

# IPM-Based Production for Food Safety, Sustainability, and Security

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strawberriesvegetables

eJournals: <http://ucanr.edu/strawberries-vegetables> and <http://ucanr.edu/pestnews>

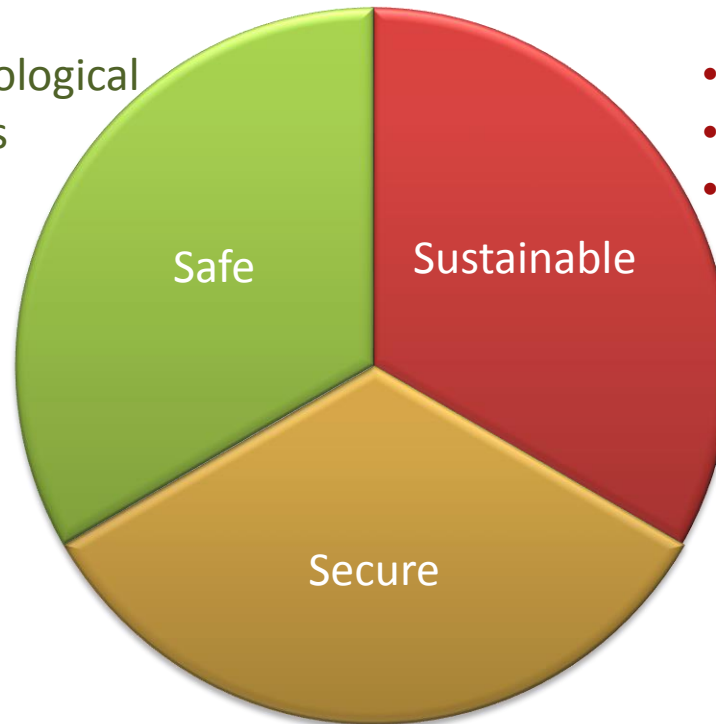
Download "IPMinfo" for iOS and Android devices

# Two questions

- Why not conventional?
- Why organic?
  
- Pesticides
- Fertilizers
- Environment
- Sustainability

# Ideal food production system

- Free from chemical/biological residues/contaminants

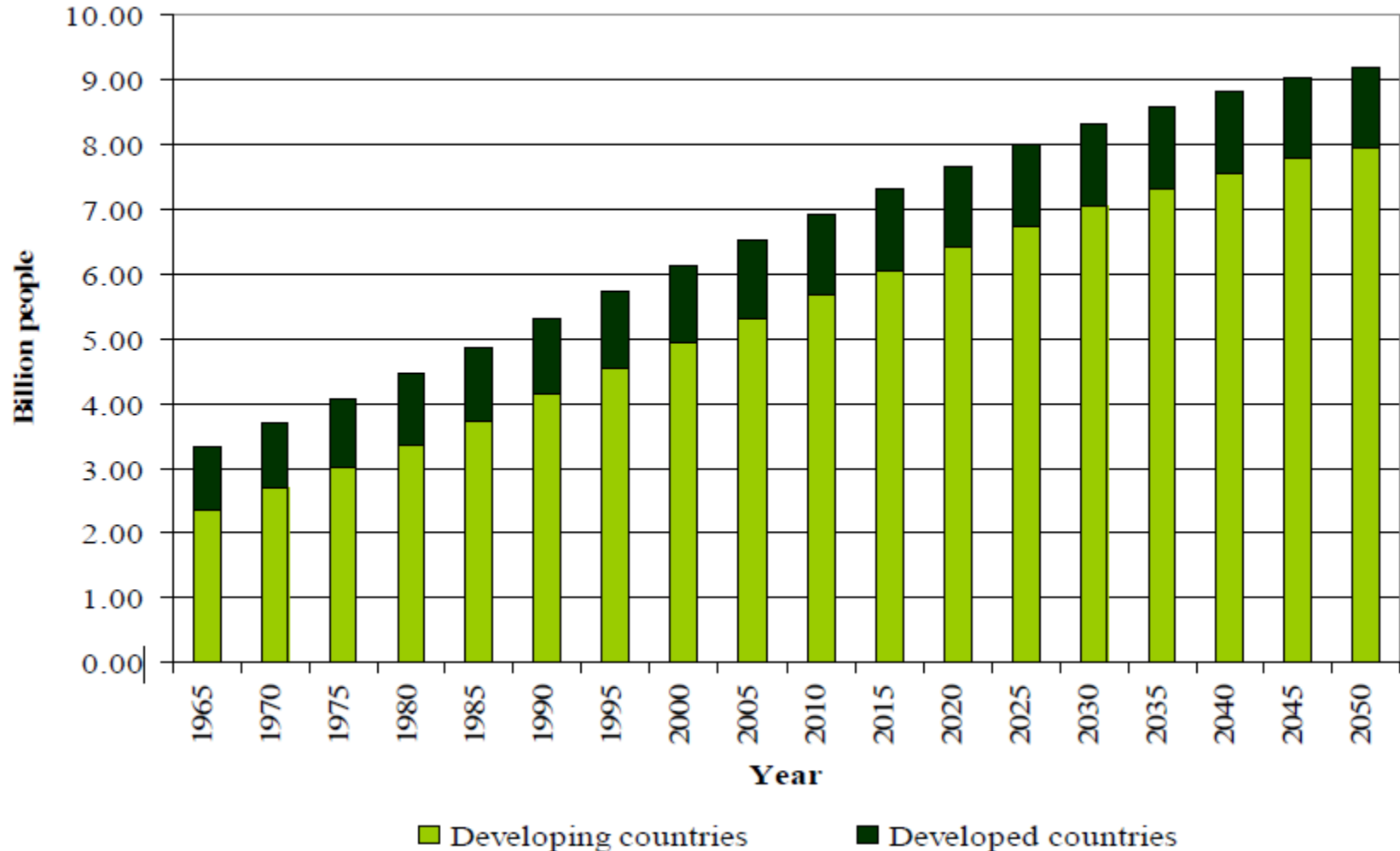


- Socially acceptable
- Economically viable
- Environmentally sound

- Sufficient for local communities
- Sufficient for growing global populations
- Affordable for everyone

# World population growth

World Population 1965 - 2050



# Urbanization of world populations

Figure I.6. Urban population by major area, 1950-2050

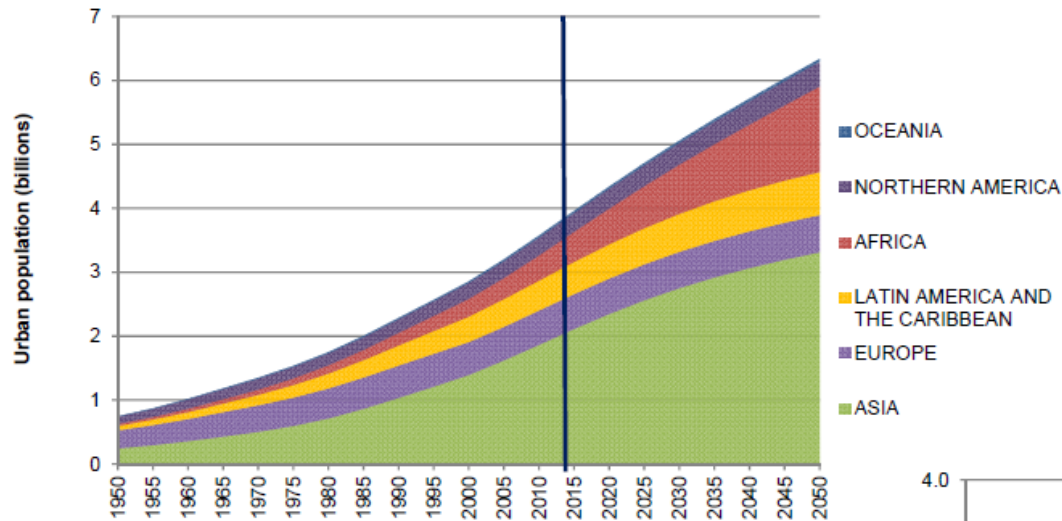
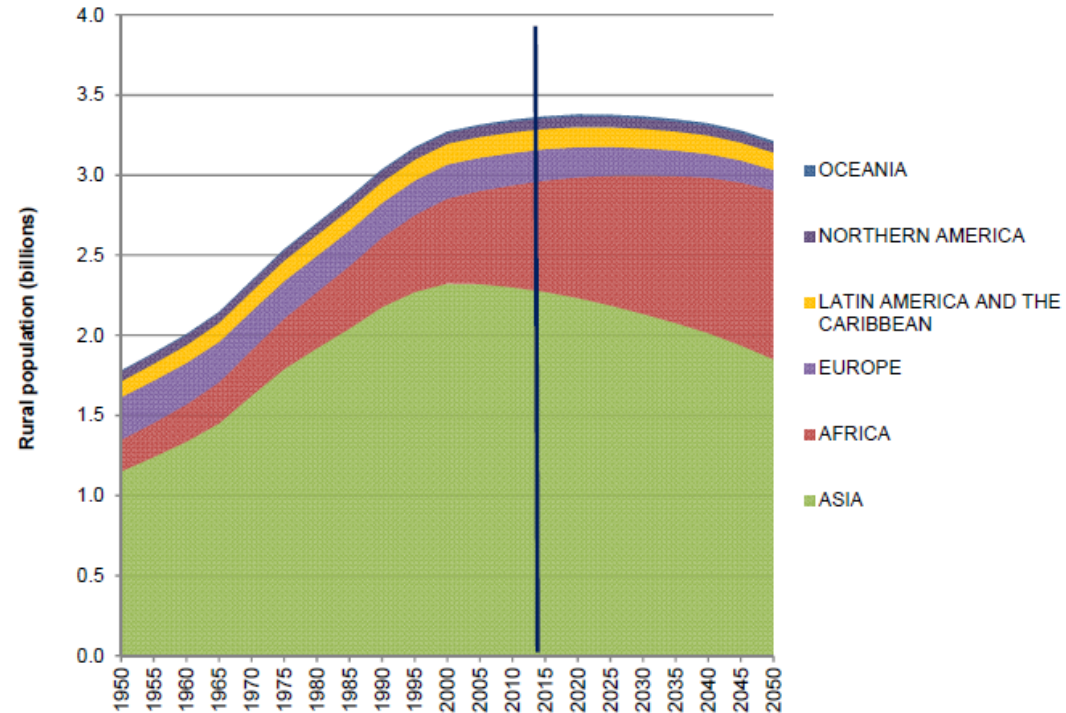
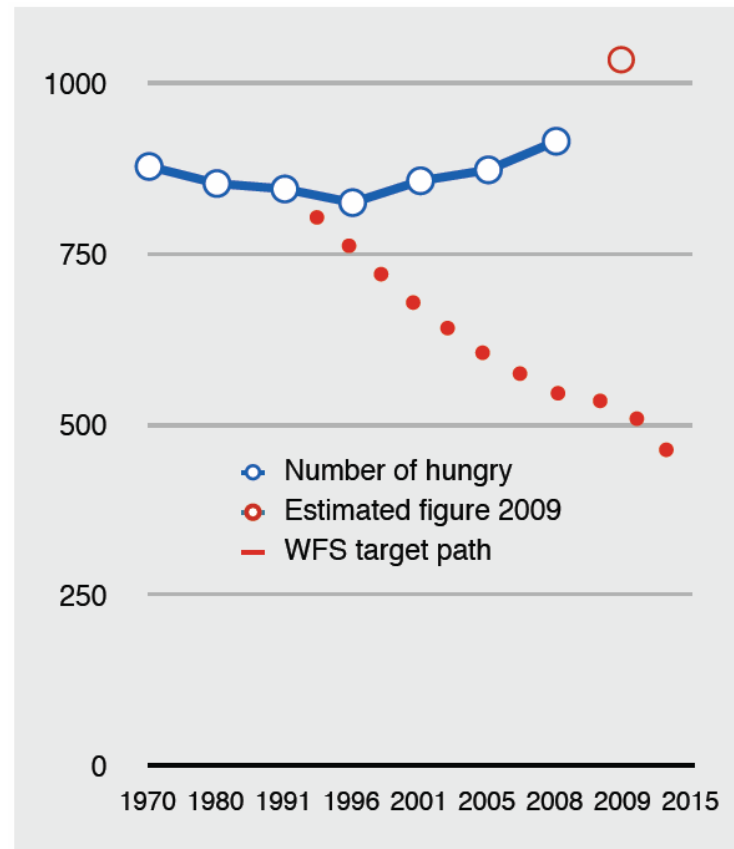


Figure I.8. Rural population by major area, 1950-2050



# Hunger and malnutrition

- More than 1 billion chronically malnourished in 2009
- Reducing the number of hungry people by 50% would generate annual benefits of \$120 billion (2015 estimate)



# History of agriculture and pest management

- Hunter-gatherer societies
- Growing crops and eventually expanding to large areas
- Increasing pest problems due to monoculture and global trade and travel
- Natural solutions ➤ synthetic compounds ➤ nature-friendly solutions
- Consumer/retailer-driven production rather than grower/science-driven production

# Why organic agriculture is gaining popularity?

**PESTICIDES DON'T KNOW**

**GO  Organic**

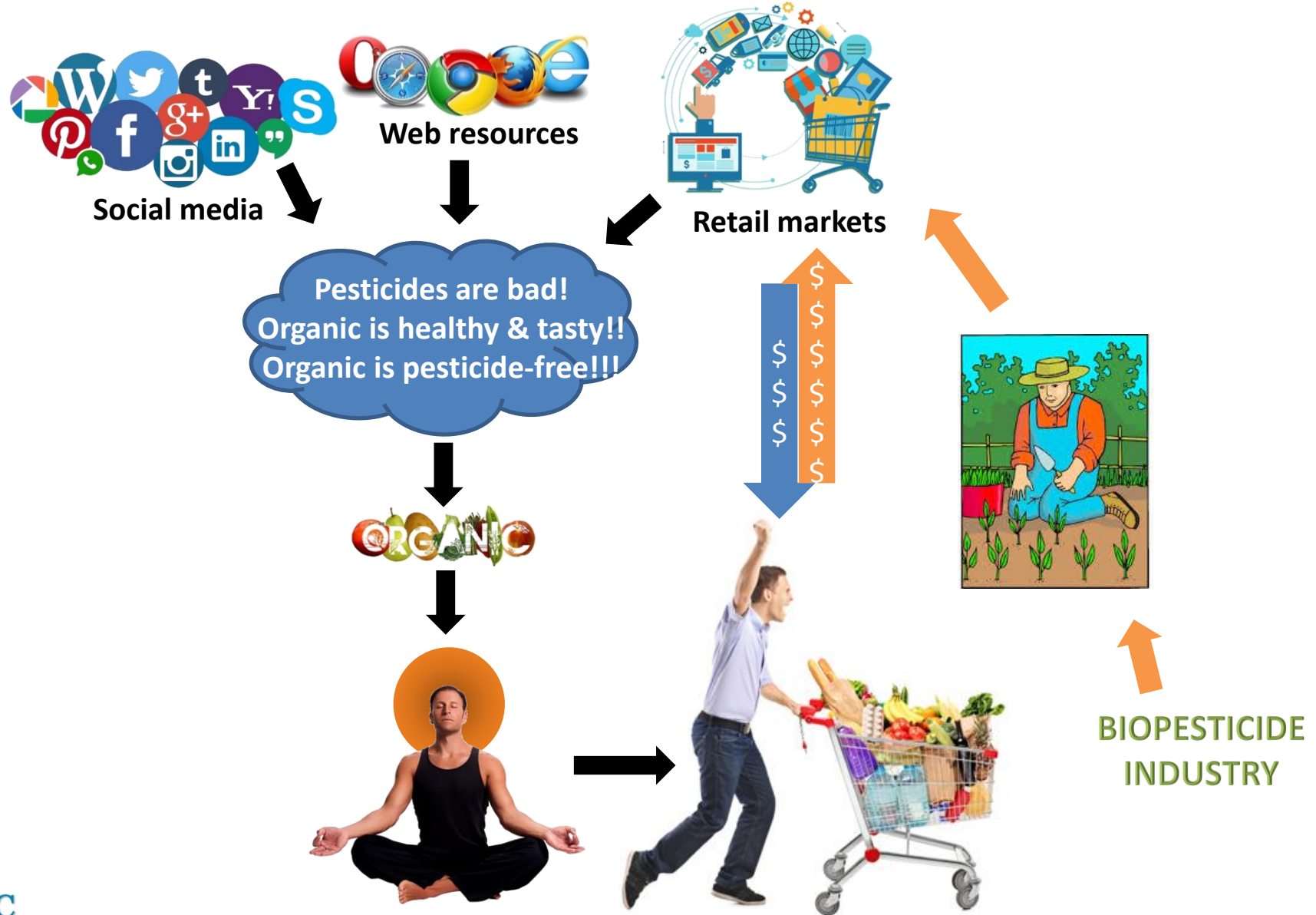
**WHEN TO STOP KILLING**



[www.peaceproject.com](http://www.peaceproject.com) 888-822-7075 (#S179)



# Why organic agriculture is gaining popularity?



# Is organic agriculture a solution?

- Productivity
- Profitability
- Pest management
- Other challenges

# Why not an IPM label?



# Integrated Pest Management

## Host Plant Resistance

- Resistant/tolerant varieties
- Other varietal traits

## Cultural Control

- Adjusting planting dates
- Modification of irrigation or nutrient management
- Use of trap crops, crop rotation, etc.

## Biological Control

- Conserving natural enemies
- Releasing predators or parasitoids

## Behavioral Control

- Baits or traps
- Mating disruption

## Physical/Mechanical Control

- Netting and other exclusion options
- Vacuuming

## Microbial Control

- Entomopathogenic microorganisms
- Microbial metabolites

## Chemical Control

- Natural compounds from plants or other sources
- Synthetic chemical compounds

# Crop production approach

Both synthetic and natural fertilizers, pesticides, and other materials are used. Although biological, cultural, and other non-chemical options and natural sources of nutrients are also used, the focus is generally on synthetic compounds.

Conscious effort on using cultural, biological, and other options first and using chemicals as needed. A balance in using synthetic and natural compounds.

Emphasis on sustainability and using natural materials. Prohibits the use of synthetic fertilizers and pesticides.

CONVENTIONAL

IPM-BASED

ORGANIC

# Production cost

Low mainly because several chemical pesticides and synthetic fertilizers are inexpensive.

Optimized because a variety of practices and are implemented and materials used.

Generally high due to higher cost of control options and limited nutrient sources.

# Returns

CONVENTIONAL

Higher in the short term.

IPM-BASED

Higher, in general.

ORGANIC

Moderate.

# Pest control efficacy

CONVENTIONAL

Generally higher unless there are resistance issues due to indiscriminate use of pesticides.

IPM-BASED

Generally higher by taking advantage of multiple control options and yields are also higher.

ORGANIC

Low to moderate depending on the pest.



# Endemic and invasive pests

Critical for managing certain pests, which can lead to bigger problems if not managed effectively.

Important for managing all kinds of pests.

Managing some pests is very difficult. Unmanaged pests can cause long-term and area wide issues and huge economic losses.

CONVENTIONAL

IPM-BASED

ORGANIC

# Pesticide resistance

Higher risk if certain chemicals are repeatedly used.

Lower risk due to optimal use of chemicals by rotating in different mode of action groups or by alternating with non-chemical options.

Repeated use of certain biopesticides or organic-approved pesticides can still lead to resistance issues.

CONVENTIONAL

IPM-BASED

ORGANIC

# Natural enemies

CONVENTIONAL

Can have a negative impact on natural enemies.

IPM-BASED

Minimum to moderate negative impact on natural enemies.

ORGANIC

Minimum to moderate negative impact on natural enemies.

# Environmental impact

Environmental health can be affected when certain chemicals are used.

Environmentally safe.

Environmentally safe.

CONVENTIONAL

IPM-BASED

ORGANIC

# Human health

Human health is typically not affected where pesticide use is effectively regulated.

Safe for human health.

Safe for human health.

CONVENTIONAL

IPM-BASED

ORGANIC

# Food security and affordability

CONVENTIONAL

Ensures food security and is affordable for all consumers.

IPM-BASED

Ensures food security and is affordable for most, if not all, consumers.

ORGANIC

Food security is difficult and affordable for only some consumers.



Good pest control efficiency, human and environmental health, affordability, profitability, and food security through a balance of synthetic and natural solutions for crop production and protection.



**Genes**  
**Environment**  
**Nutrition**  
**Health**





# Points to ponder

- Breeding vs. GMO
- *Bacillus thuringiensis* (*Bt*) sprays vs. *Bt* crops
- Organic is not pesticide-free
- Pyrethrum, spinosad, and other such molecules or *Bt* can lead to resistance issues
- Nicotine, pyrethrum, and other such materials are natural, but they are still pesticides
- An approach that maintains a balance between traditional and modern solutions can be more beneficial

# Thank you!

Tuesday, November 28, 2017

8 am – 3 pm

Shepard Hall, Santa Maria Library

<http://ucanr.edu/2017berryveggimeeting>



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