

# FUNDAMENTALS of WEED MANAGEMENT

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A weed is any plant growing where you do not want it. In turf (and elsewhere) there are weeds that are monocots (grass-like and grass plants) and weeds that are dicots (the broadleaved plants.) In each category there are annuals, biennials and perennials. Knowing which are which and how these plants differ in their physiology, reproduction and susceptibility to herbicides will make selection of a control method or chemical easier.

In almost all cases a lawn that is managed using BMPs (best management practices) seldom has much of a weed problem. These BMPs include growing a moderately dense stand of quality grasses appropriate for the site and management level, testing for proper pH and fertility, maintaining at a mowing height from 3 to 4 inches, mowing frequently enough that no more than 1/3 of the blade is removed at a time, watered both deeply and infrequently only if needed, and repairing damaged areas promptly.

## ANNUAL WEED GRASSES

Annual grasses are monocots that complete their life cycle in one year and reproduce by seed. Summer annuals (SA) germinate in spring or summer and set seed in late summer or fall. Winter annuals (WA) germinate in late summer or fall and set seed in spring. Proper cultural practices are best for preventing annual grass invasion. If chemicals are needed, pre-emergence materials to prevent germination are best.

Examples:

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|---|---|
| downy brome grass ( <i>Bromus tectorum</i> )<br>WA/SA | Japanese stilt grass ( <i>Microstegium vimineum</i> ) |
| crabgrass ( <i>Digitaria</i> spp.) SA                 | witchgrass ( <i>Panicum capillare</i> ) SA            |
| goosegrass ( <i>Eleusine indica</i> ) SA              | wild-proso millet ( <i>Panicum miliaceum</i> )        |
| barnyardgrass ( <i>Echinochloa crusgalli</i> ) SA     | fall panicum ( <i>Panicum dichotomiflorum</i> ) SA    |
| annual ryegrass ( <i>Lolium multiflorum</i> ) WA      | annual bluegrass ( <i>Poa annua</i> )                 |
|   | yellow foxtail ( <i>Setaria glauca</i> ) SA           |

### IPM CONTROL STRATEGIES\*\*

Biological	
<b>Cultural</b>	Maintain proper fertility and pH levels for the turfgrasses grown
	<b>Maintain a high mowing height (&gt;2 inches on residential turf)</b>
	If irrigating, water deeply and infrequently
	<b>Seed/reseed lawns in late summer or fall. Avoid spring or summer seeding.</b>
	Correct poor drainage
	<b>Repair damaged areas promptly by seeding or sodding</b>
	Plant high quality grass seed appropriate for the area
Mechanical/Physical	Hand pulling, raking or hoeing when young
	Reduce soil compaction
<b>Chemical: pre</b>	D CPA ( <i>Dacthal</i> ), siduron ( <i>Tupersan</i> ), pendimethalin ( <i>Pendulum</i> , <i>Pre-M</i> , <i>Halts</i> , etc.) Bensulide ( <i>Betasan</i> , <i>Bensumec</i> , <i>Lescosan</i> , <i>Weedgrass Preventer</i> ), oxadiazon ( <i>Ronstar</i> ), benefin ( <i>Balan</i> ), benefin+trifluralin ( <i>Team</i> ), dithiopyr ( <i>Dimension</i> ), proflumicafone ( <i>Barricade 65W</i> ) quinclorac ( <i>Drive</i> ), corn gluten ( <i>WOW et al</i> ) etc.
Chemical: post	Organic arsenicals ( <i>MSMA</i> , <i>DSMA</i> , etc.), dithiopyr ( <i>Dimension</i> ), fenoxaprop-p-ethyl ( <i>Acclaim Extra</i> ), quinclorac ( <i>Drive</i> )
Chemical: TVC - total vegetation control	Glyphosate ( <i>Roundup</i> , etc.), glufosinate-ammonium ( <i>Finale</i> )

\*\* IPM strategies are general for the weed category. Identify the weed, then consult Rutgers recommendations and weed references for specific information about individual weeds. Products listed are examples. No discrimination is intended against products not listed. TVC=total vegetation control  
Boldface in IPM Control Strategies indicates the more desirable strategies.

IPM CONTROL STRATEGIES for Annual Bluegrass\*\*

Biological	
<b>Cultural</b>	<b>Raise mowing height (3+ inches on residential turf)</b>
	<b>Collect clippings during seedhead production</b>
	Avoid excessive nitrogen and phosphorus levels
	<b>Avoid overwatering, especially during peak germination (as early as August 10, but generally in September)</b>
	Allow turf to wilt
Mechanical/Physical	Aerate soil frequently to prevent or reduce soil compaction
	Completely renovate turf
Chemical: pre	D CPA ( <i>Dacthal</i> ), pendimethalin ( <i>Pre-M</i> , etc.) bensulide ( <i>Betasan</i> , <i>Bensumec</i> , <i>Lescosan</i> ), oxadiazon ( <i>Ronstar</i> ), benefin ( <i>Balan</i> ), dithiopyr ( <i>Dimension</i> ), prodiamine ( <i>Barricade</i> ), isoxaben ( <i>Gallery</i> ) et. al.
Chemical: post	Calcium arsenate ( <i>Turf-Cal</i> ), ethofumesate ( <i>Prograss</i> ),
Chemical: TVC	Glyphosate ( <i>Roundup</i> , etc.), glufosinate-ammonium ( <i>Finale</i> )

**PERENNIAL WEED GRASSES**

A perennial grass is a monocot that persists for more than two years regenerating each year from an established root system. Simple perennial weed grasses reproduce by seed, but can regrow from the crown. Pre-emerge materials can reduce spread from seed. Complex perennials spread by rhizomes and stolons. **Perennial weed grasses can't be selectively controlled without injuring or killing the lawn.** Total vegetation controls are best for removing perennial weed grasses, but will require reseeding or sodding the turf. Many of these perennial weed grasses are acceptable in low maintenance turf areas, but not showplace lawns.

Examples:

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|---|--|
| bentgrass ( <i>Agrostis</i> spp.)                     | nimblewill ( <i>Muhlenbergia schreberi</i> )     |
| Bermudagrass ( <i>Cynodon dactylon</i> )              | dallisgrass ( <i>Paspalum dilatatum</i> )        |
| orchardgrass ( <i>Dactylis glomerata</i> )            | reed canarygrass ( <i>Phalaris arundinacea</i> ) |
| unimproved tall fescue ( <i>Festuca arundinacea</i> ) | timothy ( <i>Phleum praetense</i> )              |
| quackgrass ( <i>Elytrigia repens</i> )                | common reed ( <i>Phragmites australis</i> )      |
| common velvetgrass ( <i>Holcus lanatus</i> )          | roughstalk bluegrass ( <i>Poa trivialis</i> )    |
| wirestem muhly ( <i>Muhlenbergia frondosa</i> )       |  |

**IPM CONTROL STRATEGIES\*\***

Biological	
<b>Cultural</b>	Maintain proper fertility and pH levels for the turfgrasses grown
	<b>Seed/reseed lawns in late summer or fall. Avoid spring or summer seeding.</b>
	<b>Plant quality grasses appropriate for the site</b>
Mechanical/Physical	Pull or cultivate out small numbers of plants when young
	Heat sterilization under plastic of an entire area for 4-8 months
Chemical: pre	Seed may be prevented from germinating by some pre-emerge materials
Chemical: post	Not effective
<b>Chemical: TVC</b>	Glyphosate ( <i>Roundup</i> , et al.), glufosinate-ammonium ( <i>Finale</i> )

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## SEDGES: yellow nutsedge

Yellow nutsedge is a grass-like plant that prefers moist sites, but tolerates drought when established. It grows more rapidly in early summer than surrounding grasses, is lighter green, and has a triangular stem and an umbrella-like seed head. Pulling nutsedge leaves “nutlets” in the ground to grow into new plants. Repeated pulling may eventually weaken plants enough that they die. Since it is a sedge, not a grass, the post-emergence chemical controls are specialized.

### IPM CONTROL STRATEGIES\*\*

Biological	
Cultural	<b>Improve drainage</b>
	Avoid frequent light irrigation
	Repair damaged areas promptly by seeding or sodding
	Maintain a dense vigorous turf
<b>Mechanical/Physical</b>	<b>Hand remove small populations regularly whenever noticed</b>
Chemical: pre	No
<b>Chemical: post</b>	Organic arsenicals ( <i>MSMA</i> , <i>DSMA</i> , etc.), bentazon ( <i>Basagran</i> ), halosulfuron ( <i>Sedgehammer</i> et al)
Chemical: TVC	Glyphosate ( <i>Roundup</i> , et al.), glufosinate-ammonium ( <i>Finale</i> )

## ANNUAL BROAD-LEAVED WEEDS (BLW)

Annuals grow, set seed, and die in a one-year period. Maintaining a dense healthy turf is the best management. Hand pulling or digging the few that pop up is also effective. These weeds may be prevented from germinating by some pre-emergence controls, but are usually killed using post-emergence BLW chemicals. They are applied as a spot-treatment on individual weed plants or as a cover application over an entire lawn area. BLW controls are available alone or in combination, in "weed and feed" products, and in spray or granular materials. Herbicides for BLW have the potential to damage many broadleaved landscape and garden plants such as dogwood and tomato.

Examples:

**Winter annuals** germinate in late summer/fall and set seed in spring.

(B\*: may also be biennial)

Virginia copperleaf (*Acalypha virginica*)

yellow rocket (*Barbarea vulgaris*) B\*

redstem filaree (*Erodium cicutarium*) B\*

henbit (*Lamium amplexicaule*)

purple deadnettle (*Lamium purpureum*)

common chickweed (*Stellaria media*)

corn speedwell (*Veronica arvensis*)

**Summer annuals** germinate in spring/summer and set seed in late summer/fall.

pigweed (*Amaranthus* spp.)

lambsquarters (*Chenopodium album*)

prostrate spurge (*Euphorbia humistrata*)

spotted spurge (*Euphorbia maculata*)

black medic (*Medicago lupulina*)

carpetweed (*Mollugo verticillata*)

prostrate knotweed (*Polygonum aviculare*)

Pennsylvania smartweed (*Polygonum pennsylvanicum*)

prickly sida (*Sida spinosa*)

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**Winter or summer annuals:**

scarlet pimpernel (*Anagallis arvensis*)  
 hairy bittercress (*Cardamine hirsuta*)  
 horseweed (*Conyza canadensis*)  
 common mallow (*Malva neglecta*) B\*  
 pineapple-weed (*Matricaria matricariodes*)

common purslane (*Portulaca oleracea*)  
 knawel (*Scleranthus annuus*)  
 common groundsel (*Senecio vulgaris*)  
 rabbitfoot clover (*Trifolium arvense*)  
 Venus' looking glass (*Triodanis perfoliata*)

**IPM CONTROL STRATEGIES**

Biological	
<b>Cultural</b>	<b>Establish dense turf through proper fertilization and pH management</b>
	<b>Promptly repair turf damage by seeding or sodding</b>
	Maintain a high mowing height (>2 inches on residential turf)
Mechanical/Physical	Pull out small populations of weeds
	Cultivate out young plants from bare soil areas
Chemical: pre	Isoxaben ( <i>Gallery</i> )
<b>Chemical: post</b>	<b>2,4-D, MCPP, and banvel (Dicamba) alone or in combination products, MCPA in combination products, 2,4-DP+triclopyr, quinclorac (<i>Drive</i>), et. al.</b>
Chemical: TVC	Glyphosate ( <i>Roundup</i> , et al.), glufosinate-ammonium ( <i>Finale</i> )

**BIENNIAL BROADLEAVED WEEDS (BLW)**

A biennial plant grows vegetatively the first year, rests, then grows vegetatively, flowers, sets seed, and dies in the second year. Control is usually not too difficult if flowering is prevented. Postemergence controls may be very effective.

Example:

yellow rocket (*Barbarea vulgaris*)  
 musk thistle (*Carduus nutans*)  
 bull thistle (*Cirsium vulgare*)  
 wild carrot (*Daucus carota*)

common teasel (*Dipsacus fullonum*)  
 Carolina geranium (*Geranium carolinianum*)

**IPM CONTROL STRATEGIES\*\***

Biological	
<b>Cultural</b>	<b>Maintain proper fertility and pH levels for the turfgrasses grown</b>
	<b>Maintain proper mowing height (&gt;2 inches on residential turf)</b>
	Plant quality grasses appropriate for the site
<b>Mechanical/physical</b>	<b>Pull or cultivate out small numbers of plants when young</b>
	<b>Mow or cut off flower stalk before seed production</b>
Chemical: pre	Seed may be prevented from germinating by some pre-emerge materials
<b>Chemical: post</b>	<b>2,4-D, MCPP, and banvel (Dicamba) alone or in combination products, MCPA in combination products, 2,4-DP+triclopyr, quinclorac (<i>Drive</i>), et. al.</b>
Chemical: total vegetation control	Glyphosate ( <i>Roundup</i> , et al.), glufosinate-ammonium ( <i>Finale</i> )

**PERENNIAL BROAD-LEAVED WEEDS (BLW)**

Perennial broadleaved plants are dicots that return year after year from the same root system and also set seed. They are generally more difficult to control than annual weeds, so repeat applications of broadleaf

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weed controls may be necessary. Late fall is an optimum time for controlling many BLW with post-emergence materials or with total vegetation controls. Spring, especially May, is also appropriate for using BLW controls. Do not repeat applications of "weed and feed" products. To do so will cause overfertilization. If more than one application of a herbicide is needed, use a liquid spot treatment. Some populations are reduced by pulling, digging to remove as much of the root system as possible, and by good cultural practices.

**Examples:**

- |  |   |
|--|---|
| common yarrow ( <i>Achillea millefolium</i> )      | yellow woodsorrel ( <i>Oxalis stricta</i> )       |
| wild onion ( <i>Allium canadense</i> )             | buckhorn plantain ( <i>Plantago lanceolata</i> )  |
| wild garlic ( <i>Allium vineale</i> )              | broadleaf plantain ( <i>Plantago major</i> )      |
| mugwort ( <i>Artemisia vulgaris</i> )              | blackseed plantain ( <i>Plantago rugelii</i> )    |
| English daisy ( <i>Bellis perennis</i> )           | oldfield cinquefoil ( <i>Potentilla simplex</i> ) |
| mouseear chickweed ( <i>Cerastium vulgatum</i> )   | healall ( <i>Prunella vulgaris</i> )              |
| chicory ( <i>Cicorum intybus</i> )                 | bulbous buttercup ( <i>Ranunculus bulbosus</i> )  |
| Canada thistle ( <i>Cirsium arvense.</i> )         | red sorrel ( <i>Rumex acetosella</i> )            |
| field bindweed ( <i>Convolvulus arvensis</i> )     | curly dock ( <i>Rumex crispus</i> )               |
| Indian mock strawberry ( <i>Duchesnea indica</i> ) | Canada goldenrod ( <i>Solidago canadensis</i> )   |
| ground ivy ( <i>Glechoma hederacea</i> )           | little starwort ( <i>Stellaria graminea</i> )     |
| orange hawkweed ( <i>Hieracium aurantiacum</i> )   | dandelion ( <i>Taraxacum officinalis</i> )        |
| yellow hawkweed ( <i>Hieracium pratense</i> )      | white clover ( <i>Trifolium repens</i> )          |
| birdsfoot trefoil ( <i>Lotus corniculatus</i> )    | slender speedwell ( <i>Veronica filiformis</i> )  |
| moneywort ( <i>Lysimachia nummularia</i> )         |   |

**IPM CONTROL STRATEGIES\*\***

Biological	
<b>Cultural</b>	<b>Maintain proper mowing height (&gt;2 inches on residential turf)</b>
	<b>Maintain proper fertility and pH for the grasses grown</b>
Mechanical/Physical	Hand remove small populations of weeds when young
	Reduce soil compaction
Chemical: pre	Some pre materials prevent seed germination of some perennial weeds
<b>Chemical: post</b>	2,4-D, MCPP, and banvel (Dicamba) alone or in combination products, MCPA in combination products, 2,4-DP+triclopyr, quinclorac ( <i>Drive</i> ), et al.
Chemical: TVC - total vegetation control	Glyphosate ( <i>Roundup</i> , et al.), glufosinate-ammonium ( <i>Finale</i> )

**WEEDS AS INDICATORS OF SOIL and CULTURAL CONDITIONS**

With ideal grass selection and turf maintenance, most weeds are never serious problems. Large populations of the weeds listed below, alone or in combination within a category, may indicate a soil or cultural problem that should be addressed.

- **Compacted soil:** plantain, goosegrass, knotweed, annual bluegrass, white clover
- **Sandy soil:** quackgrass, red sorrel
- **Poor drainage:** nutsedge, plantain, barnyard grass, curly dock, ground ivy, smartweed
- **Low fertility:** common yarrow, white clover, thistle, black medic, crabgrass, plantains, hawkweed
- **Fertile soil:** pigweed, lambsquarter, foxtail, chickweed

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- **Acid soil indicators:** red sorrel, plantain, ox-eye daisy, moss
- **Alkaline soil indicators:** shepherd's purse, field pennycress, chicory, mugwort
- **Close mowing:** carpetweed, spurge, plantains, dandelion

Weed ID, age of the weed, stage of the plant's development, soil moisture, drought or heat stress, air and soil temperature, mowing height, and rainfall after application affect a herbicide's effectiveness. Other important factors are the need for surfactants or other adjuvants (materials needed to improve a chemical's effectiveness), percentage of active ingredient in a product and application rate. Always read the entire label, follow directions exactly and keep up-to-date with changes in Rutgers or other Extension recommendations.

Additional information sources

Herbicide labels and MSDS information

RCE fact sheet E233 – *Crabgrass and Goosegrass Control in Cool Season Turfgrass*

RCE fact sheet E385 – *Broadleaf Weed Control in Cool Season Turfgrasses*

RCE fact sheet FS543 – *Yellow Nutsedge Control in Landscaped Turf*

EO37R - *2004 Pest Control Recommendations for Lawn and Turf Areas*

Uva, Richard H., Joseph C. Neal, and Joseph M. DiTomaso: *Weeds of the Northeast*. Comstock Publishing Associates, a division of Cornell University Press

<http://www.rce.rutgers.edu/weeds>

<http://www.cook.rutgers.edu/-turf>

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