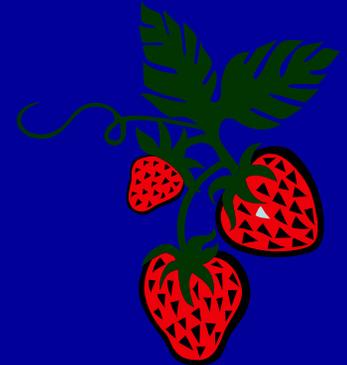


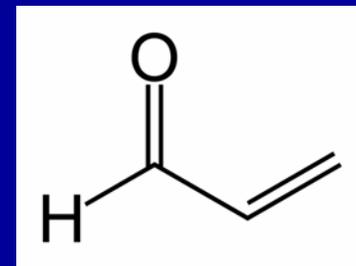
# EVALUATION OF ACROLEIN FOR CALIFORNIA STRAWBERRY PRODUCTION



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# Acrolein chemical properties



- **Acrolein: Acraldehyde, Acrylic aldehyde, allyl aldehyde, ethylene aldehyde**
- **Molecular weight: 56.06 g/Mol**
- **Colorless to yellow liquid/ irritating odor**
- **Boiling temperature: 53°C (127 F)**
- **Melting temperature: -88°C (-128 F)**
- **Water solubility >10%**

# Acrolein chemical properties make it suitable for drip fumigation

- **Highly soluble in water**
- **Good biocide: effective against many pests**
- **Highly reactive and therefore self-neutralized**
- **Half-life in water is less than 24 h**
- **There are no residues left in the soil other than normal carbohydrates**

# Methods and experiment design

- **Two locations: Watsonville and Salinas, CA.**
- **Acrolein was applied through drip irrigation systems under clear low permeability plastic mulch (SIF).**
- **Treatments:**
  - **Acrolein at 100, 200, and 400 lbs/A**
  - **MB/Pic (50/50) at 350 lbs/A, drip applied**
  - **Untreated control.**

# Methods and experiment design

- **Experiment design was randomized complete block with 4 replicates.**
- **Strawberry (var. Albion) was transplanted four weeks after fumigation.**
- **Strawberry was harvested twice weekly and separated into marketable and culls.**
- **Plots were managed according to grower best management practices.**

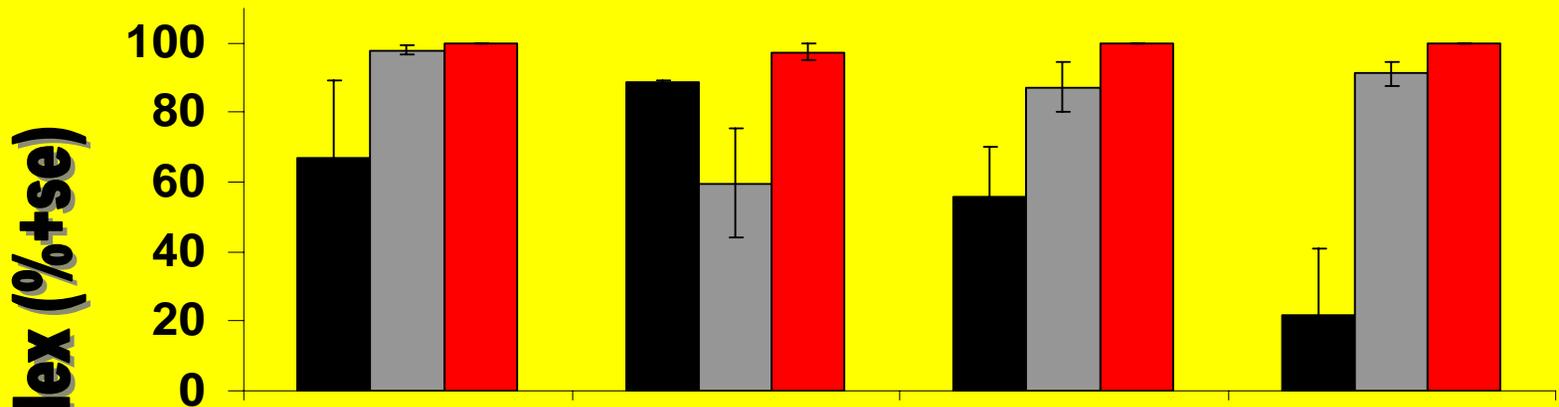
# Plant back evaluation

- **Soil was collected from soil depth of 0-10” from each plot.**
- **Lettuce seeds were used as bioassay to determine the plant back interval.**
- **Soil samples with 25 lettuce seeds were placed in closed jars and incubated for two weeks in the green house.**
- **% germination was multiplied by seedling vigor score to create the plant back index.**

# Plant back evaluation

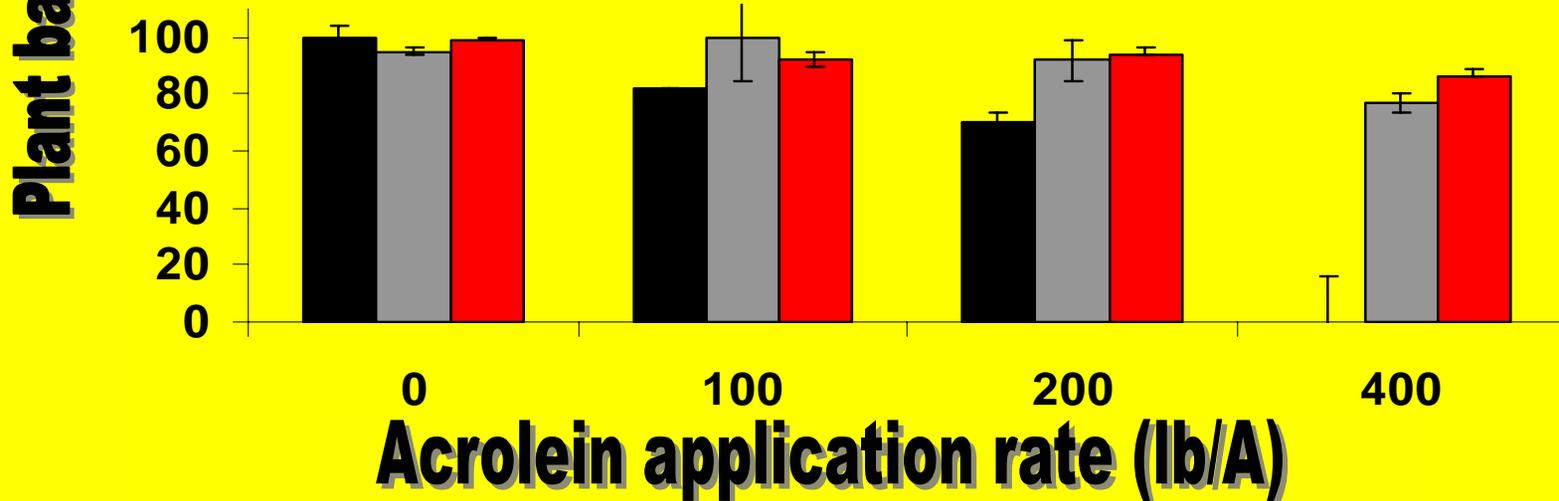
## Watsonville plant back study

■ 1 day ■ 7 days ■ 14 days



## Salinas plant back study

■ 1 day ■ 7 days ■ 14 days



# Plant back evaluation

- **Results indicated that seven days is a sufficient plant back interval.**
- **Except for 400 lbs/A rate, there were no negative effects on lettuce germination one day after application.**



# Weed evaluation

- **Weed counts were performed on the bed top prior to each hand weed removal.**
- **Fresh weed biomass was determined for the first weed count.**



# Weed density in Watsonville

Treatment	Rate	Common chickweed	Prostrate knotweed	Total weed
	lbs/A	Density (thousands weeds/acre)		
Control	--	26.7 a	40.1 a	230.3 a
Acrolein	100	8.7 a	25.8 ab	87.6 ab
Acrolein	200	8.7 a	26.9 ab	93.4 ab
Acrolein	400	4.1 a	19.2 ab	57.6 b
MbPic	350	1.6 b	5.8 b	19.5 c
<b>ANOVA</b>				
P-value		0.03	0.05	0.01

# Weed control

- Acrolein effectively controlled emerged weeds.

Common purslane 48h after application



Acrolein 100 lb/A

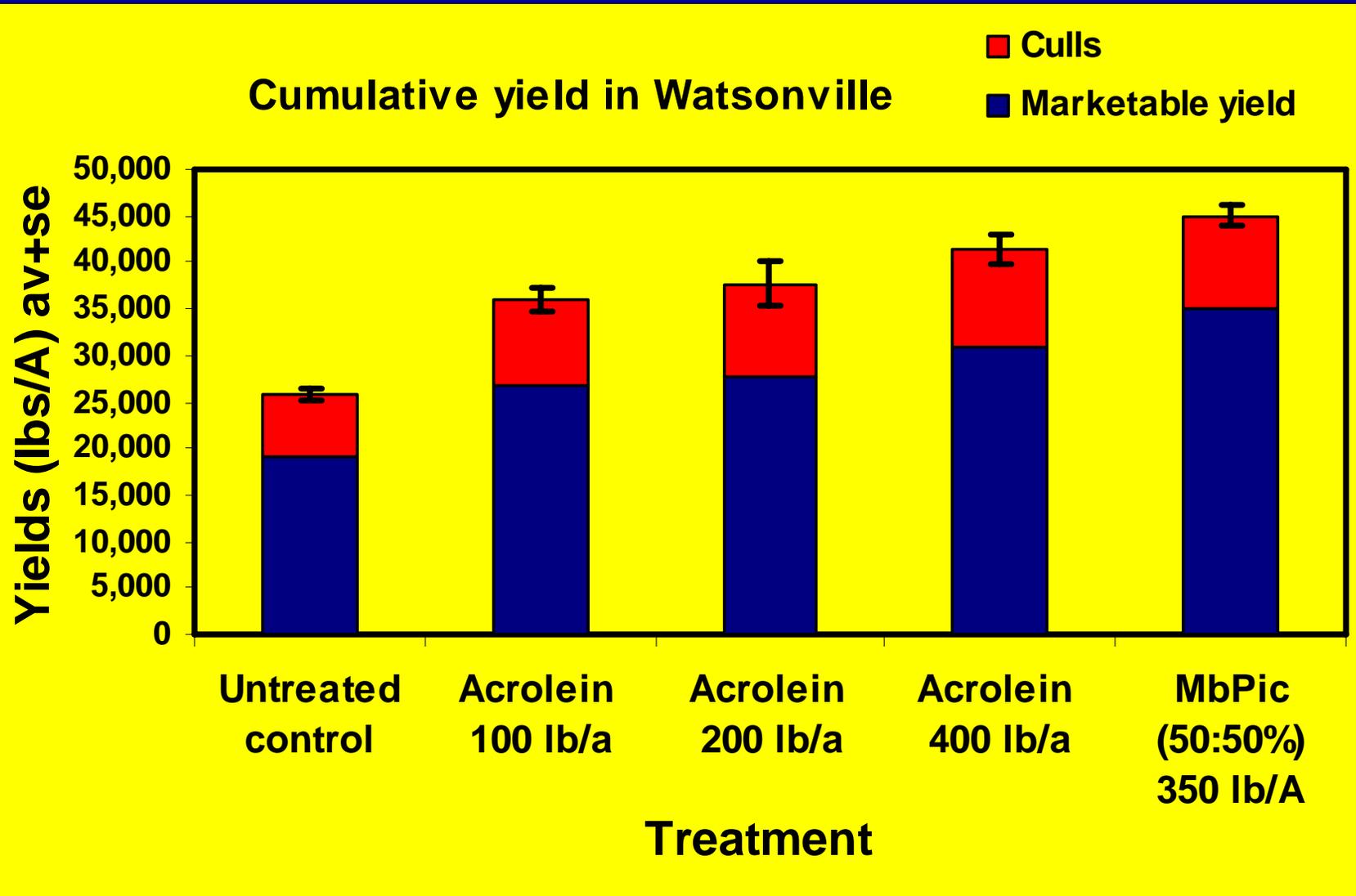
Acrolein 400 lb/A

- However in-season weed control and control of weed seed in the soil seed-bank was limited.

# Weed density in Salinas

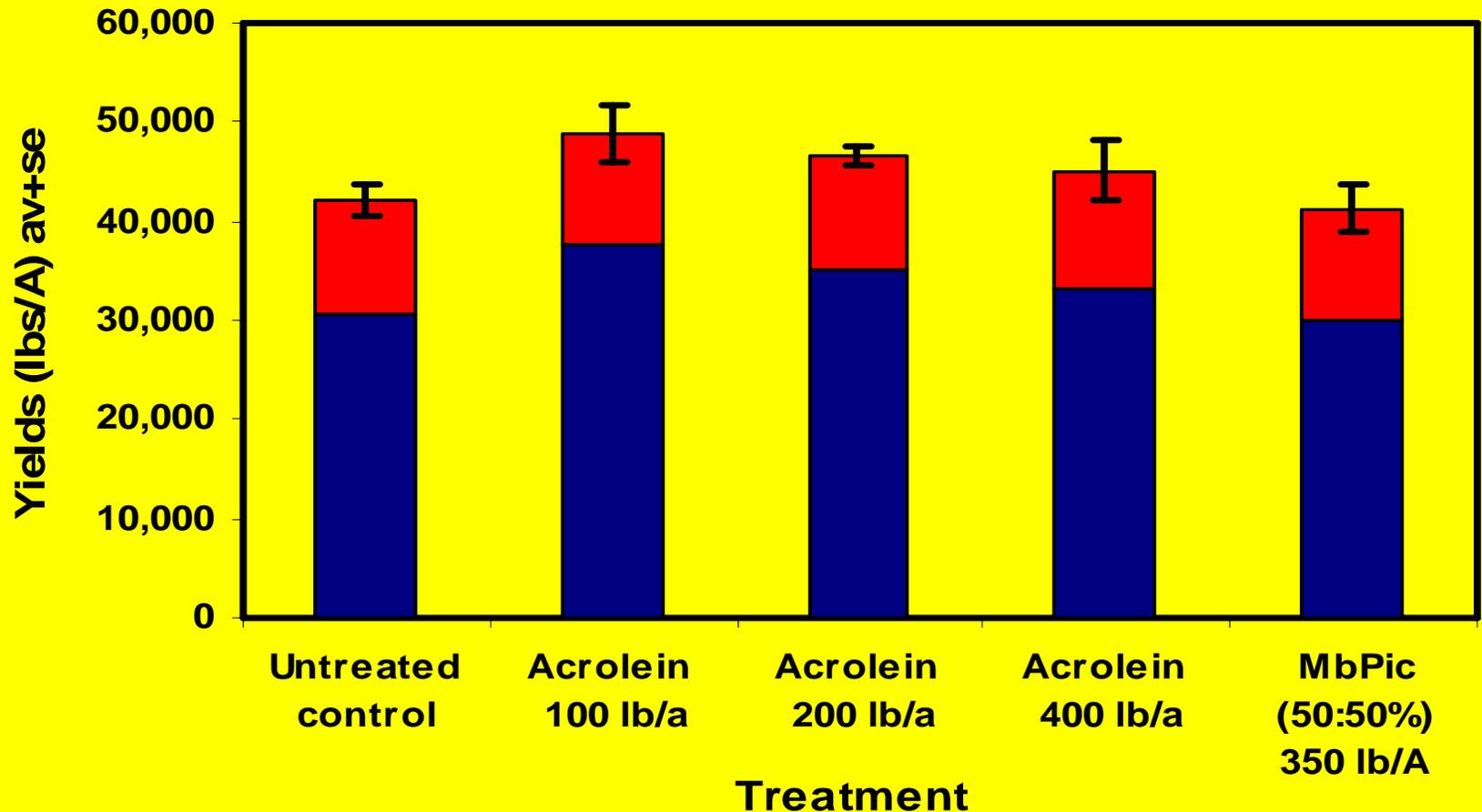
Fumigant	Rate	Clover species	Volunteer crop: Oat	Total weed
	Lb/A	Density (thousands weeds/acre)		
Control	--	13.8 a	2.2 a	25.7 a
Acrolein	100	11.6 a	2.4 a	17.4 a
Acrolein	200	14.5 a	1.2 a	23.2 a
Acrolein	400	16.0 a	0 b	20.3 a
MbPic <small>(50:50%)</small>	350	2.3 b	0 b	9.7 b
<b>ANOVA</b>				
P-value		0.04	<0.0001	<0.0001

# Strawberry yield



# Strawberry yields

Cumulative yield in Salinas



# Strawberry yield- Watsonville

- **High disease pressure resulted in a large yield loss in the untreated control plots.**
- **Strawberry yield increased with increasing Acrolein application rate.**
- **Plots treated with 350 lbs/A of MbPic and 400 lbs/A of Acrolein had similar marketable and total yields.**

# Strawberry yield- Salinas

- **Low disease pressure resulted in good yield in all plots including the untreated control.**
- **Best marketable and total yields were found in the low Acrolein application rate and the untreated control plots, but no statistical differences were found among treatments.**
- **Phytotoxicity due to late fumigation under low permeability tarp (SIF) may have caused yield reduction in the drip MB/Pic treatment.**

# Summary

- **Acrolein may have potential for strawberry production in California.**
- **Weed control efficacy of Acrolein is limited to emerged weeds only.**
- **The short plant-back interval may allow Acrolein application to follow another fumigant that can supplement Acrolein low weed control efficacy.**

# Summary – cont.

- **There are some indications that strawberries can tolerate Acrolein in-season drip applications at low rates (<50 lbs/A).**

*Thank you very much*

## Acknowledgements

- California Strawberry Commission
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