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Weed Control in Lawns

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The goal of any lawn manager, whether professional or homeowner, is to maintain an attractive lawn area. It is essential to practice weed control to maintain high quality, uniform turf grasses. Weed control enhances the beauty of a lawn by maintaining the uniformity of color and density in turf grasses.

Maintaining a weed free lawn requires diligence, as soils contain numerous weed seeds and vegetative reproductive structures such as roots and rhizomes. Also, weed seed can be introduced to lawn areas by wind, animals, and man. Vegetative reproductive structures can be introduced on aeration or mowing equipment that has not been properly cleaned.

WEED CONTROL METHODS

Cultural Control:

14.3 Weed encroachment often occurs when turfgrass
9 is weakened due to any of a number of environmental, biological and physical factors. The key to
8 avoiding weed problems is to maintain a healthy, vigorous and competitive lawn. Proper fertilization,
926 use of adapted grass varieties, proper mowing height, careful watering and a number of other cultural practices will help to insure a competitive turf. Refer to extension Circular H-244 (revised), "Your Lawn: It Can Be Beautiful" for more information on recommended cultural practices for lawns.

Mechanical Control:

Tillage prior to lawn establishment can be used to reduce seed production of established weeds and to prevent weed seed germination and growth. Tillage also may be useful in destroying reproductive vegetative structures of perennial weeds if repeated frequently during the season prior to lawn establishment.

The soil should not be tilled intensively for a few weeks prior to seeding as turfgrasses require a somewhat granular soil surface for optimum establishment. Handpulling and digging can be effective weed control measures for dealing with small infestations of annual weeds. Mowing may not effectively control certain annual broadleaf weeds or prevent seed production by many grass and broadleaf weeds since these weeds are able to produce seed below the cutting height. Close mowing (less than 1.5 to 2 inches) can rapidly reduce turfgrass vigor, as can too high a cutting height (greater than 3 to 3.5 inches).

Chemical Control:

Herbicides are used to supplement cultural and mechanical control methods. No single herbicide or herbicide combination is effective against all weed species. Herbicides generally are most effective on small weeds and are ineffective for controlling annual or biennial weeds which are at or beyond the flowering stage of growth. Successful weed control depends on 1) proper weed identification, 2) correct herbicide selection, 3) accurate herbicide application and 4) reading and following the label directions.

Herbicides are specific as to which weeds they will control. Proper identification of weed species in a lawn is essential in selecting the correct herbicide. Knowledge of the life cycle of weeds is also important. Annual weeds complete their life cycle in one year. Summer annual weeds such as crabgrass and knotweed are most easily controlled in the spring since small, actively growing weeds are easier to control than more mature weeds.

Winter annual weeds such as shepherdspurse are most easily controlled in the fall when they are small and actively growing. Winter annuals can also be controlled in the spring before seedhead formation. Following seedhead formation the plants are more

tolerant to herbicides. Biennial weeds such as musk thistle and bull thistle complete their life cycle in two years. They are most easily controlled in the vegetative stage during their first year of growth. During the second year of growth they produce seedheads and become more tolerant of herbicides. Perennial weeds live for more than two years. They are often difficult to control because of their extensive root systems. For best results, treat perennial weeds in the fall prior to the first killing frost. Movement of the herbicide to the plant root system will be enhanced at this time. Repeat treatments the following year may be necessary for complete control.

TYPES OF HERBICIDES

Preemergence herbicides should be applied before weeds germinate. They do not control emerged weeds. Preemergence herbicides, except siduron (Tupersan), will stunt, thin or severely injure lawn grasses emerging from seed.

Postemergence herbicides are applied after weeds emerge. They are most effective when applied to seedling weeds. Weeds emerging after application are not controlled. Contact herbicides such as bromoxynil kill only the portion of the plant they contact. Good spray coverage is essential. Contact herbicides are ineffective against perennial or mature annual weeds. Systemic herbicides such as 2,4-D are absorbed by plant roots and shoots and are moved throughout the plant. Spray coverage is not as critical with these herbicides as with contact types.

CAUTION: Spray or vapor drift from postemergence herbicides may injure sensitive ornamental or garden plants. All herbicides can drift as spray droplets. Herbicides such as dicamba (Banvel), 2,4-D and MCPP can drift in significant quantities. Application of these herbicides in early spring before sensitive plants leaf out or in the late fall after leaf senescence will reduce the risk of injury from spray drift. Amine forms of 2,4-D and MCPP may drift as particles but will not cause damage from vapor drift. The ester forms of these herbicides can cause damage from particle and vapor drift and should not be used close to ornamental plantings. Applying herbicides during cool weather reduces the potential for vapor drift. Herbicides should not be applied during windy weather.

Herbicide Formulations:

The formulation of a herbicide is listed on the product label and is designated by a letter at the end of the product name. W or WP refers to a wettable powder; L refers to a liquid; E or EC refers to an emulsifiable concentrate; F refers to a flowable (water dispersed suspension) and G refers to a

granular formulation. Herbicide recommendations are given as pounds of active ingredient per acre (lb a.i./A) and as fluid ounces, ounces or pounds of product used per 1000 square feet or per acre. The active ingredient (a.i.) is that part of the herbicide formulation which produces herbicidal effects. The amount of active ingredient in a herbicide is always listed on the label.

Active ingredient is expressed as a percentage of the formulation for dry formulations (G, W or WP). For example, Dacthal W-75 is a wettable powder formulation which contains 75 percent active ingredient.

Active ingredient in liquid formulations (E or EC, F) is expressed in pounds active ingredient per gallon of product (lbs a.i./gal). For example, 2,4-D usually is formulated as 4 lb a.i./gal; therefore, 1 quart of 2,4-D contains 1 pound of active ingredient.

Sprayer Calibration:

Calibration is required for accurate herbicide application. Improper calibration can result in either poor weed control (too little herbicide applied) or turfgrass injury (too much herbicide applied). Spray equipment, especially nozzles, should be checked periodically for spray pattern uniformity and rate of delivery.

Hand-Held Sprayers:

Calibration of hand-held sprayers is often difficult since uniform spray pressure and correct height above the turfgrass or target weed is difficult to achieve. Application accuracy can be improved through practice by spraying water on a warm, dry surface and observing the spray pattern. The rate of drying across the spray swath will give an indication of application uniformity. Uneven drying of the treated area indicates a non-uniform application. Practice until a uniform application is achieved. To calibrate, determine the amount of spray solution needed to treat the area. Fill the sprayer tank and spray an area of 100 square feet. Determine the amount of water used by refilling the tank. The amount of water used is not important, but whatever the amount, it must be a known quantity.

The amount of herbicide to use per 100 square feet can be obtained from the herbicide label and the amount to put in the sprayer can be calculated as shown in the following example.

Calibration Example:

A sprayer applied 0.5 gallon on 100 square feet. The herbicide label recommends 1 ounce of product per 100 square feet. How much product and water must be added if the area to be sprayed is 5000 square feet?

0.5 gallon/100 square feet = $0.5 \times 50 = 25$ gallons
water/5000 square feet

1 ounce/100 square feet = $1 \times 50 = 50$ ounces
product/5000 square feet

Note: Hose-end sprayers are very difficult to calibrate and are not suggested for herbicide application to lawn areas.

Dry spreaders are often used to apply "weed and feed" materials (herbicide is impregnated on fertilizer particles). The amount of material to use can be obtained from the product label. The feed setting for adjustable fertilizer spreaders that will apply the desired amount of material can also be obtained from the product label or the equipment manufacturer's use instructions. Cyclone spreaders do not have graduated feed settings as do the push type granular applicators. When using this type of spreader make a number of passes over the lawn area applying a low rate of material on each pass to ensure a more even distribution of material. The same approach should be used with push type spreaders which do not have adjustable feed settings or for those spreaders where the adjustment is worn.

NOTE: Walking speed and spray tank pressure should be kept as constant as possible when using hand-held sprayers. Walking speed and feed setting should be kept as constant as possible when using dry spreaders. Varying walking speed, tank pressure or feed setting will result in non-uniform herbicide application. Do not apply herbicides or fertilizer materials impregnated with herbicides under the drip line of trees and ornamental shrubs as injury may occur. The drip line is that area beneath the branches of a tree or shrub.

Sprayer Care:

Sprayers used to apply herbicides should not be used for applying other pesticides, plant growth regulators or liquid fertilizers. Sprayers should be drained and rinsed with water after use. Partially refill the sprayer with a water/detergent mixture after rinsing and spray out the solution. Finally, drain and rinse the sprayer again with clean water.

Spreaders used to apply granular herbicides or "weed and feed" mixtures should also be thoroughly cleaned after use to prevent corrosion. A whisk broom is generally all that is needed to remove residual material from the spreader box. In cases where the fertilizer/herbicide material has become caked, water may be needed to dissolve the material. Whenever water is used to clean a spreader, make sure that the spreader is dried thoroughly before storing it to prevent the metal parts of the spreader from corroding. A light coating of oil or diesel fuel on the metal parts will protect them from corrosion while the spreader is in storage.

Major Lawn Herbicides:

The most commonly used lawn herbicides are included in this section. Rates are expressed as amount of active ingredient or product per 1000 square feet on a broadcast basis. Read and follow label directions before applying any pesticide.

Annual grasses (crabgrass, foxtail): Preemergence herbicides should be applied before these weeds germinate, which often occurs in early to late April in North Dakota. These herbicides have no effect on emerged, established grassy weeds. For newly seeded lawns, use only siduron (Tupersan). Many of the products listed below are available in mixtures with fertilizer (ie. "weed and feed" products).

Herbicide	Active Ingredient lb a.i./1000 ft ² (Formulation/1000 ft ²)	Remarks
benefin (Balan 1.5L, Balan 2.5G)	0.034 to 0.46 (3 to 4 fl oz) (1.5 to 2 lb 2.5G)	Not recommended for use on bentgrass. Wait six to eight weeks before reseeding. Also has some activity on broadleaf weeds such as common lambsquarters, shepherdspurse and prostrate pigweed. Benefin should be applied twice for season-long control, with the first application in mid to late April and a second application eight to ten weeks later.
bensulide (Betasan 4E)	0.17 to 0.22 (5.6 to 7.3 fl oz)	Safe on mature stands of all grass species. May be applied in the spring or fall on established lawns. Where germination of annual grasses extends into the late summer and early fall, a second application of bensulide at the recommended rates should be made four to five months after the first application. Do not reseed into bensulide treated areas for four months following application.

Herbicide	Active Ingredient (lb a.i.)/1000 ft ² (Formulation/1000 ft ²)	Remarks
DCPA (Dacthal 75W)	0.24 (5 oz)	Controls a number of broadleaf weeds such as common chickweed and shepherd's purse in addition to annual grasses. May be applied to new seedlings after they are 1 to 2 inches high and exhibit a dark green color. Do not reseed until sixty days after application.
Oxadiazon (Ronstar 2G)	0.05 to 0.09 (2.25 to 4.5 lb)	Do not apply to wet turfgrass. May temporarily discolor turfgrass following application. Wait four months before reseeding. Oxidiazon is a restricted use pesticide. Pesticide certification is required to apply it.
Siduron (Tupresan 50W)	0.09 to 0.23 (2.8 to 7 oz)	Siduron may be applied to newly-established turfgrass. For best results, siduron should receive 0.5 inches of water within three days of application.

Postemergence annual grass control: Organic arsenical herbicides such as DSMA, MSMA, and AMA will give acceptable crabgrass control as well as partial control of several broadleaf weeds such as chickweed and prostrate pigweed. Best control is obtained when weeds are small and actively growing. A second application seven to 10 days after the first treatment may be required for complete control. These herbicides may temporarily discolor turfgrass and should not be used on bentgrass and fine fescue lawns. Apply when temperatures are above 75F and do not water for 24 hours following application.

Perennial grass (tall fescue, quackgrass) control: Perennial grasses cannot be selectively controlled in lawns. Glyphosate (Kleenup, Roundup, Roundup L&G) can be used for spot treatment control of perennial grasses; the turfgrasses contacted will also be killed. See the individual herbicide label

for specific rates. Do not contact the foliage or green stems of desirable ornamentals with the spray as severe injury may result.

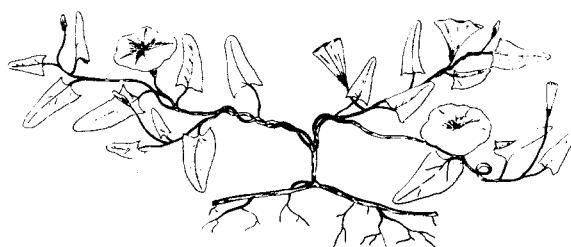
Annual and Perennial Broadleaf Weeds: Best control of broadleaf weeds is achieved when they are young and actively growing. A number of the herbicides listed below have the potential to injure or kill broadleaf ornamentals, so take care to avoid contacting sensitive plants with the spray. Additionally, certain herbicides (2,4-D, dicamba, MCPP) have the tendency to vaporize and this vapor may also injure or kill sensitive broadleaf plants. Vapor drift can be minimized by spraying on cool days when wind speed is low. Application of 2,4-D, dicamba and MCPP in the fall after sensitive broadleaf plants have lost their leaves will greatly reduce the potential for injury from these herbicides.

Herbicide	Active Ingredient (lb a.i.)/1000 ft ² (Formulation/1000 ft ²)	Remarks
2,4-D (4 lb a.i./gal)	0.03 to 0.05 (1.1 to 1.5 fl oz)	Two formulations of 2,4-D are available, amine and ester. The ester formulation should not be used for lawn weed control since it is quite volatile and therefore has greater potential to injure sensitive broadleaf plants than does the amine formulation. Do not apply 2,4-D to newly seeded lawns until after the lawn has been mowed three or four times. 2,4-D should not be applied to bentgrass at the rates suggested for bluegrass. See the individual herbicide label for 2,4-D use rates on bentgrass. 2,4-D is very effective in controlling dandelion and plantain.
MCPP (4 lb a.i./gal)	0.03 to 0.06 (1.1 to 2 fl oz)	MCPP is chemically related to 2,4-D. It gives better control of chickweed and clover than does 2,4-D, but is not as effective in controlling dandelion and plantain as 2,4-D. Use MCPP with the same precautions as 2,4-D. It is often used in combination with 2,4-D.

Herbicide	Active Ingredient lb a.i./1000 ft ² (Formulation/1000 ft ²)	Remarks
dicamba (Banvel 4 lb a.i./gal)	0.006 to 0.012 (0.19 to 0.37 fl oz)	Dicamba is most often used in combination with 2,4-D and MCPP to increase the spectrum of broadleaf weeds controlled. Dicamba is quite volatile and can injure sensitive broadleaf plants. Do not apply dicamba under the dripline of trees, the area under the limbs of trees and shrubs, as root uptake and subsequent injury may occur. Wait six weeks after application before seeding turfgrasses in areas treated with dicamba.
bromoxynil (ME4 Brominal 4 lb a.i./gal, Buctril 2 lb a.i./gal)	0.009 to 0.011 (0.6 to 0.7 fl oz-Buctril, 0.3 to 0.35 fl oz-ME4 Brominal)	Controls annual broadleaf weeds such as shepherds-purse, knotweed and lambsquarters. It is ineffective against perennial broadleaf weeds or older, more mature annual broadleaf weeds. Bromoxynil is a contact herbicide, so thorough coverage is essential for good weed control. Bromoxynil can be used on both newly-seeded and established lawns. Bentgrass is tolerant of this herbicide.



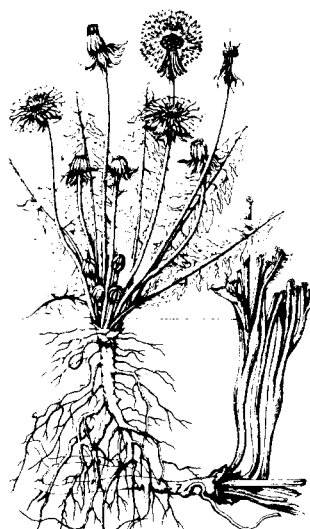
Creeping Bellflower
(*Campanula rapunculoides*)



Field Bindweed
(*Convolvulus arvensis*)



Common Chickweed
(*Stellaria media*)



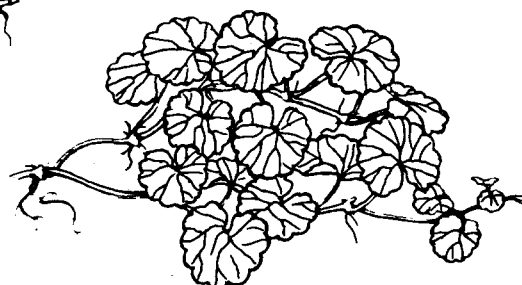
Common Dandelion
(*Taraxacum officinale*)



White Clover
(*Trifolium repens*)



Mouseear Chickweed
(*Cerastium vulgatum*)



Ground Ivy
(*Glechoma hederacea*)



Erect Knotweed
(*Polygonum erectum*)



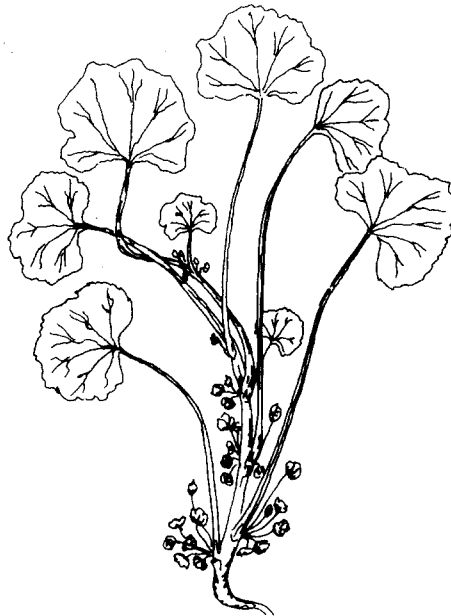
Prostrate Knotweed
(*Polygonum aviculare*)



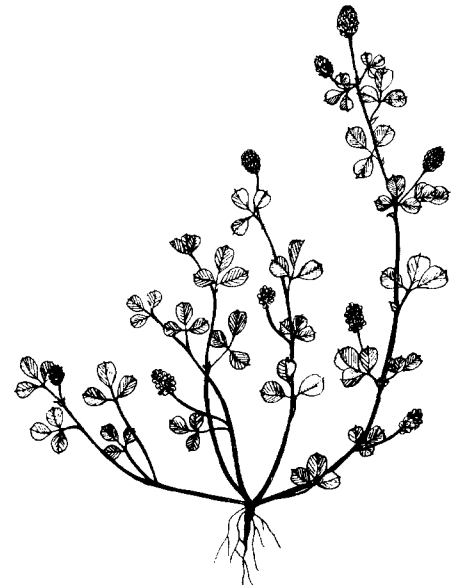
Kochia
(*Kochia scoparia*)



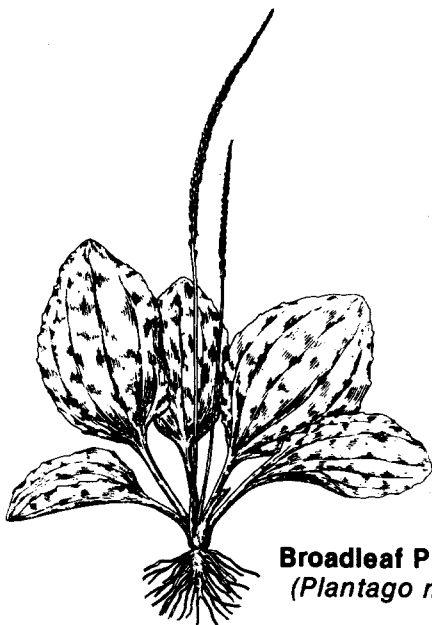
Common Lambsquarters
(*Chenopodium album*)



Common Mallow
(*Malva neglecta*)



Black Medic
(*Medicago lupulina*)



Broadleaf Plantain
(*Plantago major*)



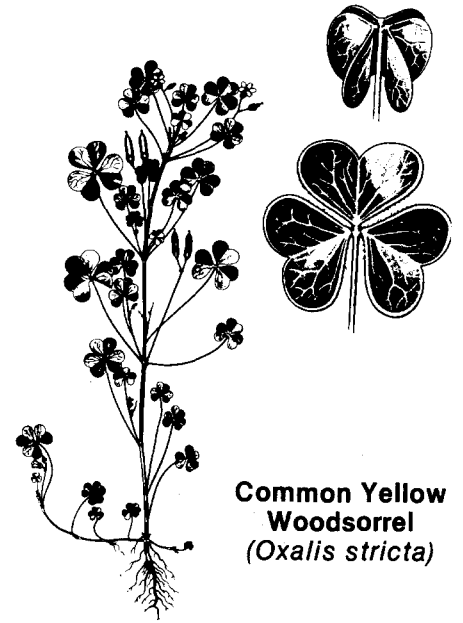
Prostrate Pigweed
(*Amaranthus blitoides*)



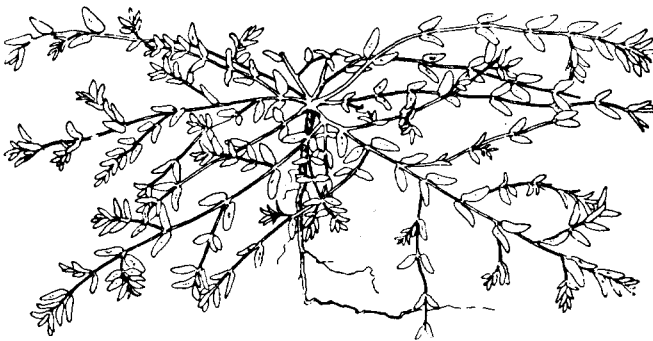
Shepherdspurse
(*Capsella bursa-pastoris*)



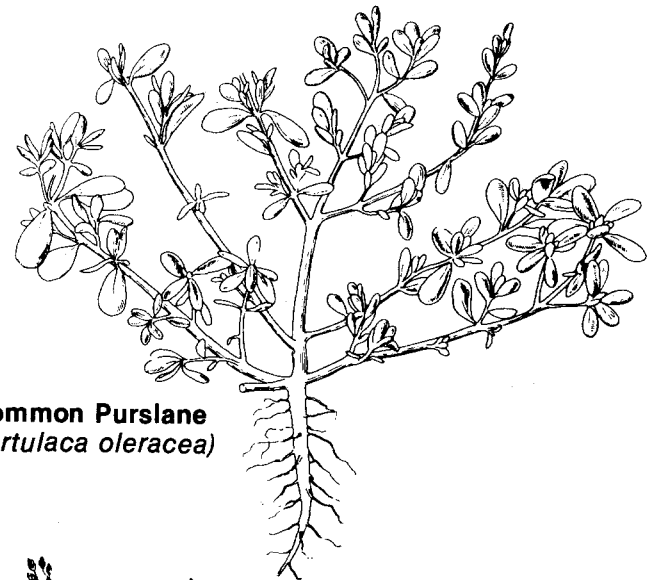
Canada Thistle
(*Cirsium arvense*)



Common Yellow Woodsorrel
(*Oxalis stricta*)



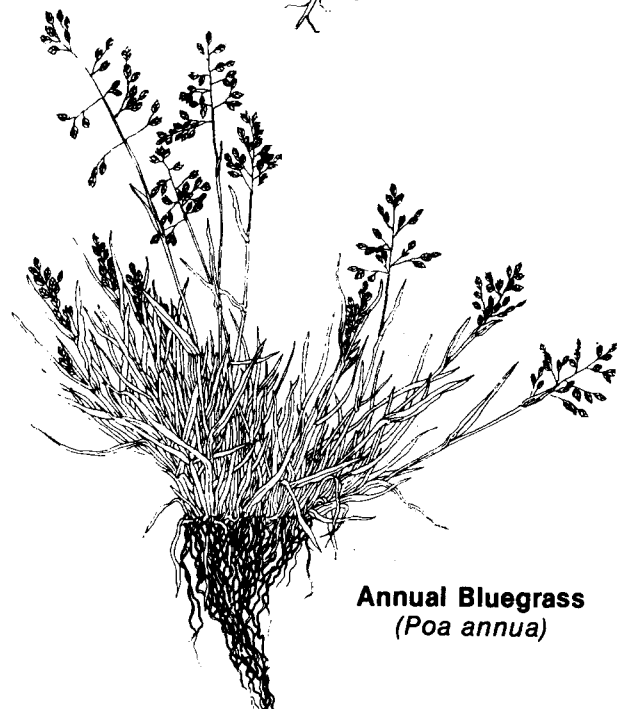
Prostrate Spurge
(*Euphorbia supina*)



Common Purslane
(*Portulaca oleracea*)



Barnyardgrass
(*Echinochloa crus-galli*)



Annual Bluegrass
(*Poa annua*)



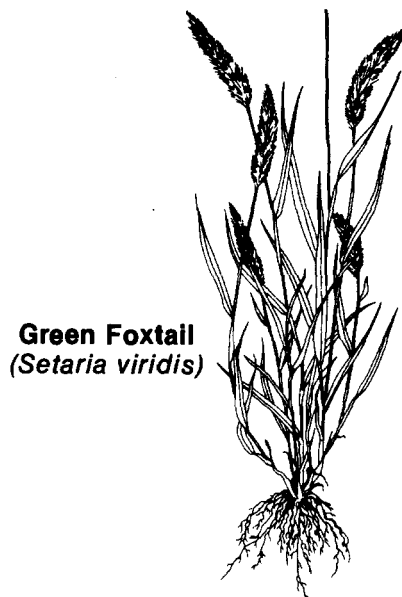
Smooth Brome grass
(*Bromus inermis*)



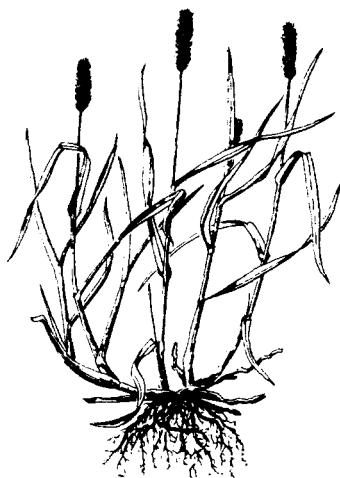
Large Crabgrass
(*Digitaria sanguinalis*)



Tall Fescue
(*Festuca arundinacea*)



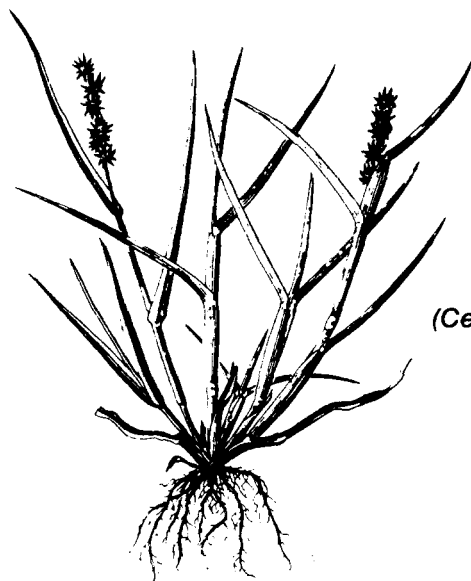
Green Foxtail
(*Setaria viridis*)



Yellow Foxtail
(*Setaria lutescens*)



Quackgrass
(*Agropyron repens*)



Sandbur
(*Cenchrus longispinus*)

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