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WELCOME! CONFERENCE REMINDERS

- CEU attendance will be taken by the collection of Evaluations at the end of class. You **MUST** fill out an evaluation if you would like CEU credit
- The Evaluations help FRPA gather feedback for speakers and future education. Everyone is encouraged to complete one.
- Please leave seating in all classrooms and General Sessions as it is upon entry as these are in place per safety protocols.
- Follow current Conference mask, safety, and physical distance protocols at all times.
- Keep your personal pen handy to cut down on sharing writing devices (and germs!).
- Respect the comfort of others by judging your interactions based on what color wristband they have chosen.

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Got Weeds? Understanding the Basics of Herbicide Application

Welcome to the 2021
FRPA Conference!
August 30 - September 2

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Learning objectives

1. Recall the basics of weed control using integrated pest management.
2. Identify tips and techniques for how to properly apply herbicides in a sustainable way.
3. Recognize the environmental concerns when applying herbicides.

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What is extension?

Extension is a partnership between federal, state, and local government with the roles of...

- Communicating science-based information to the local community
- Communicating the needs of the community to the scientists



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Photos: UF/IFAS

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What is a weed?

- Any plant that is growing in an area where it is not wanted and/or competing with other cultivated plants



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What is a weed?

- Characteristics of weeds
 - Lots of seeds
 - Seed dormancy
 - Long-term seed survival
 - Ability to spread
 - Vegetative reproductive structures
 - Rapidly establish in an area



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Photo: "Freedom" by frankieleon
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How do weeds move?

- Natural movement
 - Wind
 - Water
 - Animals
 - Plant growth
- Human assisted movement
 - Intentionally and accidentally

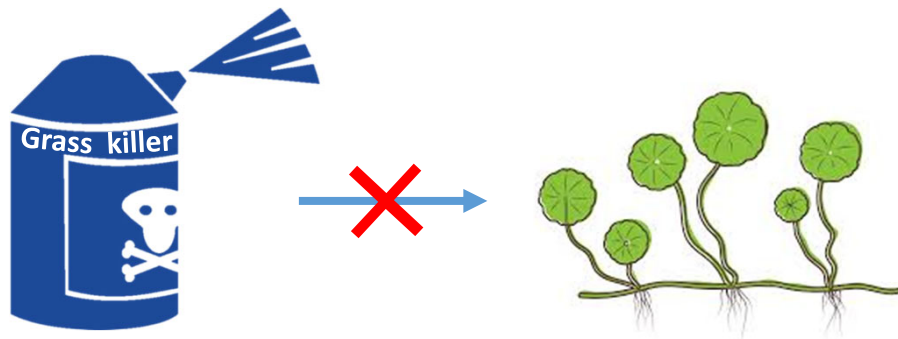


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Why identify weeds?

- Identification of the weed is important for proper control!



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How do we identify weeds?

Broadleaf



Grass



Sedge



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Photos: Bugwood.org- Steve Dewey,
Doug Doohan, Howard F. Schwartz

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How do we identify weeds?



Broadleaf

- Net-like veins
- Veins connect to main vein (midrib) and connect to each other
- Can have brightly colored flowers

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Photos: Bugwood.org- Steve Dewey

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How do we identify weeds?



Grasses

- Parallel veins
- Leaf blades long and narrow
- Hollow rounded stems with nodes

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Photos: Bugwood.org - Doug Doohan

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How do we identify weeds?



Sedges

- Similar looking to grasses
- Stems have a triangular shape
- Leaves in clusters of three
- Many like wet conditions

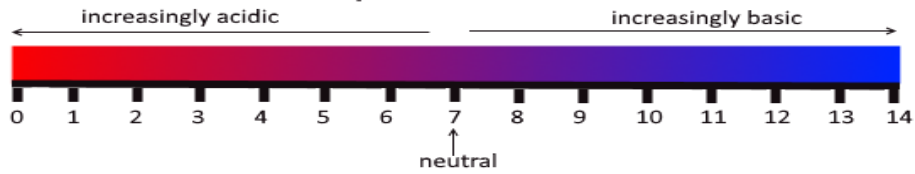
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Photos: Bugwood.org- Howard F. Schwartz

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What can the weeds tell us about the area?

pH Scale

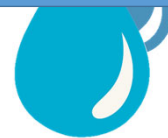
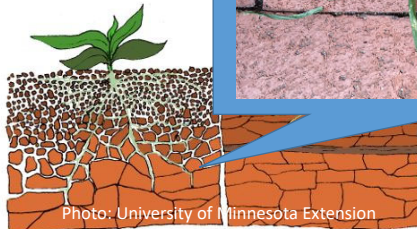
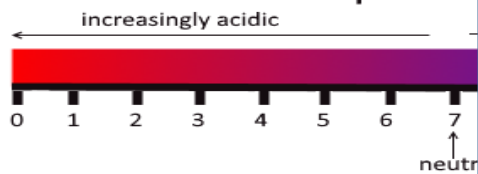


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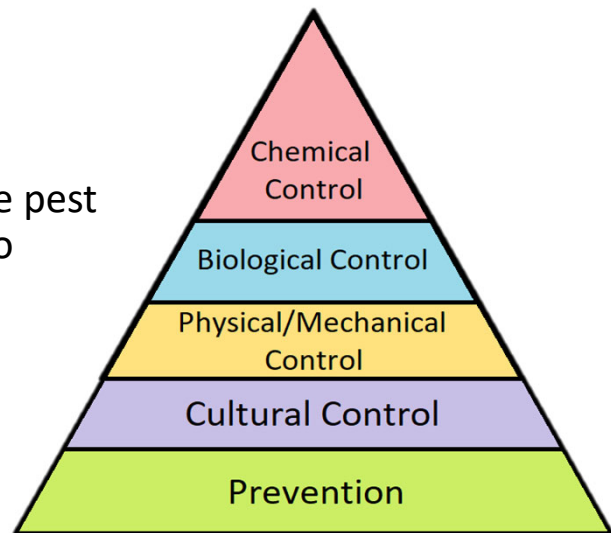
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What is IPM?

• Integrated Pest Management

- Combination of appropriate pest control tactics into a plan to reduce pests



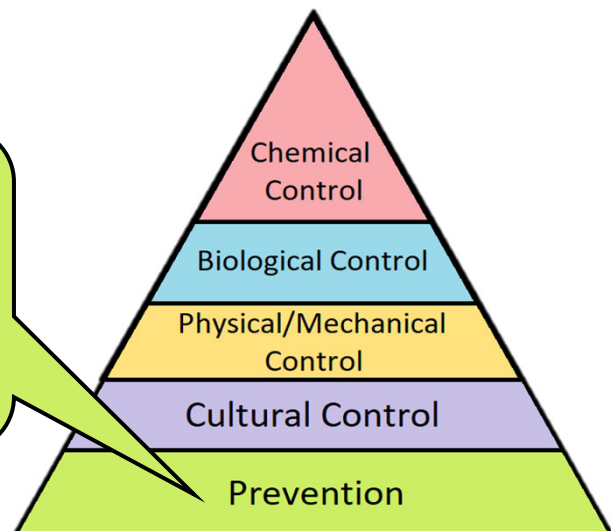
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What is IPM?

Prevention

- Keep weeds out
- Use soil/plants that are weed seed free
- Don't let the weeds reproduce
- Clean equipment between sites



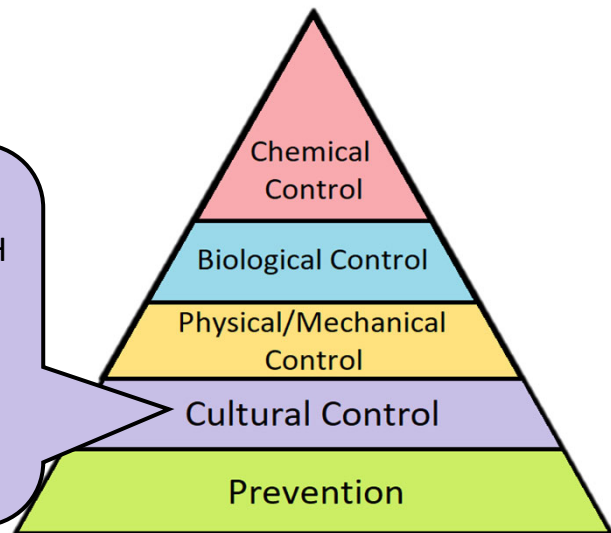
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What is IPM?

Cultural Control

- Proper fertilization, irrigation, soil pH
- Right plant, right place
- Select plants that can outcompete weeds
- Adjust spacing between plants to limit extra space for weeds to grow



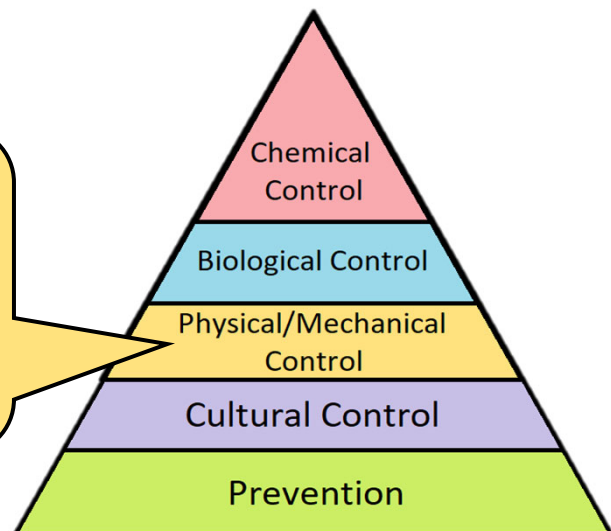
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What is IPM?

Physical/Mechanical Control

- Hand pulling weeds
- Solarization
- Tillage/Cultivation
- Mowing
- MULCHES!

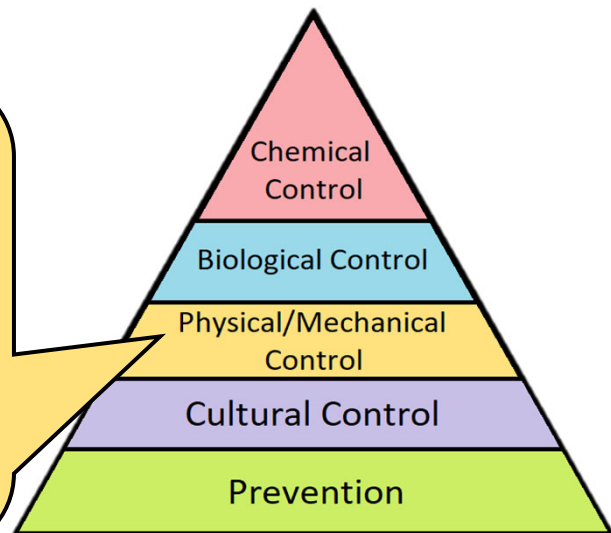
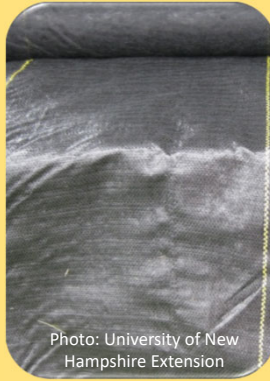


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What is IPM?

Organic vs Inorganic Mulches



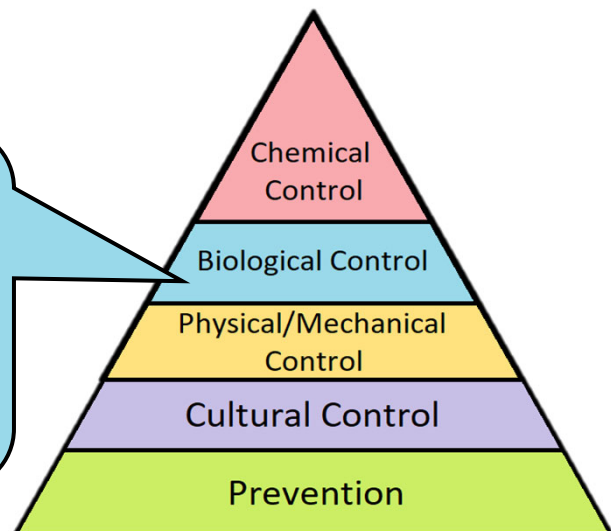
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What is IPM?

Biological Control

- Predator, parasitoid, or pathogens that reduce weed populations
- Very specific to weed species
- Take time to show reduction in weeds



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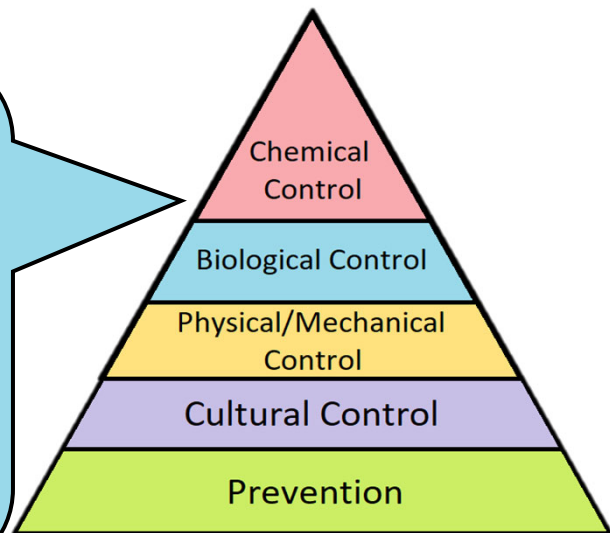
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What is IPM?

Air Potato Beetle



Photo: T. Center and W. Overholt, UF/IFAS



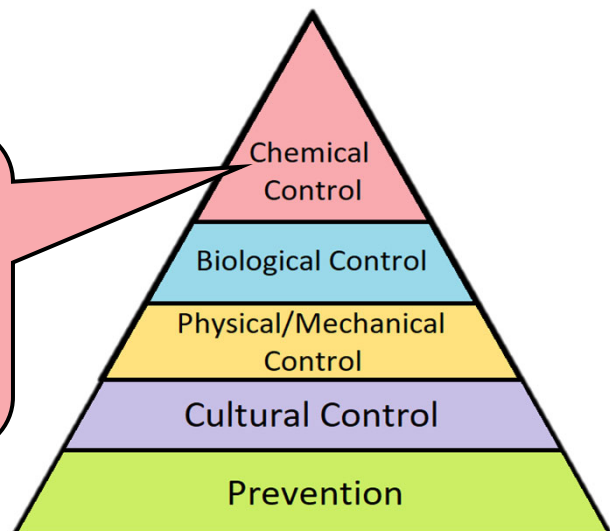
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What is IPM?

Chemical Control

- Herbicides!
- Always be sure to rotate your modes of action



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What are herbicides?

- A substance that is toxic to plants and can be used to destroy weeds



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Photo: Paul Harris, Utah State
University Extension

Chemical
Control

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What are herbicides?

Herbicides can sometimes injure desirable plants...

- Factors that increase phytotoxicity:
 - High temperatures
 - High application rates
 - Plant sensitivity
 - Drift or movement of herbicide to other areas



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Photo: David L. Roberts,
Michigan State University

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How are herbicides classified?

Contact vs. Systemic

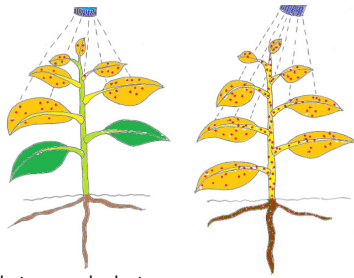
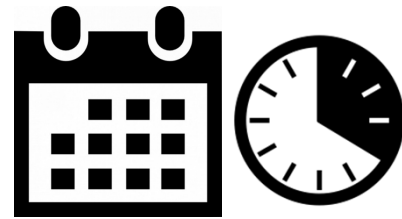


Photo: www.lccdnet.org

Selective vs. Non-selective



Persistent vs. Non-persistent



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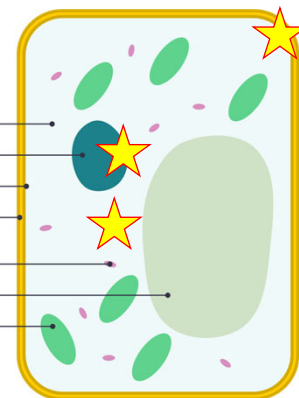
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What is the mode of action of an herbicide?

The specific process in the plant that the herbicide targets...



Cytoplasm
Nucleus
Cell membrane
Cellulose cell wall
Mitochondrion
Permanent vacuole
Chloroplast



Graphic: Domdomegg, Wikimedia commons

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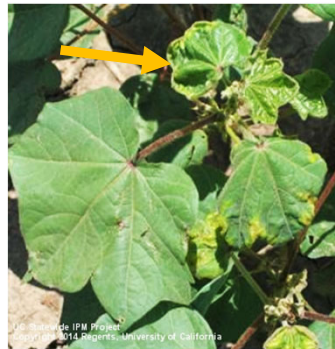
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What is the mode of action of an herbicide?

Herbicide MOAs

- Photosynthesis inhibitors
- Fatty acid synthesis inhibitors
- Pigment synthesis inhibitors
- Amino acid inhibitors
- Growth inhibitors
- Cell membrane disruptors
- Growth regulators

Growth inhibitor



Pigment synthesis inhibitor



Photos: UC Statewide IPM Project

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Chemical
Control

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How are herbicides applied?

Timing of Herbicide Applications



- **Pre-emergence**
 - Apply before germination



- **Post-emergence**
 - Apply after germination
 - Apply when young and delicate (**weed seedlings**)

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Chemical
Control

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Why aren't all plants effected?

- **Selectivity**- difference in response to an herbicide by different plant species

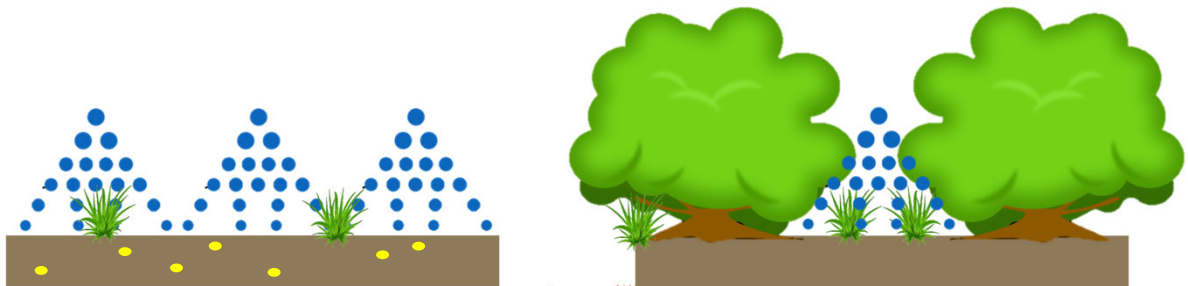


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Why aren't all plants effected?

- **Placement**-the herbicide is put in a place so that it doesn't reach our desired plant (timing and location is key)

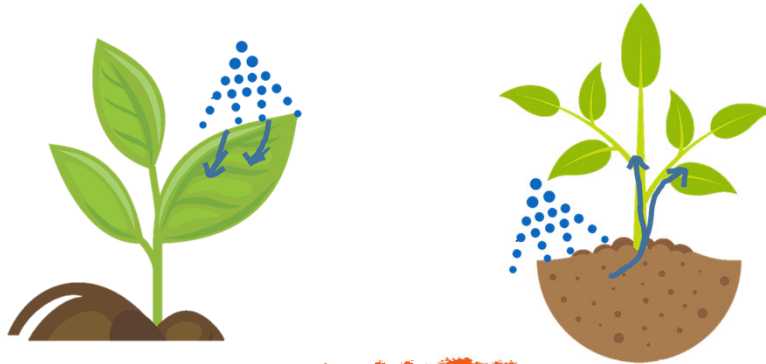


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Why aren't all plants effected?

- **Differential uptake**- our desired plant doesn't take up as much herbicide

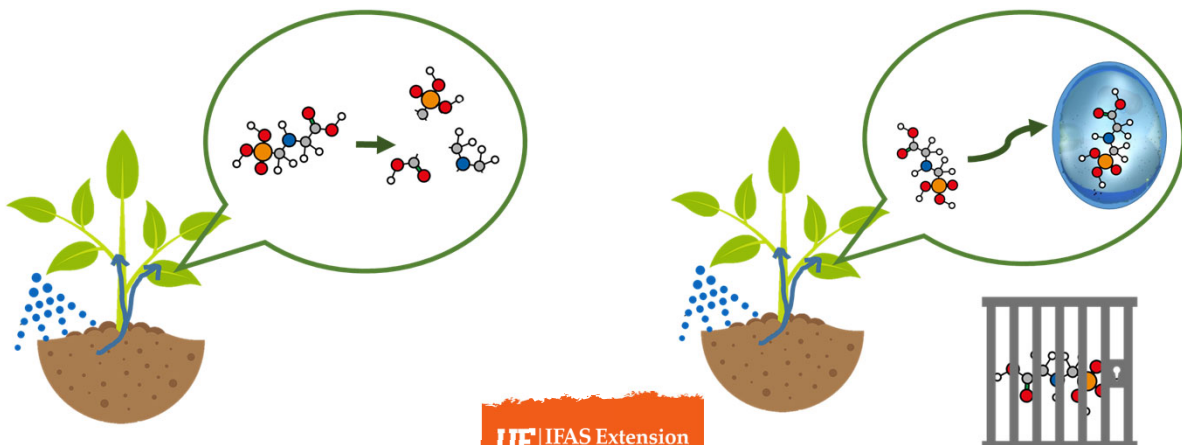


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Why aren't all plants effected?

- **Metabolism**- the plant can break down the herbicide once it is inside it

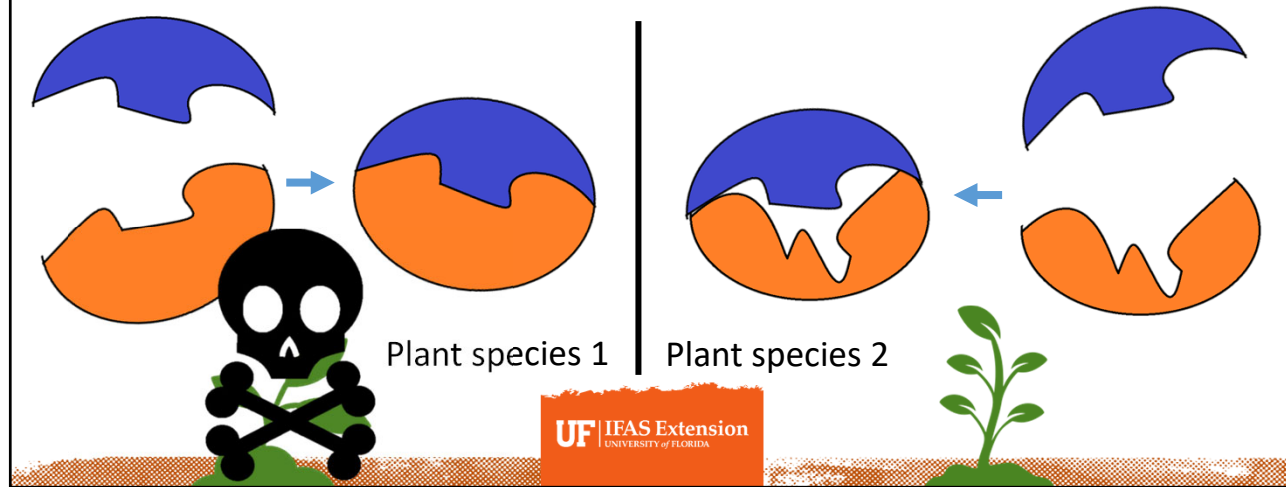


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Why aren't all plants effected?

- Differential binding at the enzyme level

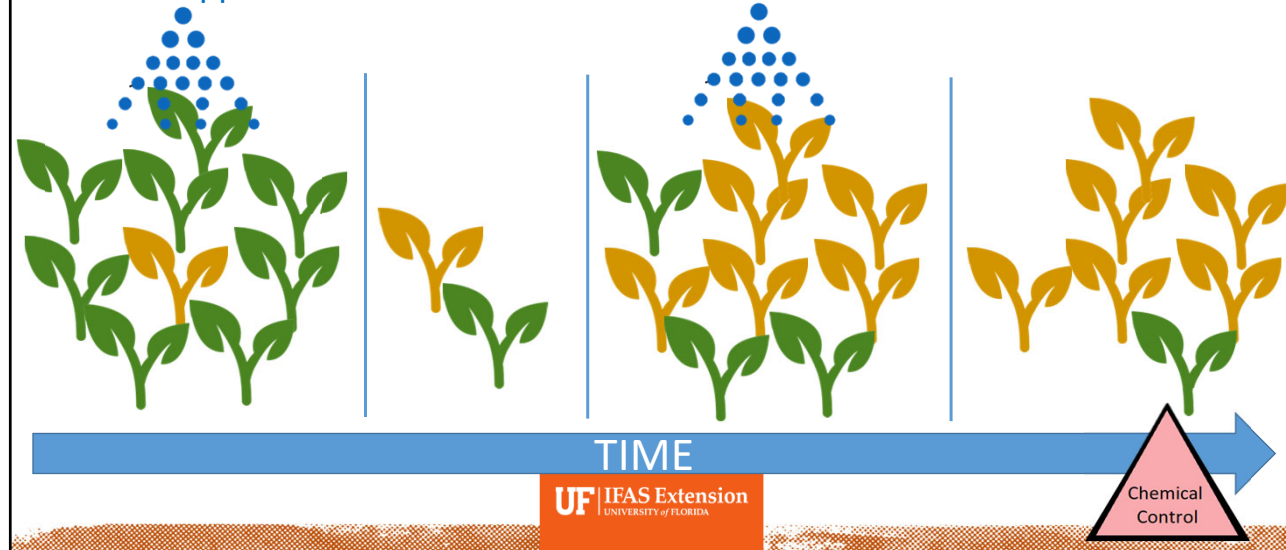


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What is herbicide resistance?

Herbicide application

Herbicide application



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How do we prevent herbicide resistance?

Rotate modes of action!

Use your IPM toolbox!

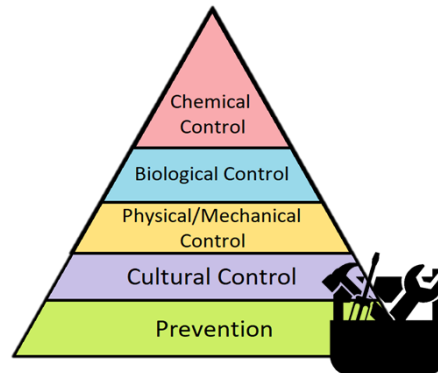


GROUP **9** HERBICIDE

The complete broad-spectrum postemergence professional herbicide for industrial, turf and ornamental weed control.

Complete Directions for Use

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION IS LIKELY TO RESULT.

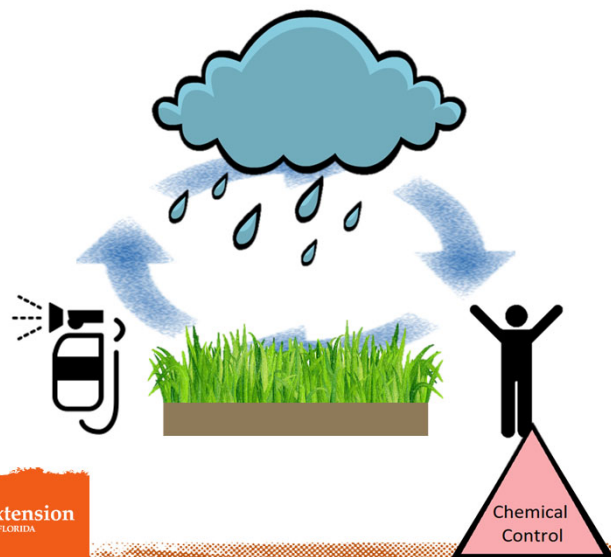


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What happens to herbicides after they are applied?

- It depends on a lot of factors!
 - Temperature and climate
 - Rain and irrigation
 - Solubility of the herbicide
 - Soil properties
 - If it was applied correctly...

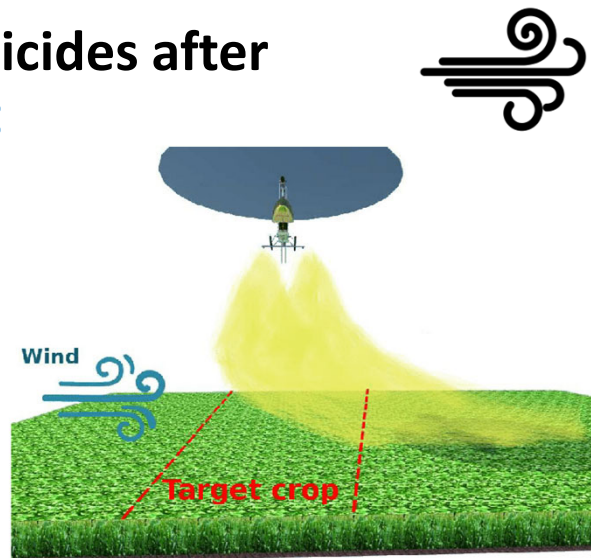


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What happens to herbicides after they are applied? **Drift**

- Drift is the movement of pesticide by air to non-target areas
- Reduce drift by increasing droplet size

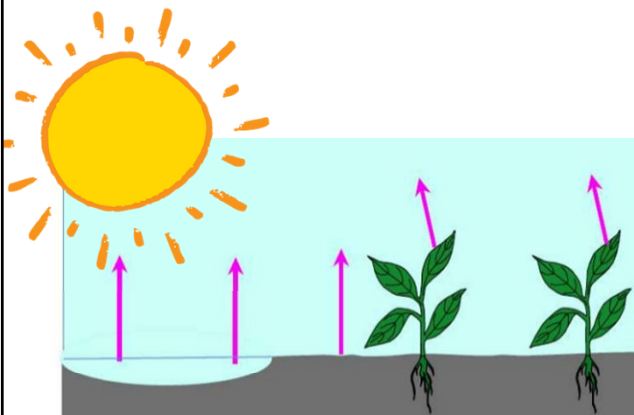


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Photo: Faical et al. 2017

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What happens to herbicides after they are applied? **Volatilization**



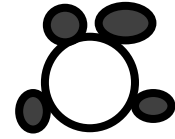
- Volatilization is when a pesticide transforms from a liquid to a gas
- Increased with:
 - High temperature
 - High wind speed

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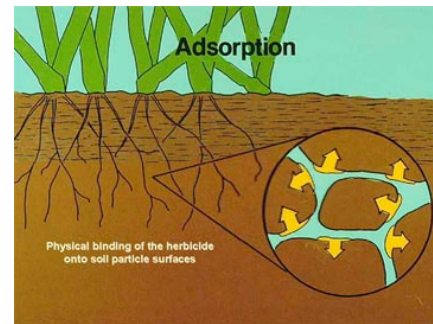
Photo: yunusadbuteckno

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What happens to herbicides after they are applied? **Adsorption**



- Adsorption is the ability of a pesticide to bind to the soil
- Organic matter and clay like to hold on to pesticides

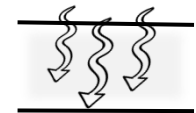


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Photo: PSU Extension

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What happens to herbicides after they are applied? **Leaching**



- Leaching is when water moves down through the soil taking the pesticide with it
- Increases with:
 - Sandy soils
 - Overwatering or heavy rain

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What happens to herbicides after they are applied? **Runoff**



- Runoff is when water runs across the soil and takes pesticides with it
- Increases with:
 - Soil compaction
 - Overwatering or heavy rain



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Photo: University of Kentucky

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Learning objectives

1. Recall the basics of weed control using integrated pest management.
2. Identify tips and techniques for how to properly apply herbicides in a sustainable way.
3. Recognize the environmental concerns when applying herbicides.

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For more information about the Florida
 Recreation and Park Association visit frpa.org

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