

Organic Herbicides: Efficacy and Safety

Dr. Scott Nissen
Weed Scientist
Colorado State University

Rank the Following for Toxicity

- Caffeine
- 2,4-D (common lawn herbicide)
- Aspirin
- Roundup (most common herbicide used in the world)
- Nicotine
- Malathion (insecticide)
- Tordon (common non-crop herbicide)
- Gasoline
- Salt

Toxicity Based on LD₅₀ Values

- | | |
|-------------|----------------------------|
| • Nicotine | LD ₅₀ 50-60 |
| • Gasoline | LD ₅₀ 50-100 |
| • Caffeine | LD ₅₀ 192 |
| • 2,4-D | LD ₅₀ 699 |
| • Aspirin | LD ₅₀ 750 |
| • Malathion | LD ₅₀ 1000-2800 |
| • Salt | LD ₅₀ 3320-4180 |
| • Roundup | LD ₅₀ 4300 |
| • Tordon | LD ₅₀ 8200 |

General weed management factors

- Exclusion
- Elimination
- Prevent Establishment
- Removal
- Amelioration

Weed Management for Organics

-Exclusion-

- Field selection
 - a good choice
 - knowledge needed of sites
 - usefulness depends on available certified land
- Prevent weed additions
 - critical for Organics
 - “bring-ins” may contain weeds
 - Organic mulches
 - Raw manures

Weed Management for Organics

- Elimination -

- Prevent weed build-up
 - timely cultivation, tillage
 - purposeful plantings – don't let weeds take over
- Weed population reduction
 - perennial management through grazing
 - fallow / tillage cycles
 - solarization
 - fumigants???

Weed Management for Organics

- Prevent Establishment -

- Preemergence “herbicides”
 - corn gluten meal, mustard meal
- Timely cultivation
- Stale seedbeds
- Cover crop management
 - Species important: e.g. rye
 - Crop sequence
- Grazing
- Mulches
 - organic and synthetic

Weed Management for Organics

- Weed Removal –

“Stop ‘em in their tracks”

- **Mechanical – cultivation**
 - keep it shallow
 - minimize injury to the crop
 - Improve the root zone
- **Manual**
 - choose easy-to-use tools

Weed Management for Organics

- Weed Removal (cont.)–

“Stop ‘em in their tracks”

- **Chemical: vinegar, pelargonate, etc.**
 - currently just contact activity
 - good foliage cover needed
- **Physical: energy consumers!**
 - flame
 - special equipment, directed flame
 - best for small, annual weeds
 - steam

Weed Management for Organics

- Amelioration -

- **Crop Selection**
 - use crops that tolerate weeds
 - rapid growth, dense canopy
 - crops that allow weed control
 - sweet corn – easily cultivated
- **Give crop an edge**
 - plant date
 - transplants

USDA National Organic Program Standards

- Consistent national standards
- Any farm, wild crop harvesting, or handling operation that wants to sell an agricultural product as organically produced must adhere to the NOP standards
- Requirements apply to the way the product is created, not to measurable properties of the product itself

USDA NOP Standards

- Crop pests, weeds, and diseases will be controlled primarily through management practices including physical, mechanical, and biological controls
 - When these practices are not sufficient, a biological, botanical, or synthetic substance approved for use on the National List may be used

OMRI Listed® Products

- Organic Materials Review Institute is a non-profit organization
- The *OMRI Products List* is a directory of all products OMRI has determined are allowed for use in organic production, processing, and handling.
- OMRI Review Program is voluntary



Organic Herbicides

- Advantages:
 - Breakdown rapidly in the environment after application
 - Generally have no residual activity
 - Many have a low toxicity to people & animals

Organic Pesticides

- Disadvantages:
 - Expensive
 - Differences in quality from batch to batch
 - Gross misconception that these products are not dangerous

Signal Words Required

- Caution: LD50 500-5,000 mg/kg
 - Simple precautions-wash hands, wear gloves
- Warning: Health concerns, eye, skin or lung irritation (temp)
- Danger: Permanent eye, skin or lung damage
- Danger/Poison: Permanent eye, skin or lung damage possibly fatal

Organic Applicators

- Anyone applying organic pesticides for hire needs an applicators license
- Must adhere to EPA Worker Protection Standards

Organic Herbicides

- Corn Gluten Meal



Corn Gluten Meal

- **Status as a pesticide**
 - Classified by EPA as a "minimum risk pesticide"
 - Exempt from EPA registration requirements
 - Section 25b
 - Must be registered with CDA

Corn Gluten Meal

- **By-product of processing corn to make corn starch and corn syrup**
- **Generally sold as a golden yellow meal or as light brown granules**
- **Uses**
 - Herbicide
 - Food for cows, cats, dogs, fish, and poultry
 - Fertilizer – about 10% nitrogen

Corn Gluten Meal

- **Herbicide**
 - Prevents sprouting seeds from developing normal roots
 - Does not directly kill the seedlings
 - Makes them susceptible to dehydration if the soil gets dry
 - Established plants are not affected

Potential Health Problems

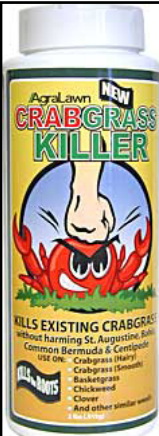
- **Corn and corn by-products are known to cause allergies for some people**
- **A few people have serious reactions**
 - Respiratory problems
 - Hypersensitivity
- **People with known corn allergies should avoid exposure to corn gluten meal**

Active Ingredients

- **Most product active ingredients are vinegar (acetic acid), clove oil (eugenol), or soap (fatty acids)**
- **Products must be allowed by your certifier**
 - On USDA National Organic Program Approved Materials List
 - Evaluated by Organic Materials Review Institute (OMRI)
 - <<http://www.omri.org>>

Common Active Ingredients

Active ingredient	Products	ai.Conc.
Vinegar	Nature's Touch Ecosharp	6.25%
	Weed/Grass Killer Weed Pharm	20%
Eugenol	Products containing up to 22% clove oil	




AgraLawn CrabGrass Killer

- Also EPA minimum risk
- NOT registered with CDA
- Active Ingredient: Cinnamon Bark - 0.95%

KILLS EXISTING CRABGRASS without harming St. Augustine, John's Common Bermuda & Centipede (See On: Crabgrass (Large), Crabgrass (Small), Buckgrass, Chickweed, Clover, And other similar weeds)

Weed Pharm

- 20% Acetic Acid
- Non-selective contact herbicide
- Signal word – Danger
- Not registered in CO



Weed Pharm Label

KEEP OUT OF REACH OF CHILDREN

DANGER - PELIGRO

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

EPA Registration No. 81906-1-81905
EPA Establishment No. 81906-WA-001

Pharm Solutions Inc.
2023 E. Sims Way.
Suite #358
Port Townsend, WA 98368

Active Ingredients by wt.	First Aid cont.
Acetic Acid 20.0%*	vomiting unless told to do so by poison control center or doctor. Do not give anything by mouth to an unconscious person.
Other Ingredients 80.0%	
TOTAL 100.0%	
*Equivalent to 200 grain vinegar by filtration	
First Aid	
If In Eyes Hold eyelids open and flush with a steady, gentle stream of water for 15-20 min. Remove contact lenses, if present, after first 5 min., then continue rinsing eye.	If Inhaled Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call poison control center or doctor for further treatment.
If on Skin or Clothing Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 min. Call poison control center or doctor for further treatment	NOTE TO PHYSICIAN: Probable mucosal damage may contra-indicate the use of gastric lavage.
If Swallowed Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce	Have product container or label with you when getting poison control center or doctor, or going for treatment. You may also contact 1-800-858-7378 for emergency medical treatment.
	See label inside panel for additional precautionary statements.

Weed Pharm -- MSDS

- **EMERGENCY OVERVIEW**
- Vapors irritating to the eyes and respiratory tract. Avoid inhalation. Liquid may cause eye burns and permanent damage to cornea, possibly leading to blindness. Causes skin irritation.

Weed ZAP

- JH Biotech Inc.
- Active ingredient: 30% Cinnamon Oil
- Inert ingredients: lactose, vinegar, water – Vinegar likely contributes to herbicidal activity
- Contact herbicide (no selectivity)
Will cause crop injury
Small annual weeds
- Use 3% solution and spray weeds to point of run off
- Peaceful Valley \$79.99/gallon

Matratec AG

- ClawE! Specialty Products
- Active ingredient: 50% clove oil • Inert ingredients: Wintergreen, Butyl lactate, Lecithin
- Contact herbicide with no selectivity
–Will injure crops
–Complete weed coverage important
- Use on annual weeds less than 4" in height
- Use rate 5 to 8%
- \$98.20/gallon

EcoExempt HC

- **Active Ingredients:**
Clove Oil-21.4%
2-phenethyl propionate-21.4%
EcoSMART Technologies; Franklin
Tennessee

Burnout II

- **Active ingredients:**
12% clove oil & 8% sodium lauryl
sulfate
- **Inert ingredients:** acetic acid & citric
acid
- **Dilute 3:1 for small weeds or 2:1
larger weeds**
- **St. Gabriel Laboratories -
\$37.20/gallon**

Conclusions

- **Organic herbicides are generally
non-selective**
- **Contact activity only**
- **High concentration of vinegar/acetic
acid can cause significant eye
damage**
- **No control of perennial weeds**
- **Pick fields with low weed pressure is
the best way to start**