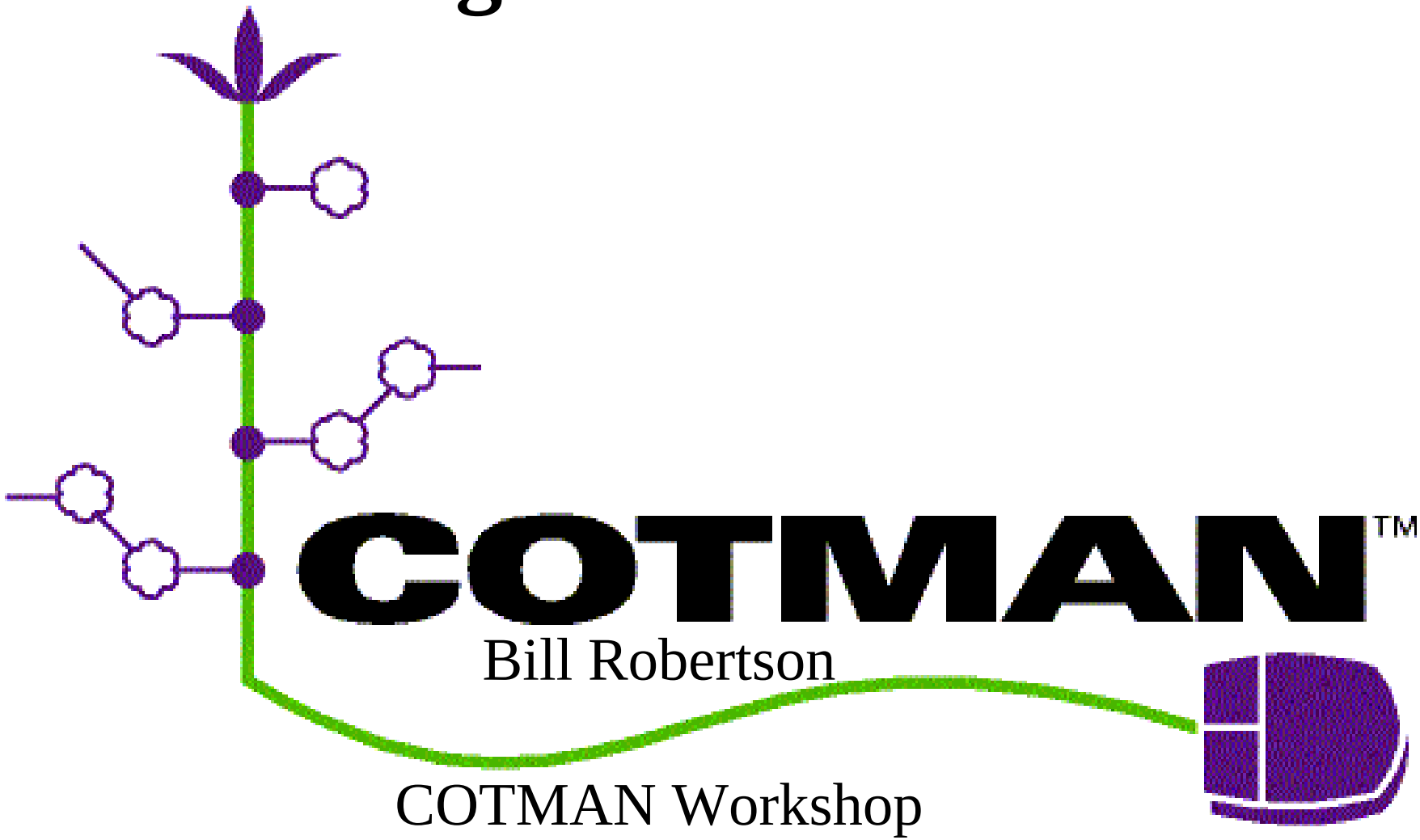
Irrigation Termination



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Principal Investigators

- Southeast Missouri: Bobby Phipps, University of Missouri
- Northeast/Central-east Arkansas: Earl Vories and Tina Teague, University of Arkansas; Jason Stewart, Arkansas State University
- Southeast Arkansas: Jeremy Greene (Charles Allen and Marwan Kharboutli), University of Arkansas

Principal Investigators

- Northeast Louisiana: Ernie Clawson (Steve Hague and Joel Faircloth), Louisiana State University
- Mississippi: Lyle Pringle, Mississippi State University
- Texas: Drip and LEPA studies, Texas Cooperative Extension

Methods and Materials

2000 – 6 studies

3 sites in NE AR, 3 in SE AR

2001 – 8 studies

1 site in SE MO, 3 in NE AR, 2 in SE AR, 2 in NE LA

2002 – 10 studies

1 site in SE MO, 3 in NE AR, 1 in CE AR, 2 in SE AR, 1 in MS, 2 in NE LA

Methods and Materials

2003 – 8 studies

1 site in SE MO, 3 in NE AR, 1 in CE AR, 2 in SE AR, 1 in NE LA

2004 – 8 studies

1 site in SE MO, 1 in NE AR, 1 in CE AR, 2 in SE AR, 1 in MS, 1 in NE LA

2005 – 7 studies

1 site in SE MO, 2 in NE AR, 2 in SE AR, 1 in NE LA, 1 in MS

Findings

2000

- 1 site in NE AR, 2 in SE AR: yield not significantly affected by final irrigation timing
- SE: yield increase until final irrigation at 422 HU after NAWF=5; no additional increase
- NE: 1- yield increase until final irrigation at 251 HU after NAWF=5; no additional increase
- NE: 2- field quite variable; no increase after 42 HU **before** NAWF=5
- NE AR: later irrigations tended to have lower % first harvest

Findings

2001

- LA studies not harvested (late rains)
- 4 studies (MO, 2 NE AR, 1 SE AR): yield not significantly affected
- NE AR: yield increase until final irrigation at 243 HU after NAWF=5; no additional increase
- SE AR: yield increase until final irrigation at 735 HU after NAWF=5; no additional increase
- NE AR: later irrigations tended to have lower % first harvest

Findings

2002

- MO, NE AR, 1 LA not harvested (late rains)
- 4 studies (2 SE AR, MS, 1 LA): yield not significantly affected
- CE AR: yield increase until final irrigation at 349 HU after NAWF=5, no additional increase

Findings

2003

- MO (late rains) and LA (herbicide drift) not harvested,
- 4 studies (2 NE AR, CE AR, 1 SE AR): yield not significantly affected
- SE AR: yield increase through final irrigation at 864 HU after NAWF=5

Findings

2004

- MO not harvested (rain)
- 4 studies (CE AR, 2 SE AR, MS): yield not significantly affected
- Rain affected MS, but AR conditions seemed well suited to irrigation termination study (maybe plentiful rain during season led to full reservoir late season?)

Findings

2005

- MO results not available
- 4 studies (2 NE AR, LA, MS): yield not significantly affected
- 2 SE AR studies: yield increase through 550 DD60 after NAWF=5

Summary

- Cases where yield differences significant: differences for SE Arkansas observed later (422 HU in 2000, 735 HU in 2001, 864 in 2003, 550 in 2005) than for NE Arkansas (no differences later than 251 HU). One observation in between (CE AR) no difference later than 349 HU.
- Hope to determine if there is a true N-S effect or due to some confounded factor (soil type, management) .

Summary

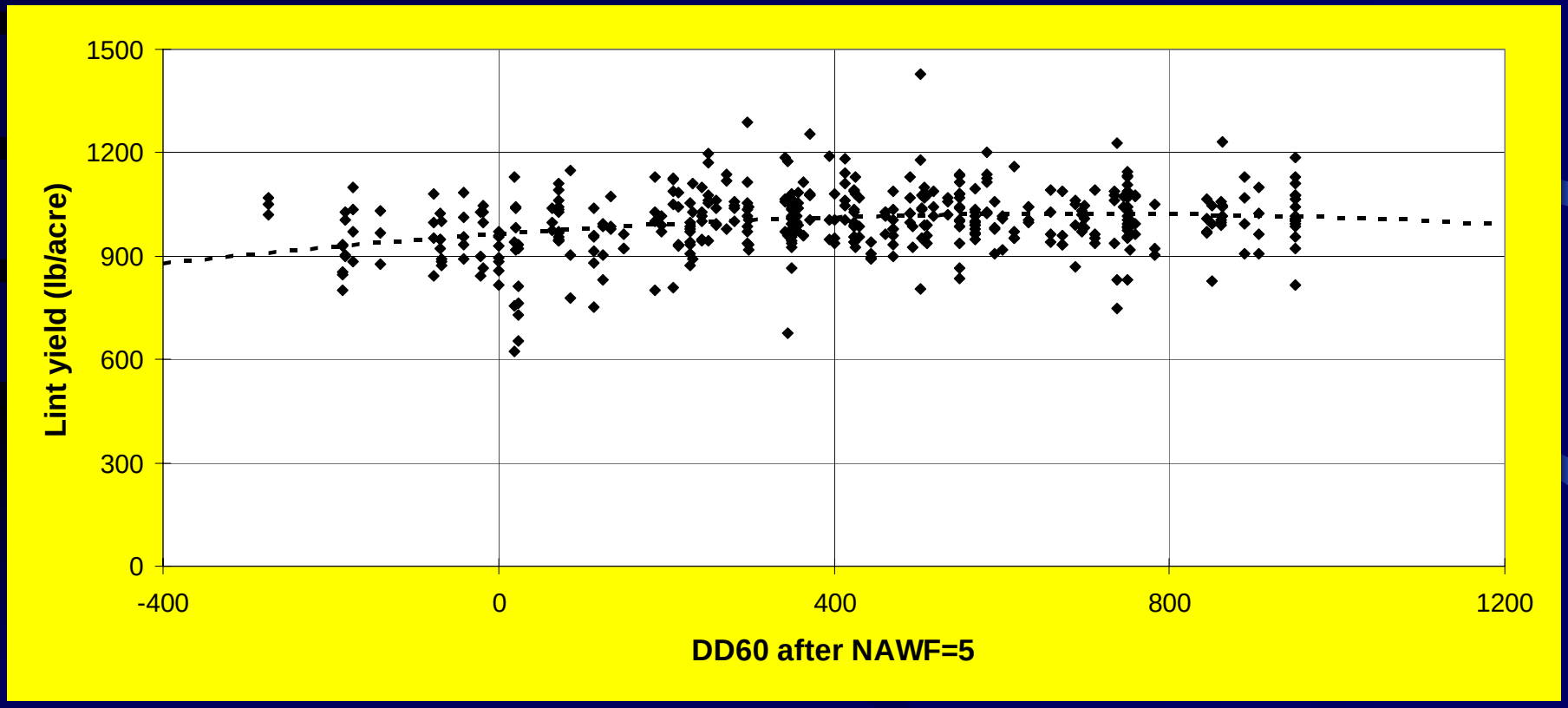
- Where studies harvested twice (NE AR in 2000, 2001; LA in 2002) later crop associated with later irrigation, though differences not significant in LA.
- Very little difference observed in fiber quality (data being collected, but not presented here).

2005 Procedure

- Data sets from 26 Mid-South studies during the 2000 through 2005 growing seasons
- Total of 432 data points
- All 432 data points fit to quadratic equation:
  - $LY = a(DD60\_5)^2 + b(DD60\_5) + c$
  - where LY is lint yield (lb/acre, assuming a 35% gin turnout); DD60_5 is growing degree days, 60° F base (DD60), after NAWF=5; and a, b, and c are regression coefficients
  - used quadratic equation because yield often declined with later irrigations

2000-2005 Lint Yield vs. DD60_5

(26 studies, quadratic equation, normalized data)



2005 Findings

$$LY = 963 - 0.000121(DD60\_5)^2 + 0.167(DD60\_5)$$

- $R^2 = 0.075$
- Residual analysis suggested no major outliers
- Maximum lint yield: 1021 lb/acre @ 692 DD60_5
- Lint yield = 963 lb/acre @ NAWF=5 (physiological cutout)
- Only 58 lb/acre additional lint after NAWF=5

Recommendations

Can we make a DD60-based recommendation for furrow-irrigated cotton in Midsouth yet? Need to verify:

- Quadratic equation is best fit
- Whether there is a N-S difference
- Fiber quality not negatively impacted
- Maturity not excessively impacted

Economic Impacts of Termination Timing for Irrigation and Plant Bug Control

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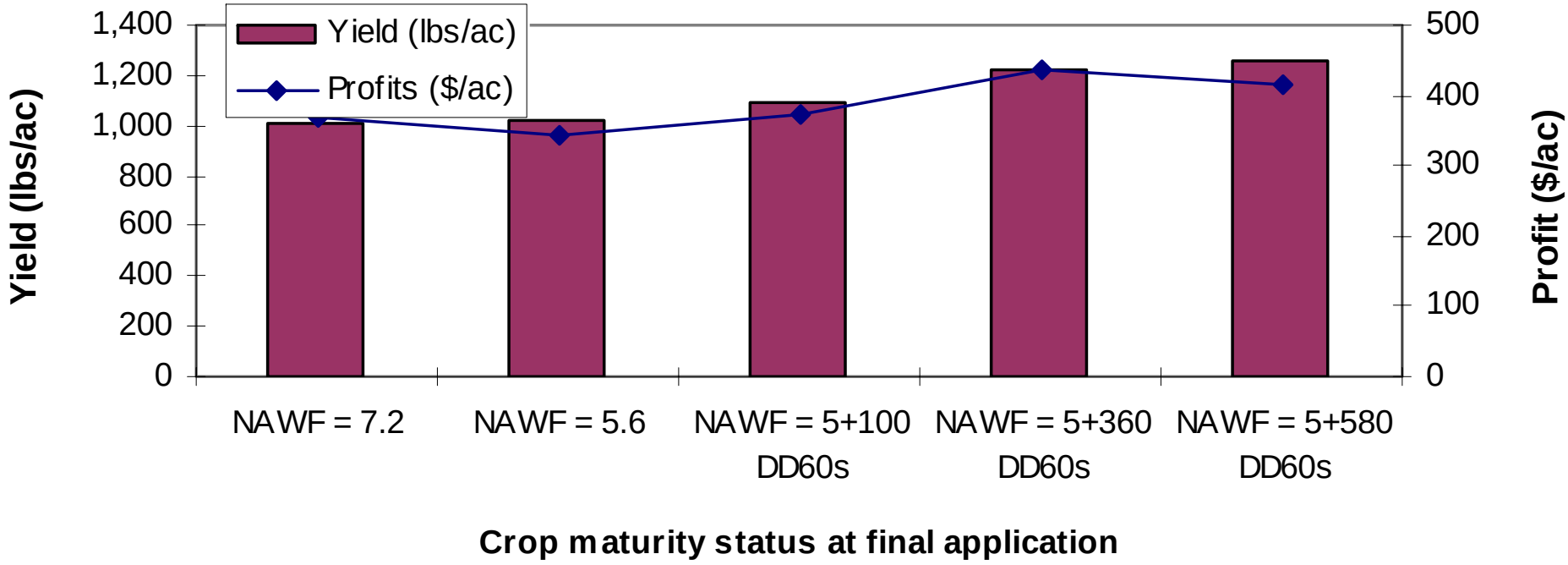
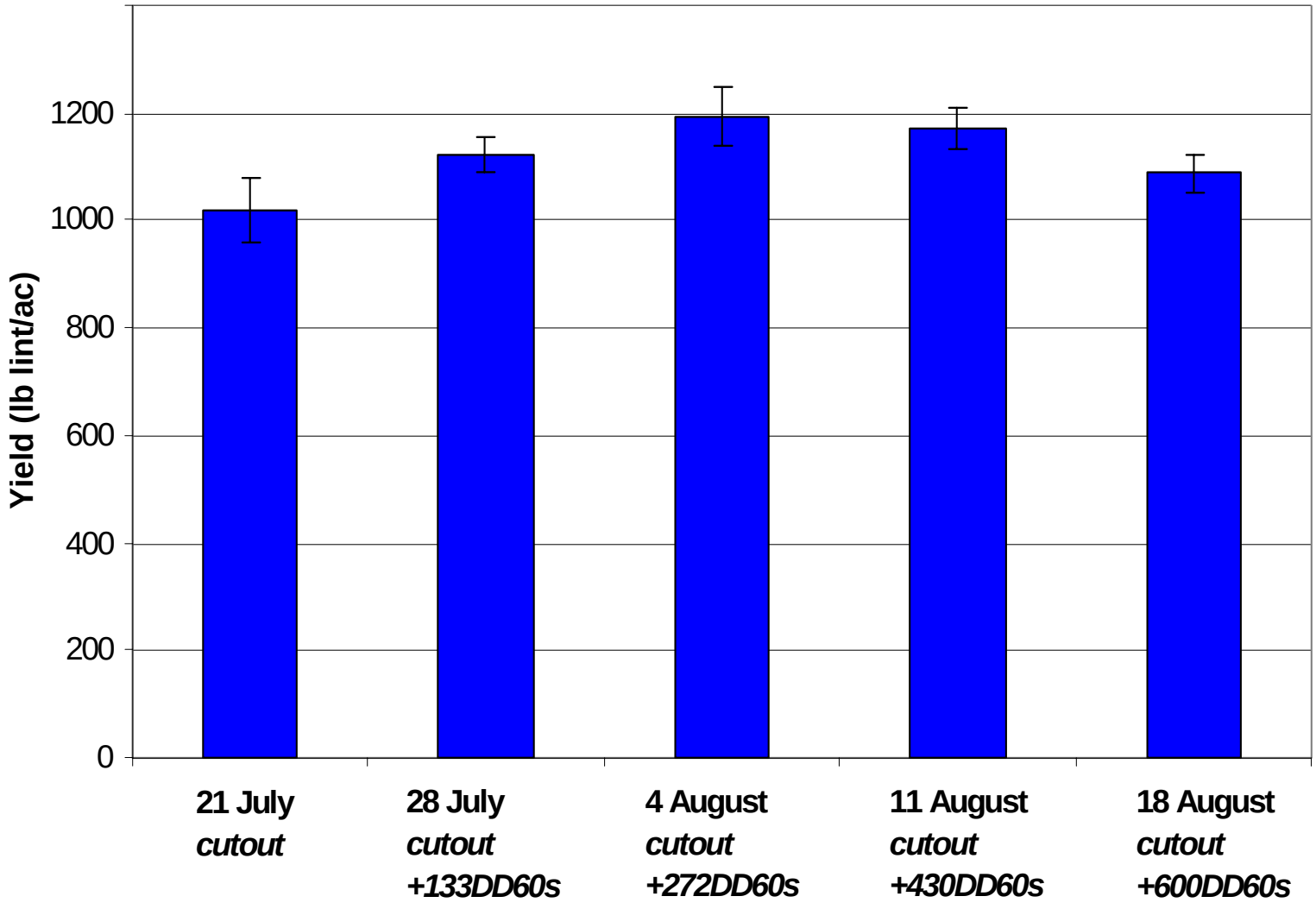
**Department of Entomology, University of Arkansas at Arkansas State University

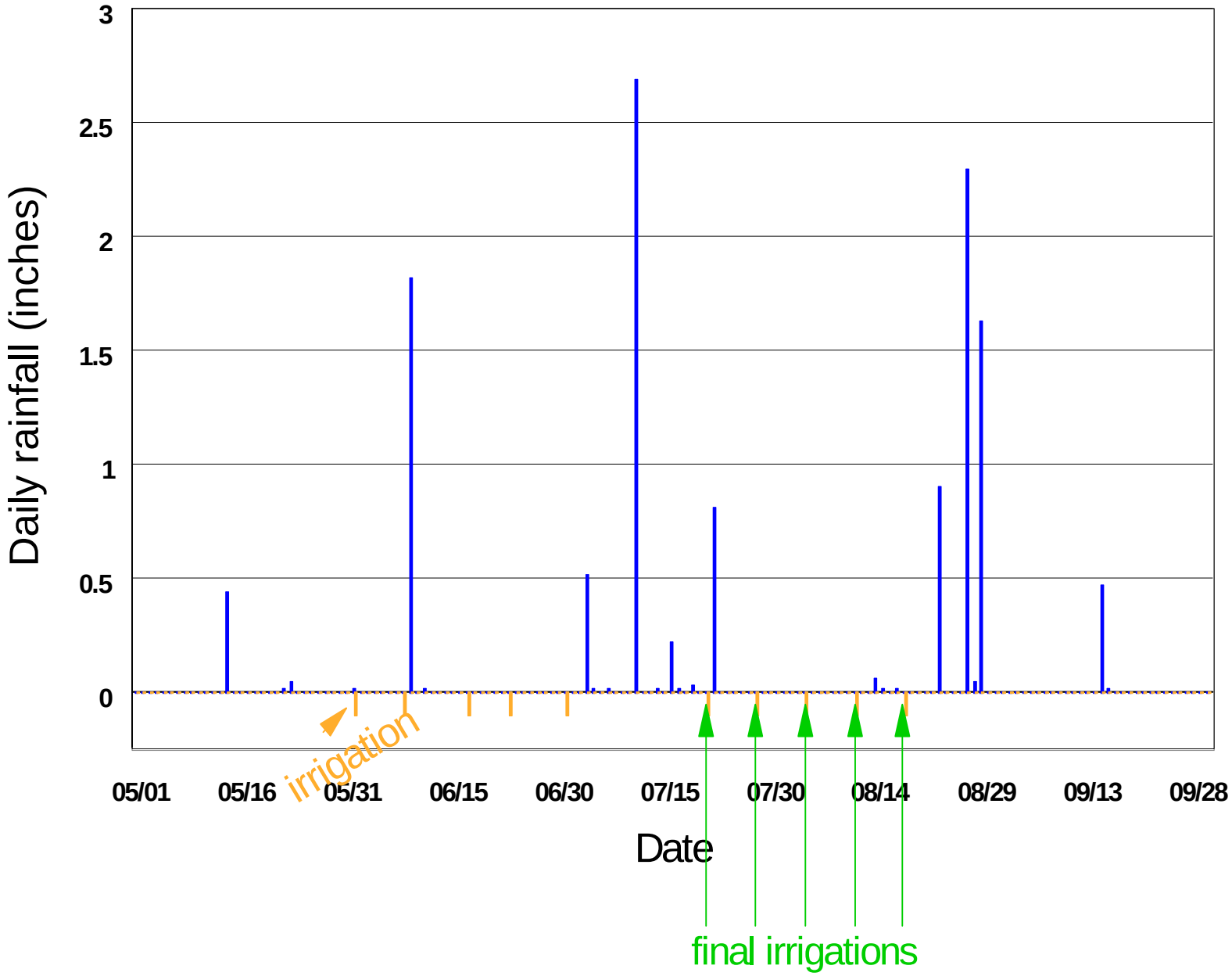
Figure 2. Effects of irrigation termination on yields and profits for 2004



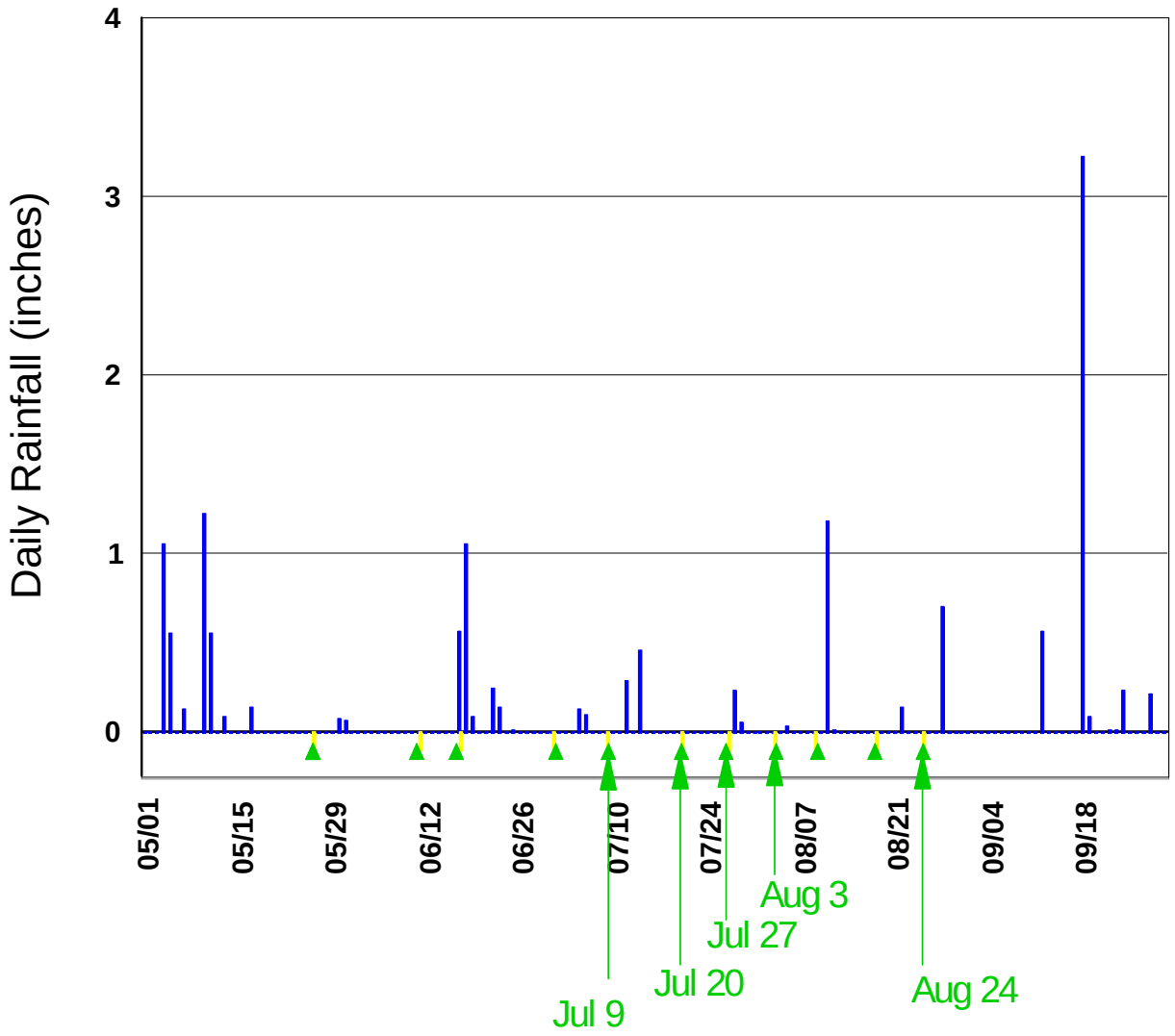
Irrigation Termination – Judd Hill 2005



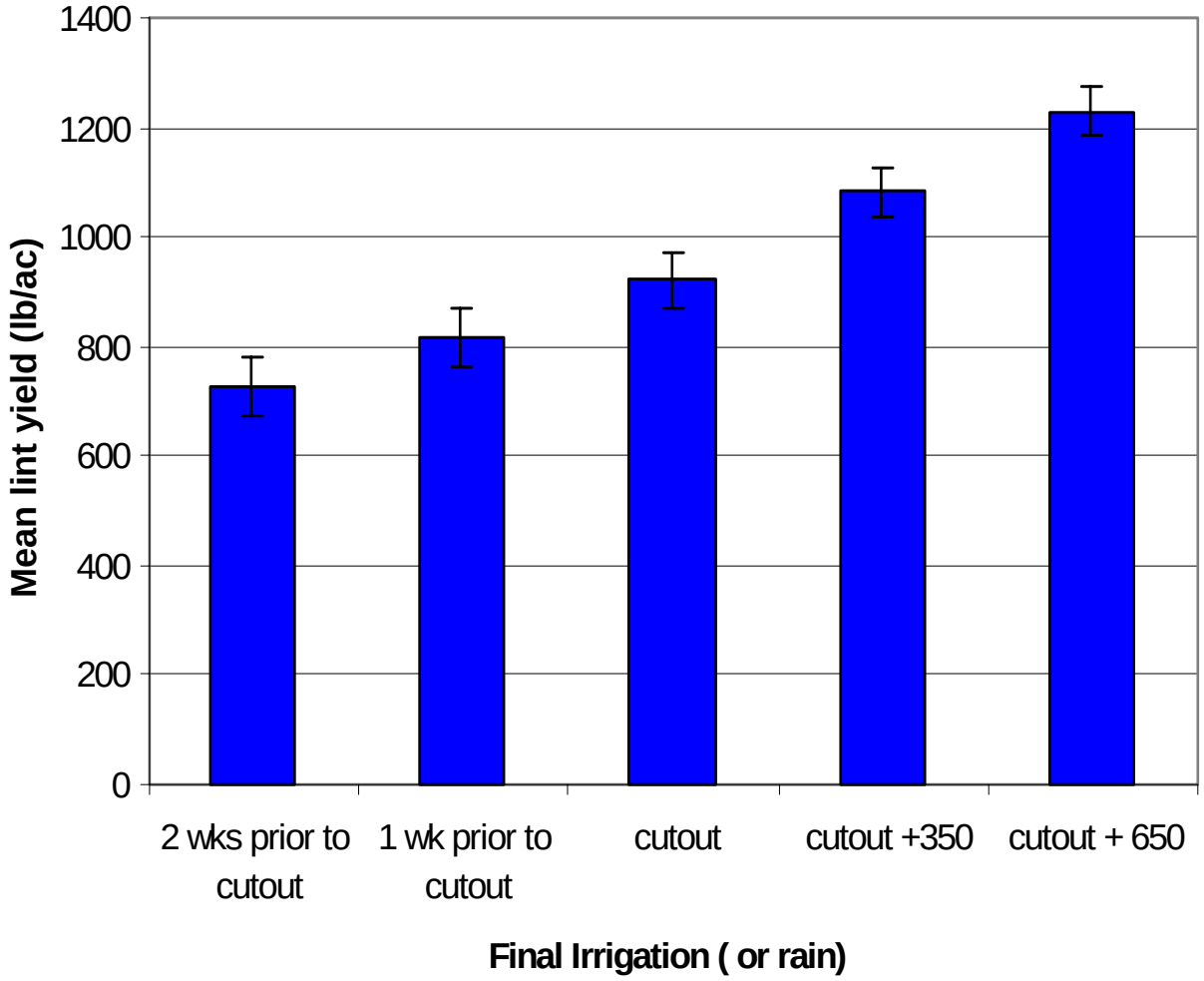
Rainfall – Judd Hill 2005



Marianna 2006 Rainfall



Irrigation Termination - Marianna 2006



When to Quit?

- NAWF=5 + 350 DD60s
- Evaluate for Final Irrigation

Factors to Consider

- Availability of deep moisture
- Current weather conditions
- Factors influencing rooting potential
- Crop maturity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