



UNIVERSITY OF ILLINOIS
EXTENSION

**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



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

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”

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



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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

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

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

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 *Actinomyces* species and *Saccharopolyspora 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

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

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

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)

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:** *Phytophthora* (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.

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

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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