Making Pesticide Recommendations – What You Really Need to Know

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2/4/2010
Outline

• Keeping current – how the UF/IFAS PIO can help
• Making recommendations
• Formulations
• Adjuvants
• Water pH and Insecticides

2/4/2010
Keeping Current: How the UF/IFAS PIO Can Help

Pesticide Information Office

- Licensing & Certification
  - CEU Programs
  - Licenses & Certification Exams
  - CEU Modules
  - Types of Licenses
  - Pesticide Applicator - Certification and Licensing in Florida (pdf)

- Laws, Regulations & Policy
  - Laws and Regulations
  - Restricted Use Pesticides
  - UF/IFAS Pesticide Policy Handbook

- Labels & MSDS

- Fact Sheets & Publications

- Chemically Speaking Newsletter

EDIS Publications
- Pesticide Information and Education Program
- Pesticide Regulations and Safety

May 2008 UF/IFAS Pesticide Policy Handbook
The newest revision of the UF/IFAS Pesticide Policy Handbook is now available online. Link...

IFAS Employee Training
These training modules are all behind a gatorlink login as they are intended for IFAS employees only.

*Internet Explorer users must enter 'UFADI\<gatorlink name>' as their login.

Certification Exam Training:
----- Please Select a Training -----
Keeping Current: How the UF/IFAS PIO Can Help

• Licensing & Certification
  – CEU programs
  – Exam information
  – Certification & licensing info

• Laws, Regulation & Policy
  – Federal and state regulations
  – Restricted use pesticides
  – UF/IFAS pesticide policies
Keeping Current: How the UF/IFAS PIO Can Help

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Other Training:
----- Please Select a Training -----

IFAS CEU Day 2010
Need CEUs? An opportunity for licensed pesticide applicators to earn CEUs will be held March 30, 2010 from 8:30 to 4:00 EST. The event will be conducted via polycom from participating UF/IFAS county extension offices and research and education centers. Link to Flier...
Keeping Current: How the UF/IFAS PIO Can Help

Monthly newsletter provides updates of:

- New pesticide active ingredients
- Emergency, experimental and SLN registrations
- Pest updates

2/4/2010
Keeping Current: How the UF/IFAS PIO Can Help

IFAS CEU Day – 2010

Need CEUs? An opportunity for licensed pesticide applicators to earn CEUs will be held March 30, 2010 from 8:30 to 4:00 EST. The event will be conducted via polycom from participating UF/IFAS county extension offices and research and education centers. An applicator will be able to attend any or all of the 6 sections for pesticide licensing recertification credit. A total of 6 IFASCS-approved CEUs are available for the entire day in the following categories:

- Agricultural Row Crop
- Agricultural Tree Crop
- Aquatic Pest Control
- Demonstration & Research
- Forest Pest Control
- Natural Areas Weed Management
- Ornamental & Turf
- Private Applicator Agriculture
- Right-of-Way Pest Control
- Pest Control Operator - Lawn & Ornamental
- Limited Commercial Landscape Maintenance
- Limited Lawn & Ornamental Pest Control

Agenda:

<table>
<thead>
<tr>
<th>Section</th>
<th>Time</th>
<th>Topic Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9:00 – 9:50</td>
<td>How Different Kinds of Herbicides Work</td>
<td>Greg Macdonald</td>
</tr>
<tr>
<td>2</td>
<td>10:05 – 10:55</td>
<td>Plant Anatomy: The Route of Herbicides Into and Within Plants</td>
<td>Clyde Smith</td>
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<tr>
<td>3</td>
<td>11:10 – 11:35</td>
<td>New Herbicide Registrations and Use Patterns</td>
<td>Mike Netherland</td>
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<tr>
<td></td>
<td>11:35 – 12:00</td>
<td>Managing Herbicide Applications Against Development of Resistance</td>
<td>Bill Huller</td>
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<tr>
<td>4</td>
<td>1:00 – 1:50</td>
<td>New Weeds to be on the Look-out for</td>
<td>Colette Iacono</td>
</tr>
<tr>
<td>5</td>
<td>2:05 – 2:50</td>
<td>Integrating Biological Controls and Herbicides</td>
<td>Jim Cuda</td>
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<tr>
<td></td>
<td>2:30 – 2:55</td>
<td>What is NPDES and How it May Affect Herbicide Applicators</td>
<td>Mark Mossler and Fred Friel</td>
</tr>
<tr>
<td>6</td>
<td>3:10 – 3:35</td>
<td>Which Herbicide to Use</td>
<td>Jason Ferrell</td>
</tr>
<tr>
<td></td>
<td>3:35 – 4:00</td>
<td>Minimizing Non-target Herbicide Effects</td>
<td>Ken Langeland</td>
</tr>
</tbody>
</table>

Credit for Certified Crop Advisors has been applied for and is pending approval.

If interested in attending, contact your local UF/IFAS county extension office
http://solutionsforourlife.ifas.ufl.edu/map/index.html
Making Recommendations

- UF/IFAS policies hold employees to a higher standard than prescribed by law
Making Recommendations

Revised May, 2008
Making Recommendations

• Any UF/IFAS employee who...
  – provides verbal or written pesticide recommendations must be certified and licensed
Making Recommendations

- Land Grant University and UF/IFAS tradition (It’s what we do!!!)
  - Consistent with pesticide product labels, and
  - Products currently registered by both EPA and FDACS
Making Recommendations

• Liability
  – Employees not *individually* liable for any pesticide use problem if adhering to label
  – *BUT*.....UF/IFAS can’t protect any person who knowingly makes “off label” recommendation
Making Recommendations

CAUTION: Implied Recommendations

• Implied examples:
  – A client mentions a pest problem and you mention a pesticide that kills the pest, but the product is not registered for that site
  – You tell a client that a product can’t be legally used, then tell them how to use and apply it
  – Don’t imply that a product having a Section 18 or 24(c) label in Georgia is ok to use in Florida
You don’t want a phone call from people such as this!

Morgan & Morgan is a leading personal injury law firm representing accident and injury victims nationwide. We strive to provide our clients with the best legal representation and our personal injury lawyers are committed to defending your rights if you have been injured due to negligence.

Our experienced team of attorneys handles all personal injury claims, including car accidents, workers compensation, medical malpractice, nursing home abuse, product liability.
Making Recommendations

UF/IFAS publications containing use recommendations must include disclaimer statements.
At field days, do you ever.....

- Use plot signs displaying non-registered uses of products in your plots?
- Distribute written handouts containing plot treatments of non-registered uses of products in your plots?
If so, use the following statement.....

“The information provided in this report is not and must not be considered as either an express or implied recommendation of pesticide product use.”
Making Recommendations

- Should make only in area of expertise
- Every use is a labeled use
- Based on data indicating effectiveness

You gotta know whatcha doing!
Recommendations and Master Gardeners

- No certification and licensing necessary
- Must provide recommendations from approved Extension publications, e.g., EDIS
Formulations
PESTICIDES AND FORMULATION TECHNOLOGY

Andrew Martin, Program Specialist, Purdue Pesticide Programs
Fred Whitford, Coordinator, Purdue Pesticide Programs
Tom Jordan, Extension Weed Specialist, Purdue University
Why are pesticides formulated?

- They’re rarely applied in technical form
- Formulating improves:
  - Handling
  - Storage
  - Application
  - Effectiveness
  - Safety

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Pesticide Ingredients

• **ACTIVE** – responsible for killing the pest
• **INERT** – makes the formulation safer, more effective and easier to handle
• **ADJUVANT** – may or may not already be present in the product; used for the same reason as the inert ingredients
A single active ingredient may be sold in more than one formulation.

SEVIN® brand 4F Carbaryl Insecticide

FOR AGRICULTURAL OR COMMERCIAL USE ONLY
ACTIVE INGREDIENTS:
Carbaryl (1-naphthyl N-methylcarbamate)
INERT INGREDIENTS:

10% SEVIN GRANULES

Sevin® 80 WSP Carbaryl Insecticide

SEVIN® 5 BAIT N-METHYL CARBAMATE

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Formulation Considerations (Prior Questions to Ask)

- Do you have the right equipment?
- Can it be applied safely under the existing conditions?
- Will it reach the target and stay in place?
- Will it harm contacted surfaces?
Liquid Formulations and Abbreviations

- RTU – ready to use
- EC or E – emulsifiable concentrate
- S, SL or SC – water soluble liquids
- AS, F, FL, L or WDL – aqueous suspensions, flowables, water-dispersible liquids
- A - aerosols
The amount of active ingredient in liquid pesticides is expressed in pounds per gallon.

5 pounds of malathion per gallon of formulation
Emulsifiable Concentrates (EC or E)
-oils dispersed in water and contain an emulsifier which allows them to be mixed with water
Emulsifiable Concentrates

• **Advantages**
  – Versatile with many uses
  – Needs little, but some agitation

• **Disadvantages**
  – Readily absorbed through skin
  – Potential foliage burn under high temps

• **Examples**
  – Avid 0.15 EC, Tame 2.4 EC, Malathion 5 EC
Water-soluble liquids (S, SL or SC)  
- once mixed with water, there is no settling out forming a true solution  
Examples: Sevin SL, Conserve SC
Ready-to-Use (RTU)

Advantages
• Require no dilution
• Contain small amount of ai
• Relatively safe
• Useful for household uses

Disadvantages
• High cost per unit of ai

Example
• Numerous

2/4/2010
Flowables/Water-Dispersible Liquids (AS, F, FL, L or WDL)

- combines many characteristics of WPs and ECs

- Very thick – require moderate agitation
- Leave visible residues
- Contain solid particles – can be abrasive to spray equipment
- Settle out in containers
- Leave residues

Example: Forbid 4 F
Microencapsulates (ME or MEC)

Liquid or dry particles in a plastic coating

**Advantages**
- Delayed release prolongs effectiveness
- Slower volatilization – less loss
- Reduce potential phytotoxicity
- Safer

**Disadvantage**
- Same size of pollen grains – bee toxicity

**Example**
- Demand CS

2/4/2010
Microencapsulates (ME or MEC)

Left: Electron micrograph of insecticide microcapsules. Right: A microcapsule on a human hair.

2/4/2010
Aerosols (A)

2 types: ready-to-use, smoke or fog generators

Advantages (ready-to-use)

• Portable
• Easy storage
• Convenient

Disadvantages

• Inhalation injury
• Hazardous if punctured, overheated
• Difficult to confine to target site
• Expensive

2/4/2010
Smoke and fog generators are used in structures for insect control.

**Advantage (smoke and fog generators)**
- Fills entire space with pesticide

**Disadvantages**
- Difficult to confine – requires closure
- May cause inhalation injury – requires respirator
Dry Formulations and Abbreviations

- D – dusts
- B – baits
- G – granular
- WP or W – wettable powder
- SP or WSP – soluble powder or water soluble packet
- DF – dry flowable
- WDG – water dispersible granule
Dusts (D)

Advantages
- Ready to use – no mixing
- Simple or no equipment
- Effective in hard-to-reach areas

Disadvantages
- Easily drift off target
- Eye, nose, throat irritation
- May not stick to surfaces well
- Dampness causes clumping
- Difficult to get even distribution

Example
- Carbaryl

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Granular (G)

Advantages
- Ready to use
- Little or no drift
- Simple equipment
- Slow release

Disadvantages
- Will not stick to foliage
- May need soil incorporation
- May need moisture to activate
- May be hazardous to non-target species
- May not be effective in drought
Advantages

• Relatively safe on foliage (no burning)
• Less skin absorption compared to ECs and other liquids

Disadvantages

– Constant agitation required
– Abrasive wear of equipment
– Often clog nozzles
– Inhalation hazard during mixing
– May leave visible residues

Example

• Merit 75 WP
Dry Flowables (DF) and Water Dispersible Granules (WDG)
Dry Flowables (DF) and Water Dispersible Granules (WDG)

Disadvantages
- Essentially the same as the WPs, except

Advantages
- Less inhalation hazard than WPs
- Easier measuring and mixing

Example
- Dipel DF, Arena 50 WDG
Soluble Powder and Water Soluble Packets (SP or WSP)

Advantages

- Essentially the same as the WPs, except less inhalation hazard
- Form true solutions

Example

- Imida E-Pro 60 WSP
- Mallet 75 WSP
Fumigants

• Pesticides that form poisonous gases when applied
  – May be liquids packaged under high pressure
  – May be volatile liquids enclosed in ordinary containers
  – May be solids that release upon presence of moisture or high humidity
Fumigants

Disadvantages

• Highly toxic to many organisms
• Off-site movement potential
• Target site must be enclosed
• Extreme inhalation hazard – specialized PPE

2/4/2010
Two found dead after termite extermination

FORT LAUDERDALE, Fla. (AP) — The bodies of two men were found yesterday in an apartment building that had just been covered with a tent and saturated with poison gas to kill termites, authorities said.

Police were unsure if the men were inside when the gas was turned on, died before the extermination or entered the building during the procedure. One of the victims lived in the building.

Autopsies were being performed.

Exterminators went to work on the apartment building Wednesday, and tenants were informed last week they would have to spend the night away from home.

Exterminator Ray Cardenas said the building was checked before the gas was turned on.

“When my guys came back to take the tent down, they saw a seam open on the left hand side,” Cardenas said.
Fumigants

Advantages

• Toxic to a wide range of organisms
• Can penetrate cracks, crevices, and tightly packed areas such as soil
• Single treatment usually kills most pests

Example

• MBC 98-2
Adjuvants

- **Surfactants**: increase spray coverage on leaf
  - Emulsifying agents: promote suspension of one liquid into another (oil in water vs. water in oil)
  - Wetting agents (spreaders): decrease surface tension of mixture, causing a larger portion of each spray droplet to come into contact with the surface
  - Crop oil concentrates: products that contain 80 to 85% petroleum or vegetable oil plus 15 to 20% surfactant and emulsifiers
Adjuvants

- **Surfactants**: increase spray coverage on leaf
  - Silicone surfactants: provide a tremendous reduction in water surface tension at very low concentrations
  - Stickers: cause the pesticide to adhere to the plant foliage - they prevent runoff of the spray

2/4/2010
Adjuvants

- Compatibility agents: aid in the suspension of pesticides when they are combined with other pesticides or fertilizers
- Acidifiers and buffers: alter spray solution pH
- Anti-foaming agents: eliminate excess foam
- Coloring agents: aid applicator in sight
- Drift control agents: increase viscosity of spray solution
Check the label – some pesticides require adjuvants for effectiveness.
Water pH and the Effectiveness of Pesticides
What is pH?

- Indicator of alkalinity or acidity
- Scale from 1.0 to 14.0
- Logarithmic concentration scale of:
  - $\text{H}^+ \text{ (Hydrogen)}$ and $\text{OH}^- \text{ (Hydroxide)}$ ($\text{H}^+ + \text{OH}^- = \text{H}_2\text{O}$)
  - If $\text{H}^+ = \text{OH}^-$: then pH is 7.0 or neutral
  - If $\text{H}^+ > \text{OH}^-$: then pH is acidic
  - If $\text{H}^+ < \text{OH}^-$: then pH is alkaline (basic)
pH Scale

• Scale is logarithmic; so:
  – pH 5.0 is 10x more acidic than pH 6.0
  – pH 4.0 is 100x more acidic than pH 6.0
Why is pH important?

• pH affects many chemical and biological processes:
  – E.g. – aquatic animals best at pH 6.5 – 8.0
  – pH outside of this range can decrease diversity:
    • Due to physiological stresses
    • Due to reduced reproduction
  – Low pH can allow more toxic elements to become more mobile and available for plant/animal uptake
Why is pH important to applicators?

• Some pesticides lose effectiveness when mixed with alkaline water
• pH of 8 to 9 can greatly diminish or cause complete loss of effectiveness
• Most common with some insecticides:
  – Carbamates and organophosphates
• Few fungicides and herbicides susceptible
Why is pH important to applicators?

- Most water sources in FL derive from limestone aquifers
- Contain high levels of carbonates – removes $H^+$ from water, thus increases pH
## Examples (pH half-lives)

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>pH 6</th>
<th>pH 7</th>
<th>pH 8</th>
<th>pH 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbaryl</td>
<td>125 days</td>
<td>27 days</td>
<td>2-3 days</td>
<td>1-3 days</td>
</tr>
<tr>
<td>dimethoate</td>
<td>12 h</td>
<td>---</td>
<td>---</td>
<td>1 h</td>
</tr>
<tr>
<td>disulfoton</td>
<td>32 h</td>
<td>---</td>
<td>---</td>
<td>7 h</td>
</tr>
<tr>
<td>malathion</td>
<td>8 days</td>
<td>3 days</td>
<td>19 h</td>
<td>---</td>
</tr>
</tbody>
</table>
Why is pH important to applicators?

USE PRECAUTIONS

Read all precautions and directions before using. Apply this product only as specified on this label.

Imidan 70-W is compatible with most commonly used insecticides and fungicides, but is incompatible with alkaline materials such as spray lime, lime sulfur, and Bordeaux mixtures. These materials will reduce the insecticidal activity of Imidan 70-W.

Insecticidal activity may also be reduced when the spray solution has a pH of 6 or higher. The pH of the spray solution must be corrected by the addition of a suitable buffering or acidifying agent for optimum insecticidal activity.
Determining pH

http://soilslab.ifas.ufl.edu
Litmus Paper

- Cheap - $5.00/75 tests
- Can vary by as much as ±2.0 points

2/4/2010
ExStik™ pH Pen

- ±0.01 accuracy
- Digital displays
- Battery-powered
- $79.70
Commercial pH Meters

- Accuracy generally very reliable
- Price range: $60 to $170
- Calibration buffer solutions also available
Is pH Correction Needed?

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Acidifiers and Buffering Agents

Use 4 oz. to 2 pints of BUFFER XTRA STRENGTH per 100 gallons of water to lower and stabilize the pH of the spray solution. The rates of BUFFER XTRA STRENGTH may vary with water conditions and will depend upon the alkalinity of the water used or the presence of other products in the spray mix. The use of a pH measuring device is recommended for determining the optimum rate of BUFFER XTRA STRENGTH. Final spray solution pH for many pesticides should be in the 4-7 range.

BUFFER
XTRA STRENGTH

BUFFERING AND CONDITIONING AGENT FOR
PESTICIDE SPRAYS

*ACTIVE INGREDIENTS:
Proprietary blend of Alkyl Aryl Polyethoxy Ethanol Phosphates and Organic
Phosphatic Acids.................................................................................................................. 50.00%
Components ineffective as a buffer or conditioner......................................................... 50.00%
TOTAL.................................................................................................................................. 100.00%
Additional Information

Water pH and the Effectiveness of Pesticides

F. M. Fishel, J. A. Ferrell

Introduction

Some pesticides lose their effectiveness when mixed with alkaline (high pH) water. This document discusses the effects of alkalinity and presents some methods for preventing this reaction in pesticide mixes.

Water pH and Pesticides

What is pH?

The term pH, potential of hydrogen, refers to a measure of the concentration of hydrogen ion (H+) and hydroxide ion (OH-) in a solution. If hydrogen predominates, the solution is acidic; if hydroxide predominates, the solution is basic, or alkaline. A logarithmic scale of 0 to 14 is used to measure pH. A pH value of 7 indicates neutrality. Values below 7 indicate acidic conditions; pH values above 7 indicate alkaline conditions. Because a logarithmic scale is used in measuring pH, a pH of 6 is 10 times more acidic than a pH of 7, and a pH of 5 is 100 times more acidic than a pH of 7.

How does pH affect pesticides?

Some pesticides, particularly carbamate and organophosphate insecticides, undergo a chemical reaction in the presence of alkaline water (water that has a pH value greater than 7). The reaction is known as alkaline hydrolysis, and it reduces the effectiveness of the pesticide's active ingredient. The speed with which the breakdown occurs depends on the specific chemical properties of the pesticide, the pH of the mix water and the length of time the pesticide is in contact with the water. Spray-mix water with a pH value between 8
Thanks for your attention!