

Weed Management in the Home Landscape

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Some resources listed on VMS – Garden Notes

350 – Weed Management

[PDF: WEED MANAGEMENT SECTION](#) (contains all of the following in a single PDF document)

[#350, References and Study Questions: Weed Management](#) (useful, but needs updating)

[#351, Weed Management](#) (useful; basics of weed management – what we'll talk about today)

[#352, Weed Identification](#) (not useful; no photos and not a key; better stuff later today)

[#353, Weeds Associated with Specific Environments and Cultural Conditions](#) (useful; will talk about later)

2



Keys to Managing Weeds in the Landscape

- Know and understand the enemy (why weed ID is important!)
- Understand WHY your “system” allows weeds to invade
- Develop weed management strategies for your system (prevention and control)
- Understand the types of weed management strategies (preventive, cultural, mechanical, biological, chemical)
- Observe and adapt (plant/soil systems and their weeds change over time)
- Learn...study...experiment
- Evaluate – rationally and honestly – your management strategies

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Keys to Managing Weeds in the Landscape

Know and understand the enemy!

- What is a weed? What makes a plant “weedy”?
- What plant characteristics or adaptations are used by weeds to invade and become problematic in your vegetable garden, lawn, driveway, flower bed, tree circle, gravel mulch bed, etc.?
- Why is it important to identify this plant that is being weedy?
- How do you identify a plant unknown to you? What are some good weed ID resources?

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What don't we like about these plants we call weeds?

- Plant out of place
- Plant that interferes with human or animal activities in some way
- Plant possessing negative characteristics that outweigh positive characteristics
- Plant that is **unattractive**
- Plant that **competes** with desirable plants for water, space, light, and nutrients
- Plant that can be **poisonous** or produces **painful** structures (thorns, spines, hairs)
- Plant that can cause **allergies/allergic reactions**
- Plant that creates a **fire hazard**
- Plant that **attracts other pests** or serves as an alternate host for another pest
- Plants which can become **invasive** in natural habitats, disrupting natural ecological processes and negatively impact native ecosystems



Wild violet



Puncture vine



Jimson weed

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Why are weeds a constant and common problem in our landscapes?

- Produce large numbers of seeds
- Able to reproduce vegetatively via stolons or rhizomes
- Seeds are able to remain dormant, in the soil for long periods of time.
- Seeds have specialized structures for transport, for example burrs to cling to animals.
- Exhibit allelopathic properties (Produces chemicals that inhibit the growth of other plants).
- It is more "ecologically fit" than other plants in lawns and gardens
- Often adapted to disturbed soil/sites common in urban landscapes
- May not have insects and diseases to keep them in check (non-native species)
- May be better competitors for light, nutrients or sun



Foxtail



Quackgrass

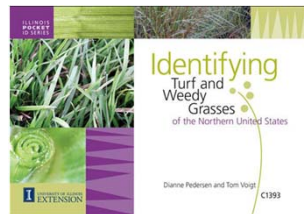
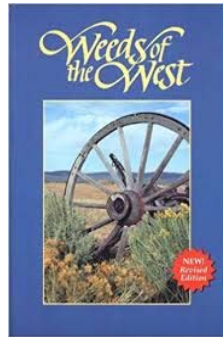


Bindweed

6

Weed Identification Resources

- Books
- Apps
- Other people who know plants!



University of Missouri Offers Weed ID App

Name of App: ID Weeds
 Developer: University of Missouri Extension
 Availability: iPad, iPhone, iPod touch, Android
 Cost: Free
 Intended Audience: Anyone in Missouri who needs to identify a weed
 Purpose of App: To assist individuals with identifying a plant they believe may be a weed
 Description: Upon starting ID Weeds, the user has four options. The first is to "Identify a weed." The second through fourth options are "Search for a weed," "View weed list," and "About ID Weeds." These last three are self-explanatory as to their function. Perhaps the best feature in my mind, though, is the "Identify a weed" option. It will start by asking if you have a grass or grass-like plant or a broadleaf weed. After

To Download

- Apple
- Android

Division of Plant Sciences
 University of Missouri

Weed ID GUIDE

Home | Weed Key | Search by Name | MU Weed Science

PLANT TYPE

Broadleaf | Grass or grass-like

Start Over

results
 443 Records Found

Common Name
 Latin Name
 Alligatorweed

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Weeds of California and Other Western States

Publication Number: 3488
 Copyright Date: 2007
 Length: V1 848 pp. V2 912 pp.
 Language: English
 ISBN-13: 978-1-879906-69-3
 Author: JOSEPH M. DITOMASO
 Inventory Type: Paperback

This easy-to-use 2-volume set is the most comprehensive guide available. Includes a CD of every photograph in the book; perfect for presentations.

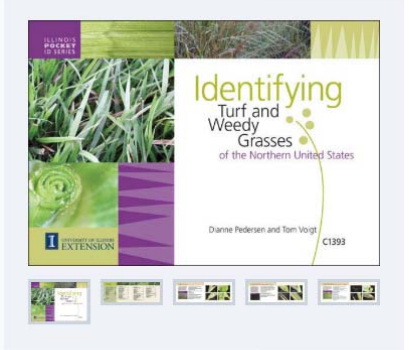
Read more...

AVAILABILITY: Available

\$65.00 - 1 +

<https://anrcatalog.ucanr.edu/Details.aspx?itemNo=3488>

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Gardening / Horticulture

Identifying Turf and Weedy Grasses of the Northern United States

\$6.75 # C1393

Option: **Single Copy**


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Qty:

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Buy now

<https://pubsplus.illinois.edu/product/identifying-turf-and-weedy-grasses-of-the-northern-united-states/single-copy>

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University of Missouri Offers Weed ID App

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To Download

- [Apple](#)
- [Android](#)



View in iTunes
 This app is designed for both iPhone and iPad
 Free

Weed/Plant Identification Apps

- U. Missouri Weed ID app (ID Weeds)
- PlantNet
- LeafSnap
- iNaturalist

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University of Missouri Weed ID Website

<https://weedid.missouri.edu/weedKey.cfm>

 Division of Plant Sciences
University of Missouri

Weed Id GUIDE

Home

Weed Key

Search by Name

MU Weed Science

PLANT TYPE



Broadleaf



Grass or grass-like

select

Start Over

results

461 Records Found

Common Name

Latin Name

Alligatorweed

American Bellflower

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LIFE SCIENCES

Weed Identification

Below are weeds commonly submitted to the Virginia Weed Identification Clinic. Narrow the list by choosing characteristics that match your unknown plant or search for plants by name. Please contact your local Extension office if you cannot identify your weed. Comments can be emailed to WeedID@vt.edu

Search by plant or family name

OR

Select characteristics below to narrow the plant list

Plant type

Broadleaf



Grass or grass like



Order the list by common or scientific name

Common Name Scientific Name

Common name

(747 weeds)
absinthe
Adam and Eve orchid
air yam
allegheeny monkeyflower
alligatorweed
American barberry
American basswood
American beautyberry
American beech
American black elderberry
American bur-reed
American burnweed
American cancer-root
American climacium moss
American climbing fern

Grass key often leads to wrong species – or nothing at all! Works well for broadleaf weeds.

<https://weedid.cals.vt.edu/index/>

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The banner features the Pl@ntNet logo at the top left. A navigation menu at the top right includes links for PARTICIPATE, DOWNLOAD, NEWS, CONTACT, PRESS, DONATE, API, and a French flag icon. The main visual is a hand holding a smartphone displaying the app's interface. The app screen shows the text "ONE PICTURE" in large white letters, followed by the subtitle "With the Pl@ntNet app, identify one plant from a picture, and be part of a citizen science project on plant biodiversity". Below the subtitle are two buttons: "MORE" (green) and "SUPPORT US" (orange). The app screen also displays a plant image and the name "Echinacea penduliflora Wild ex".

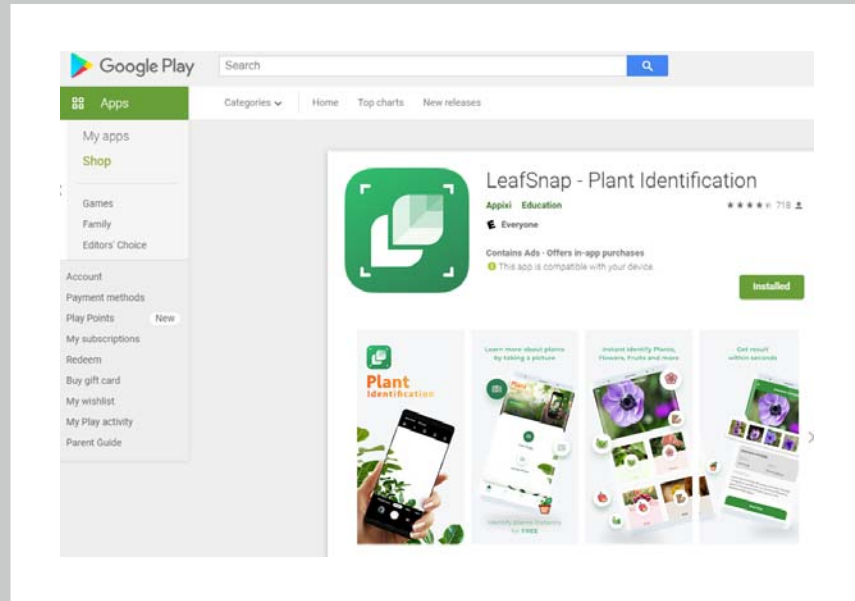
Download on the **App Store** GET IT ON **Google Play** **Pl@ntNet** Online Version

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The web interface shows the Pl@ntNet logo and "World flora" with "21777 species 2218312 images". Navigation links include "Identify", "Explore", "Contributions", and "Login". Below this are "Query" and "Hints" tabs. The main area features a large grey box with icons for a flower, leaf, wood, and fruit, and the text "ADD / DROP AN IMAGE" and "or add an url". At the bottom, there are two buttons: "IDENTIFY" (green) and "NEW QUERY" (blue).

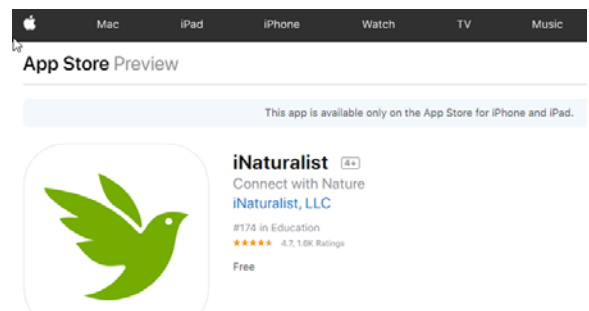
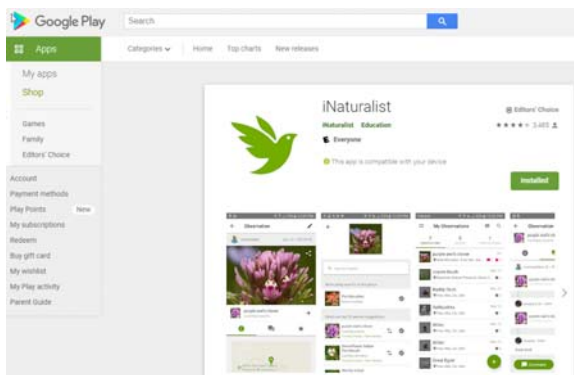
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LeafSnap (both Android and iOS versions)



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iNaturalist



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Home ▾ Animals ▾ Brands ▾ Conservation ▾ ICS ▾ Labs ▾ Markets ▾ Plants ▾ State Fair

Conservation ▾ Noxious Weeds

Noxious Weeds

The aim of the Noxious Weed program is to control noxious weeds, the non-native aggressive invaders that replace native vegetation, reduce agricultural productivity, cause wind and water erosion and pose an increased threat to communities from wildfire. We do this by preventing the introduction of new invasive species; eradicating species with isolated or limited populations and containing and managing those invasive species that are well-established and widespread.

To accomplish these goals the program coordinates the efforts of local, state and federal noxious weed managers; provides funding for local entities to carry out on-the-ground weed management projects; conducts education and outreach activities and supports similar local activities; and maintains close contact with neighboring states and counties to prevent the interstate spread of noxious weeds.

What's New

NEW! Funding Available for Boot Brush Kiosk! [Application and Information](#)

Noxious Weed Advisory Committee seats available. Nominations due December 10th. [Learn more.](#)

Alert! [Flowering rush](#) was recently found in Grand Junction in a tributary to the Colorado River! Keep your eyes out for this incredibly noxious weed, and [report](#) any sightings.

[Results of Stakeholder Input to Noxious Weed Listing Standards.](#)


<https://www.colorado.gov/pacific/agconservation/noxiousweeds>

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List A Weeds

- African rue (*Peganum harmala*)
- Cypress spurge (*Euphorbia cyparissias*)
- Dyer's woad (*Isatis tinctoria*)
- Mediterranean sage (*Salvia aethiopsis*)
- Myrtle spurge (*Euphorbia myrsinites*)
- Orange hawkweed (*Hieracium aurantiacum*)
- Tansy ragwort (*Senecio jacobaea*)

Designated for eradication because they are not widespread



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List B Weeds

- Black henbane (*Hyoscyamus niger*)
- Canada thistle (*Cirsium arvense*)
- Chinese clematis (*Clematis orientalis*)
- Common teasel (*Dipsacus fullonum*)
- Dame's rocket (*Hesperis matronalis*)
- Houndstongue (*Cynoglossum officinale*)
- Leafy spurge (*Euphorbia esula*)
- Moth mullein (*Verbascum blattaria*)
- Oxeye daisy (*Chrysanthemum leucanthemum*)
- Quackgrass (*Elytrigia repens*)
- Russian-olive (*Elaeagnus angustifolia*)
- Salt cedar (*Tamarix* spp.)
- Venice mallow (*Hibiscus trionum*)
- Wild caraway (*Carum carvi*)
- Yellow nutsedge (*Cyperus esculentus*)
- Yellow toadflax (*Linaria vulgaris*)



These weeds have discrete populations and will be **managed** to stop their continued spread, or eradicated in certain areas

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Dame's rocket (*Hesperis matronalis*) dominating a home landscape

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List C Weeds

- Chicory (*Cichorium intybus*)
- Common mullein (*Verbascum thapsus*)
- Common St. Johnswort (*Hypericum perforatum*)
- Downy brome (*Bromus tectorum*)
- Field bindweed (*Convolvulus arvensis*)
- Puncturevine (*Tribulus terrestris*)
- Redstem filaree (*Erodium cicutarium*)
- Velvetleaf (*Abutilon theophrasti*)

These weeds are already very widespread, and **not required** to be controlled; however education and research continue on these species.



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Keys to Managing Weeds in the Landscape

Understand WHY your “system” allows weeds to invade

- Where do weeds come from?
- What kind of “niches” allow weeds to invade?
- What is the soil weed seed bank? How can understanding the weed seed bank help with weed management?
- How does competition work to reduce weed pressure?
- How does mulch reduce weed invasion? Does mulch work to prevent all weeds?

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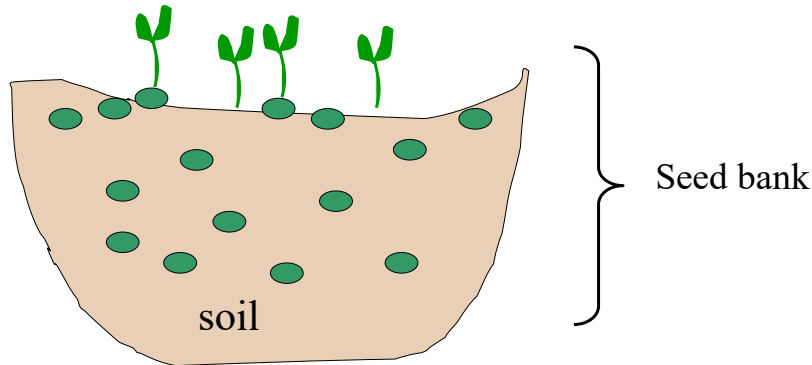
How do Weeds Get into Your Landscape?

- They have always been there...the “seed bank”
- Weeds going to seed (add to the seed bank)
- Brought into garden in manure and soil amendments or with “garden” soil or “topsoil”
- Deliberate introduction – YOU planted them! (in seed, planted as ornamental plants)
- Move from neighboring properties (wind, creep)
- In “irrigation” water (ditchwater)
- Brought into garden by humans, pets, animals, equipment

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The Soil Weed Seed Bank

- A weed seed bank builds up as a weed drops seed into the soil over many years – seed can remain viable for years
- Persistence and vigilance are keys to depleting the seed bank



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The Weed Seed Bank

	<u>Number of seeds produced per plant</u>
Dandelion	15,000
Canada thistle	680
Curly dock	29,500
Lamb's quarter	72,450
Mullein	223,200
Pigweed (rough)	117,400
Purslane	52,300

	<u>Viability of buried seed</u>
Black mustard	50 years
Curly dock	80 years
Foxtail	30 years
Mallow	20 years
Plantain	40 years
Shepherd's purse	35 years



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Seed Dispersal

- Major agents in the dissemination of weeds are wind, water, and animals.
- Wind distribution is facilitated by structural modifications of the seed and fruit.
- Seeds lacking in dispersal adaptations are spread by surface runoff, streams, drainage and irrigation water.
- Seeds pass through the digestive tracts of animals without loss of viability.
- Humans still remain the primary agent in the dispersal over long distances.



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Does the composting process kill weed seeds?
Well, it depends...



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Compost Temperatures and Duration Required to Kill Weed Seeds

	Temperature (°F)			
	140	122	115	108
	time required to kill 90% of seeds (hours)			
Annual sowthistle	<1.0	2.1	13.3	46.5
Barnyardgrass	<1.0	5.4	12.6	unaffected
London rocket	<1.0	4.0	21.4	83.1
Common purslane	1.3	18.8	unaffected	unaffected
Black nightshade	2.9	62.0	196.6	340.6
Tumble pigweed	1.1	107.0	268.5	unaffected

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Introduced ornamentals can become weed problems under the right conditions – but may not be problematic in other situations/regions.



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Six new plants, trees added to Minnesota's 'noxious weed' list

The list sets out how the weeds must be controlled to prevent spread.

ADAM UREN · JAN 30, 2020

[f](#) [t](#) [p](#)

Japanese honeysuckle (*Lonicera japonica*), which is categorized as Prohibited Eradicate.




The Minnesota Department of Agriculture has announced that six weeds have been added to the state's "noxious weeds" list.


The list is updated three years, and identifies weeds that may be harmful to public health, the environment, roads, crops, livestock or other property.

Weeds are placed into four categories: Prohibited Eradicate, Prohibited Control, Restricted, and Specially Regulated (definitions below).

Norway maple (*Acer platanoides*), which is designated as Specially Regulated



Winged burning bush (*Euonymus alatus*), which is Specially Regulated.



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Keys to Managing Weeds in the Landscape

Develop weed management strategies for your landscape systems

- Prevention vs. control
- Understand life cycles: annual, biennial, perennial
- What are some weed prevention strategies?
- What are the basic types of control strategies?
- Why is timing of prevention/control strategies so important when managing weeds?
- Can organic weed management work? Are there effective natural products/biological controls for all weed problems?



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Weed Life Cycles

To control weeds, you need to know and understand their life cycles



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Annual Weeds in the Home Landscape

Summer Annual Weeds

- The seed germinates in the spring, plant develops and produces seed during the summer, dies with killing frost in the fall
- Crabgrass, foxtail, puncture vine, purslane, lambsquarter, pigweed



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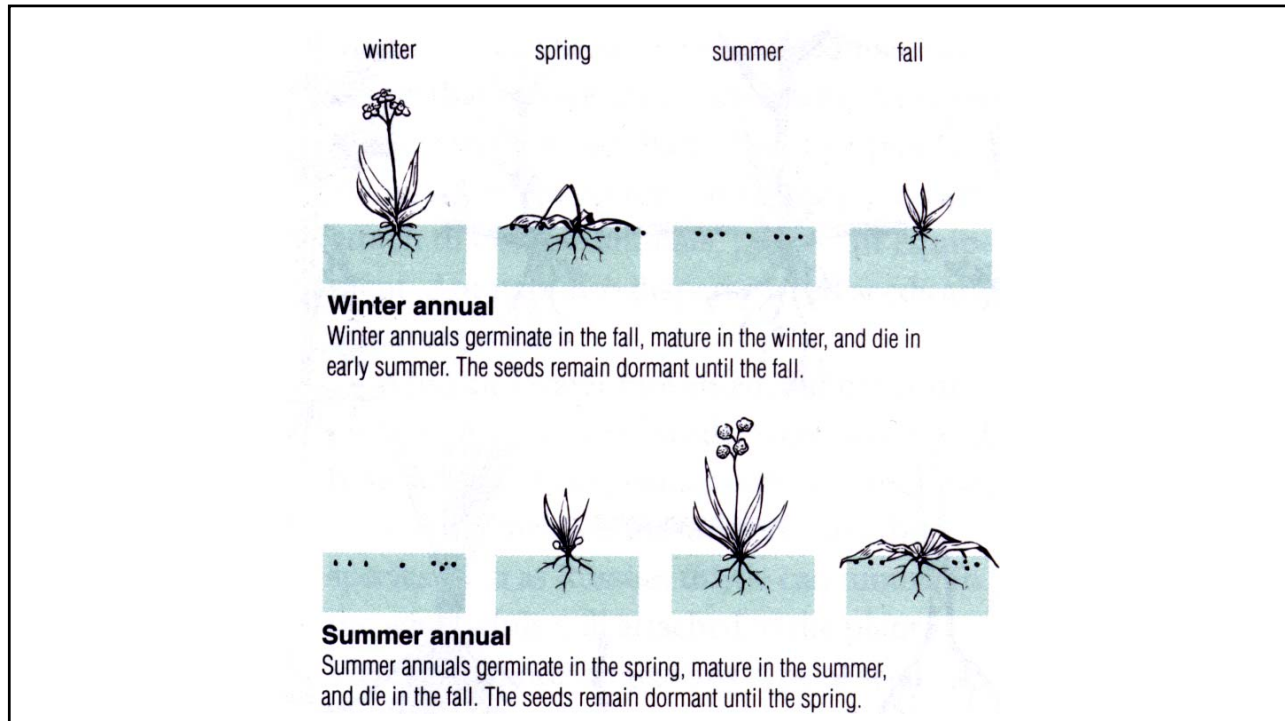
Annual Weeds in the Home Landscape

Winter Annual Weeds

- Germinate in late summer or fall; live over winter as small plants, forming tufts of leaves or rosettes
- Resume growth in spring, mature (and forms seed) early in the summer.
- Die in late spring/early summer heat
- Downy brome (cheatgrass), Shepherd's purse, mustards, henbit, chickweed



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Keys to Controlling Annual Weeds

- Preventing seed production
- Depleting the seed bank
- Preventing germination
- Competition (from other plants, mulch) will help prevent seed germination and seedling development
- Winter annuals must be controlled before seed set in early summer
- Summer annuals must be controlled before seed set in mid to late summer or early fall
- The use of herbicides at the end of an annual's life cycle is often ineffective – and does not make sense!



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Downy bromegrass (aka cheatgrass)

- A winter annual
- Photo taken in late May
- What can you do at this point to “break the life cycle”?



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Biennial Weeds in the Home Landscape

Dicot plants with a 2-year life cycle

- Vegetative growth the first year
- Flower, produce seed and die in the second year

Bull thistle
Queen Anne's Lace
Sweet clover
Burdock
Teasel
Mullein



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Perennial Weeds in the Home Landscape

SIMPLE perennials propagate by seed, form a crown and rosette of leaves and a taproot.

Dandelion
Plantain
Curly Dock

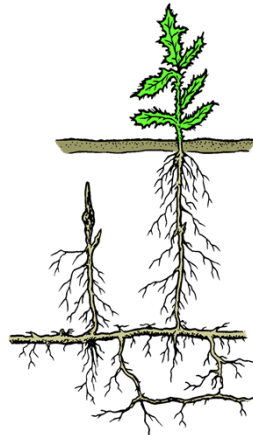


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Perennial Weeds in the Home Landscape

CREEPING perennials propagate by seed, creeping aboveground stems (stolons), and/or creeping underground parts (rhizomes).

Quackgrass
Bermudagrass
Canada thistle
Bindweed



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Keys to Controlling Perennial Weeds

Key to control is to prevent seed production and to kill the plant

Perennials have a more extensive root system than annuals, making them more difficult to control



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Keys to Managing Weeds in the Landscape

Understand the types of weed management strategies

- **Prevention**
Weed-free soil/manure/compost; weed-free seed; avoid weedy plant introductions
- **Cultural**
Cover cropping, irrigation management, fertility, mulch
- **Mechanical**
Tillage/hoeing, pulling, mowing, solarization, flaming, steaming
- **Biological**
Insects, pathogens, grazing
- **Chemical**
Herbicides (synthetic and “natural”)

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Cover Cropping for Weed Management

Building Healthy Soils in Vegetable Gardens: Cover Crops Have Got It Covered

Megan M. Gregory
Email: meganmgregory1@gmail.com; Website: <http://blogs.cornell.edu/jee/>

These articles were published as a four-part series by the Garden Professors extension Community of Practice at: <http://blogs.extension.org/gardenprofessors/>. This document contains all four articles; all references have been gathered into a single list at the end. Individual articles include:

- [Part I: Introduction to Cover Cropping](#)
- [Part II: Types of Cover Crops — Non-Legumes, Legumes, and Mixtures \(oh, my!\)](#)
- [Part III: Selecting Cover Crops for Vegetable Gardens](#)
- [Part IV: Planting and Managing Cover Crops in Vegetable Gardens](#)

***** Part I: Introduction to Cover Cropping

What are cover crops, anyway?

Cover crops are close-growing plants sown in rotation with food crops, or inter-seeded between food crops to cover bare ground. They are not harvested, but rather are planted to improve soil quality and provide other benefits for crop production and the environment. Before planting the next vegetable crop, most cover crops need to be cut down. The shoots can be chopped (or mowed) and left as mulch on the soil surface, or incorporated into the soil.

There is a large body of research supporting the use of cover crops on organic and sustainable farms.¹ However, vegetable gardeners can successfully plant and manage cover crops with hand tools, and reap the benefits of this practice for their soil and crops.²



Figure 1. Rye and vetch cover crop in a community garden plot in Ames, just before it was cut down and mulched in preparation for planting vegetables. Photo credit: M. Gregory.

<https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/3/1229/files/2015/05/Garden-Prof-Cover-Crop-Series-1ivs0n9.pdf>



Cover crops and green manures in home gardens

[Home](#) > [Yard and garden](#) > [How-to](#) > [How to manage soil and nutrients in home gardens](#) > [Cove](#)

Cover crops form a living mulch in gardens because they grow thickly among each other. They help reduce soil splash and erosion, and keep weeds in check.

Cover crops are “green manures” when a gardener turns them into the soil to provide organic matter and nutrients. Green manures include legumes such as vetch, clover, beans and peas; grasses such as annual ryegrass, oats, rapeseed, winter wheat and winter rye; and buckwheat.



White clover

Planting cover crops

Some gardeners sow cover crops plants in spring, especially in new garden plots to improve the soil and choke out weeds. In established vegetable or flower gardens, plant a green manure early in the season to improve the soil. After you turn it under, plant warm-season vegetables, bedding plants or container-grown perennials.

<https://extension.umn.edu/how-manage-soil-and-nutrients-home-gardens/cover-crops-and-green-manures>

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Johnny's
Selected Seeds

VEGETABLES FRUITS FLOWERS HERBS FARM SEED TOOLS & SUPPLIES ORGANIC FEATURED SALE GROWER'S LIBRARY

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- ASK A GROWER
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- HERB LIBRARY
- FARM SEED LIBRARY
- FRUIT LIBRARY
- ORGANIC GROWING

The COVER CROP Decision-Making Process

Above, Johnny's stalling crew transplants tomato seedlings in between rows of hairy vetch and clover at "The Maple Palace" Stirling Fields, Milton, Maine, in early June.

ON THIS PAGE

- Step 1 - What Are Your Goals?
- Step 2 - What's Your Timing?
- Step 3 - Got equipment?
- Step 4 - Where Do You Live?
- Step 5 - Now Plant & Track

U.S. COOPERATIVE EXTENSION SERVICE

Find Your Local Cooperative Extension Office / Land Grant University [LGR]

Contact Jason Lilley, University of Maine Cooperative Extension Service

5 Steps for Deciding What to Plant When & Where

Adapted courtesy of Jason Lilley, Sustainable Ag Professional, U Maine Cooperative Extension

ADDITIONAL COVER CROP PLANNING TOOLS & RESOURCES

<https://www.johnnyseeds.com/growers-library/farm-seed-cover-crops/cover-crop-decision-making-5-steps.html>

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Farm Seed / Cover Crop Mixes

COVER CROP MIXES

FALL GREEN MANURE

SPRING GREEN MANURE

FILTERS

SEED TYPE

- Open Pollinated
- Organic Seeds, Plants, and Supplies

FEATURED

USE

Sort By: Please Select One ▾

1 - 3 of 3

Cover Crop Mixes

Johnny's offers the convenience of precombined crop mixtures for both spring and fall planting. These mixes can be used as a green manure incorporated into the soil or to provide winter erosion control.

Farm Seed & Cover Crops | Dynamic Comparison Chart

Spring Green Manure Mix Organic Cover Crop Seed GG

Enriches the soil with both nitrogen and organic matter.

Peas and Oats Mix Organic Cover Crop Seed GG

Easy to manage cover crop.

Fall Green Manure Mix Cover Crop Seed

Versatile choice for late summer and fall planting.

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CO-Horts

Friday, October 4, 2013


Cover Crops: They look cool and serve a purpose

Posted by: Alison O'Connor, horticulture agent, Larimer County Extension


As the weather cools, my thoughts turn to comfort food, good books, warm fires...and cover crops? Ok, I never really gave planting a cover crop in my garden a second thought, until my poor veggies were smushed to smithereens in August from hail. With my garden sitting fallow and sad...and the fact that I've never tilled, amended or fertilized my garden...I decided to plant a cover crop.

What's the purpose you ask? Well, the [Colorado Master Gardener site](#) has an excellent publication that will answer your questions. But essentially, I did it out of sheer curiosity and to do a good thing for my soil and plants next year (free nitrogen from the legumes!). Lesson learned: planting a cover crop is really easy. Easier than growing tomatoes, that's for sure.

So here's what I did...enjoy the photographs!



Provided by CSU Extension



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<http://csuhort.blogspot.com/2013/10/cover-crops-they-look-cool-and-serve.html>

50

Drip Irrigation as a Weed Management Tool?



51

Mulch for Weed Prevention

- Inhibits weed seed germination – reduces seedling weed survival
- Reduces evaporation from soil surface, cutting water use by 25 to 50 percent
- Organic mulches improve soil tilth and help lessen soil compaction
- Stabilizes soil moisture
- Prevents soil compaction
- Moderates soil temperature extremes
- Controls erosion
- Gives a finished look; aesthetics



52

Wood/Bark Chip Mulch

- Wood or bark chip mulch is great around trees, shrubs, perennials, and small fruits
- In perennial and shrub beds, wood/bark chips can reduce the need for irrigation by as much as 50%
- More difficult to use in vegetable beds (seeding; N immobilization/C:N)



53



54

Grass Clippings as Mulch

- Grass clippings make good mulch when applied in thin layers and allowed to dry between applications
- Add additional layers each week the lawn is mowed
- With a few layers, weed seed germination will be checked
- Grass clippings decompose rapidly, requiring additional layers during the growing season
- A grass clipping mulch recycles its nutrients into the garden bed
- Do not use grass clippings from lawns that have been treated with herbicides or other pesticides, for at least four weeks after application



55



56

Straw as Mulch?

- OK if clean...if not...can be weed source
- Can result in nitrogen deficiency



57

Herbicide-Contaminated Grass Clippings, Manure, and Compost

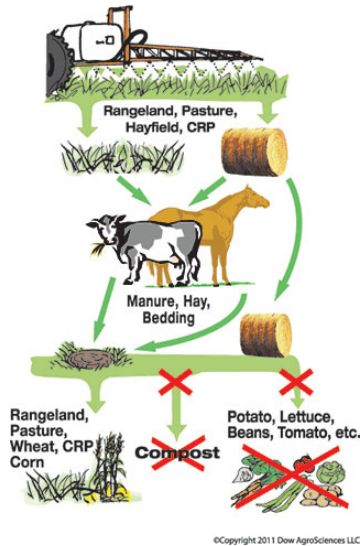


- Clopyralid (especially) and other postemergence herbicides can persist through composting
- Fresh grass clippings from lawns where postemergence broadleaf herbicides have been applied, then collected and used for mulch or compost, can be extremely damaging
- Milestone (aminopyralid) in manure and compost made from manure or hay

58

Milestone (aminopyralid)

Forage and Manure Management



59

Newspaper Under Mulch

- Newspapers make a good underlay for a wood/bark chips or grass mulch
- The newspaper shuts out light, giving a quick stop to germinating weed seeds that were brought to the surface during cultivation for seed bed preparation
- Apply newspapers only one to two sheets thick and top with wood/bark chips or grass to hold it in place
- Any remaining newspaper may be cultivated into the soil in the fall
- Newspapers are printed with soy-based inks and are safe for use



60

Plastic Mulch

- Colored plastic will kill weeds more effectively than clear
- May enhance plant growth
- Will warm soil
- Can conserve water
- Can cause excessive soil wetness
- May encourage slugs and some insect pests
- May provide cover for rodents



61



62



63



64



65



66



67



68



69



70



71



72



73



74



75



Which way was the wind blowing that day???

76

Healthy Turf is a Living Mulch



77

Mechanical Weed Control in the Vegetable Garden

- Pulling
- Cultivation (tilling, hoeing)
- Solarization
- Flaming



78

Solarization

- Using solar energy to sterilize the soil
- Alternative to using herbicides for weed control
- Will kill living grass (to convert lawn to garden)
- Will kill some weed seeds
- Will kill insects and some fungi
- Temperature of soil when done in summer may reach 108° to 131°F at a depth of 2 inches and 90° to 99°F at 18 inches
- Control of soil pests is usually best in the surface 6 inches of soil
- Also effective for raised beds



<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74145.html>

79

Solarization



- Use CLEAR plastic (1-4 mil)
- Black plastic is less effective (unless cool)
- Water soil/turf well before laying plastic
- Seal/weight down edges with soil/sod
- Leave 4-6 weeks when hot, 8-10 weeks in cooler weather



80

Solarization to Kill Lawn

- Use CLEAR plastic
- Saturate lawn and soil before covering
- Seal edges with sod
- Leave plastic on for 4-8 weeks
- Works best June-August period
- Works best in full sun
- Sterilizes surface 3-6 inches
- Leave dead grass; avoid tillage to avoid weed seed bank disturbance
- Plant seed/plugs into dead turf; remove dead turf to plant sod
- Rhizomatous weeds (bermudagrass, bindweed) may not be killed – or can move back in from borders

See U. California IPM website for more information on solarization
<http://ipm.ucanr.edu/PMG/PESTNOTES/pn74145.html>



81

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82

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See U. California IPM website for more information on solarization
<http://ipm.ucanr.edu/PMG/PESTNOTES/pn74145.html>

83

Weed Flaming

- Works best on SEEDLING weeds
- Ineffective on mature perennials – unless repeated many times
- There is the obvious potential for unintentional fires



Home Resource Areas eXtension.org

Video Clip: Flame Weeders from Vegetable Farmers and their Weed Control Machines

Organic Agriculture August 30, 2018 Print

Source: Vegetable Farmers and their Weed-Control Machines [DVD]. V. Grubinger and M.J. Elise. 1996. University of Vermont Extension. Available for purchase at <http://www.uvm.edu/vtvegandberry/Videos/weedvideo.htm> (verified 31 Dec 2008).

This is a Vegetable Farmers and their Weed Control Machines video clip.



<https://articles.extension.org/pages/58694/video-clip:-flame-weeders-from-vegetable-farmers-and-their-weed-control-machines>

84

Flaming Weeds



85

Steam Weeding

- Non-selective, thermal weed control
- Used frequently for weed control on hardscapes, bricks, sidewalks, drives, etc.
- Also gaining popularity in organic crop production (high value crops like vegetables, hops)

<https://www.youtube.com/watch?v=E71TRCQg5us>



86

Biological Management of Weeds

- Use of insects, fungi or other organisms that selectively feed upon specific weed species
- Eradication is rarely achieved
- Biocontrol is self-regulating: as the weed population increases, so does the insect population. As the weed population decreases due to the insect, the insect population also decreases. A balance is hopefully attained where the weed and insect populations are held at a low level.
- Pros
 - little labor
 - environmentally friendly
- Cons
 - not always effective
 - does not totally eradicate weeds
 - may be slow

Biocontrol for Weed & Insect Pests

The Insectary has ongoing biological control programs for many noxious or problem weed species including:

Bull thistle



Canada thistle



Dalmatian/Yellow toadflax



Diffuse / Spotted knapweed



Field bindweed



Leafy spurge



Musk thistle



Puncturevine



87

Insects as Biological Controls

Use of carefully screened insects to attack portions of the weed (stems, seeds, flowers, etc.)

Bindweed mite

Leafy spurge flea beetle

Thistle stem gall fly

Knapweed flower beetle

Puncture vine seed weevil



88

Biocontrol

Biological pest control helps decrease agriculture's reliance on chemical pest control. The Insectary imports, rears, establishes, and colonizes new beneficial organisms for control of specific plant and insect pests. Successful biological pest control reduces production costs, decreases amounts of chemicals entering the environment, and establishes colonies of beneficial insects offering a natural permanent pest control solution.

[Contact the Insectary](#)

Weed and Insect Programs

Approximately 30 weed predators are being cultured, released, and established on weed infestations throughout the State. In addition to the biological weed control programs, this section conducts control programs for the alfalfa weevil, and Oriental fruit moth, with a total of twelve beneficial species. The main function of the Biological Pest Control Section is the rearing and releasing of natural enemies for control of specific plant and insect pests. To request biological pest control please contact our office. This section also acts as the State's receiving station for biological control agents. New biological control programs are being developed primarily by agencies of the United States Department of Agriculture. Foreign exploration produces several new species each year that are known to control introduced plant and insect pests. These exotic species are exposed to a strict quarantine procedure before they become available to cooperating states for general release. This ensures that potentially hazardous species are not accidentally introduced with the beneficial insects.

[View Fees & Request A Bug](#)

<https://www.colorado.gov/pacific/agconservation/biocontrol>

89

Request-A-Bug

Fees

Biological pest control agents are seasonally available to help suppress weed and insect pests in Colorado. They can be requested by private landowners in the State, or other governmental agencies concerned with controlling the spread of exotic invaders. Supplies can be limited and vary from one year to the next; thus, the Insectary cannot guarantee a release for each request submitted.

Please **Do Not Send Payment Now** (with your request). We will contact you to arrange for payment and shipping arrangements in season.

For Private Land and Home Owners	
Fee	Description
Varies	Canada Thistle - rust fungus \$50, gall flies \$30
\$30.00	Dalmatian Toadflax
\$30.00	Diffuse Knapweed
\$35.00	Field Bindweed
\$30.00	Leafy Spurge
\$30.00	Musk Thistle
\$30.00	Puncturevine
\$30.00	Russian Knapweed
\$30.00	Spotted Knapweed
\$30.00	Yellow Toadflax

<https://www.colorado.gov/pacific/agconservation/request-bug>

90

Do Bindweed Mites Work?

- *Aceria malherbae*
- The greater the amount of irrigation applied, the lower the success rate
- Choose a non irrigated, dense stand of bindweed for the initial release
- After healthy populations have been established mow the bindweed patch and leave the cuttings to spread the galls to other parts of the patch
- If you expect that ALL of your bindweed problems will disappear, you WILL be disappointed
- If you recognize that your UNIRRIGATED bindweed problem will gradually become more manageable, you will be satisfied with their use



http://www.colostate.edu/Dept/CoopExt/Adams/weed/bindweed_mite.html

91

Herbicide Use: A HUGE Topic

- Herbicide Types
- How They Work
- The Herbicide Label
- Selecting the Right One
- Correct Application
- Herbicide Effectiveness
- Why They Don't Always Work
- Herbicide Safety
- Herbicide Injury to Non-Target Plants



92

What about this combination for weeds?



93

Classification of Herbicides

Timing of Application

Pre-Emergence

- MUST be applied to soil/turf prior to time that weed seeds germinate
- Residual effect may last for anywhere from 4 weeks to 4-6 months



94

Classification of Herbicides

Timing of Application in Weed Life Cycle

Post-Emergence

- Applied directly on the weeds after they are up and growing
- Don't act as a pre-emergence herbicide



95

Classification Of Herbicides

Selectivity

- A **non-selective herbicide** kills or damages all plant life in a treated area (glyphosate/ Roundup)
- A **selective herbicide** will kill weeds without harming desirable plants which may be contacted by the herbicide (2,4-D for control of broadleaf weeds in a lawn)



96

Classification of Herbicides

Mode of Action - CONTACT

- Kills plant parts covered by the herbicide and are directly toxic to living cells
- Little or no translocation or movement of the material through the plant
- Effective against annual weeds but they only "burn off" the tops of perennial weeds

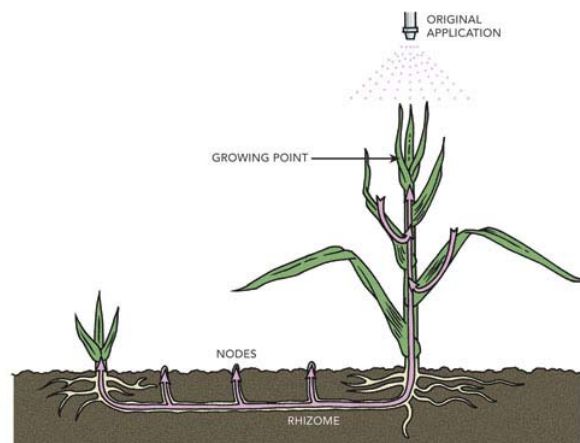


97

Classification of Herbicides

Mode of Action - SYSTEMIC

- Absorbed by either the roots or leaves
- Translocated/moves in the plant
- Effects may not show for a week or more after application



98

GreenMatch[®] EX

Burndown Herbicide

FOR ORGANIC PRODUCTION

- For Control of Grasses and Broadleaf Weeds in Crop and Non Crop Areas
- CONCENTRATED EMULSION
- NO REENTRY INTERVAL
- Ingredients in this product meet the requirements of the USDA National Organic Program



Active Ingredient: Lemon grass oil 50%
 Other Ingredients:* 50%
 Total: 100%
 * Water, Corn Oil, Glycerol Esters, Potassium Oleate and Lecithin



KEEP OUT OF REACH OF CHILDREN CAUTION

See Inside Booklet for Additional Precautionary Statements and directions for use.

This product has not been registered by the US Environmental Protection Agency. Marrone Organic Innovations represents that this product qualifies for exemption from registration under the Federal Insecticide, Fungicide, and Rodenticide Act.

DIRECTIONS FOR USE

Use only according to label instructions. Read the entire label before using this product.

GreenMatch[®] EX is intended for non-selective weed control in and around all crop and noncrop areas. Only protected handlers may be in the application area. Do not apply this product in a way that will contact workers or other persons either directly or through drift. Keep unprotected persons out of treated areas until sprays have dried. To prevent crop damage, apply GreenMatch EX directly on weeds.

GENERAL INFORMATION: GreenMatch EX is a contact, non-selective, broad spectrum, foliar herbicide. This product will only control actively growing emerged green vegetation. It controls both annual and perennial broadleaf and grassy weeds. The degree of control is less when the plants are mature or biennial/perennial types. The product does not translocate. It will affect only those portions of plants that are coated with the spray solution. GreenMatch EX may DAMAGE CROPS; therefore directed spray on weeds or application with hooded spray equipment is recommended to prevent the spray from contacting crop.

99

Factors Affecting Herbicide Effectiveness

- The Weed Leaf
- Climate
- Time of Day
- Age of Weed
- Nutrition
- Cultivation
- Soil Organic Matter
- Soil Texture
- Soil Moisture
- Chemical Compatibility



http://trace.tennessee.edu/cgi/viewcontent.cgi?article=1031&context=utk_agexgard

100

Keys to Managing Weeds in the Landscape

Observe and adapt (systems and their weeds change over time)

- Weed spectrum and intensity will change with the crop you grow, your management of that system, and the age of that system
- How does your management of a system change the types of weeds you experience – or their aggressiveness?
- Do weeds adapt to YOUR management practices?



101

Compacted Soils

- annual bluegrass (*Poa annua*)
- common chickweed (*Stellaria media*)
- goosegrass (*Eleusine indica*)
- knotweed (*Polygonum aviculare*)
- mouse-ear chickweed (*Cerastium vulgatum*)
- prostrate spurge (*Euphorbia supina*)



102

Infertile (Low N) Soils

- black medic (*Medicago lupulina*)
- plantains (*Plantago spp.*)
- white clover (*Trifolium repens*)



103

Dry Soils/Droughty Lawns

- black medic (*Medicago lupulina*)
- dandelion (*Taraxacum officinale*)
- bindweed (*Convolvulus spp.*)
- kochia (*Kochia scoparia*)
- stinkgrass (*Eragrostis cilianensis*)



104

Formerly Agricultural/Farm Land

- barnyardgrass (*Echinochloa crusgalli*)
- bindweed (*Convolvulus spp.*)
- Canada thistle (*Cirsium arvense*)
- foxtail (*Setaria spp.*)
- quackgrass (*Elytrigia repens*)
- smooth bromegrass (*Bromus inermis*)



105

Keys to Managing Weeds in the Landscape

Learn...study...experiment

- If something doesn't seem to work – why keep doing it?
- Be open to trying a different way of managing weeds.
- May not have to use certain practices forever...and probably shouldn't!?
- Encourage people to try SCIENCE-based strategies, tools, new uses for old tools/strategies
- **Why do we NOT recommend/suggest "grandma's/grandpa's weed spray" recipes for weed management?**



106

Weed Management Options for the Vegetable Garden

- Competition
- Mulches
- Mechanical methods
- Herbicides (traditional and “organic”)
- Biological controls
- Container gardening



107

Resources for Weed Management in Vegetable Gardens

- Unofficial fact sheet
Vegetable Garden Weed Management
- Unofficial fact sheet
Natural Herbicides for Landscape Weed Management
- U. Minnesota fact sheet
Controlling Weeds in Home Gardens
<https://extension.umn.edu/planting-and-growing-guides/controlling-weeds-home-gardens#corn-gluten-meal-879562>

108



109

Ability of Vegetable Species to Suppress Weeds

Good

- Squash
- Beans
- Pumpkins
- Cucumbers
- Sweet corn
- Melons
- Irish potatoes
- Sweet potatoes
- Tomatoes
- Broccoli and Cabbage

Poor

- Lettuce
- Carrot
- Pepper
- Greens
- Onions
- Peas
- Radishes
- Beets



110



111



112

Solarization of Raised Beds



- Works best if plastic is close to soil surface
- A double layer of plastic (using plastic bottles as spacers between layers) can raise temperature in soil another 5-10 degrees



113

Herbicides for Use in Vegetable Gardens



Synthetic

- Trifluralin (Treflan, Preen)
- Glyphosate (Roundup, many others)



114

Same Thing? Read the Label!



115

Using Preen Organic (corn gluten meal)

When to Apply

Apply Preen Weed Preventer Organic Vegetable Garden anytime during the growing season around established vegetables, herbs, and fruits. Since this product does not kill existing weeds, you must first remove any that have already begun to grow. When your vegetable sprouts have true leaves and are 2 - 3 inches tall, it is safe to apply this product even up to the day of harvest. By applying Preen Weed Preventer Organic Vegetable Garden as early as possible, you can eliminate the need for hand weeding. Reapply every 4 - 6 weeks.

Since Preen Weed Preventer Organic Vegetable Garden only inhibits sprouting seeds, it can be used with confidence around established plants. However, do not apply on newly seeded areas.

How to Apply

Sprinkle Preen Weed Preventer Organic Vegetable Garden evenly over the entire soil surface, at the rate of 5 lbs. per 250 sq. ft. If you choose, you can use twice the recommended rate for even better control with no fear of burning your plants. Rake lightly into the soil. Immediately water the top 1 - 2 inches of soil to activate the product. Afterwards, do not water for at least 2 - 3 days. If excessive rain occurs, reapplication may be necessary.

116

Table 2. Standard Nitrogen Fertilizer Application Rate for Gardens

	Soil Organic Content		
	Typical garden soil low in organic matter (<2% organic matter)	Moderate level of organic matter (2-3% organic matter)	High levels of organic matter (4-5% organic matter)
Nitrogen needed	0.2 lb. actual N per 100 sq. ft.	0.1 lb. actual N per 100 sq. ft.	0
Fertilizer examples			
Ammonium sulfate 21-0-0	1 lb. fertilizer per 100 sq. ft. (approx. 2 cups)	0.5 lb. fertilizer per 100 sq. ft. (approx. 1 cup)	0
OR			
Ammonium nitrate 34-0-0	0.6 lb. fertilizer per 100 sq. ft. (approx. 1 1/3 cup)	0.3 lb. fertilizer per 100 sq. ft. (approx. 2/3 cup)	0
OR			
Urea, 45-0-0	0.4 lb. fertilizer per 100 sq. ft. (approx. 1 cup)	0.2 lb. fertilizer per 100 sq. ft. (approx. 1/2 cup)	0

5 lbs. of CGM/250 sq ft =
0.2 lbs. N/100 sq ft

2 applications would exceed annual N need by 2X

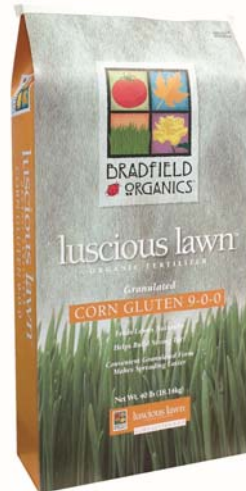
But... "you can apply twice the recommended amount without fear of burning your plants"

And... "reapply every 4-6 weeks"

Could apply as much as 0.8-1.6 pounds of N/100 sq ft if you follow instructions and make 4 applications in a single growing season

117

Corn Gluten Meal (CGM)



118

Studies Documenting Ineffectiveness of CGM for Weed Control in Turf and Vegetables

Kentucky State U

<http://organic.kysu.edu/CGM.shtml>

Oregon State U

<http://extension.oregonstate.edu/gardening/corn-gluten-meal-did-not-prevent-weeds-germinating-osu-study>

Cornell U

<https://ecommons.cornell.edu/handle/1813/42513>

Purdue University

https://turf.purdue.edu/report/2011/PDF/07_AGRY_Patton_crabgrass.pdf

North Dakota State U.

https://www.ag.ndsu.edu/archive/dickins/research/2008/agron_pat/agron08m.pdf

U. California-Davis

<http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=6498>

Washington State University

<https://puyallup.wsu.edu/wp-content/uploads/sites/403/2015/03/corn-gluten.pdf>

119

Herbicides for Use in Vegetable Gardens

Organic

- Soaps
- Acetic acid (“vinegar”)
- Citric acid
- Essential oils
 - clove
 - cinnamon (eugenol)
 - thyme
 - citrus (d-limonine)



120

Scythe Herbicide

(Dow Agrosciences)

- **Non-selective**, contact
- Pelargonic & other fatty acids
- Rapid membrane destruction
- Effective – but not selective
- Signal Word: **Warning**



121

EcoSMART
ORGANIC HERBICIDE

ORGANIC WEED & GRASS KILLER
ORGÁNICO HERBICIDA

KILLS ALL TYPES OF WEEDS & GRASSES

USE ON PAVED & LANDSCAPED AREAS & WHEREVER COMPLETE VEGETATION CONTROL IS DESIRED

ENVIRONMENTALLY SAFE

WORKS FAST!
SEE RESULTS IN HOURS

NET CONTENTS: 64 FL. OZ. (1/2 GAL / 1.89 L)

Active Ingredients:

2-Phenethyl Propionate	5.0%
Eugenol	5.0%
Sodium Lauryl Sulfate	0.05%
Other Ingredients*	89.95%
Total	100.00%

*Water, Potassium Oleate, Sodium Bicarbonate, Lecithins

122


Postemergence Herbicides


Burnout Weed & Grass Killer

- Clove Oil (12%) and sodium laurel sulphate (8%) are the active ingredients
- Inerts: Vinegar, Lecithin, Water, Citric acid, Mineral Oil 80%
- “Made of special blend of vinegar and lemon juices”
- Wilting w/in 20 minutes, dead plants by morning
- **Non-selective**
- But are they REALLY dead?



123



BurnOut II

Fast Acting Weed & Grass Killer

CONCENTRATE

For Non-Selective Control of Herbaceous Broadleaf and Grass Weeds.

DANGER
KEEP OUT OF REACH OF CHILDREN

DANGER: See back panel for additional precautionary statements.

MADE FROM PLANT OILS

ACTIVE INGREDIENTS:	
Citric Acid	24%
Clove Oil	8.0%
OTHER INGREDIENTS:	
Water, Lauric Acid, Sodium Caprylate, Gum Arabic, Xanthan Gum, Sodium Acetate	
Total Other	68%
Total	100%



NET CONTENTS: 2.5 US GALLON (9.46 L)

124



125



126



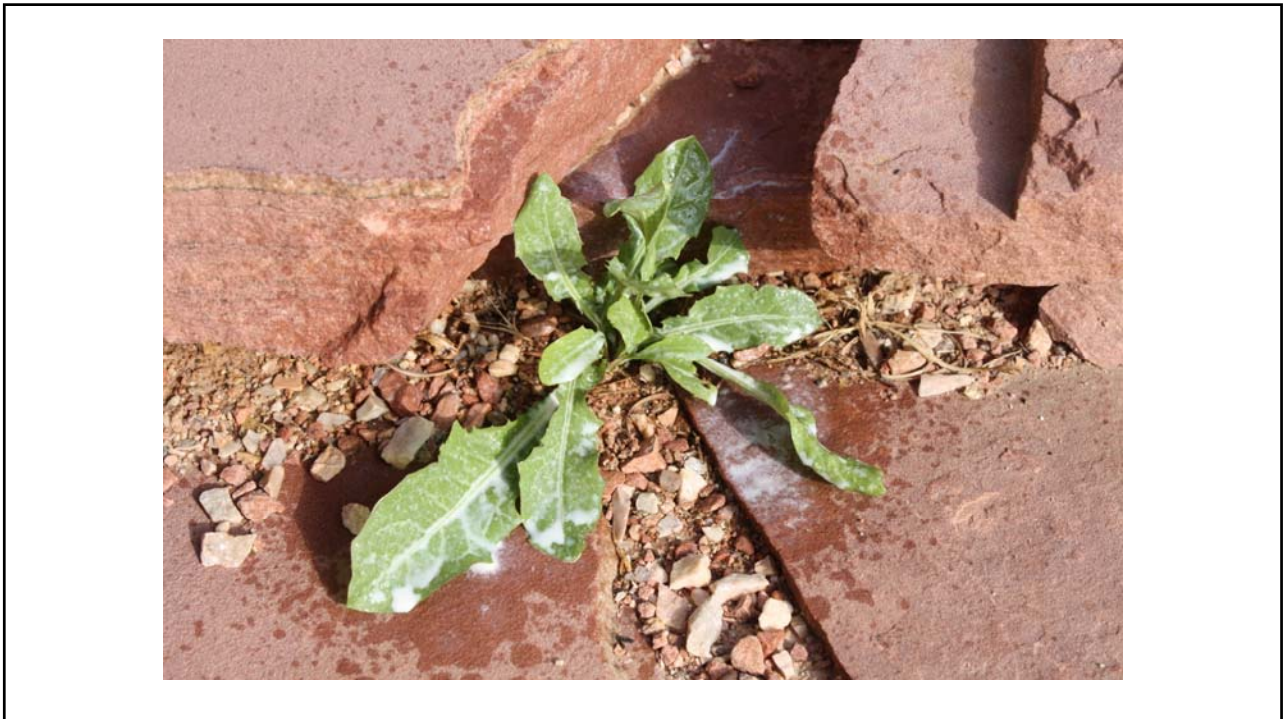
127



128



129



130



131

**KEEP OUT OF REACH OF CHILDREN
DANGER - PELIGRO**

Si usted no entiende, 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. 81936-1-81935
EPA Establishment No. 85804-NC-001
Batch Code: _____

Pharm Solutions, Inc.
2023 E. Sims Way, Suite 355
Port Townsend, WA 98368
www.pharmsolutions.com

Active Ingredients by Wt.

Acetic Acid.....	20.0%*
Other Ingredients.....	80.0%
Total.....	100%

*Equivalent to 200 grain vinegar by titration

FIRST AID

IF IN EYES:
Hold eyelids open and flush with a steady, gentle stream of water for 15-20 minutes.
Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
Call a poison control center or doctor for advice.

IF ON SKIN OR CLOTHING:
Take off contaminated clothing.
Rinse skin immediately with plenty of water for 15-20 minutes.
Call a poison control center or doctor for further treatment advice.

IF SWALLOWED:
Call a poison control center or doctor immediately for treatment advice.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

DANGER: Corrosive - causes irreversible eye damage. Wear goggles or face shield when handling. Harmful if absorbed through skin. Harmful if swallowed. Do not get in eyes, on skin, or on clothing. In case of contact, immediately flush eyes or skin with plenty of water. Get medical attention if irritation persists. Wash thoroughly with soap and water after handling. Wear personal protection equipment when handling and/or applying.

PERSONAL PROTECTION EQUIPMENT (PPE): Applicators and other handlers must wear appropriate protective eyewear, such as face shield or goggles, and face mask (with MSHA/NIOSH approval number prefix such as N-95, R-95, or P-95), long sleeved shirt and long pants, waterproof gloves and shoes plus socks.

USER SAFETY RECOMMENDATIONS: Users must:

- 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:

This pesticide is toxic to birds exposed to spray drift, direct treatment or residues on crops or weeds. Do not apply this product or allow to drift to crops or weeds if birds are actively visiting the treatment area.

This pesticide is toxic to fish and aquatic invertebrates.

For terrestrial use only. Do not apply directly to water.

132

What about Bindweed???

- Perennial
- Spreads MAINLY by underground stems
- Also produces seed
- Repeat applications of glyphosate
- MULCH!!!
- Pull it...pull it...wear it out!
- MUST DEplete ENERGY RESERVES!
 - Prevent photosynthesis
 - Re-growth uses stored reserves
- Bindweed mites?



133



134



135

Lawn Weed Management Resources

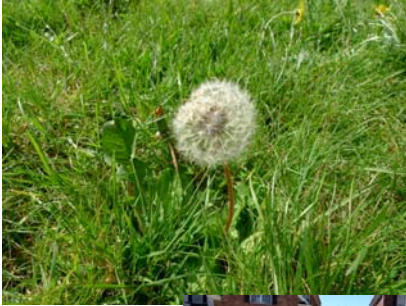
- CMG GardenNotes #551
Basic Turf Management Principles
- CSU Fact Sheet 7.202
Lawn Care
- CSU Fact Sheet 3.101
Control of Annual Grassy Weeds in Lawns
- Unofficial Fact Sheet
Weed Management in the Home Lawn
- *Planttalk*
Numerous short notes on weeds in lawns

<https://planttalk.colostate.edu/?s=lawn+weed&submit=>



136

Causes of Weed Problems in Turf



WHY WEEDS?

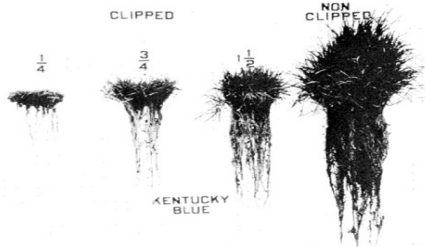
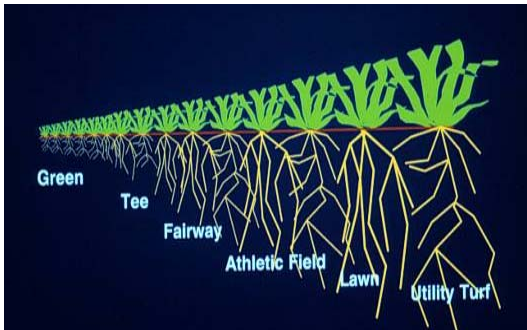
- Weed “seed bank” and soil disturbance
- No pre-plant weed control of tough perennials
- Poor cultural practices (results in a thin, poor quality turf)
- Wrong species/cultivar selection
- Other pest problems
- Planting weeds by using poor-quality seed or weedy sod

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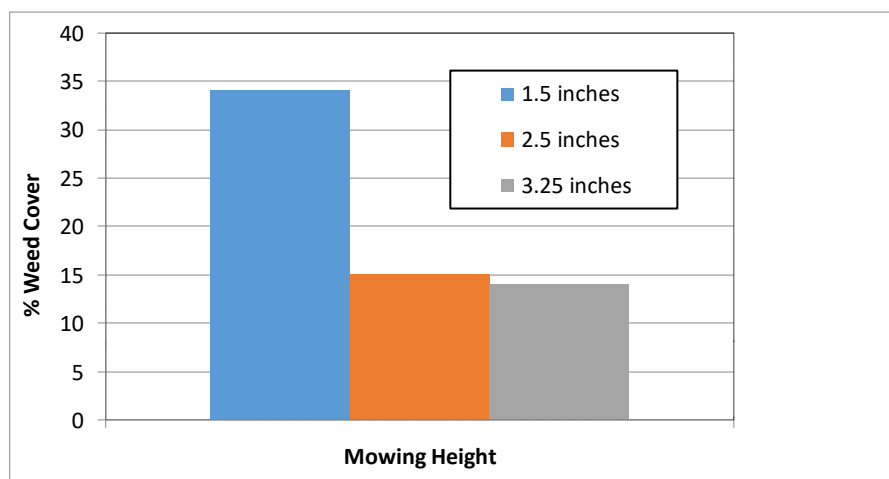
Mowing Tall Makes Lawn Care Easier



- 2 to 3 ½ inches
- Healthier and deeper roots
- Less heat and drought stress
- Fewer weeds, insects and disease problems
- Less frequent mowing
- Increased water infiltration, less runoff
- Reduced potential for fertilizer leaching and runoff

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Mowing Height Effects on Weed Invasion



Evaluation of Mowing Height and Fertilizer Regime On Quality and Weed Invasion of Five Lawn Grasses.
 Brad DeBels¹, Shane Griffith², Mark Garrison², William Kreuser³, Eric Melby² and Douglas Soldat², (1)Soil Science, University of Wisconsin-Madison, Madison, WI, (2)University of Wisconsin-Madison, Madison, WI, (3)Cornell University, Ithaca, NY

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Summer Annual Grassy Weeds



- crabgrass
- goosegrass
- foxtails
- barnyardgrass

Management

- ✓ Prevention – healthy turf
- ✓ Preemergence herbicides
- ✓ Postemergence herbicides

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Fine Fescue Mowing Height Study

3 inches

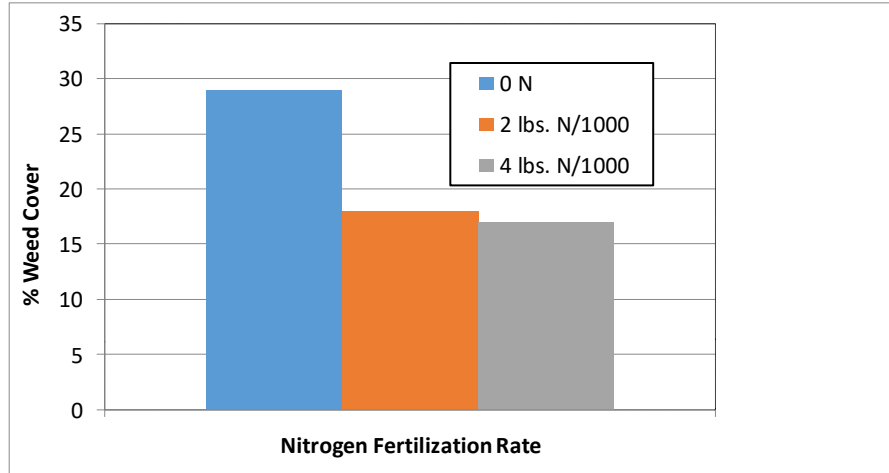
1.5 inches



Crabgrass and yellow foxtail

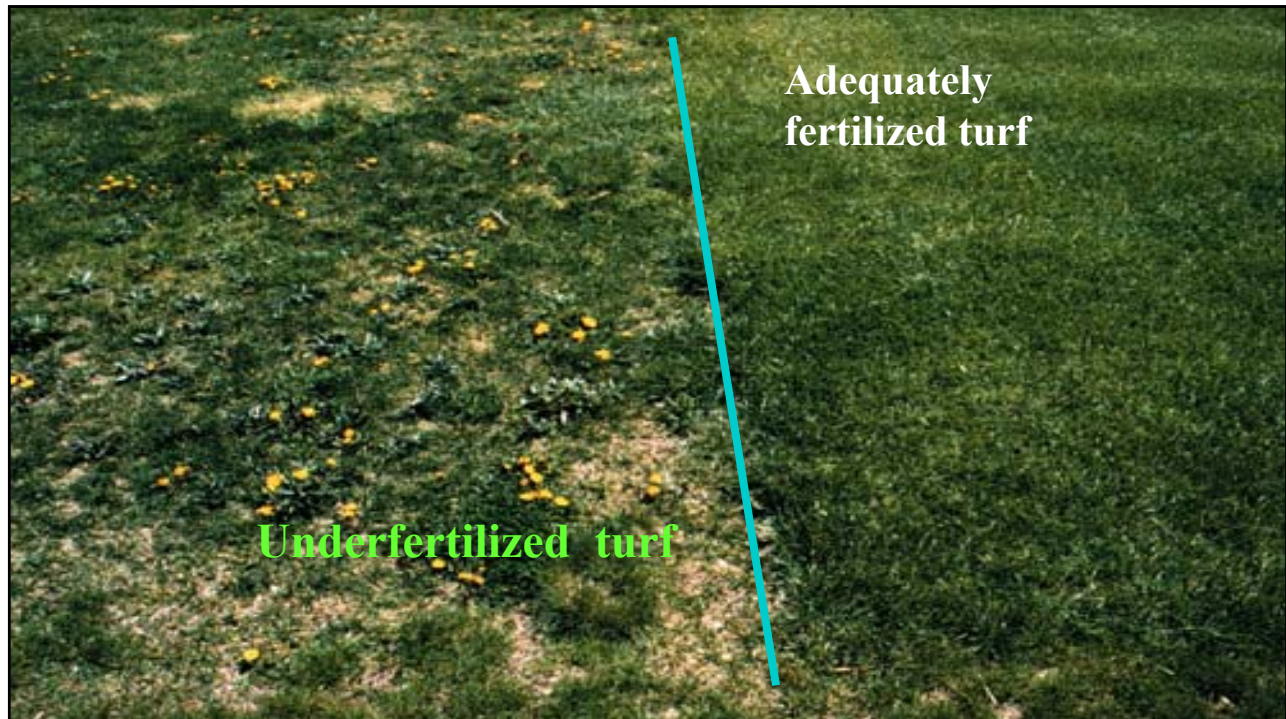
142

Nitrogen Fertility Effect on Weed Invasion

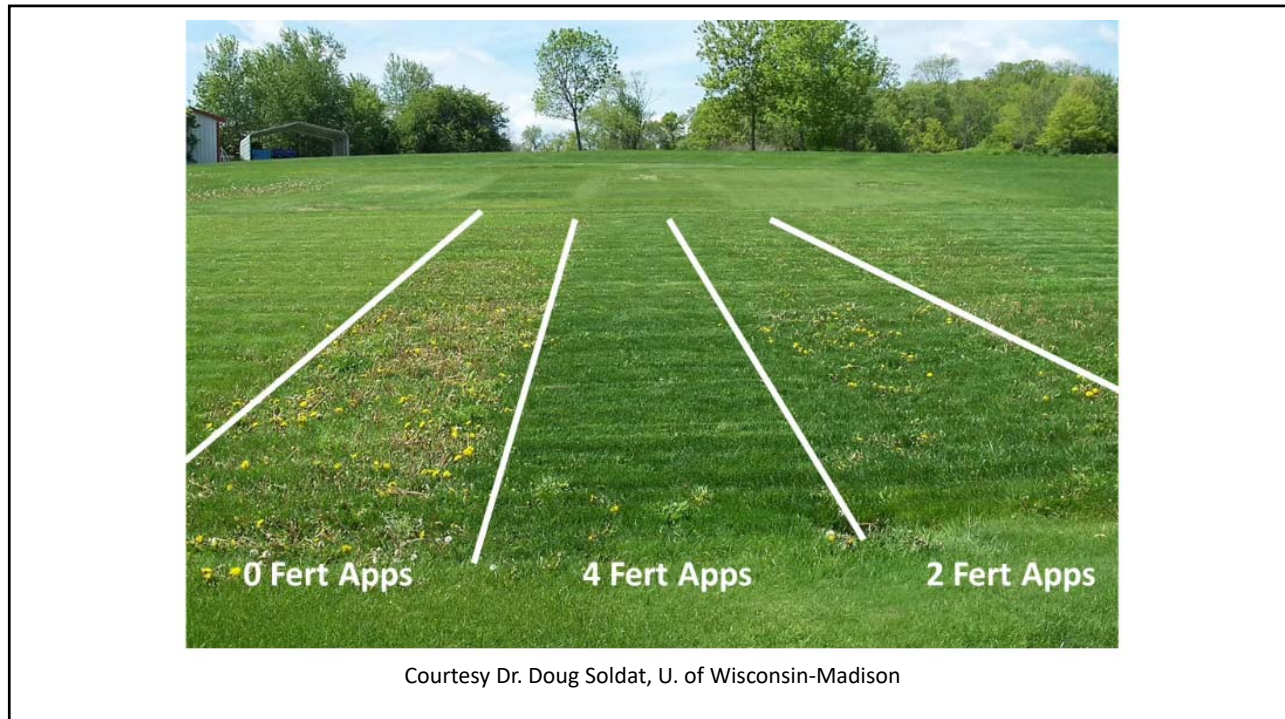


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Irrigation/Drought Effects on Weeds

Excess Irrigation/Precipitation

- Annual bluegrass/*Poa annua*
- Bentgrass
- Crabgrass, barnyardgrass
- *Poa trivialis*/Roughstalk bluegrass
- Nutsedge

Drought/Poor Irrigation Coverage

- Thistle
- Bindweed
- Knotweed
- Spurge
- Crabgrass, goosegrass
- Yarrow



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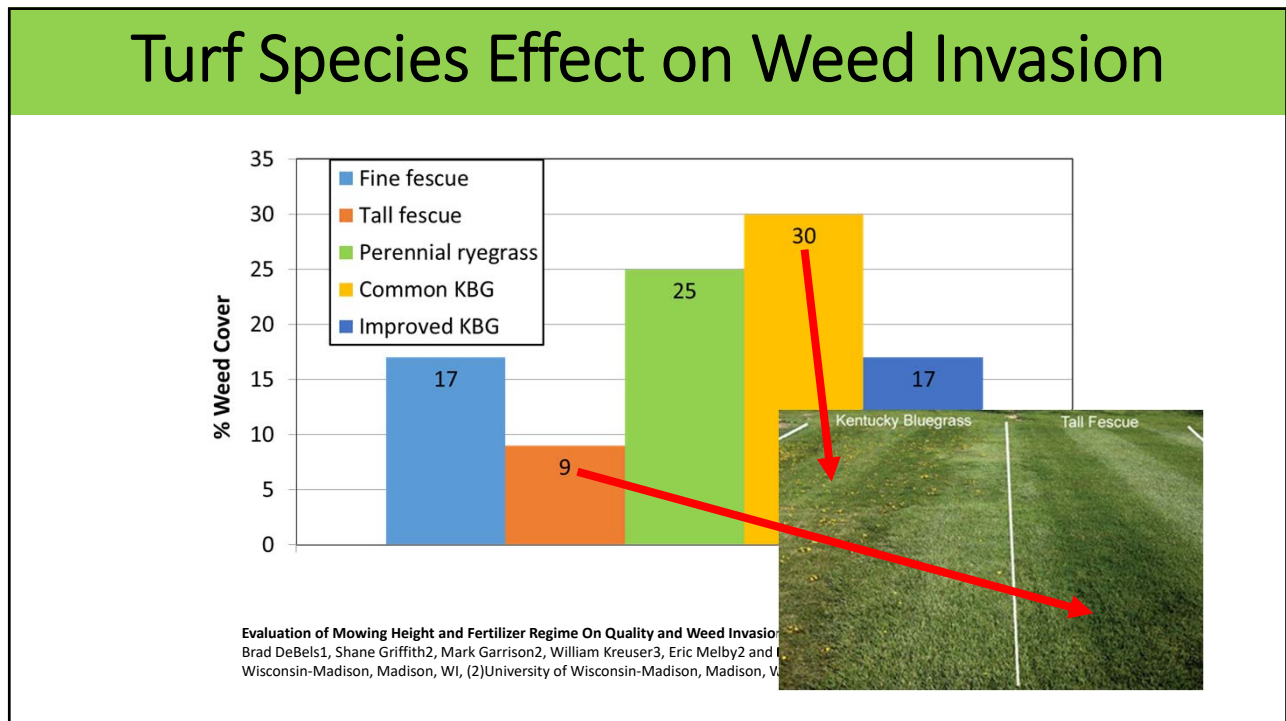
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Necrotic Ring Spot

Ophiosphaerella (Leptosphaeria) korrae



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Summer Annual Grassy Weeds



- crabgrass
- goosegrass
- foxtails
- barnyardgrass

Management

- ✓ Prevention – healthy turf
- ✓ Preemergence herbicides
- ✓ Postemergence herbicides

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Preemergence Herbicides

- benefin (Balan)
- benefin + trifluralin (Team)
- bensulide (Betasan)
- **dithiopyr (Dimension)**
- isoxaben (Gallery, Portrait) – broadleaf weeds
- oxadiazon (Ronstar)
- **pendimethalin (Pre-M, Pendulum, Scotts products)**
- **prodiamine (Barricade)**



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Effective Use of Preemergent Herbicides

- **TIMING:** BEFORE seed germination (March/early April); soil temperature 55-60 F at 1-inch depth
- **RATE:** Follow the instructions and spreader settings!
- **Water:** 3/4 to 1 inch
- Uniform application is essential for control and for preventing turf injury (follow label instructions!)
- Can be applied either prior to or following core cultivation



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Consumer Products with Quinclorac






2,4-D, dicamba, **quinclorac**

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Grasses and Sedges Controlled by Tenacity

Barnyardgrass (pre and post)

Creeping bentgrass (post)

Crabgrass species (pre and post)

Foxtail, Yellow (pre and post)

Goosegrass (pre and post)

Nimblewill (post)

Yellow nutsedge (post)

Windmillgrass (post)



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Postemergence Crabgrass Control

Tenacity (mesotrione)

- Pigment destroyers & inhibitors (bleachers)
- Two sequential applications will control mature crabgrass
- Can be used at the time of seeding of bluegrass, ryegrass, buffalograss to control weeds – without harming the germinating grass
- Can be used safely on young grass seedlings



Click Image to Zoom



Scotts® Turf Builder® Starter® Food For New Grass Plus Weed Preventer

★★★★☆ 4.2 / 5

\$35.99

ADD TO CART

Size 5 M

Quantity 1

FIND A STORE

Overview & Benefits

- Great for sod and grass plugs
- 2-in-1 formula feeds new grass and prevents weeds
- Prevents crabgrass and dandelions for up to 6 weeks
- Weeds sprout white and die quickly, won't harm new grass
- Grows new grass quicker and thicker versus unfed lawn

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Syngenta

Tenacity Turf Herbicide - 8 ounces

★★★★☆ 230 customer reviews | 90 answered questions

Price: \$59.63 & FREE Shipping

Get \$40 off instantly: Pay \$19.63 upon approval for the Amazon.com Store Card.

Note: Not eligible for Amazon Prime.

In Stock.

Get it as soon as March 7 - 9 when you choose Expedited Shipping at checkout.

Ships from and sold by ePest Solutions Online.

- Mesotrione 40.0%
- Tenacity Herbicide is for use on turfgrass species listed on the above label in commercial and residential sites such as golf courses, sod farms, athletic fields, parks, residential and commercial properties, cemeteries, airports, and lawns. Do not use on golf course putting greens maintain a 5 foot buffer from the greens.
- Mix 1/3 ounce of Tenacity herbicide in 1 gallon of water for spot treatments.

Compare with similar items

New (11) from \$59.63 & FREE shipping.

[Report incorrect product information.](#)

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Too late...for herbicides anyway...



161

Perennial Weedy Grass Species



- Tall fescue
- Quackgrass
- Bromegrass
- Bentgrass
- Redtop
- Orchardgrass
- Zoysiagrass
- Bermudagrass
- *Poa annua*
- *Poa trivialis*

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Managing Perennial Grassy Weeds

- Digging/pulling
- Glyphosate, followed by reseeding or sodding
- Learn to tolerate the different grass species
- Hire professional lawn care to apply specialty herbicides for SOME species



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Creeping Bentgrass Control with Tenacity



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Dicot Weed Control

Perennials

- Dandelion, clover, bindweed, thistle, plantain, violet

Annuals

- Spurge, puncturevine, oxalis, purslane

Prevention

- Weed control prior to seeding/sodding
- Healthy turf

Herbicides

- Gallery/Portrait (isoxaben) is an effective **preemergence** herbicide for broadleaf/dicot weeds, but gives poor control of annual grasses
- Many postemergence products for homeowners



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Postemergence Broadleaf Herbicides

- 2,4-D (many names, often with other herbicides)
- dicamba (Banvel)
- MCPP, mecoprop (many brands)
- MCPA (many)
- dichlorprop
- triclopyr (Turflon Amine, Turflon Ester)
- clopyralid + triclopyr (Confront)
- quinclorac (Drive)
- clopyralid (Lontrel)
- metsulfuron methyl (Manor)
- carfentrazone-ethyl (component of Speed Zone, Power Zone)
- fluroxypyr (Spotlight)
- sulfentrazone (Dismiss; component of Surge and Q4)
- **mesotrione (Tenacity)**



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Spot treating individual weeds is always preferable to broadcast application of herbicides.



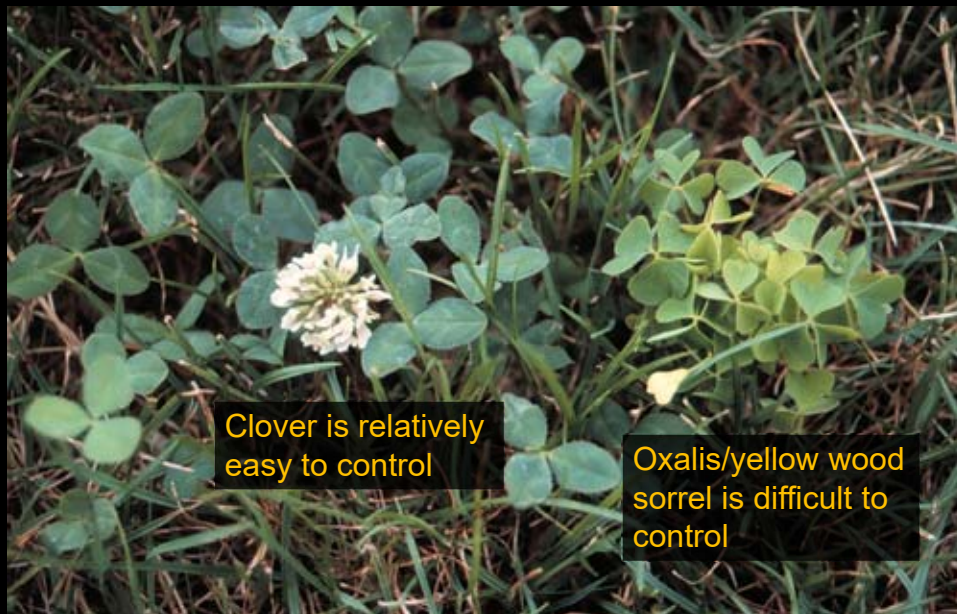
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Postemergent Herbicide “Failure”

- Weeds curl and discolor, but don't die
- Weeds appear to have died, but come back
- Reasons...
 - Weed species
 - Weed health
 - Weed age
 - Post-application management of lawn



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Clover is relatively
easy to control

Oxalis/yellow wood
sorrel is difficult to
control

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Drought-stressed weeds

- poor herbicide uptake
- poor translocation
- difficult to kill

Actively growing weeds

- good herbicide uptake
- rapid translocation
- more easily killed



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Fiesta Herbicide



Active Ingredient:

Iron HEDTA 26.52%, 4.43% actual iron



174



**Iron X!™ Selective
Weed Killer for Lawns**

- ✓ Fast and effective. ✓ See results in hours.
- ✓ No unpleasant odor.
- ✓ Works in cool weather down to 50°F.
- ✓ Can be used on new lawns after grass emergence.
- ✓ Can be used to spot treat problem areas.
- ✓ People and pets can enter treated area when spray dries.

Active Ingredient	By Wt.
Iron HEDTA (FeHEDTA)	26.52%
Other Ingredients	73.48%
Total	100.0%

**KEEP OUT OF REACH OF
CHILDREN
CAUTION**

EPA Registration No. 67702-26-56872
EPA Establishment 56872-OH-001

Iron HEDTA herbicides

Bayer Advanced Natria Lawn Weed Control	26.5% (concentrate)
Fiesta Turf Weed Killer	26.5% (concentrate)
Iron-X Selective Weed Killer for Lawns	26.5% (ready to use)
Ortho Elementals Lawn Weed Killer	1.5% (ready to use)
Whitney Farms Lawn Weed Killer	1.5% (ready to use)

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Know what you are spraying... follow all instructions... and apply the herbicide correctly!



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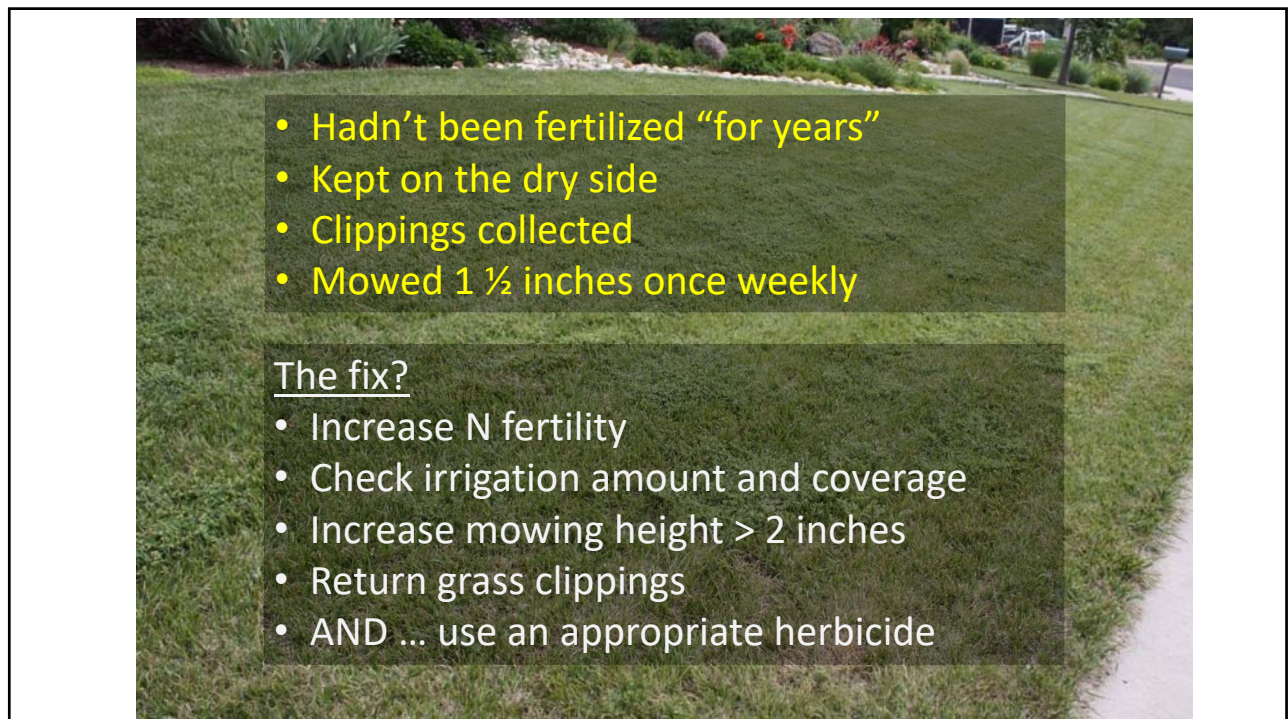
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Annual Flower Beds

- Preplant weed control ESSENTIAL for difficult perennial grasses and dicots
- Mulches are most effective tool for controlling weeds AFTER planting
- Hand weeding
- Dense planting and growth of annuals may provide effective competition
- Preemergence herbicides (annual weeds)
 - Pendimethalin (Pre-M, Pendulum)
 - Proflumicafone (Barricade)
 - Trifluralin (Preen)
- Postemergence herbicides (grasses)
 - fluazifop (Grass B Gon, Ornamec)
 - sethoxydim (Grass-Getter)
 - Clethodim (Envoy)
- Glyphosate (wiping perennial weeds, NOT spraying!)

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Herbaceous Perennial Beds

- Preplant weed control ESSENTIAL for difficult perennial grasses and dicots
- Many weeds should eventually be shaded out if perennials form dense canopy
- Mulches are most effective tool
- Hand weeding
- Preemergence herbicides (annual weeds)
 - pendimethalin (Pre-M, Pendulum)
 - proflumicafone (Barricade)
 - trifluralin (Preen)
 - isoxaben (Gallery, Portrait)
 - isoxaben + trifluralin (Snapshot)
- Postemergence herbicides (grasses)
 - fluazifop (Grass B Gon, Ornamec)
 - sethoxydim (Grass-Getter)
 - clethodim (Envoy)
- Glyphosate (wiping weeds, NOT spraying!)



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Grassy Weeds in Flowerbeds, Junipers, etc.



- Grass Getter, Over-the-Top (sethoxydim)
- Grass B Gon (fluazifop)
- Wipe selectively with glyphosate
<http://csuhort.blogspot.com/2017/07/another-way-to-stick-it-to-weeds.html>

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Brick Patios, Flagstone Walkways, Sidewalks, and Driveways

- Weeds growing in the cracks of these areas are unsightly and can lead to disintegration of bricks, stone or concrete
- Do not apply soil sterilants/extended control herbicides to these areas; there are often roots of desired plants under them which could absorb the herbicide and be injured
- Non-chemical options
 - Hand-pulling
 - Flaming
- Herbicides
 - acetic acid, clove oil, pelargonic acid products on YOUNG, seedling weeds
 - preemergence herbicides? (crabgrass preventers; only if label allows)
 - glyphosate (Roundup)
 - diquat (Reward, Real Kill Liquid Edger, K-Gro Fence And Walk Edger, Ortho Diquat)
 - diquat + fluazifop (Shoot-Out, Spectracide Grass and Weed Killer, Real Kill Grass and Weed Killer)
 - glufosinate ammonium (Finale)



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