Response of determinate field tomatoes to foliar nutrients

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NORTHEAST SARE Sustainable Agriculture Research & Education

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Thank you for taking a few minutes to fill out the survey!

Research Question:

A fertilizer dealer and formulator recommends

several foliar fertilizer sprays during the season

Does foliar feeding improve tomato crop quality or yield?

Foliar feeding defined:

-Application of Fertilizers directly to plant surfaces

-Fertilizers (by definition) contain essential plant nutrients


Foliar feeding trials in 2017

Production Methods

- Determinate variety ‘Red Deuce’
- Grown on raised black plastic w/drip, single-row beds
- No staking or cages
- 2’ between plants, 6’ between rows = 3,630 plants/ac
- Pre-plant fertilizer/acre: 72 lbs N, 42 lbs P_2O_5, 78 lbs K_2O, 84 lbs Ca, 24 lbs S;
- N is polyacrylamide coated = “controlled release”
- High P fertilizer at transplanting


Study sites

FARM 1

- Loamy sand
- pH 6.2
- O.M. 1.5%
- Soil Test: all macros “below optimum” except P (“excessive”)
- No Rye cover

1.2 ac strip w/ 2 foliar sprays
1.2 ac strip w/o foliar sprays

FARM 2

- Sandy loam
- pH 6.2
- O.M. 3%
- Soil Test: all macros “optimum” except Ca (“below optimum”)
- No Rye cover

3/4 ac strip w/ 3 foliar sprays
3/4 ac strip w/o foliar sprays

URI

- Silt loam
- pH 6.7
- O.M. 3.4%
- Soil Test: all macros “optimum” except Ca (“excessive”)
- Rye cover turned in

4 plots w/ 3 foliar sprays
4 plots w/o foliar sprays

Total of 1/6 ac (50’ x 130’)

What was applied?

- Total of 5 different products of various analyses
- 4 liquid concentrates, 1 water soluble
- All tank-mixed with fungicide (but not at URI)
- 3 separate applications on Farm 2 and URI,

  2 times on Farm 1
- PRODUCT DETAILS LATER


Sampling for yield and quality

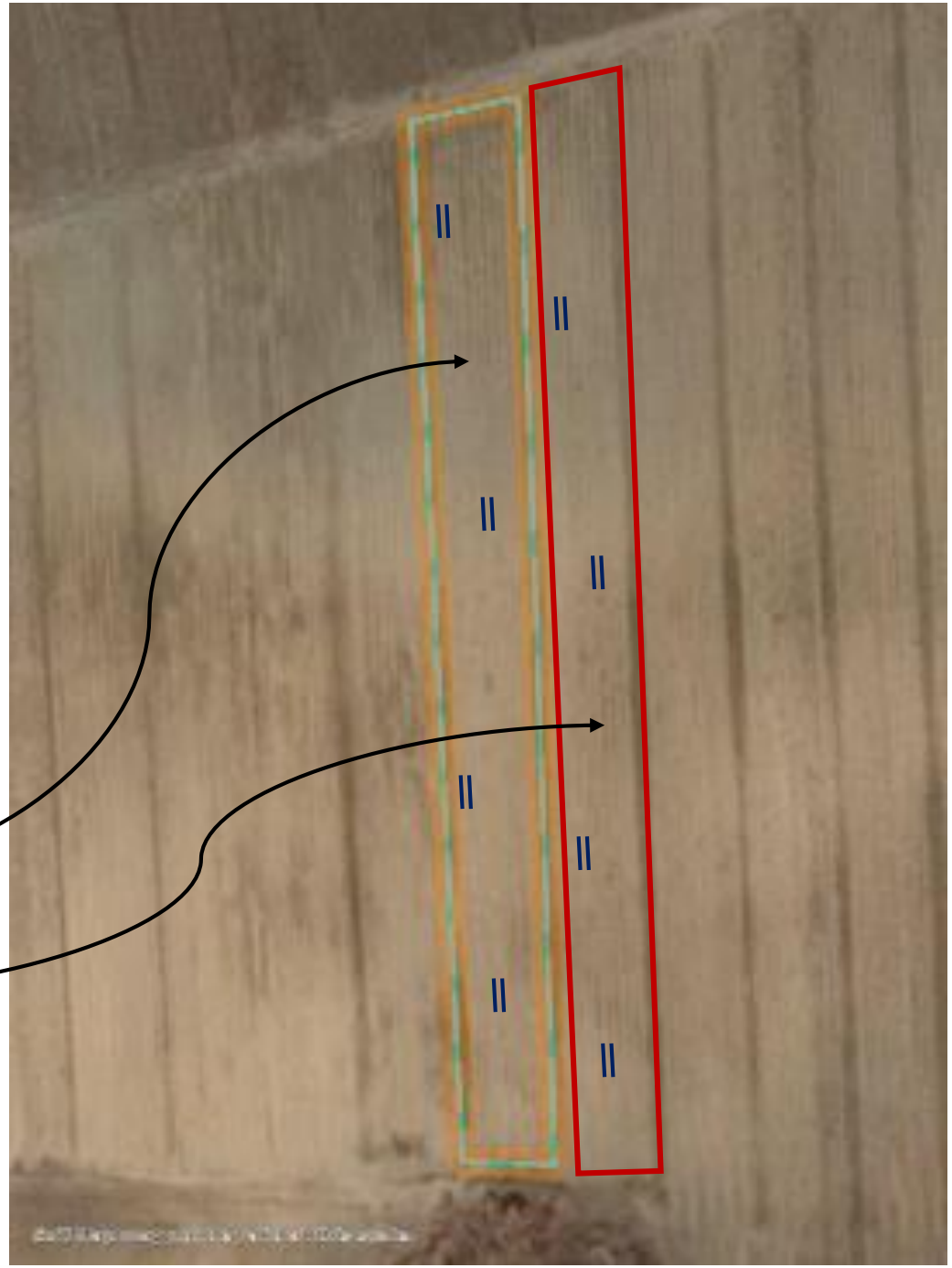

08/16/2017

Four subsamples from sprayed

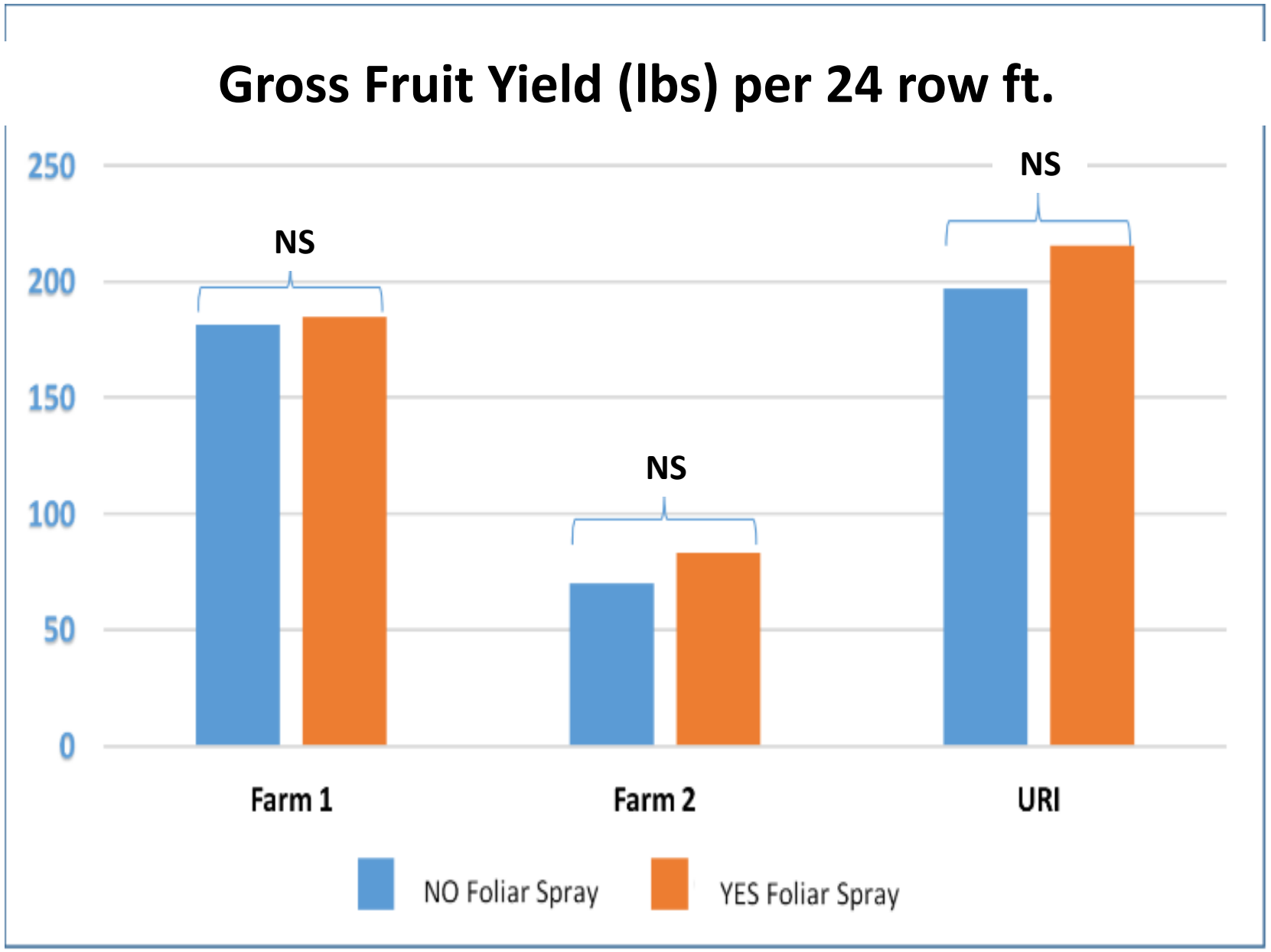
Four subsamples from unsprayed

Each subsample was 24 row-feet

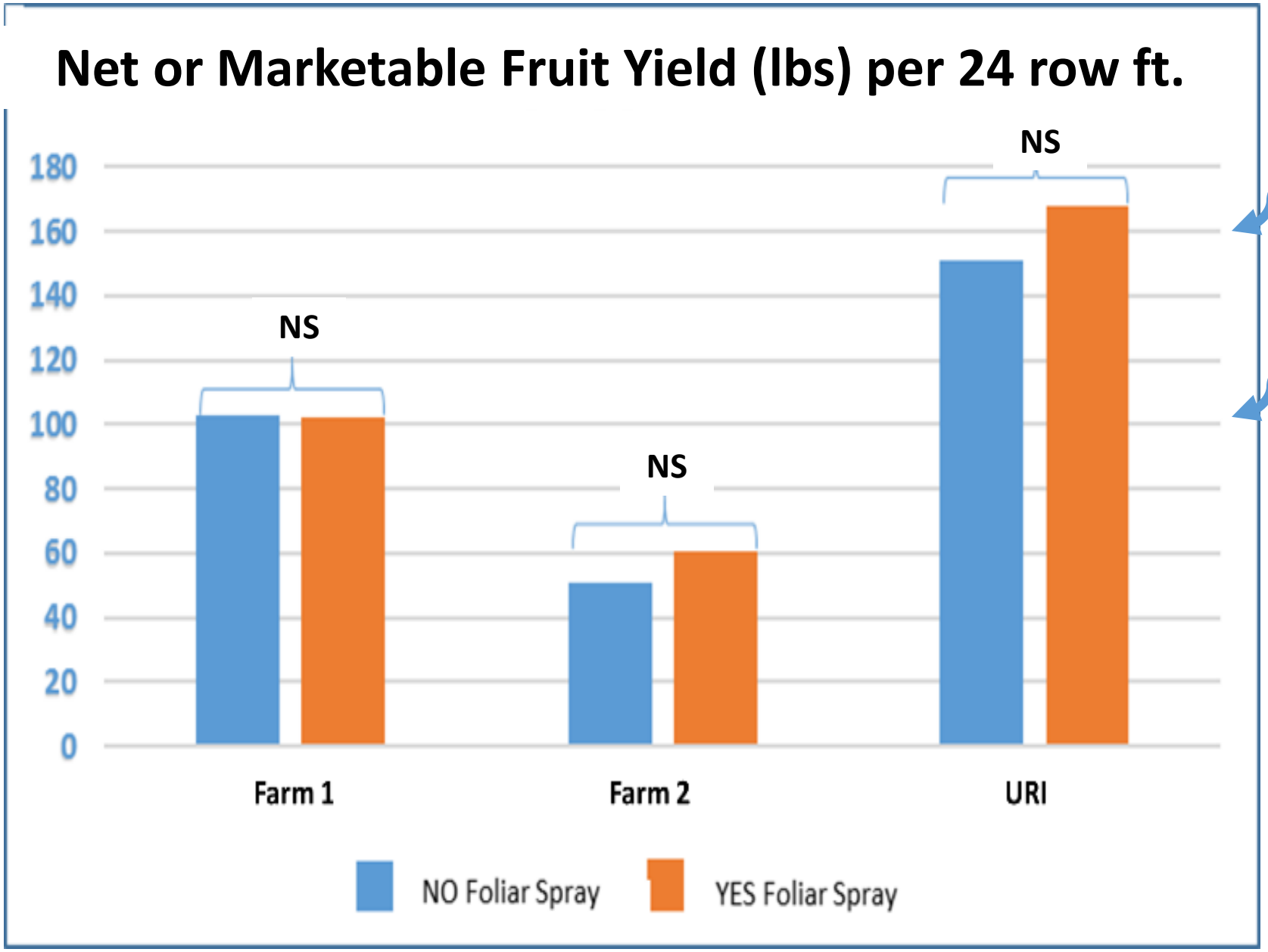
from all three sites




Results



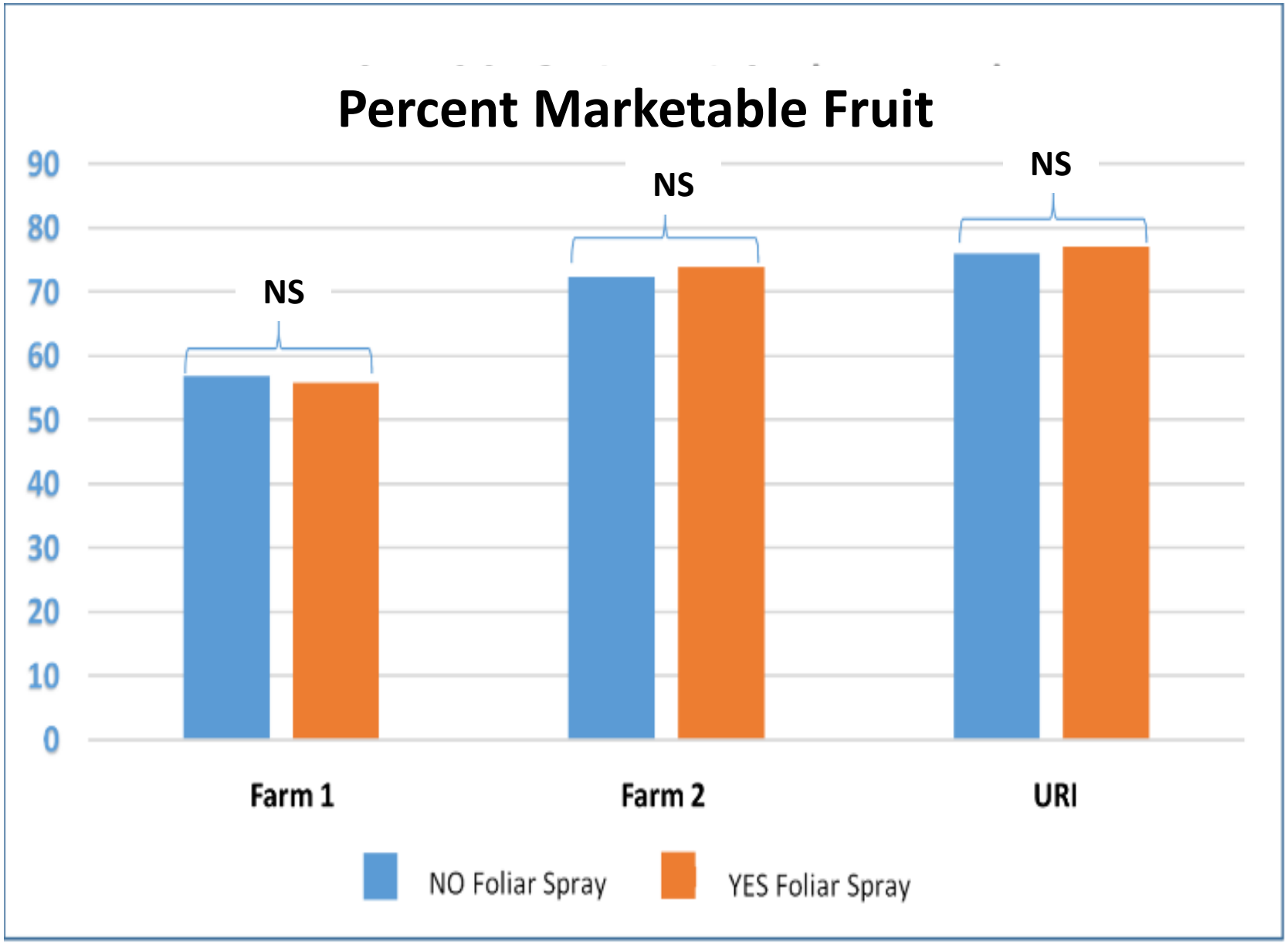
No difference between sprayed and unsprayed at all three sites [p>>0.05]



~25 T/ac

~15 T/ac

No difference between sprayed and unsprayed at all three sites [p>>0.05]



No difference between sprayed and unsprayed at all three sites [p>>0.05]

Unforeseen Circumstances…

Product Details

%N	%P_2O_5	%K_2O	Additional	Vol/ac	lbs/ac	Effective lbs/per ac (total)
4	0	0	24 Ca; UREA- N	4 qt	14	0.6 N, 3.4 Ca
3	0	8	Mostly UREA- N	3 qt	7.65	0.23 N, 0.6 K
3	0	15	Mostly UREA- N	3 qt	8.3	0.25 N, 1.2 K
3	0	20	8 S; 0.2 B; 0.1 Mn	6 qt	16.9	0.5 N, 3.4 K, 1.4 S, 0.04 B, 0.02 Mn
5	10	27	chelated Ca, Mg, Co, Cu, Mn and Zn, plus B and Mo	n.a.	3.12	0.16 N, 0.31 P, 0.84 K, 0.12 Ca, 0.05 Mg, miniscule amounts of micronutrients

Tissue Testing

- URI plants consistently had higher nutrient concentrations across the board except B and Cu
- Especially higher in N*, K*, Fe
- Farms fertigated with a lot of Zinc Humate- no real boost in tissue Zn

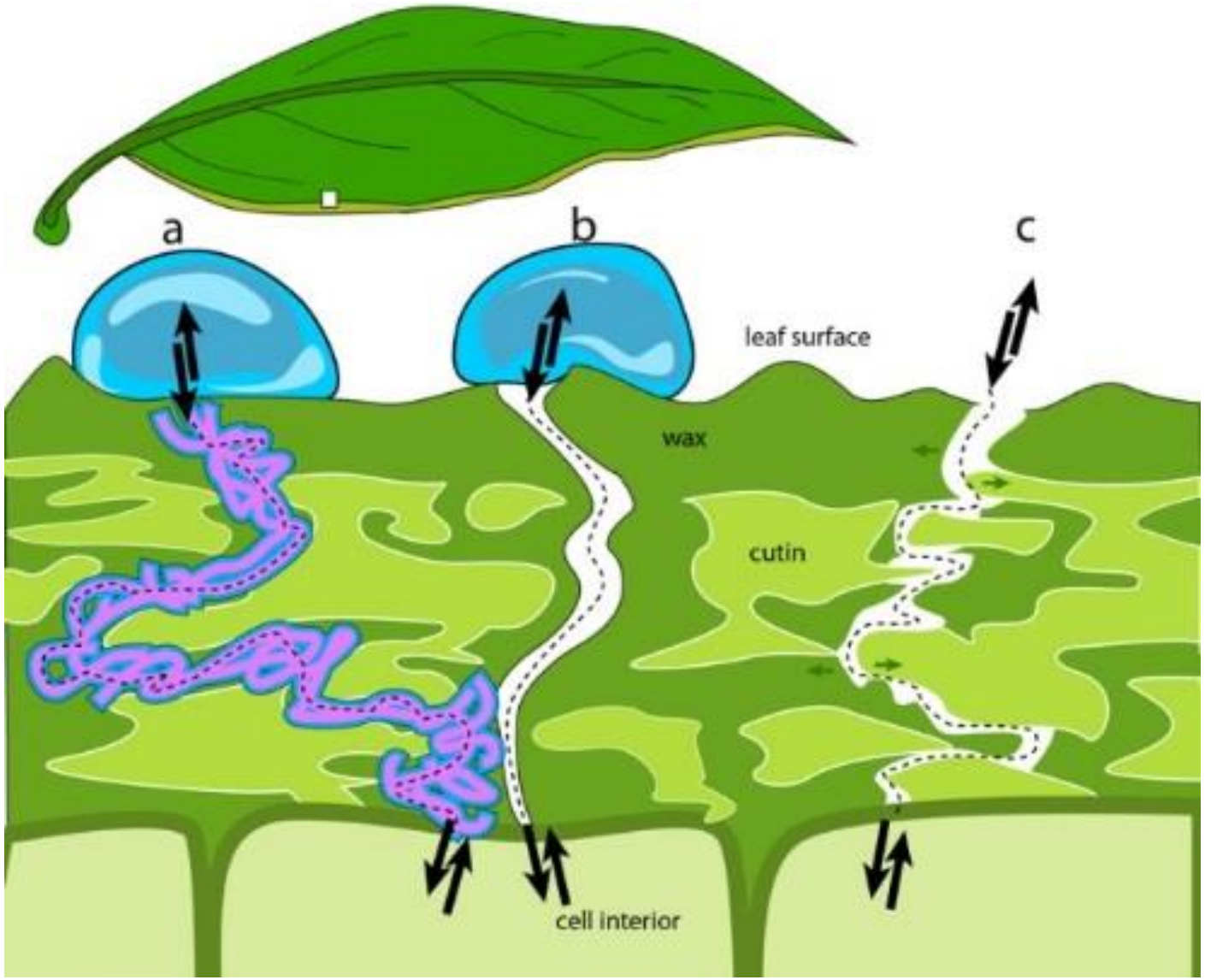
Interpretation

- We did not see significant differences between sprayed and unsprayed tomatoes but…
- There were a lot of problems:
  - **Fertigations may have masked any effects of foliar spraying, though not at URI**
  - **Bacterial Canker may have also masked effects- plants were maybe too sick to respond**
  - **Probably not an intensive enough foliar spray regimen**


Capsicum 22 days - from seed
NUTRI-WOW! Foliar spray
Untreated control

Nutrient molecules and ions mainly pass through “aqueous” pores in **cuticle**

Stomatal penetration unclear



MANY FACTORS influence ABSORPTION:

- Plant **SPECIES**
- Plant **PHYSIOLOGICAL STAGE**
- Plant **STRUCTURE**: fruit (young vs immature), leaf (new vs fully expanded), bracts, stems
- **ENVIRONMENTAL CONDITIONS** at the time of application
- **WATER SOLUBILITY** of active ingredient
- **SIZE** of molecules, **CHARGE** of molecules
- Tank **MIXING**

Thanks!

Our cooperating GROWER

Alex Wojtkowiak, Coastal Fellow student assistant

Gabriel Torphy, staff Research Assistant

Timothy Sherman, URI Farm Manager

Peter Naumann, RI's only Certified Crop Adviser (besides me)

Heather Faubert, fellow Extension Agent, Plant Diagnostician and No. 1 Steam-Blow-Off Receiver

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