UF-IFAS Nitrogen Fertilization and Management Recommendations for Fresh Tomato Production in Florida in the BMP Era

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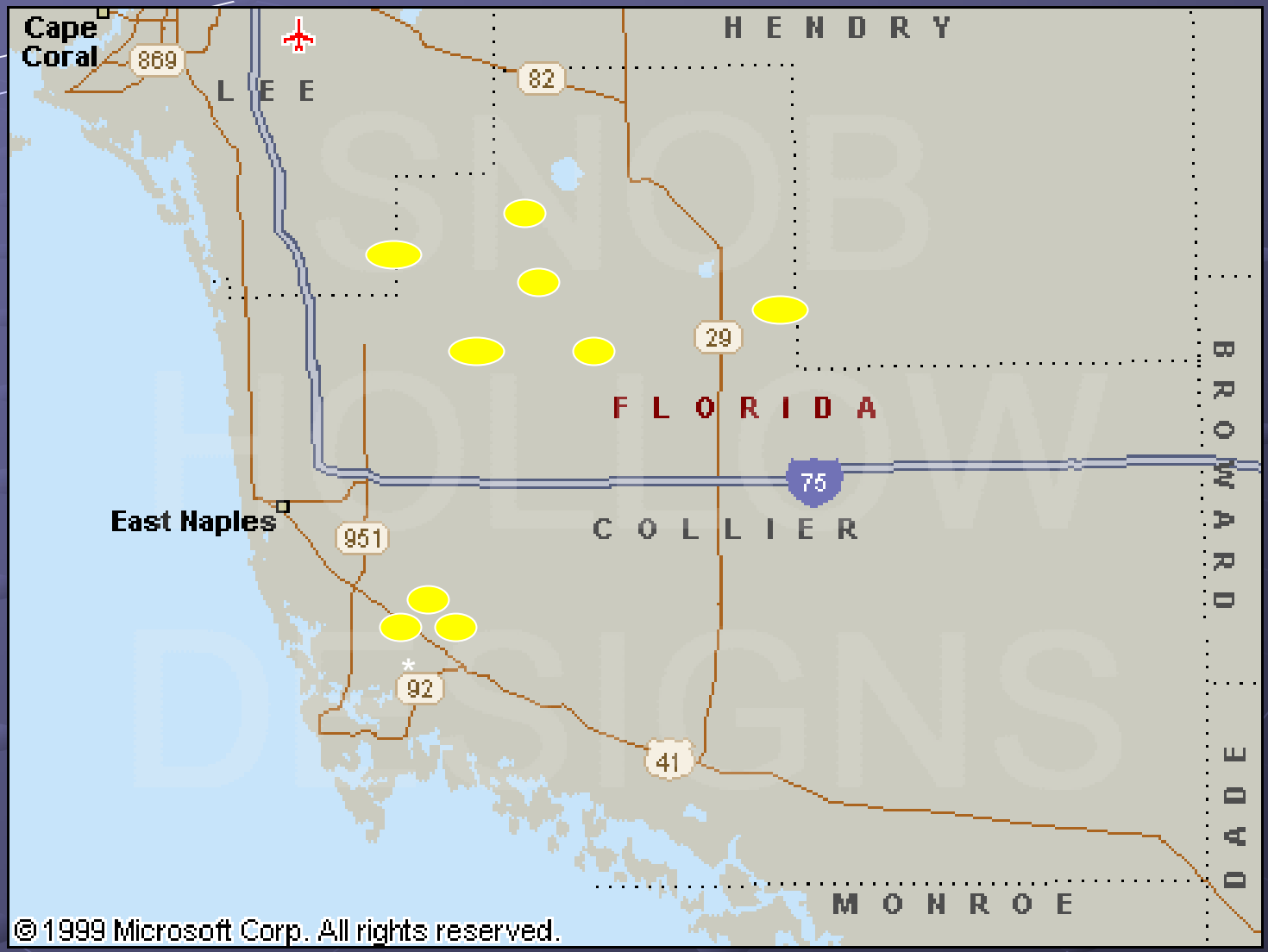
Objectives

- Establish partnerships with selected southwest Florida vegetable growers to evaluate the effects of N nutrient applications under commercial growing conditions;
- Evaluate the effect of selected N application rates on plant growth, disease incidences, and production;
- Determine the optimal N rate for tomato production and evaluate the cost effectiveness of selected N application rates;
- Propose, if needed, a change in N recommendation to PNOC
- Develop an Extension plan to demonstrate the updated N recommended rate and facilitate the adoption of nutrient BMPs by the industry.

Experiment Locations

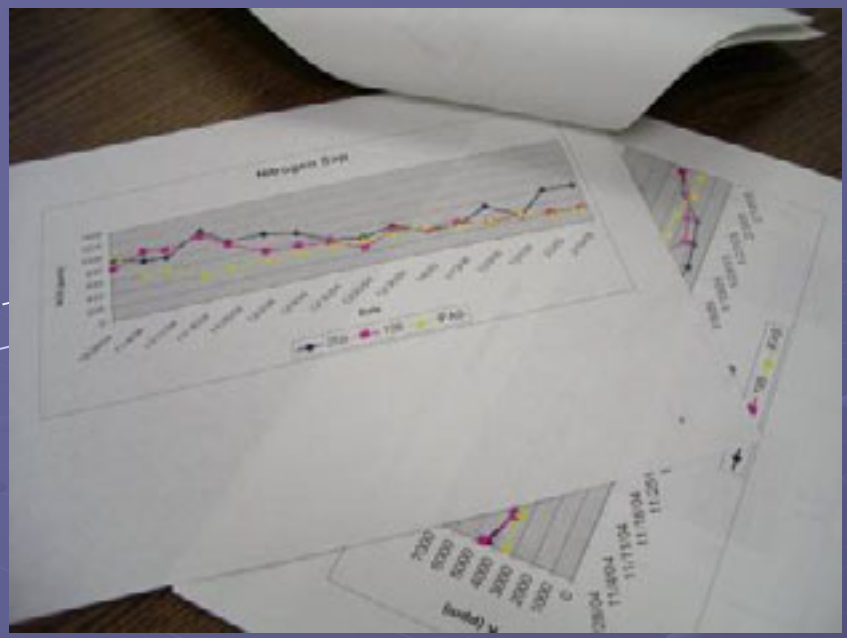


Nitrogen Rates

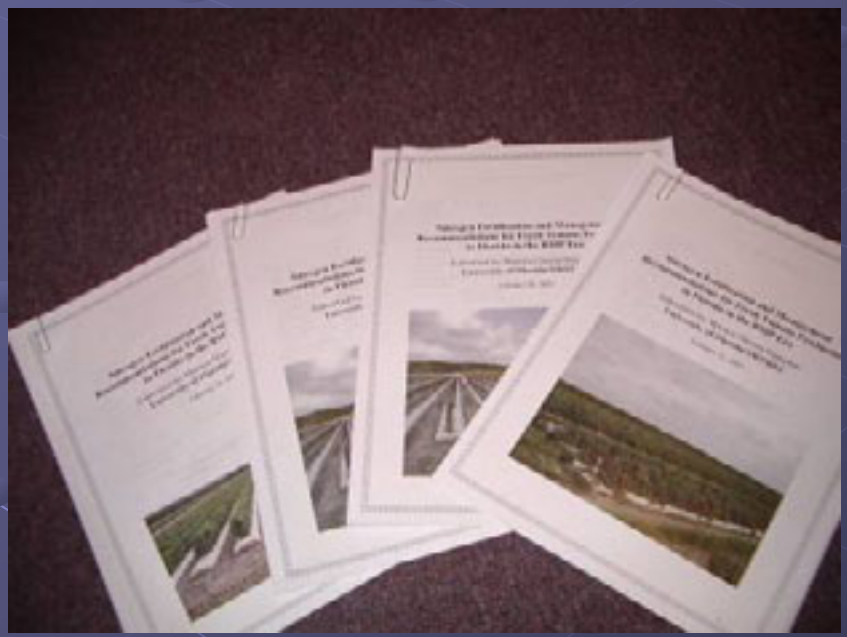
Farm	Season	Irrigation Type	N (lb/acre)	Plot size (acre)
1	Fall	Seep	200, 240, 260, 260 plus biosolids	0.33
2	Fall	Seep	195 and 255	0.83
2	Fall	Seep	195 and 255	0.83
2	Spring	Seep	195 and 255	0.83
3	Spring	Seep	200 and 300	0.83
4	Fall	Drip	250 and 418	0.10
5	Fall	Drip	200 and 300	50
5	Fall	Drip	200 and 300	35
5	Spring	Drip	200 and 300	50

Seep Experiments

6 plots per treatment
10 plants per plot
3 harvests



Weekly report to growers and IFAS



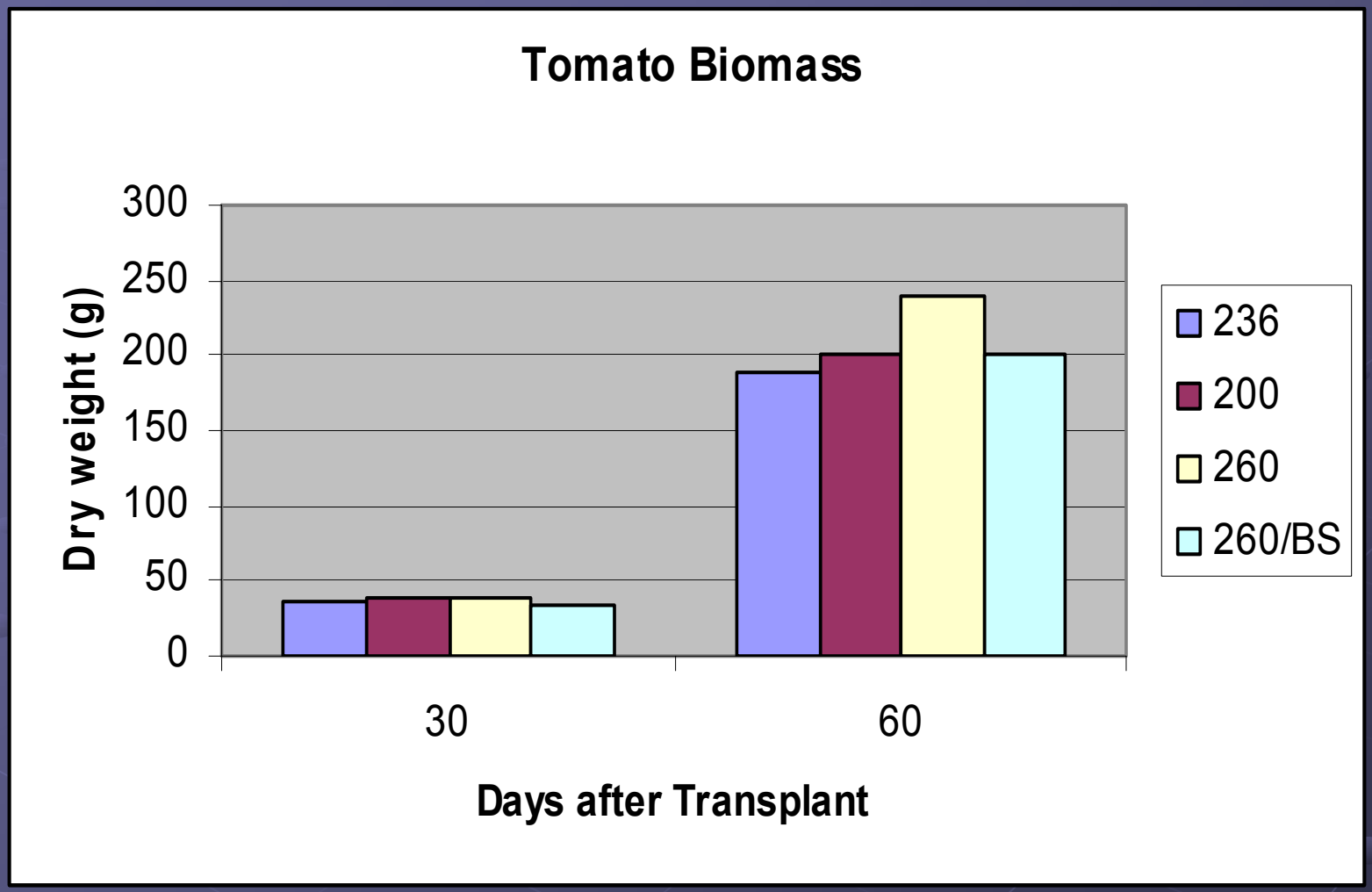
Final report to growers and final data set to IFAS

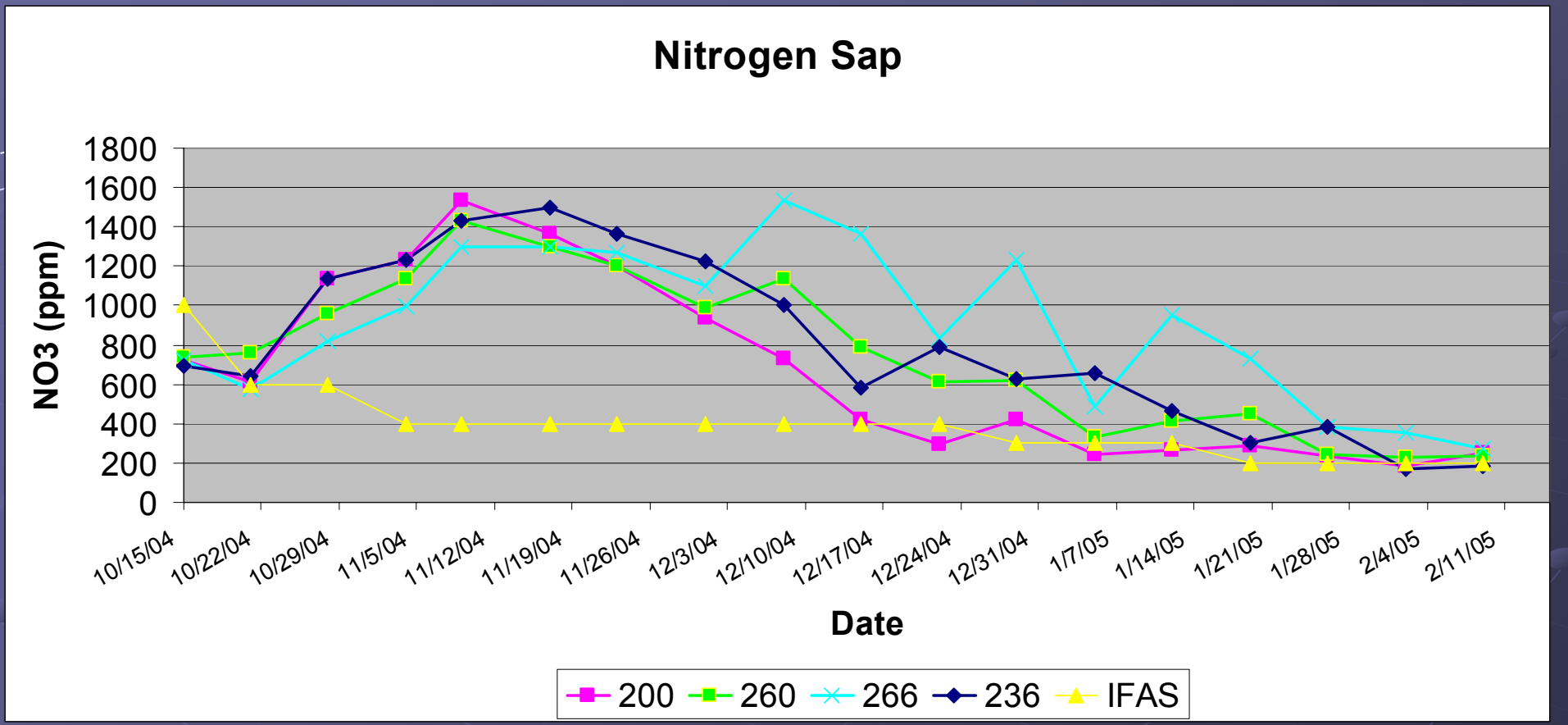

Farm # 1
Seep Irrigation
Fall, 2004
200 lb/N

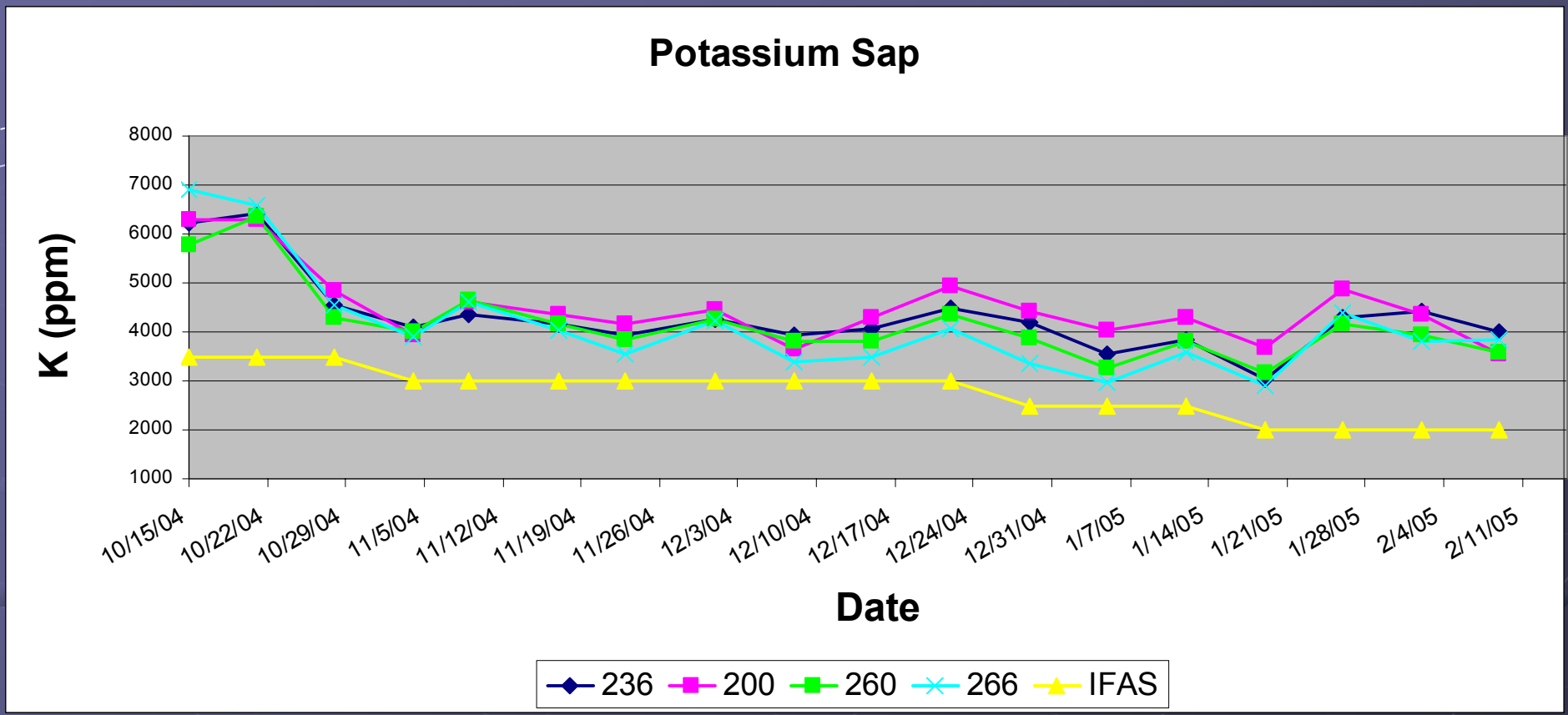
Field History

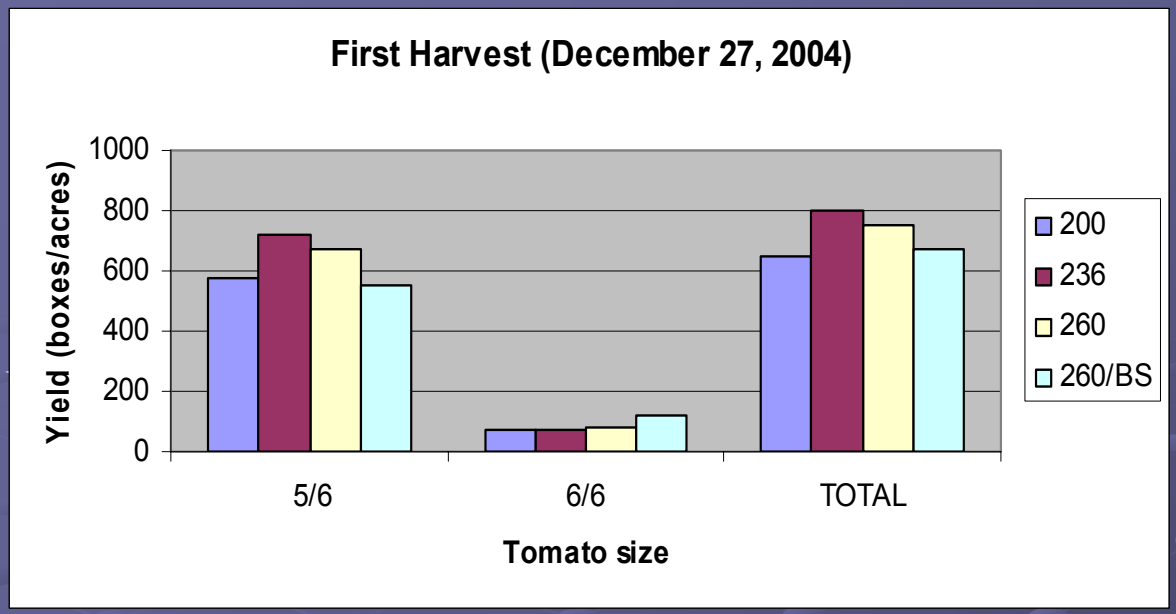
Farm acreage	1,300
N Rates (lb/acre)	200 to 260 plus BS
IFAS rate (top mix)	1200 lb/a (15-0-26)
Irrigation	Seepage
Plot size	0.33 acre
Planting Date	28-Sep-04
Cell Size	242
Fumigation	Methyl Bromide
Linear ft per acre	7,260
Plant population	4,840
Bed Heigth	8 in
Plant Spacing	18 in
Row run	North - South
Monitoring Wells	4
Harvest Date	
1st	27-Dec-04
2nd	19-Jan-05
3rd	8-Feb-05

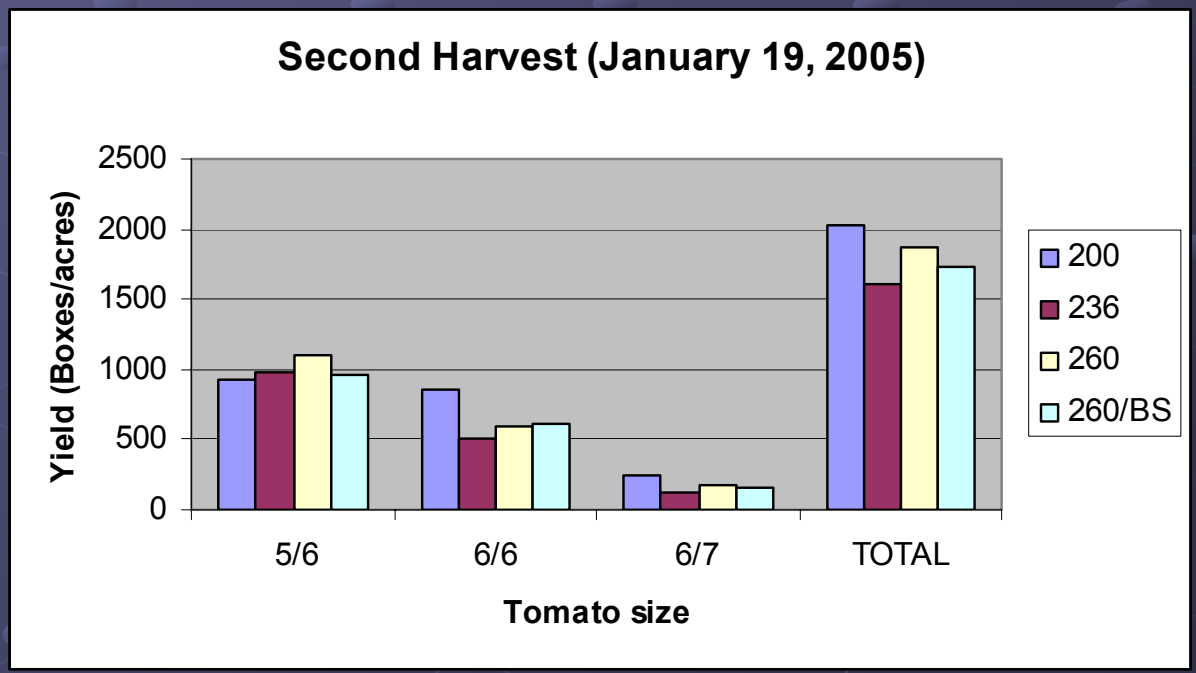
	Soil Analysis (ppm)
pH	6.6
Phosphorus	>145
Potassium	11
Magnesium	>208
Calcium	>1024

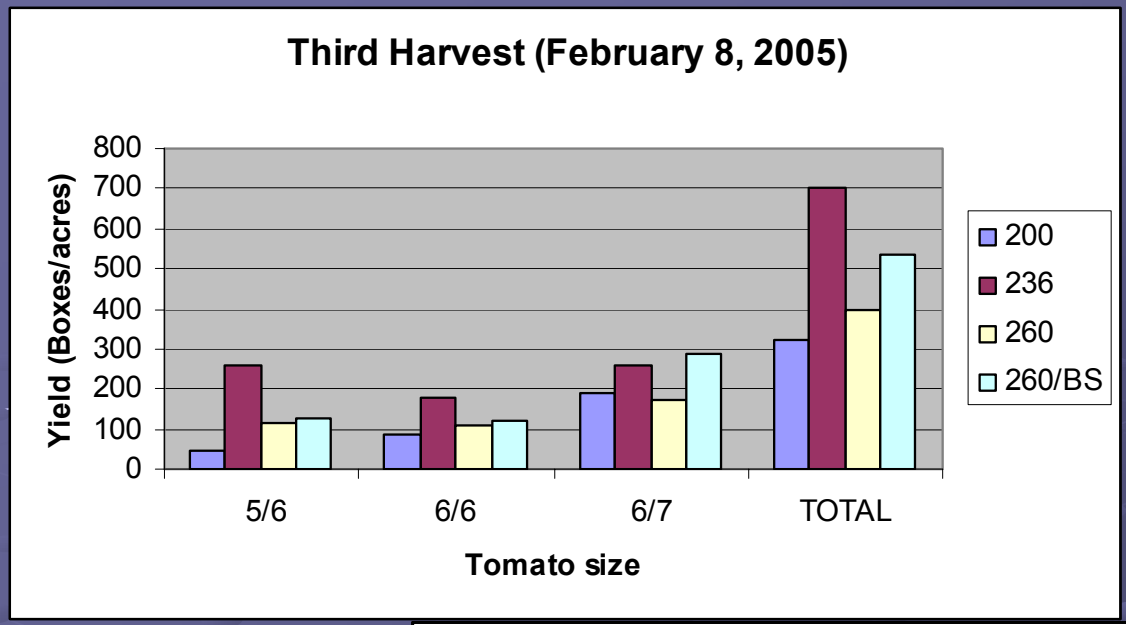

Tomato Biomass
Dry weight (g)
300
250
200
150
100
50
0
30
60
Days after Transplant
236
200
260
260/BS

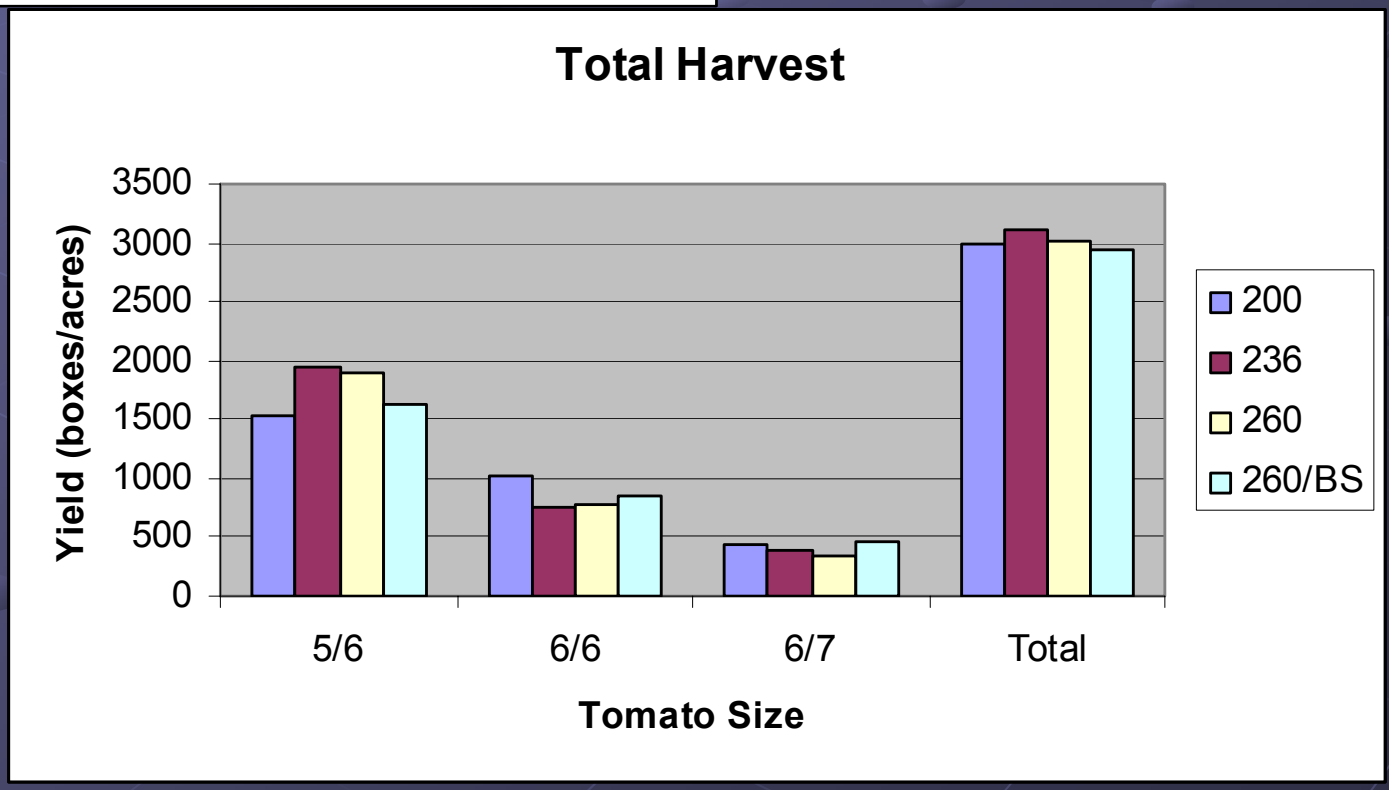

Nitrogen Sap
NO3 (ppm)
1800
1600
1400
1200
1000
800
600
400
200
0
10/15/04
10/22/04
10/29/04
11/5/04
11/12/04
11/19/04
11/26/04
12/3/04
12/10/04
12/17/04
12/24/04
12/31/04
1/7/05
1/14/05
1/21/05
1/28/05
2/4/05
2/11/05
Date
200
260
266
236
IFAS

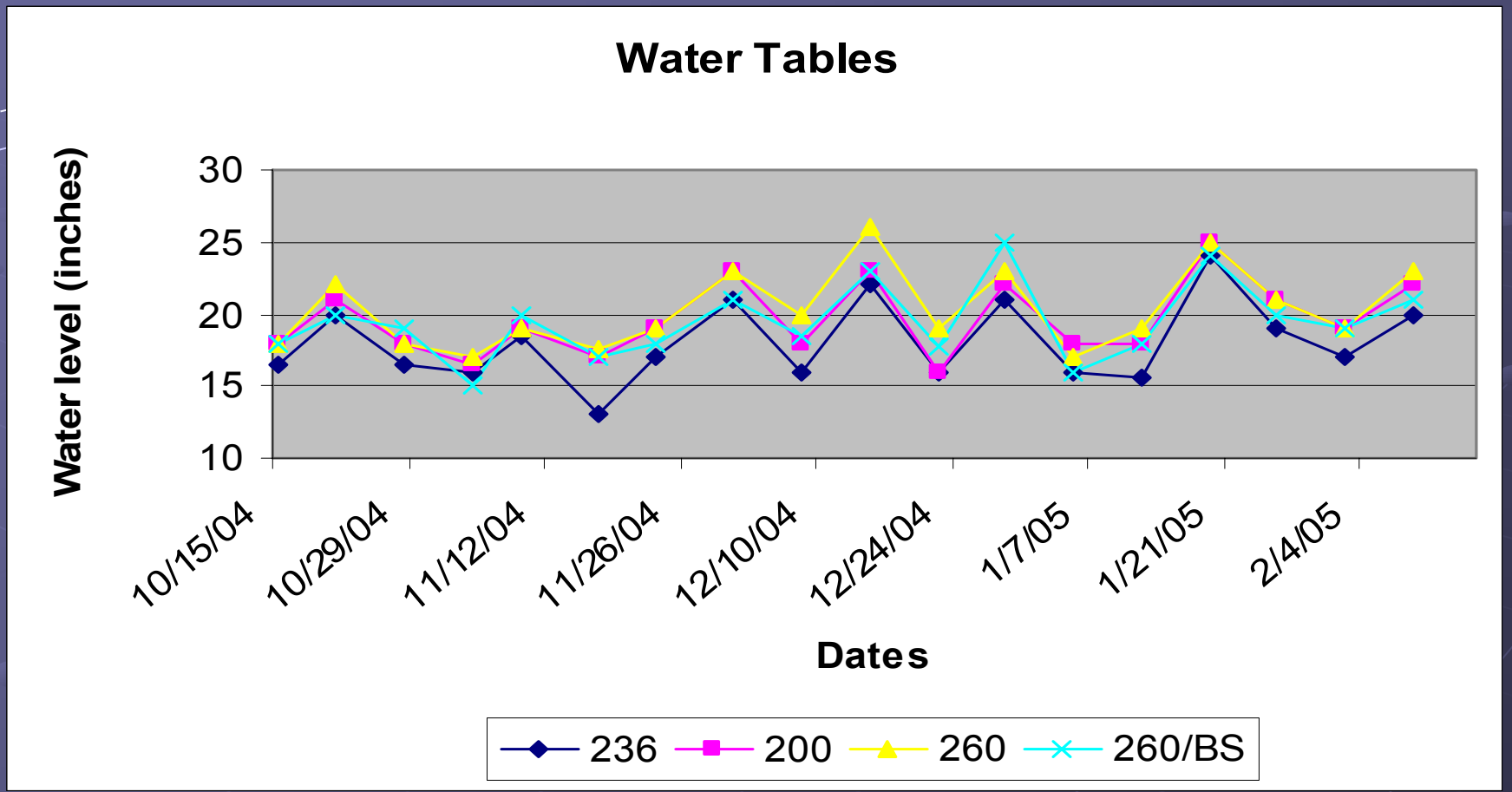

Potassium Sap
K (ppm)
8000
7000
6000
5000
4000
3000
2000
1000
10/15/04
10/22/04
10/29/04
11/5/04
11/12/04
11/19/04
11/26/04
12/3/04
12/10/04
12/17/04
12/24/04
12/31/04
1/7/05
1/14/05
1/21/05
1/28/05
2/4/05
2/11/05
Date
236
200
260
266
IFAS

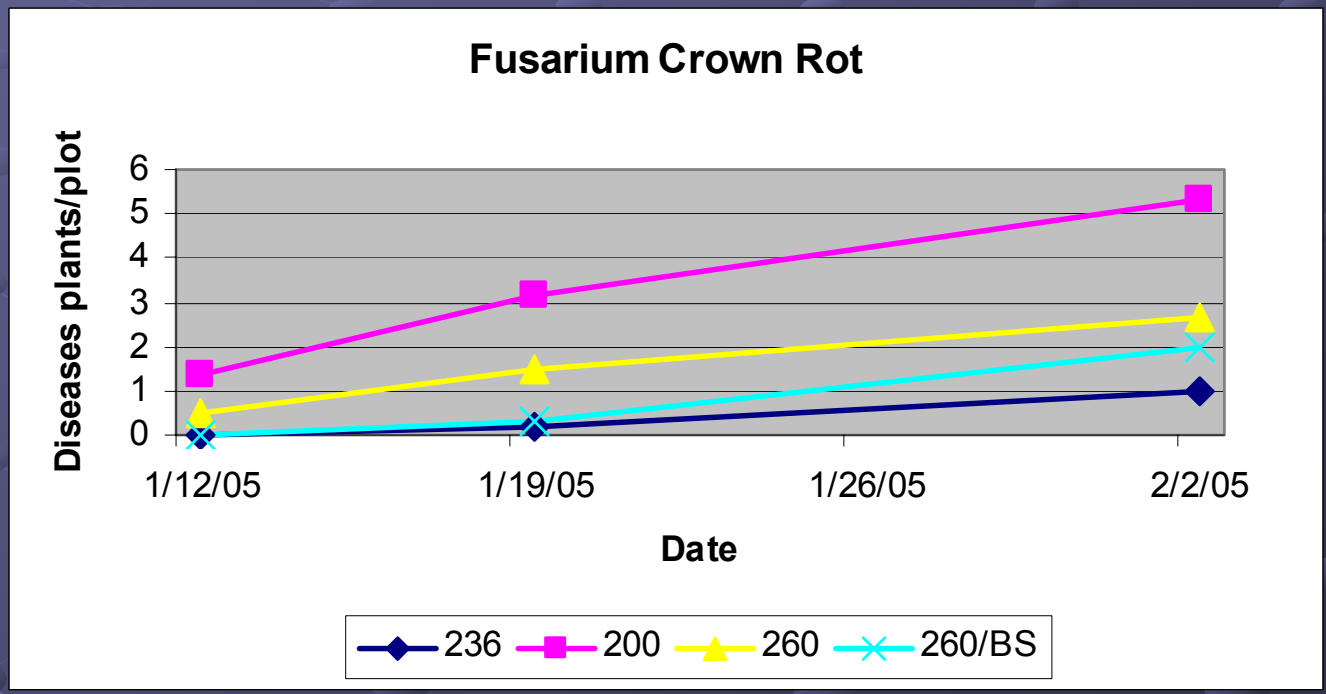

First Harvest (December 27, 2004)
Yield (boxes/acres)
1000
800
600
400
200
0
5/6
6/6
TOTAL
Tomato size
200
236
260
260/BS


Second Harvest (January 19, 2005)
Yield (Boxes/acres)
2500
2000
1500
1000
500
0
5/6
6/6
6/7
TOTAL
Tomato size
200
236
260
260/BS


Third Harvest (February 8, 2005)
Yield (Boxes/acres)
800
700
600
500
400
300
200
100
0
5/6
6/6
6/7
TOTAL
Tomato size
200
236
260
260/BS


Total Harvest
Yield (boxes/acres)
3500
3000
2500
2000
1500
1000
500
0
5/6
6/6
6/7
Total
Tomato Size
200
236
260
260/BS


Water Tables
Water level (inches)
30
25
20
15
10
10/15/04
10/29/04
11/12/04
11/26/04
12/10/04
12/24/04
1/7/05
1/21/05
2/4/05
Dates
236
200
260
260/BS

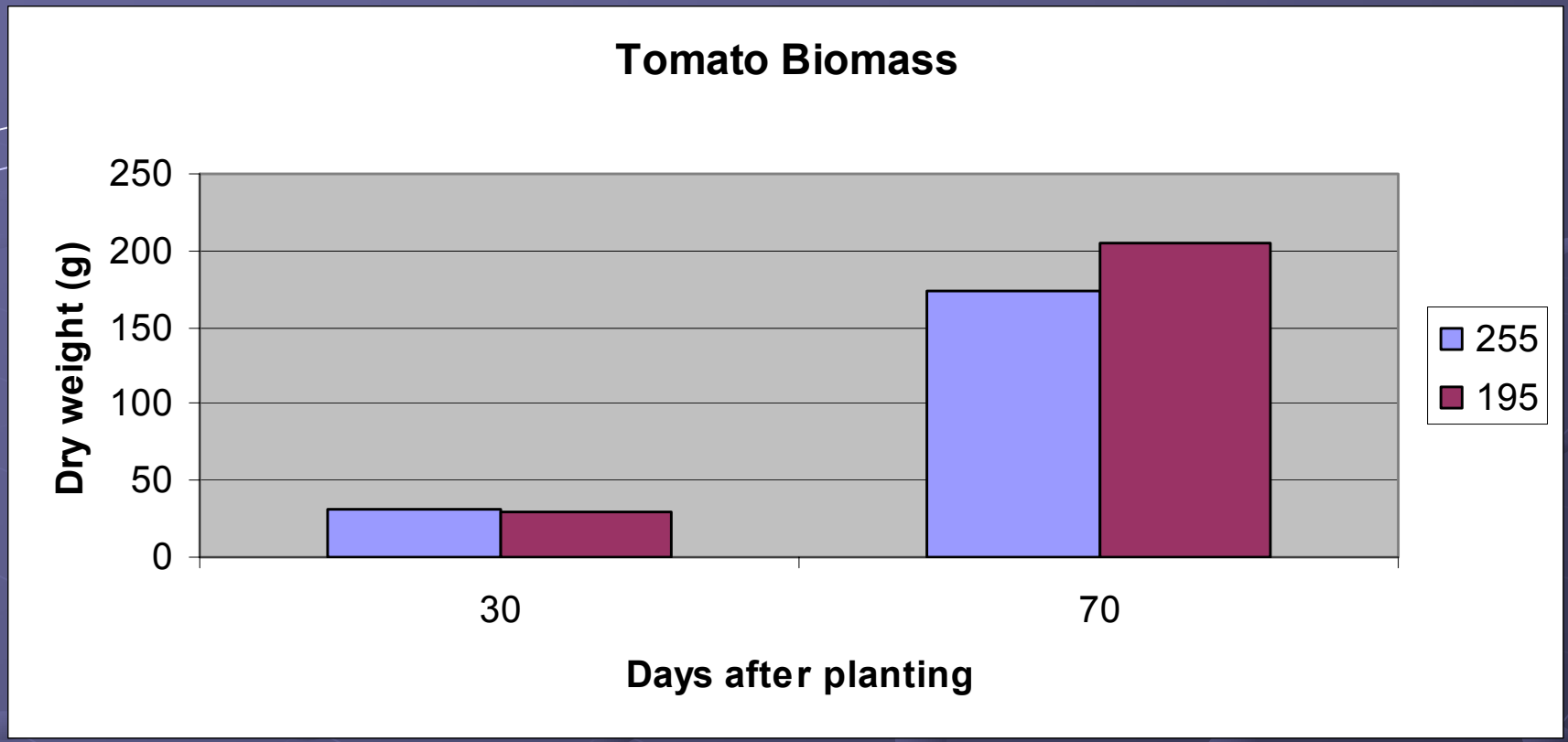

Fusarium Crown Rot
Diseases plants/plot
6
5
4
3
2
1
0
1/12/05
1/19/05
1/26/05
2/2/05
Date
236
200
260
260/BS

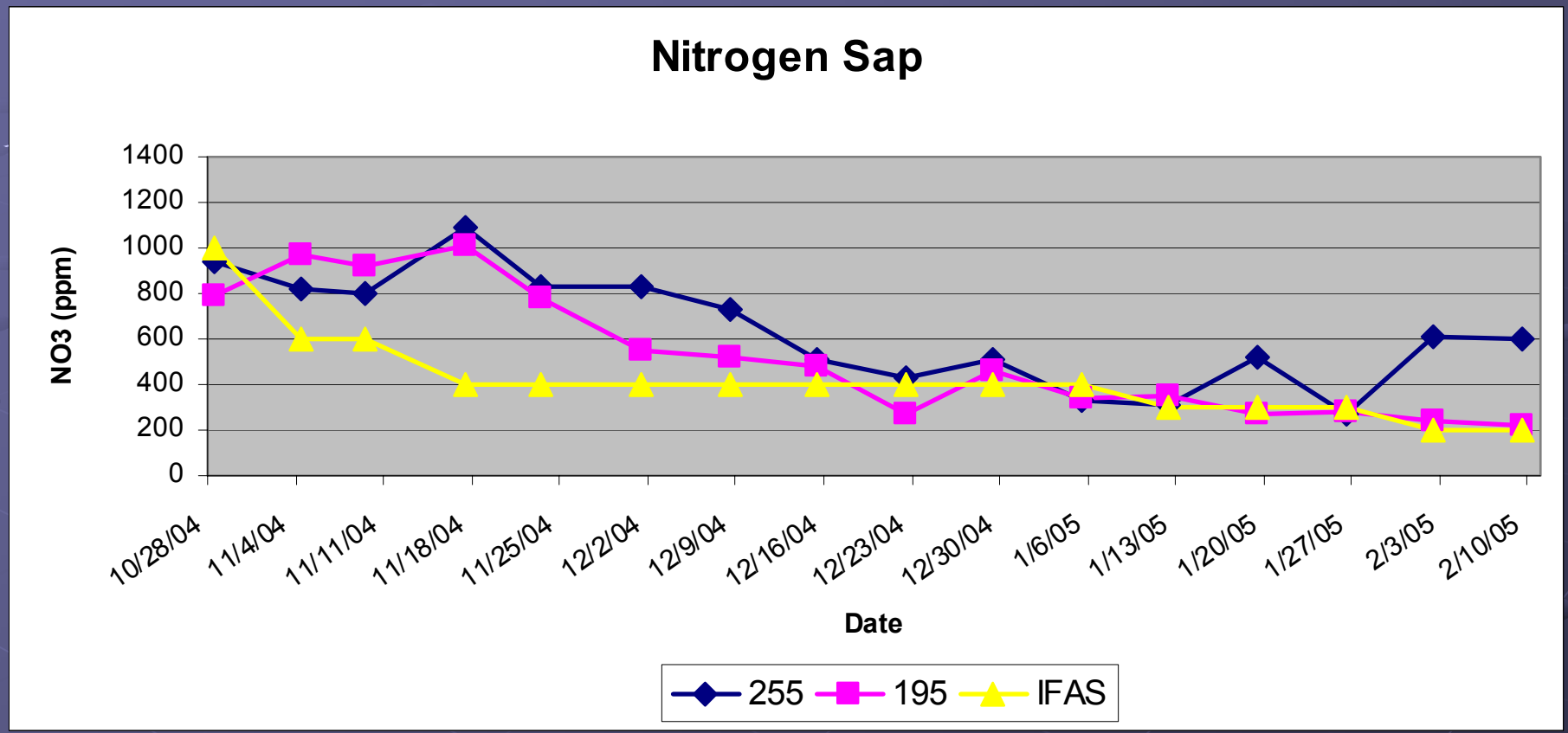

Farm # 2
Seep Irrigation
Fall, 2004

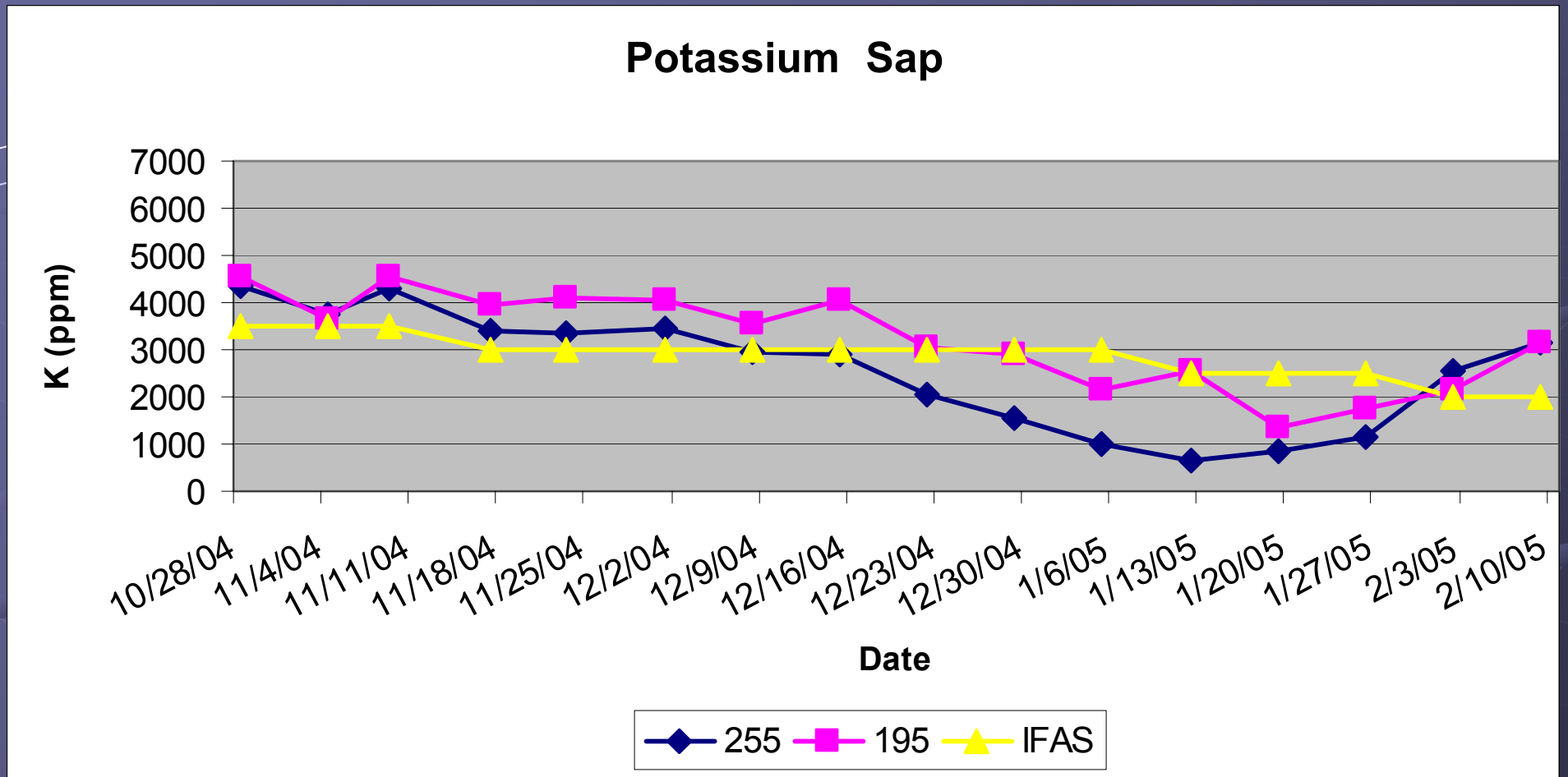
Field History

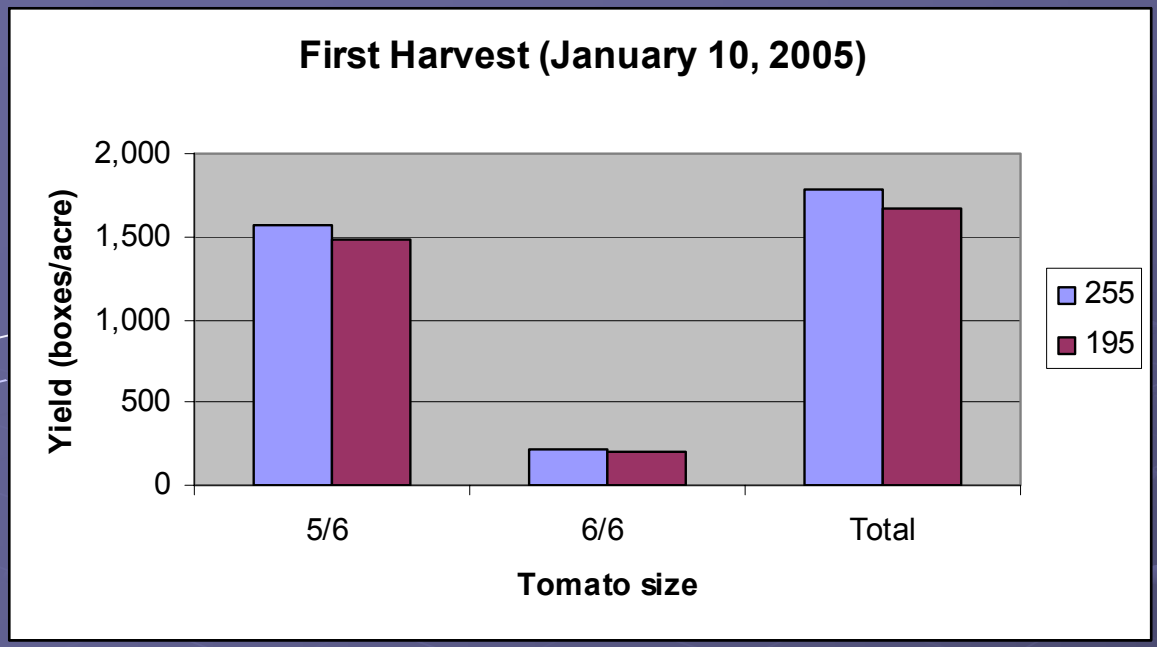
Farm acreage	3,600
N Rates (lb/acre)	200 & 255
IFAS rate (top mix)	1500 lb/a (11-0-26)
Irrigation	Seepage
Plot size	0.83 acres
Planting Date	10/5/2004
Cell Size	200
Fumigation	M.B 150/acre (98:2)
Linear ft per acre	7,260
Bed Heigth	8 in
Plant Spacing	20 in
Row run	North to South
Monitoring Wells	2
Harvest Date	
1st	10-Jan-05
2nd	28-Jan-05
3rd	10-Feb-05

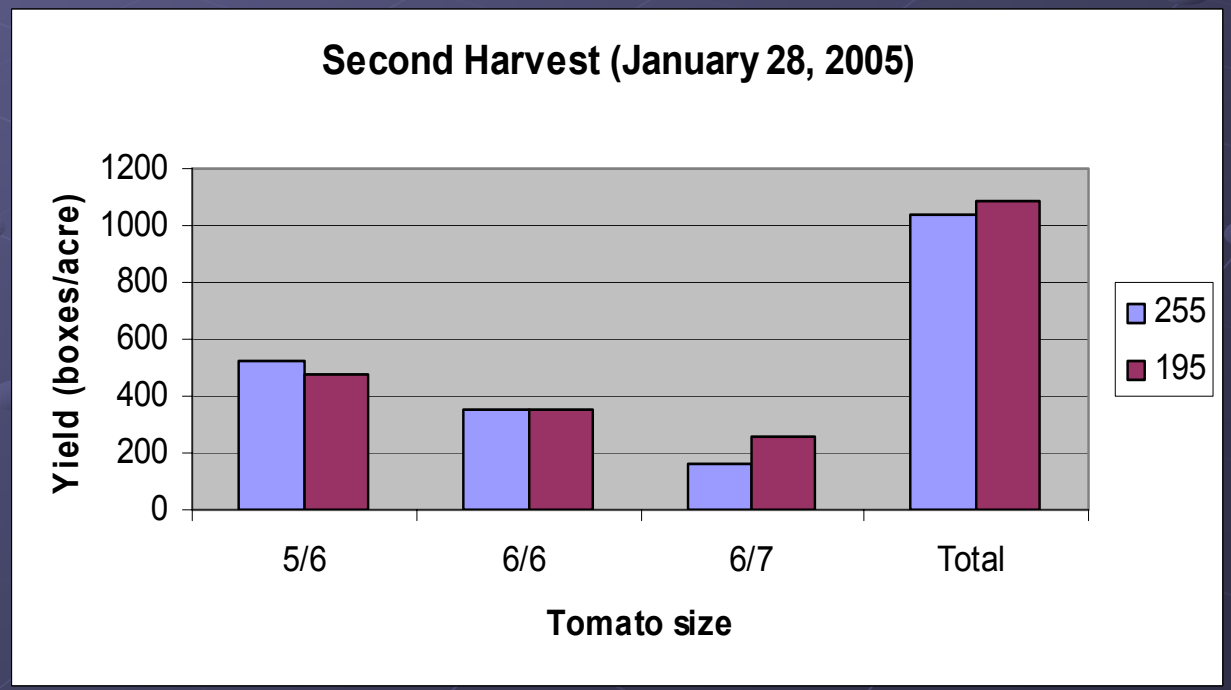
	Soil Analysis (ppm)
pH	7.4
Phosphorus	92
Potassium	4
Magnesium	47
Calcium	430

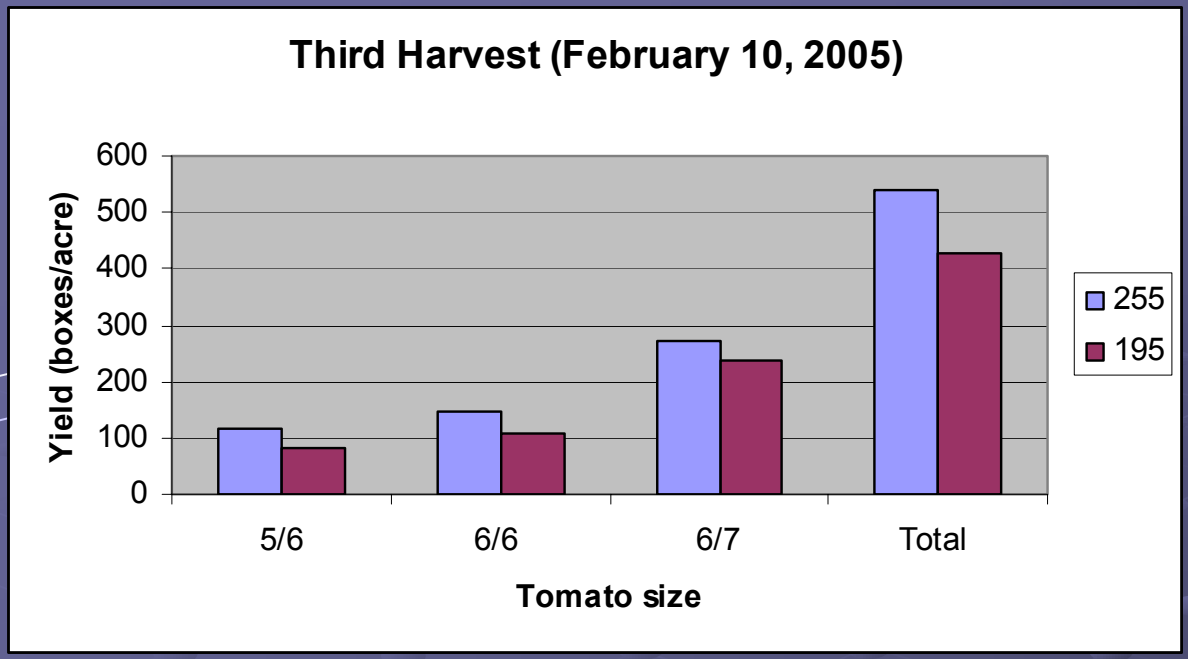

Tomato Biomass
Dry weight (g)
250
200
150
100
50
0
30
70
Days after planting
255
195

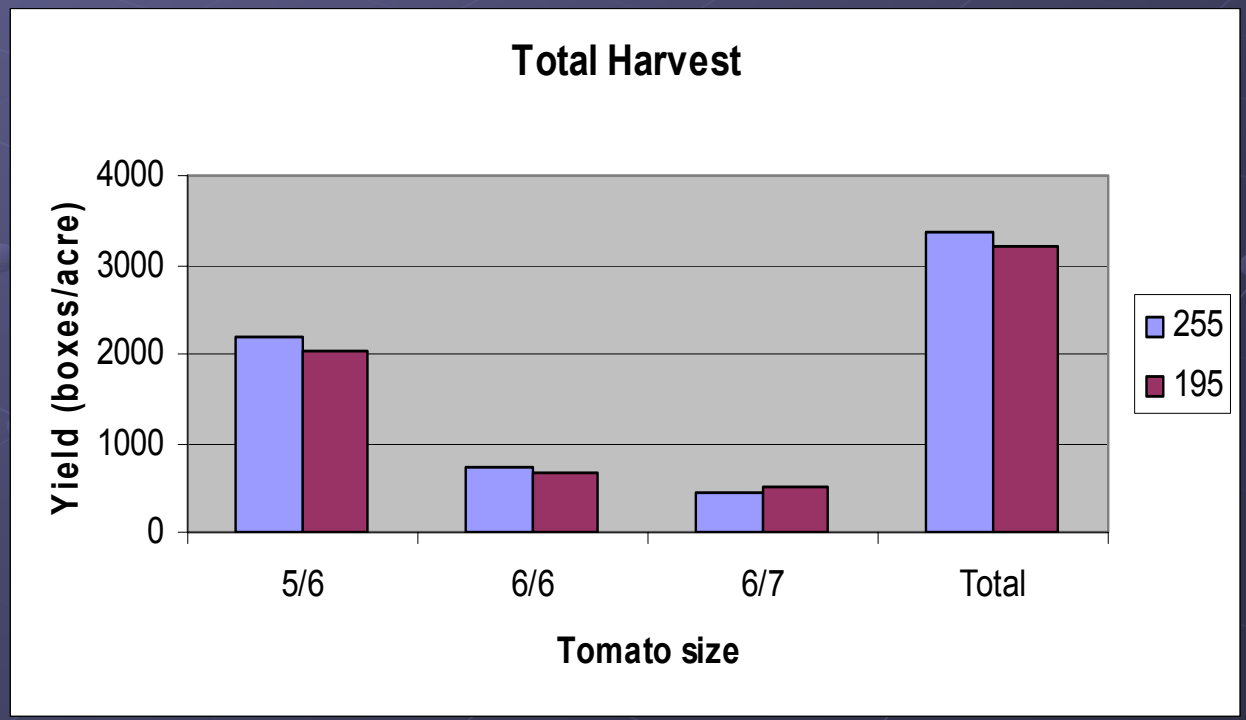

Nitrogen Sap
NO3 (ppm)
1400
1200
1000
800
600
400
200
0
10/28/04
11/4/04
11/11/04
11/18/04
11/25/04
12/2/04
12/9/04
12/16/04
12/23/04
12/30/04
1/6/05
1/13/05
1/20/05
1/27/05
2/3/05
2/10/05
Date
255
195
IFAS

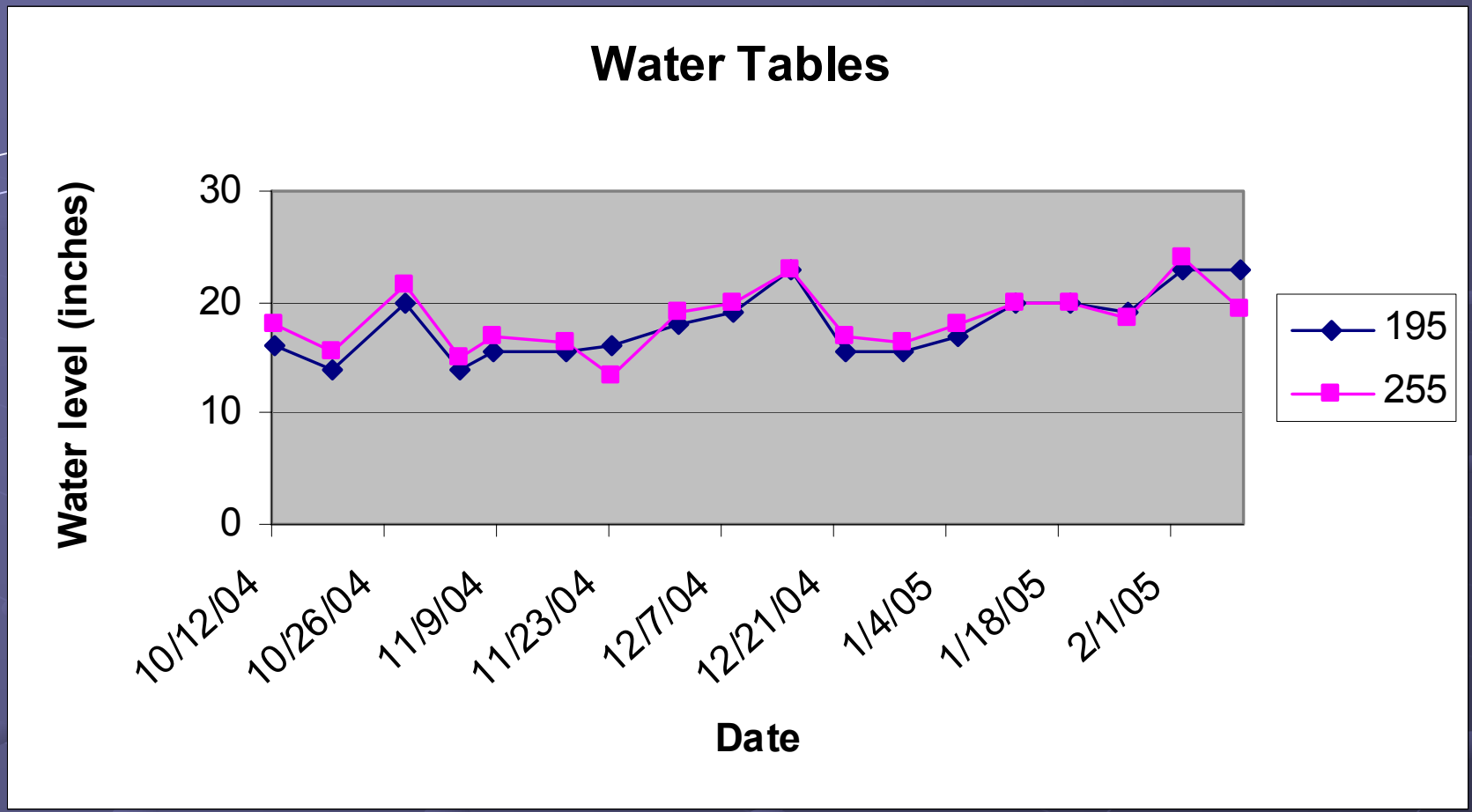

Potassium Sap
K (ppm)
7000
6000
5000
4000
3000
2000
1000
0
10/28/04
11/4/04
11/11/04
11/18/04
11/25/04
12/2/04
12/9/04
12/16/04
12/23/04
12/30/04
1/6/05
1/13/05
1/20/05
1/27/05
2/3/05
2/10/05
Date
255
195
IFAS


First Harvest (January 10, 2005)
Yield (boxes/acre)
2,000
1,500
1,000
500
0
5/6
6/6
Total
Tomato size
255
195


Second Harvest (January 28, 2005)
Yield (boxes/acre)
1200
1000
800
600
400
200
0
5/6
6/6
6/7
Total
Tomato size
255
195


Third Harvest (February 10, 2005)
Yield (boxes/acre)
600
500
400
300
200
100
0
5/6
6/6
6/7
Total
Tomato size
255
195


Total Harvest
Yield (boxes/acre)
4000
3000
2000
1000
0
5/6
6/6
6/7
Total
Tomato size
255
195

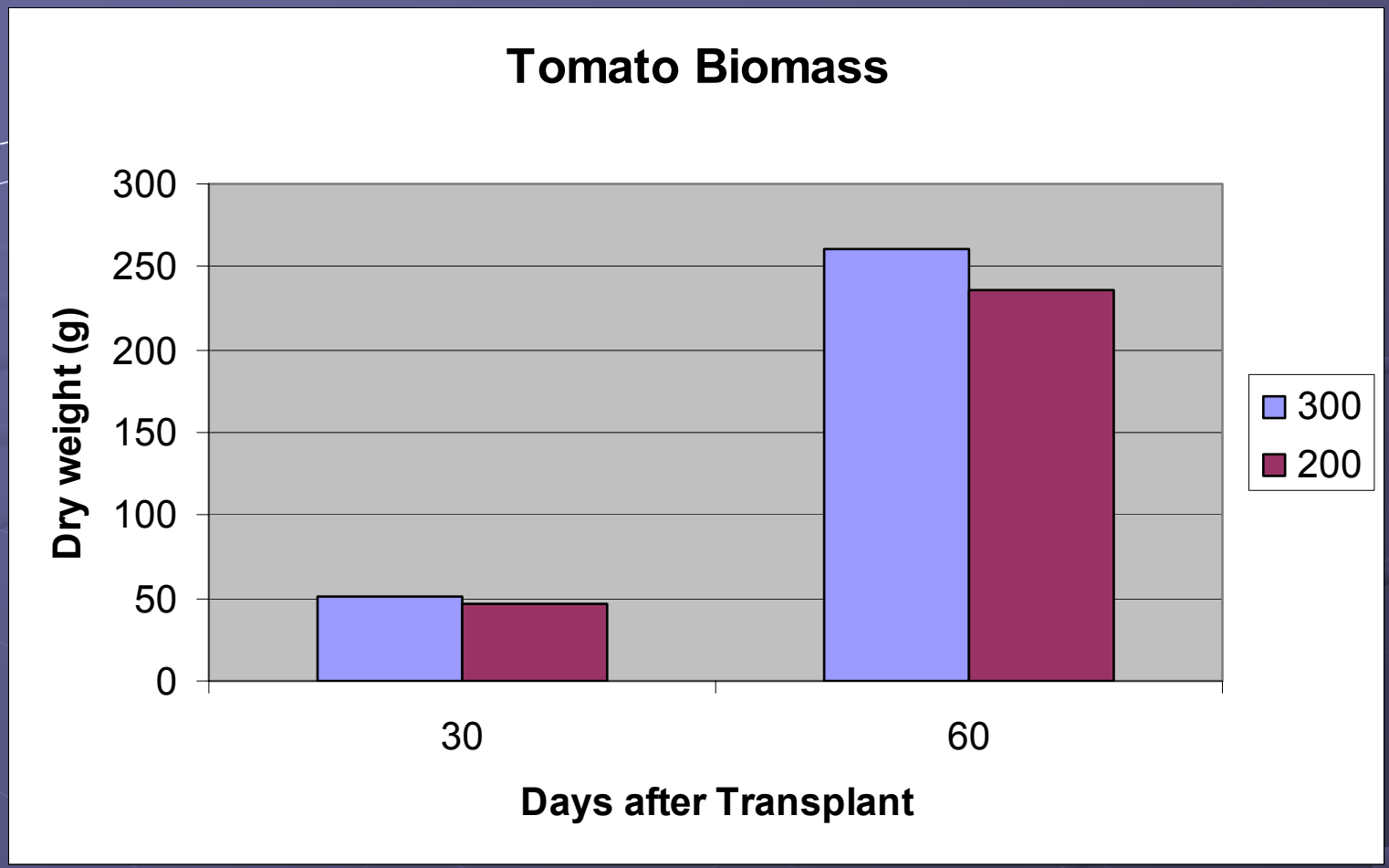

Water Tables
Water level (inches)
30
20
10
0
10/12/04
10/26/04
11/9/04
11/23/04
12/7/04
12/21/04
1/4/05
1/18/05
2/1/05
Date
195
255

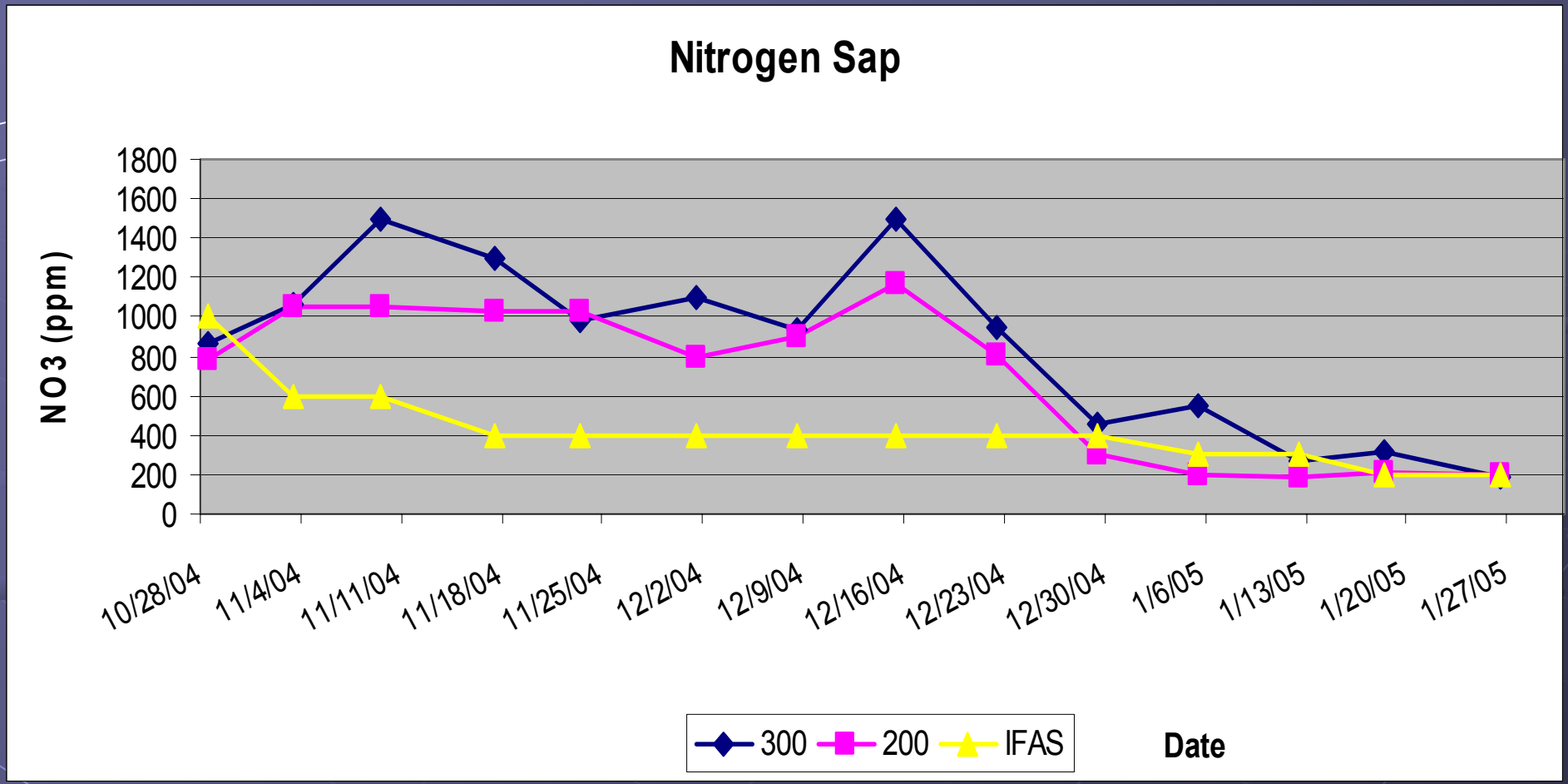

Farm # 3
Seep Irrigation
Fall, 2004

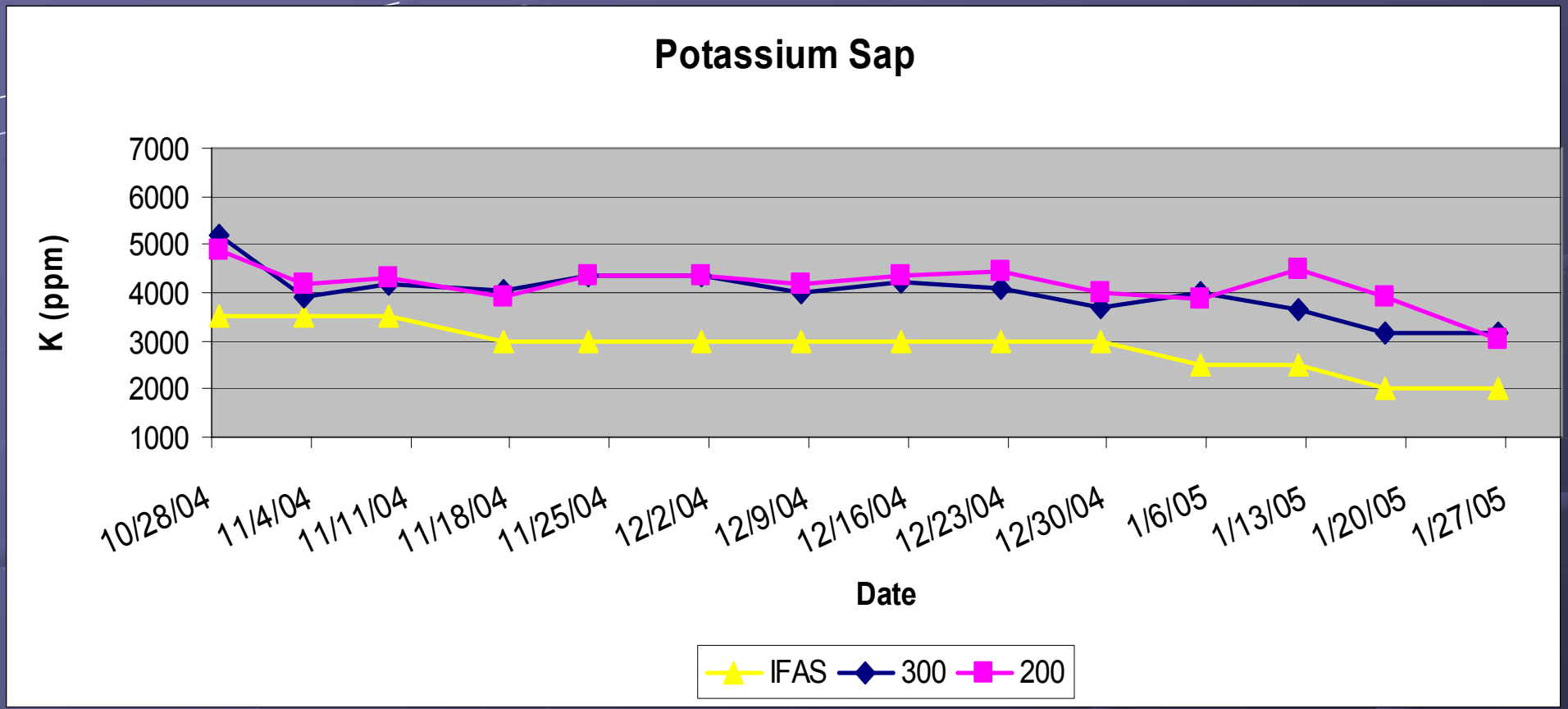
Field History

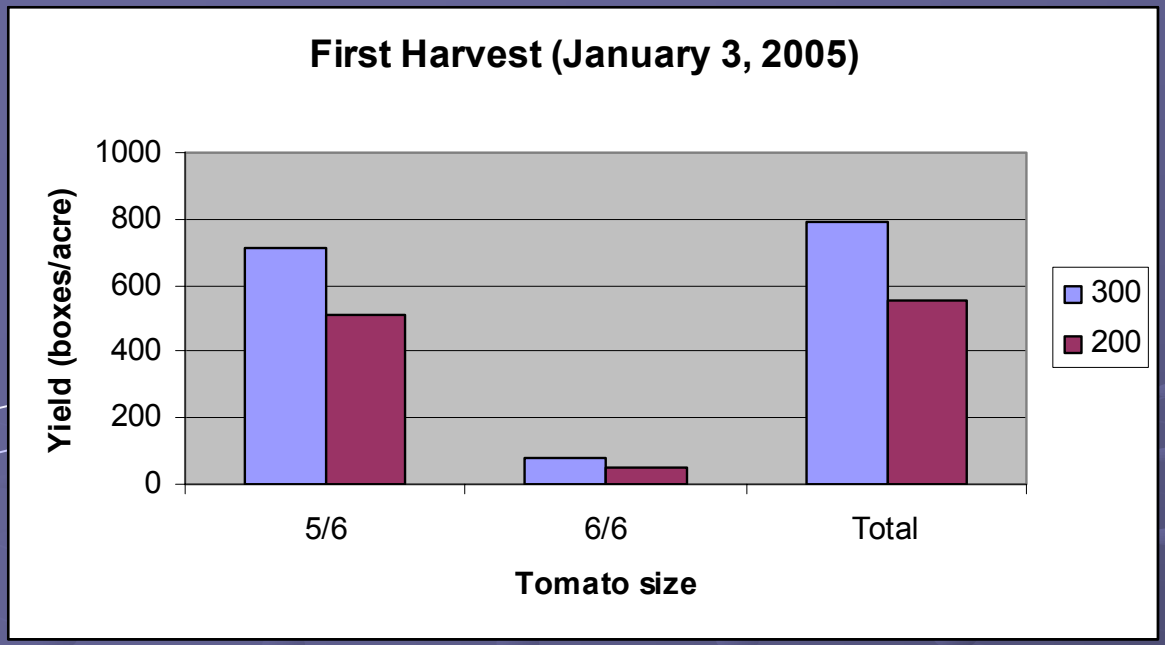
Farm acreage	2,500
N Rates (lb/acre)	200 & 300
IFAS rate (top mix)	1350 lb/a (14-0-26)
Irrigation	Seepage
Plot size	0.83 acre
Planting Date	10/5/2004
Cell Size	128
Fumigation	M.B 200/Acre (67:33)
Linear ft per acre	7,260
Bed Heigth	8 in
Plant Spacing	26 in
Row run	North to South
Monitoring Wells	2
Harvest Date	
1st	3-Jan-05
2nd	18-Jan-05

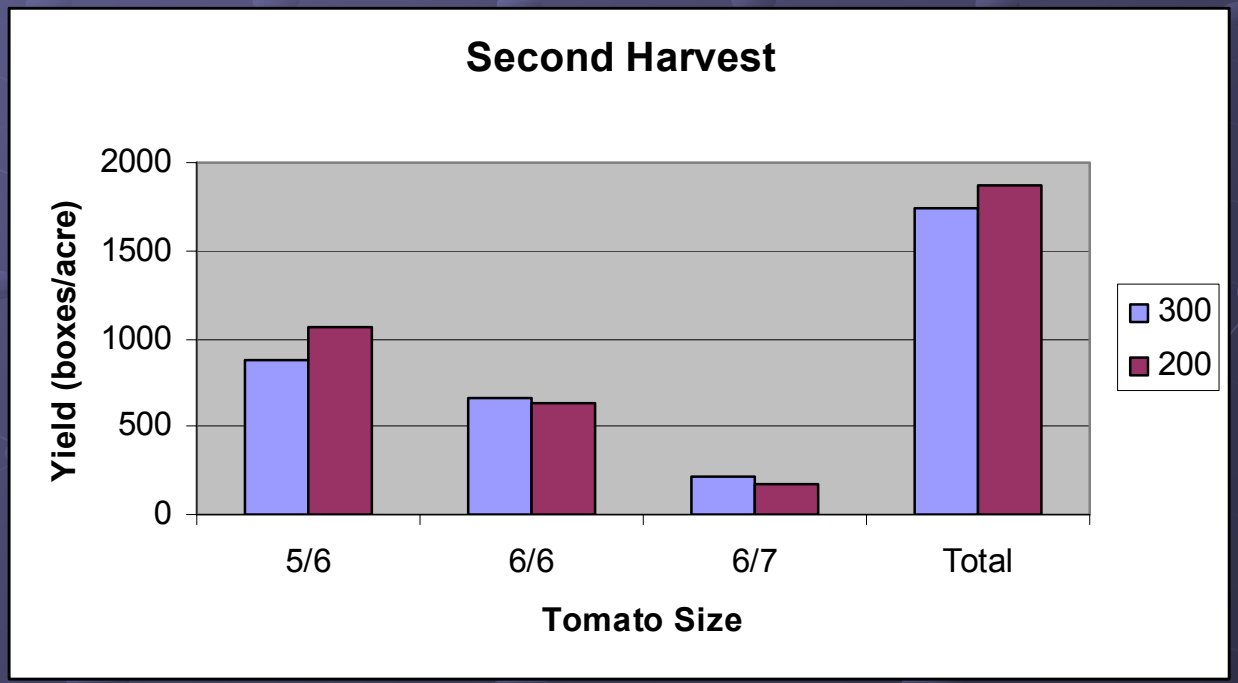
	Soil Analysis (ppm)
pH	6.9
Phosphorus	>184
Potassium	22
Magnesium	180
Calcium	>1494

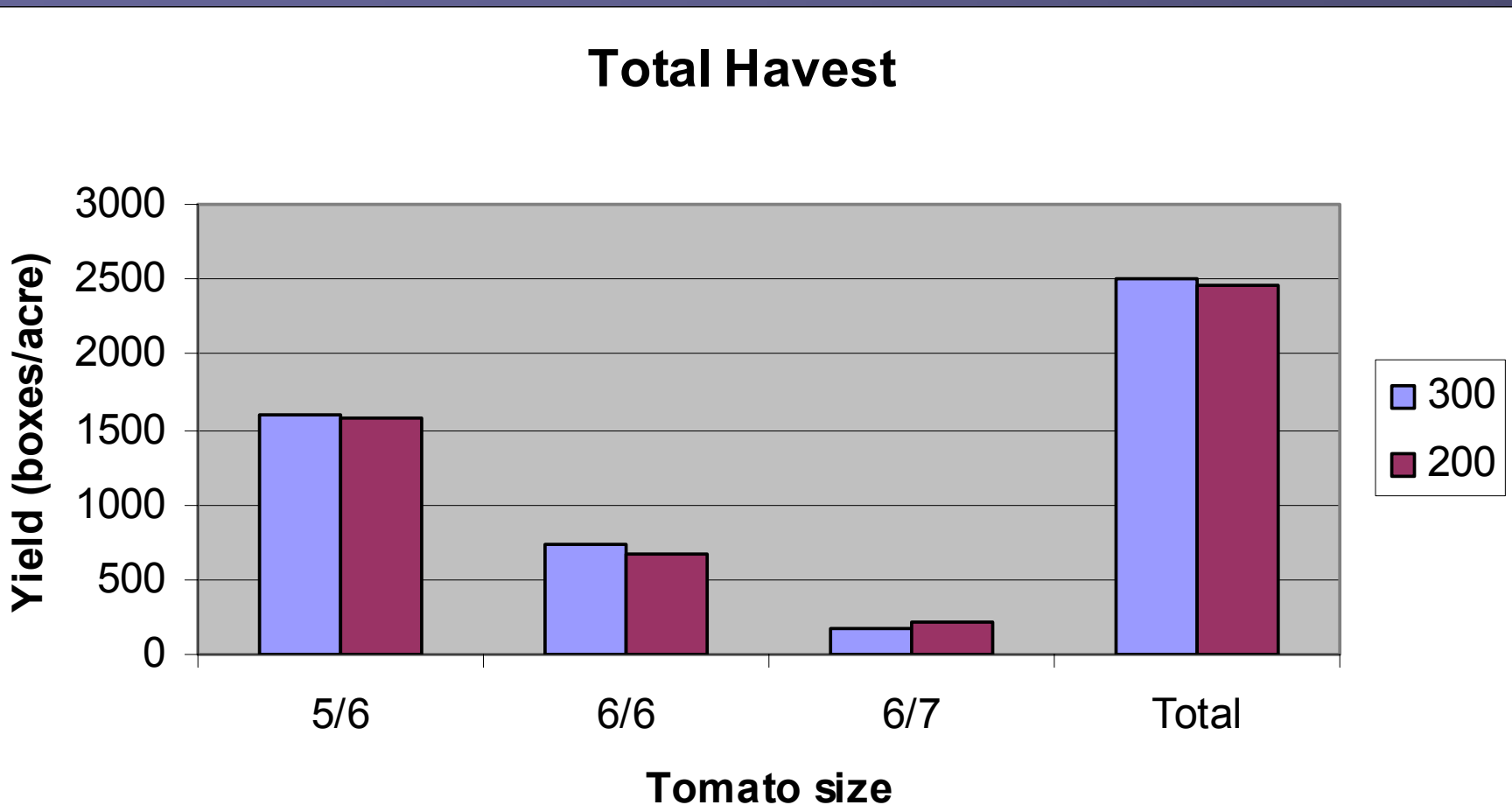

Tomato Biomass
300
250
200
150
100
50
0
Dry weight (g)
30
60
Days after Transplant
300
200

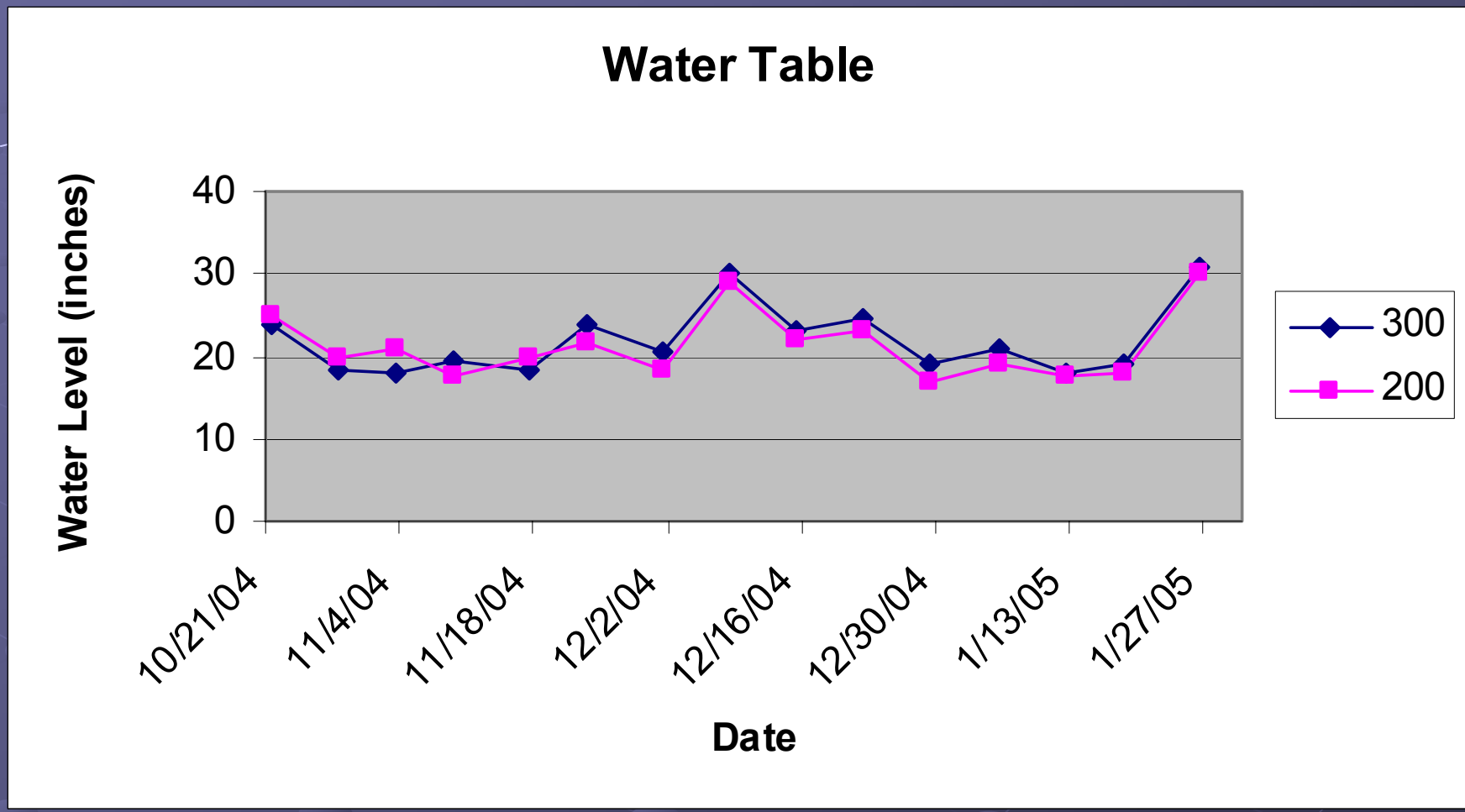

Nitrogen Sap
NO3 (ppm)
1800
1600
1400
1200
1000
800
600
400
200
0
10/28/04
11/4/04
11/11/04
11/18/04
11/25/04
12/2/04
12/9/04
12/16/04
12/23/04
12/30/04
1/6/05
1/13/05
1/20/05
1/27/05
300
200
IFAS
Date


Potassium Sap
7000
6000
5000
4000
3000
2000
1000
K (ppm)
10/28/04
11/4/04
11/11/04
11/18/04
11/25/04
12/2/04
12/9/04
12/16/04
12/23/04
12/30/04
1/6/05
1/13/05
1/20/05
1/27/05
Date
IFAS
300
200


First Harvest (January 3, 2005)
Yield (boxes/acre)
1000
800
600
400
200
0
5/6
6/6
Total
Tomato size
300
200


Second Harvest
Yield (boxes/acre)
2000
1500
1000
500
0
5/6
6/6
6/7
Total
Tomato Size
300
200


Total Havest
Yield (boxes/acre)
3000
2500
2000
1500
1000
500
0
5/6
6/6
6/7
Total
Tomato size
300
200

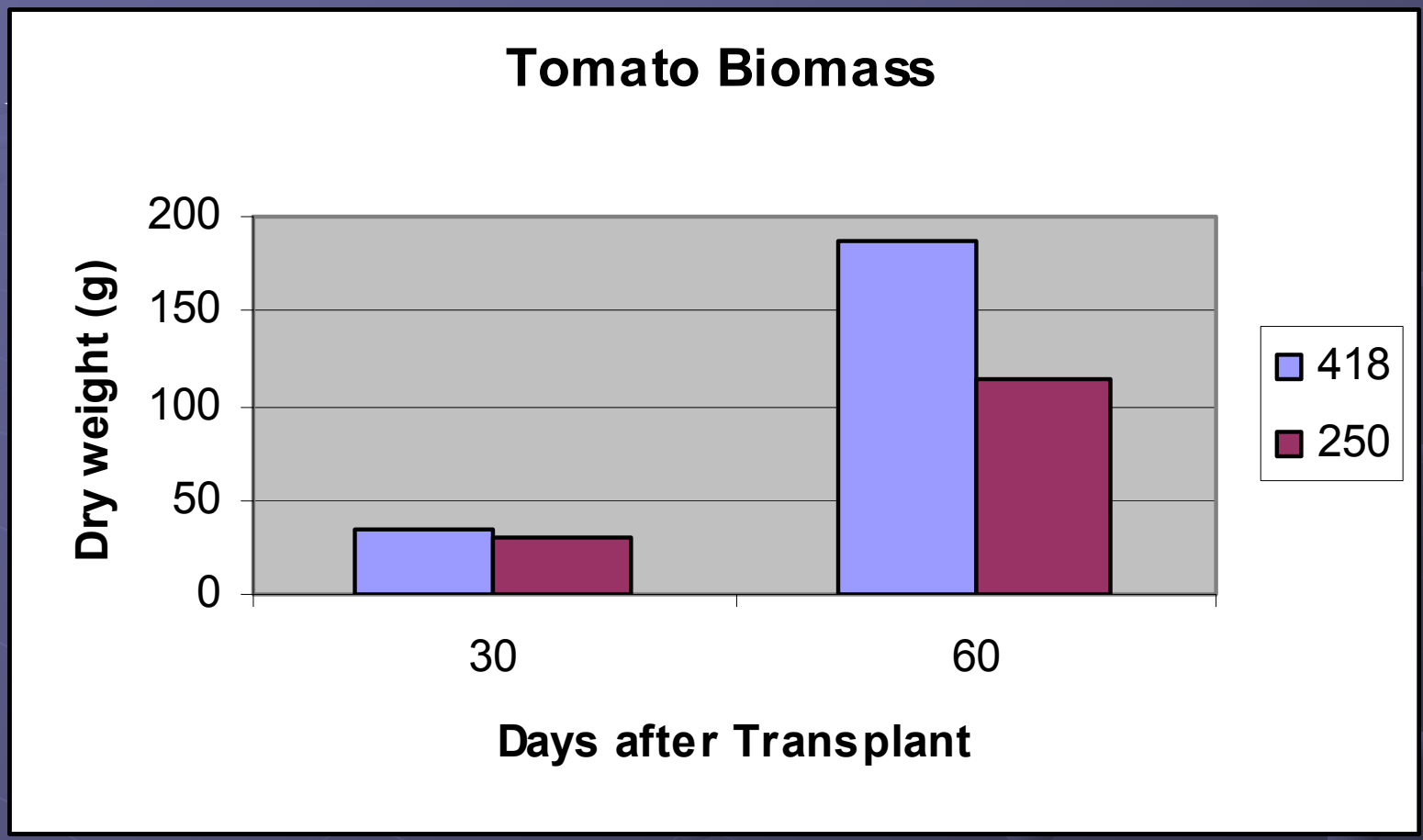

Water Table
Water Level (inches)
40
30
20
10
0
10/21/04
11/4/04
11/18/04
12/2/04
12/16/04
12/30/04
1/13/05
1/27/05
Date
300
200

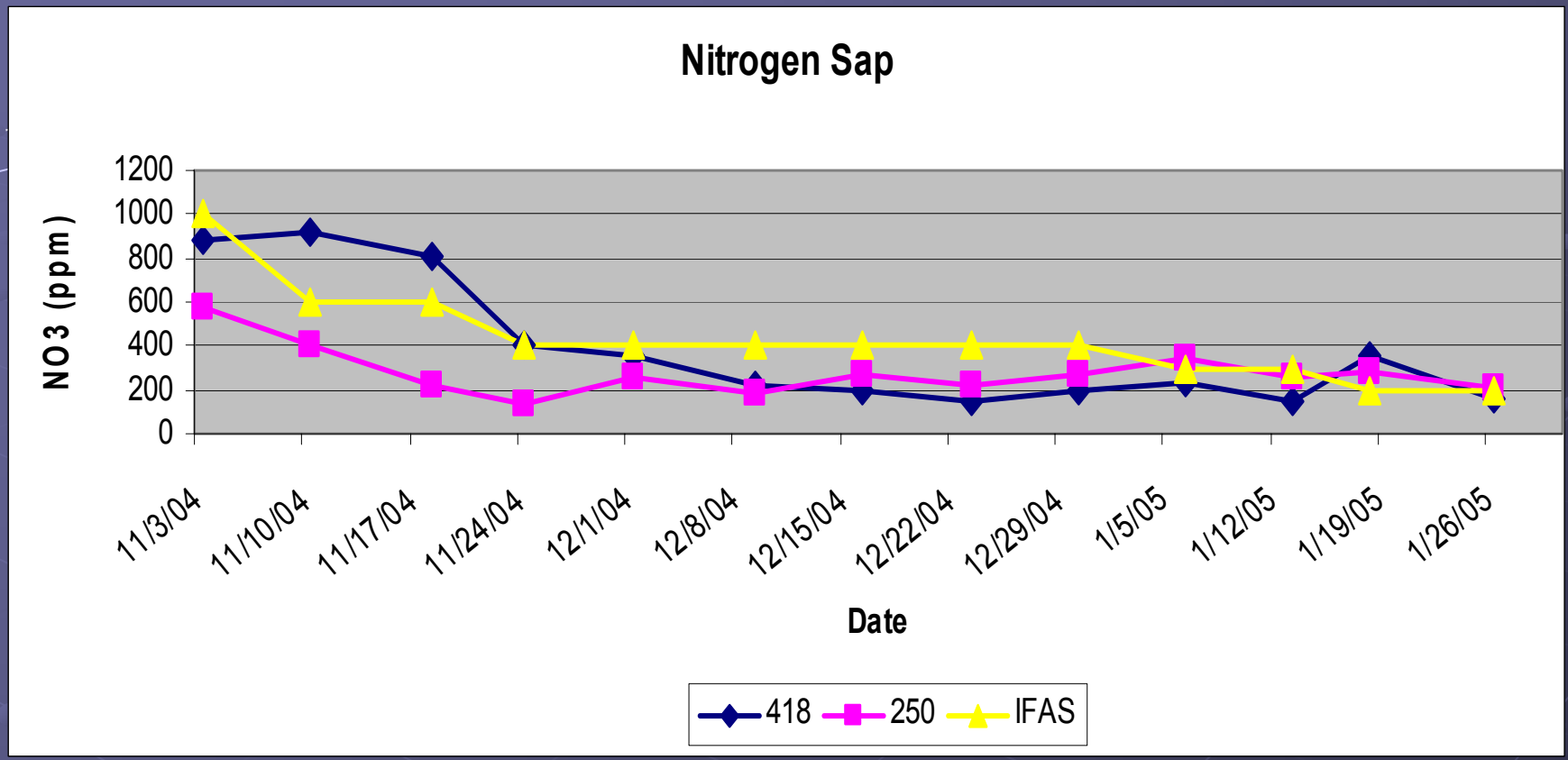

Farm # 4
Drip Irrigation
Fall, 2004

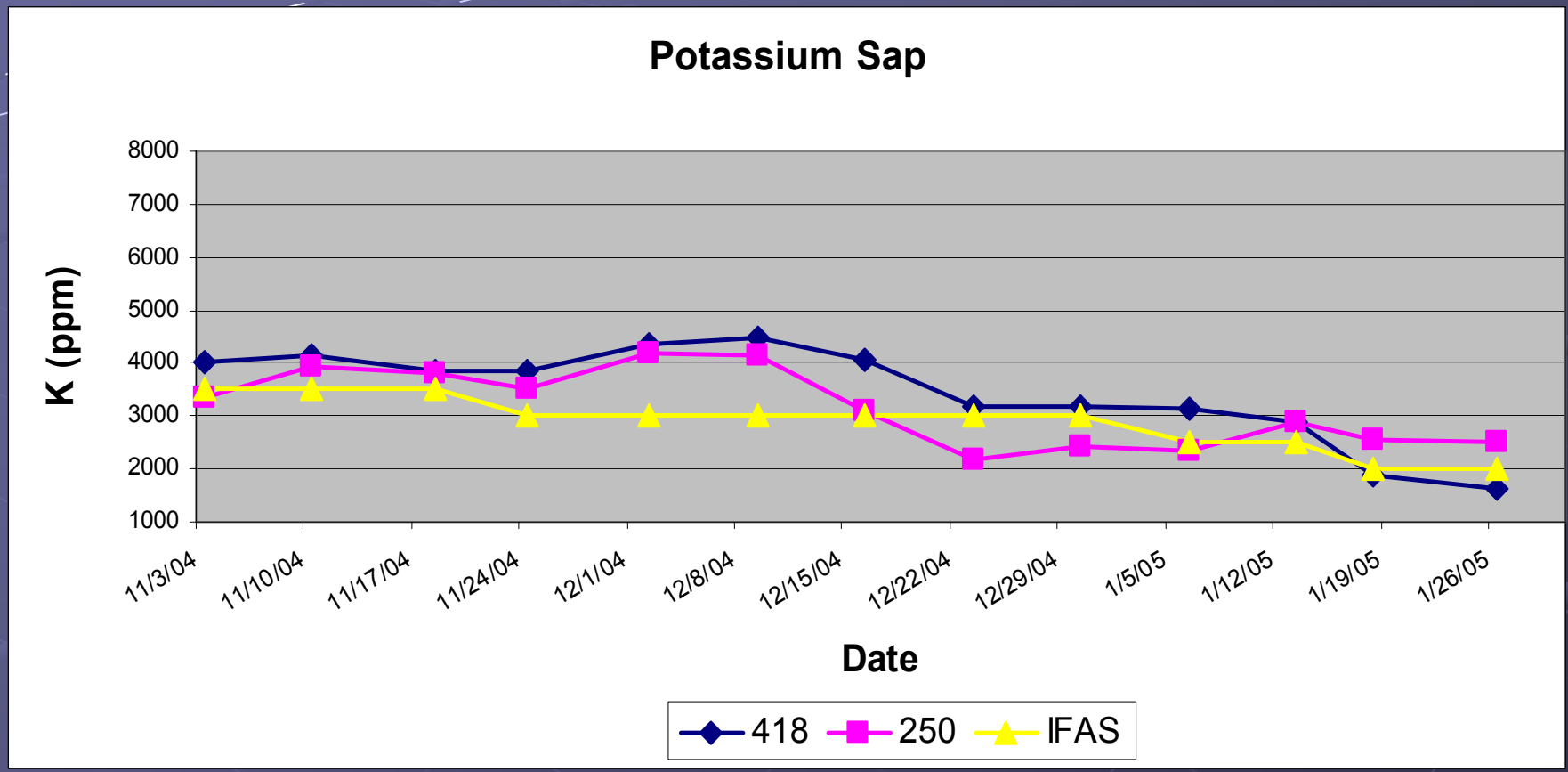
Field History

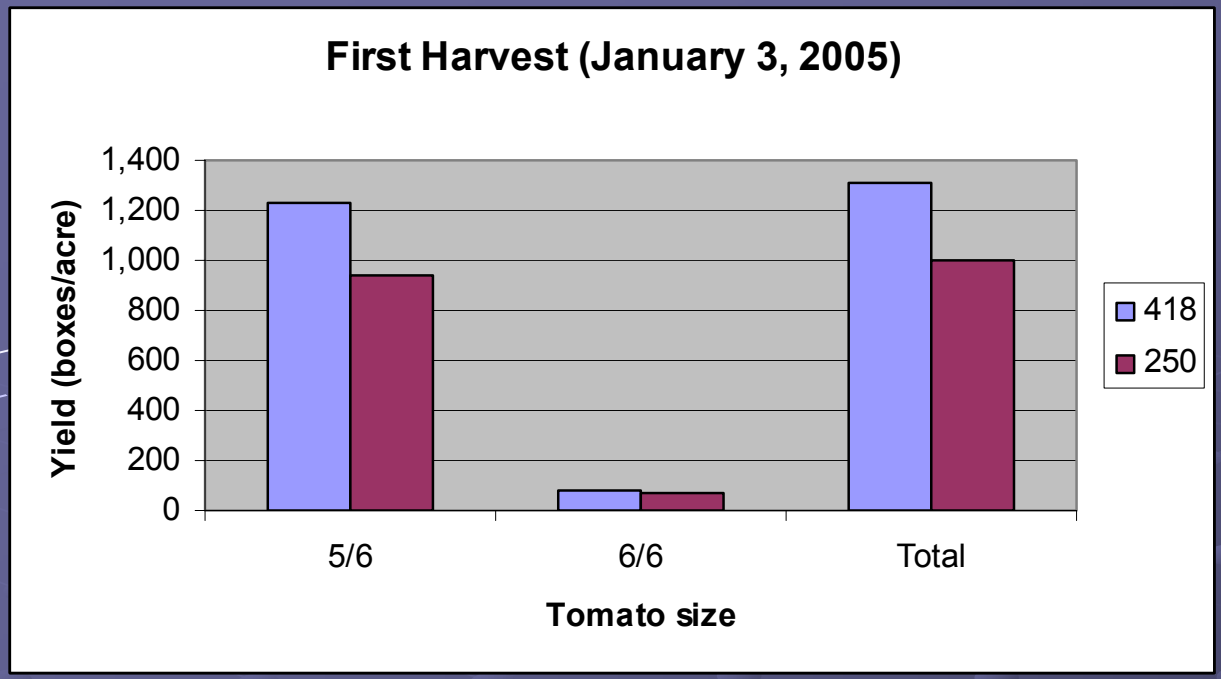
Farm acreage	700
N Rates (lb/acre)	250 & 418
IFAS rate	No dry fertilizer
Irrigation	Drip
Planting Date	11-Oct-04
Cell Size	220
Fumigation	M.B 225/Acre
Linear ft per acre	8,712
Plant population	4,356
Bed Heigth	8 in
Plant Spacing	24 in
Row run	North to South
Monitoring Wells	3
Harvest Date	
1st	3-Jan-05
2nd	18-Jan-05
3rd	27-Jan-05

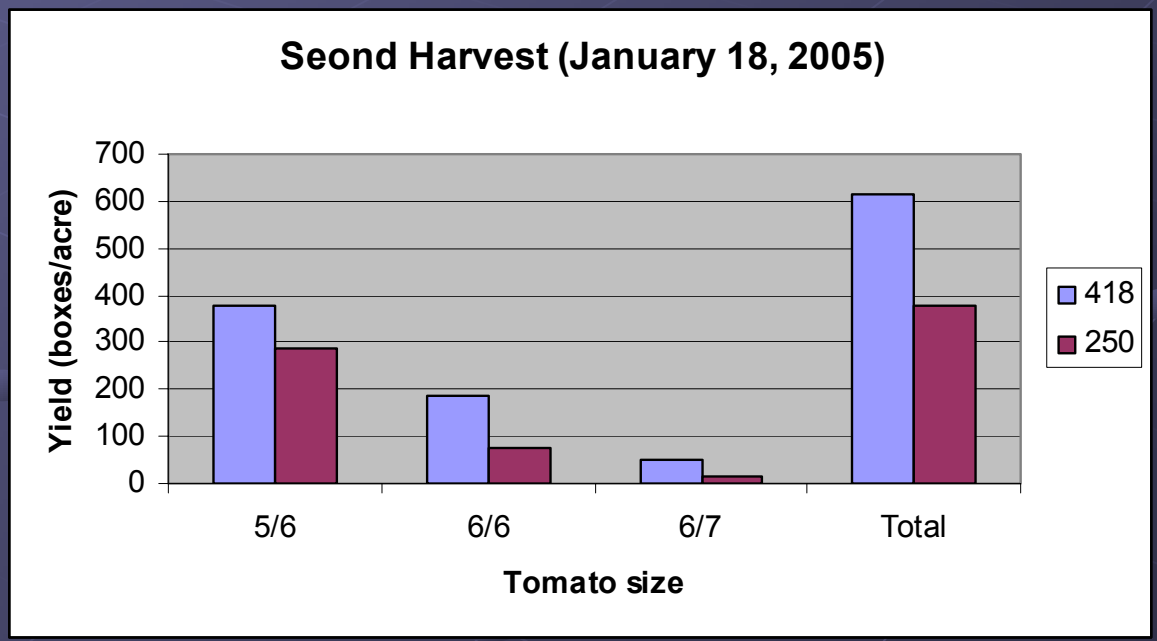
	Soil Analysis (ppm)
pH	6.8
Phosphorus	>184
Potassium	16
Magnesium	118
Calcium	>1,868

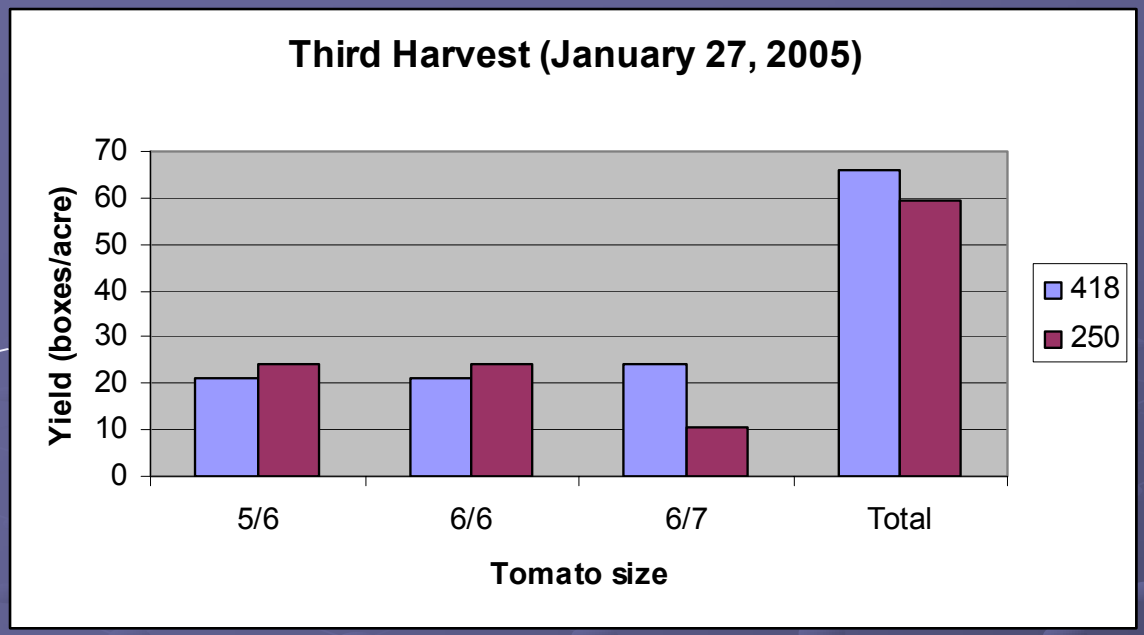

Tomato Biomass
Dry weight (g)
200
150
100
50
0
30
60
Days after Transplant
418
250

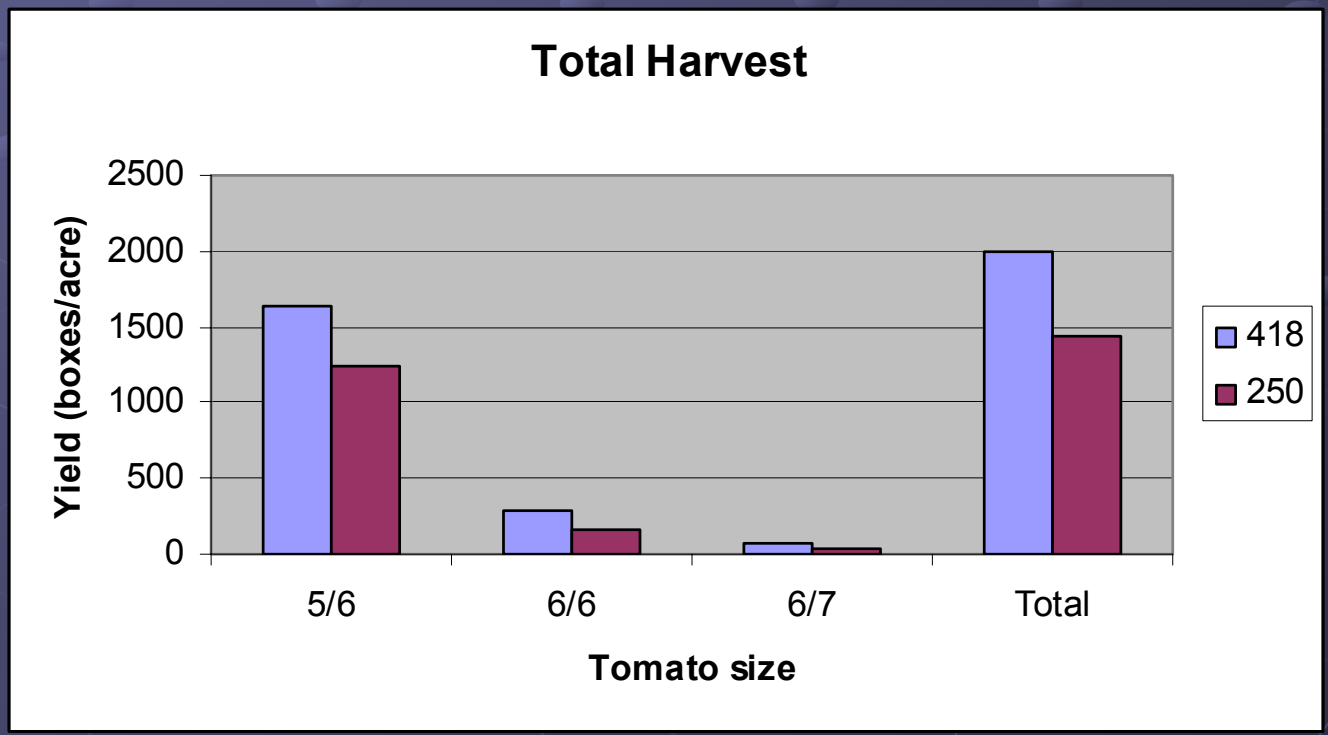

Nitrogen Sap
NO3 (ppm)
1200
1000
800
600
400
200
0
11/3/04
11/10/04
11/17/04
11/24/04
12/1/04
12/8/04
12/15/04
12/22/04
12/29/04
1/5/05
1/12/05
1/19/05
1/26/05
Date
418
250
IFAS

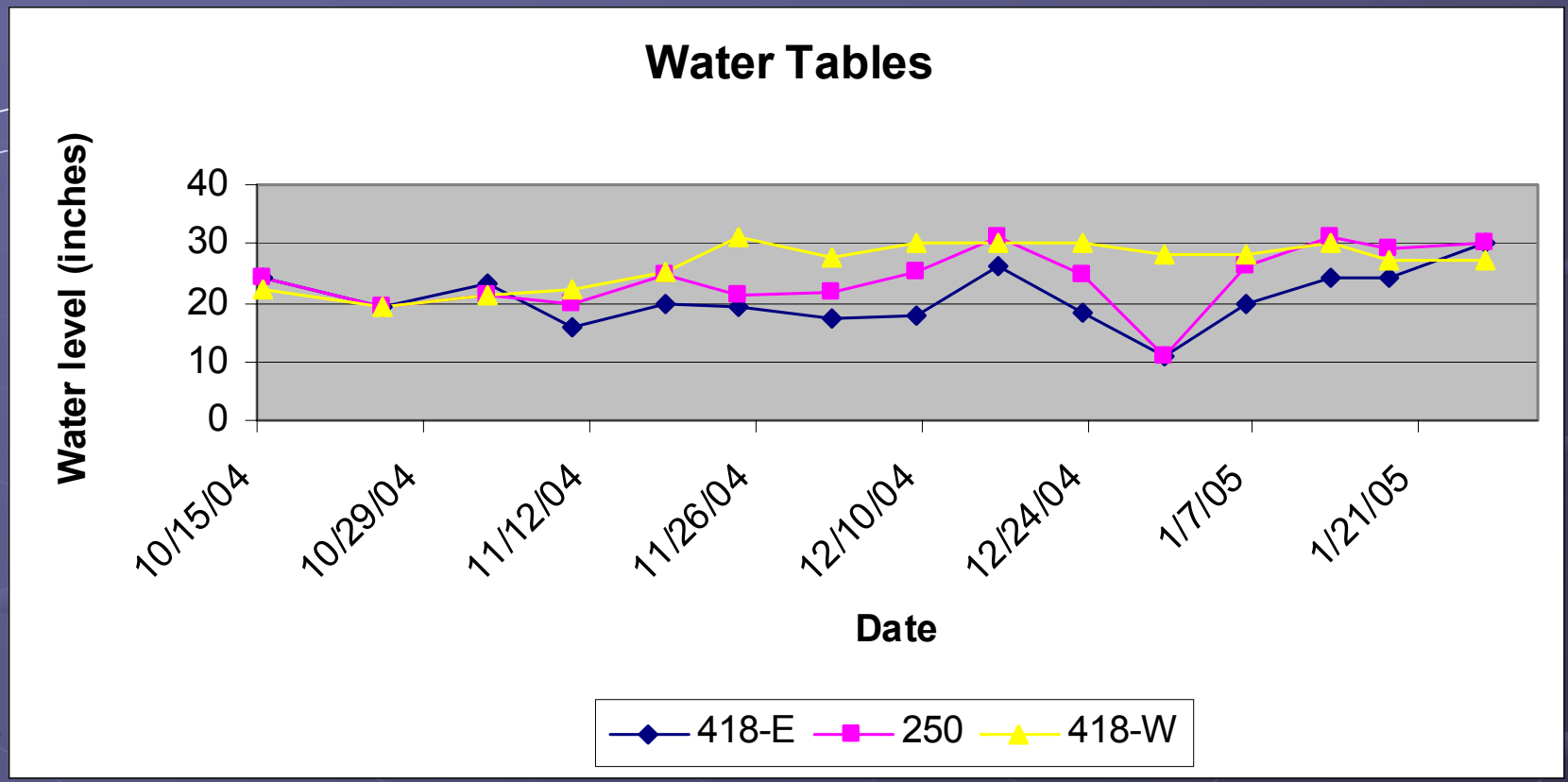

Potassium Sap
K (ppm)
8000
7000
6000
5000
4000
3000
2000
1000
11/3/04
11/10/04
11/17/04
11/24/04
12/1/04
12/8/04
12/15/04
12/22/04
12/29/04
1/5/05
1/12/05
1/19/05
1/26/05
Date
418
250
IFAS


First Harvest (January 3, 2005)
Yield (boxes/acre)
1,400
1,200
1,000
800
600
400
200
0
5/6
6/6
Total
Tomato size
418
250


Seond Harvest (January 18, 2005)
Yield (boxes/acre)
700
600
500
400
300
200
100
0
5/6
6/6
6/7
Total
Tomato size
418
250


Third Harvest (January 27, 2005)
Yield (boxes/acre)
70
60
50
40
30
20
10
0
5/6
6/6
6/7
Total
Tomato size
418
250


Total Harvest
Yield (boxes/acre)
2500
2000
1500
1000
500
0
5/6
6/6
6/7
Total
Tomato size
418
250


Water Tables
Water level (inches)
40
30
20
10
0
10/15/04
10/29/04
11/12/04
11/26/04
12/10/04
12/24/04
1/7/05
1/21/05
Date
418-E
250
418-W


Farm # 5
Drip Irrigation
Fall, 2004
200 lb N/acre
300 lb N/acre


Farm # 5
Drip Irrigation
Fall, 2004
200 lb N/acre
300 lb N/acre


Farm # 5
Drip Irrigation
Fall, 2004

Future Testing

Spring Experiments