

The Basics of Organic Pest Management



**Integrated
Pest Management**
Lincoln University Cooperative Extension

Schools of Thought

Welcome to the National Organic Program



What is organic?

Organic is a labeling term that indicates that the food or other agricultural product has been produced through approved methods that integrate cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity. Synthetic fertilizers, sewage sludge, irradiation, and genetic engineering may not be used. [Consumer Information.](http://www.ams.usda.gov/AMSv1.0/nop)

<http://www.ams.usda.gov/AMSv1.0/nop>



► Misconception

- No plastic in organic

◦ ▼ Mulch – plastic

Status: Allowed with Restrict
 Class: Crop Pest, Weed, an
 Origin: Synthetic
 Description: Plastic mulches, incl
 synthetic resins, poly
 components, must b
 mulches in perennial
 must be removed be
 similar to this not OPS
 May be used to cont
 205.206(e) are met.
 Cover is prohibited.
 NOP Rule: 205.601(b)(2)(ii) As
 covers [petroleum by
 205.206(e), 6

Environmental Imp

- Pyganic – 37.1
- Imidicloprid – 30
- Veratran – 39.4
- Roundup – 15.3

➤ The National Organic Program (NOP) final rule (USDA, 2000) emphasizes the use of **preventive** and **cultural** practices that enhance crop health:

- crop rotation, cover cropping, sanitation measures, disease-resistant cultivars, etc.

➤ Organic farmers need to develop a system of cultural, biological, and/or genetic strategies in a comprehensive pest management program, and describe this program in the **Organic System Plan**, before applying a pesticide as a control measure

IPM Triangle

Increased
intervention
and toxicity

Emphasis is on
maintaining
optimal soil and
plant conditions
to prevent pest
problems

Prevention

INFORMATION

- ▶ IPM requires knowledge of:
 - Biology of your crop
 - What pests likely
 - When pests are likely
 - What natural enemies present
 - Biology of the pest
 - Soil types and drainage

The PAMS Approach

- ▶ Prevention
- ▶ Avoidance
- ▶ Monitoring
- ▶ Suppression

Publication available at:

<http://www.ipm.msu.edu/uploads/files/NRCS/PAMSapproach2010-9-1new.pdf>



Specific Integrated Pest Management (IPM) tactics are selected to match crop/pest/environment scenarios. Each site should have in place a management strategy for Prevention, Avoidance, Monitoring and Suppression (PAMS) of pest populations.

The Natural Resources Conservation Service (NRCS) uses PAMS as core strategies in the 595 Integrated Pest Management Practice standard. Growers enrolled in the Environmental Quality Incentives Program (EQIP) for pest management are required to have a site-specific IPM plan. The IPM plan uses these PAMS strategies to identify a specific course of action to control pests in the cropping system.

Prevention

Prevention is the practice of keeping a pest population from infesting a field or site and should be the first line of defense. It includes tactics such as: using pest-free seeds and transplants; preventing weeds from reproducing; irrigation scheduling to avoid situations conducive to disease development; cleaning tillage and harvesting equipment between fields or operations; or using field sanitation procedures and eliminating alternative hosts or sites for insect pests and disease organisms.



Abandoned orchards often harbor pests that can be difficult to control. This five acre orchard was removed to help reduce pest-pressure at neighboring commercial orchards.

Monitoring

Monitoring and proper identification of pests through surveys or scouting programs, including trapping, weather monitoring and soil testing where appropriate, should be performed as the basis for

suppression activities. Records should be kept of pest incidence and distribution for each field or site to help plan crop rotation selection and other suppressive actions.

Avoidance

Avoidance may be practiced when pest populations exist in a field or site but the impact of the pest on the crop can be avoided through cultural practices. Avoidance tactics include: crop rotation such that the crop of choice is not a host for the pest; choosing cultivars with genetic resistance to pests; using trap crops or pheromone traps; choosing cultivars with maturity dates that may allow harvest before pest populations develop; fertilization programs to promote rapid crop development; or not planting certain areas of fields where pest populations



Suction traps monitor soybean aphids as they migrate between alternate hosts and soybean plants.



A crop rotation can be used to help break the life cycle of pests and perennial weeds.

Prevention

- ▶ Keeping a pest population from invading
 - Know what to expect
 - Clean seeds and transplants
 - Keep weeds from reproducing
 - Careful irrigation
 - Sanitation
 - Genetic Resistance

“An ounce of prevention is worth a pound of cure”



Solanaceous Pests(Includes pests of tomato,potato, eggplant and peppers)



Hornworms



Aphids



Stink bugs



**Colorado
Potato Beetle**



Mites



Tomato Fruitworm

COLE CROPS (cabbage, broccoli, cauliflower, collards, kale, mustard, radish, turnip)



Diamondback moth



**Southern cabbage Worm
= checkered white**



Imported cabbageworm



Harlequin Bugs



Onion thrips



Cabbage looper

CUCURBITS (summer and winter squash, cucumber, watermelon, muskmelon, zucchini, pumpkins)



Spotted cucumber beetle



Striped cucumber beetle



Squash vine borer



Squash bugs



Mites



Karen Rane

Seedcorn maggot

Clean Starter Material

- ▶ Seeds from a reputable source
- ▶ New unopened potting media
- ▶ Clean/sterilized pots, trays, stakes, tools
- ▶ Clean water*



Irrigation

- ▶ The number one factor contributing to plant disease development is moisture
 - Monitor soil moisture closely
 - Improve drainage if necessary
 - Avoid overhead irrigation
 - Foliage never needs to be wet

Sanitation

► Clean up plant debris ASAP

Pathogen	Disease	Overwintering sites
<i>Colletotrichum coccodes</i>	Anthracnose	Infected plant debris, in soil, and seeds
<i>Botrytis cinerea</i>	Botrytis gray mold	Infected plant debris
<i>Alternaria solani</i>	Early blight	Infected plant debris
<i>Fulvia fulva</i> = <i>Cladosporium fulvum</i>	Leaf mold	Infected plant debris, in seeds, and soil
<i>Septoria lycopersici</i>	Septoria leaf spot	Infected plant debris



Some diseases for which you can buy disease resistant transplants

VEGETABLE	DISEASE
Broccoli	Downy mildew • Brown bead • Black rot
Cabbage	Black rot • Fusarium yellows • Bacterial speck
Cantaloupe and other melons	Downy mildew • Powdery mildew • Fusarium, races 0, 1, 2
Cucumber	Angular leaf spot • Anthracnose • Zucchini yellow mosaic virus • Cucumber mosaic virus • Papaya ringspot virus • Watermelon mosaic virus • Downy mildew • Powdery mildew • Scab
Eggplant	Tobacco mosaic virus • Verticillium wilt
Lettuce	Downy mildew • Lettuce mosaic virus
Pepper	Tobacco mosaic virus • Bacterial leaf spot, races 1, 2, 3, 5 • Potato virus Y • Cucumber mosaic virus • Pepper mottle virus • Tobacco etch virus
Squash (summer)	Powdery mildew • Zucchini yellow mosaic virus • Cucumber mosaic virus • Papaya ringspot virus • Watermelon mosaic virus
Squash (winter)	Powdery mildew
Tomato	Alternaria stem canker • Bacterial speck • Early blight • Fusarium, races 1, 2, 3 • Nematode • Stemphyllium • Gray leaf spot • Tobacco mosaic virus • Verticillium, races 1, 2 • Tomato spotted wilt virus
Watermelon	Anthracnose, races 1, 2 • Fusarium, races 0, 1, 2

Avoidance

- ▶ Pests are present so they must be avoided using cultural techniques such as
 - Crop rotation
 - Genetic resistance*
 - Trapping
 - Adjusted planting/harvest dates
 - Exclusion
 - Repellants

Crop Rotation

- ▶ Rotate by family/crop type, not variety or species
- ▶ At least 3 year rotations, longer is better
- ▶ Consider cover crops in the rotation
 - Pest hosts/non-hosts
 - Pest killers
 - Biofumigants



Planting Dates

- ▶ Simply planting when conditions are ideal help
- ▶ Planting early or late to avoid times of high population
- ▶ Timely/Early Harvest



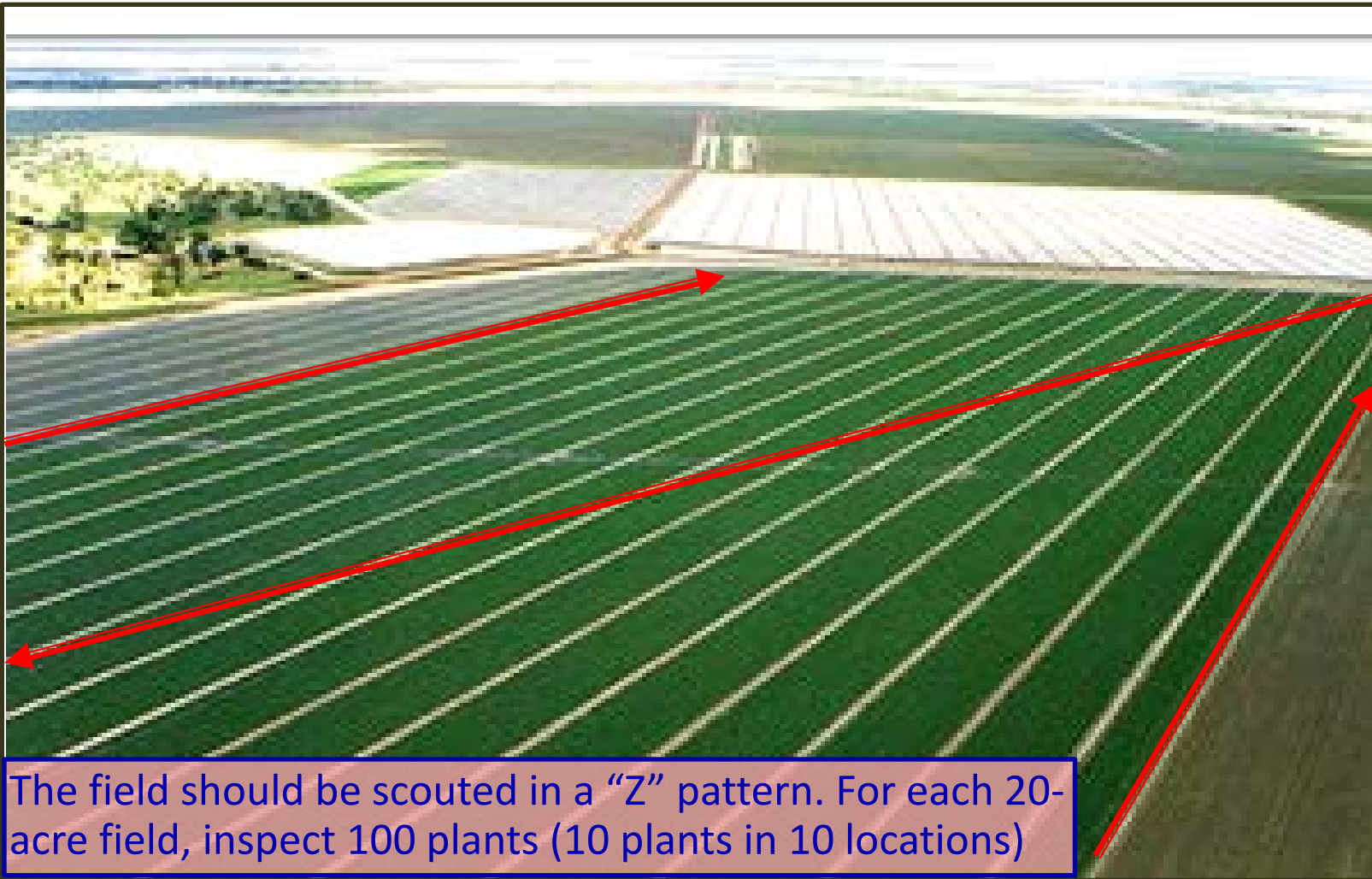
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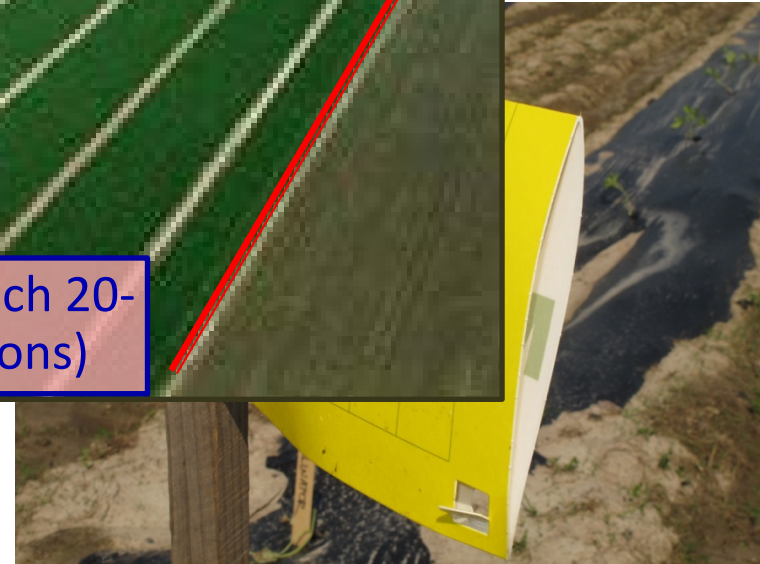
Monitoring

- ▶ Lets you know when outbreaks are occurring or likely to occur
 - Pest numbers and distribution
 - Field conditions (temp, humidity, soil moisture, etc...)
 - Monitoring must be used in conjunction with economic thresholds

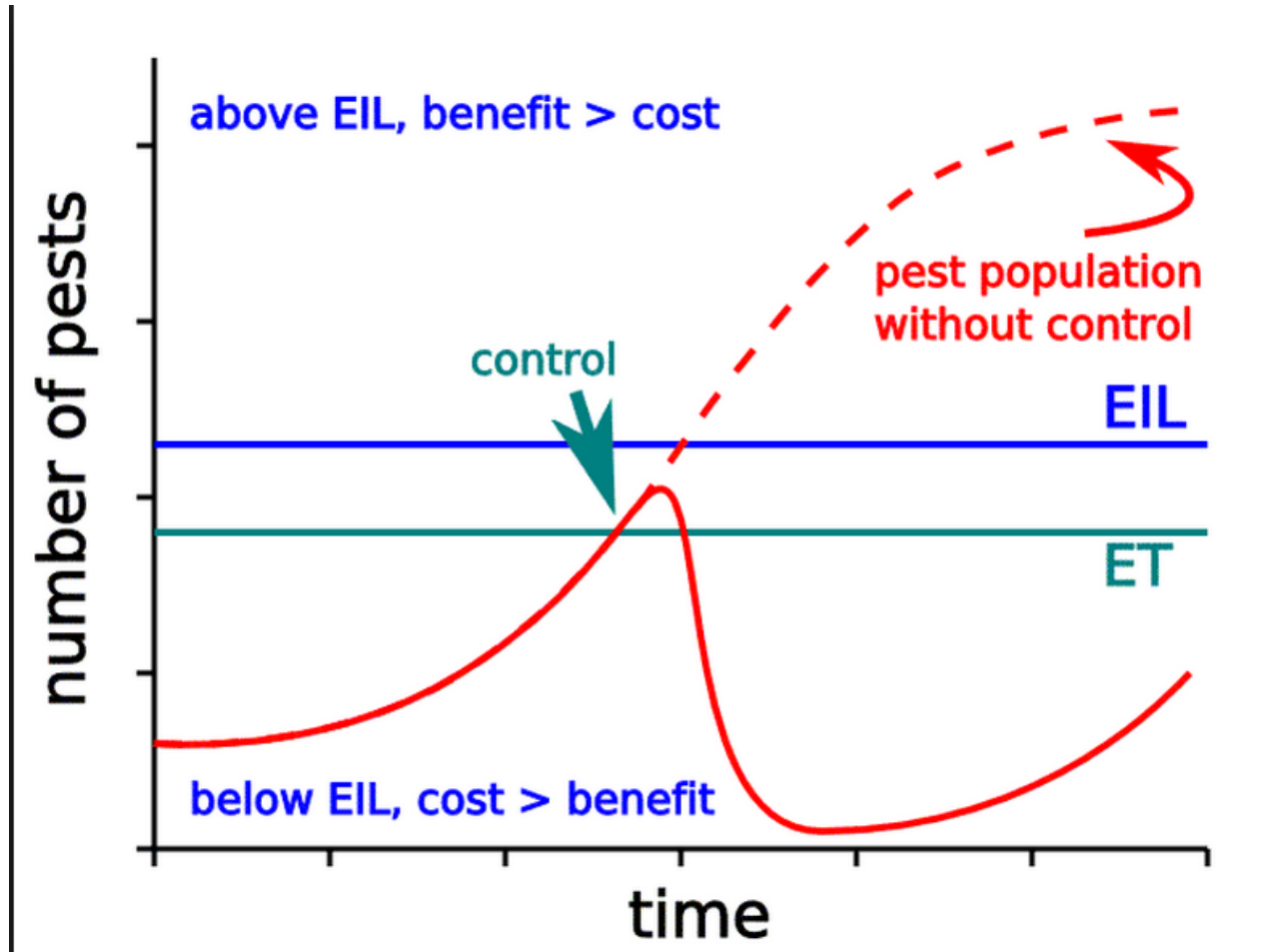
Monitoring



The field should be scouted in a “Z” pattern. For each 20-acre field, inspect 100 plants (10 plants in 10 locations)



Economic Thresholds



Suppression

- ▶ Kill, Kill, Kill!
 - Can be Pesticides or
 - Flaming
 - Vacuuming
 - Hand picking
 - Natural enemy releases
 - Suggestions?



Insecticides

Mode of Action and IRAC code	Active Ingredient	Trade Names	Origin	Comments
Pyrethrins 3A	Pyrethrins	Pyganic	Chrysanthemum	Very effective broad spectrum killer that is devastating to pollinators and aquatic life.
Unknown MoA Insect growth regulator	Azadirachtin	Neemix, AZA-Direct, Molt-X, Azatrol	Neem tree	Most effective against immature stages of insects.
Spinosyns 5	Spinosad	Entrust, Seduce, Captain Jacks Dead Bug	Bacterial fermentation	Most effective against chewing insects, safe for beneficial once residue dries.
Pyrethrins 3A and Unknown	Pyrethrins and Azadirachtin	Azera	Chrysanthemum flowers and Neem tree	Extremely effective and broad spectrum. Is devastating to beneficial insects and aquatic life.
Unknown MoA	Potassium Salts of Fatty Acids	Safer Insecticidal Soap, Garden Safe, M-Pede	Extracted from lipids such as those in olive oil	Most effective against soft bodied insects, can be phytotoxic .
Mid gut targets 11	<i>Bacillus thuringiensis (Kurstaki, Israelensis, San diego/tenebrionis)</i>	Dipel, Monterey Bt, Trident, Novodor	Naturally occurring soil dwelling bacteria	Each strain is specific for only a few insects, so very safe and effective.
Entomopathogenic Fungi	<i>Beauveria Bassiana</i>	Mycotrol, Botanigard,	Naturally occurring Fungi	Broad spectrum pathogen that can also affect beneficial insects, slow to work, but effective.
Entomopathogenic Fungi	<i>Metarhizium anisopliae</i>	Met 52	Naturally occurring fungi	Best on thrips, mites and white flies.
Viral infection	Various virus species	Spod X, Gemstar, Madex HP, CYD X	Naturally occurring Virus	Species specific, very safe and effective on certain caterpillars.
Entomopathogenic Nematodes	<i>Steinernema and Heterorhabditis Sp.</i>	NeemaSeek, NeemAttack, Grub Guard	Naturally occurring endoparasitic round worms	Results are highly variable, but will attack a wide range of soild dwelling insects.

Thank You!

Questions?

