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Integrated Pest Management, Master Gardener Training 2022

Pesticides are the Most Common Form of Pest Management in the USA

- Issue #1: Most people don't understand what pesticides are, or how to use them judiciously/responsibly
- Issue #2: Pesticides have been used for too long, as a silver bullet solution to pest management

Objectives of this Class: balance pest management goals with environmental and human health

- You will understand the importance of sound information, when making pest management decisions
- You will consider your tolerance of particular pests on particular plants, when making pest management decisions
- You will choose pest management options wisely.
- You will be able to integrate multiple strategies to best manage pests.

There are 4 Parts of an IPM Strategy

- 1) Monitoring: catch problems early!
- 2) Identification: know your opponent.
- 3) Action Thresholds: should you even care?
- 4) Manage Using All Available Strategies: Cultural, Physical, Biological, Chemical

Monitoring: gives you a first alert warning, and allows you to best time control measures

- Visual Estimates (of damage, pest ##, beneficial ##): keep a garden journal
- Color Traps: yellow sticky cards, yellow pan traps
- Shelter: slug and snail boards
- Food: beer traps or bread dough, melons
- Mate Traps: codling moth traps
- Oviposition Traps (catch insects looking to lay their eggs): SWD traps, apple maggot traps

Identification: correctly identifying a problem often saves unnecessary pesticide applications

- Many nutritional issues are incorrectly identified as something that can be solved with a fungicide or pesticide
- Abiotic Issues (weather, nutrients) often show regular patterns of damage in the garden
- ٠ Biotic Issues (voles, deer, insects, pathogens) often show irregular patterns of damage in the garden • Insect Issues:
 - - Chewing = Beetles, Caterpillars (sometimes earwigs, wasps)
 - Distortion = sucking insects (e.g. aphids, leafhoppers)
 - Stippling = sucking insects / arthropods (e.g. lacebugs, spider mites)
 - Galls = galling insects (most plants are robust to gall damage)
- Video on Identifying Insect Pests in the Garden
 - http://www.entsoc.org/buzz/csi-garden-pests-how-identify-insect-pests-your-vegetable-garden

Action Thresholds: were originally developed for commercial growers, who would suffer economic loss if they did not take action to control pests. Most homeowners don't have economic thresholds. Instead, we have aesthetic threshholds.

• Consider if a 'pest' is really a pest (e.g. spiders)

- Spider Mating Video: <u>http://www.youtube.com/watch?v=A6Pu-4qzMkk</u>
- Consider your tolerance for risk of losing a particular plant
- Consider if it is time to replace an affected plant with a more suitable choice for your garden

Manage Using All Available Strategies

Cultural Controls: using good horticultural technique to grow healthy, vigorous plants

- Plant Selection
 - Choose High Quality Nursery Stock
 - Search for Pest Resistant Cultivars
- Plant Installation: improper planting is arguably one of the top causes of plant decline and death
 - In heavy clay soils, containerized plants should be planted in a hold that is relatively shallow (allow 10% of root ball to sit above soil surface), but very wide (2-3X the diameter of the pot)
 - Root prep your plants prior to installation
- Sanitation: clean up garden debris that could serve as a source of pests for your garden
- Plant Maintenance
 - Water for deep, spread roots
 - Don't drought stress plants (aphids, lacebugs and other phloem sucking insects can explode in ## on drought-stressed plants)
 - Prune for air management (keeps disease down)
 - Don't overfertilize
 - Use mulch to help with weeds

Physical Controls: preventing or getting rid of pest problems by physically blocking pests or removing them

- Rowcovers: SWD, cabbage worms
 - Timing is very important (post pollination, pre-pest arrival)
 - Don't cage pests IN
- Handpicking: works great for cabbage worms, aphids ~ particularly at early stages of infestation
- Watersprays: can knock back aphids, but they will climb back. Generally won't work for more mobile pests (e.g. leafhoppers). Generally won't work for spider mites.
- Pruning: good for tent caterpillars (before they disperse), but not great for scales

Biological Controls: using predators, parasitoids or pathogens to help manage pests

- Top Natural Pest Control Agents in the Garden: Syrphid Flies, Ladybugs, Lacewings, Parasitoids, Spiders, Predaceous Bugs
- Larvae east more than adults, have no wings and can't fly away. For this reason, larvae generally pack a bigger biological control punch than adults.
 - Parasitoid Video
 - http://www.youtube.com/watch?v=sjXf_kCZp50&list=PLD55E8DADE6F6062D
- Buy and Release
 - Ladybugs ~ generally doesn't work
 - Lacewing Eggs ~ spread them around your garden
 - Parasitoids ~ you often don't get what you buy
- Make Your Garden a Happy Home for Natural Pest Control Agents
 - Reduce broad spectrum insecticide use
 - Plant a complex garden (not just lawn)
 - Popping aphids is a great way to attract biological control agents
 - Aphid mummies are a sign that you have natural pest control going on in your garden
 - Caterpillars with parasitoids are pest control factories
 - Plant a variety of floral shapes and colors and provide bloom all season long

- 'simple' flowers with accessible nectaries, rather than double hybrids
- The two flowering plants that attract the most bees (abundance, not necessarily diversity) are Russian Sage (*Perovskia sp.*) and Catmint (*Nepeta sp.*)
- Plants that are good for biological control agents: herbs gone to flower; lettuce that bolts and flowers, asters, coreopsis, yarrow, buckwheat, sunflowers, etc.
- Low-levels of herbivorous 'pests' help to feed biological control agents. Nectar-and pollen-producing plants keep biological control agents around when herbivorous pests fall to low numbers

Chemical Controls: IPM permits chemical use, but also seeks to actively reduce pesticides

- If a product bears an EPA Reg. No., it is a pesticide
 - Exception ~ minimum risk pesticides: <u>https://www.epa.gov/minimum-risk-pesticides</u>
- Broad versus Narrow Spectrum ~ range of pests controlled
 - Broad Spectrum Insecticides: organophosphates (Malathion), carbamates (Sevin), pyrethroids, neonicotinoids (provado)
 - Labels that say something akin to 'kills 50+ types of insects' are broad spectrum
 - Narrow Spectrum Insecticides: Bt-k (Dipel, Thuricide), Bt-i (mosquito bits)
- Organic versus Synthetic ~ derived from organic materials (organic), or synthesized in lab (synthetic)
 - Main benefit of using an organic pesticide, over a synthetic, is that the organic product breaks down quicker in the environment
 - Organic pesticides are not necessarily less toxic than synthetics. They still must be used with caution.
- Least Toxic Pesticides ~ no real definition, but often, folks use this term to refer to soaps and oils
 - Soaps: degrade waxy exocuticle of small, soft-bodied insects
 - Oils: smother small, soft bodied insects and their eggs
 - Beware of potential phytotoxic impacts, for both soaps and oils
- Systemics (Imidacloprid) ~ insecticide applied as a root drench (or foliar spray); taken up by plant and transported through vascular system to all parts of plant. Plant is systemically protected, from the inside out.
 - Benefits: have helped preserve Midwest and mid-Atlantic ash trees, eastern hemlock forests; can reduce # of insecticide sprays, may decrease non-target effects by only impacting those insects that feed on the plant
 - Concerns: persistence and concentration in plant; non-target impacts on beneficial insects that sip nectar from flowering plants; can you compost the leaves?
- Minimizing Negative Impacts of Pesticides
 - Choose narrow over broad spectrum insecticides
 - Spot treat, rather than broadcast a pesticide.
 - Always read the label, follow directions and do not apply more than is recommended.
 - Wear protective clothing and eyewear.
 - Dispose of unwanted pesticides and empty containers properly.
 - Do not spray plants in bloom.

Resources Cited in Presentation

Resources to Help You Monitor Pests in Your Garden

- VegNet: OSU's regional pest monitoring network on veggies <u>https://agsci-labs.oregonstate.edu/vegnet/</u>
- OSU Extension Garden Calendar: <u>http://extension.oregonstate.edu/gardening/calendar</u>

• Plant Clinic Monthly highlights: <u>http://plant-clinic.bpp.oregonstate.edu/year</u>

Resources to Help You Identify Pests or Plant Problems in Your Garden

- Ask an Expert: <u>https://extension.oregonstate.edu/ask-expert</u>
 - Submit high quality photos / several views [keeping in mind that it is VERY difficult to identify most insects from a photo]
- PNW Plant Disease Handbook, Key to nutrient deficiencies in vegetable crops
 - <u>https://pnwhandbooks.org/plantdisease/pathogen-articles/nonpathogenic-phenomena/key-nutrient-deficiencies-vegetable-crops</u>
- PNW Disease Handbook: <u>http://pnwhandbooks.org/plantdisease/</u>
- OSU Plant Clinic: <u>http://plant-clinic.bpp.oregonstate.edu/</u>
- Use Your Local Master Gardener Program!

Garden Ecology

• Garden Ecology Lab: <u>http://blogs.oregonstate.edu/gardenecologylab/</u>

Fun Videos about Insect IPM

- "Garden CSI" Insect Damage Video: <u>http://www.entsoc.org/buzz/csi-garden-pests-how-identify-insect-pests-your-vegetable-garden</u>
- "Think Before You Stink" Video: <u>https://www.youtube.com/watch?v=9jIgJ4WjryY</u>
- "Spider Mating Dance" Video: <u>http://www.youtube.com/watch?v=A6Pu-4qzMkk</u>
- Video of Parasitoid: <u>http://www.youtube.com/watch?v=sjXf_kCZp50&list=PLD55E8DADE6F6062D</u>

IPM Worksheet

1) What type of pest monitoring activities do you currently practice, when gardening? What new types of monitoring might you be willing to try?

2) What pest do you have the lowest tolerance for, in your garden? Is there an organism that others consider a pest, that you have a greater tolerance for, in your own garden?

3) List examples of cultural controls that you currently use.

4) List examples of physical controls that you currently use.

5) List examples of biological controls that you use in the garden.

6) What types of pesticides do you currently use in the garden? If you are only using a chemical control approach to manage a particular pest problem, is there a way to integrate other management strategies into your pest management practices?

7) List five ways that you might be able to improve your current IPM practices. What pest is particularly problematic, that you might need help developing an IPM plan.