

Herbicide Application and Runoff: Challenges and Solutions

Ottawa County Water Quality Forum
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Herbicides: Vital to farming

- EVERY commercial grower needs herbicides and other weed controls
- Herbicides are part of whole-farm practice to control weeds
- Herbicides protect against diseases, increase crop value/yield, protect health and safety of livestock and consumers



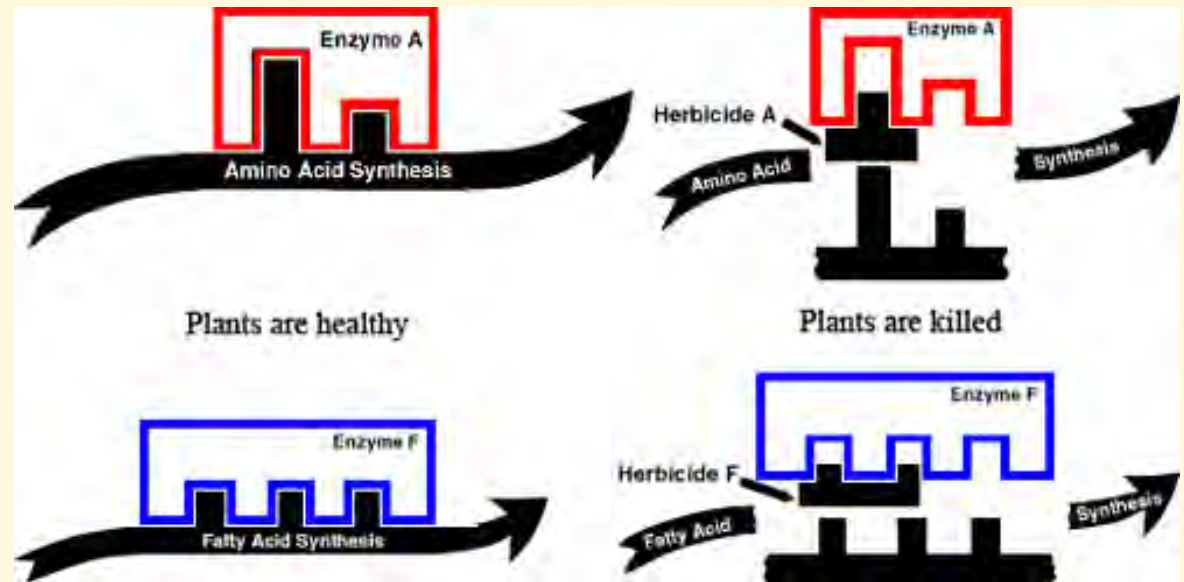
Chenopodium album
(lamb's quarters)



Amaranthus palmeri
(palmer amaranth)

Technology Delivers Safer Products, Better Results

- Modern herbicides target specific characteristics (interrupting photosynthesis or amino acid production in specific plant varieties)
- Low toxicity for animals and humans
- Rigorous testing, application and setback requirements
- Combined with genetic traits for resistance – reduces the need for more toxic chemicals



The Challenge: Runoff

Management challenge:

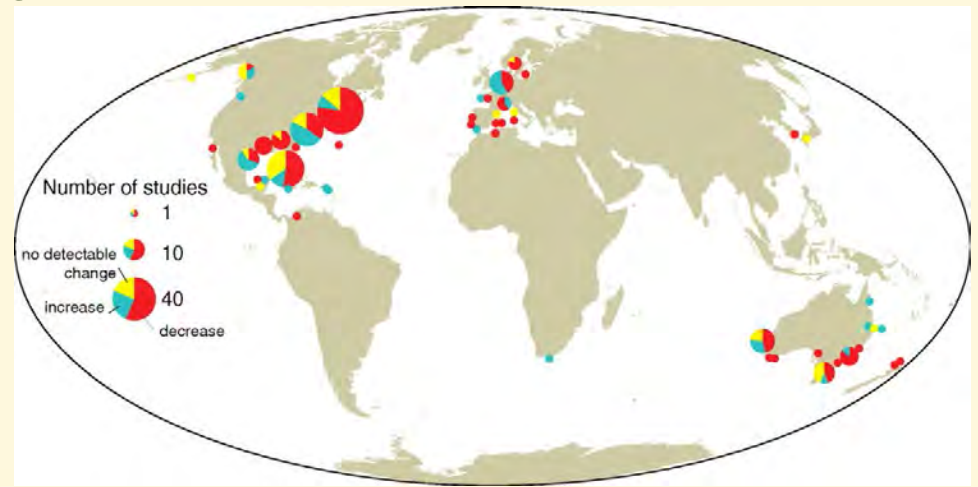
- Surface runoff
 - Worse during rain events
 - Bad application timing
 - Usually <2% of what is applied, but rain events can increase that to 15%
- Tile/drainage runoff
 - Usually also <2%, but that can increase in heavy clay and silty soils

Additional challenge:

- Research shows there can be worse issues with herbicide volatilization than with runoff
 - Evaporation, air turbulence, wind
 - Can be 25 – 50% under worst-case conditions

Why is herbicide loss bad?

- Wasted resources – lost farm revenue, lost impact where it's needed
- Off-target impacts
 - Sensitive ecosystems
 - Riparian areas
 - Neighboring fields or residential areas
 - Drinking water
- Herbicide resistance



Loss of seagrass area in global coastal areas since 1980

Solutions: Regulatory

- The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA): 1947
 - Set requirements for quality, labeling, safety standards
- Federal Environmental Pesticide Control Act (FEPCA): 1972
 - Established standards for environmental safety of pesticides, required registration of new pesticides
 - Put EPA in charge of testing
- Clean Water Act (CWA): 1972
 - Restricts runoff of pesticides into nation's waterways
- Endangered Species Act (ESA): 1973
 - Provides special protections for endangered and threatened species habitats, including pesticide application setbacks
- Pesticide Applicator Certification (restricted use)
 - Managed at the state level

Solutions: On the Farm

- Follow label instructions!!!
- Watch the weather
 - Both temperature and precipitation
- Integrated weed management
 - Crop Rotation
 - Conservation tillage
 - Buffer/Filter Strips
 - Leave crop residue on fields

AVENGE
Wild oat herbicide

**FOR USE IN
BARLEY AND WHEAT**

ACTIVE INGREDIENT:
difenzoquat methyl sulfate 31.2%

INERT INGREDIENTS 68.8%

TOTAL 100.0%

(1 gallon contains 2 lbs. of difenzoquat cation)

EPA Reg. No. 241-266

**KEEP OUT OF REACH
OF CHILDREN
DANGER!
¡PELIGRO!**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)

STATEMENT OF PRACTICAL TREATMENT
If in eyes: Hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. Get medical attention.
If swallowed: Call a doctor or get medical attention. Do not induce vomiting. Drink promptly a large quantity of milk, egg white, gelatin solution, or if these are not available, large quantities of water. Avoid alcohol.
If on skin: Wash with plenty of soap and water. Get medical attention.
If inhaled: Remove victim to fresh air. If not breathing, give artificial respiration preferably mouth-to-mouth. Get medical attention.
NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

**PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS
AND DOMESTIC ANIMALS**

DANGER!

Corrosive: Causes irreversible eye damage. May be fatal if swallowed or absorbed through the skin. **DO NOT** get in eyes, on skin, or on clothing.

Personal Protective Equipment (PPE):
Applicators and other handlers must wear:

- coveralls over short-sleeved shirt and short pants
- waterproof gloves
- shoes plus socks
- protective eyewear
- dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C).

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. **DO NOT** reuse them. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR (70.240 (d) (4-6)), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations:
Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS
DO NOT apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. **DO NOT** apply when weather conditions favor run-off and/or drift from target area. **DO NOT** contaminate water when disposing of equipment washwaters.

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling. **DO NOT** apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

DO NOT apply this product through any type of irrigation system.
This label must be in the possession of the user at the time of pesticide application.

In case of an emergency endangering life or property involving this product, call collect, day or night, Area Code 201-635-3100.

Solutions: On the Farm

- Drift management
- Precision application
- Sensitive area mapping
- Vegetative barriers (wind) and edge-of-field plantings (water)
- Mixing/rotating herbicides
- New technologies for reducing volatilization – chemical/surfactant structure



Shield sprayer for herbicide application

Additional Resources

- Michigan State University Extension: <http://msue.anr.msu.edu>
- University of California-Davis Alfalfa Workgroup: <http://alfalfa.ucdavis.edu/>
- University of Minnesota Extension: <http://www.extension.umn.edu>
- University of Nebraska-Lincoln: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2372&context=usdaarsfacpub>
- *Herbicides: Current Research and Case Studies in Use*, edited by Andrew J. Price and Jessica A. Kelton, available at: <http://www.intechopen.com/books/herbicides-current-research-and-case-studies-in-use>
- Field Watch/Drift Watch: <https://driftwatch.org/>

Thank you!

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