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# ORGANIC PEST MANAGEMENT

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## Overview

Organic producers have a limited 'tool box' when it comes to managing pests and are unable to use many of the products their conventional counterparts might use. Many producers must therefore rely on other management tactics such as cultural, physical and biological forms of pest control. This presents a convenient lens to introduce students to the concept of integrated pest management (IPM) and the different strategies employed in this approach. This module introduces the principles of IPM through organic producer video cases studies. Using chemical controls is still part of IPM and there are a variety of substances that are allowed in organic production. This can be confusing for students who might associate organic farming with no pesticides. This module also includes an assignment through which students explore the differences between allowed and prohibited substances.

## Learning Objectives

### Concepts:

- The principles and strategies in Integrated Pest Management (IPM), including cultural, biological, chemical, genetic, regulatory, and physical controls.
- Differences between pest and pest management strategies across a range of organic operations (including the constraints of economics, regional climate, and the organic 'toolbox').
- The National Organic Program dictates which substances are allowed and prohibited for use in organic agriculture. In general, naturally derived substances are allowed and synthetic substances are prohibited.

### Skills:

- Evaluate how IPM strategies are developed and applied by individual organic producers.
- Use online information resources to determine if products are allowed for use in organic production.

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## Notes for Instructors

# Lesson 1: Pest Management Video Case Studies

### Description

In this lesson, students will watch video interviews of 5 certified organic producers who discuss their weed, insect pest, and disease problems and how they manage them. The producers featured in these case studies include dairy, grain, and diversified vegetable farmers. After watching these interviews, students will answer questions to draw conclusions about pest management strategies.

### Lesson Notes

There is a question bank to support students exploring the different pest management strategies presented in these case studies, however a subset of question might be appropriate (or none at all) depending on your teaching goals and whether you treat this as an assignment outside of the classroom (i.e. as homework) vs. a launching point for in-class discussion or online discussion threads. The 'Resources' list at the end of this module includes some readings and websites on IPM that may be helpful to provide to students before or with this assignment (i.e. Penn State Extension – Integrated Pest Management (IPM) Tactics). Additionally, the following readings on some of the specific pests mentioned in this video are included below and could be the foundation for an additional assignment on pests:

- Western Corn Rootworm - (<http://extension.colostate.edu/docs/pubs/insect/05570.pdf>)
- Bindweed (<https://www.colorado.gov/pacific/agconservation/field-bindweed>)
- Onion Root Maggot (<https://ag.umass.edu/vegetable/fact-sheets/onion-maggot>)
- Wild Mustard ([http://wric.ucdavis.edu/information/natural%20areas/wr\\_S/Sinapis.pdf](http://wric.ucdavis.edu/information/natural%20areas/wr_S/Sinapis.pdf))
- Downy Mildew (<https://extension.psu.edu/downy-mildew>)

### Performance Expectation

Students will evaluate examples of pest management practices as they relate to broader integrated approaches in agricultural systems.

*Skills:* Critical Thinking (evaluating)

*Disciplinary Ideas:* Plant Production (pest management), Regulations

*Concepts:* Systems

### Time

30-45 minutes

### Materials

Computer/Device for viewing videos

## Notes for Instructors

# Video Companion Notes

### Organic Producer Perspectives: Pest Management

*Youtube Link:* <https://youtu.be/UXNiOVv7hCM>

*Run Time:* 11 minutes

*Organic Producers:* Jordan Brown, Tony Potenza, Jean and Bryce Hediger, Malaika Spencer, Brian England (Aurora Organic Farms)

Jordan Brown is the owner of The Family Garden a 20 acre farm in Gainesville Florida, which is situated in the North Central part of the state. Because of the warmer climate, Jordan produces food year round, with a CSA that runs from October through June. The warm and moist climate is also ideal for a variety of fungi and insect pests to thrive. Besides organic certification, The Family Garden also has a Food Justice certification. This ensures fair treatment of employees by paying living wage and establishing workers' rights.

Tony Potenza owns Potenza Organic Farms in Trumansburg, New York. Trumansburg is located in the Finger Lakes region of New York, an area defined by long thin lakes stretching north and south. This area experiences lots of moisture and 'lake effect snow' – with average precipitation ranging from 67" – 115". Tony has been involved in the organic movement for most of his career as a farmer. He was a founding member of an organic growers association called Finger Lakes Organic Growers in the 1970's and was the first producer in the state of New York to become certified organic. After starting out in vegetables, Tony now grows soybeans, dry beans and, small grains.

The Hedigers own Golden Prairie Inc. in Northern Colorado, growing grains and specializing in millet. Their farm doesn't use irrigation, relying only on the average 14.5" of precipitation they receive a year. The dry climate with cold winters means that they do not have a big problem with fungi and many insect pests. Perennial weeds however are a big challenge in dryland farming because they compete with the crops for water and are difficult to manage. As a family, the Hedigers work together to manage different aspects of the operation. Bryce and his father Randy focus on farming and production. Jean handles the marketing and works with over a dozen nearby growers to sell their combined 20,000 acres of millet. The Hedigers have been a part of the organic movement in Colorado since the 1980's.

Malaika Spencer owns Roots to River Farm with two locations in New Hope, Pennsylvania and Titusville, New Jersey. Her diversified vegetable farm markets their produce at farmers markets, restaurants, and through their CSA. Using season extension techniques like high tunnels, Roots to River Farm produces food year round.

Aurora Organic Dairy is one of the largest organic dairy producers in the United States, supplying the in-house brands for retailers such as Walmart and Costco. The majority of their milk production comes from their 7 dairy farms located in Colorado and Texas. Their climate is similar to what the Hedigers experience in northern Colorado, except that Aurora does use irrigation for some of their fields instead of practicing dryland farming. Additional dairy, forages, and feed crop production comes from more than 100 independent farmers who supply to Aurora Organic Dairy.

# Assignment: How Do Organic Producers Manage Pests?

1. As you watch the video, record the pest management practices that each farmer uses in the category it belongs to.

<b>Integrated Pest Management Techniques</b>	<b>Jordan Brown</b>	<b>Tony Potenza</b>	<b>The Hedigers</b>	<b>Malaika Spencer</b>	<b>Brian England</b>
<b>Genetic</b> (resistant varieties)					
<b>Cultural</b> (timing, rotations, plant needs)					
<b>Physical</b> (barriers, tillage, traps, removal)					
<b>Biological</b> (predators, parasites, diseases)					
<b>Chemical</b> (sprays, pellets)					

2. Based on how you filled out your table, what is something all these farmers have in common (or their overall strategy) when it comes to managing pests organically?

3. Both Tony and Bryce talk about the economics of weed management.

a) Explain why Bryce is able to use more expensive and intensive weed management techniques.

b) Explain why Tony doesn't mind his mustard problem.

4. Jean Hediger says that part of being a sustainable operation for them will include taking some of their weediest fields out of organic production for a few years in order to treat them for perennial weeds using non-organic methods like herbicides (and then transitioning them back in the future). What is your opinion on this practice? Should organic producers be able to take land in and out of organic production to deal with weeds?

5. Part of the organic definition is to 'conserve biodiversity'. Give two examples of farmers incorporating diversity on the farms for pest management.

6. Regional climates (precipitation and temperature) can influence what types of pest problems farmers are faced with. Give two examples from the video where farmers talk about how the climate influences their pests or pest management.

7. Do you think pest management can be more or less difficult in organic systems? Explain why in 2-3 sentences using an example from the film.

# Key: How Do Organic Producers Manage Pests?

Instructors can email Randa Jabbour ([rjabbour@uwyo.edu](mailto:rjabbour@uwyo.edu)) from their institutional email address to request the key.

## Notes for Instructors

### Lesson 2: Allowed and Prohibited Substances

#### Description

Depending on student's background, it can be a common assumption that all pesticides are banned from use in organic production. This lesson is designed to introduce students to the rules regarding which substances are and aren't allowed and where they can find this information. In general, natural substances are allowed for use in organic production and synthetic substances are prohibited, however there are exceptions to this rule. Students will be given a list of substances to investigate and a set of resources to help them find the answers.

#### Lesson Notes

This assignment includes the option for students to choose 2 other substances to investigate. This may take some more time to grade as you will have to investigate these substances for yourself to determine if the students arrived at the right answer – depending on your time constraints and the size of your class, you might want to stick to the list of substances with answers in the key.

#### Performance Expectation

Students will use a variety of information sources to investigate allowed and prohibited substances in organic production within the regulatory framework.

*Skills:* Ability to use information resources

*Disciplinary Ideas:* Regulations

*Concepts:* Interdisciplinary

#### Time

30-45 minutes

#### Materials

Computer/Device for accessing the internet

## Assignment: What Pesticides Can You Use In Organic?

In general, synthetic substances are prohibited, and non-synthetic substances are allowed in organic production. However there are exceptions to both of these rules that are listed in the National List and reviewed by the National Organic Standards Board (NOSB). To complicate matters, most products include both active and inert ingredients that must meet NOP regulations to be used in organic production. So how do producers know if substances are allowed and how do they know what products they can use?

For this assignment you will be using a number of resources to learn about different substances and answer questions. Resources include:

- *The NOP decision tree* -- a guide to help you decide whether a substance is synthetic or not.
- *Cornell Material Sheets* – Provides descriptions about a number of different substances, and how they work.
- *Section 205.601 and 205.602 of the NOP regulations* – found at: <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=9874504b6f1025eboe6b67cadfgd3b40&rgn=div6&view=text&node=7:3.1.1.9.32.7&idno=7>
- <http://www.omri.org/ubersearch> -- A searchable list of products. Use substances as keywords to look for related products. This page includes instructions for using the search tool.

For each of the substances listed, answer the following questions using the resources provided:

- 1.) Is the substance synthetic or non-synthetic? Briefly document how you got to your answer using the decision tree (for example: 1. Yes, 2. No, = Nonsynthetic). And write 1 sentence on the origins of this substance or how it is produced. [Worth 2 points]
- 2.) Is the substance allowed for use in organic production? [Worth 0.5 point]
- 3.) If the substance is allowed, find a specific product with that substance. List the product name, the company who makes it, classifications, and any restrictions. [Worth 1 point]

Substances for you to investigate:

- Pyrethrum
- Pyrethroids
- Nicotine
- Spinosad
- Lime Sulfur
- Another one (your choice, can be found using Cornell Material Sheets or other appropriate source)
- Another one (your choice, can be found using Cornell Material Sheets or other appropriate source)

Here is an example of what we expect from you for substance (using *Bacillus thuringiensis* as an example):

- 1.) Nonsynthetic (1. Yes, 2. No = Nonsynthetic). Derived from spore-forming bacteria commonly found in soils or on plants and has insecticidal properties.
- 2.) Yes.
- 3.) Condor WP Wettable Powder Bioinsecticide. Company: Certis USA. Classification: Crop Pest, Weed, and Disease Control. Restrictions: "May be used as a pesticide if the requirements of 205.206(e) are met, which requires the use of preventative, mechanical, physical, and other pest, weed, and disease management practices."

## Key: What Pesticides Can You Use In Organic?

Instructors can email Randa Jabbour ([rjabbour@uwyo.edu](mailto:rjabbour@uwyo.edu)) from their institutional email address to request the key.

# Resources

## Print

Altieri, Miguel, Clara Nicholls, Marlene Fritz. 2005. *Managing Insects on Your Farm: A Guide to Ecological Strategies*. SARE Handbook Series Book 7.

*PDF available online at:*  
<https://www.sare.org/Learning-Center/Books/Manage-Insects-on-Your-Farm>  
*Geared towards farmers, this handbook covers the principles of ecological pest management including topics like enhancing beneficials, soil management, biodiversity and habitat management.*

Caldwell, Brian, Eric Sideman, Abby Seaman, Anthony Shelton, Christine Smart. 2013. *Resource Guide for Organic Insect and Disease Management*. Cornell University.

*PDF available online at:*  
<http://web.pppmb.cals.cornell.edu/resourceguide/>  
*This guide includes management practices for a number of common pests organized by crop, including images and material fact sheets for a number of pesticide substances.*

Finney, Denise and Nancy Creamer. *Weed Management on Organic Farms*. Center for Environmental Farming Systems and North Carolina State University.

*PDF available online at:*  
<https://cefs.ncsu.edu/resources/weed-management-on-organic-farms/>  
*This guide covers a number of tactics for organic weed management including prevention, choosing competitive crops,*

*cultivation techniques, integrating livestock, and organic herbicides.*

## Web

Penn State Extension – Integrated Pest Management (IPM) Tactics

<https://extension.psu.edu/integrated-pest-management-ipm-tactics>  
*This webpage summarizes and provides a quick overview of the six tactics in IPM including cultural, physical, genetic, biological, chemical, and regulatory.*

Eric Brennan USDA ARS - A Biological Control Buffet (Youtube video)

<https://www.youtube.com/watch?v=zLvJLHERYJI>  
*This 12 minute video uses the USDA research farm in CA as an example to explain how habitat management can improve biological control by supporting natural enemies.*

eXtension – Organic Weed Management Topics

<http://articles.extension.org/pages/61887/weed-management-topics>  
*This webpage is a jumping off point for a host of weed management topics including weed profiles, case studies and videos.*

eOrganic – Farm Profiles Series: Pest Management on Quiet Creek Farm

<https://www.youtube.com/watch?v=z-Yq-2Rl3mo>  
*This 14 minute video is a detailed case study of pest management on a diversified vegetable farm. Management tactics covered include row covers, kaolin clay spray, and Bt.*