

# Small Organic Vineyard Management

Subtitle

Christopher Chen, Ph.D.

UCCE – Integrated Vineyard Systems Advisor

North Coast

# What makes a vineyard organic?

- An **organic** vineyard must abstain from the use of synthetic pesticides, herbicides, or fertilizers
- To use the label “Organic” the vineyard must adhere to the regulations of **California Certified Organic Farmers (CCOF)**
- A vineyard may be **farmed organically** but not certified with CCOF



# Benefits and detriments of organic farming

## Benefits

- “Organic premium”
- Focus on the agro-ecosystem
- Promote health of environment, vineyard, and people
- Fewer chemical inputs
- No synthetic chemicals
- Less acutely toxic chemicals

## Detriments

- Broad-spectrum pesticides
- Limited to organic inputs
- Additional equipment needed to replace synthetic herbicides
- Potential for high crop loss
- May need additional labor
- “Organic premium” may not apply

# Strategies for Organic Vineyard Management

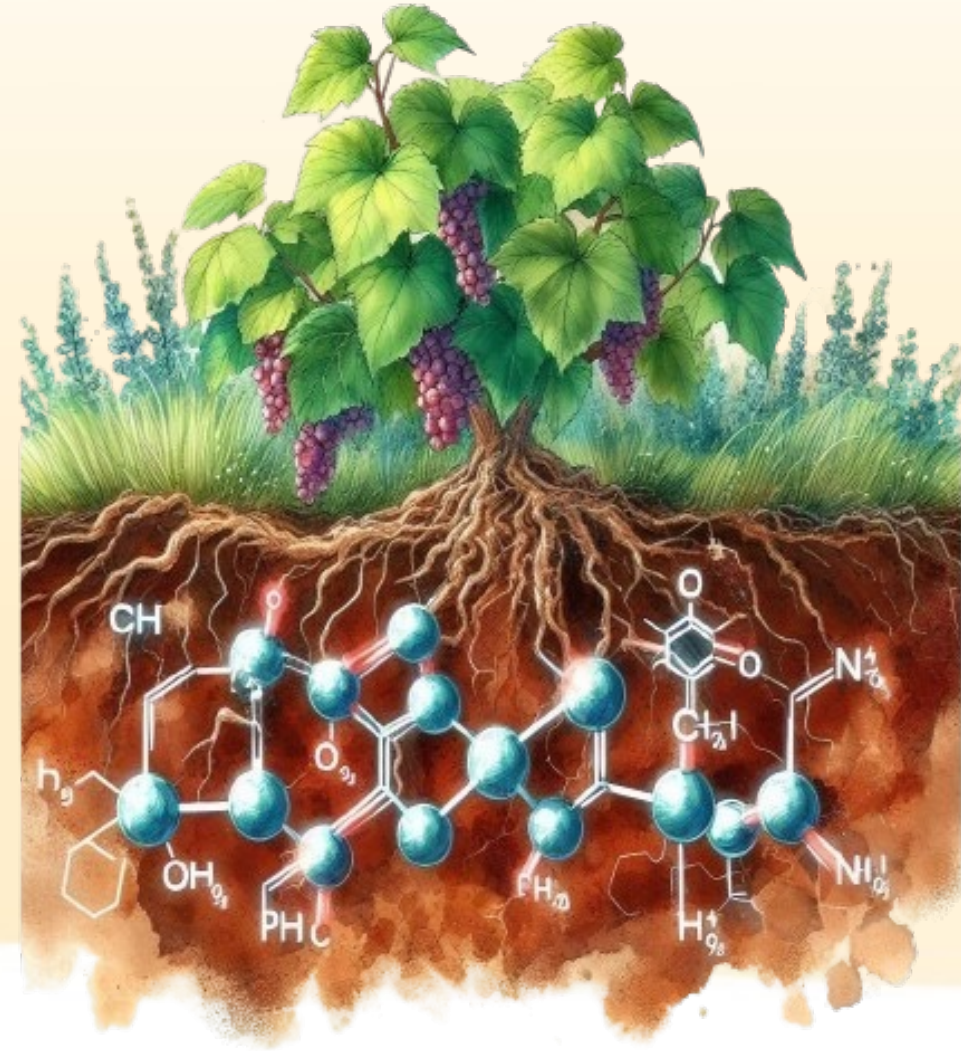
# Main Objectives

1. Soil Fertility
  - Available and plentiful nutrients available to grapevines
2. Vine Health
  - A well-balanced vine with high production quality, yield, or both
3. Pest Control
  - Minimal losses incurred to pests
4. Agroecology
  - A healthy, living system within the vineyard
5. Water Use Efficiency
  - High water use efficiency
6. Economic Thresholds
  - Accepting that some crop loss will happen and knowing the limit you can lose before taking action



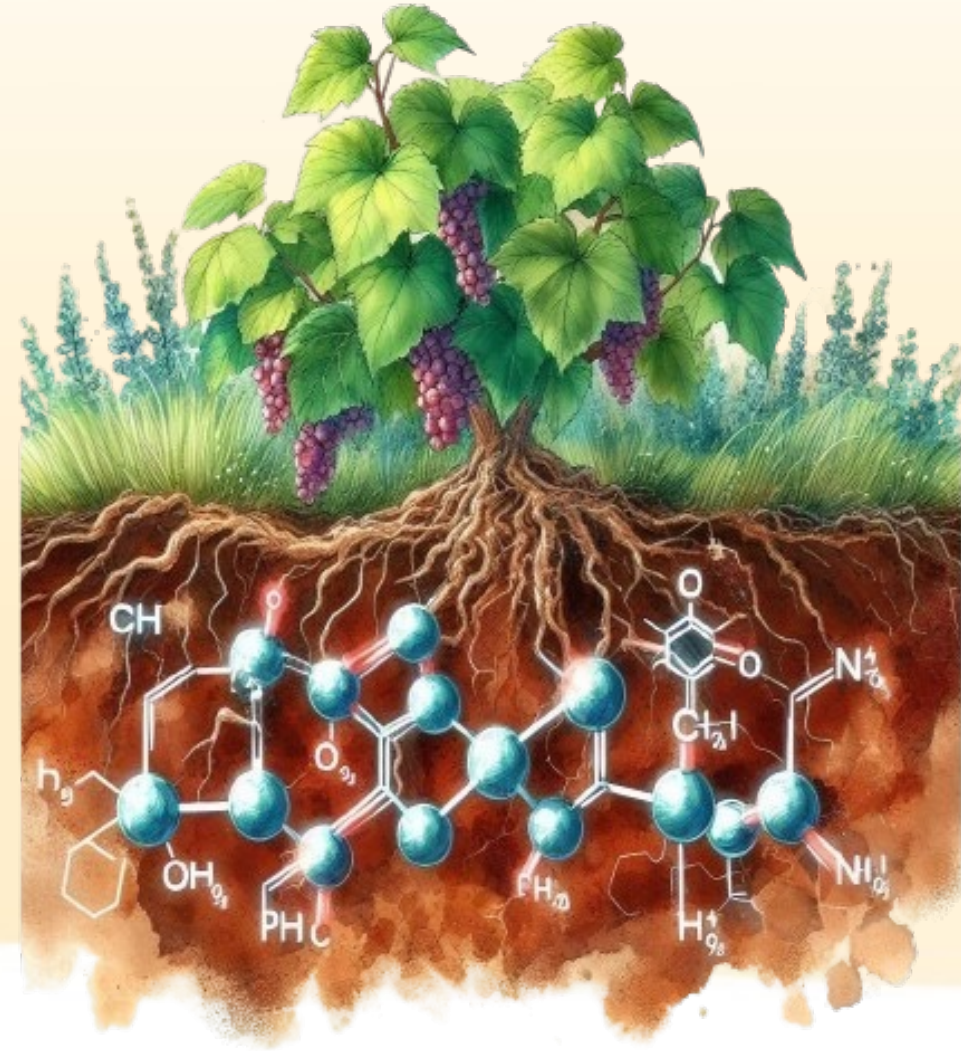
# Soil Fertility

- Soil fertility refers to the concentration of **nutrients** in the soil that are **available** to the grapevine
- Nutrient availability depends on soil properties like:
  - Soil pH
  - Nutrient content
  - Competition
  - Soil cultivation
  - Soil texture
  - Water availability
  - Fertilizing methods
  - Cover cropping



# Soil Fertility

- In organic systems nutrients must be added from an organic source
  - Organic compost
  - Organic mulch
- Nutrient availability will depend on:
  - Cultivation methods (till / no-till)
  - Soil structure and aggregation
  - Microbial activity in rhizosphere
  - Nutrient composition of organic fertilizer





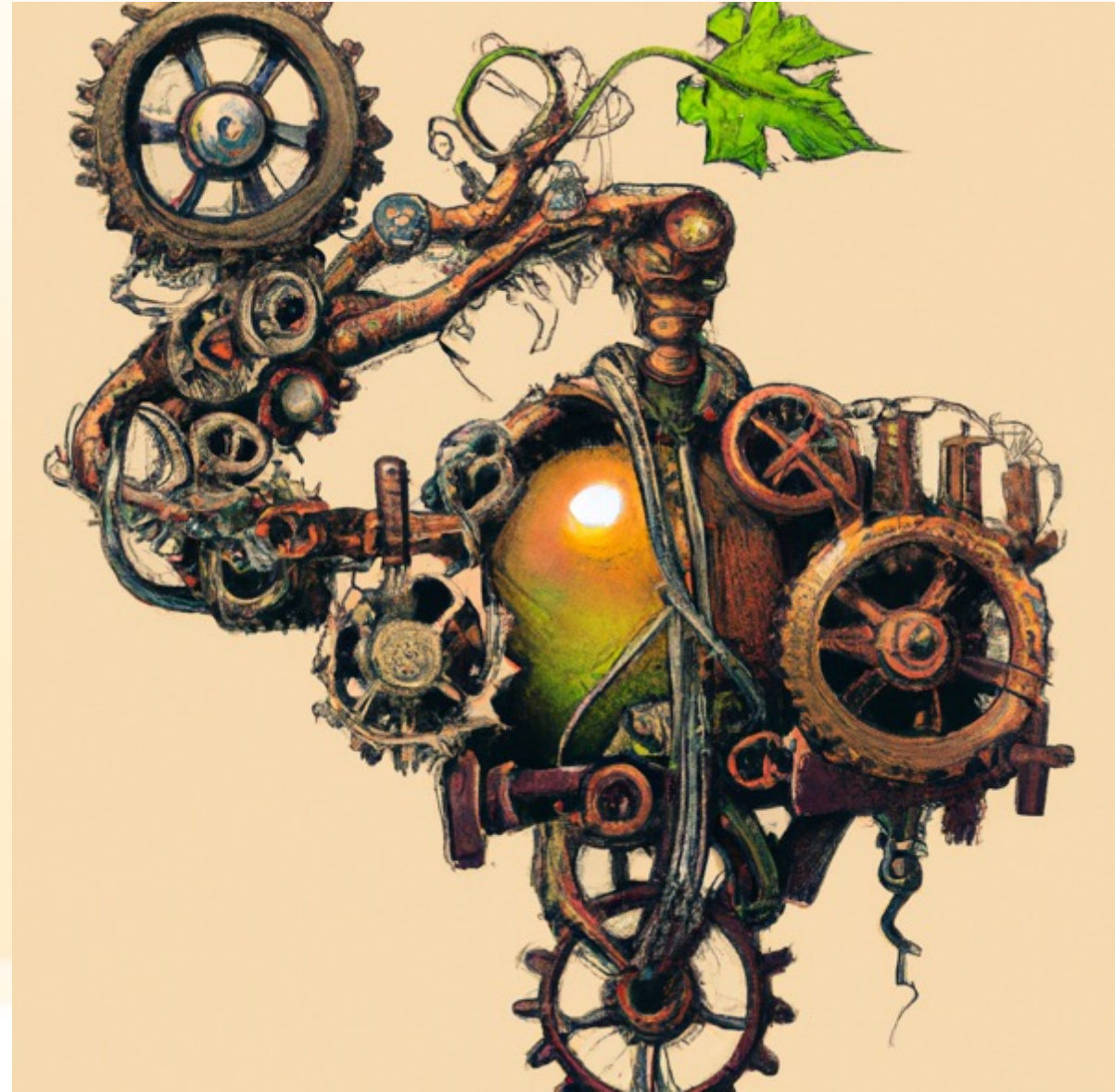
# Vineyard Health

- ‘Health’ – the state of being **free** from illness or injury
- No way to be **totally free** of illness or injury
- The next best option is to keep illness or injury to a minimum



# Vineyard Health

- **Vine Function  $\approx$  Vine Health**
- Important Vine Functions
  - i. Photosynthesis
  - ii. Vascular system
  - iii. Reproductive efficacy
  - iv. Gas exchange (respiration)



# Changing Climates

- Climates are changing and impacting the factors that affect vine health.
  - i. Temperatures
    - Affects all aspects of vine health
  - ii. Precipitation
    - Affects all aspects of vine health
  - iii. Extreme weather events
    - Heatwaves, fire, and late frost events
    - Impacts photosynthesis and reproduction
  - iv. Pests and Diseases
    - Directly limits vine health



# Pest Control

- Can be challenging in organic cropping systems
- Often rely on preventative methods
  - Leaf removal ~ Mildews and Bunch Rot
  - Ground litter management ~ Overwintering pests
- Sometimes a reflexive response is needed
- Required to use organic pesticides
  - e.g., Pyganic -> from Chrysanthemum flowers
  - May be less effective and target more organisms than synthetic pesticides
- Biological control organisms are also useful
  - Green lacewings
  - Lady Beetles
  - Parasitoid wasps
  - Raptors



# Integrated Pest Management (IPM)

# IPM Defined

## Definition:

*a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.*

## Key Tenants:

1. Identifying the pest
2. Monitoring and assessing the population size, damage, and favorable conditions
3. Using economic injury thresholds to determine when management is needed
4. Preventing pest problems
5. Combining management methods (biological, cultural, physical, chemical)

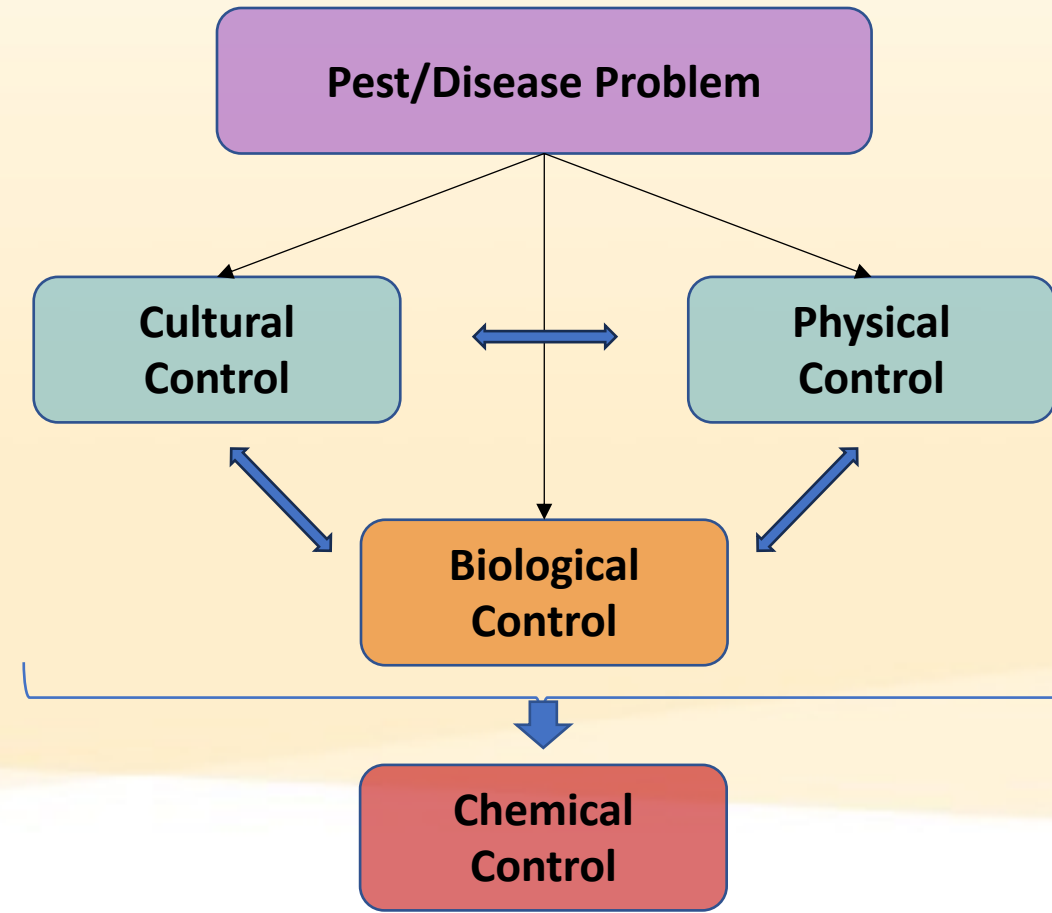
# Integrated Pest Management (IPM)

Est. 1959 but really took off in the 60s

IPM is a foundational pillar of sustainable agriculture

Utilized practices:

1. Cultural
2. Physical
3. Biological
4. Chemical



# IPM in Organic and Conventional Vineyards

- IPM looks similar in organic and conventional vineyards
- Alternatives to chemical controls should be explored before resorting to pesticide applications when using IPM
- Often the difference between organic and conventional IPM becomes apparent when chemical pesticides are used on site



# Chemical Controls - Conventional

- Narrow spectrum is the goal
- Many synthetic chemicals target highly-specific pest groups
- Can be more acutely toxic or poisonous to humans and the environment
- Often requires a licensed applicator
- Very effective if used correctly
- **READ & FOLLOW THE LABEL**





# Chemical Controls - Organic

- Often are broad spectrum
- Negatively impact more than the target pest or disease
- May be less acutely toxic/poisonous to humans and environment
- Often less effective than conventional pesticides
- **READ & FOLLOW THE LABEL**



# Agroecology

- Vineyards support natural predators and parasitoids to help control pests
- Sometimes beneficial species also improve site health (e.g., soil structure)
- Some examples:
  - Gophers ~ Weeds (predatory) Lady beetles ~ Mealybugs
  - Lacewings ~ Many pests (predatory) Raptors ~ Rodents
  - *Anagyrus* wasp ~ Leafhoppers (parasitism)
  - Cover crops ~ Weeds (competition) *Trichoderma* ~ Trunk Fungi
  - Worms ~ Soil Aggregation (site health) Ground cover ~ Erosion

# Water Use Efficiency

- Water use efficiency of any vineyard is a function of vine transpiration and surface evaporation
- Improving soil water holding capacity through soil-building practices help
- Managing vine canopies to help balance the vine and shade the vineyard floor reduce water loss from the vineyard



# Economic Thresholds

- Economic thresholds are the point at which addressing a pest issue becomes less costly than accepting the accompanying damage
- This concept may be more important for organic than conventional sites
- Organic pesticides which serve as a response to a problem often require **more application to achieve the same effect** as a comparable synthetic pesticide



# Key Organic Practices for Vineyards

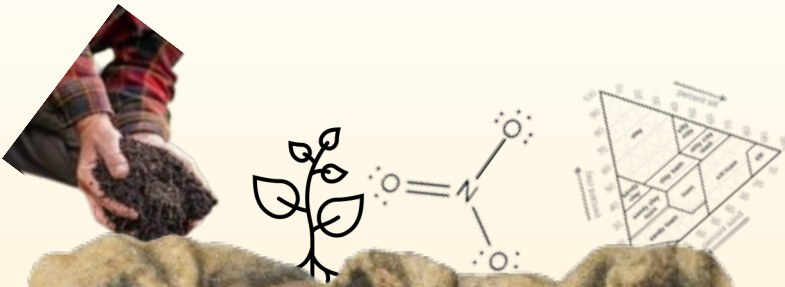
- Fertilization
  - Should be testing the soil and the grapevines to see what is deficient or in toxic excess
  - Testing your fertilizer for nutrients also helps
- Improving soil characteristics
  - Retaining a soil pH between 5.5-7
  - Preserving soil aggregation
  - Reducing soil compaction
  - Deciding on a till or no-till strategy
- Monitoring and managing pest populations
  - Always look out for pests based on their annual development
  - If management is needed, implement it quickly



# Key Organic Practices for Vineyards

- Preserving ecosystem services and health
  - A farm has a whole ecosystem within it
  - Encourage beneficial organisms  
(e.g., raptors, insect predators, parasitoids)
- Improve irrigation scheduling
  - Overirrigation leads to more pest problems
  - Underirrigation leads to crop loss
  - It is cheaper and better for production to irrigate the right amount, based on environmental conditions
- Economic threshold analysis
  - Do the math and find out how much crop loss you can incur before it becomes less costly to provide a control
  - Don't try to eliminate every problem, focus on the bad ones





# *Organic Vineyard Management*

## Summary

1. Vine and site health should be considered when designing an organic vineyard management plan
2. Consider how your plan will impact: soil fertility, vine health, pest populations, vineyard ecology, water dynamics, and your economic thresholds
3. Organic fertilizers should be tested for nutrient content; especially composts, as this varies
4. Understand your economic threshold for taking action to control a pest problem; this will likely be different from a conventional vineyard



Thank You



# Sources

You can find this presentation at:

1. <https://ucanr.edu/sites/chenlab>
2. Speaker Presentations
3. “Other Presentations”
4. “Small Organic Vineyard Management – UCCE Organic Day”

Some original images created by Co-Pilot & OpenAI Labs Dall-E Program