The Good, Bad, and Ugly of Herbicides By: Jeff Stachler, Extension Cropping Systems Specialist at Carrington Research Extension Center 2025 Spring Fever Garden Forum – 4-7-25 EXTENDING KNOWLEDGE >> CHANGING LIVES NDDSU EXTENSION

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Outline

- 1. Weed control basics
- 2. The Good of herbicides
- 3. The Bad of herbicides
- 4. The Ugly of herbicides

5. Important points

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Weed life cycles

- 1. Annual
 - A. Summer
 - B. Winter
- 2. Biennial
- 3. Perennial
 - A. Simple (tap root)
 - B. Creeping (rhizomes, roots, tubers, corms, bulbs, etc.)

Garden weasel

Methods of weed control

- Cultural
 - Good soil fertility to encourage fast crop growth.
 - o Narrow row spacing to cause quicker crop canopy closure.
 - Crop rotation.
 - Mulches grass clippings, straw, plastic (safe?), other.
 - o Solarization temperature, soil moisture, direct sunlight, and time are critical.
 - Prevent weed seed production. *** Extremely important
- Biological
 - o Cover crops.
 - Companion crops.
 - o Chickens and geese ? unpredictable, but potential use.

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Methods of weed control

- Mechanical
 - Pull weeds.
 - Tillage tools rototiller, cultivator, hoe, other.
 - Reduced-tillage weeders garden weasel, tine weeders, others.
 - Mowing.
- Chemical
 - Organic.
 - o Synthetic.

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Types of herbicides

Contact

- Herbicide enters parts of plant (mostly the leaves) and kills the cells in the area of contact based upon a metabolic response.
- o All parts of weed must be covered for complete control.

Systemic

- Herbicide applied to plant, taken in by plant (mostly the leaves) and moves through plant to growing tissues stopping some metabolic function.
- Only need to apply a lethal dose to a few parts of the plant to kill it.

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Types of herbicides

- Selective
 - Controls specific types and/or species of weeds having little or no injury to crops planted.
 - Group 1 herbicides only control grass weeds.
 - ✓ Examples: clethodim

Non-Selective

- o Herbicide kills nearly all or many weed and crop species.
- Examples:
- ✓ Glyphosate

Types of herbicide applications

- Preplant incorporated
 - Herbicide applied to soil surface, incorporated to proper depth, then crop planted.
 - o Controls germinating seedlings.
- Preemergence
 - Herbicide applied after crop is planted, but before weeds and crop emerge.
 - o Controls germinating seedlings and sometimes small-emerging plants.
- o Postemergence
 - Herbicide applied after weeds and crop have emerged.
 - Apply to small (<3") annual weeds.
 - Apply to bud to early flowering perennial weeds when using glyphosate.

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Herbicide names

- Trade name
 - o Usually the name of the herbicide you are purchasing.
- Common name / active ingredient
 - "Official" name of a single herbicide active ingredient.
 - Historically these names were used by weed scientists.
 - Today, due to herbicide pre-mixtures and generic herbicides, homeowners now need to know these names!

• Chemical name

o Listed on every herbicide label, but usually only used by chemists.

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The GOOD of herbicides

- 1. Least time spent controlling weeds.
- 2. Very effective way to control weeds.
- 3. Most effective and easiest way to control grassy weeds in broadleaf crops.
- 4. Controlling weeds in perennial crops.
- 5. Most effective way to control perennial and woody plant species.
- 6. Many organically-approved herbicides are safer to environment.





When to apply glyphosate to perennial species

- 1. Bud to early flower stage
- 2. Fall
 - A. Minimum plant height 4 to 12 inches species dependant
 - B. Timing
 - i. Before frost/leaf drop for warm-season perennials
 - ii After frost for cool-season perennials
 - C. Glyphosate rate = 2 to 4% v/v (2.6 to 5.0 fl oz/gallon of total spray).
 - D. Add spray grade ammonium sulfate (17 lbs/100 gallon) spray volume.
 - E. Control winter annual and biennial weeds like cool-season perennial.

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Organic approved herbicides in gardens

- Corn gluten meal
 - Example = Preen Natural Vegetable Garden Weed Preventer [caution] {harmful to humans; not in water}
 - PPI + water.
- Essential Oils
 - Example = BurnOut II (citric acid, clove oil, Other) [Danger] {harmful to humans and aquatic species} (garden use?)
- Citrus oil-based (orange peels)
 - Example = GreenMatch Burndown Herbicide [Caution] {harmful to humans and pets; not to water}

Organic approved herbicides in gardens

- Acid-based
 - Example = SummerSet AllDown Herbicide (Acetic acid, citric acid) [Danger] {harmful to bees, birds, aquatic species}
- Fatty acid-based
 - Example = Scythe (Pelargonic acid and related fatty acids [Warning] {harmful to humans and aquatic life}
- Iron HEDTA
 - Example = Naturia Lawn Weed & Disease Control [Caution] {harmful to humans and pets; don't apply to water] (Lawns only)

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PPI/PRE synthetic herbicides (don't spray on foliage)

- pendimethalin
 - Example = Pendulum (landscape, trees, shrubs) [Caution] {harmful to humans, pets, and aquatic life} (water in quickly)
- trifluralin
 - Example = Preen Garden Weed Preventer (garden, landscapes, fruit shrubs and trees) [Caution] {harmful to humans, pets, and aquatic life} (incorporate & water immediately; carryover)
- isoxaben
 - Example: Gallery DF (ornamentals, bulbs, fruit shrubs and trees, more) [Caution] {harmful to humans and animals; leaches and runoff] (water in)
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PPI/PRE synthetic herbicides (don't spray on foliage)

- Dithiopyr
 - Example: Dimension EC (landscape ornamentals, trees) [warning] {harmful to humans, pets, and aquatic life} (water in)
- Oryzalin
 - Example: Surflan AS Specialty (landscape ornamentals, bulbs, trees, fruit trees and shrubs) [caution] {harmful to humans and pets, and aquatic life} (incorporate and water)
- Pre-mixtures of some of these and dimethenamid

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POST synthetic herbicides (add adjuvants and need rain-free period!)

- glyphosate
 - Example: Roundup PowerMax (garden, landscape ornamentals, trees, fruit trees and shrubs) [warning] {harmful to humans and pets; not to water} (nonselective; zero glyphosate can touch desirable plants; translocating; release from roots could kill plants)
- glufosinate
 - Example: Cheetah Pro (landscape ornamentals and trees) [caution] {harmful to humans and pets; not to water} (non-selective; can't touch desirable plants)

POST synthetic herbicides (add adjuvants and need rain-free period!)

- carfentrazone
 - Example: QuickSilver (landscape ornamentals and turf) [caution] {harmful to humans, pets, aquatic species} (broadleaf weeds only; contact; can't touch desirable plants)
- diquat
 - Example: Reward (landscape ornamentals and trees) [caution] {harmful to humans and pets, aquatic species} (non-selective; contact; can't touch desirable plants)
- clethodim
 - Example: GrassoutMax (gardens, oranmentals, trees, fruit trees and shrubs) [caution] {harmful to humans and pets; not to water} (grass weeds only; translocating; can be sprayed over broadleaf crops)

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The BAD of herbicides

- 1. Choosing the incorrect herbicide to control the weeds present.
- 2. Applying herbicides at an inappropriate plant growth stage.
 - A. Annual weeds being too large (>2-3") to control.
 - B. Applying glyphosate at an improper time to control perennial and woody species.
- 3. Crop injury from the herbicide applied.
- 4. Carryover of herbicide to the next growing season.

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The BAD of herbicides

- 5. Drift of herbicides to non-targeted desirable plants.
- 6. Applying herbicides illegally.
 - A. Applying to the incorrect crop.
 - B. Applying to incorrect location.
- 7. Organically-approved herbicides usually are not as effective.
- 8. Always wear all labeled personal protective equipment when applying herbicides! NO flip flops, leather shoes, or shorts!



The UGLY of herbicides

- 1. Herbicide-resistant weeds.
- 2. Can be harmful to humans when applied improperly.
- 3. Can be harmful to animals, arthropods, fungi, bacteria, and other organisms when applied improperly and too often.
- 4. Decrease water quality due to runoff and leaching when applied improperly.
- 5. Potential herbicide residues in the crops when applied improperly or at incorrect stage of crop growth.

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Important points

- 1. Follow all herbicide label directions, especially the use of PPE [NO flip flops, leather boots, and shorts when applying herbicides and wear nitrile gloves].
- Only apply herbicides as necessary and in a timely manner.
 A. Glyphosate applied at the proper time is the most effect way to control perennial weeds.

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Important points

- 3. Only apply those herbicides labeled for the crop.
- 4. Hand removal of weeds is safest, but most time consuming method of weed control.

