CORN RESPONSE TO DRIP IRRIGATION

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Why Drip Irrigation for Corn?

- It works!
- Conserve water
- Use existing drip system (crop rotation)
- Automation
- Fertigation
- Weed and disease control

Conserve Water by Minimizing Water Losses

- Runoff
- Evaporation
- Drainage

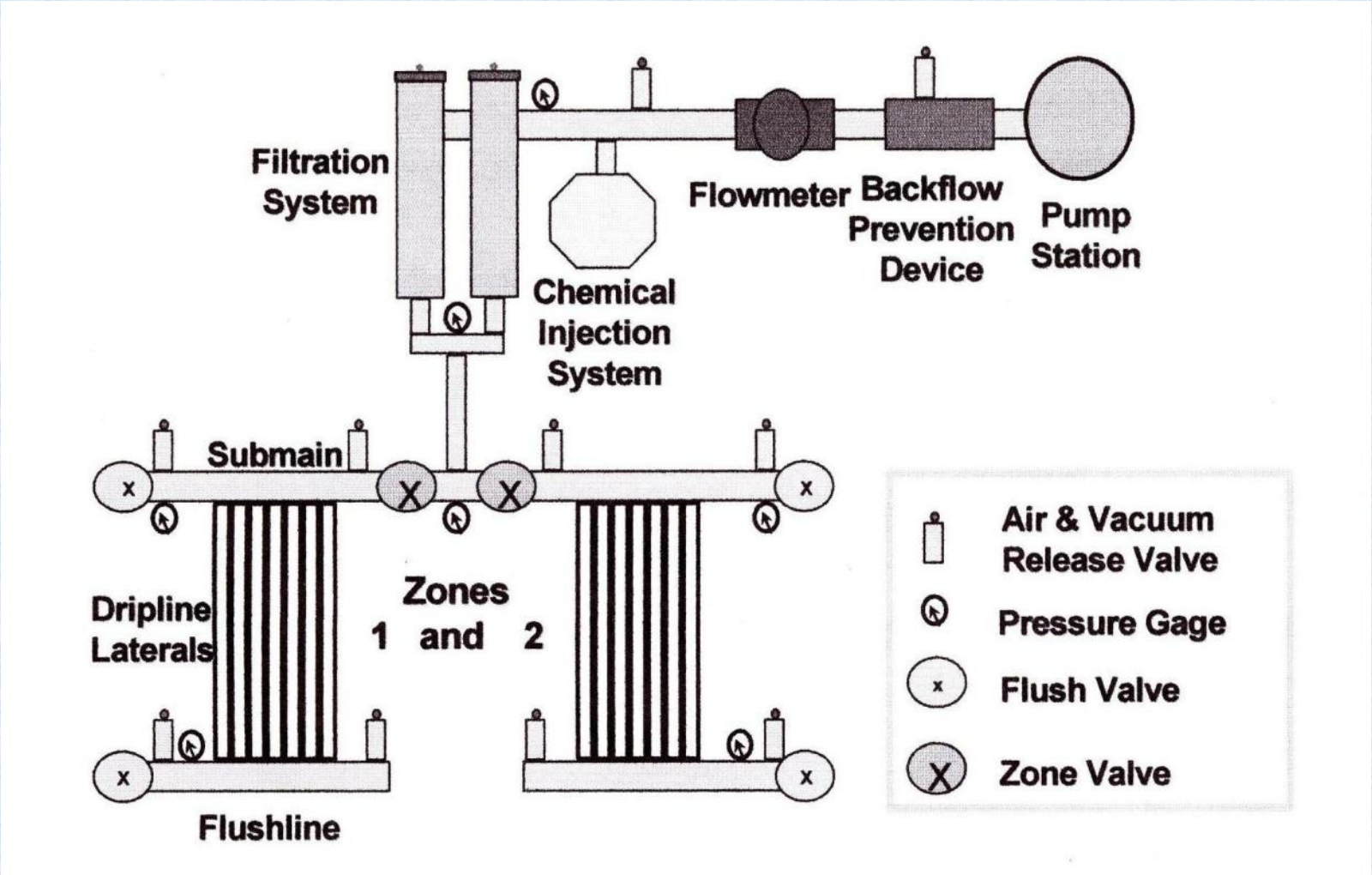
Irrigation Efficiency

- Furrow Irrigation: 40-60%
- Sprinkler Irrigation:
  - Siderolls: 60-80%
  - Center Pivots: 70-95%
- Subsurface Drip Irrigation: 90-100%

Concerns!

- Cost
- Arkansas River Compact
- Water supply
- Salinity
- Maintenance

Typical SDI Configuration



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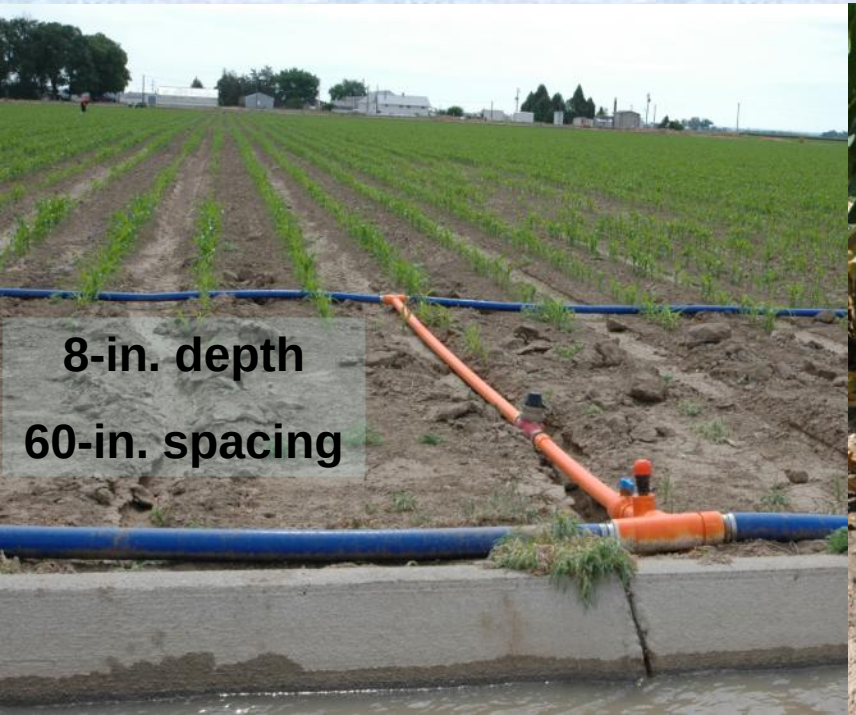
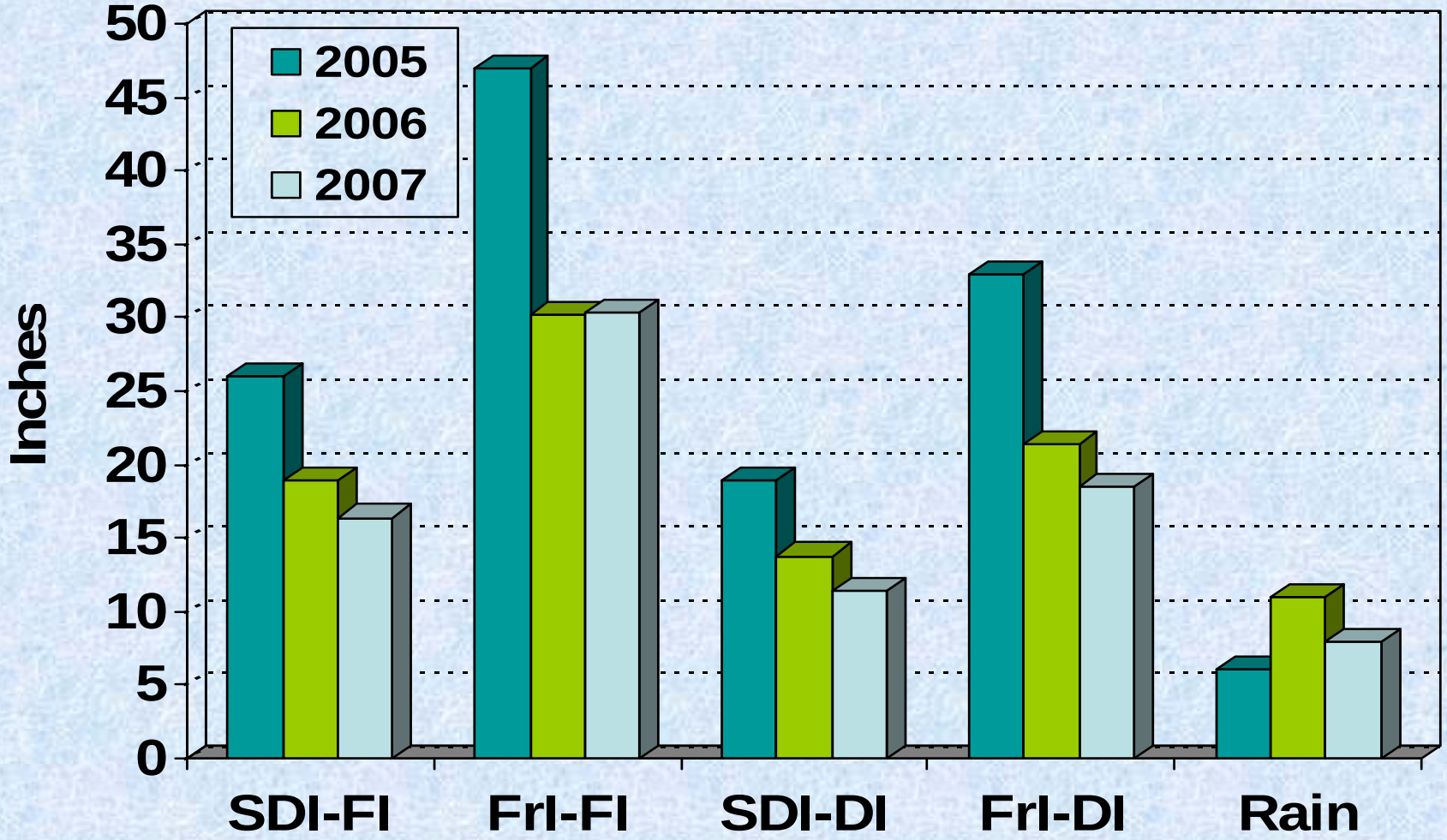
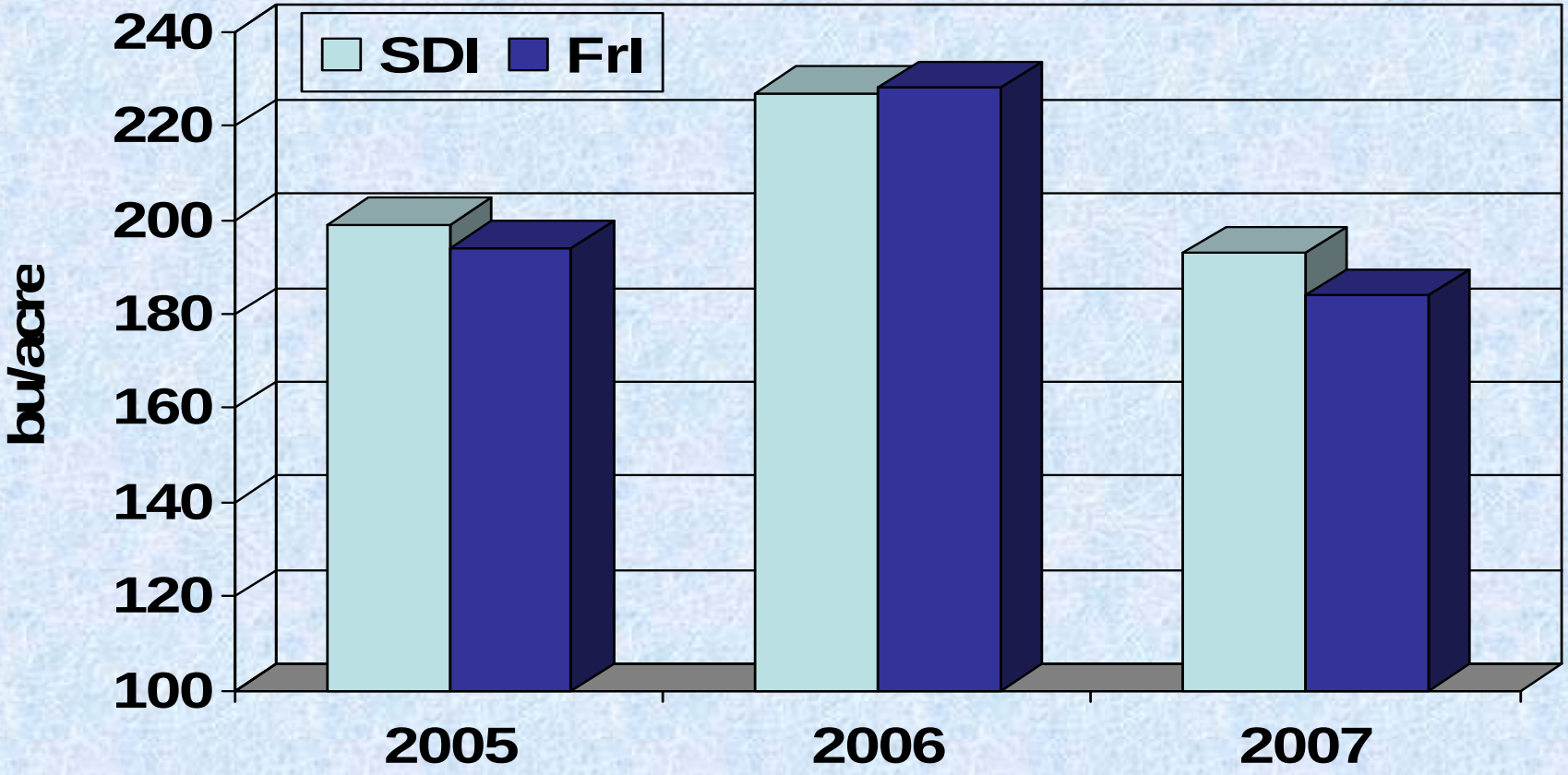

8-in. depth
60-in. spacing

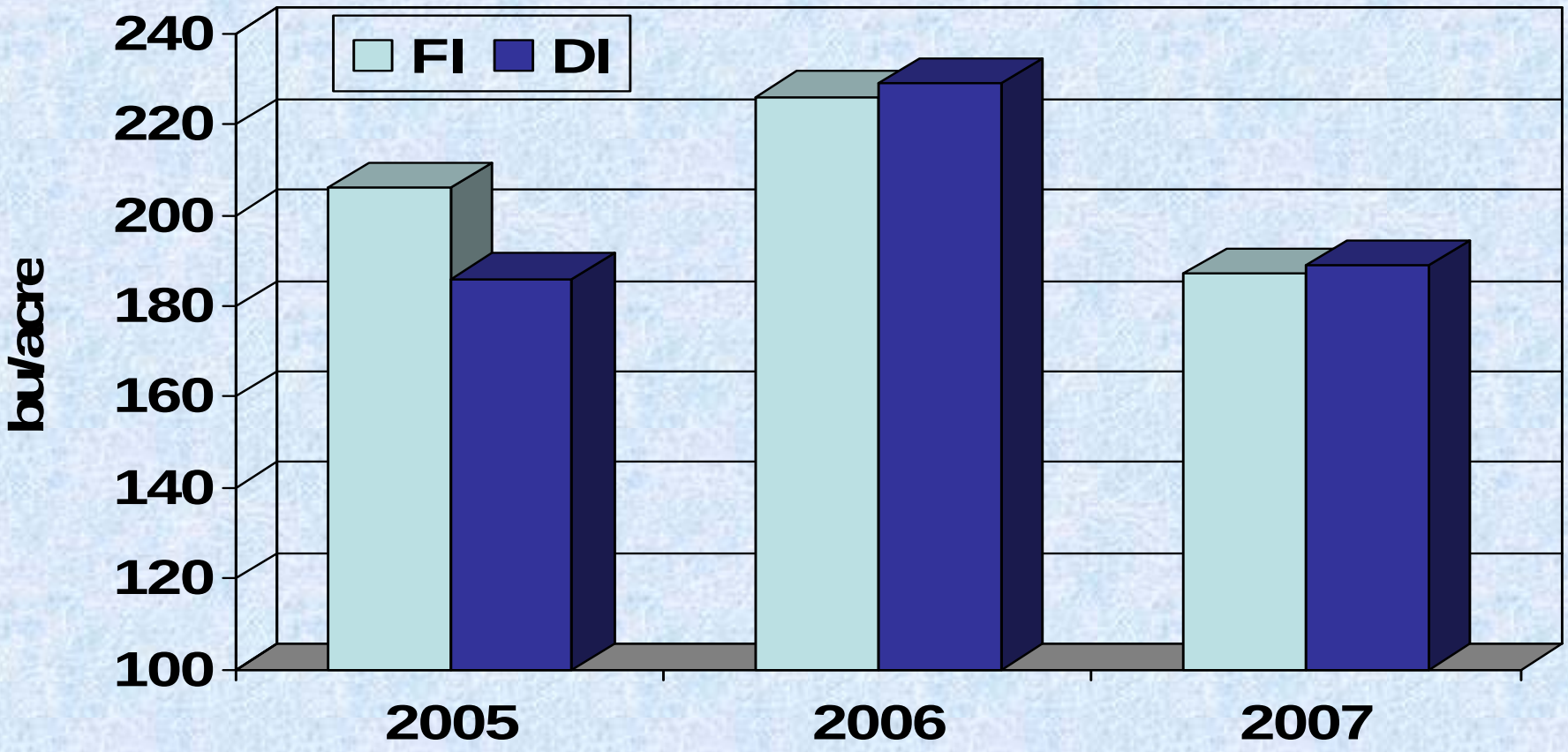
Precipitation Amounts (gross)



Corn Yield: Drip vs. Furrow Irrigation



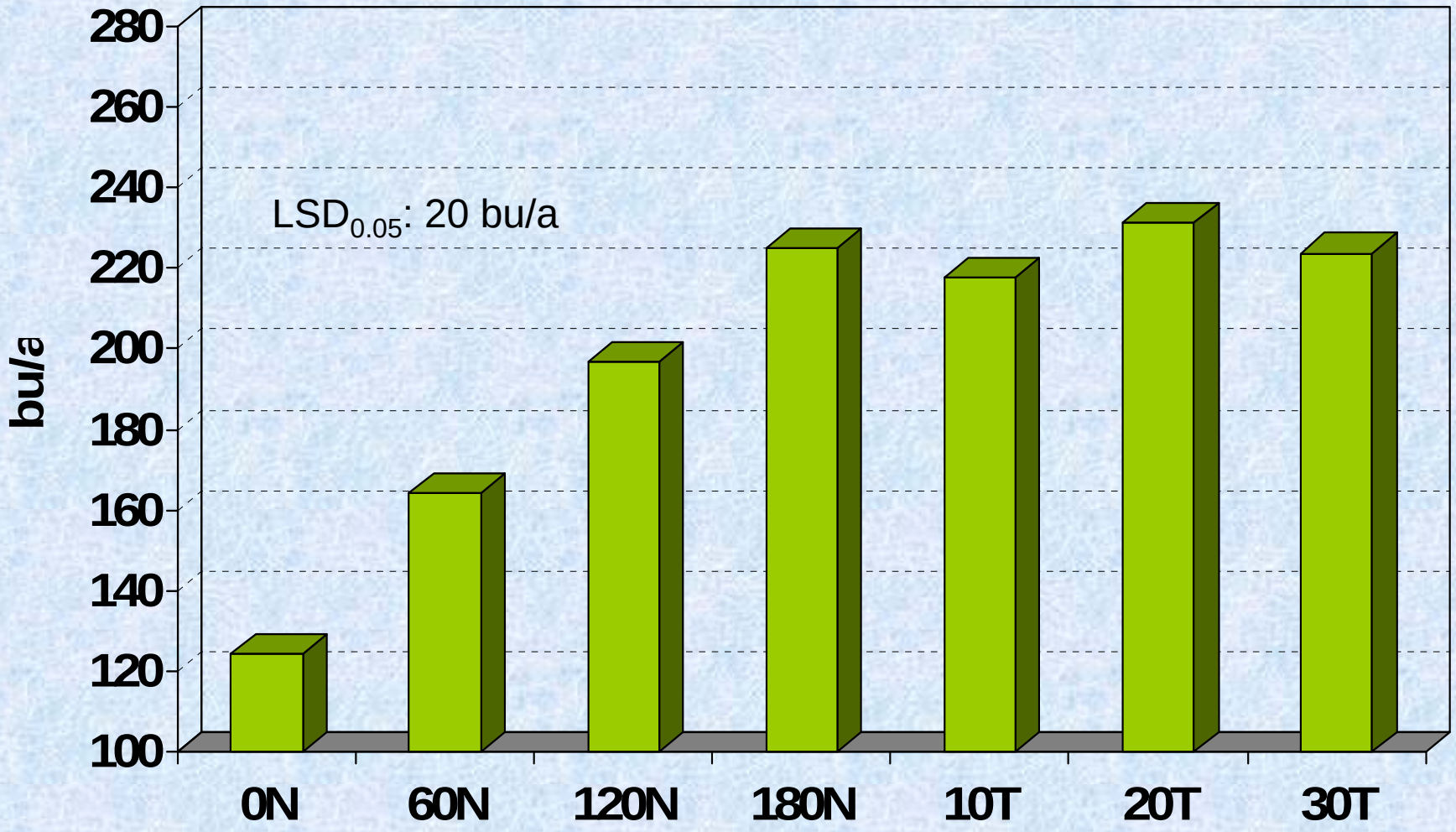
Corn Yield: Full vs Deficit Irrigation



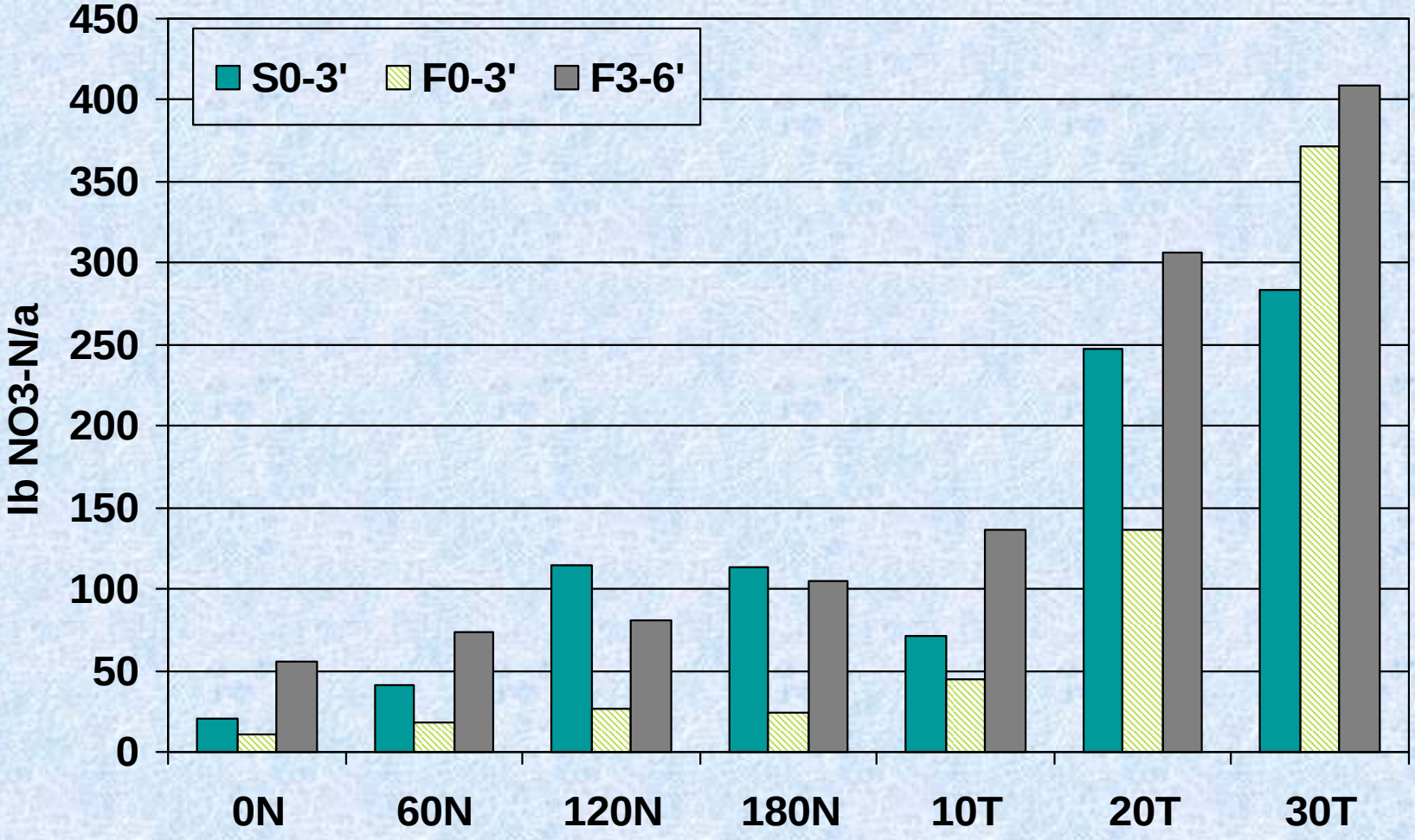
Fertilizer Application History

Cropping Season	Nitrogen Fertilizer	Manure
2005	YES (March’05)	YES (March’05)
2006	YES (March ’06)	YES (Nov.’05)
2007	NO	NO

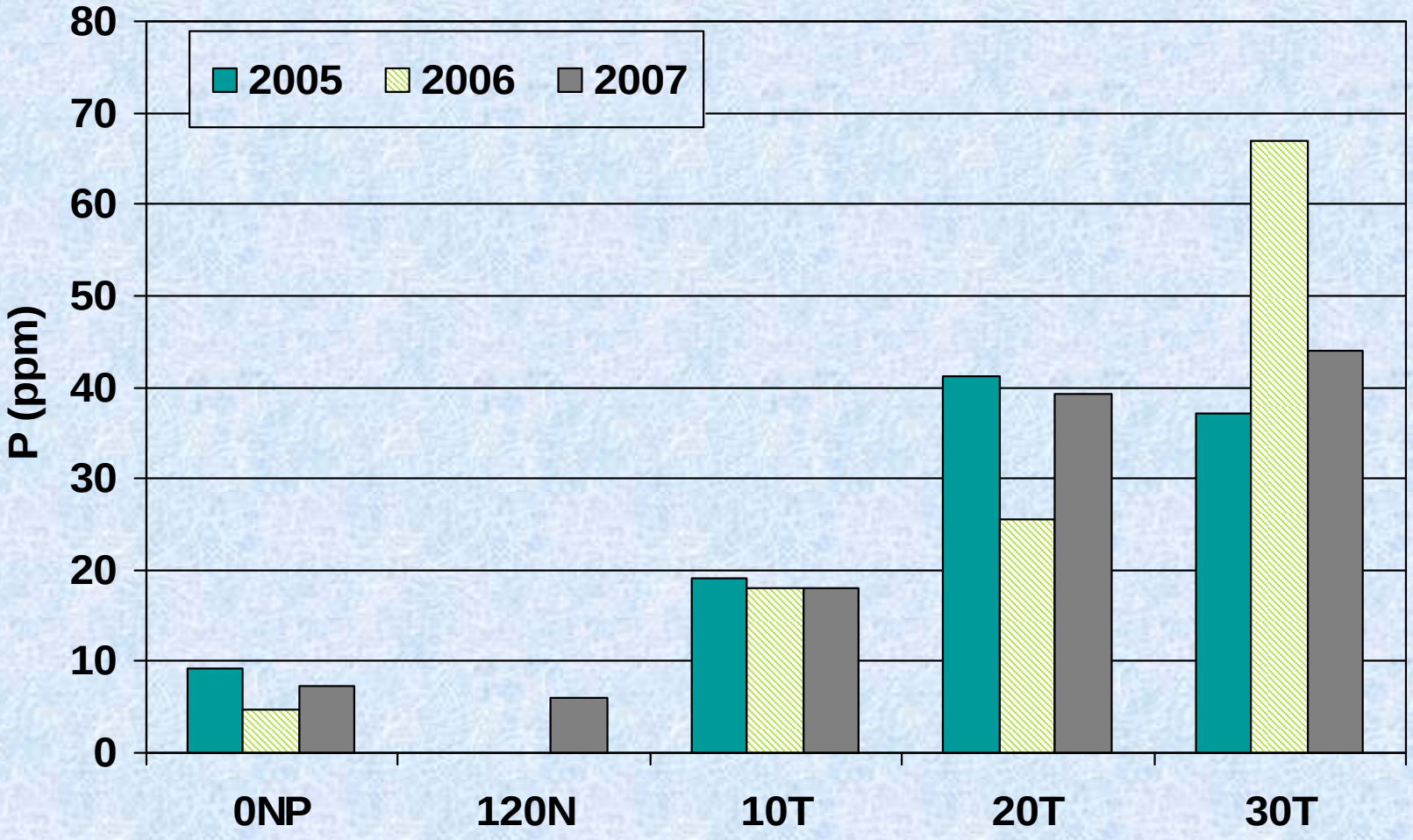
Corn yield as affected by N and manure rates in 2007



Soil Nitrate-N in the Spring and Fall 2007



Post harvest soil P in 0-1 ft in 2005-2007



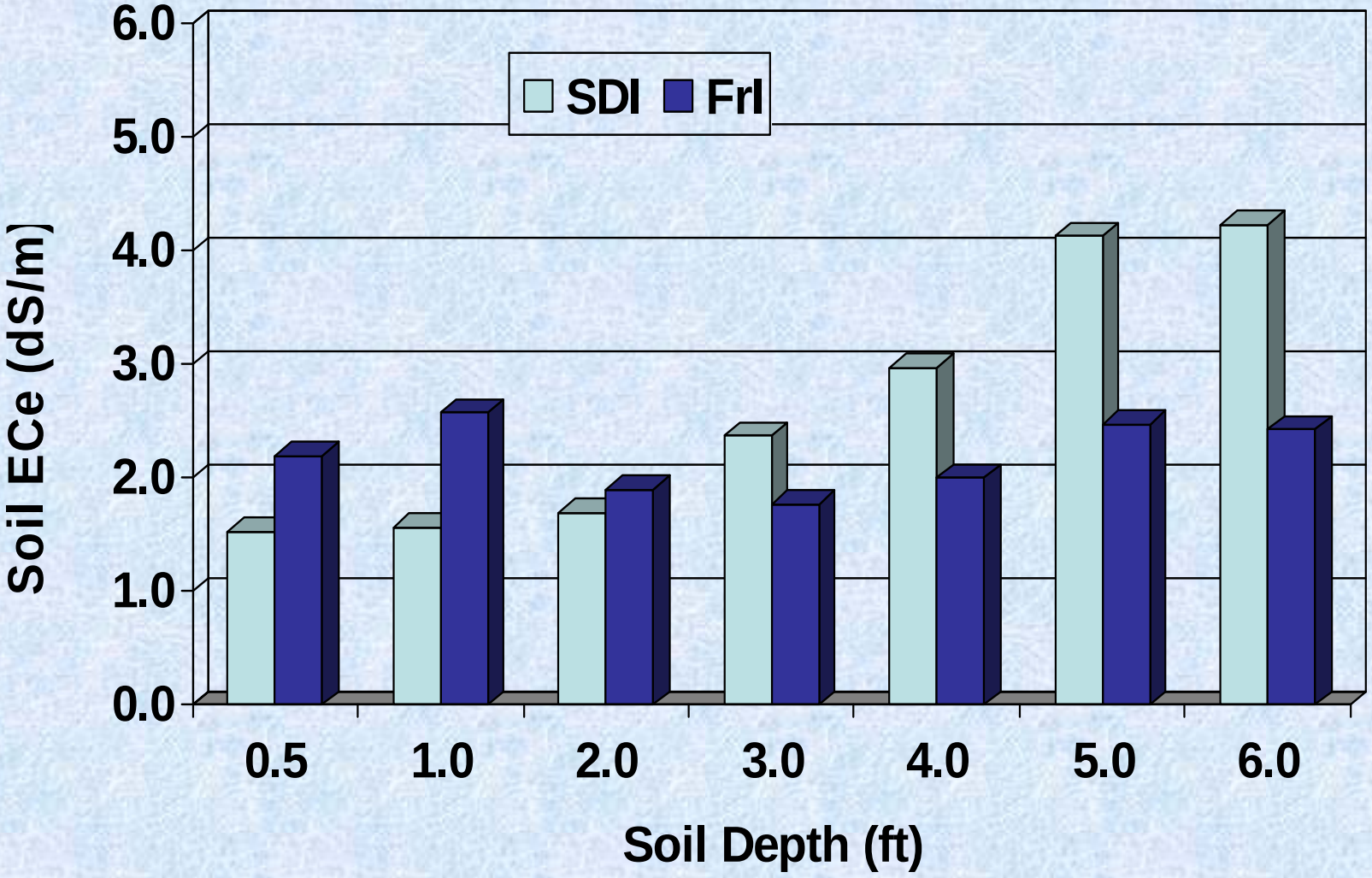
ECe as affected by irrigation type and sampling position and depth in Nov'06

	SDI (dS/m)			FrI (dS/m)		
Depth	**F**urrow	**R**ow	**M**iddle	**F**urrow	**R**ow	**M**iddle
0-6"	1.1	1.3	2.2	1.1	1.7	3.8
6-12"	1.4	1.6	1.7	1.3	1.5	4.9
1-2'	1.9	1.9	1.3	1.3	1.4	3.0
2-3'	**2.7**	**3.0**	1.4	1.4	1.4	2.5
3-4'	**2.9**	**3.9**	2.1	1.8	1.7	2.5
4-5'	**4.0**	**4.8**	**3.6**	2.3	2.5	2.6
5-6'	**4.1**	**4.7**	**3.9**	2.4	2.6	2.3

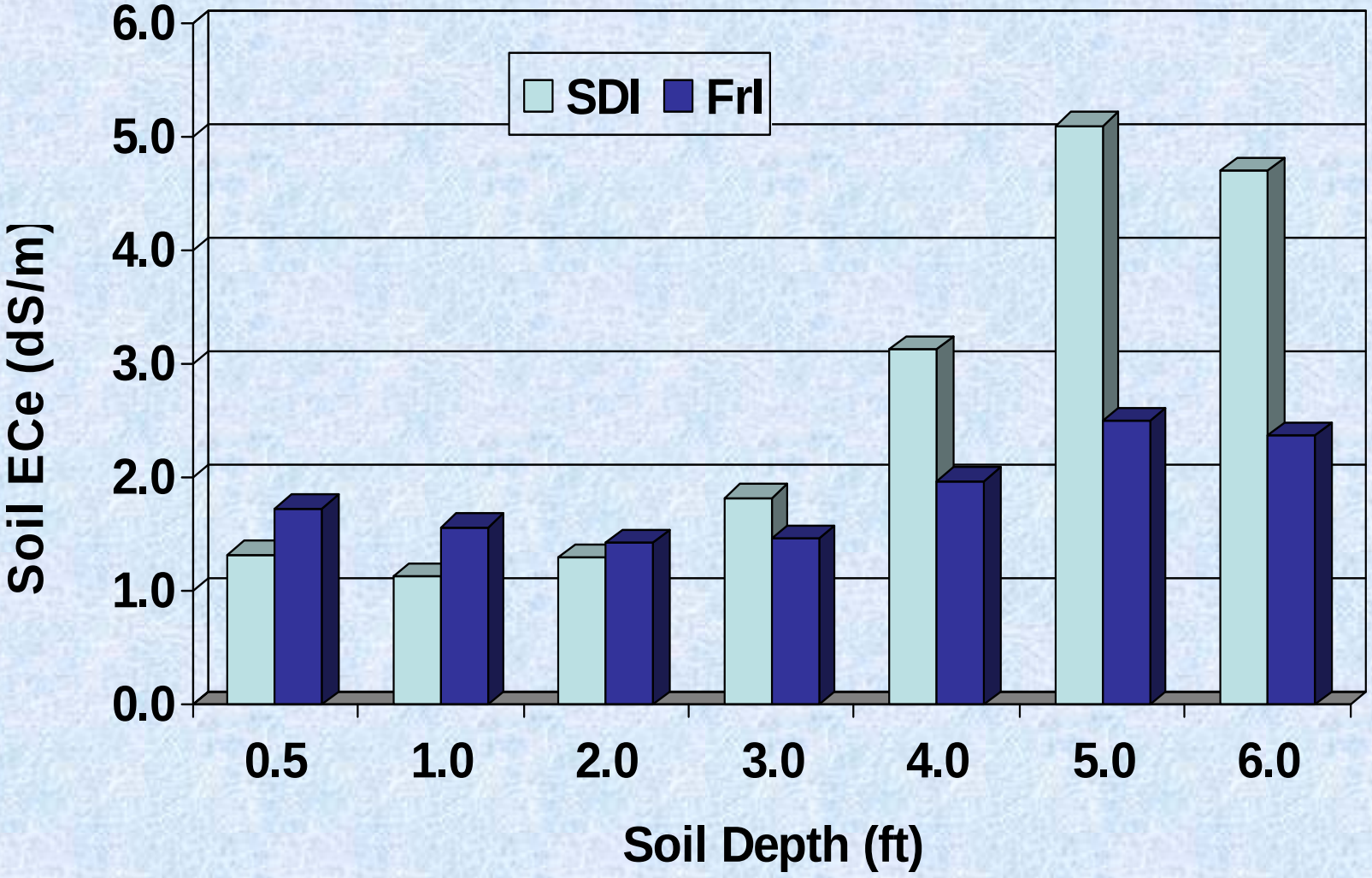
ECe as affected by irrigation type and sampling position and depth in Oct'07

	SDI (dS/m)			FrI (dS/m)		
Depth	**F**urrow	**R**ow	**M**iddle	**F**urrow	**R**ow	**M**iddle
0-6"	1.4	1.3	1.3	1.5	1.6	2.1
6-12"	1.1	1.2	1.1	1.4	1.4	1.9
1-2'	1.0	1.8	1.1	1.2	1.2	1.9
2-3'	1.7	**2.6**	1.2	1.3	1.1	2.0
3-4'	**3.7**	**3.5**	2.2	1.5	1.7	2.7
4-5'	**5.3**	**5.2**	**4.8**	2.3	2.3	2.9
5-6'	**3.8**	**5.0**	**5.3**	2.1	2.5	2.5

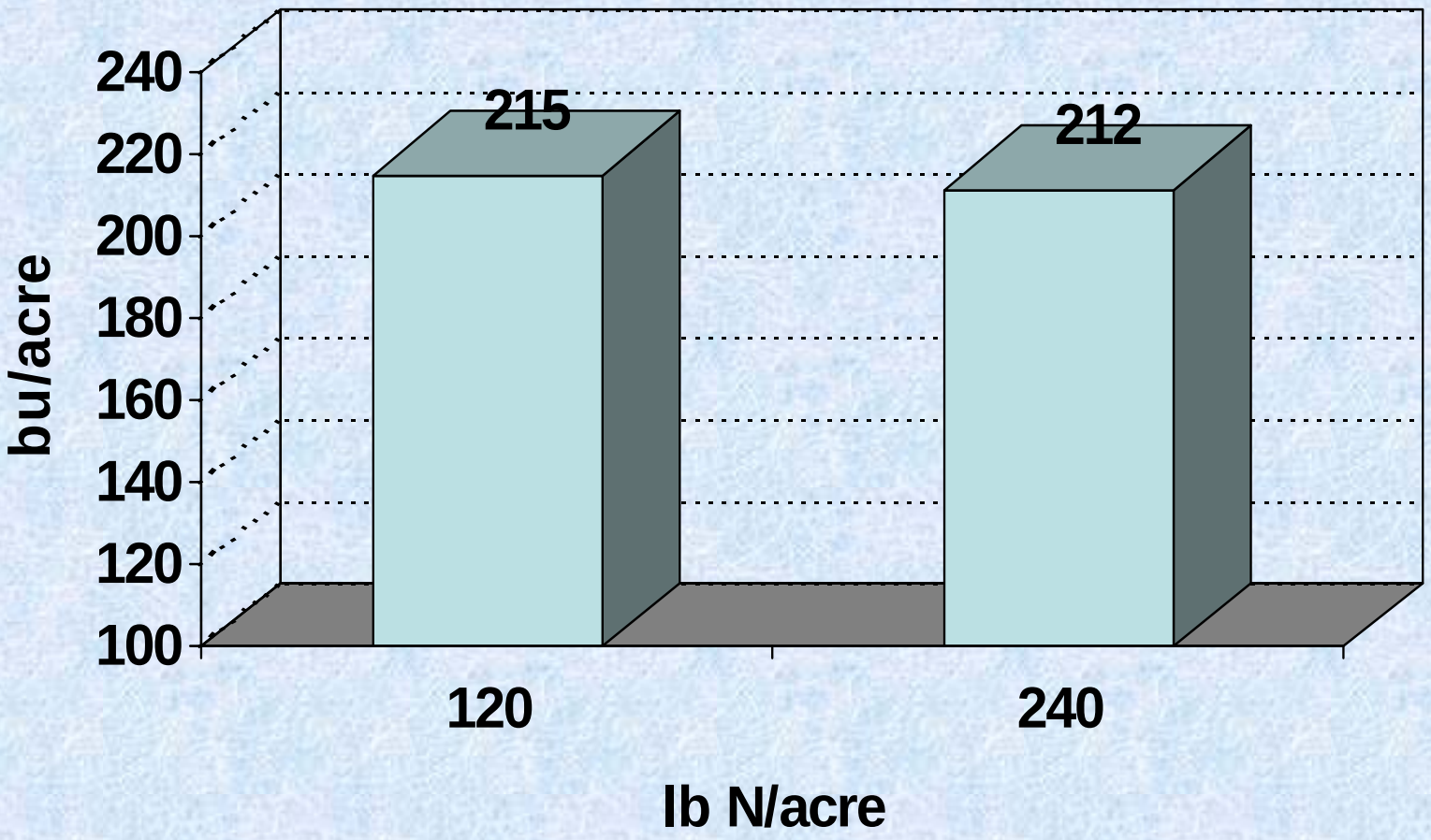
Soil ECe of SDI and FrI in Nov'06



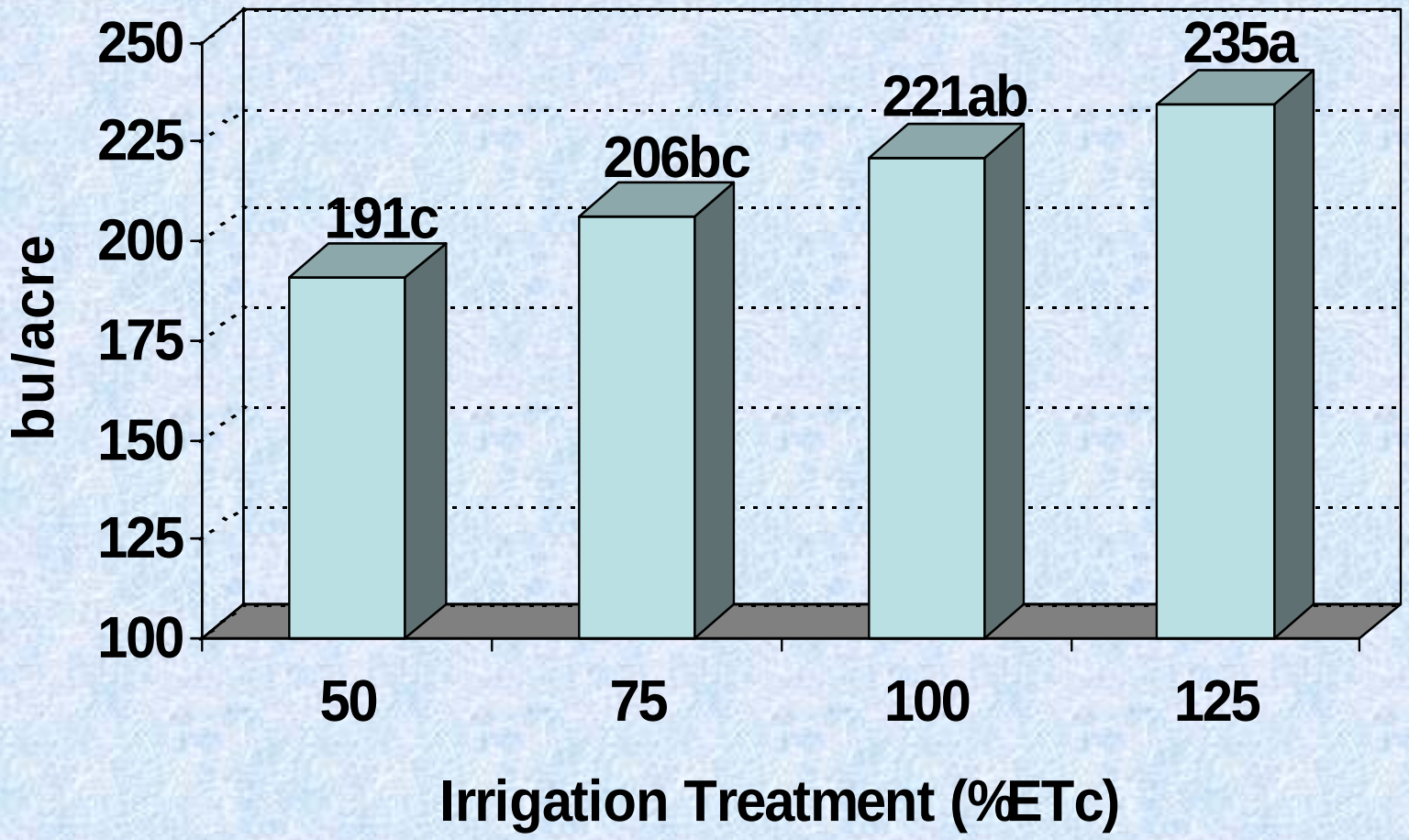
Soil ECe of SDI and FrI in Oct'07



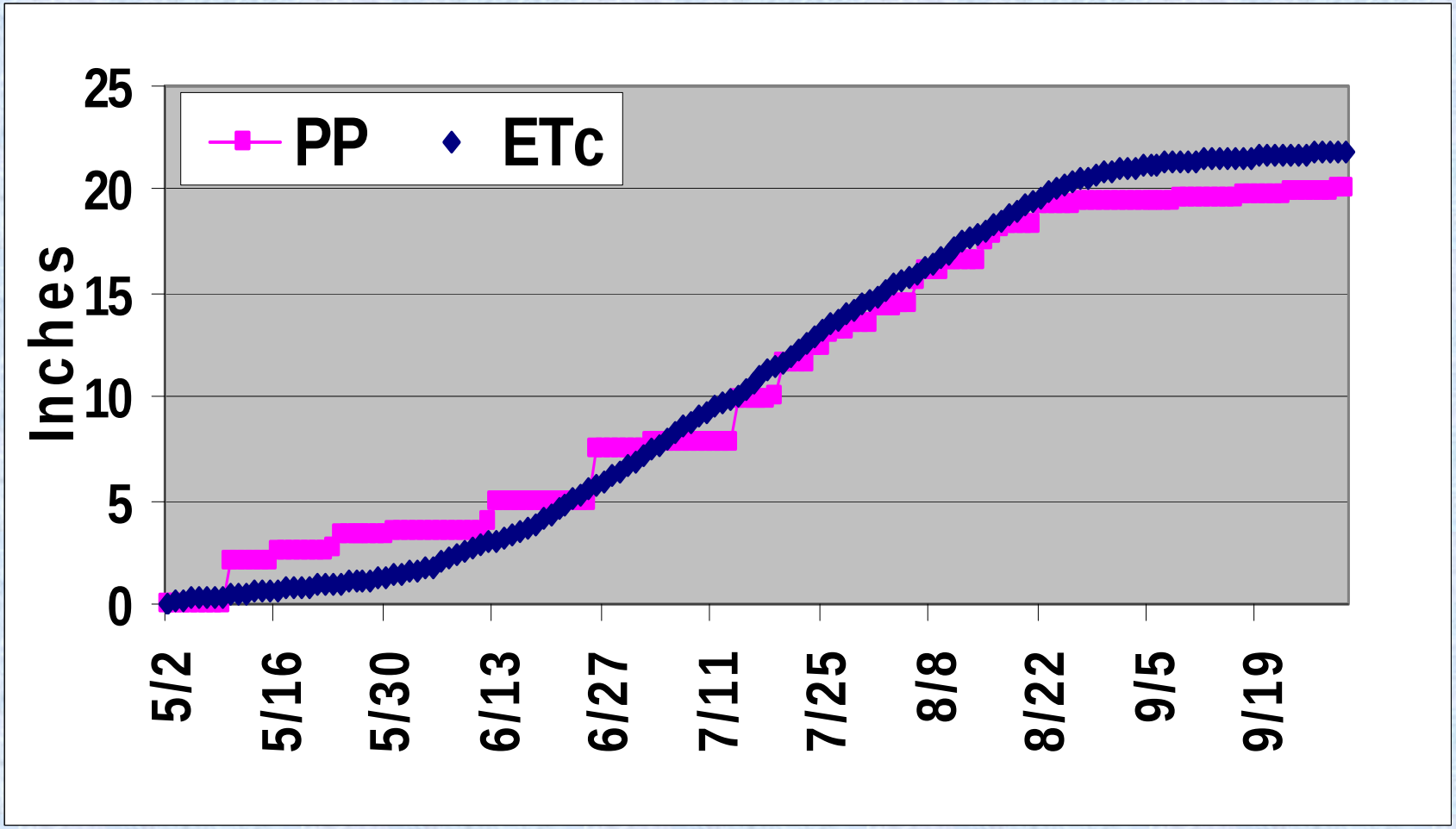
Irrigation Scheduling Experiment



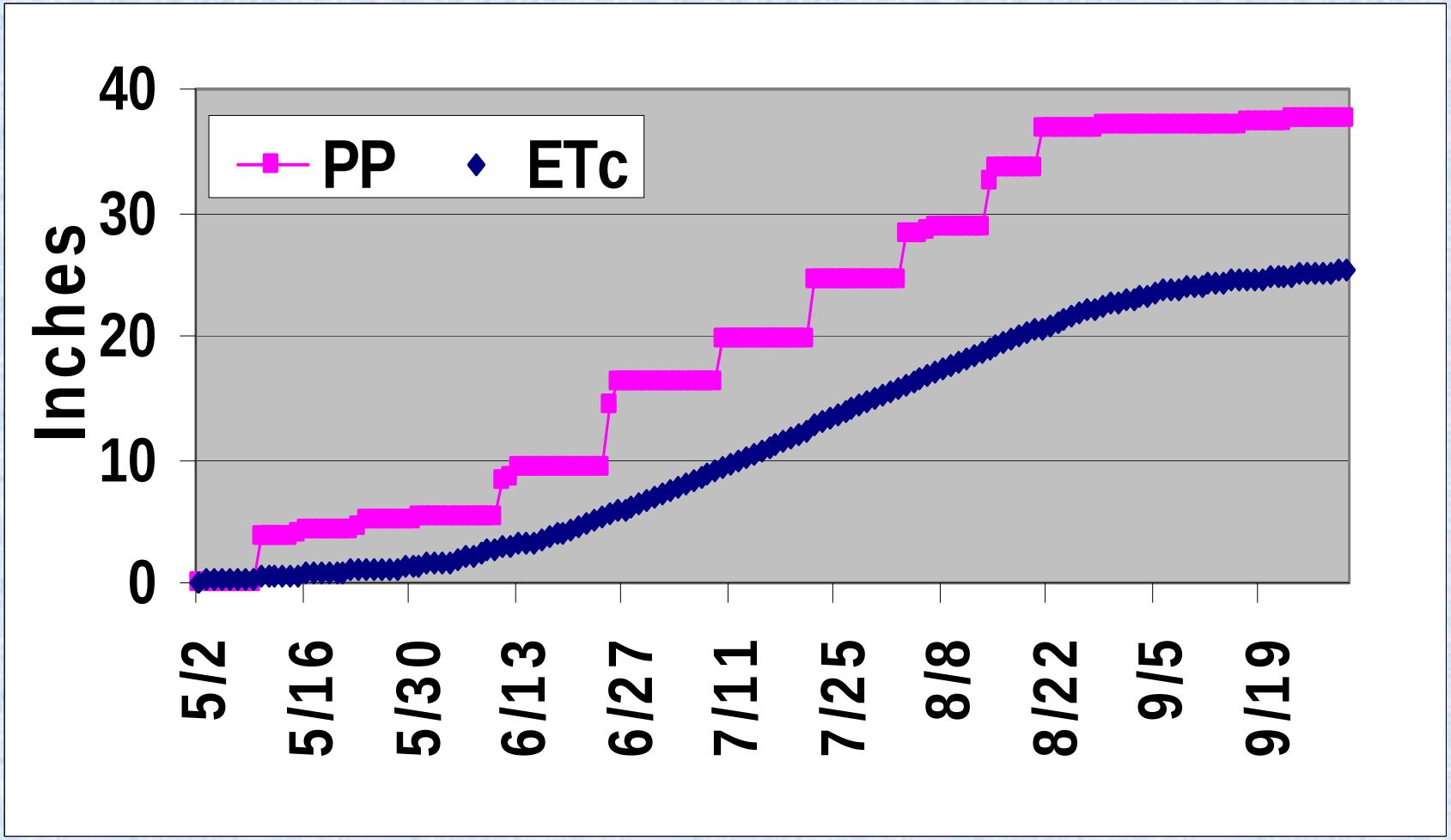
Irrigation Scheduling Experiment



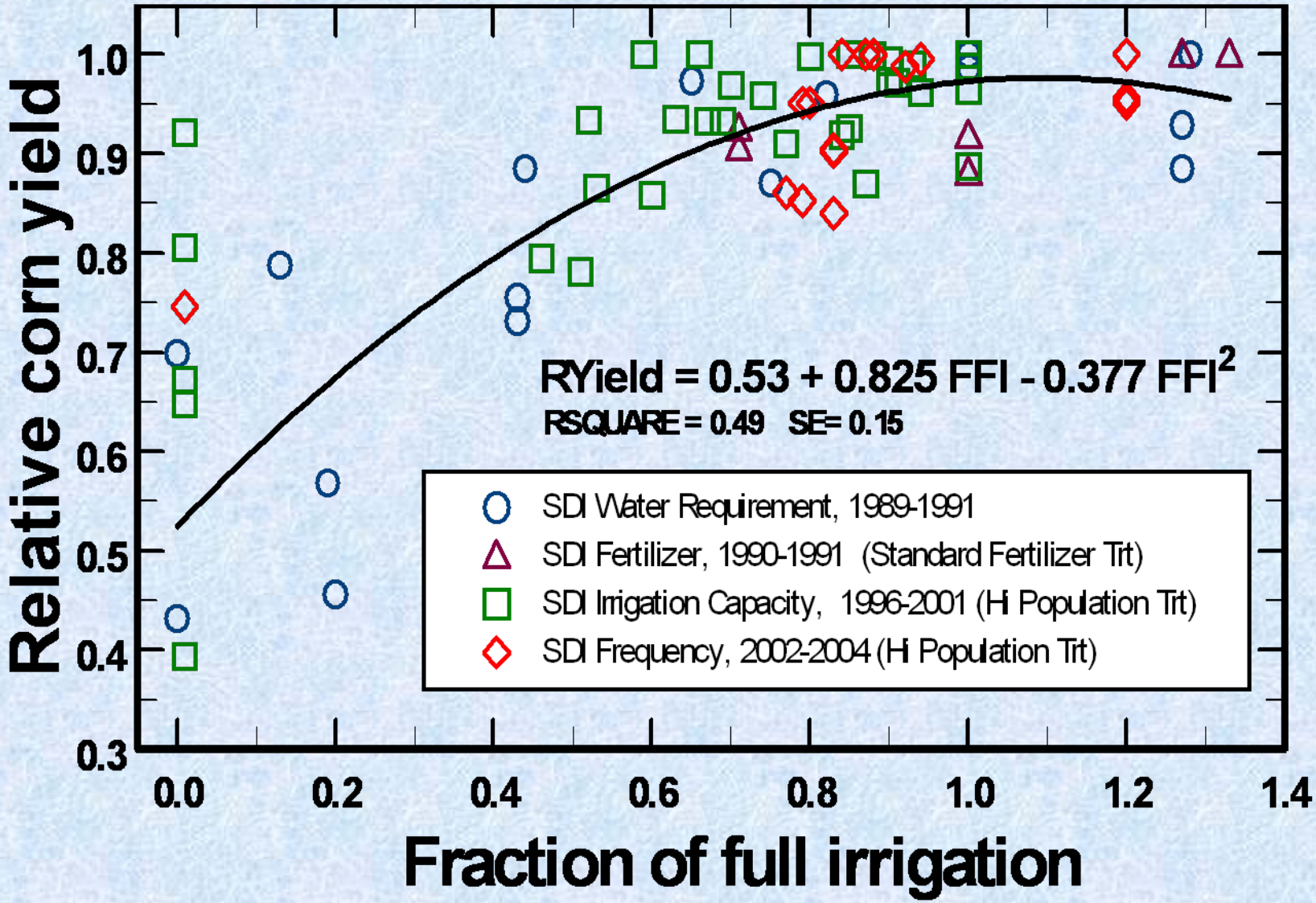
Cumulative Crop ET & Precipitation



Cumulative ETc and PP in FrI



Corn Response to SDI in Colby, KS



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The results of SDI studies in 1989-2004 in Colby, KS show that relative corn yield reached a plateau at about 80% of full irrigation.

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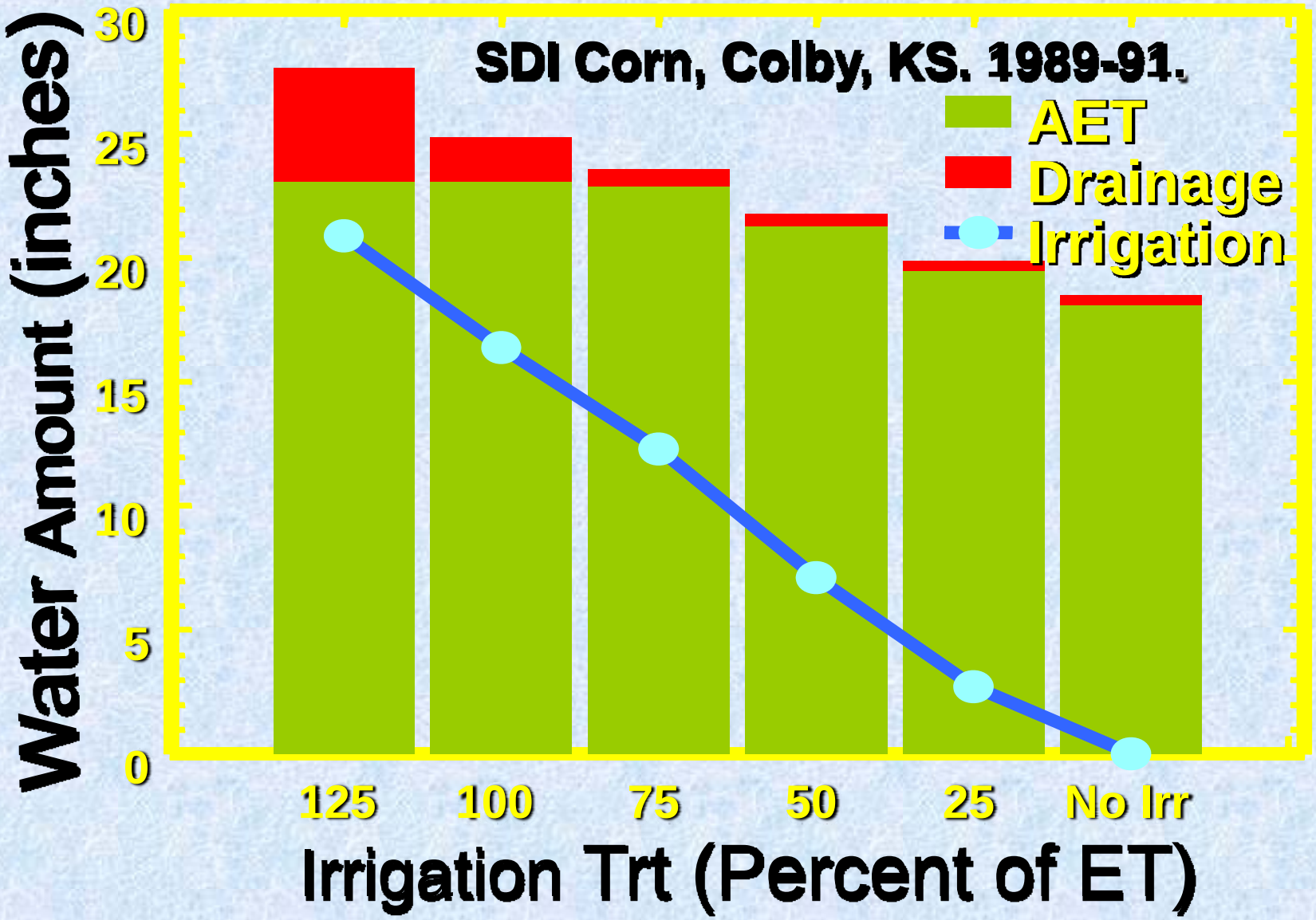
Conserve Water

- Minimize water losses
  - Runoff
  - Evaporation
  - *Drainage*

7% percolation reduction at 75% of Irrigation!



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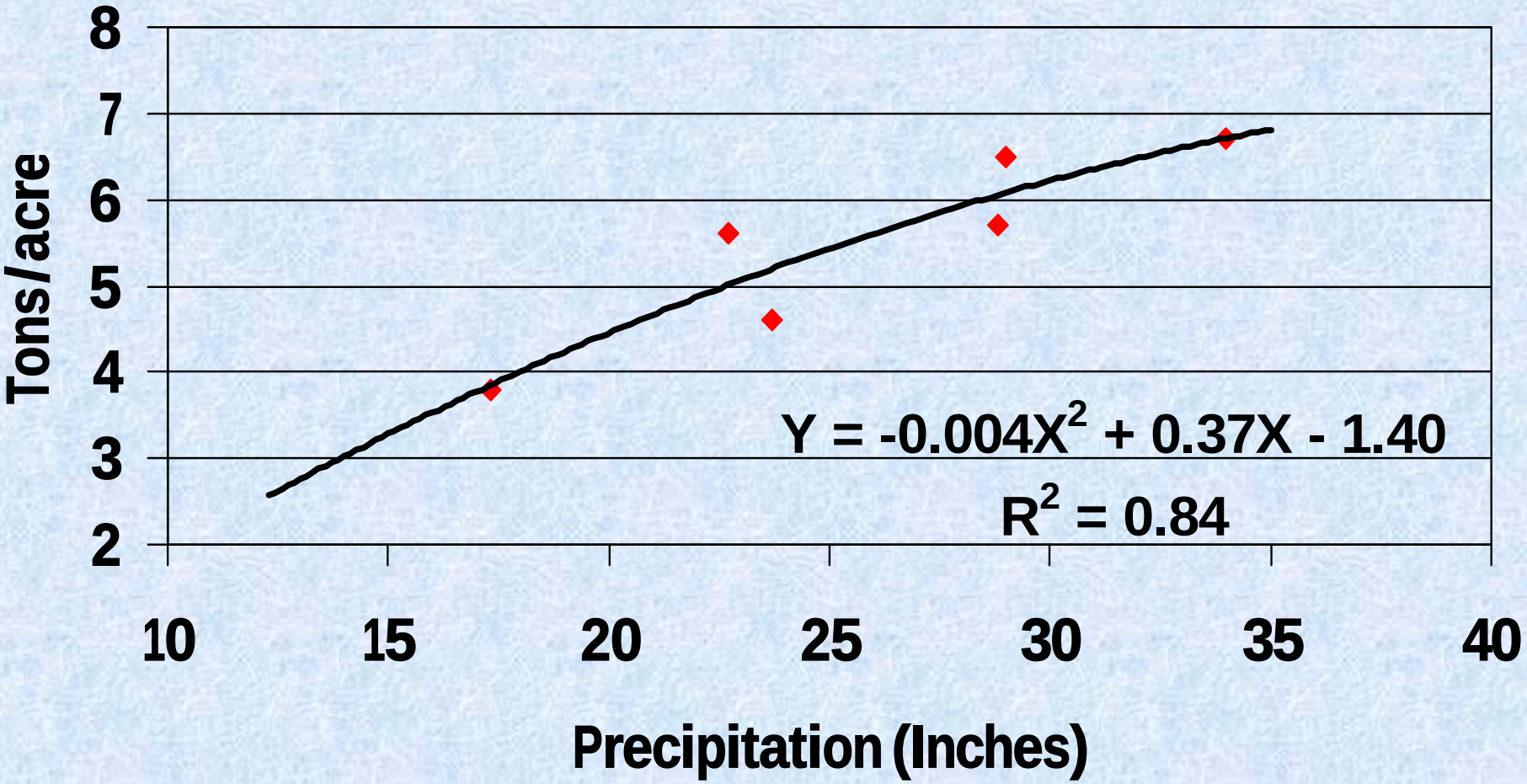
Alfalfa Response to SDI
Yellow Jacket, 2002&2003



Take Home Message

- SDI = FrI with ~43% less water
- Additional savings (20-30%) with sound irrigation scheduling (Targeted irrigation)
- N rate ↔ Soil test results & Yield goal
- Challenges with SDI
  - Salt accumulation
  - Seed germination

Thank You!