Alabama Law
Private Pesticide Applicator Certification Requirements

- Pest Control
- Pest Identification
- Pesticide Formulation
- Pesticide Labels
- Pesticide Safety
- Pesticide Law
- Protecting Environment

- Pesticide Handling
- Pesticide Application
- Calibration
- Pesticide Transportation
- Pesticide Storage
- Pesticide Disposal
- Spill Cleanup
Pest Control
Pest-i-cide

Chemical that kills, prevents, or controls a pest
Pest-i-cide
Chemical that kills, prevents, or controls a pest
<table>
<thead>
<tr>
<th>Pest Types</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insects</td>
<td>Cockroaches</td>
</tr>
<tr>
<td>Mites, ticks, spiders</td>
<td>Spider mites</td>
</tr>
<tr>
<td>Diseases (fungi, bacteria, etc.)</td>
<td>Leaf spots, wilts</td>
</tr>
<tr>
<td>Weeds</td>
<td>Crabgrass</td>
</tr>
<tr>
<td>Mollusks</td>
<td>Snails, slugs</td>
</tr>
<tr>
<td>Vertebrates</td>
<td>Rats, voles</td>
</tr>
<tr>
<td>Nematodes</td>
<td>Root knot</td>
</tr>
</tbody>
</table>
Before Controlling a Pest

Identify it first
It may not be a pest
It may be beneficial

Select best control
Monitor* pests for:

Kind

Numbers

Time to control

Check on control efforts

*scouting, trapping, inspection, etc.
Adult insect

- head
- thorax
- abdomen
Chewing Mouthparts

(Coleoptera: Cicindelidae)  *Megacephala carolina* (L.)  Carolina Tiger Beetle
Metamorphosis
Simple Metamorphosis

Grasshopper Life Cycle

- Eggs
- 1st instar nymph
- 5th instar nymph
- Adult
Complete Metamorphosis

Mosquito Life Cycle

- Adult
- Larva
- Pupa
- Eggs
Weed Life Cycles

- Annuals
- Biennials
- Perennials
Annual Weeds

1. Complete life cycle in one year

2. Reproduce only by seeds

3. Two types: Summer and Winter
Biennial Weeds

1. Complete life cycle in two years
2. Reproduce only by seeds
3. Problem in untilled areas

Examples: bull thistle and wild carrot
Perennial Weeds

1. Live more than three years

2. Reproduce from seeds or from vegetative structures

Examples: dandelion and wild garlic
Plant Diseases

- Fungi
- Bacteria
- Viruses
- Mycoplasmas
- Nematodes
Mollusks
Snails
Slugs
Vertebrate Pests

Birds

Rodents

House Sparrows by Larry McQueen

Field mouse
Contact your county agent at the county extension office for assistance.
Use pest control when:

- Damage above threshold levels
- Strategy will work
- Aimed at pest only
<table>
<thead>
<tr>
<th>Goals of pest control</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>Fungus diseases</td>
</tr>
<tr>
<td>Suppression</td>
<td>Many insects</td>
</tr>
<tr>
<td>Eradication</td>
<td>Boll weevil in some states</td>
</tr>
</tbody>
</table>
Successful control means using a variety of methods
IPM

A single plan

Combination of tactics

Natural controls

Applied controls
IPM

Natural controls
- Climate
- Natural enemies
- Geographic barriers
- Food-water
- Shelter

Examples
- Adverse temperatures
- Lady bug beetle
- Oceans, mountains
- Dry leaves (fungi)
- Snakes – remove brush
IPM

Applied controls
- Host resistance
- Biological
- Cultural
- Mechanical
- Sanitation
- Chemical

Examples
- Resistant plant varieties
- Bacillus thuringiensis
- Crop rotation
- Animal traps
- Manure management
- Pesticides
Resistant varieties have the ability to tolerate damage resulting from pest attack.
Biological Control

Includes the use of living organisms or the use of favorable environment to control pests.
Cultural Methods

- Planting Dates
- Harvesting and Tillage Practices
- Fertilization
- Crop Rotation
- Cultivation
- Irrigation
Mechanical Control

- Traps
- Barriers
- Lights
- Radiation
- Electricity
Sanitation

Involves cleaning up the following:

- Messes
- Spills
- Wood piles
- Garbage
- Dead plants and plant parts
Pesticide Groups

- Protectants
- Sterilants
- Contacts
- Systemics
- Stomach poisons
- Residual herbicides

- Translocated herbicides
- Fumigants
- Anticoagulants
- Selective
- Nonselective
Pesticides are usually the fastest way to control a pest. However, there are times when chemical controls may fail.
Pesticide Resistance

Photo courtesy
Dr. Michael J. Adang, University of Georgia
Avoid Pest Resistance to Pesticides

Rotate families of pesticides

Use only when necessary - IPM
Pesticide Failure Reasons

Pest resistance
Incorrect pesticide
Incorrect dose/timing
Incorrect pest identification
Improper equipment/calibration
Infestation after control applied
Soil Factors

- Soil texture
- Soil pH
- Organic matter
Weather Factors

Rain

Humidity

Temperature
Review of Section One
Pest Control
Q & A

Explain what is meant by prevention, suppression, and eradication of pests.
Q & A

What common features do all insects share?
Q & A

How are weed pests classified?
Q & A

Define Integrated Pest Management (IPM) and list several possible control tactics that may be used in an IPM strategy.
Labels/Labeling*

Label – on or attached to container

Labeling – label plus other manufacturer information

*must be approved by and registered with EPA
### Pesticide Registrations

<table>
<thead>
<tr>
<th>Type</th>
<th>Other designations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal EPA</td>
<td>“full” registration</td>
</tr>
<tr>
<td>Special local needs</td>
<td>SLN, 24 (c)</td>
</tr>
<tr>
<td>Emergency exemption</td>
<td>Section 18</td>
</tr>
</tbody>
</table>
Pesticide Use Classifications

Restricted Use – may cause unreasonable adverse effects to the environment or humans, even if used as directed.

Unclassified – usually no adverse effects if used as directed.
Why Restricted Use?

Acute toxicity (humans, birds, mammals)

Oncogenicity (tumors in laboratory animals)

Groundwater concern

Other concerns
Restricted Use Designation

“RESTRICTED USE PESTICIDE”

always in a box at top of the front panel on the pesticide label
Parts of Labels

- Brand Name
- Ingredient Statement
- Common name (active)
- Chemical name (active)
- Inert ingredients
- Registration Number
- Establishment Number
- Manufacturer Name/Address
- Net Contents
- Type of pesticide
  - (If Restricted Use)
  - (If Local Need Registration)
- Directions for use
Pesticide Label Components

Active ingredient:
Carbaryl (1-Naphthyl N-Methyl Carbamate --- 50%

Inert ingredients:
--- 50%

Net contents:
Glyphosate
Signal Words

DANGER* - highly toxic
WARNING – moderately toxic
CAUTION – slightly toxic

*with skull/crossbones/POISON = acute illness
*without skull/crossbones/POISON = skin/eye irritation potential
The pesticide label and Material Safety Data Sheets (MSDS) give detailed information on first aid, protective clothing, precautionary statements, special hazards.
Directions for Use
Requirements

Entry statement
Storage/Disposal/Mixing
For: Plants, Animals, Sites
Pests, How much
Equipment
Potential injuries stains
When, How often, Where
Directions
for use
by reference
It is YOUR responsibility!
Okay – If Not Prohibited by Label

Less than label rate

Pests not on label

Equipment/methods of application

Mix with fertilizer/other pesticides
The Pesticide Label

Understanding and following its directions assures you, the environment, and those around you that extra measure of protection against pesticide misuse.
Review of Section Two
Pesticide Labeling
Q & A

Explain the difference between the terms “label” and “labeling”.

Q & A

What do the words “Restricted Use Pesticide” tell you about the pesticide product?
Q & A

Name and explain the meaning of the signal words and symbols you may see on a pesticide product.
Q & A

What kind of information can be found under the “Directions for Use” section of the pesticide label?
Q & A

Where would you look to find out whether a pesticide is classified as Restricted Use?
Q & A

What kind of information is included in the Worker Safety statements being added to pesticide labels?
Formulations
Liquid formulation
4 lb a.i./gal
Liquid Formulations & Abbreviations

EC, E – Emulsifiable concentrates
S – Solutions
RTU – Ready To Use
C, LC – Concentrate solutions
ULV – Ultra Low Volume
F, L – FLowables
A – Aerosols
Smoke, Fog
Invert Emulsions
Emulsifiable concentrate (E or EC)

product
diluted
Emulsifiable concentrate (E or EC)

product diluted
Solution (S)
product
diluted
Flowable (F) or Liquid (L)

product
diluted
Aerosols

Formulations that contain one or more active ingredient (AI) and a solvent.

Most aerosols contain a low percentage of AI
Dry Formulations & Abbreviations

D – Dusts
B – Baits
G – Granules
P, PS – Pellets
WP, W – Wettable Powders
SP, WSP – Soluble Powders
M – Microencapsulated
DF – WDG – Dry Flowables

Fumigants (Gases) may be dry, liquid, or gas formulations
Baits

A dry formulation that is mixed with food to control pests.

AI = usually < 5%
Dusts

Are finely ground and used dry, but may easily drift off the target area.

Some AI are formulated as dusts because they are safer for the crop.
Dry flowable (DF) and Water-dispersible granule (WDG) product diluted
## Pesticide Ingredients

<table>
<thead>
<tr>
<th>Types</th>
<th>Where found/purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>In the formulation-kill/control the pest</td>
</tr>
<tr>
<td>Inert (inactive)</td>
<td>In the formulation-make it safer, more effective, easier to use</td>
</tr>
<tr>
<td>Adjuvents</td>
<td>Added to formulation or tank mix same purpose as inert</td>
</tr>
</tbody>
</table>
Common Adjuvants/Inactive Ingredients

- Surfactants
- Wetting agents
- Emulsifiers
- Invert emulsifiers
- Spreaders
- Stickers
- Penetrants
- Foaming agents (reduce drift)
- Thickeners
- Safeners
- Compatibility agents
- Buffers
- Anti-foaming agents
Understanding pesticide formulations is important for accurate pest control!
Review of Section Three
Pesticide Formulations
Q & A

What is the difference between active ingredients and inert ingredients?
Q & A

How are liquid formulations normally used?
Q & A

If you had a choice of either wettable powder formulation or a granular formulation for a particular pest control task, which would be best if drift were a major concern?
Q & A

In what conditions are dry pesticide formulations applied?
Q & A

Why are adjuvants sometimes added to pesticide formulations?
Q & A

Adjuvants are added to a pesticide formulation or tank mix to increase its effectiveness or safety.
Plant Diseases

Fungi

Bacteria

Viruses

Mycoplasmas

Nematodes