Environmental Impacts of Non-Herbicidal Weed Control

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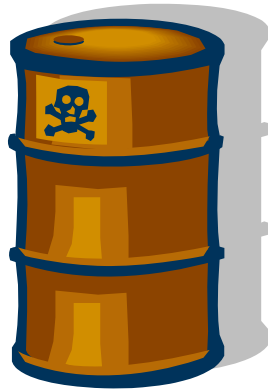
SEEPPC 2010

Impacts Of Not Using Herbicides

- Herbicides can have negative impacts
- Not ignoring these impacts, but want to discuss the negative environmental and safety consequences that result from a decision NOT TO USE herbicides.
- These impacts are often totally ignored by many land managers and the general public.
- EIS documents dismiss these impacts without proper discussion

Non-Chemical Methods

- “Non-Chemical” or “without harmful chemicals” are the terms used by proponents of these methods
- Methods are chosen to with the intention to:
  - protect the environment
  - reduce impact on the environment,
  - protect people and wildlife
  - prevent exposure to dangerous chemicals and for worker safety



Non-Chemical Methods vs Herbicides

However, research shows most “non-chemical” methods:

- Use a larger volume of chemicals
- Often use more dangerous chemicals
- Expose people to more dangerous chemicals
- Have potentially greater environmental impacts
- Have lower worker safety records

FACT: Non herbicidal chemicals are not benign and have their own environmental impacts

Popular “Non-Chemical” Methods

- Plastic mulch and barriers
- Weed burners and torches
- Hand and manual methods
- Grazing
- Mechanical methods: tractors, mowing, plowing, chain saw use
- Salt, soap, detergent, boiling water

Plastic Mulch

- Polyethylene barriers and permeable weed plastic
- Placed on the soil or over vegetation to stop weeds from germinating or kill vegetation
- Often recommended for for invasive species like kudzu. 2 years of use can give 90% control.

Plastic Mulch

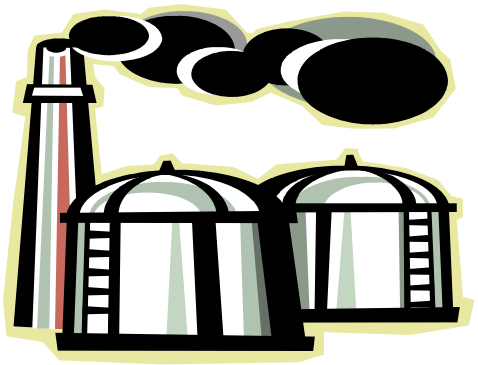
Proponents of its use give these negatives:

- Non-selective, controls all vegetation
- Mosquitoes breed in rainwater puddles on sheets
- Material costs are $1400 per acre

- Research shows: can raise soil temperatures by 10^{O} C or more, resulting in potentially negative effects on soil flora and fauna

Plastic Mulch

- 1328 POUNDS of 6 mil polyethylene needed to cover one acre: $1600-2000/acre
- Oil and natural gas are the raw materials Greenhouse gases released in manufacture



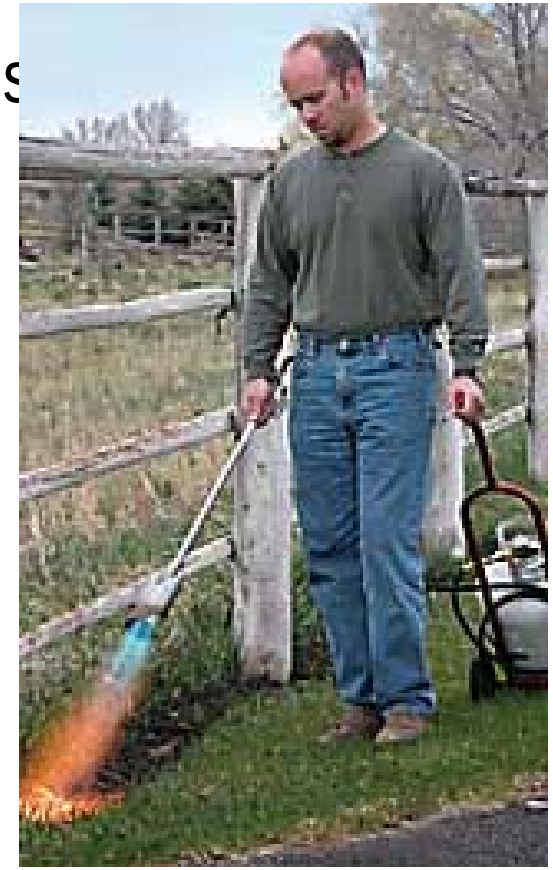
- More than 200 degradation products: alkanes, alkenes, ketones, aldehydes, alcohols, carboxylic acid, keto-acids, dicarboxylic acids, lactones … whose impacts have not been studied.

FACT: 14 ounces of Milestone VM herbicide gives a similar or better level of control

Weed Burners and Torches

Weed Dragon Advertising Text:

- Weed Dragon 100,000 BTU Weed Burner
- Environmentally safe way to eliminate weeds
- No chemicals (???)
- No dangerous threats to our environment
- Don’t bag leaves or trash, burn it; its faster and better for the environment



Weed Burners and Torches

- Use a flammable chemical, propane, that can also explode
- Burning vegetation produces greenhouse gases
- Increased chance for wildfire vs herbicides
- Danger of personal injury and property damage
- Pounds of propane per acre use higher than herbicide
- Propane contains radioactive compounds including radon, lead, polonium, and bismuth
- Heat damages soil flora and fauna?

Propane Properties from MSDS

- 1.2% concentration in air = propane LC50
- MSDS:
  - health hazard high
  - flammability extreme
- Cancer, target organs, developmental hazards – inadequate data to evaluate the cancer hazard

FACT: Propane burners are clearly a chemical form of weed control with environmental impacts that should be considered

Propane Use for Barberry Control

- Foliar spraying is definitely quicker than torches as we covered 2.7 acres today using 26 oz/acre of glyphosate and 3 hr/acre (rough, rocky terrain). It would have taken 6 hr/acre and 24 lbs/acre of propane to do the same work.

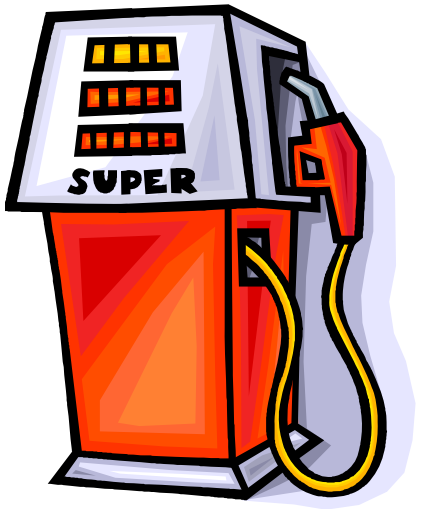
- Jeff Ward, Dept of Forestry and Horticulture, The Connecticut Agricultural Experiment Station

Hand and Manual Methods

- Hand pulling weeds
- Weed wrenches
- Hoes, shovels, etc
- Can be quite effective and environmentally sound close to home and on flat ground away from water
- Requires a large amount of time and manpower
- Useful for small areas or where there is a large, local, volunteer labor pool or money is no object

Hand and Manual Methods

- If mechanized travel needed to get labor to the treatment site, a very large use of fuel per acre can negate any potential stated “environmental” benefits of using hand labor
- Volunteer weed pulls are great for public education, but they use more chemicals per acre than a herbicide crew.
- Greenhouse gases, oil spills



Manual Invasives Control

- Manual invasive weed control programs are usually measured in MAN DAYS PER ACRE. Some surgical kudzu control methods use hundreds of man hours per acre.
- Repeated trips to the site are usually made using gasoline as a fuel
- Are sanitary facilities provided at the site, or is pollution from human deposited wastes added to the equation

Hand Held Sprayer Kudzu Control

- A 5-person ground spray crew can treat 10 to 15 acres per day, at a labor cost of $50-100/acre.
- Herbicide costs would be $25-85/acre/treatment
- 3 to 5 treatments using a max total of 5 pounds of herbicide active ingredient would control most kudzu patches
- Dead roots are left in the ground to prevent erosion, and they degrade over time

Grazing

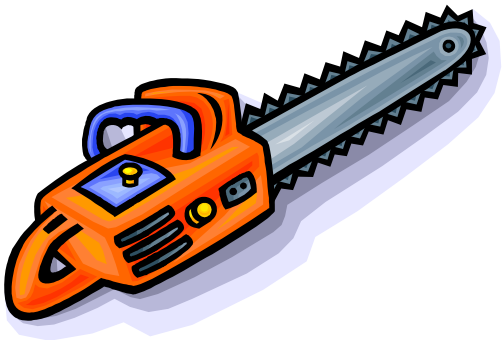
Hair Sheep During First Pass 300 per Acre

Fuel to move, manure, compaction, eat native vegetation

Mechanical Methods

All mechanical methods utilize fuel and lubricating oils, and some use hydraulic fluids

- Mowing
- Bulldozing, other heavy equipment clearing, raking, shearing
- Mulching machines
- Chain saw and other hand-held mechanical saws



⚠WARNING

NO SMOKING STOP MOTOR

Smoking and running engines can ignite a spark. To reduce the risk of fire, extinguish all smoking materials and turn off engine before fueling process.

ALWAYS extinguish cigarettes before getting out of your car.

NEVER leave engine running during fueling process.

Electrical Discharge Warning

Cellular phones, pagers and personal electronic devices may cause electrical discharge. Do not use while fueling.

NEVER use electronic devices during fueling process.

NEVER allow children to use pump. Only persons of licensed age should use pump. Keep children away from pump area. Do not allow children under licensed age to use the fuel dispenser.

HEALTH WARNINGS

- Gasoline is harmful or fatal if swallowed.
- Long-term exposure to vapors has caused cancer in laboratory animals.
- Avoid prolonged breathing of vapors.
- Keep face away from nozzle and gas tank.
- Keep away from eyes and skin.
- Never siphon by mouth.
- For use as a motor fuel only.

Static Electric Spark Explosion Hazard

A static electric spark can occur when filling portable containers sitting on truck bed liners or on any vehicle's carpeting or floor matting. This spark will explosively ignite a gasoline vapor fire. SERIOUS INJURY OR DEATH COULD OCCUR. It is unlawful and dangerous to dispense gasoline into unapproved containers.

NEVER fill portable containers that are in or on vehicle.

ALWAYS place containers on ground. Keep nozzle in contact with container while filling.

BEFORE fueling, discharge any static electricity build-up by touching your bare hand to a metal surface away from the nozzle.

DO NOT re-enter your vehicle while gasoline is pumping. Re-entry could cause static electricity build-up.

DO NOT OVERFILL TANK OR PORTABLE CONTAINER.

Hold-Open Latch Warning

Persons using dispensers with hold-open latches must remain at the refueling point during fueling process.

NEVER leave refueling area when using dispensers with hold-open latches.

IN CASE OF FIRE

- DO NOT REMOVE NOZZLE FROM VEHICLE.
- Evacuate all passengers from the vehicle and refueling area.
- Activate Emergency Shutoff Switch.
- Notify attendant.
- Call 911, if no attendant is on site.

Mechanical Methods
Gasoline

- The LD50 around 635
- Mixture of up to 15 chemicals
- Cancer hazard, flammable, and contains chemicals that can damage the body and internal organs
- Gasoline ~ 2-10 times more toxic than popular natural area herbicides
- Spills extremely dangerous to fish and wildlife
- Diesel less toxic than gasoline, but has many of the same drawbacks

Mechanical Control

- Cost is generally higher than herbicide
- Fuel consumption
- Deposition of up to 5% of the fuel used unburned on the ground + any other spilled fluids
- Greenhouse gas emissions from combustion
- Bar oil is toxic and long lived in the soil
- Chainsaw operators are exposed to unsafe levels of carbon monoxide, causing unsafe levels of carboxyhemoglobin in the blood. (The American Conference of Governmental Industrial Hygienists)

Mechanical Methods
Fuel

Swedish Board of Occupational Safety and Health study of mechanical clearing found that:

- Workers are exposed to poisonous gases and fumes from combustion of 14 liters of fuel per hectare
- Operations deposited an average of 7 liters/hectare of minimally tested fuels and lubricants unburned thru the exhaust
- Chain saw bar oils remains in the soil for up to ten years

Mechanical Methods, Mowing

- Fuel use
- Rutting
- Soil erosion
- Destruction of animal nesting sites
- Direct death to animals

Turkey eggs on ROW

Mowing in a Wetland

Aerial Herbicide Application


Herbicide Brush Control


Turtle Sushi

Mowing, Utility ROW

- Mass. study found better wildlife habitat on sprayed lines compared to mowed and cut, along with and better brush control.
- At one year, no herbicide residues were found in the soil.
- Bar oil and hydraulic fluid residues were found in the mechanically cleared areas.

ECI & Tufts University

Mechanical Methods
Roadside Mowing

- Mow the thistle, etc, and do not let it go to seed…….
- Mowing uses 3.5 to 11 pounds of fuel/acre
- Spraying uses .5 to 1.2 pounds of fuel, herbicide, and growth regulator per acre, with less greenhouse gas emissions

Mowing or Spraying 30 acres

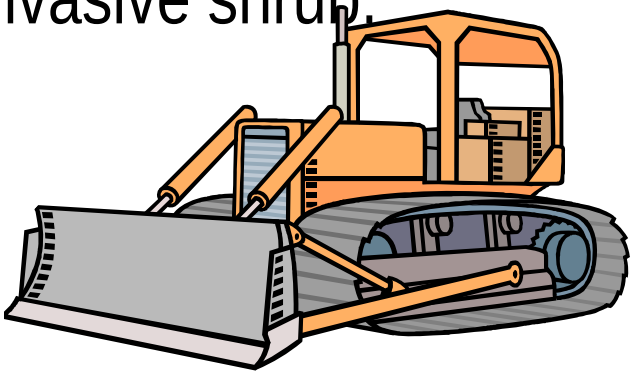
	Mowing	Herbicide and Growth Regulator
Fuel	30 gallons	1 gal
Herb and Growth Reg		3 pounds
Toxicity of Chemicals Used	Higher	Lower
Greenhouse Gas Emissions	Higher	Lower
Wildlife Habit Value	Lower	Higher

Mowing on Slopes

Non Chemical Aquatic Control?

Mechanical
Total Clearing

- Bulldozer, KG blade, shearing and piling
- 5 tons of soil/acre lost on gentle slopes in the SE, soil compaction and habitat loss.
- Fuel use is high
- Habitat loss is high
- Clearing along streams causes severe erosion
- Pictorial series showing control of an invasive shrub, Elaeagnus repens, in AL.




After Basal application and a flood


Mechanical: Before the Flood


After the flood.

Mulchers

Backpack Sprayer

Non Chemical Weed Formula for Home

- 4 cups household vinegar or some call for bleach
- 1 cup salt
- Tablespoon of dishwasher detergent “ to make it stick to the plants” or “for bonding”
- Isn’t dishwasher detergent a mix of chemicals?
- Try planting something after use. Stick your hand in the solution for a while.
- Others include 20% acetic acid, bleach, bleach and salt, add some lemon juice here and there. Chemicals?

Non-Herbicidal Methods

- Are not benign
- Use toxic chemicals, often at high rates
- Have their own environmental impacts
- These impacts need to be considered by land managers and project planners
- The term non-chemical is inaccurate and needs to be thrown out
- Education is needed to show risks from everyday chemicals

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