College of Agricultural, Consumer and Environmental Sciences

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All About Discovery!™
New Mexico State University
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Got Weeds?
Integrated Weed Management

About the College: The College of Agricultural, Consumer and Environmental Sciences is an engine for economic and community development in New Mexico, improving the lives of New Mexicans through academic, research, and extension programs.

What is a weed?

- A plant out of place
- Any plant that is objectionable or interferes with the activities or welfare of man (WSSA)
  - Often objectionable because they interfere

Weed Management Tools

- How do I achieve successful control?
  - Early bird catches the worm…or in this case, the weed!
    - The younger the plant the 'easier' the control
    - Young plants haven't developed structures that make weed development and growth successful
      - Seed development
  - Develop weed management strategy



Developing weed management strategy

- Determine the specific objectives of your area
- Identifying weed and desirable plant species
- Management
  - Knowledge of tools available to you
- Evaluation of control methods
  - Impacts
  - Success
    - Integrated Weed Management

Integrated weed management (IWM)

- Multiple control options available
  - No single weed control option will be successful!
- Combinations of good management practices are required for effective control
  - Prevention + mechanical + cultural + herbicides
- Strategies should be specific to biology of target weed
  - **Accurate identification**

Weed Management Tools

- How do I manage weeds?
  - Prevention
    - Plant certified seed, clean equipment, weed control prior to seed production
  - Mechanical/Physical
    - Tillage, hoeing, hand pulling, mowing, mulching, etc.
  - Cultural
    - Reduce weeds by managing desired plants
      - Irrigation, fertilization, mowing (if lawn), planting timing
  - Biological
    - Insects or fungi that work negatively on weed
  - Herbicides
    - The label is LAW!

Prevention


CERTIFIED PRODUCT
MULCH & SOIL COUNCIL
Premium Potting Soil
Standard Potting Soil
Landscape Soil & Soil Amendment
Specialty Soils
Mulch
This product has been registered and tested for conformance to the standards of the Mulch & Soil Council for the indicated product category. The Mulch & Soil standards do not contain a product category for pesticides, and this certification mark does not apply to pesticide claims. For more information, refer to the MSC website at www.mulchandsoilcouncil.org.


Daikon Radish Sprout Seed
Instructions: Soak (2-3 tbsp. of seed) 6-8 hours in 4 parts water to 1 pa
seed; rinse and drain. Spread evenly in a sprouting container. Sprout
MUST be RINSED and DRAINED WELL 2-3 times per day during the
growing period of 2-3 days. Expose to light 3-5 hours to develop color
the end of the growing period. 65-75°F is ideal. Rinse the hulls away
immersing in a large bowl of cool water, separate clumps, let hulls
the surface, and skim off. This process will help prevent fermentation
Refrigerate air tight container and rinse 2-3 times per day to maintain
freshness.
8 OZ
226 grams
Other Crop:0.02%
Weed: 0.03%
Germination: 85%
Purity: 99.80%
Inert Matter: 0.15%
Lot # HF-RDSH- 43
Test Date: 01/15
Best Germination it Used by: 01/17
www.handypantry.com

Prevention

- Pros
  - Prevents the appearance of weeds in the first place
    - One less weed to have to deal with later
- Cons
  - Could be time consuming
    - Cleaning equipment between tasks
  - Expensive
    - Products treated to remove weed contaminates are more expensive

Mechanical/Physical

Prescribed Burning

- Controlling weed seed using high temperatures produced by prolonged flames
  - Burning of a designated area (highway)
  - Hand held propane torch
- Useful for annual weeds
  - Not for perennials
- Will not be effective on killing all weed seed
  - Soil is a buffer
  - Some seed tolerant of high temperatures

Mechanical/Physical

- Pros
  - Very impactful on weed management strategy
    - Hand pulling still No. 1 in landscapes
  - Loosens soil so weeds are easy to pull
- Cons
  - Could be limiting
    - Get weeds when they are small
    - Remove as much of plant as possible
      - Taproots, tubers, stolons, rhizomes
  - Physical exertion
  - Disturbing the soil may prompt weed seed to germinate
  - Mulches, plastic films, landscape fabrics may be difficult to remove and are ineffective when damaged

Cultural

Why are the weeds there?

- Indicator weeds – weeds whose presence in an environment can often indicate an underlying management problem
- Often different management can be suggested to help desirable plants outcompete weeds
  - Won't control weeds outright, useful tool
  - Management depends on the desirable plant


What does this indicate?


What does this indicate?

Cultural

- Pros
  - Often considered the best management technique
    - Dense plantings discourage weeds
    - "Best defense against weeds is a dense, aggressive turf" – lawncare golden rule
    - Applicable to vegetable gardens and ag crops?
  - Enhancing the quality of desired plants while simultaneously controlling weeds
- Cons
  - Time consuming
  - More expensive

Biological

Salt cedar damage

After one month…

Biological

- May be limited to certain locations/climates
- Applicability is dependent on weed populations

- More examples of biological weed control
  - Livestock foraging (“goats will eat anything”)
  - Field bindweed mite – *Aceria malherbae*
  - Puncturevine weevil – *Microlarinus* spp.
    - Seed and stem
  - Thistle head weevil – *Rhinocyllus conicus*
    - Attacks multiple thistle species, including natives

Biological

- Pros
  - Help from mother nature
    - "Organism controls weeds so you don't have to"
- Cons
  - Organisms often have to be introduced & nurtured
  - Biological organisms can usually come and go as they please
  - Often won't cause enough damage to control weed on it's own (IPM)
    - Salt cedar beetles

Things to consider with Herbicides

- Chemicals used to kill or suppress unwante vegetation
  - Includes synthetic and organic
- Primary method of weed control in multiple cropping systems
  - Inexpensive (can help reduce production costs)
  - Results are often quick and may offer extended control
- Helpful tool
  - Herbicides alone will not eradicate weeds
- Success is always dependent on…
  - Applications in accordance with the label
  - Weed identification

Organic Herbicides

- Generally fall under 7 product categories
  - Natural acids
    - Vinegar, citric acids
  - Phytotoxic oils
    - *d*-limonene, clove oil, rosemary oil
  - Corn gluten meal
    - preemergent
  - Herbicidal soaps
    - Pelargonic acids, ammoniated soap of fatty acids
  - Salt-based herbicides
    - Potassium or ammonium salts of fatty acids (aka soap salts)
  - Iron-based herbicides
    - Iron HEDTA
  - Combination products


GREEN GOBBLER
20% VINEGAR WEED KILLER
KEEP OUT OF REACH OF CHILDREN
DANGER
PELIGRO: SI USTED NO ETIQUETS, 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.)
SEE LABEL SIDE PANELS FOR ADDITIONAL PRECAUTIONARY STATEMENTS.
20% Vinegar Weed Killer is a quick-acting, non-selective contact herbicide containing an organic acid for which the residues degrade promptly in the soil. Foliar contact results in rapid desiccation and control of annual weeds and grasses, and top growth reduction of herbaceous perennial weeds and grasses (see list below). For control of established perennial weeds, retreatment may be necessary. 20% Vinegar Weed Killer may be applied up to two days before harvest.
TYPICAL WEEDS CONTROLLED
DO NOT SPRAY DIRECTLY ONTO FOOD CROPS
DRIFT MANAGEMENT
EARLY SEASON ANNUAL WEED CONTROL


SAFE AROUND CHILDREN & PETS
EcoLogic
Weed & Grass Killer
Ready-To-Use
Active Ingredients:
Rosemary Oil 1.0%
Cinnamon Oil 1.0%
Sodium Lauryl Sulfate......1.0%
Other Ingredients† 97.0%
Total 100.0%
†Water, Soap, Lecithins, Glycerin
*When used and stored as directed
‡Refers to Rosemary and Cinnamon Oils
Keep Out of Reach of Children
CAUTION See back for additional precautionary statements.
Manténgase fuera del alcance de los niños
PRECAUCIÓN Consulte la parte posterior para conocer las declaraciones preventivas adicionales.
Net Contents 1 gal (128 fl oz/3.78 L) 17-16183

Organic Herbicides

- Things to consider
  - You are still applying a herbicide
    - Must have a viable label with directions for safe and effective application
    - Do not use DIY mixtures as herbicides
  - Generally considered to be contact herbicides
    - Injure the plant by burning plant cuticle or disrupting cell walls (plants lose too much water and die)
    - Chelated iron products are taken up by the plant
  - Non-selective
  - Not as effective as synthetic counterparts
    - Must be combined with other IPM practices
    - Important to apply to weeds shortly after germination
- Must be OMRI listed to use in certified organic production
  - Organic Materials Review Institute
  - www.omri.org

Organic Herbicides

- Pros
  - Can provide control on very small annual broadleaf weeds
    - 1-2 leaf
  - Rapid results
    - Plant death (or at least injury) should be observed within 24 hours
    - Even more rapid injury on hot, dry, sunny days
  - Limited residual activity
    - Reduced ability to cause offsite damage
    - Still need to pay attention to drift and leaching

Organic Herbicides

- Pros
  - Useful for managing weeds in gravel and on patios/sidewalks
    - Make sure product doesn't stain or damage surface
  - Fit well into an IPM program, though weed monitoring and rapid response is essential
  - Non-selective, mainly damages broadleaves
    - Can burn back grasses temporarily, but will recover

Organic Herbicides

- Cons
  - No residual activity
    - Repeated applications often required
  - Weeds must be small
    - Timing is important – within 2 weeks of germination
  - Non-selective
    - Potential to damage desirable plants
  - Contact herbicide
    - Good spray coverage essential
    - Roots are not injured/killed by herbicide contact
    - Repeated applications often needed
      - Larger weeds, perennial plants
  - Effectiveness can vary from product to product
    - Not as effective as synthetics
    - Still under restrictions of the label (label is law)

Organic Herbicides

- Cons
  - Higher percentages of active ingredients needed for adequate control
    - 15% or more with acetic acid
    - Household vinegar (5%) not strong enough and doesn't have herbicide label
  - Severe eye irritation, burns, dermatitis, chronic bronchitis, erosion of teeth etc. increase with higher a.i. percentages
  - Potential damages to spray surfaces
    - Sidewalks, patio furniture, decorative stones, etc.
  - Acids and oils can damage and wear down spray equipment (especially metals)
  - Expensive
    - Can often be more expensive than hand labor

Weed ID is essential for effective management

Why identify?

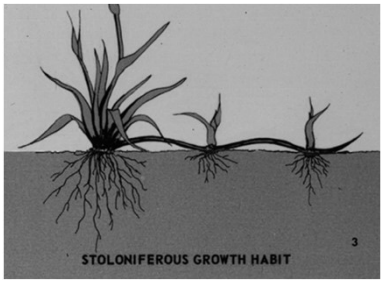
- Annuals vs. Perennials
  - Pre vs. Post control options vary
- Variation in response to management
  - Select the right tool for success
- Life cycle, flowering, seed production
  - Timing of management is essential

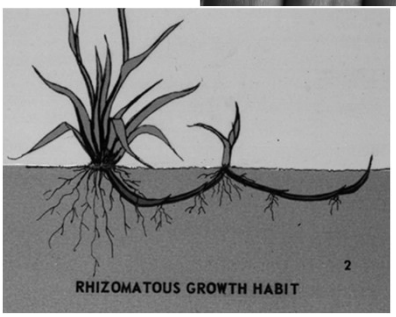
Why are weeds successful?

- Rapid colonization of disturbed areas
- Very rapid growth
- Self compatible
- Very high seed production
- Seed dormancy
- Vegetative reproductive structures
- Seed dispersal mechanisms

Vegetative Reproductive Structures

- Bulbs/tubers
- Tillers
- Creeping stems
  - Rhizomes
  - Stolons





Weeds are categorized into one of four lifecycles

1. Summer annuals
   - Summer annuals germinate in the spring when soil temperatures reach about 55-65ºF, flower in the summer and die in the fall at first frost
2. Winter annuals
   - Winter annuals germinate in the fall (55-65ºF), grow until spring and die during late spring or early summer
3. Biennials
   - Life cycle lasts two years. Few examples
4. Perennials
   - Perennial weeds are capable of living more than two years

Optimum control timings depends on weed lifecycle

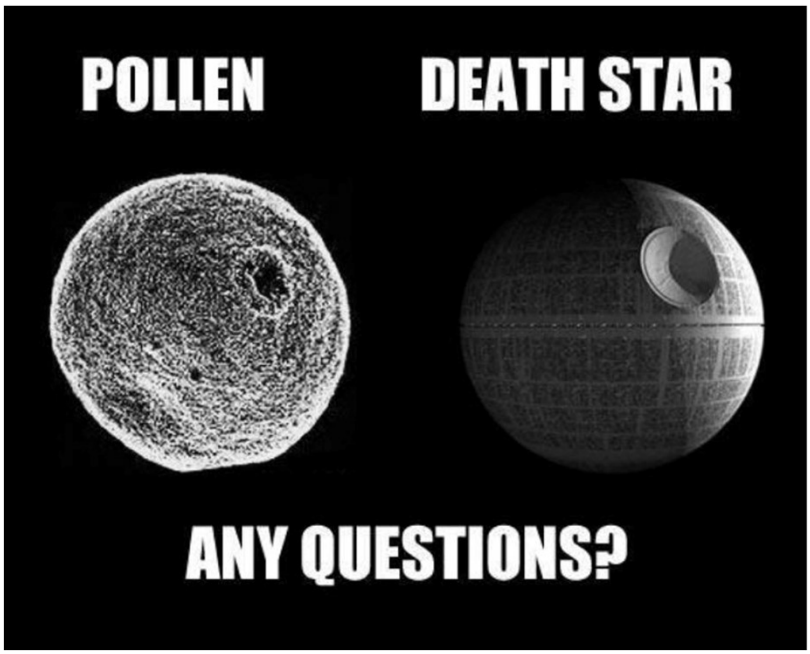
- Winter annuals
  - Sept. – Nov. optimum control window
  - Should I apply a herbicide in the spring?
- Summer annuals
  - When at seedling stage (May-June)
- Biennials
  - When in first growing season (rosette stage)
    - Only reproduces by seed
- Perennials
  - Fall management works best!
  - Late Sept. through mid-Nov. is best
    - Depending on temperatures
  - Second best timing is mid-March through May

Annual weed management

- Prevent seeds from entering/forming
- Easier to manage weeds when they are young
- Competition from desirables can be VERY EFFECTIVE
  - Limit the amount of open space for germinating weeds
    - Turf, xeriscapes, garden mulch, etc.
- Wide range of tools available for management

Perennial weed management

- Prevent establishment
  - Seeds from forming
  - Continually reduce stored energy in perennial vegetative structures
    - Ex: digging up taproots
- EARLY DETECTION AND RAPID RESPONSE!!
- Thorough understanding of biology
  - Optimize management methods
- IWM is essential for adequate management
- Long-term management required if population is allowed to establish


POLLEN
DEATH STAR
ANY QUESTIONS?