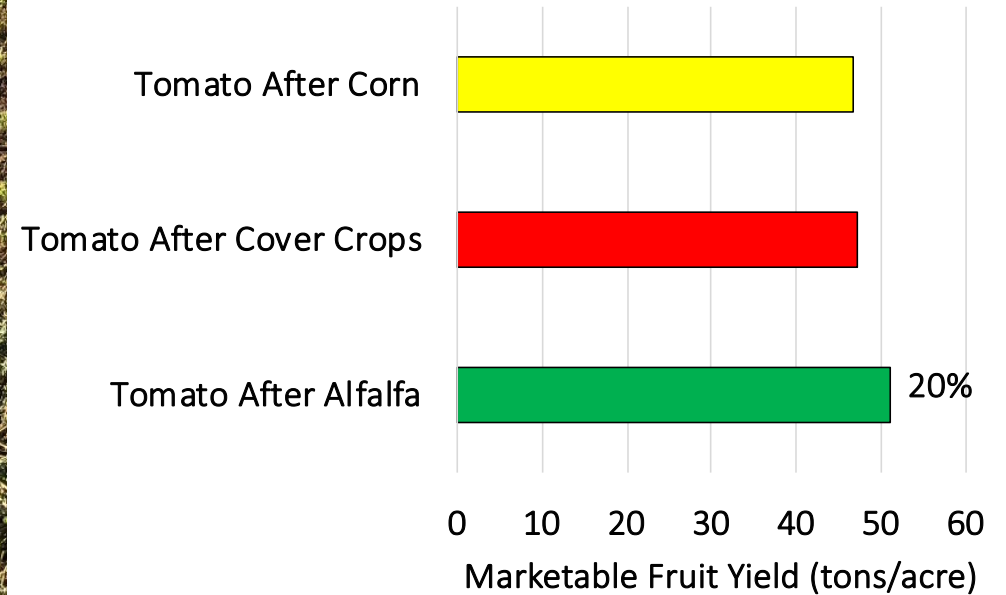


Rotation Effects on Yields

2017



2019



Alfalfa Rotation Effects Studied in Midwest

- Fertilizer N equivalent
- N Credits
- *Factors*
 - *Stand length*
 - *Plant density*
 - *Cutting frequency*

1st-year corn after alfalfa often requires no fertilizer N

June 18, 2012

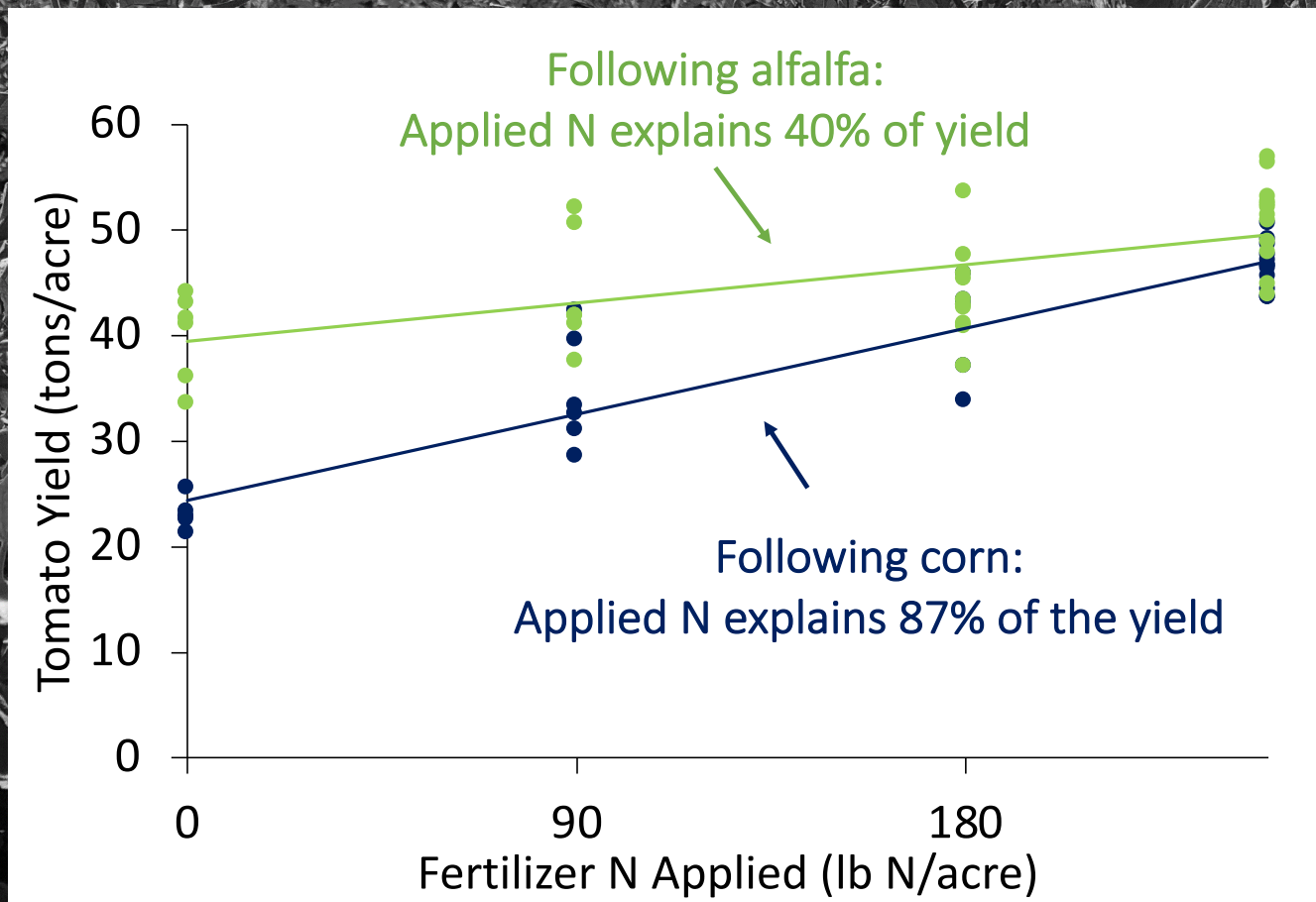
Compared with fertilizer nitrogen (N) guidelines for corn following corn, guidelines for first-year corn following alfalfa in the U.S. Corn Belt suggest that N rates can be reduced by about 150 lbs. per ac (the alfalfa N credit) when more than 4 or 5 alfalfa plants per sq.-ft. are present at termination. These alfalfa N credit recommendations have been questioned by growers and their advisors, however, as corn grain yields have increased over time.



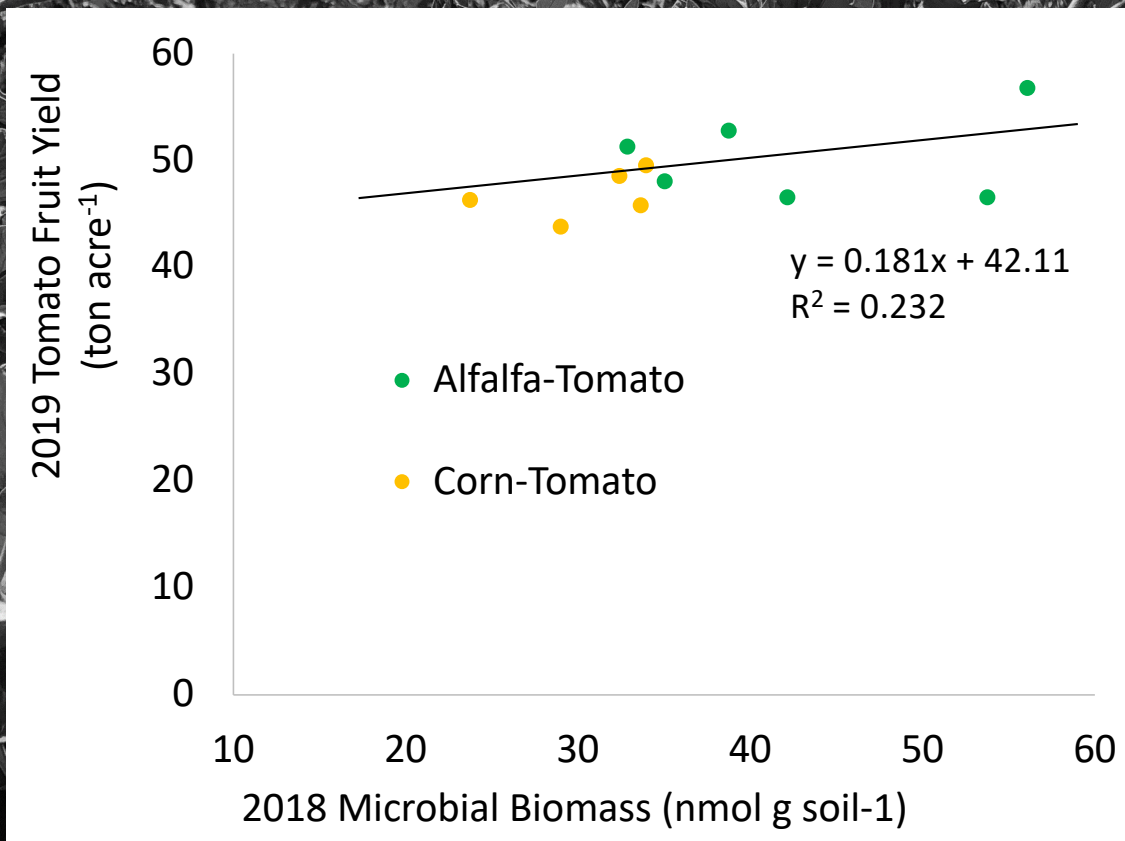
“Alfalfa has been observed to improve P availability (Iyamuremye et al. 1996), suppress disease-causing organisms (Snapp et al. 2005), and serve as a host to beneficial mycorrhizal fungi (Bradbury et al. 1991). These effects have been less studied than the N credit...the benefits of alfalfa in rotation...are not limited to the N credit...”

-- Fernandez et al. 2017 Cutting management and alfalfa stand age effects on organically grown corn grain yield and soil N availability. Renewable Agriculture and Food Systems 34:144-154.

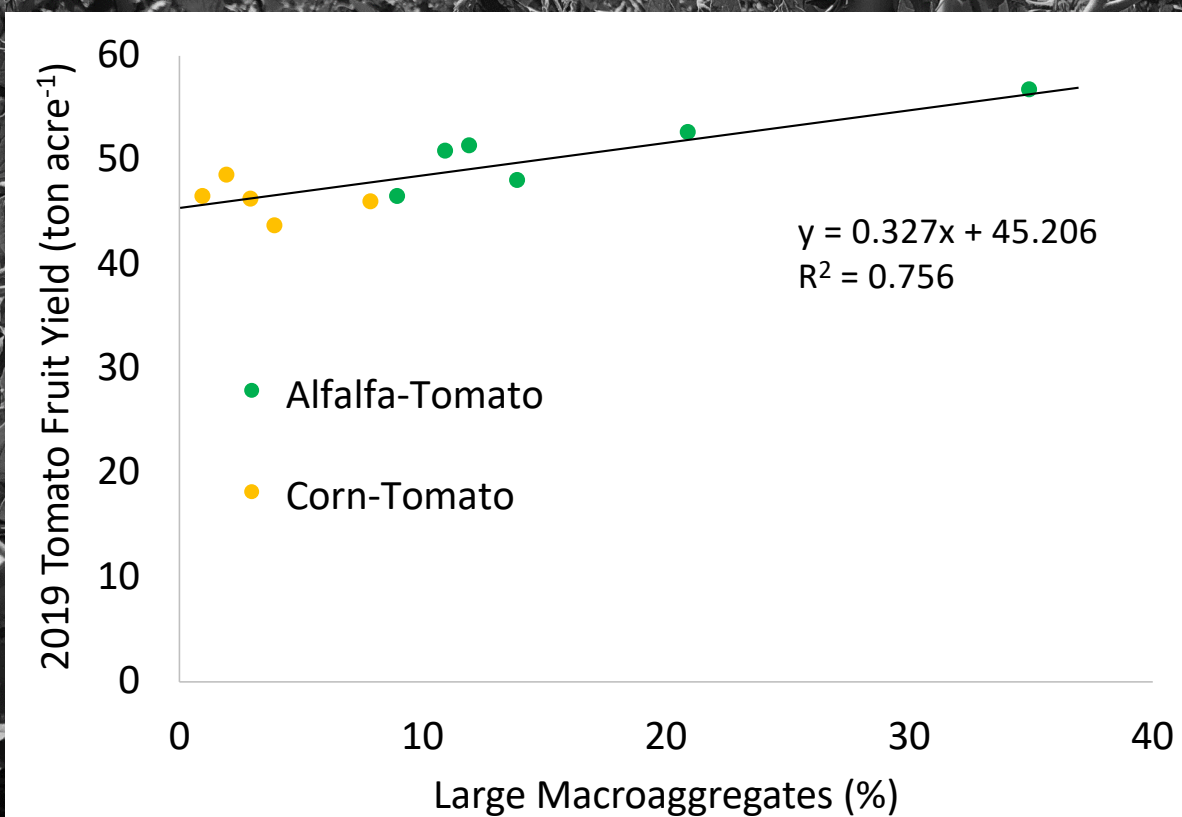
Residual Nitrogen – Following Corn vs. Alfalfa



Connecting Yields to Rotation Crop Factors -- *Biological*



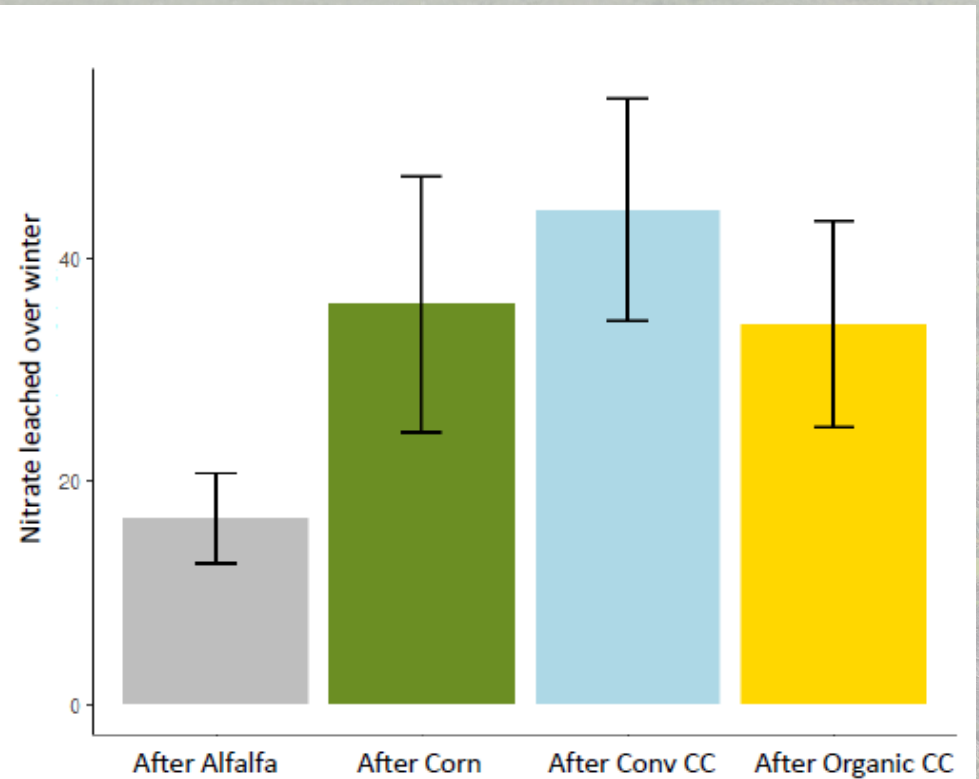
Connecting Yields to Rotation Crop Factors -- *Physical*

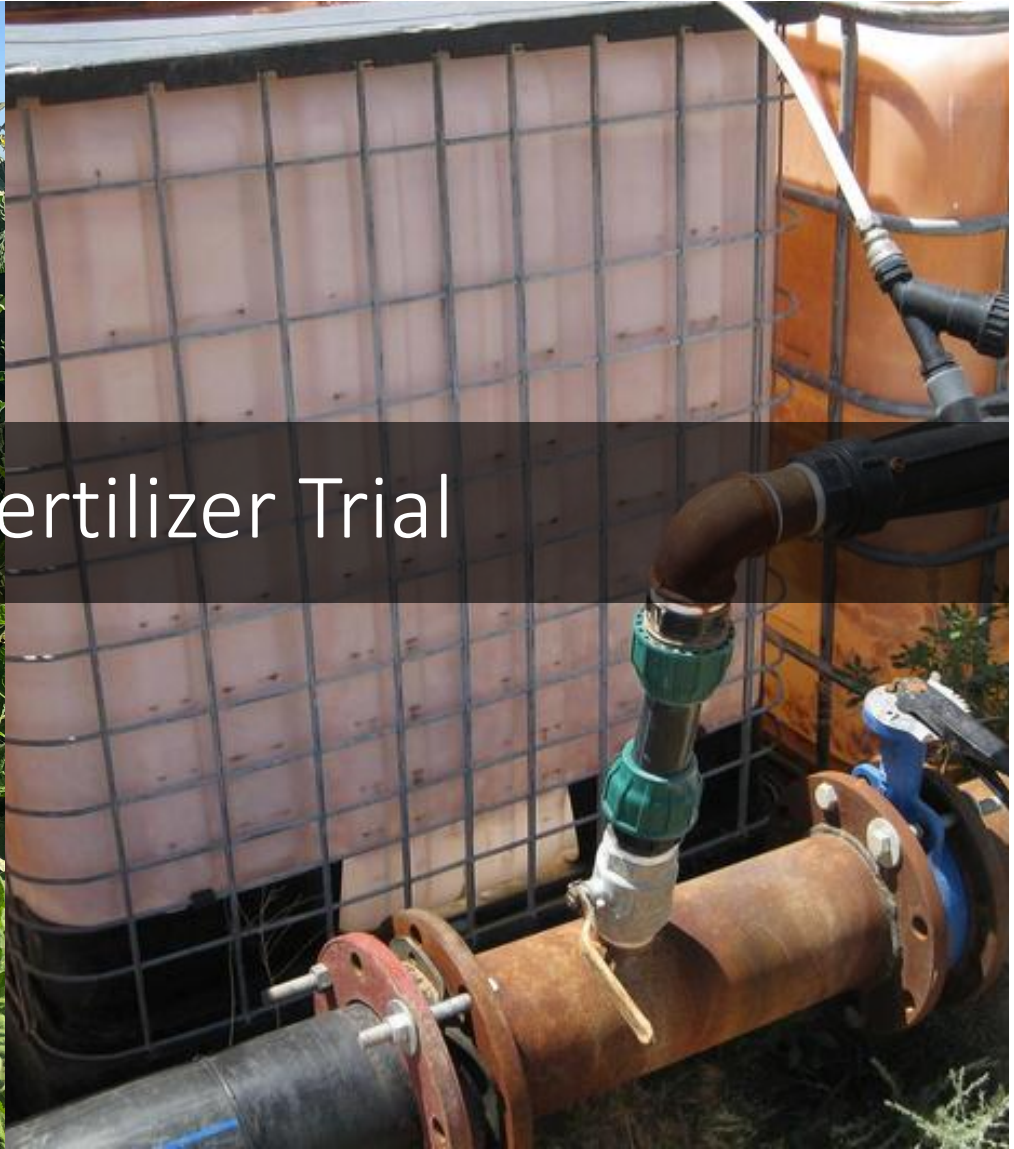


Ecosystem Services – Benefit Water Quality

October 2018-
We installed
10 bags, 65 cm
deep, in each
of the 12 plots
(120 total
bags). Bags
were installed
in undisturbed
side of trench.

Bags were
retrieved
from each
plot in
March 2019

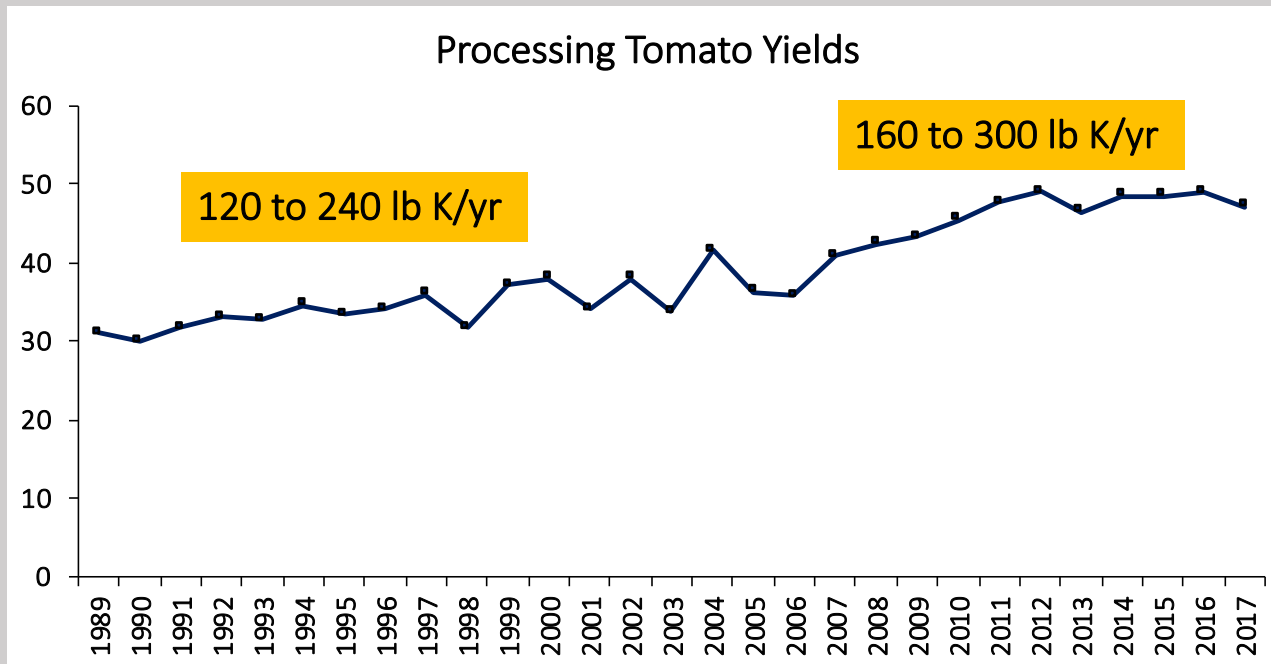




Potassium Fertilizer Trial

Yield Gains Mean More Withdrawals

- 4 to 6 lb K/ton fruit (Hartz et al. 2002)



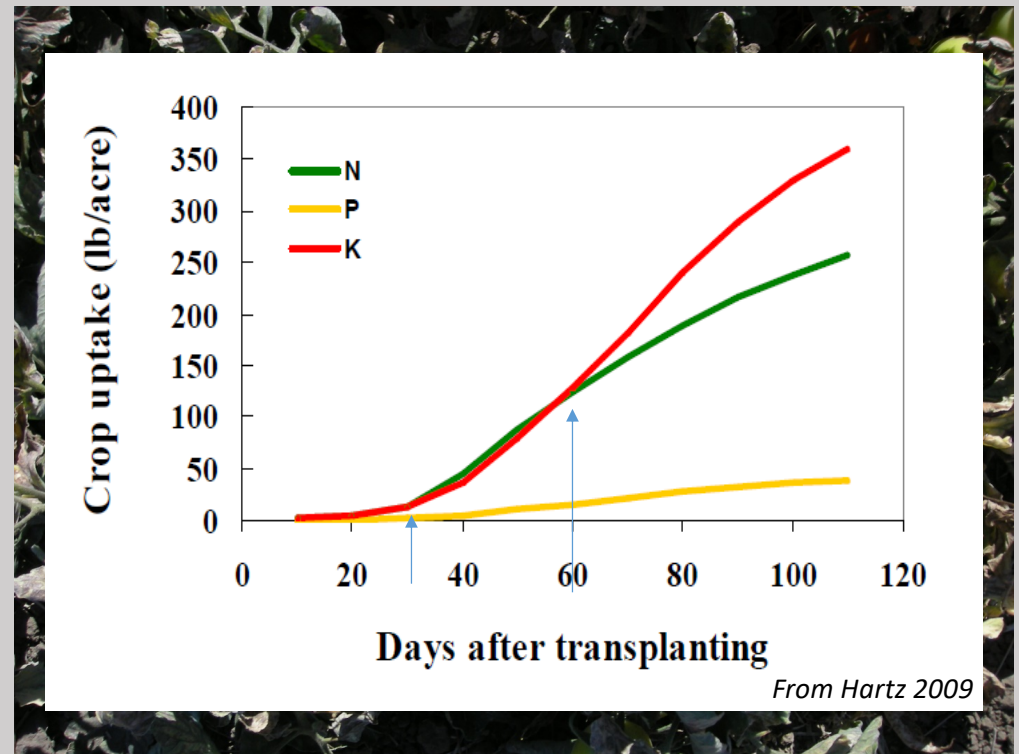
K Fertilizer Treatments

Three Treatments

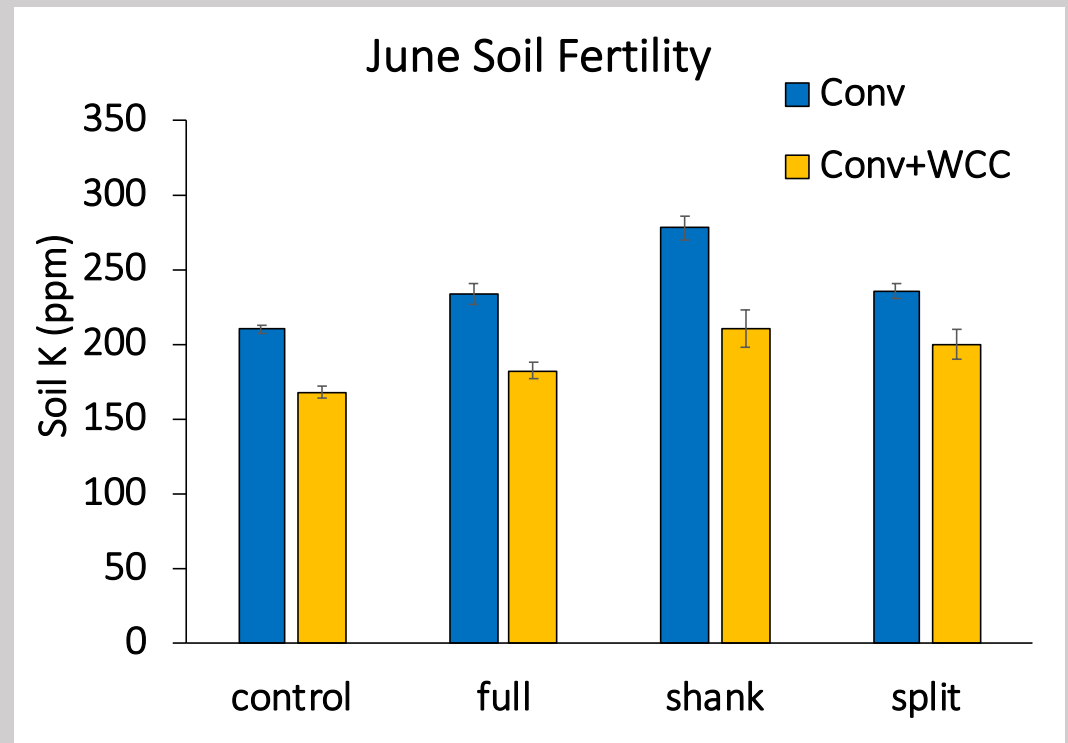
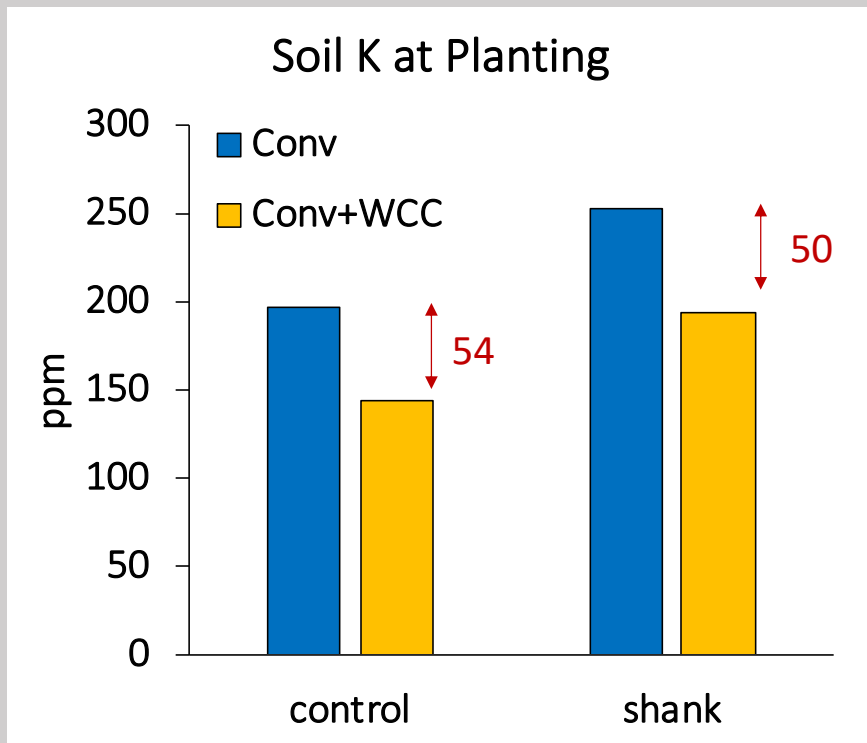
1. Fall Sidedress (shanked in)
 2. Full Early Fertigation
 3. Early+Mid-season Split Fertigations
- (Unfertilized Control)

Two Sites

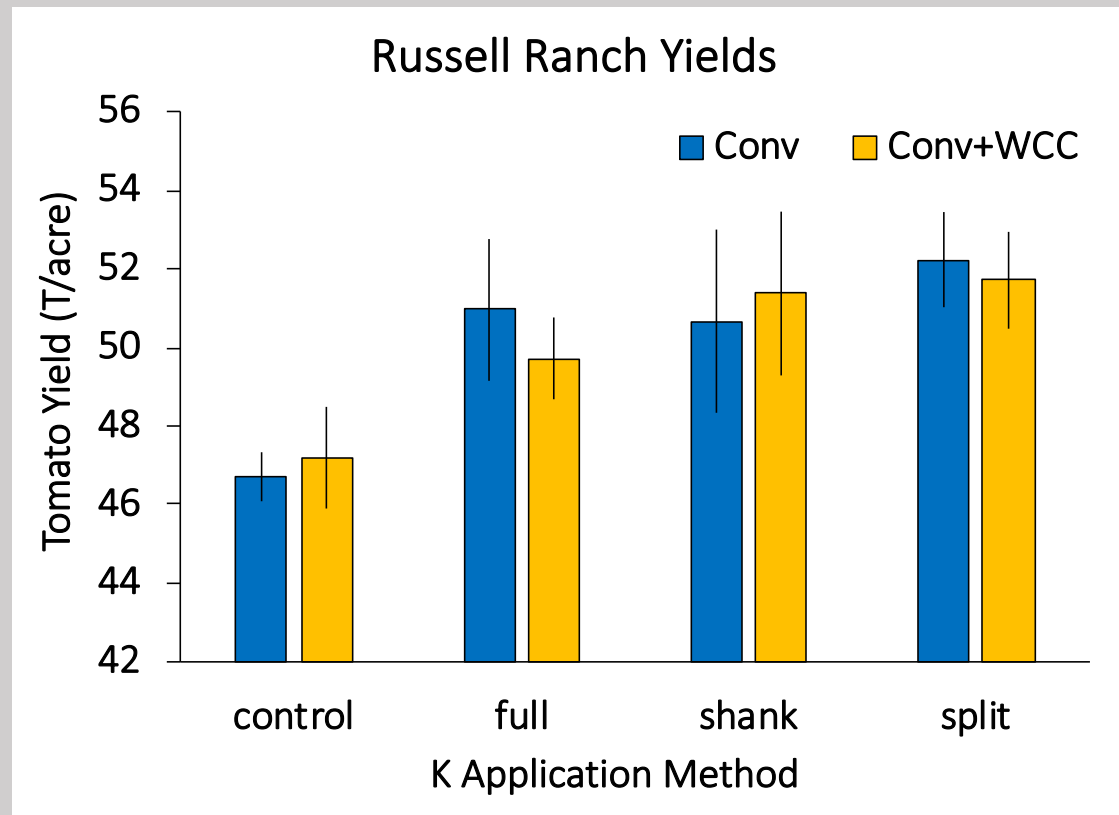
- Yolo County (2 “systems”)
- San Joaquin County



All K Fertilizer Methods Increased Soil K



All K Fertilizer Methods Increased Yields



Costs:

\$0.78 per #K₂O for potassium sulfate

\$0.66 per #K₂O for KCl

| Treatment | Profit Above Cost (Conv) | Profit Above Cost (Conv+CC) |
|------------|--------------------------|-----------------------------|
| | \$ per acre | |
| Fall Shank | \$165.90 | \$180.67 |
| Full | \$225.49 | \$101.91 |
| Split | \$317.62 | \$244.91 |

Fruit Quality

- No consistent effects on color or SS among K treatments
- Solids were ~0.5 points greater than control
- Hue was 3 points higher in K fertilized than control
- pH was lower in K fertilized than control, especially w/ cover crops
- pH was 0.1 to shank



Applying K both early and mid-season is likely most optimal

THANK YOU

