

Economics of Strawberry Production with Alternative Fumigants

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Objective

- 🍓 To estimate application rates of alternative fumigant treatments that result in profits equal to MBr-PIC 67-33 profits
- 🍓 To estimate application rates that maximize profits for each alternative fumigant treatment
- 🍓 To estimate the effect of using virtually impermeable film (VIF) rather than high-density polyethelene (HDPE)
- 🍓 To estimate the effect of using VIF and/or metam sodium on profits (*separate trial*)

Field Trials

- 🍓 Locations (Oxnard, Watsonville)
- 🍓 Years (2002 – 2003, 2003 – 2004)
- 🍓 Fumigation (12 treatments)
 - PIC (50, 100, 200, 300, 400 lbs per acre)
 - Inline (50, 100, 200, 300, 400 lbs per acre)
 - Methyl Bromide (350 lbs. per acre)
 - None (control)
- 🍓 Two tarps for each treatment (VIF, HDPE)

Approach

- 🍓 Yield and weeding time data from trials
- 🍓 Fumigant and tarp prices provided by industry members and suppliers
- 🍓 University of California cost studies provided information on other costs
<http://coststudies.ucdavis.edu>
- 🍓 Profits calculated for each year, location, tarp and treatment combination

Costs and Returns

Costs that vary:

-  VIF versus standard film (HDPE)

-  Fumigant

-  Hand weeding

-  Harvesting labor and materials

 All other costs assumed to be constant

Returns:

-  Yields vary by treatment

-  Quality assumed to be constant

Caveat

Results are only as good as the data.

- 🍓 Field trial conditions may differ from field conditions.
- 🍓 Cost studies use information from a number of growers and suppliers but not a random sample.
- 🍓 Prices change over time.
- 🍓 Price of broadcast application of methyl bromide is **high** relative to drip application of chloropicrin or Inline.
 - 🍓 If your cost of applying fumigants with drip is substantially higher than \$50/acre, then your application rates of Inline and PIC EC that generates the same profits as MBr-PIC will also be higher.

Statistical Analysis

🍓 Relative profitability

🍓 Chloropicrin (PIC)

🍓 1,3 – D (Inline)

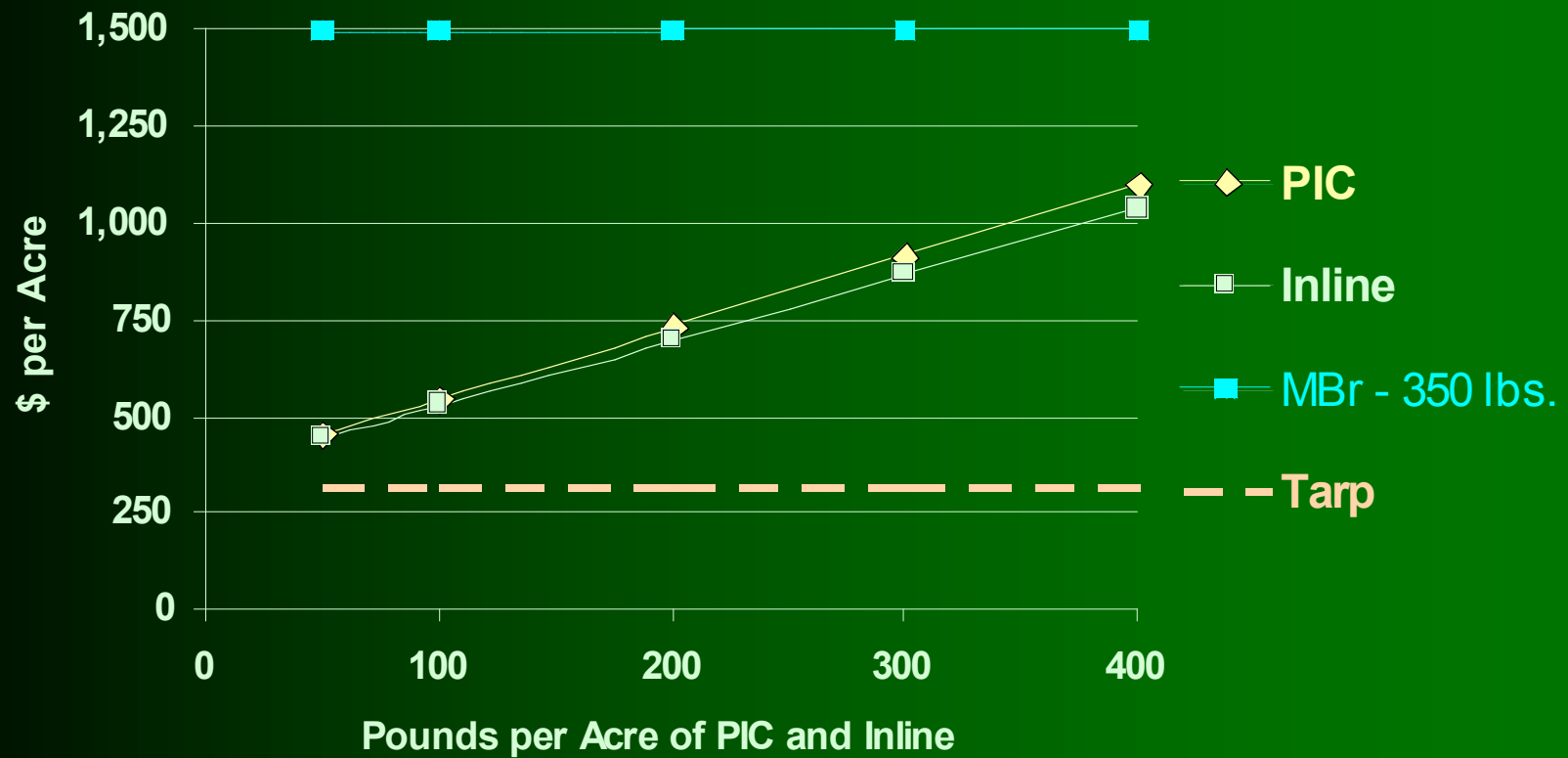
🍓 Methyl bromide

🍓 Breakeven application rates (PIC, Inline)

🍓 Profit maximizing rates (PIC, Inline)

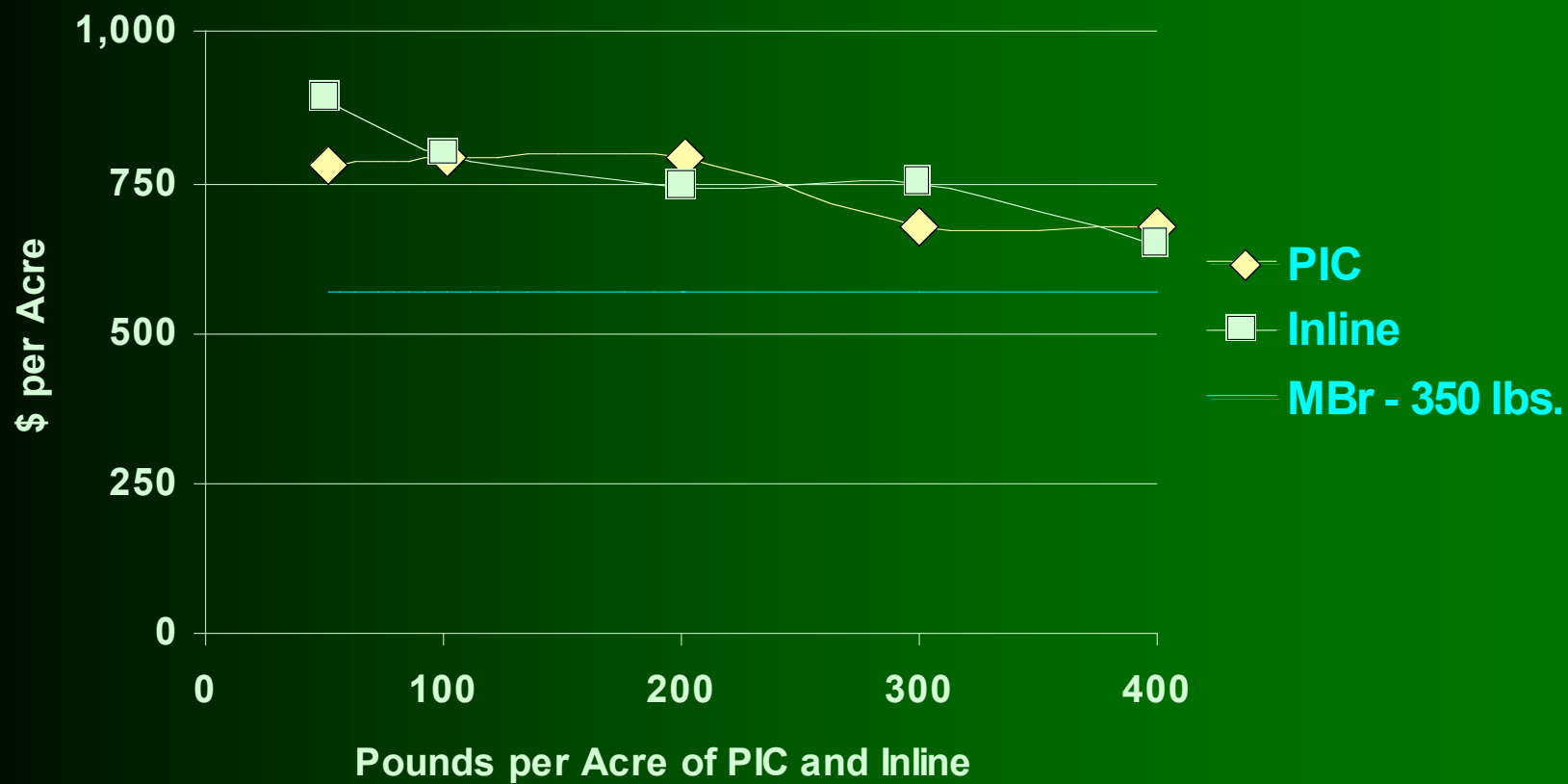
🍓 Change in profits from switching to VIF
from HDPE

Fumigation Cost with HDPE, Oxnard



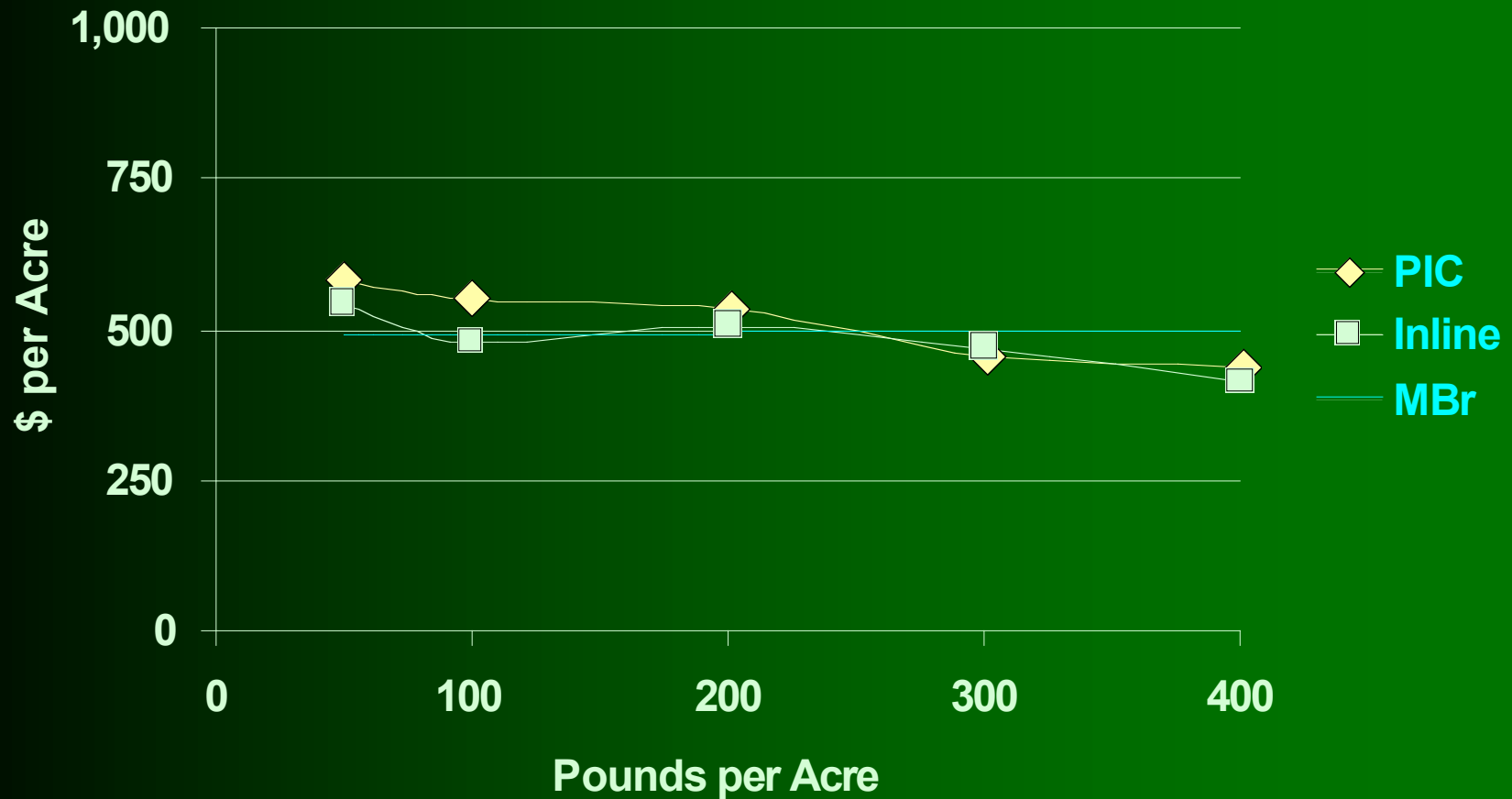
Hand Weeding Cost with HDPE, Oxnard

Average 2002 - 2003 and 2003 - 2004



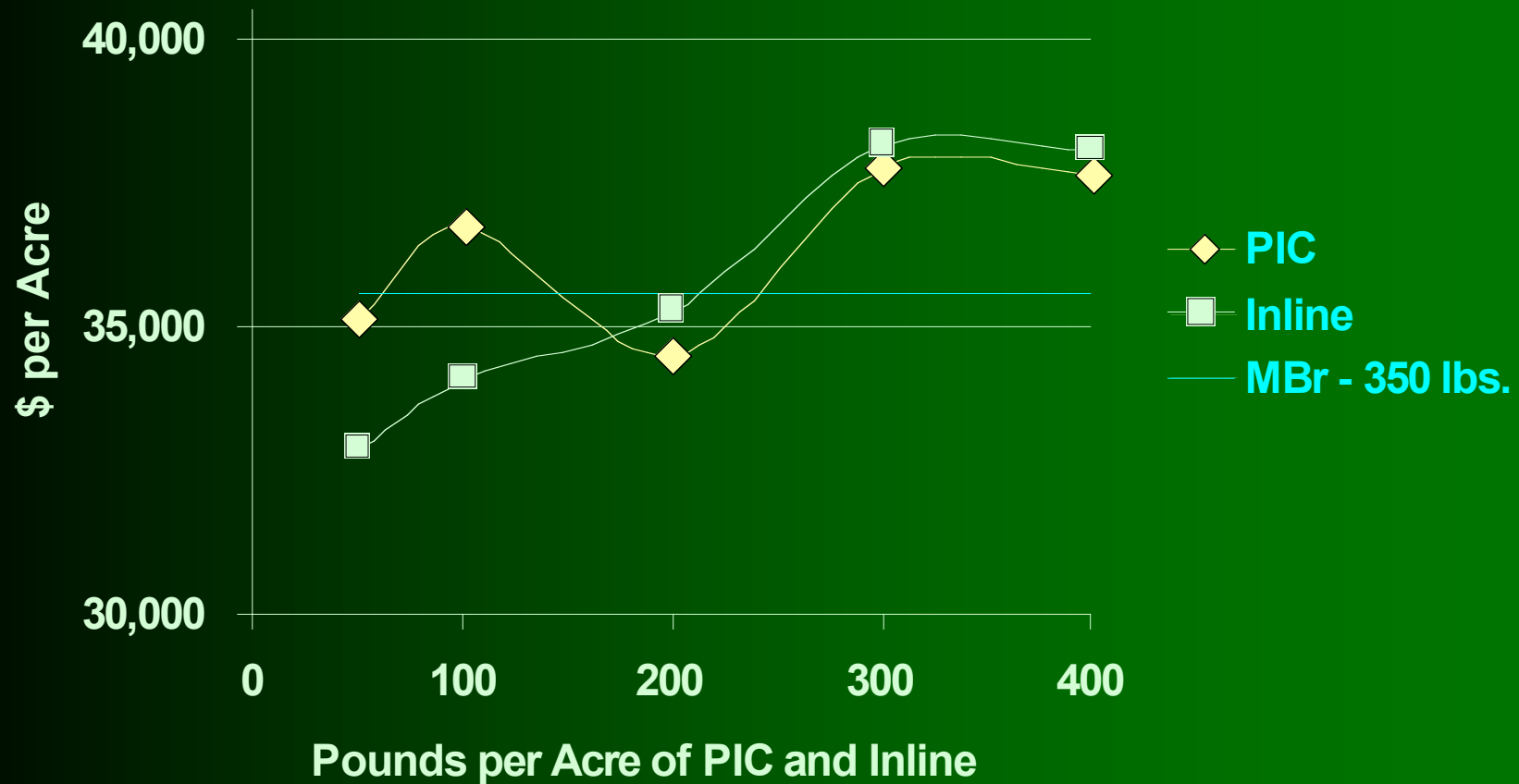
Hand Weeding Cost with VIF, Oxnard

Average 2002 – 2003 and 2003 - 2004



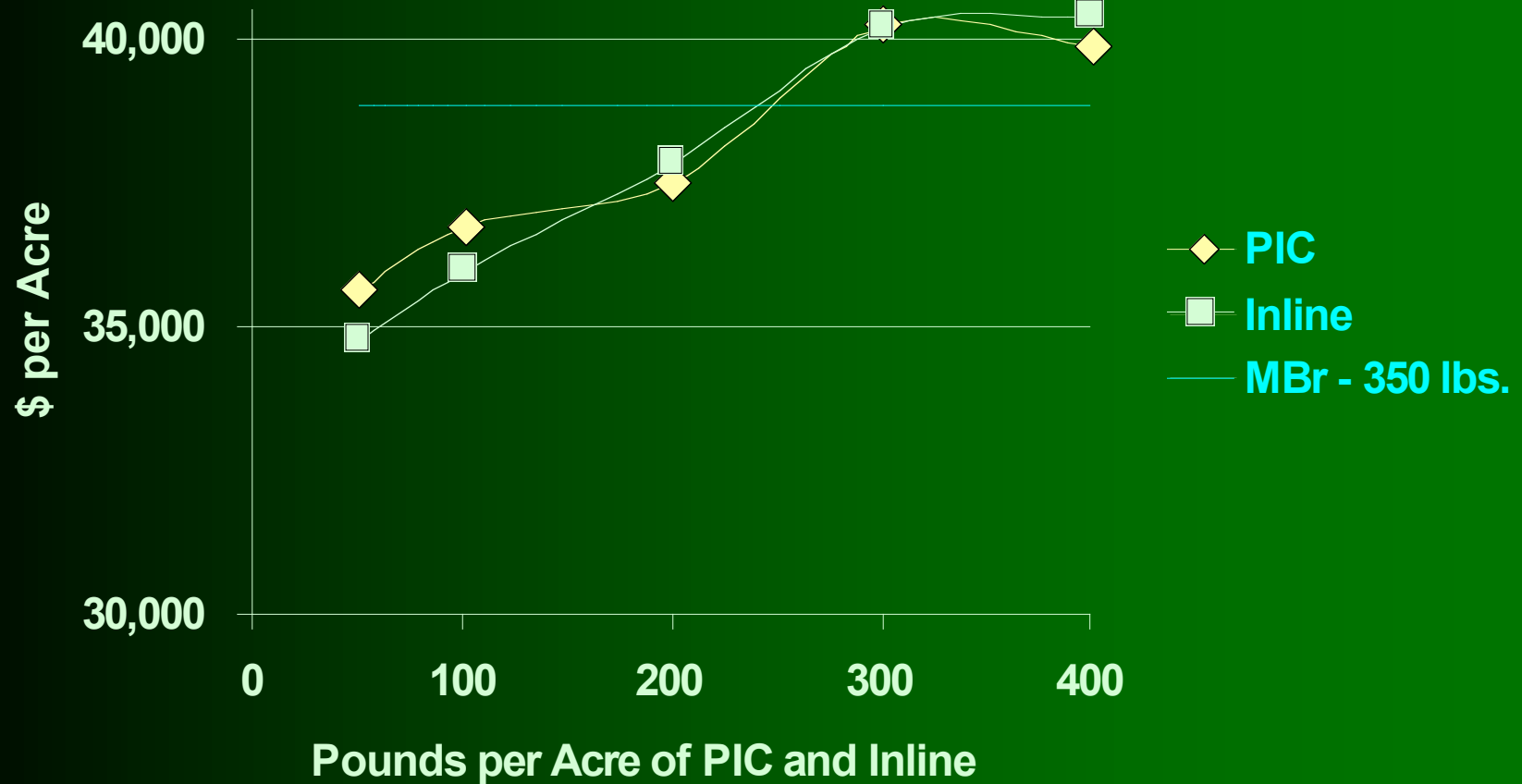
Revenue with HDPE, Oxnard

Average 2002 – 2003 and 2003 - 2004



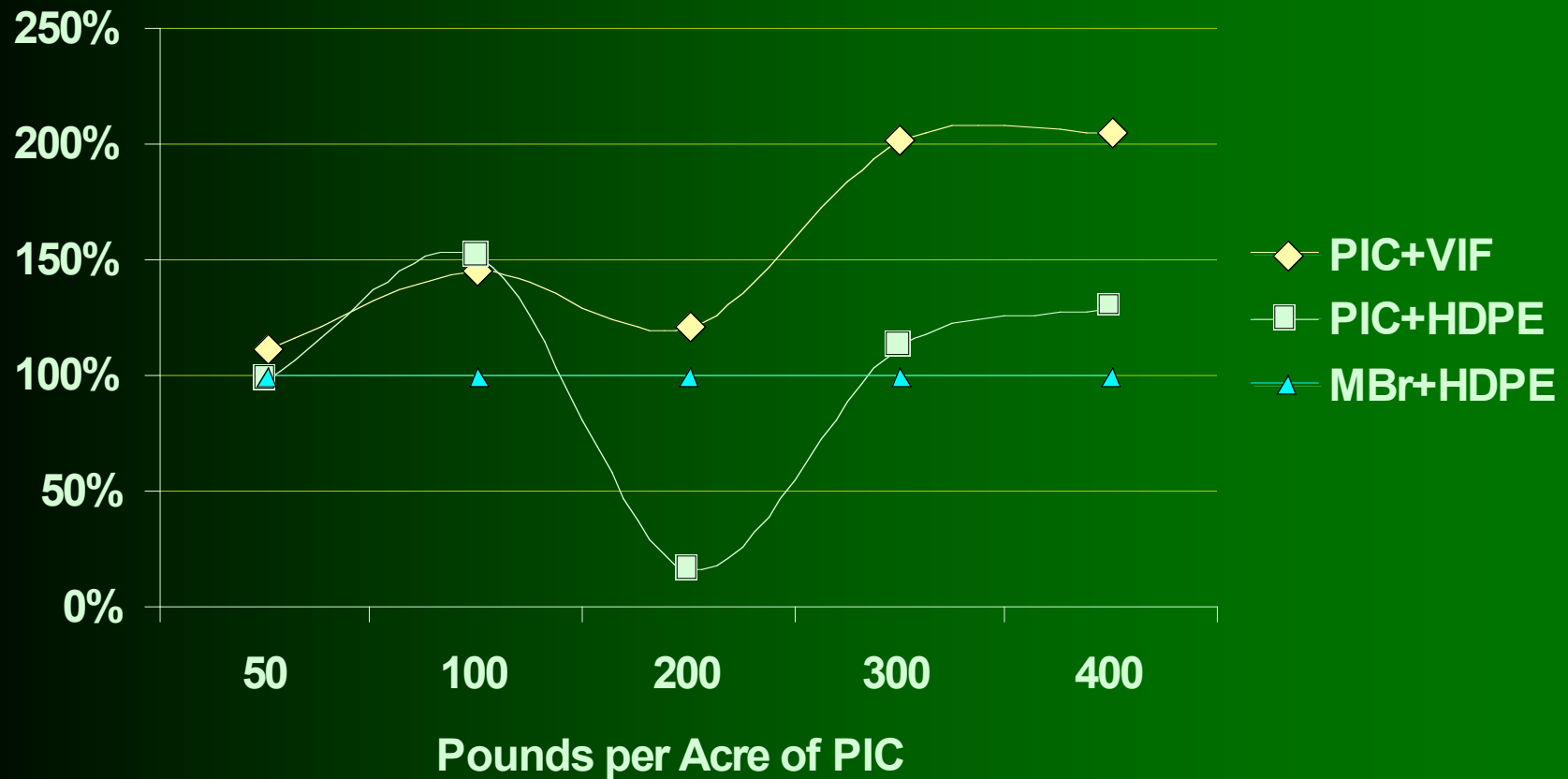
Revenue with VIF, Oxnard

Average 2002 – 2003 and 2003 - 2004



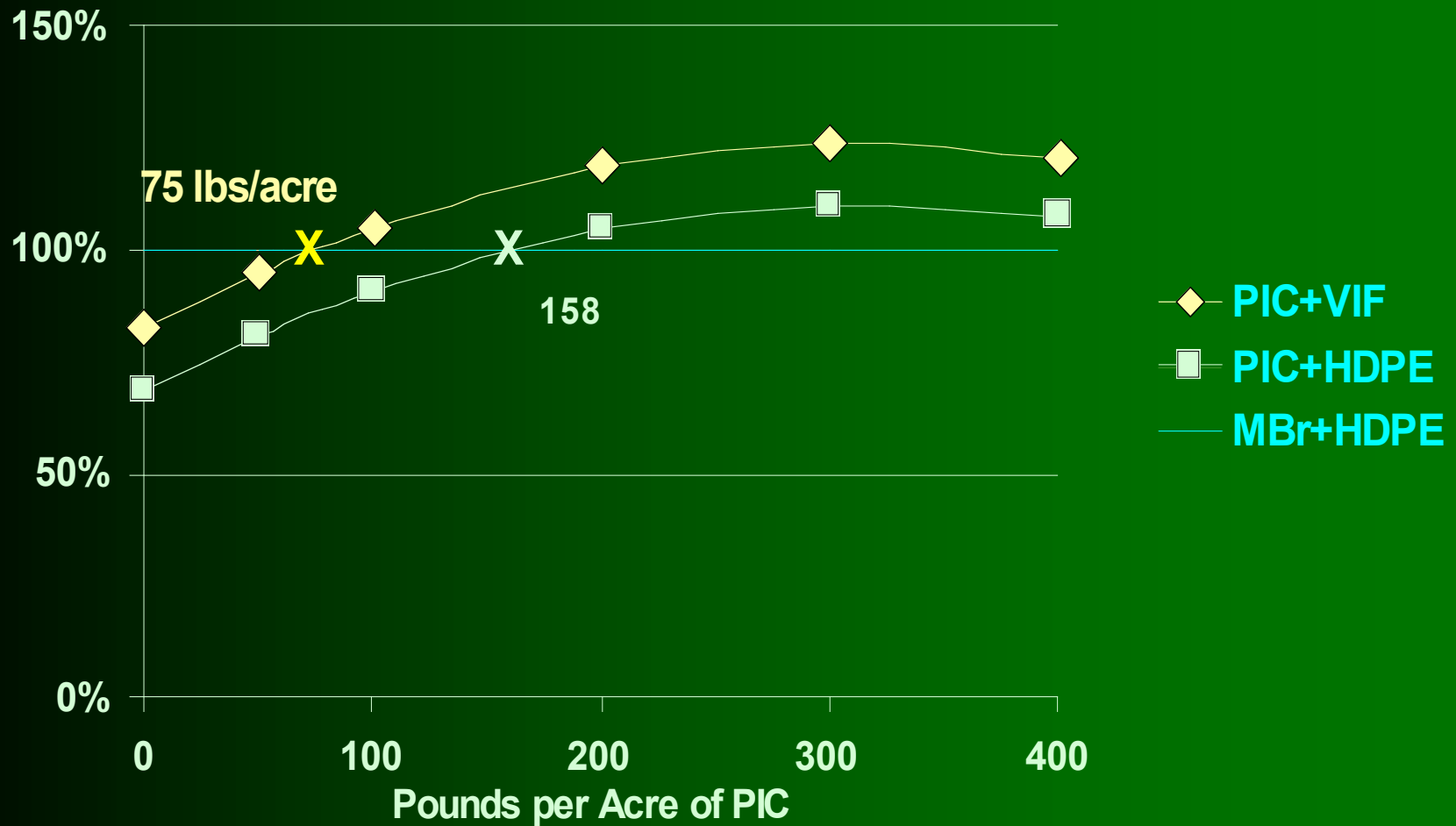
Chloropicrin, Oxnard 2003 - 2004

Profits as Percentage of MBr-PIC HDPE at Varying Application Rates



Chloropicrin, Oxnard, 2003 - 2004

Estimated Profits as Percentage of MBr HDPE



Results

1. Compare profits by treatment to profits from MBr-PIC, 350 lbs/acre
2. Calculate profit-maximizing rates for PIC, Inline
3. Compare profits with VIF to using HDPE

Oxnard

Application Rates with Profits Equal to MBr-PIC Profits (lbs/acre)

	2002-03		2003-04	
	VIF	HDPE	VIF	HDPE
PIC	31	45	75	158
INLINE	33	53	108	219

Oxnard

Estimated Profit-Maximizing Rates (lbs/acre)

	2002-03	2003-04	Both Yrs
PIC	276	317	293
INLINE	282	419*	326

* Estimated profit-maximizing rate outside observed range

Oxnard

Estimated profit change from using VIF (\$ per acre)

	2002-2003	2003-2004	Both Years
PIC	\$448	\$1,136*	\$872**
INLINE	\$651	\$1,654**	\$1,108***

PIC application rate 300 lbs/acre

INLINE application rate 300 lbs/acre

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Oxnard
Estimated profit change from using VIF
(% HDPE profits)

	2002-03	2003-04	Both Years
PIC	4.9%	12.5%*	13.2%**
INLINE	7.9%	15.9%**	16.5%***

PIC application rate 300 lbs/acre

INLINE application rate 300 lbs/acre

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Summary: Oxnard

- 🍓 Drip-applied chloropicrin and Inline more profitable than methyl bromide at common application rates (low breakeven rates)
- 🍓 Profit maximizing rates
 - 🍓 PIC approx. 300 lbs./acre
 - 🍓 Inline has wider range: 282 – 419 lbs./acre
- 🍓 VIF increases profits for PIC and Inline

VIF and Metam Sodium Field Trial

- 🍓 Location: Oxnard
- 🍓 Years: 2001 – 2002
- 🍓 Fumigation (5 treatments)
 - 🍓 PIC EC (22 gallons per acre, drip-applied)
 - 🍓 Inline (36 gallons per acre, drip-applied)
 - 🍓 Telone C35 (33 gallons per acre, shank-applied)
 - 🍓 PIC (33 gallons per acre, shank-applied)
 - 🍓 Methyl Bromide (375 lbs. per acre, shank-applied)
- 🍓 Two tarps for each treatment (VIF, HDPE)
 - 🍓 Metam sodium (45 gallons per acre, drip-applied separately)
 - 🍓 No Metam sodium

Metam Sodium Study Approach

- 🍓 Data collection, costs and returns same as in first study
- 🍓 Statistical analysis
 - 🍓 Profitability of using VIF
 - 🍓 Profitability of using metam sodium
 - 🍓 Profitability of using both
 - 🍓 Can only do changes in profits, not profit-maximizing rates

Profitability of Fumigants

- 🍓 All alternatives in this trial less profitable than methyl bromide
 - 🍓 Only one application rate for each alternative fumigant, so result is only for those specific rates
 - 🍓 For PIC EC, profit-maximizing rates from other trial suggest may be partially because the rate was too high (approx. 360 lbs./acre)

Effect on profitability of VIF and Metam Sodium

(change as percent of MBr-PIC HDPE returns)

	Metam sodium	No metam sodium
VIF	45.9%	29.9%
HDPE	41.2%	---

Summary: Metam sodium and VIF

- 🍓 VIF increases profits
- 🍓 Metam sodium increases profits
- 🍓 Using both increases profits more than using either one alone
- 🍓 Results based on Oxnard-only trial