

**LEADERSHIP IN REDUCING
VOCs FROM SOIL-APPLIED
PESTICIDES –**

The UCIPM Story

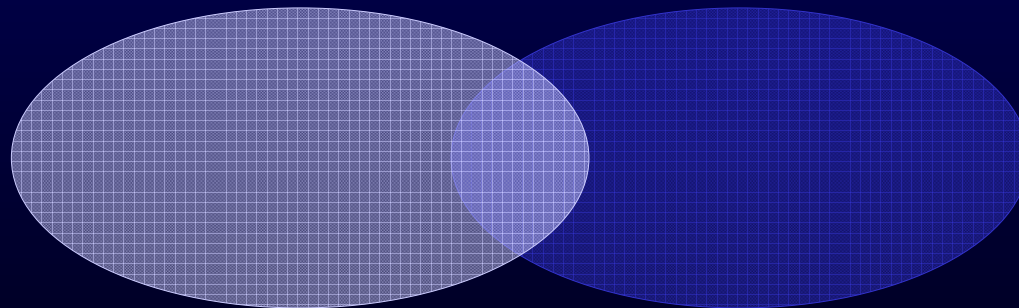
*James J. Stapleton
UC Kearney Agricultural Center
Parlier*

**University of California
Integrated Pest Management
Program mandate since 1979:**

**“Protect Human Health
and Reduce Pesticide
Impact on the Environment”**

**UCIPM programs are based
on complementary and
interactive approaches:**

Research \longleftrightarrow **Education**



UCIPM-Administered Competitive Research Grant Programs:

- Core Research Grants (current)
- **Exotic/Invasive Pests & Diseases
Research Grants**
- Smith-Lever Implementation
Grants

UCIPM Education/Extension Resources:

- Personnel
- **Manuals & IPM Guidelines**
- Websites



ALTERNATIVES TO SOIL FUMIGANTS

for mitigation of:

- **Atmospheric ozone depletion**
- **VOC air pollution**

UCIPM has sponsored more than 100 multi-year research and education projects (1979-2007) targeting soilborne:

- Pathogens
- **Nematodes**
- Weed propagules
 - **Insects**

Cultural/Physical/Chemical Approaches:

- Water/nutrient mgt.
 - **Avoidance**
- Tillage modifications
 - **Solarization**
- Biofumigation/Crop Rotation/Cover Crop
- **Reduced risk pesticides**

A microscopic image of plant cells, showing various organelles and cell walls. The cells are arranged in a grid-like pattern, with some cells appearing more prominent than others. The overall color is a mix of green and brown, with some darker spots.

Biological Approaches:

- **Predation/Parasitism/
Competition**
- **Soil community
alterations**
- **Host plant resistance**

Several projects funded by UCIPM have explored soil treatment by:

- Solarization

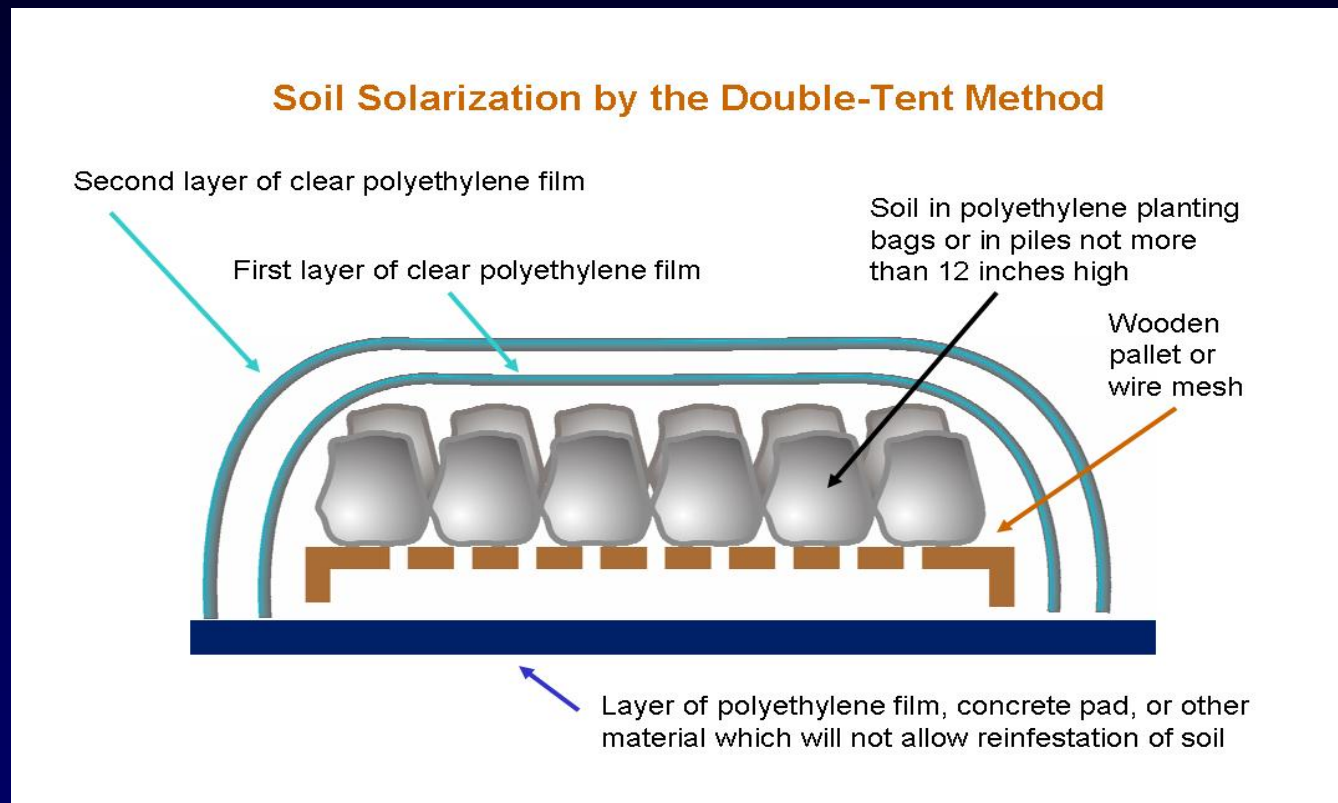
and

- Biofumigation



SOIL SOLARIZATION

“Double-tent” solarization has been approved by CDFA for production of nematode-free nursery stock



Adapted from CDFA

http://www.cdfa.ca.gov/phpps/pe/nipm_pdfs/nipm_7.pdf

Solarization - What are the Limitations?

- * **Climate/Weather**
- * Land out of production during summer(?)
- * **"Top-down heating"**
- * Some resistant pests
- * **Few "product reps"**

FILM TECHNOLOGY NEEDS:

- * Polymer composition
 - * **Permeability**
 - * Durability
(multi-purpose?)
- * **Recycling/Disposal**



BIOFUMIGATION

BIOFUMIGATION

Release of biotoxic compounds from organic materials (roots or residues of cash or cover crops; green manures) during growth or decomposition in soil, which results in reduction of pest organism populations or activity.



How does

BIOFUMIGATION

Work?

Biofumigation Mode of Action:

Biotoxic Compounds

(Brassica sources most used to date)

- **Glucosinolate hydrolysis (isothiocyanates)**
- **Other compounds (sulfides, sulfoxides, mercaptans, aldehydes, etc.)**

in soil vapor and aqueous phases

A microscopic view of soil organisms, showing various shapes and colors, including purple and blue structures, likely representing microbial life.

Biofumigation Mode of Action:

**Increased or altered biological
activity in soil
leading to**

Microbial Antagonism

Biofumigation - What are the Limitations?

- * Frequent mild efficacy or treatment unpredictability**
- * May need tarp/solarization**
- * May require growing cover or green manure crop**
 - * Few “product reps”**

An aerial photograph of a field with a distinct path or boundary line. The field is a mix of brown and green, suggesting different crops or stages of growth. The path is a straight line running horizontally across the middle of the image.

Be aware of possible

Phytotoxicity

(allelopathy)

to following crop

ALTERNATIVES TO FUMIGANTS

Situation-Specific Combinations
Of Treatments =

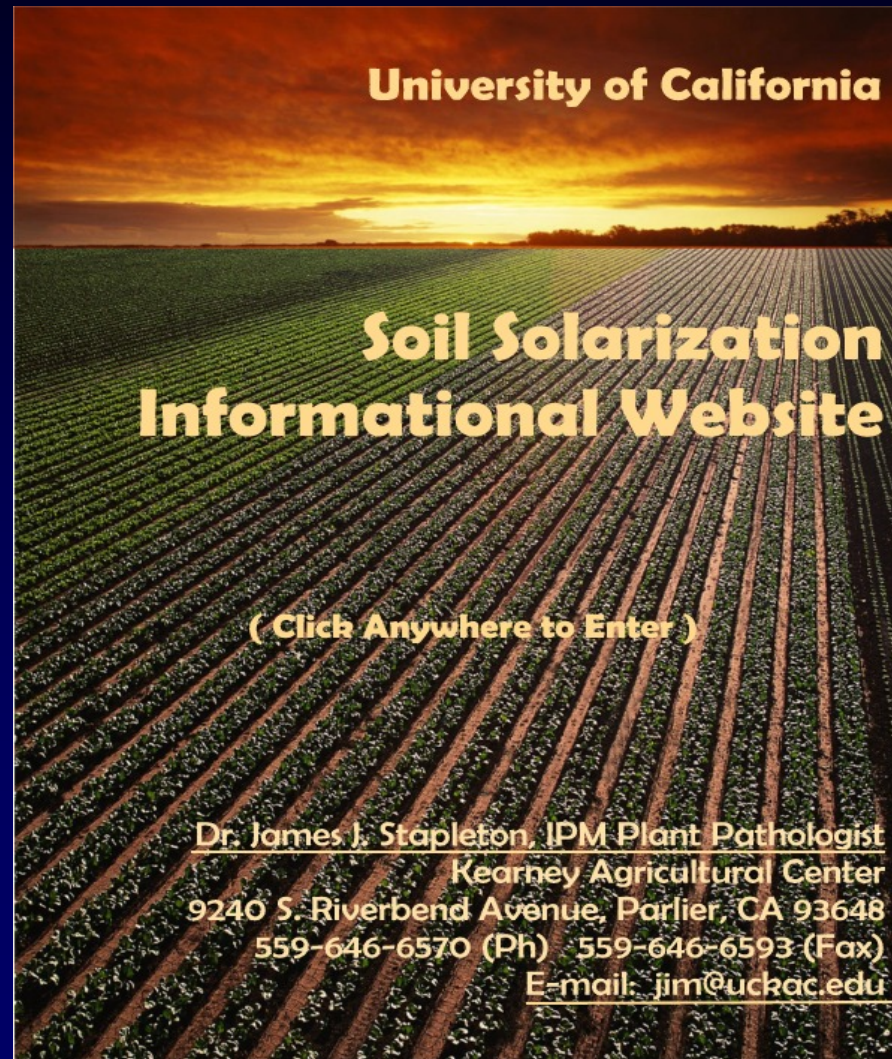
***INTEGRATED
MANAGEMENT***

References:

**UNIVERSITY OF CALIFORNIA
STATEWIDE IPM PROGRAM
WEBSITE:**

<http://ipm.ucdavis.edu>

<http://solar.uckac.edu>



University of California

**Soil Solarization
Informational Website**

(Click Anywhere to Enter)

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