

Case Study: Alternatives to Fumigation

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Organic vs. Conventional Farming
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Cultivating a Sustainable Agricultural Workplace

California Pesticide Illness Tracking **NIOSH SENSOR PROGRAM**

- **S**entinel **E**vent **N**otification **S**ystem
for **O**ccupational **R**isk
- State-based occupational illness tracking
- Worker illness tracking can detect
community exposure risk

California Pesticide Illness Tracking Project Staff

- John Beckman*
- Ximena Vergara
- Patrice Sutton, MPH
- Rupali Das, MD, MPH*
- Robert Harrison, MD, MPH*
- Lisa Bunin, PhD†

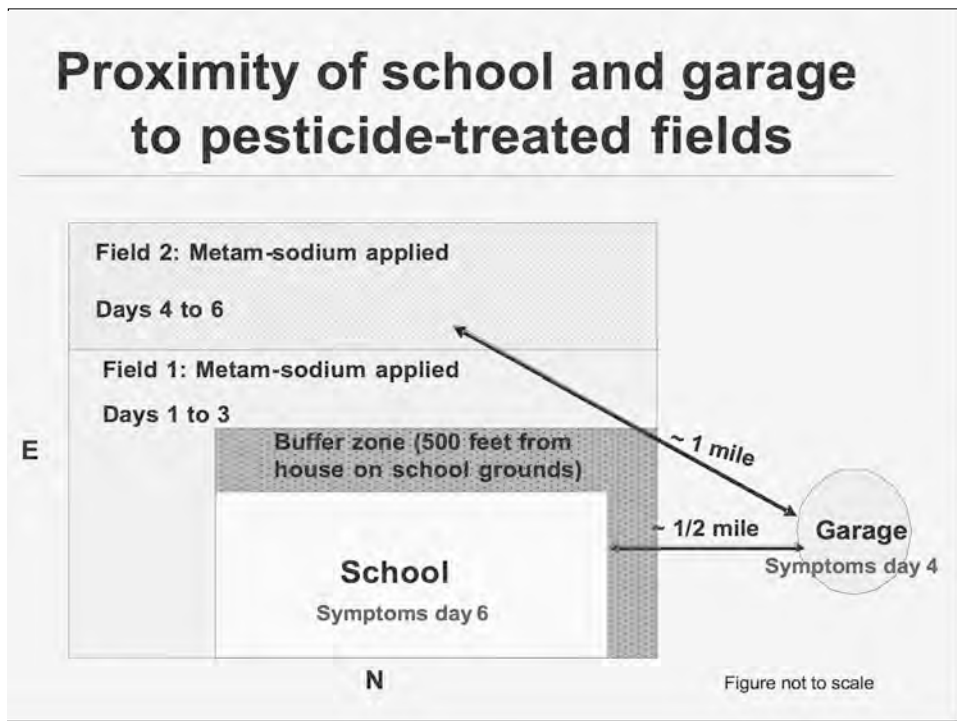
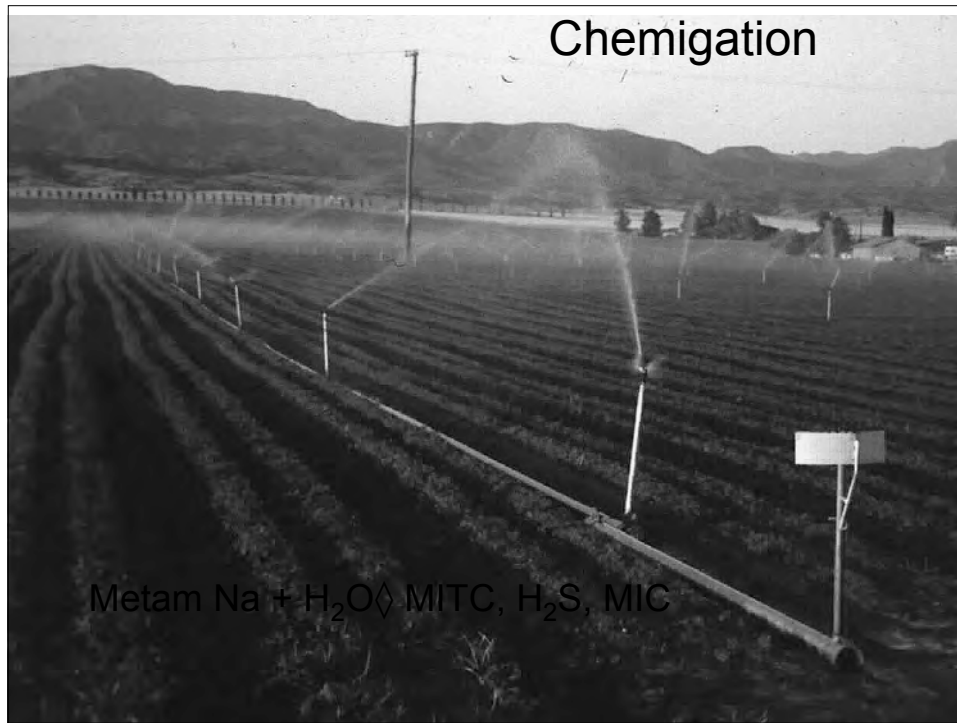
* Current staff

† Contractor for this project only

Case Study: Illness due Metam Sodium Drift

- Work-related illness report investigated by California Department of Health Services, Occupational Health Branch
- Cuyama, CA, May 1999





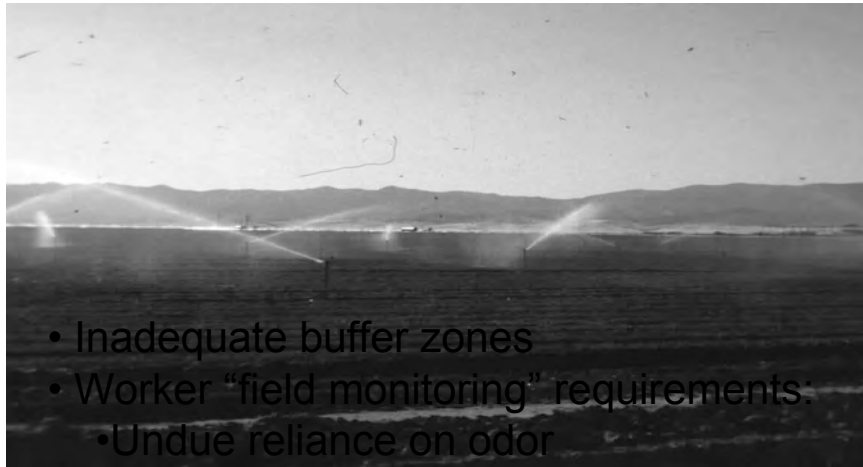
Health Outcomes

-
- No
- Illness



Main Findings

- Inadequate buffer zones
- Worker “field monitoring” requirements:
 - Undue reliance on odor



Investigation Conclusions

- Fumigants volatile & toxic
- Application conditions unpredictable
- Engineering & administrative methods of limiting exposure are subject to failure; harmful to workers
- Substitution usually with other fumigants

Non- Pesticide Alternatives CDHS pilot project

- Survey range of available practices that eliminate metam in carrot production
 - λ Eliminate, not substitute hazard
 - λ Focus on pre-plant metam use on carrots
 - λ Limited to sustainable, organic agricultural methods



“Cultural Practices”*

Methods

- Interviews with organic growers, organizations
 - λ UC Santa Cruz (UCSC)
 - Center for Agriculture and Sustainable Food Systems
 - λ California Certified Organic Farmers (CCOF)
 - Each farm contacted
- Literature review of alternative farm practices

“Cultural Practices that Substitute for the Use of Metam Sodium as a Pre-Plant Soil Fumigant”, Bunin L 2002. Report to CDHS.

Cultural Practices

Results

- Completed interviews
 - λ 5 farmers
 - λ CCOF staff
 - λ Managers at a farm utilizing both organic & non-organic methods



Results

Why Increased Reliance on Metam?

Organic farmers' perspective

- Increase in large-scale monocropping
- Short-term economic pressures
 - λ May result in near-term crop-yield reductions*
 - λ Cultural practices are long-term strategies
 - Letting land lie fallow
 - Growing alternative crops to increase pest and disease resistance

*Organic farms produce ~ 20% less; use ~ 50% less energy; Mäder et al., Science. 2002. 296:1694-1697.

*Insecticides eliminated in Bangladeshi farms with cost savings and without reduction in crop yield. IRRI 2004. www.irri.org

“Cultural Practices” Weed Control 1

Practice	Hand weeding, long-handled hoe
Limitations	Bending; labor costs



“Cultural Practices” Weed Control 2

Practice	Limitations
Wooden/metal platform on wheels	Maneuvering between crops; equipment cost



Rikkakoneet
(Finland)

“Cultural Practices” Weed Control 3

Practice	Limitations
Flame weeding	Propane & open flame



Photo: Eden Valley Farm,
Loveland, CO



“Cultural Practices” Weed Control 4

Practice	Limitations
Soil solarization	Loss of soil microbial activity; plastic waste



“Cultural Practices” Nematodes & Pythium (root rot)

Avoid planting in infested fields
Compost: builds micronutrients, prevents nematode infestation
Cover crops: vetch and bell beans attract beneficial insects; inoculants fix N into soil
Natural soil fumigants: brassicas: broccoli, mustard & glucosinolates & isothiocyanates
Crop rotations, planting time, irrigation patterns



“Cultural Practices”
Incidental Findings

- Both organic & conventional farming methods may be used on same farm
- Metam Sodium Taskforce website documents efforts to convince EPA to downgrade hazards of metam (www.metampsc.com)

“Cultural Practices”
Limitations

- Results based on limited responses
 - λ Many organic farmers not available for interview
 - λ UCSC program in infancy, lacked resources
 - λ Farmer disdain for CCOF fees
- Limited published studies on alternative farm practices, occupational risks

Conclusions

- Cultural practices can substitute for pre-plant use of metam on carrots, eliminating pesticide hazards to workers, environment
- Primary risk to workers of organic farming are ergonomic
- Worker health effects in organic vs. conventional farming needs further study

Recommendations

- More research on cultural practices & other non-fumigant soil treatments
- Economic incentives may be needed to encourage wider adoption by farmers
- Evaluation should take into account hazards associated with new processes

