Herbicide Do’s and Don’ts

Common mistakes and how to fix them

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Key Topic Areas

1. Herbicide efficacy
2. Environmental safety
3. Applicator safety

1. Herbicide Efficacy

Common mistakes:

• Don’t read entire label
• Don’t understand how herbicides work

Sometimes the mistake is ignorance!
How do systemic herbicides work?

**Systemic Herbicides**
- Absorbed by weed
- Moves from treated to untreated portions
  - Foliar-applied systemics move down to roots
  - Soil-applied systemics move up to shoots
- Moves inside the plant with the water (up) or sugar (down) transport system
- Takes time to move, takes time to kill weed

**DO**: choose systemic herbicides for perennial weed control

- Work best during optimal weed growing conditions: warmth, moisture

**Systemic Herbicide DO’s**
- Make applications:
  - To actively growing weeds
  - To non-stressed weeds (avoid drought, cold)
  - To intact weeds (don’t mow before/after)
  - When rain is not expected until rainfast

Allow:
- Sufficient time for control, 7-10 days
DO: Treat at optimum time of year or weed development stage
DON'T: Miss your optimal application window

- Annuals: When small, & before seeds formed
- Perennials: Fall - when movement down prevails
- Biennials: First year, 2nd yr before flowering

DO: Correctly identify your weed!

When treating very dense/tall vegetation-

DO:
- Cut before treating, allow to regrow

Do you think he's wearing the required PPE?

CFAES

DON'T: Miss your optimal PLANNING window

- Invasive Species: Often break bud before natives
- Get out there and assess early
Systemic Herbicides

DO:
Use the right herbicide formulation

Water-soluble
• Amines
• Lower volatility
• Lower drift hazard
• Won’t penetrate bark
• Inferior in cold

Oil-soluble
• Esters (emulsifiable concentrates)
• May be highly volatile
• Greater drift hazard
• Superior penetration – bark, stems, leaves
• Superior control in cool weather

Systemic Herbicides

DO use a systemic herbicide to selectively treat invasive woody species

Systemic Herbicides

Basal Bark treatment
• DO use an oil-soluble herbicide formulation
• Do treat entire circumference
• DON’T treat wet bark

CFAES
Systemic Herbicide

Hack and Squirt Method
spaced cuts around circumference, herbicide injected or sprayed in cut

- **DO**
  - use a water-soluble formulation
- **DON'T**
  - completely girdle tree

Systemic Herbicide

Cut Stump

- **DO**
  - apply in a continuous ring
- **DO**
  - tank mix a dye to ensure coverage
- **DO**
  - use the appropriate formulation for the situation
- **DON'T**
  - apply during sap flow

Foliar Herbicides

**Do**
Use adjuvants
Read the herbicide label for adjuvant info
DO: Distinguish between Selective and Non-selective herbicides

Selective Herbicides
Kills Broadleaf OR grassy weeds

Non-selective Herbicides
Kills everything (theoretically)

DON'T CONFUSE THE TWO!

Soil-Applied Herbicides

DON'T Apply to frozen or saturated soils
Do: Select the right kind of soil-applied herbicide

- Preemergence Herbicides
  - Prevent weed growth from seed
  - Insoluble, and relatively immobile in soil
  - Short persistence - several months
  - Relatively safer to many plants
- Some soil-applied herbicides are pre + post
  - Broad spectrum
  - As a group, more soluble, mobile in soil
  - Persistent
  - Potential harm to many plants

Pre-emergence Herbicides: How the control barrier works

- Control Barrier: herbicide stays in shallow soil layer
- Newly germinated weeds killed as they grow through barrier
- Example preemergent herbicides: Pendulum (pendimethalin)

Do Not
- Apply after most weeds have germinated
  - Timing is critical
- Fail to irrigate if there is no rainfall
  - Review label information on activation
- Disturb the soil surface after application
Mobile, Persistent Herbicides

- **DO**
  - Read label carefully!
- **DON'T**
  - Apply near desirable trees, sensitive sites
  - AVOID
  - Slopes, leach-prone soils, surface water, lakes, streams
- **Example herbicide:** sulfometuron-methyl (Oust XP)

DO: Manage Herbicide Resistance

- **DON'T** Create a "super race" of weeds
- **DO:** preserve usefulness of herbicides

Herbicide Resistance

**WH**
When a normally susceptible weed species develops ability to tolerate a herbicide

- Happens when a single herbicide MOA is used repeatedly to control weeds
- Over generations, resistant individuals in the population survive and multiply
- Over time, the resistant population takes over
Herbicide Resistance arises naturally in a pest population from time to time

Resistant = red individuals

Effect of using a single MOA...

Repeat applications with the same chemistry just kill off the competition!

Effect of using a single MOA ...
...over more time
Let’s go back in time!
- If at this point, you had switched to an alternative chemistry...

Managing Resistance by Alternating Chemistries

No Survivors!

DO Manage Herbicide Resistance

How:
- Alternating different modes of action
  or
- Tank mixing different modes of action
  also:
  • Using full labeled rate of herbicide
  • Treat weeds when small (seedlings)
  • Use alternative, non-chemical controls (IPM)
Manufacturers make it easier to select herbicides by MOA with group numbers that appear on label.

2. Environmental Safety

Common mistakes:

• Don’t read entire label
• Don’t understand how or why herbicides move off target

Sometimes the mistake is ignorance!

How can herbicides move off-target?

• Drift of spray droplets on air currents to sensitive areas
• Run-off of pesticides from surface to lakes and streams
• Leaching of pesticides through the soil to the groundwater
• Uptake by roots of desirable plants in the soil application zone
DO: Assess the treatment area for environmentally sensitive sites

- Ground and surface waters
  - VERNAL POOLS!
- Aquatic organisms
- Pollinators (bees and other kinds)
- Endangered species
- Sensitive crops
- Residential landscapes, schools

DO: Follow all label precautions/restrictions

- Such as:
  - Windspeed
  - Setback / Buffer requirements
  - Soil type restrictions
  - Endangered species use limitations
DON'T apply to impervious soils

- Frozen or saturated soil
- Highly compacted soil
- Also don't apply just before heavy rainfall

NEVER use a product unless labeled for your use site

For the control of woody plants in forests, in rangeland and permanent pastures, and in non-crop areas including industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, road sides and railroads, and commercial and residential landscapes, fence rows, non-irrigation ditch banks and around farm buildings. Use on these sites may include application to grazed areas as well as establishment and maintenance of wildlife openings.

Ranger v. Rodeo
Two different glyphosate formulations
Very different site restrictions

Rodeo – aquatic sites on label
For control of annual and perennial weeds and woody plants in natural and production plantations, forests for site preparation, mid-rotation release treatments, timber stand improvement activities, noncrop sites including industrial sites, rights-of-way (including roadslides, electric utility and communication transmission lines, pipelines, railroads, airports), irrigation and drainage ditches, canals, reservoirs, natural areas (including wildlife management areas, wildlife openings, wildlife habitats and refuges, parks and recreational areas, campgrounds, trailheads and trails), rangeland, and in and around aquatic sites and wetlands; also for perennial grass release, and grass growth suppression and grazed areas on these sites.
Ranger v. Rodeo
Two different glyphosate formulations

Ranger – aquatic sites not on label

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

DO: use aquatic formulations for natural areas!

NEVER exceed product use rates!

…and DON’T forget annual maximum rates
Not good at pesticide math?

DO:
- Get help!
- Contact Pesticide Safety Education Program – we can help!

DON’T: Overapply!

• Spray to Wet or Spray to Drip?

DO: Follow best practices for pesticide handling

• Such as:
  - Transportation
  - Storage
  - Mixing
  - Equipment cleaning
  - Pesticide and container disposal
DO: Follow best practices mixing in the field

- Such as:
  - Use of a containment tray

DO: Prepare for a spill

Have a spill kit on hand

**Contents:**
- Absorbent materials
- Broom, shovel
- Plastic Bags
- PPE

*Also keep emergency tel. numbers handy!

DO: Follow best practices for equipment cleaning

Cleaning your equipment, tank, and empty pesticide containers generates *RINSATE* – water with pesticide residues

What to do with rinsate?
- Recycle the rinsate in next tank mix
- Apply rinsate to a labeled site

- Be careful where & how you clean out to prevent environmental contamination
3. Applicator Safety

Common mistakes:

• Don’t read entire label
• Careless behavior

What determines your RISK from Pesticides?

Risk = Toxicity x Exposure

- DANGER: how much
- WARNING: how often
- CAUTION: how long
  where exposed

DO:

Wear the label-required Personal Protective Equipment (PPE)

... and follow the label
DO: wear the right kind of PPE

- See pesticide label for required level of chemical resistance
- These are poor choices!

DO: wear chemical resistant gloves

- Whether required by label or not
- Cuts your exposure 70-80%
  - Hands and forearms are most common route of exposure
- Also wear when servicing pesticide equipment

DON'T assume different products with same active ingredient require same PPE

**Garlon 3A (amine)**

- **DANGERS**
  - Contact: Irritating to Eyes, Skin; Harmful if Swallowed
  - Inhalation: Harmful
  - Fire: May explode on contact.

- **CAUTION**
  - Caution: Irreversible Eye Damage
  - Harmful if Swallowed
  - Poisonous if Swallowed

- **Applications and other handlers must wear**
  - Long sleeved and long pants
  - Closed-toe shoes
  - Non-slip rubber or other non-skid

**Garlon 4 (ester)**

- **DANGERS**
  - Contact: Irritating to Eyes, Skin; Harmful if Swallowed
  - Inhalation: Harmful
  - Fire: May explode on contact.

- **CAUTION**
  - Caution: Irreversible Eye Damage
  - Harmful if Swallowed
  - Poisonous if Swallowed

- **Applications and other handlers must wear**
  - Long-sleeved shirt and long pants
  - Closed-toe shoes
  - Non-slip rubber or other non-skid
DO: Have eyewash available when using pesticides with DANGER signal word

NEVER: Use food containers for pesticides

DO: Label service containers

DO: Walk in, Spray out

- Walk to most inaccessible area first
- Spray while walking out

Benefits:
- Reduces exposure (avoids walking through the area you sprayed)
- Avoids respraying areas already sprayed
DON'T!

Taking a Break?

DO: Wash Hands BEFORE eating, drinking, smoking, bathroom breaks

DO: Be prepared to wash up in the field

- You need
  - Soap
  - Water
  - Single use towels

Hand sanitizer does not work!
DON'T Contaminate your home

- DON'T Wear spray boots home
- DO Shower, change clothing
- DON'T Wear spray clothes > 1X
- DO Wash spray clothes in separate load

DO: Train the people working for you

- Annual training for trained servicepersons will be required in several years
- Safety & best practices for pesticide application

DO: Have pesticide labels at hand during application

- Required by law for trained service persons working in absence of licensed commercial applicator
In Conclusion……

1. Read the label before you get to the site!
2. Wear the PPE
3. Follow the label

Questions???

Pesticide Safety Education Program
614-292-4070
pested.osu.edu

Where to find out more about pesticide toxicity:
National Pesticide Information Center (NPIC)
npic@ace.orst.edu
1-800-858-7378

EPA Emergency Spill Hotline
1-800-282-9378
for any spill entering waterways or other spills in reportable quantities

Chemtrec
24/7 technical support for any hazardous substance spill
1-800-424-9300

G. Phillips and Sons, LLC
ACRC Container Recycling contractor
Midwest and Northeast USA
https://www.acrecycle.org/
Questions???

For Invasive recommendations:

Penn State Wildland Weed Management
(The Quicksheet series is prescriptive)

http://plantscience.psu.edu/wildland

Penn State Extension, Forestry Invasive and Competing Plants

https://extension.psu.edu/forests-and-wildlife/forest-management/invasive-and-competing-plants