# Results of Latest BMP Trials 2006-2007 season

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# Thanks, Thanks and Thanks to the “tomato growers” for creating a popular BMP program

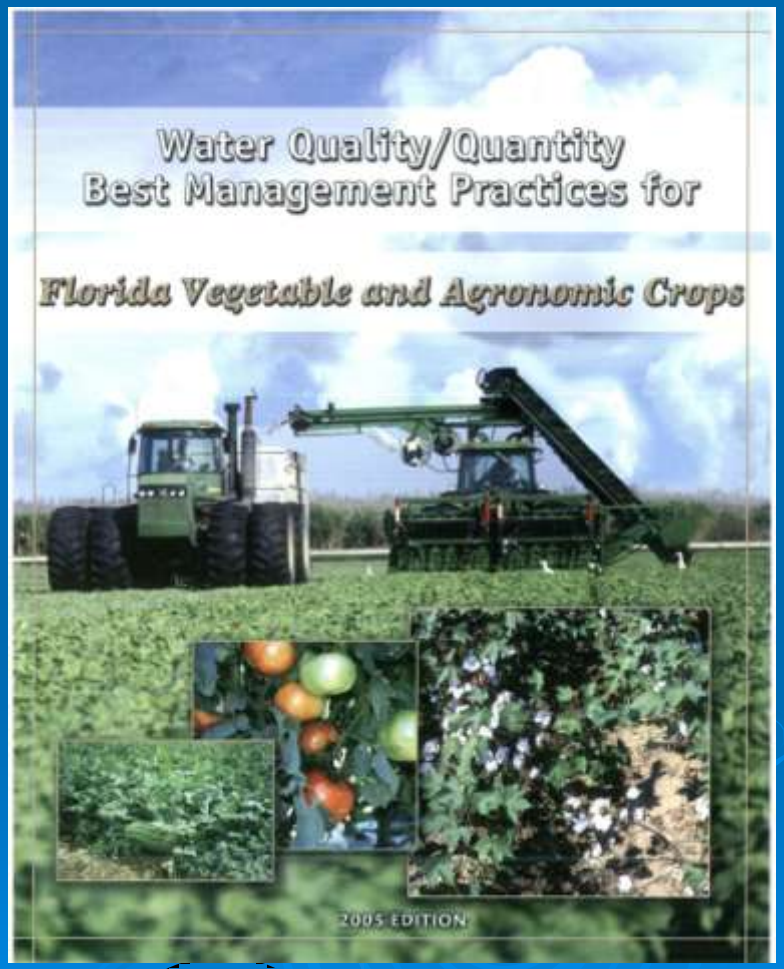
# BMP Background

- As a response to the Federal TMDL mandate, the Florida legislature passed the Florida Watershed Restoration Act.

- The legislation gave the Florida Department of Agriculture and Consumer Services (FDACS) the authority to develop BMP (Best Management Practices) to reduce pollutants loads in target watershed.

# BMP for Vegetables

DACS. Florida has been adopted by reference and by rule 5M-8 of the Florida Administrative code on February 9, 2006.'




- **DACS web-site:**
- http://www.floridaagwaterpolicy.com/PDF/Bmps/Bmp_VeggieAgroCrops2005.pdf
- http://swfrec.ifas.ufl.edu/bmp/vegetable

The BMP program is "voluntary"

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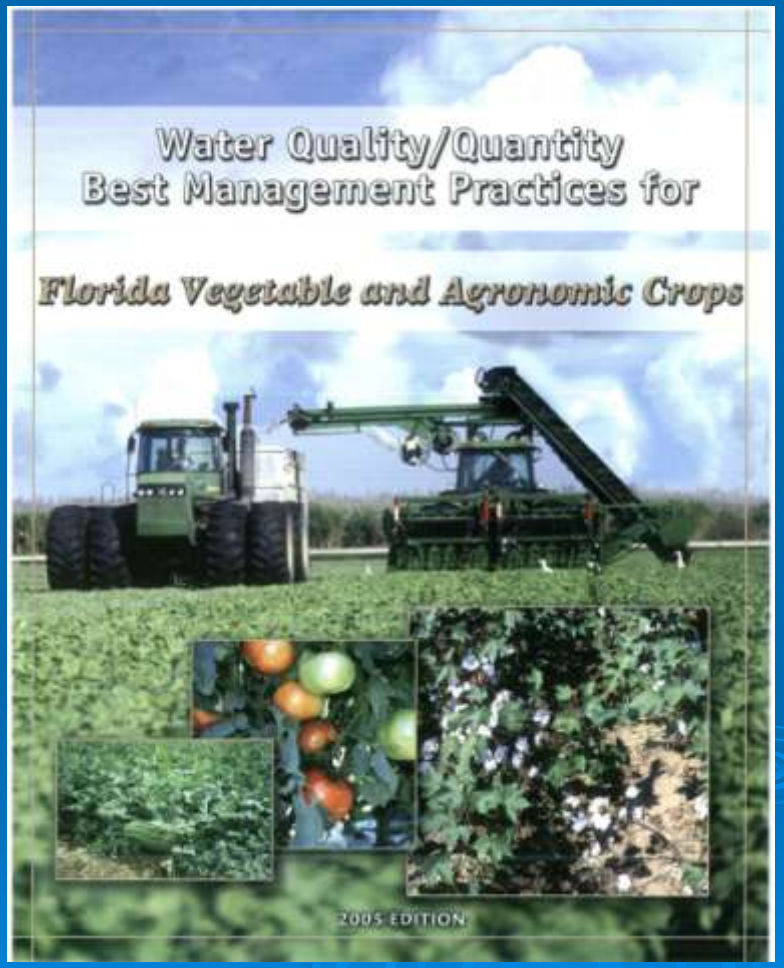
- Pesticide Management
- Conservation Practices and Buffers
- Erosion Control and Sediment Management
- Nutrient and Irrigation Management
- Water Resources Management
- Seasonal Farming Operations Management
- Appendix
- Total = 49 BMPs!



# Optimum fertilizer management/application (33)

1. Use UF/IFAS (200 lb/acre) or reputable published fertilizer recommendation.

2. If UF/IFAS rates are exceeded, 'grower are expected to employ additional nutrient and irrigation BMP's to negate possible environmental impacts' (A-8)

3. 'For farming operations in significantly impaired basins caused by nutrients, growers must strictly adhere to all recommendations set forth by the Basin Management Action Plan'

# Three years funding from DACS

1. Establish partnerships tomato growers to evaluate the effects of N rates under commercial growing conditions.

2. Evaluate the N rates on plant growth, disease incidences, and production.

3. Determine the optimal N rate and evaluate the cost effectiveness.

4. Propose, if needed, a change in N recommendation

**70% of the tomato production is in the Southwest Florida area: Collier and Manatee County in sandy soils**

# Experiment Locations

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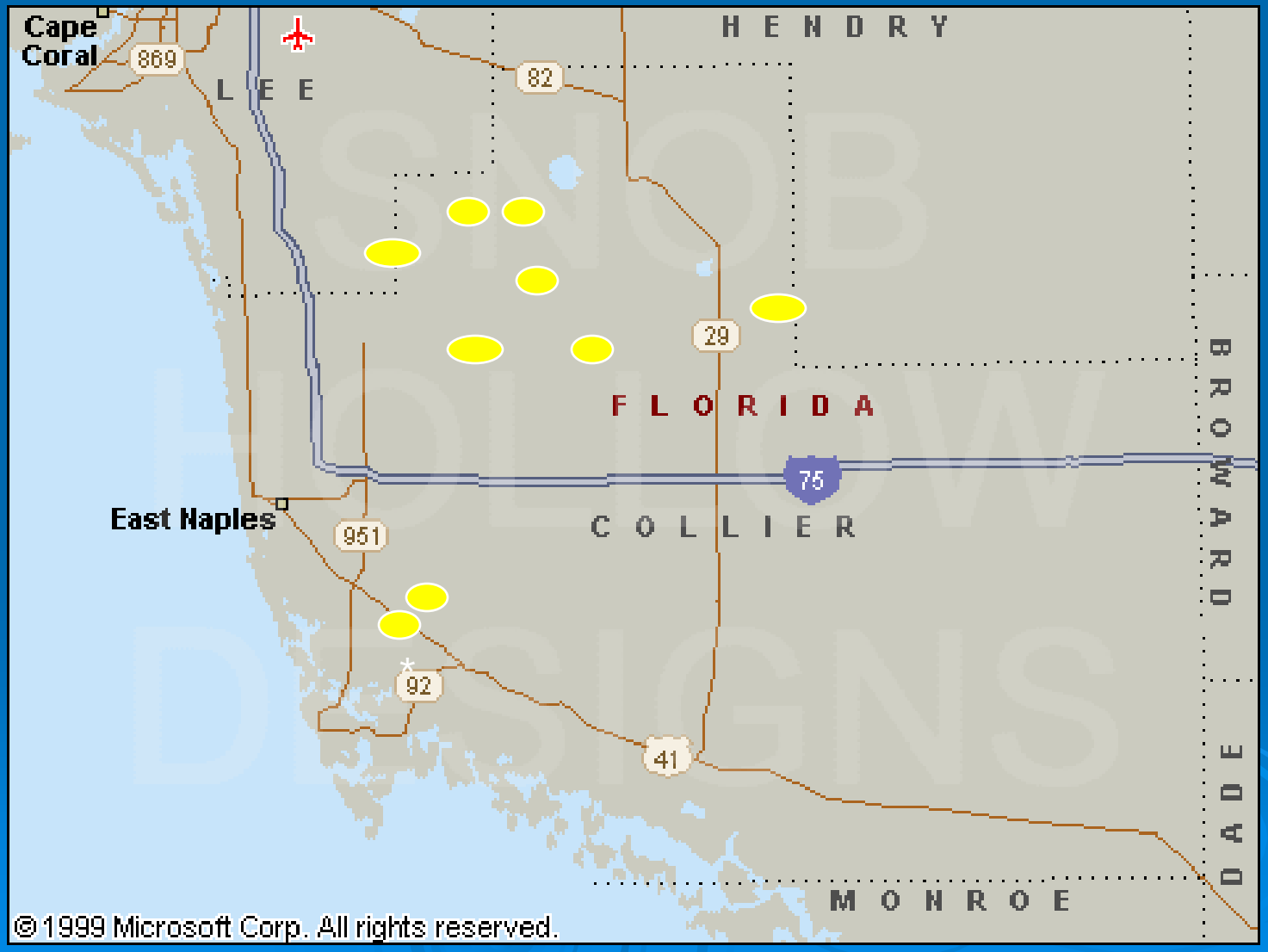
# Experiment Locations



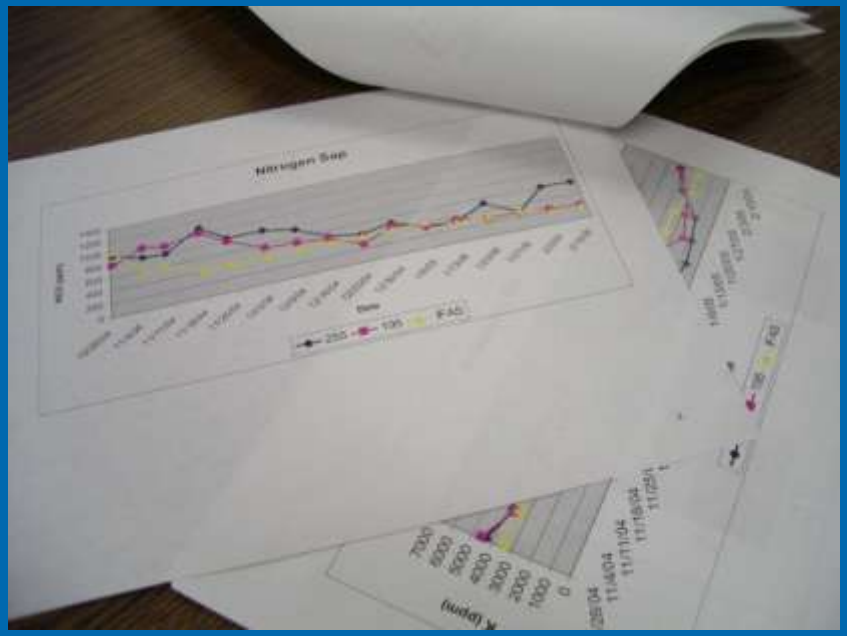
| Trial number | Location | Season | Irrigation type | N rate (lb/acre) | Exp size (acres) |
|---|---|---|---|---|---|
| 2006-07 (310 acres total BMP trials) | | | | | |
| 1 | Collier | Fall, Aug 31 | Seepage | 200 and 260 | 21 (CRD/3) |
| 2 | Collier | Winter, Oct 16 | Drip | 200 and 300 | 35 |
| 3 | Collier | Winter, Oct 17 | Seepage | 200, 250, 200+C | 1 (CRD/3) |
| 4 | Collier | Winter, Oct 26 | Seepage | 200 and 320 | 3 (CRD/3) |
| 5 | Collier | Winter, Nov 15 | Seepage | 200 and 260 | 21 (CRD/3) |
| 6 | Collier | Winter, Nov 27 | Drip | 200 and 300 | 50 |
| 7 | Palm Beach | Winter, Nov 21 | Seepage | 200 and 300 | 5.5 (CRD/3) |
| 8 | Palm Beach | Winter, Nov 24 | Seepage | 200 and 300 | 5.5 (CRD/3) |
| 9 | Collier | Spring, Feb 12 | Seepage | 200 and 260 | 18 (CRD/3) |
| 10 | Manatee | Spring, Feb 15 | Seepage | 20 to 420 | 0.4 (CRD4) |
| 11 | Manatee | Spring, Feb 19 | Drip | 225 and 330 | 19 (CRD/3) |
| 12 | Manatee | Spring, Feb 19 | Drip | 225 and 330 | 19 (CRD/3) |
| 13 | Manatee | Spring, Feb 19 | Drip | 225 and 330 | 13 (CRD/3) |

# Seepage Experiments


1
2
3
1
2
3

2-12 plots per treatment with 3 reps
10 plants per plot
3 harvests

4-12 plots per treatment
10 plants per plot
3 harvests




Weekly report to growers and IFAS

Final report to growers and final data set to IFAS


Fall Season
Aug-Oct 15
5 inches of rain
Trial 1
Seep Irrigation
Fall, 2006 (August 31)
21 acres


# Winter Season
# Oct 15 - Dec 15

**2-14 inches rain**


Trial 5
Seepage Irrigation
Winter, 2006 (Nov 15)
21 acres

# Winter Season
# Oct 15 - Dec 15
## 2-14 inches rain

Trial 6
Drip Irrigation
Winter, 2006 (Nov 27)
50 acres

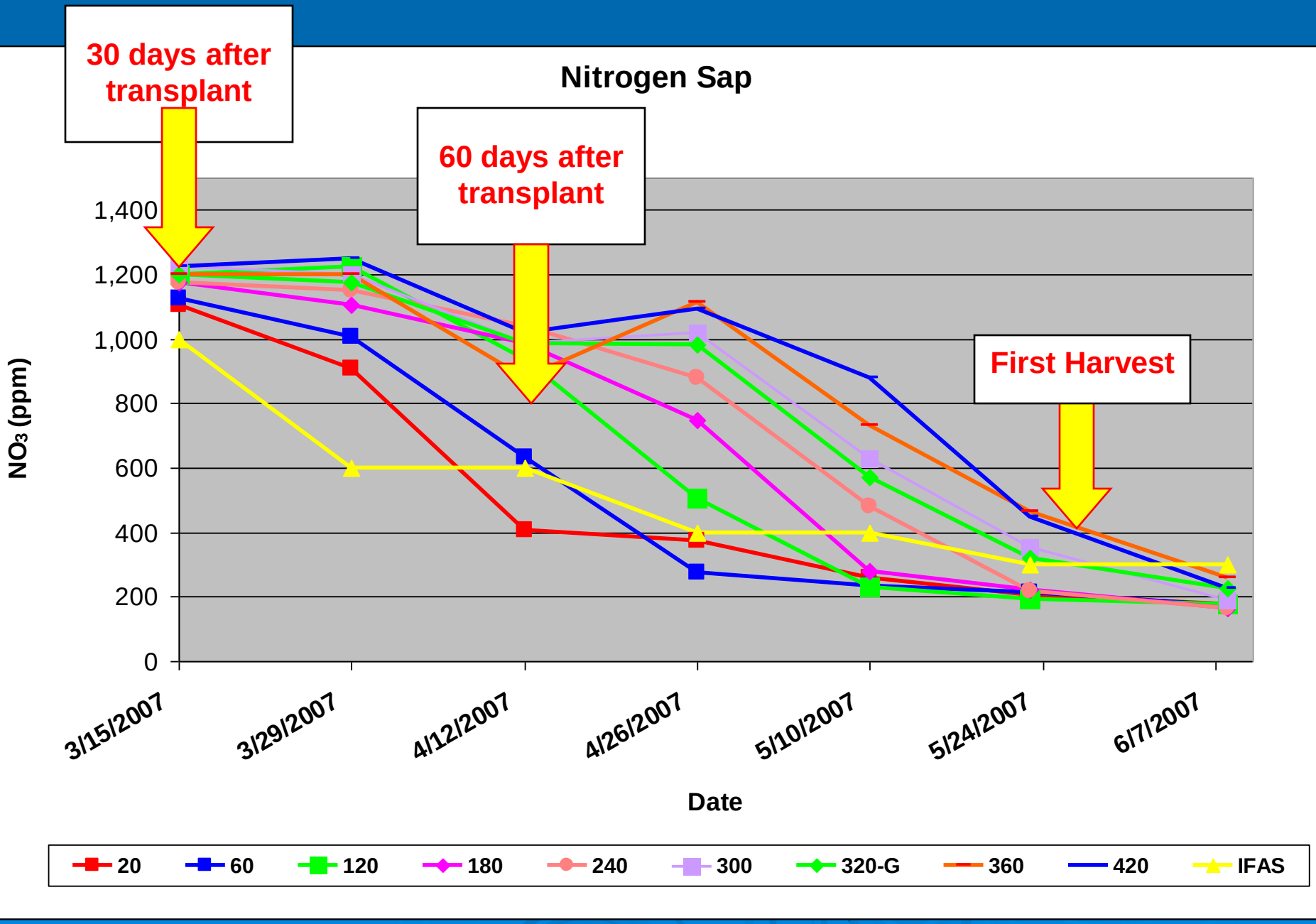
Trial 7-8
Seepage Irrigation
Winter, 2006 (Nov 22)
5.5 acres

# Spring Season
# Dec 15 – Feb 1 (10 inches rain)





# Results and Conclusions


30 days after transplant
60 days after transplant
First Harvest
Nitrogen Sap
1,400
1,200
1,000
800
600
400
200
0
NO3 (ppm)
3/15/2007
3/29/2007
4/12/2007
4/26/2007
5/10/2007
5/24/2007
6/7/2007
Date
20
60
120
180
240
300
320-G
360
420
IFAS


20


60


30 days
120


180

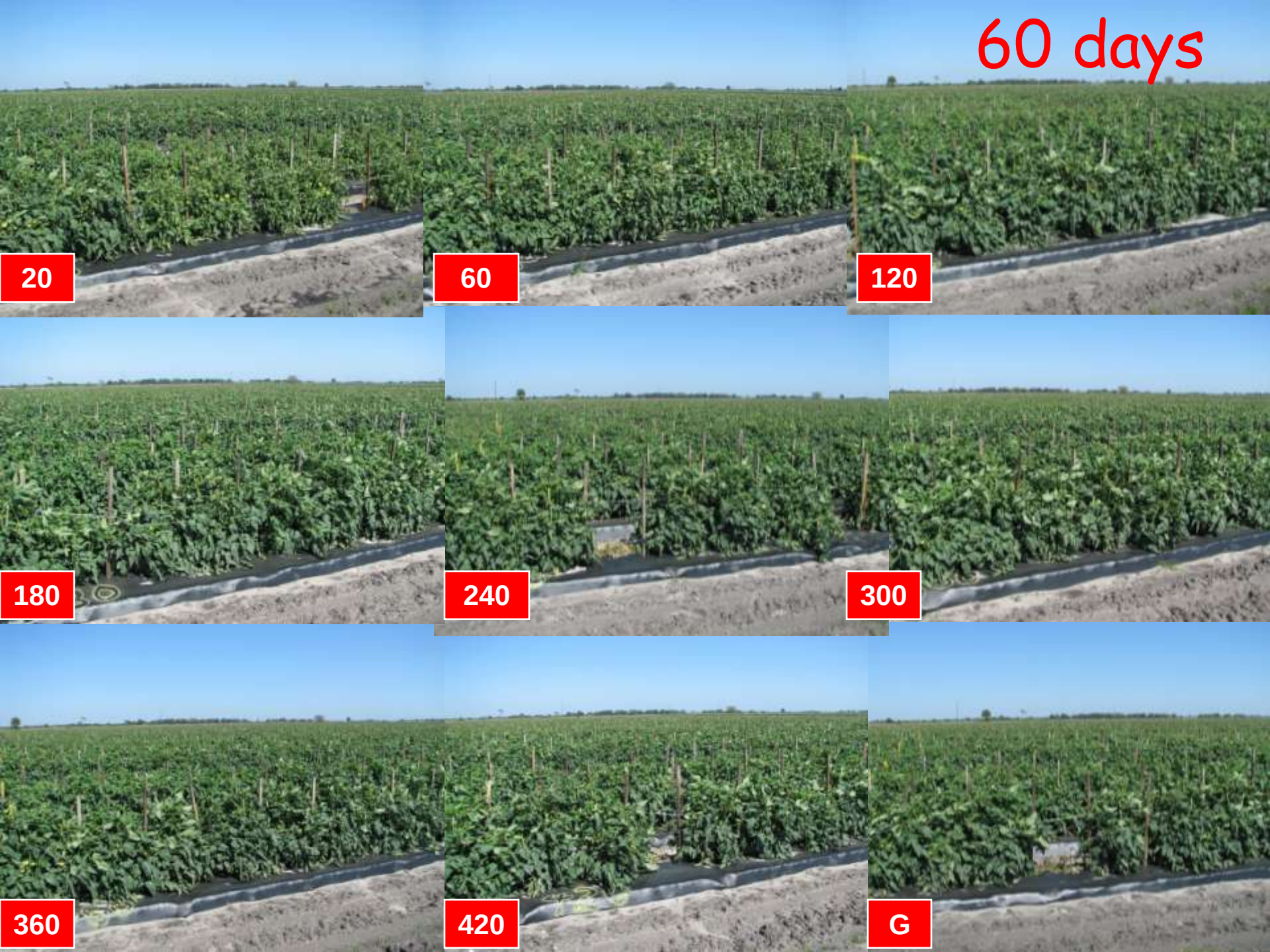

240

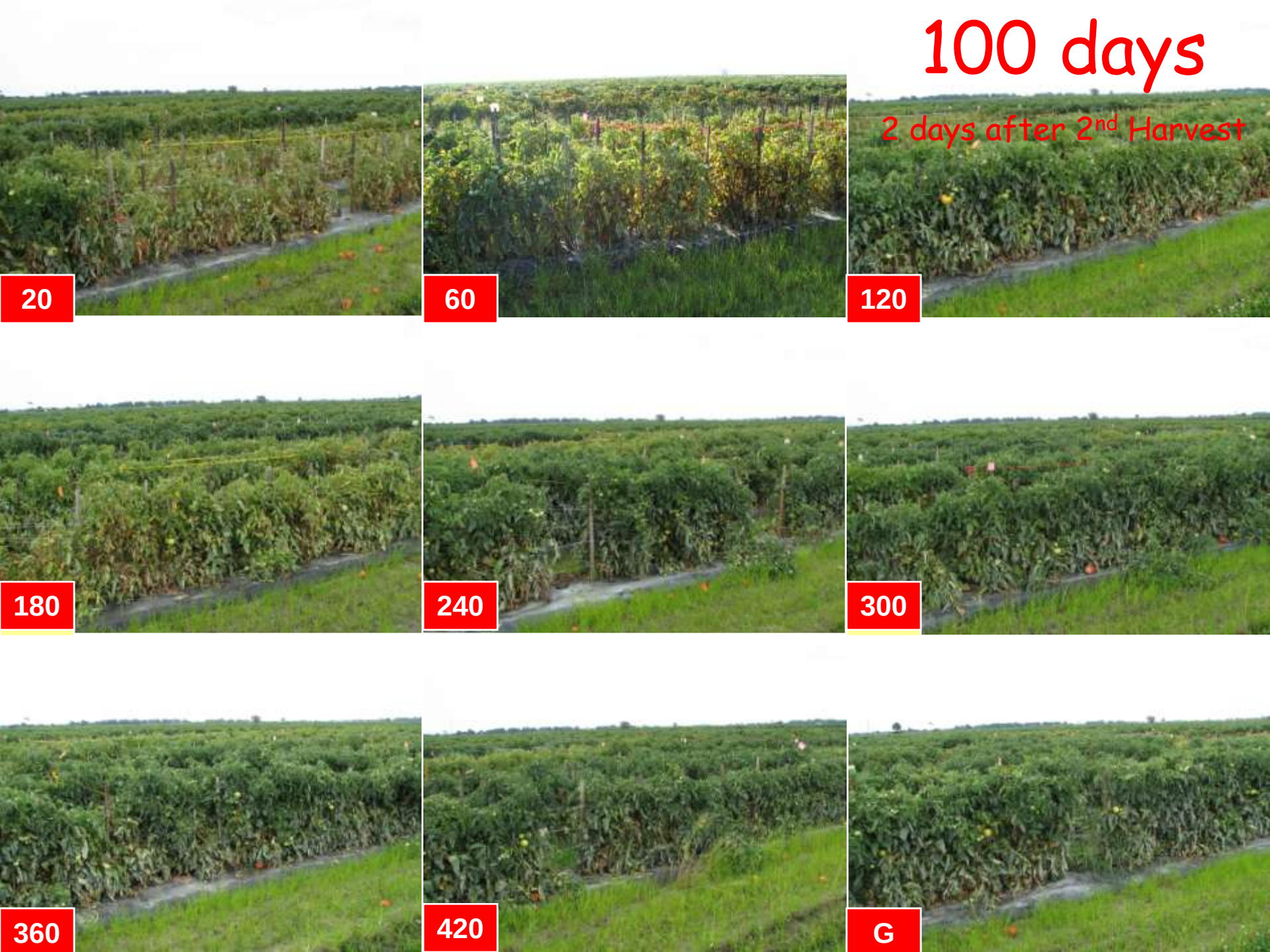

300

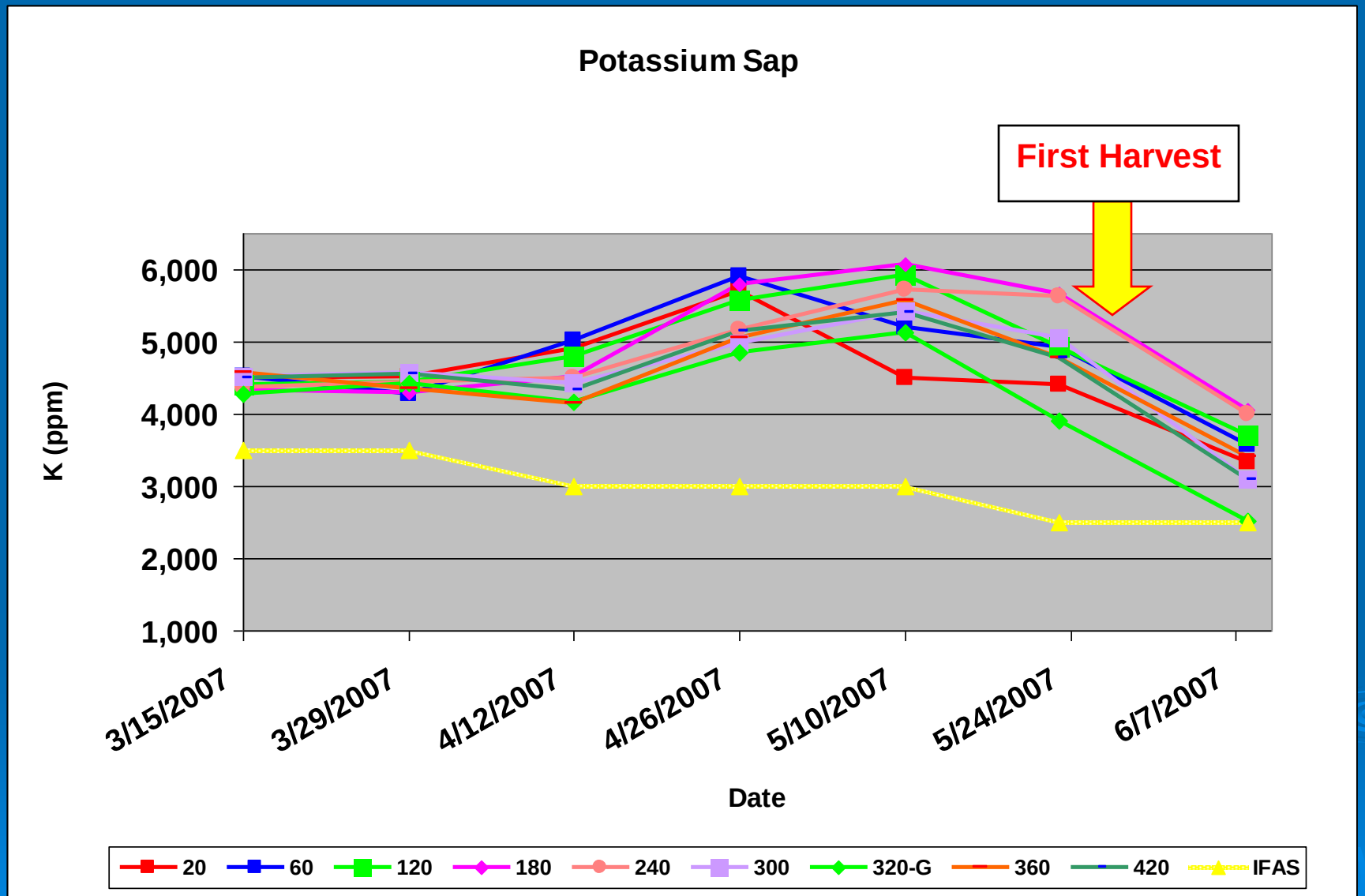

360


420


Grower


60 days
20
60
120
180
240
300
360
420
G


100 days
2 days after 2nd Harvest
20
60
120
180
240
300
360
420
G


Potassium Sap
First Harvest
K (ppm)
6,000
5,000
4,000
3,000
2,000
1,000
3/15/2007
3/29/2007
4/12/2007
4/26/2007
5/10/2007
5/24/2007
6/7/2007
Date
20
60
120
180
240
300
320-G
360
420
IFAS

| First Harvest N rate | | 5x6 | 6x6 | 6x7 | Total |
|---|---|---|---|---|---|
| | | Fall | | | |
| 1 | 200 to 260 | ns | ns | IFAS | ns |
| | | Winter | | | |
| 2 | 200 vs. 300 drip | GROWER | ns | GROWER | GROWER |
| 3 | 200, 250, 200+C | ns | IFAS | IFAS | ns |
| 4 | 200 vs. 320 | ns | ns | ns | ns |
| 5 virus | 200 vs. 260 | ns | ns | ns | ns |
| 6 | 200 vs. 300 drip | GROWER | IFAS | ns | ns |
| 7 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| 8 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| | | Spring | | | |
| 9 virus | 200 vs. 260 | ns | ns | ns | ns |
| 11 | 225 vs. 330 | ns | ns | ns | ns |
| 12 | 225 vs. 330 | ns | ns | ns | ns |
| 13 | 225 vs. 330 | ns | ns | ns | ns |

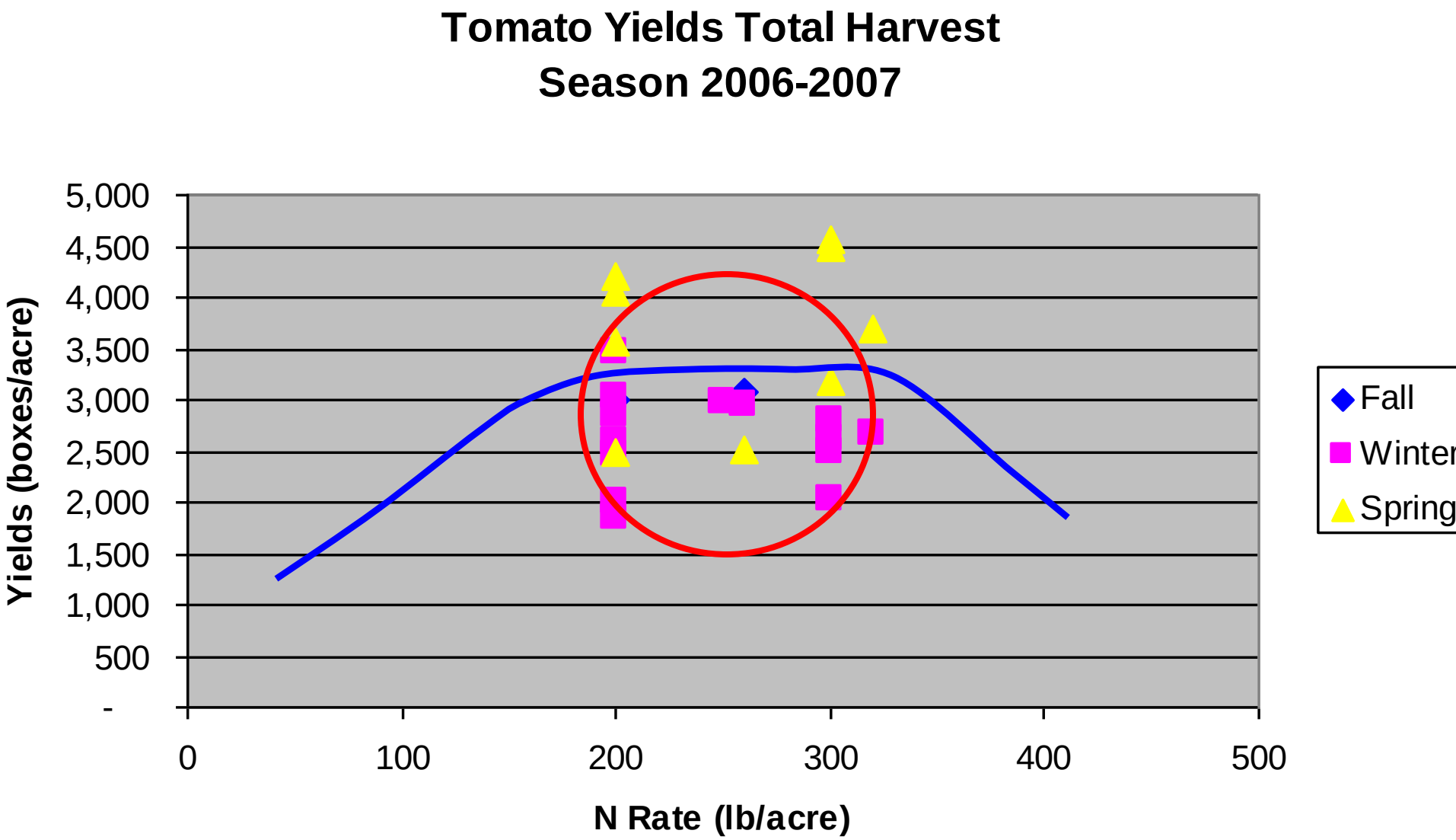
| Second Harvest N rate | | 5x6 | 6x6 | 6x7 | Total |
|---|---|---|---|---|---|
| | | Fall | | | |
| 1 | 200 to 260 | ns | ns | ns | ns |
| | | Winter | | | |
| 2 | 200 vs. 300 drip | ns | GROWER | GROWER | ns |
| 3 | 200, 250, 200+C | ns | ns | ns | ns |
| 4 | 200 vs. 320 | ns | GROWER | ns | ns |
| 5 virus | 200 vs. 260 | ns | IFAS | ns | ns |
| 6 | 200 vs. 300drip | ns | ns | IFAS | ns |
| 7 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| 8 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| | | Spring | | | |
| 9 virus | 200 vs. 260 | ns | ns | ns | ns |
| 11 | 225 vs. 330 | GROWER | ns | IFAS | ns |
| 12 | 225 vs. 330 | ns | ns | ns | ns |
| 13 | 225 vs. 330 | ns | ns | ns | ns |

| Third Harvest N rate | | 5x6 | 6x6 | 6x7 | Total |
|---|---|---|---|---|---|
| | | Fall | | | |
| 1 | 200 to 260 | ns | ns | ns | ns |
| | | Winter | | | |
| 2 | 200 vs. 300 drip | ns | ns | ns | ns |
| 3 | 200, 250, 200+C | ns | ns | ns | ns |
| 4 | 200 vs. 320 | ns | ns | ns | ns |
| 5 virus | 200 vs. 260 | ns | ns | ns | ns |
| 6 | 200 vs. 300 drip | GROWER | GROWER | GROWER | GROWER |
| 7 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| 8 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| | | Spring | | | |
| 9 virus | 200 vs. 260 | ns | ns | ns | ns |
| 11 | 225 vs. 330 | ns | ns | ns | ns |
| 12 | 225 vs. 330 | GROWER | GROWER | GROWER | GROWER |
| 13 | 225 vs. 330 | ns | ns | ns | ns |

| Total Harvest N rate | | 5x6 | 6x6 | 6x7 | Total |
|---|---|---|---|---|---|
| | | Fall | | | |
| 1 | 200 to 260 | ns | ns | ns | ns (+95G) |
| | | Winter | | | |
| 2 | 200 vs. 300drip | ns | GROWER | GROWER | ns (+179G) |
| 3 | 200, 250, 200+C | ns | ns | ns | ns (+106G) |
| 4 | 200 vs. 320 | ns | ns | ns | ns (+197G) |
| 5 virus | 200 vs. 260 | IFAS | IFAS | ns | IFAS |
| 6 | 200 vs. 300 drip | GROWER | ns | ns | GROWER |
| 7 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| 8 21%CRF | 200 vs. 300 | ns | ns | ns | ns |
| | | Spring | | | |
| 9 virus | 200 vs. 260 | ns | ns | ns | ns (+44G) |
| 11 | 225 vs. 330 | GROWER | IFAS | IFAS | ns(+298G) |
| 12 | 225 vs. 330 | ns | ns | ns | GROWER |
| 13 | 225 vs. 330 | ns | ns | ns | ns |

# Growers Trials 200 vs. 300

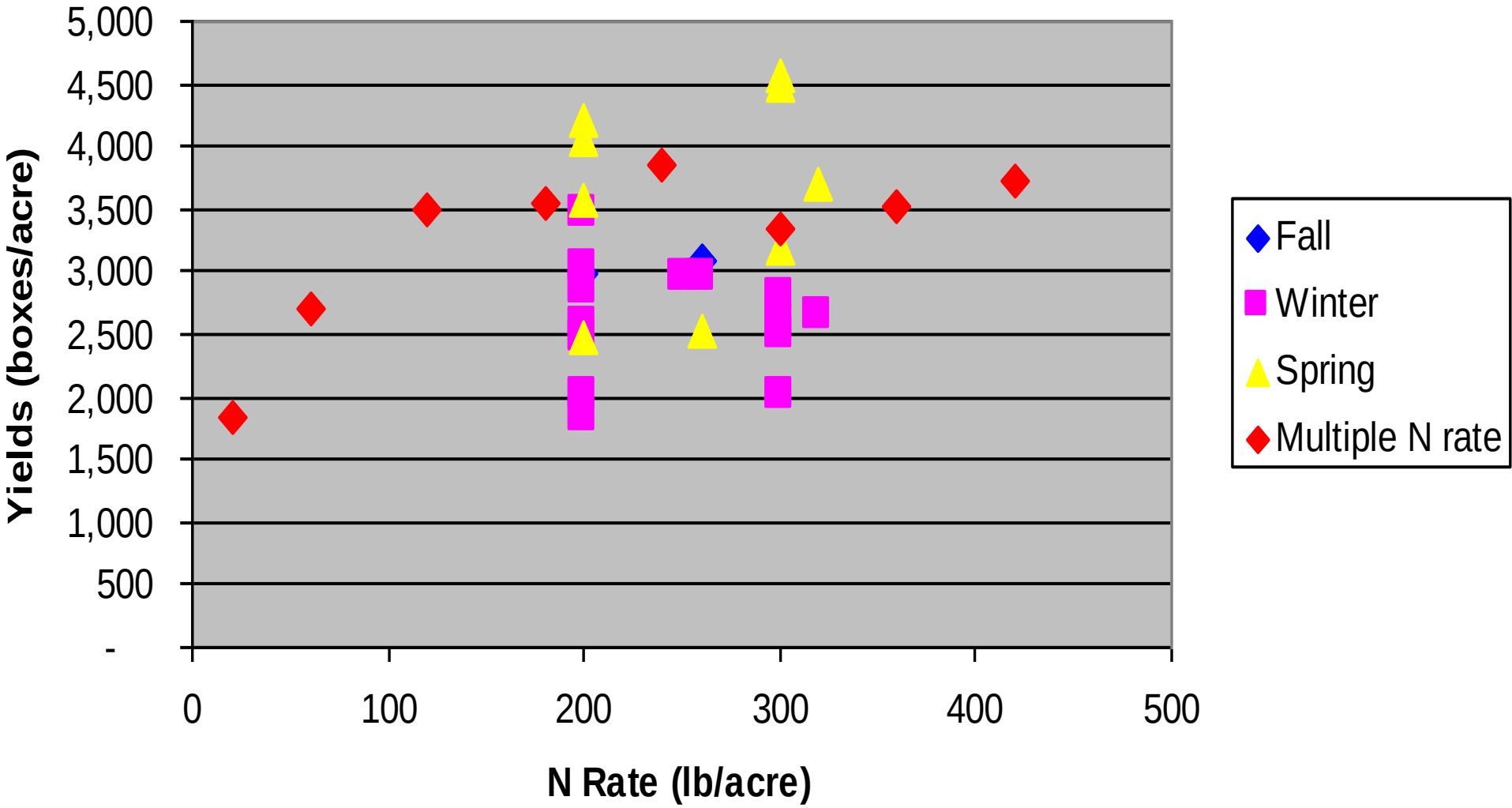
| Season | Acres | Tomato Type | Boxes/acres |
|---|---|---|---|
| Fall | 2 | Round | ns |
| Fall | 5 | Round | + 49G |
| Fall | 1 | Round | + 249G |
| Spring | 2 | Round | + 210G |
| Spring | 4 | Round | +130G |
| Spring | 3 | Plums | + 326G |
| Spring | 2 | Round | + 483G |
| Spring | 1 | Round | + 179G |
| Spring | 1 | Plums | + 42G |

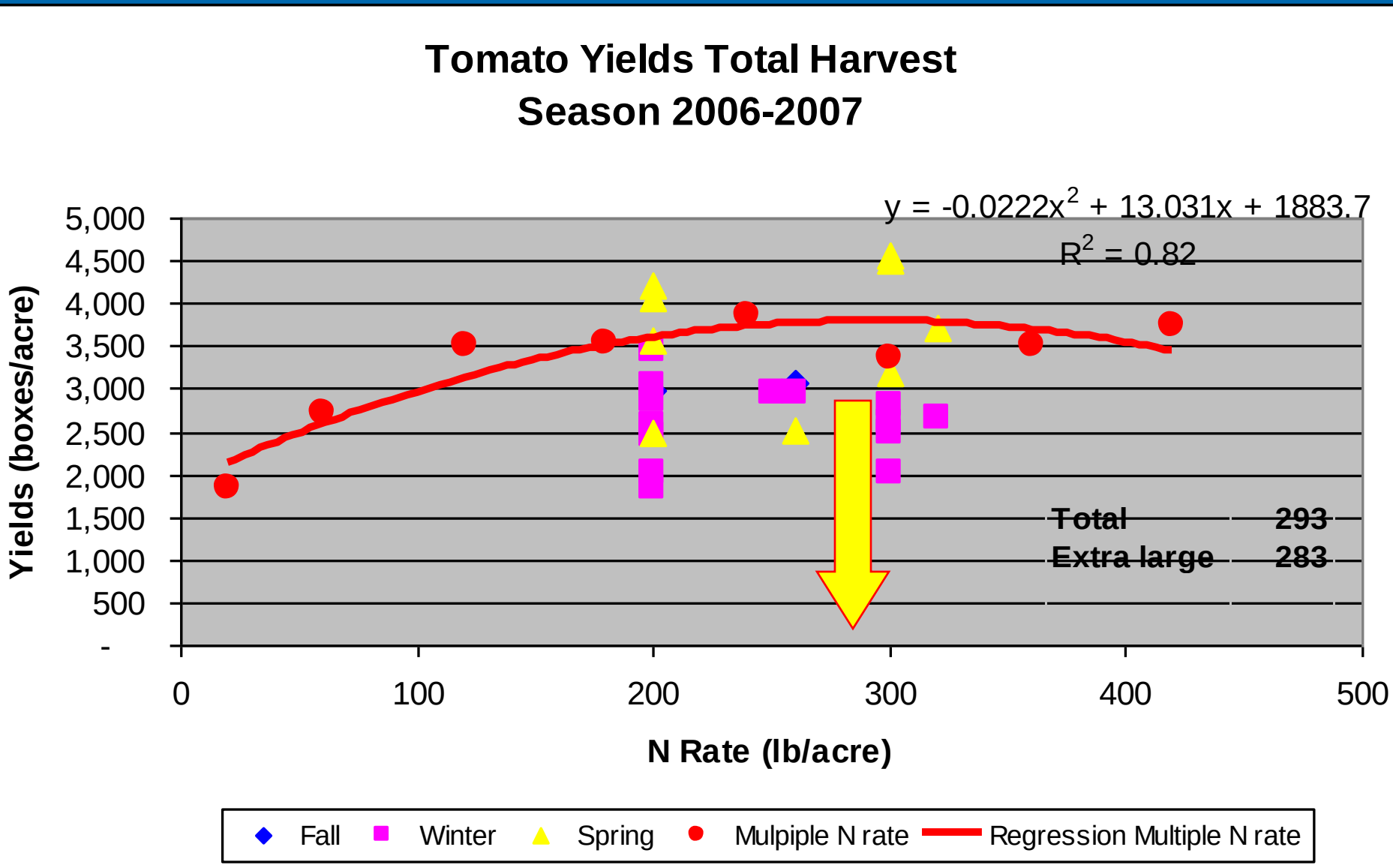

Tomato Yields Total Harvest
Season 2006-2007
Yields (boxes/acre)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
0
100
200
300
400
500
N Rate (lb/acre)
Fall
Winter
Spring

# Non-parametric approach Trends with higher N rates P<0.05

Total yield 8 (+) & 4 (-) = P 0.12 ns

# Tomato Yields Total Harvest
# Season 2006-2007




Tomato Yields Total Harvest
Season 2006-2007
y = -0.0222x2 + 13.031x + 1883.7
R2 = 0.82
Yields (boxes/acre)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
0
100
200
300
400
500
N Rate (lb/acre)
Total 293
Extra large 283
Fall
Winter
Spring
Mulpiple N rate
Regression Multiple N rate

# Conclusions

- On farm trials continue to be a growers preferred research for N BMP studies.
- Petiole sap $NO_3$-N concentrations between 200 and 300 lb of N/acre throughout the season tended to be above the UF-IFAS sufficiency and normally higher with higher N rates.
- In this a dry season, IFAS and grower rates produced significant higher yield in first harvest of extra-large tomatoes and total yields in 1 and 2 out of 13 trials ($P<0.05$)] respectively.
- The trend indicated an increase in total yield and first harvest extra-large and total extra-large fruit from 20 to 240 lb/acre N, but a plateau with higher rates of N.

# Recommendations

- **N Rate Strategies**: may be possible to reduce N rates especially when the risk of rainfall is low (winter, spring and dry year), or when only two harvests are expected (late spring).
- **Non-rate Strategies**: Cover crop, compost application, additives (such nitrogen inhibitors), CRF, etc.

# Where do we go from here?

- Continue with multiple N rates trials Tomato and peppers (fall and spring)
- CRF fertilizer trials (tomato and pepper)
- Maybe working with other tomato types such as grapes tomatoes

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- Website:

http://swfrec.ifas.ufl.edu/bmp/vegetable/