

# **Economics of Strawberry Production with Alternative Fumigants Oxnard**

Rachael Goodhue and Karen Klonsky  
Agricultural and Resource Economics  
UC Davis

# Objective

- To estimate application rates that maximize profits for each alternative fumigant treatment
- To estimate the relative profitability of the alternatives
- 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)

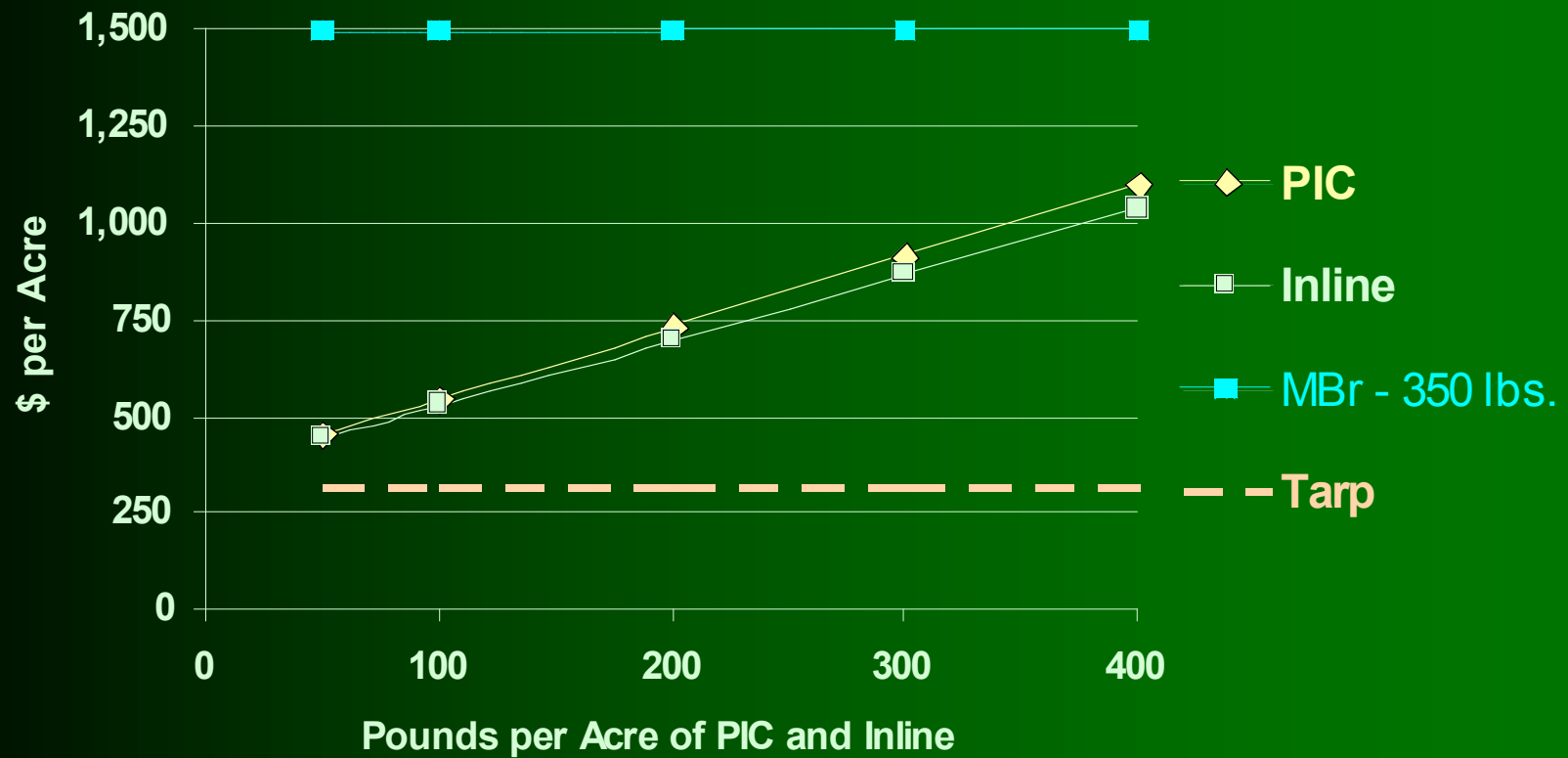
🍓 Methyl bromide (MBr)

🍓 Profit maximizing rates (PIC, Inline)

🍓 Change in profit from switching to PIC or Inline from MBr

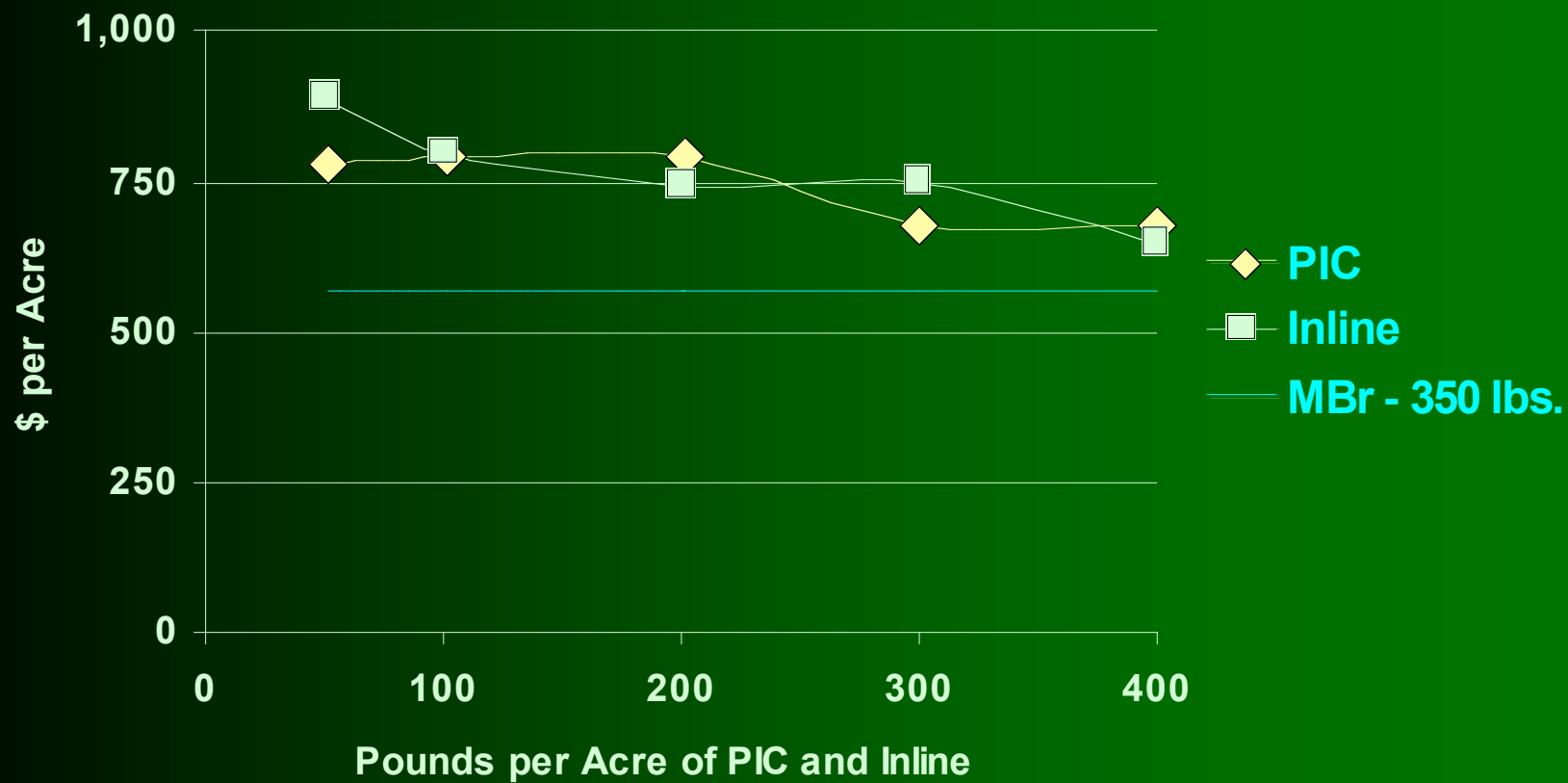
🍓 Change in profits from switching to VIF from HDPE

# Fumigation Cost with HDPE, Oxnard



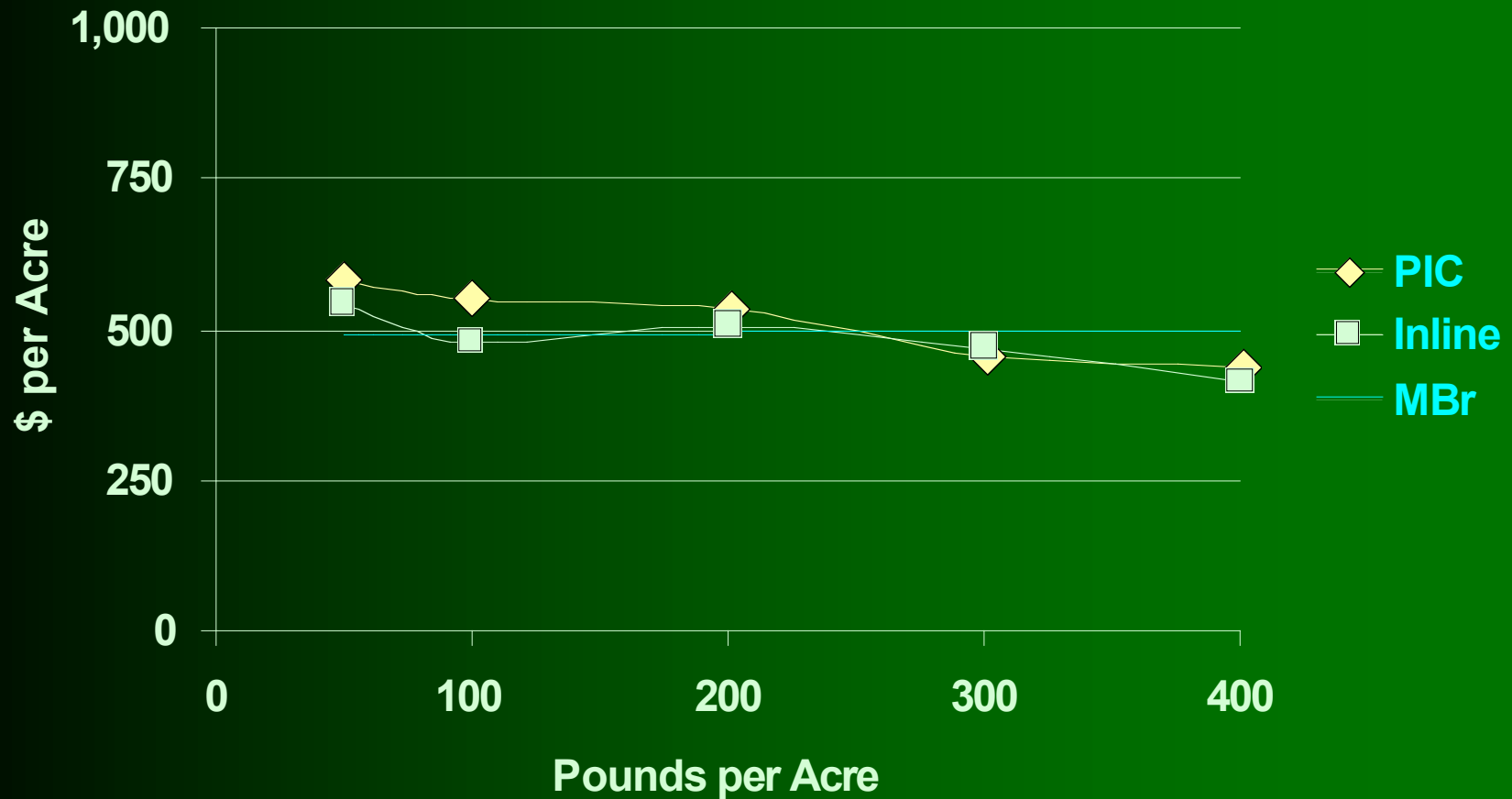
# Hand Weeding Cost with HDPE, Oxnard

Average 2002 - 2003 and 2003 - 2004



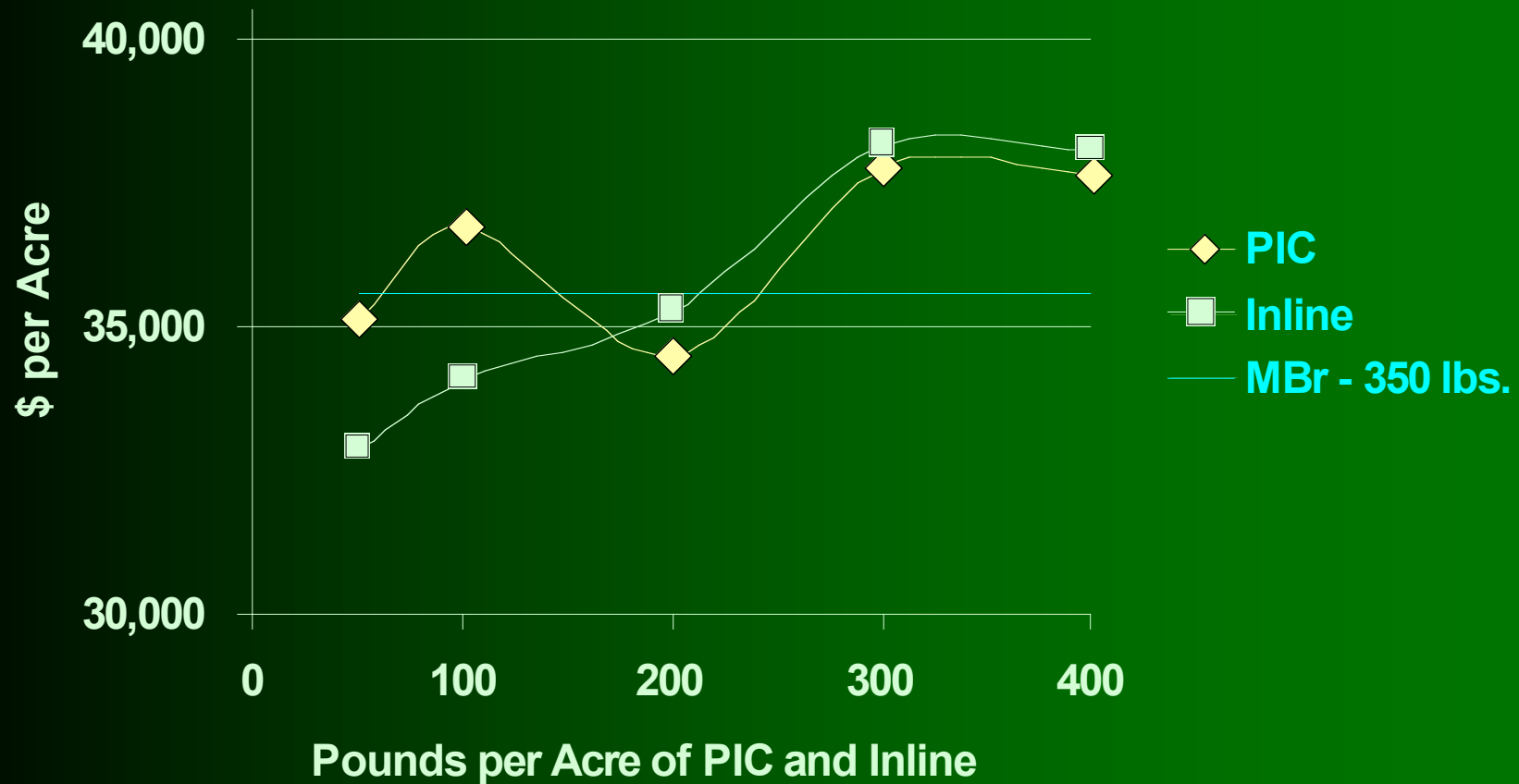
# Hand Weeding Cost with VIF, Oxnard

Average 2002 – 2003 and 2003 - 2004



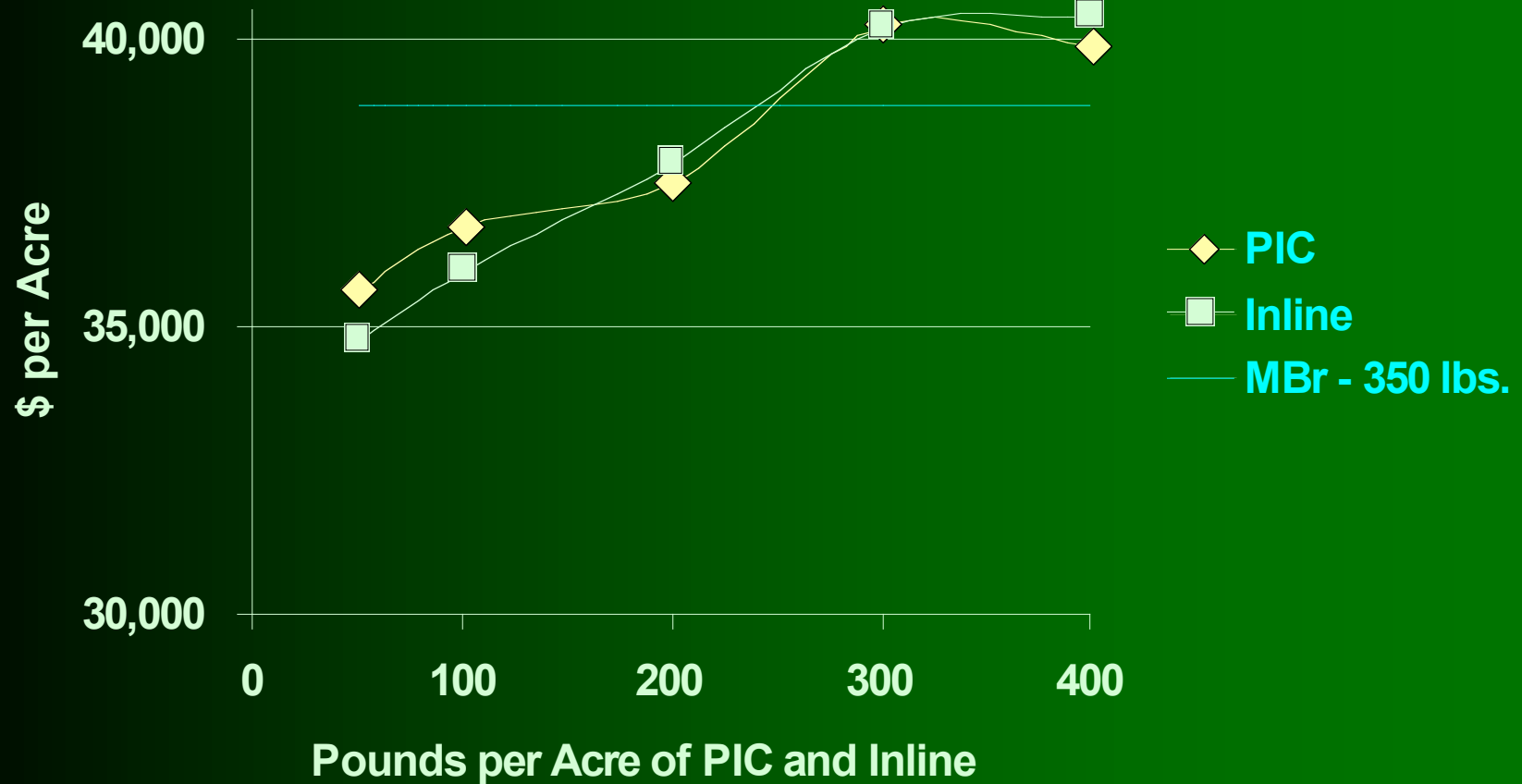
# Revenue with HDPE, Oxnard

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



# Results

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

# Oxnard

## Estimated Profit-Maximizing Rates (lbs/acre)

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

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\* Estimated profit-maximizing rate outside observed range

# Oxnard

## Estimated Profit Increase Compared to MBr 350 lbs. per Acre\*

		2002-03	2003-04
PIC	VIF	\$3,842	\$5,630
	HDPE	3,394	4,294
Inline	VIF	4,174	2,884
	HDPE	3,523	1,231

\* Estimated using profit-maximizing rates

# Oxnard

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

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

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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

🍓 Profit maximizing rates

🍓 PIC approx. 300 lbs./acre

🍓 Inline has wider range: 282 – 419 lbs./acre

🍓 Drip-applied chloropicrin and Inline more profitable than methyl bromide

🍓 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