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**GROWING A NEW GENERATION  
OF ILLINOIS FRUIT AND VEGETABLE FARMERS**

# **OVERVIEW OF OMRI/ORGANIC PESTICIDES**

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# Today's Objectives

1

- Understand what OMRI approved pesticides are

2

- Develop a better idea of where pesticides fit within organic production

3

- Become aware of the types of insecticides and fungicides/bactericides available



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# Outline

- **Organic pesticides**
  - **OMRI/Organic approved pesticide defined**
  - **Precautions in using organic pesticides**
  - **Role of pesticides in organic production**
- **Types of Insecticides available**
  - **Overview and examples**
- **Types of Fungicides and Bactericides available**
  - **Overview and examples**

# Organic pesticides defined

- Organic pesticides are “synthetic and nonsynthetic substances approved by the National board”\*
- Some nonsynthetic substances are prohibited if they “would be harmful to human health or the environment” and “inconsistent with organic farming and handling”\*
- Synthetic substance can be used if....
  - “Produced from natural source/no organic substitute
  - No adverse effect on environment in use, disposal, and manufacturing
  - Nutritional quality of food maintained when substance is used
  - Substance is recognized as safe by FDA when used in accordance to GMP and contains no residue of heavy metals or other containments”\*

Source: Organic Foods Production Act of 1990



# OMRI Approved Pesticide

- Organic Materials Review Institute
- A non-profit that approves substances (pesticides, soil amendments, etc.)
- Pesticide must be cleared by certification agency



# OMRI Approved Pesticide

**For Organic Gardening**  
*Para Jardinería Orgánica*

**Monterey**

## 70% Neem Oil

**Fungicide • Insecticide**  
**• Miticide**  
*Fungicida • Insecticida*  
*• Acaricida*

**OMRI**  
**Listed**

**Use on Roses, Flowers,  
Vegetables, Ornamental  
Trees & Shrubs**

Active Ingredient:  
Clarified Hydrophobic Extract of Neem Oil.....70.0%  
Other Ingredients.....30.0%  
Total.....100.0%

EPA Reg. No. 70051-2-54705  
EPA Est. No. 48498-CA-1      0102/0810(04)

**KEEP OUT OF REACH OF CHILDREN**  
**MANTENGA FUERA DEL ALCANCE DE LOS NIÑOS**  
**CAUTION/PRECAUCION**  
See Attached Booklet for Precautionary Statements  
and Directions for Use in English and Spanish

**NET CONTENTS: 1 PINT/473.16 mL**



# Things to keep in mind

- Organic pesticides are still toxic
  - Treat OMRI pesticides just like conventional pesticides
  - Read labeling and follow directions
  - Utilize personal protective equipment (PPE)
- Pesticides must be added to organic plan
  - Always verify with certifying agency
  - Not all agencies will allow all OMRI approved pesticides



# Things to keep in mind

- OMRI pesticides are regulated
  - Just like conventional pesticides
  - Must still follow EPA FIFRA laws/regulations and state BPC Title 7 and Title 22 laws/regulations
  - Must also follow worker protection standards
- Depending on the product, there may be certain restrictions that need to be followed if used in production



# Things to keep in mind

## ▼ Neem Extract and Derivatives

Status: Allowed with Restrictions

Class: Crop Pest, Weed, and Disease Control

Origin: Nonsynthetic

Description: For use as a pest lure, repellent, or as part of a trap, or as a disease control. May be used for other pesticidal purposes only if the requirements of 205.206(e) are met.  
See also PLANT PESTICIDES.

NOP Rule: 205.206(a),(b),(c),(d) & (e)



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# Things to keep in mind

- Pesticides are added and removed every year to the OMRI approved list
  - What you could use the previous year, you may not be able to use this year
- Follow through with IPM plan and utilize OMRI pesticides as the last resort



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# Role of pesticides in organic production

205.206(e). National Organic Program

“When the [**physical, cultural**] practices provided for in the paragraph a through d of this section are insufficient to prevent or control crop pests, weeds, and diseases, a biological or botanical substance or a substance included on the National List of synthetic substances allowed for use in organic production may be applied to prevent, suppress, or control pests, weeds, or diseases”



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# Role of pesticides in IPM

- Before using a pesticide you should utilize...

plastic mulching

trap cropping

cover cropping

crop rotation

Floating row  
covers/barriers

soil

sterilization/solarization

present/purchased insect  
predators

tillage practices

hand weeding

Insect trapping

# Types of Organic Pesticides

- Granules/Powders
- Oils
- Microbial
- Liquids
- Combinations



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# Surround(Kaolin Clay)



- Nonsynthetic, ground particles made from Kaolin Clay, a noncaking ingredient.
- **How does it work?** Places a sheath barrier and acts as irritant if it gets on insect
- **Pest Examples:** apple maggots, white apple leafhopper, pear psylla, vine borer, cucumber beetles, stink bugs
- **When to use:** applied with water at sign of damage or flowering



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# Diatomaceous Earth



- Nonsynthetic, ground particles made from diatoms (tiny aquatic organisms)
- **How does it work?** Powder makes incisions into insects and causes them to dry out
- **Pest Examples:** many pests
- **When to use:** applied at sign of damage or flowering
- **Other information:** may effect pollinators



# Neem Oil/soap



- Nonsynthetic, oil from the neem tree
- **How does it work?** Acts as an antifeedant
- **Pest Examples: Vegetables:** Mexican Bean Beetle, Colorado Potato Beetle (CPB), caterpillars, squash bugs, some stinkbugs, some aphids
- **Fruit crops:** aphids, tarnished plant bugs, leaf hoppers, leaf miners
- **When to use:** presence of pests
- **Example(s):** many different variations available

# Horticultural Oils

- Derived stems and leaves from some plants
- **How does it work:** blocks the respiratory openings and causes suffocation
- **Pest Examples:** primarily against small, sedentary insects and related organisms – aphids, overwintering aphid eggs, mite eggs, and scales.
- **Example(s):** Garlic and hot pepper oils (no different than “plain” horticultural oils)
- Rosemary oil and cinnamon oil may be more effective than other oils for some insects

# Pesticidal Soaps

- Soaps formulated to provide the best insect control with minimal damage to plants
- **How does it work:** appear to break down the waxy insect cuticle and block respiration
- **Pest Example:** Work best against soft-bodied pests such as aphids, mealybugs, mites, and whiteflies.
- **Example(s):** M-Pede and Safer's Insecticidal Soap



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# Bt (*Bacillus thuringiensis*)

- Nonsynthetic, bacteria
- **What is it?** Proteins produced by Bt.
- **How does it work?** Must be eaten to make opening in insect gut.
- **Pest Examples:** Lepidopteran species on tomato and brassicas.
- **When to use:** presence of insects
- **Examples:** DiPel, Thuricide
- **Other information:** different strains control different species
- Cannot use genetically engineered crops containing Bt
- May develop resistance.

# *Beauveria bassiana*

- Nonsynthetic, fungus
- **How does it work?** Infect tissue with spores landing on insects or consuming plant tissues.
- **Pest Examples:** thrips, whiteflies, aphids, caterpillars, weevils, ants, CPB, mealybugs.
- **When to use:** early stages of pest development.
- **Example(s) of products:** Mycotrol, Naturalis
- **Other information:** control depends on environment
- multiple spraying may be effective



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# *Metarhizium anisopliae*

- Nonsynthetic, contains spores of the fungus
- **How does it work?** Infects susceptible insects through contact on foliage or in soil
- **Pest Examples:** thrips, whiteflies, and mites on onions, peppers, tomatoes
- **When to use:** presence of insect
- **Example(s) of products:** Met 52
- **Other information:** effectiveness may be influenced by colder and hotter temperatures.

# Insect Viruses

- Some viruses are available that target certain pests
- Match insect virus to the pest
- Many of these are Baculoviruses within the genus *Nucleopolyhedrovirus*
  - **Pest Examples:** Coddling moths on apples and other fruit
  - **Example(s) of products:** Cyd-X, Carpovirusine

# Nematodes

- Labeled as a microbial pesticide, Nonsynthetic, microscopic roundworms such as *Steinernematidae* and *Heterorhabditidae*
- **How does it work?** Populations added to the soil. Match nematode species to particular pest
- **Pest Examples:** armyworms, some borers, corn earworm, corn rootworm
- **Example(s) of products:** *Steinernema carpocapsae*, *Heterorhabditis bacteriophora*
- **Other information:** wet/moist soil conditions needed



# Spinosad

- Nonsynthetic, made from Spinosyns A and D produced by the fermentation of *Actinomycece* species and *Saccharopolysora spinosa*
- **How does it work?** Broad spectrum that is ingested or direct contact. Affects nervous systems causing motor loss, die from exhaustion
- **Pest Examples:** caterpillars, beetles, thrips, flies, cph-larval stage, poor on true bugs
- **When to use:** presence of insects
- **Examples of products:** Entrust



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# Pyrethrins

- Or natural pyrethrins, Nonsynthetic, insecticide from powdered African chrysanthemum
- **How does it work?** It paralyzes insects and leads to death.
- **Pest Examples:** True bugs, caterpillars, beetles, whiteflies, thrips, leafhoppers, cabbage loopers
- **When to use:** applied at presence of insects
- **Example(s) of products:** PyGanic, Concer, Azera
- Breaksdown rapidly in sunlight



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# Outline

- Precautions in Organic Pesticide usage
- Role of Pesticides in Organic Production
- What is an OMRI approved substance
- Types of Insecticides available
  - Examples and overview
- **Types of Fungicides and Bactericides available**
  - Examples and overview

# Sulfur



- Synthetic material, controls plant diseases as protectant from pathogens .
- **How does it work?** It inhibits spore germination and growth in fungal pathogens
- **Pest examples:** powdery mildew on many crops, brown rot on peaches
- **When to use:** Apply before appearance of disease
- **Other issues:** May cause injury to some crops/varieties

# Copper Sulfate

- Synthetic, fungicide and bactericide applied as spray solution
- **How does it work?** Copper ions are absorbed by the spores of fungus or bacterium and disrupt protein functions that prevent spore germination
- **Pest Examples:** Late blight, early blight, bacterial spot and speck of tomatoes.
- **When to use:** apply before appearance of disease
- **Other issues:** “must be utilized in a way that prevents accumulation in the soil” NOP.
- May negatively effect pollinators



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# Bordeaux Mix

- Copper sulfate with calcium hydroxide
- **Pest examples:** downy and powdery mildew of grapes, fireblight and apple scab in apple, foliar diseases of tomatoes
- **When to use:** apply in early spring with diluted mixture on young foliage
- **Other information:** different rates may be needed through out the season
- Persists through wet conditions

# Bicarbonate (Potassium/Sodium)

- Synthetic, white granules/powder mixed with water
- **How does it work?** A protectant from foliar diseases
- **Pest examples:** Powdery mildew on cucurbits, grapes, and brambles
- **When to use:** first sign of disease
- **Examples of products:** Kaligreen, Spectrum foliar fungicide, Armicarb (powdery mildew on grape)



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# *Trichoderma* spp.

- Nonsynthetic, fungal species found in many soils
- **How does it work?** Colonizes plant roots to induce plant defense responses that make plants more resistant.
- **Pest examples:** *Phytium* (white root rot), *Fusarium* (wilt), *Rhizoctonia* (rot)
- **When to use:** Treat seeds, soil, and/or potting mix
- **Example(s) of products:** RootShield
- **Other issues:** Beneficial effects/pest targets vary among *Trichoderma* spp.



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# *Streptomyces lydicus*

- Nonsynthetic, bacterium found in the soil
- **How does it work?** Colonizes on plant roots/foilage and competes with other pathogens. It produces antifungal compound and enzymes that digest cell walls of fungi.
- **Pest examples:** Seed treated- *Fusarium*, *Rhizoctonia*, *Phythium*, *Sclerotinia*, and *Verticillium*
- Foliar application- powdery/downy mildews, fire blight, *Alternaria*, *Sclerotinia*, and *Anthraco*se,
- **When to use:** at planting or before disease presence
- **Example(s) of product:** Actinovate

# *Coniothyrium minitans*

- Nonsynthetic, fungus
- **How does it work?** Sold as conidia (spores) that will attack pathogens within in the soil
- **Pest examples:** *Sclerotinia sclerotium* (white mold) and *Sclerotinia minor* (soft rot and blight)
- **When to use:** applied/incorporated into top 2 in of soil before season
- **Example of product:** Contans
- **Other issues:** Environmental effectiveness is based on soil temperature and moisture

# *Bacillus subtilis*

- Nonsynthetic, bacterium that has spore form
- **How does it work?** It competes with other microorganisms and interferes with pathogen attachment and spore dispersal.
- **Pest Examples:** *Verticillium*. Combined with *Streptomyces gramicifaciens* control of root rot in cucumber and tomato.
- **When to use:** Seed and soil
- **Examples:** *Bacillus subtilis* strain (QST 713) and Serenade



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# Resources

- University of Illinois Extension's Local Foods and Small Farms Webinars: 2013-2014 Organic Insect and Disease Management  
<http://web.extension.illinois.edu/smallfarm/webinar.html>
- OMRI List of Products  
<http://www.omri.org/omri-lists>
- Cornell: Resource Guide for Organic and Disease Management (pdf) <http://web.pppmb.cals.cornell.edu/resourceguide/>
- NC State's CEFS: Organic Production Guides  
<http://www.cefs.ncsu.edu/resources/guides/organicproductionguide.html>
- Baculoviruses
- <http://www.biocontrol.entomology.cornell.edu//pathogens/baculoviruses.html>.
- Nematodes  
<http://www.biocontrol.entomology.cornell.edu/pathogens/nematodes.html>



# Summary

- OMRI pesticides are a vital part of organic production
- Many products available that can control pest problems if all other steps have been taken
- Always consult with certifying agency before using product
- Proper diagnosis needed before application
- Prevention is always the key



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# To reach us

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