

Landscape

by Dr. Elton Smith

Increasing labor costs in recent years have caused an increase in the use of both pre-emergence and post-emergence herbicides. Herbicides are a useful tool on golf courses, cemeteries, parks, arboreta, schools, as well as commercial and residential landscapes.



They are used to control weeds under trees, delineate turf areas, in and around sand traps, around grave markers, in patios, driveways, under fences and in flower, ground cover and woody plant beds.

The effectiveness of a weed control program is only as successful as the person responsible for selection, calculation, calibration, and application of herbicides. It's up to the applicator to create the proper conditions necessary to achieve the desired results. The label specifies those conditions.

Weeds typically found in the landscape are classified as either annuals or perennials. Annual weeds, such as crabgrass, foxtail or purslane, are relatively easy to keep under control by either mulching, cultivation, hand pulling, pre-emergence herbicide application, or a combination.

Perennial weeds, such as bindweed, thistle, quackgrass, or nutsedge, are much more difficult to control by the above methods principally due to their extensive root systems.



Chemical control of weeds at tree bases (top) reduces physical damage caused by mowers and trimmers. The key to weed-free plant beds is to control perennial grasses and broadleaved weeds prior to planting.

Weeds can be controlled prior to or after planting, however, many fail to recognize the importance of eliminating weeds, especially perennials, prior to planting.

Prior to planting

The most successful approach to a weed-free landscape is to control perennial grasses, and perennial broadleaved weeds, prior to preparing the area for planting. Spraying the weeds in the area with one of several post-emergence herbicides which will be translocated to the root system for total plant control is one of the most effective methods of control. Examples of such products would be 2,4-D and related products for broadleaf weed control, dalapon for grass control and amino triazole and glyphosate for general weed control. Each of these normally has to be applied more than once and most have a specific waiting period prior to planting. Glyphosate, a very effective product for perennial grass and broadleaf weed control, has no soil residue.

A number of pre-emergence herbicides are labelled for landscape plants and two are recommended for use prior to planting. Incorporate into the soil, following tillage, either Eptam or Treflan to control annual and some perennial weeds for a period of 4-6 weeks. Following incorporation to a depth specified on the label, planting of the ornamentals can begin. The incorporation of these two herbicides have been used extensively by commercial nurserymen and is now being used by landscape contractors to a large extent, especially where maintenance for a specified period of time is in the contract.

Tillage as a method of weed control prior to planting is a successful practice for the control of annual weeds but not as effective against perennial weeds. In some cases, tillage only cuts up the root system

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into smaller pieces and redistributes them.

Following planting

In recent years the landscape industry has made extensive use of mulches to prevent weeds in the landscape. Many types of mulches are available, however, the most popular in the Midwest include hardwood, Cypress and pinebark mulches along with wood chips, peat moss, and an assortment of hulls and numerous inorganic types. These should be applied at least 2-inches deep and renewed annually or as needed. Avoid the use of black plastic near woody plants as plastic contributes to excessive soil moisture.

Some weeds will come through

the mulches. These must be hand pulled or sprayed. Seeds will be carried into planting beds by wind and birds and will often germinate in the mulch. Again, hand pulling is the most satisfactory control measure in small areas, however, landscape personnel are using more & more herbicides, such as glyphosate.

As an alternative to, or in combination with mulches, are several pre-emergence herbicides that can be applied between or over the plants to control annual weeds for a period of 4 to 8 weeks. Reapplications are usually necessary to achieve season-long control depending on selection of herbicide, soil and climatic conditions. Typically, the first application

should be made prior to weed seed germination and subsequent treatments as needed based on re-growth of annual weeds.

The soil should be weed-free and moist prior to application or the treatment should be followed by rain or irrigation. It's important to know how much area is included in the beds to be treated. Once the area has been calculated, determine the amount of herbicide needed for that area, and apply with equipment that is properly calibrated and in working order. Many types of application equipment are available. Select a sprayer and/or granular applicator that is large enough to complete anticipated needs and is easy to calibrate and clean.

Calculating rates and quantities

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Granular Materials

Example—A landscaper needs to treat 4,000 sq. ft. of Juniper with 4% RONSTAR granules at 4 lbs. aia. How much RONSTAR is required?

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44,000 \text{ sq. ft./acre}} \times \frac{100}{\% \text{ granular}} = \text{lbs. required to treat area}$$

Calculation

$$4 \text{ lbs. aia} \times \frac{4,000}{44,000} \times \frac{100}{4} = 9.1 \text{ lbs. 4\% granular RONSTAR}$$

Wettable Powders

Example—A landscape firm needs to treat 4,000 sq. ft. with 50% DEVRINOL wettable powder at the rate of 10 lbs. aia.

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44,000 \text{ sq. ft./acre}} \times \frac{100}{\% \text{ powder}} = \text{lbs. required to treat area}$$

Calculation

$$10 \text{ lbs. aia} \times \frac{4,000}{44,000} \times \frac{100}{50} = 1.8 \text{ lbs. 50\% DEVRINOL W.P. to be mixed in enough water to cover 4,000 sq. ft.}$$

Liquid Concentrate

Example—The recommendation is to apply trifluralin at 2 lbs. aia. Since TREFLAN contains 4 lbs. active ingredient/gal., how many gallons should be applied on 1/2 acre of area to be planted to Purple Wintercreeper.

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44,000} \times \frac{1}{\text{lbs. active ingredient/gallon}} = \text{gallons required to treat area}$$

Calculation

$$2 \text{ lbs. aia} \times \frac{22,000}{44,000} \times \frac{1}{4} = .25 \text{ or } \frac{1}{4} \text{ gal. TREFLAN to be mixed in enough water to cover } \frac{1}{2} \text{ acre}$$

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Pre-emergence herbicides for landscape use

There are approximately 18 pre-emergence herbicides registered for the nursery industry but only the 12 listed below are utilized in landscape plantings.

Check the label for sensitive plant materials before using any herbicide. Consider using a drift preventer (cone) for liquid materials to reduce damage to desirable plants and to increase application speed. Bulbs can be affected by many preemergence herbicides. Soil type can reduce effectiveness. Foliage of desirable plants should be dry to prevent granular materials from sticking.

BETASAN, LESCOSAN (Bensulide)—used at the rate of 10-12 lbs. aia to control annual grasses, especially crabgrass, and annual bluegrass in established flower gardens. Use the 12.5% granular formulation (80-96 lbs.), the 3.6% G (278-333 lbs.), or the 4 E formulation at 3 1/8 gals./A in 80-100 gals. of water and irrigate after application. This is the only pre-emergence herbicide labelled for use with tulip and daffodil.

CASORON, DYCLOMEC (Dichlobenil)—effectively controls a wide spectrum of annual and perennial grasses and broadleaved weeds when used at 5 to 6 lbs. aia (125-150 lbs. of G-4). CASORON is one of the most effective pre-emergence herbicides against mugwort (wild chrysanthemum), thistle, nutsedge, quackgrass and bindweed, particularly if used for 2 successive years. CASORON is not especially effective in fine sandy soils. It should be incorporated 2-3 inches if the soil temperature is above 45°F, however, no incorporation is necessary if applied in late fall or winter. CASORON may injure fir, spruce, hemlock, certain Japanese hollies, viburnum and most herbaceous plants.

DACTHAL (DCPA)—is used at the rate of 10.5-12.0 lbs. aia in 75% wettable powder (14-16 lbs.) or 5% granular form (210-240 lbs.) to con-

trol annual grasses and many broadleaved weeds including dodder. DACTHAL is not effective against wild mustard, ragweed, smartweed, and velvet leaf. It can be safely used with nearly all woody ornamental and many herbaceous crops.

DEVRI-NOL (Napropamide)—controls annual grasses and broadleaf weeds including chickweed, groundsel, lambsquarters and red-root pigweed. DEVRI-NOL is ap-

plied at the rate of 4-6 lbs. aia in 10% granular form (40-60 lbs.) or 50% WP (8 to 12 lbs. in 50 gals. water). For small areas, apply the 10 G at 15 oz.—1 lb. 6 oz./1000 sq. ft. or the 50 WP at 3 oz. to 4.4 oz./2 1/2 gals. water/1000 sq. ft. DEVRI-NOL is registered on a wide selection of trees, shrubs, evergreens and ground covers.

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TABLE 1. **Woody plants tolerant to pre-emergence herbicides**

The following evergreen and deciduous plants are labeled for use with the pre-emergence herbicides across the top of the chart. An (X) in the column indicates the herbicide can be safely used for that plant listed. The list includes only those plants with company label registration.

	BETASAN	CASORON	DACTHAL	DEVRI-NOL	ENIDE	EPTAM	FURLOE	CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Narrowleaf Evergreens													
Arborvitae		X	X	X	X		X	X	X	X	X	X	X
Chamaecyparis				X	X	X							
Eastern Red Cedar		X		X	X					X			X
Fir			X	X		X	X						
Fir, Balsam							X			X			X
Fir, Douglas				X						X	X		X
Fir, Fraser										X			
Hemlock				X	X	X	X	X	X	X	X		X
Juniper	X	X	X	X	X	X	X	X	X	X	X	X	X
Pine			X	X		X	X	X					
Pine, Austrian										X	X		X
Pine, Japanese Black											X	X	X
Pine, Mugo										X		X	
Pine, Red										X			X
Pine, Scotch										X	X		X
Pine, White										X	X	X	X
Spruce			X	X		X	X						
Spruce, Blue										X		X	X
Spruce, Norway										X	X		X
Spruce, White										X	X		X
Yew		X	X	X	X	X	X	X	X	X	X	X	X
Broadleaf Evergreens													
Boxwood	X	X	X	X		X					X	X	X
Cherry Laurel					X							X	X
Euonymus				X	X		X	X			X	X	X
Firethorn	X	X		X	X						X	X	X
Holly	X	X	X	X	X	X		X			X	X	X
Holly, Japanese						X					X	X	X
Japanese Pieris			X			X		X				X	X
Leucothoe		X				X					X	X	
Magnolia grandifolia											X	X	
Mahonia					X		X			X	X	X	
Mountain Laurel		X	X		X		X				X	X	X
Rhododendron		X	X	X	X	X	X	X			X	X	X

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ENIDE (Diphenamide)—is used at the rate of 6-8 lbs. aia (12-16 lbs. 50% WP, 6.6-8.8 lbs. 90% WP) to control annual grasses and broad-leaved weeds. ENIDE, available as a 50% and 90% wettable powder, is particularly effective in sandy soils and quite safe on evergreens, deciduous plants, numerous ground covers and flowers.

EPTAM (EPTC)—is available as a 7 EC and 10% granular and can be used to rid an area of certain weeds the season prior to planting. It must be incorporated 2-3" for annual weed control and at least 6" in the soil, preferably by cross discing at 3-6 lbs. aia (30-60 lbs. G-10, 5¼-7 pts. of 7 EC in 10-50 gal. of water) for the suppression of nut-

sedge, quackgrass, and certain other weeds. Mugwort can be controlled at 17 pts. of 7 E in 10-50 gals. of water/A. Unless thoroughly incorporated into the soil, EPTAM will not give as long lasting control of broadleaf weeds as many other herbicides. EPTAM should be considered for nutsedge and mugwort control the season prior to planting only.

FURLOE CHLORO-IPC (Chloropropham)—is used at the rate of 6-10 lbs. aia as a 20% granular (30-50 lbs.) or 10% granular (60-100 lbs.) formulation to control chickweed and other annual winter weeds. FURLOE CHLORO-IPC should be applied when landscape plants are in a dormant stage. It kills established chickweed and is a most useful autumn herbicide.

ORNAMENTAL WEEDER (Chloramben 4 G)—controls annual broadleaf weeds and grasses at the rate of 4.0 lbs. aia (100 lbs. 4 G). Use in the spring on weed free soil, irrigate with ½" of water within 1 week of application but do not incorporate. Controls chickweed, crabgrass, foxtails, lambsquarters, mustard, pigweed, ragweed, seedling johnsongrass, smartweed and velvetleaf. Chloramben is more effective in clay loam soil than in sandy soils.

PRINCEP (Simazine)—is used from 1 to 3 lbs. aia in the 4% granular (25-75 lbs. G-4), 4 L (1-3 qts.) or 80% wettable powder (1.3-3.8 lbs. 80 W) formulations to control annual and perennial grasses and broadleaf weeds. PRINCEP CALIBER 90, a water dispersible granule, should be used at 2.2-3.4 lbs. of product in 25 gal. water. Princep is effective for 3 months or longer if applied in the spring. PRINCEP will injure birch, euonymus, deutzia, lilac, linden, privet, spirea, and herbaceous plants. Autumn or early winter applications at 2-3 lbs. aia are recommended with a lower rate (1 lbs. aia) suggested for summer use alone or preferably, in combination with

TABLE 1. **Woody plants tolerant to pre-emergence herbicides**
Continued

	BETASAN	CASORON	DACTHAL	DEVIRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Deciduous Trees												
Ash		X	X	X	X					X		X
Ash, White					X							X
Bald Cypress					X							X
Beech					X							X
Birch		X	X		X		X			X		
Birch, European					X							X
Chinese Chestnut			X		X							X
Corktree, Amur		X										X
Crabapple		X	X	X	X					X		X
Dogwood		X	X		X	X		X	X	X		X
Dogwood, Kousa												X
Elm		X	X									
Elm, American								X				
Elm, Siberian								X				
Ginkgo										X	X	
Goldenchaintree		X		X								
Goldenraintree		X									X	
Hackberry		X										
Hawthorn			X	X								
Honeylocust				X				X				X
Linden		X				X						
London Planetree												X
Magnolia		X	X			X	X			X		
Maple		X	X	X	X	X	X					
Maple, Amur										X		
Maple, Norway												X
Maple, Red							X					X
Maple, Silver												X
Maple, Sugar					X							X
Mountain Ash		X										
Oak		X	X		X	X				X		
Oak, Pin												X
Oak, Red								X	X	X		X
Oak, Scarlet												X
Poplar		X	X	X	X		X					
Redbud			X		X							X
Russian Olive		X	X		X			X	X			
Sassafras							X					
Sweetgum			X		X						X	X
Sycamore			X		X							X
Tuliptree			X		X							X
Tupelo												X
Walnut		X	X	X	X							X
Willow		X	X		X							X

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TABLE 2. Ground covers and flowers tolerant to pre-emergence herbicides

	BETASAN	DACTHAL	DEVIRINOL	ENIDE	EPTAM	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Ground covers										
Ajuga	X		X		X			X		
Boston Ivy		X								
Cotoneaster		X		X		X	X	X	X	X
English Ivy	X	X	X	X	X	X		X	X	
Euonymus		X		X		X		X	X	X
Honeysuckle		X		X						X
Juniper	X	X		X		X	X	X	X	X
Liriope			X						X	
Myrtle	X		X	X	X			X	X	
Pachistima		X								
Pachysandra	X		X		X			X		
Potentilla										X
Sedum	X				X			X		
Stonecrop									X	
St. John's Wort	X		X	X	X					
Flowers										
Achillea			---				---			X
Ageratum		X			X					X
Alyssum	X	X		X	X					
Amaranthus					X					
Aster	X	X		X	X					X
Baby's Breath		X		X						
Bachelor's Button	X									
Balsam					X					X
Begonia				X	X				X	
Bell Flower		X	---				---			
Bleeding-Heart		X	---				---			
Bugloss		X	---				---			
Calendula	X		---				---			X
California Poppy			---				---			X
Calliopsis			---				---			X
Campanula	X		---				---			
Candle Larkspur		X	---				---			
Candytuft	X	X	---				---			
Carnation			---				---			X
Celosia			---			X	---			
Centaurea			---				---			X
Chrysanthemum		X	---	X	X	X	---		X	X
Coleus		X	---				---			
Columbine		X	---				---			
Coral Bells	X	X	---				---			
Coreopsis		X	---				---			
Cosmos		X	---				---			X
Daffodil	X		---				---			
Dahlia	X	X	---	X	X	X	---			X
Daisy	X		---				---			
Daylily			---		X	X	---			
Delphinium		X	---	X			---			
Dianthus			---		X		---			X
Evening Primrose		X	---				---			
Fernleaf Yarrow		X	---				---			
Feverfew		X	---	X			---			
Forget-Me-Not		X	---				---			X
Four-O'Clock		X	---				---			X
Foxglove		X	---	X			---			
Gaillardia		X	---				---			X
Gazania	X		---				---		X	

continued

DACTHAL, DEVIRINOL, ENIDE, or SURFLAN.

RONSTAR (2 G), PRO GROW ORNAMENTAL HERBICIDE 1 (4 G) (Oxadiazon)—labelled for the control of many annual grasses and broadleaved weeds in trees, shrubs, vines and ground covers. This material is effective in controlling bittercress, common groundsel, galinsoga, Pennsylvania smartweed, yellow woodsorrel (oxalis) and barnyardgrass but not chickweed. Apply at 4.0 lbs. aia (100 lbs./A of the 4% G or 200 lbs./A of the 2% G formulation). Avoid application to wet foliage to prevent granules from attaching to the leaves and causing phytotoxicity.

SURFLAN (Oryzalin)—for use in landscape plantings to control annual grasses, chickweed, purslane, lambsquarters and pigweed. Apply at the rate of 2.0-4.0 aia (2 2/3-5 1/3 lbs. of 75% WP in 20-40 gals. of water) on established plants. This herbicide is labeled for numerous shrubs, evergreens, ground covers, and flowers. SURFLAN is similar to TREFLAN but does not require incorporation and can be used in existing plantings of most ornamentals. One-half inch of water is necessary to activate the herbicide following application.

TREFLAN (Trifluralin)—is primarily used as a pre-plant treatment to control annual grasses and some broadleaf weeds. The 5% granular and 4 lbs. emulsifiable concentrate forms are used 1-4 lbs. aia (20-80 lbs. G-4, 1.4 qts. EC) and must be incorporated 2-3 inches into the soil. Effectiveness is increased if shallow (1/2-2") cultivation follows application by 2-3 weeks.

Post-emergence herbicides for landscape use

Post-emergence herbicides are used for general weed clean-up around buildings, waterways, fence rows, etc. Used with extreme caution, these materials may be

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TABLE 2. Ground covers and flowers tolerant to pre-emergence herbicides
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	BETASAN	DACTHAL	DEVRIKOL	ENIDE	EPTAM	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Flowers										
Geranium		X	---	X			---		X	
Gladiolus	X	X	---				---			X
Gold Dust		X	---				---			
Golden Marguerite		X	---				---			
Golden Tuft		X	---				---			
Impatiens			---				---		X	
Iris		X	---			X	---			
Ixora			---				---			X
Lavendercotton		X	---				---			
Lily		X	---				---			
Lobelia			---	X			---			X
Lupine		X	---				---			X
Marigold	X	X	---	X	X	X	---		X	X
Morning Glory		X	---				---			
Mother-of-Thyme		X	---				---			
Nasturtium		X	---		X		---			X
Nicotiana			---				---			X
Pansy	X		---		X		---		X	
Peony		X	---	X		X	---			
Periwinkle			---				---			X
Petunia		X	---	X	X		---		X	X
Phlox			---	X			---		X	X
Pink Heath		X	---				---			
Pinks		X	---				---			
Poker Plant		X	---				---			
Portulaca			---				---			X
Primrose	X		---				---			
Purple Cone Flower		X	---				---			
Ranunculus	X		---				---			
Rudbeckia			---				---			X
Salvia		X	---	X			---			X
Scabiosa			---				---			X
Scarlet Sage		X	---				---			
Shasta Daisy			---	X			---			X
Snapdragon		X	---	X		X	---			X
Snow on the Mountain			---				---			X
Stock			---	X			---			X
Stone Crop		X	---				---			
Strawflower		X	---				---			
Sundrops		X	---				---			
Sunflower		X	---				---			X
Sweet Alyssum			---				---			X
Sweet Pea	X	X	---				---			X
Sweet William			---	X			---			X
Tulip	X		---				---			
Verbena		X	---	X			---			
Violet		X	---				---			
Virginia Spiderwort		X	---				---			
Wall Flower	X		---				---			
Wormwood		X	---				---			
Zinnia	X	X	---	X	X	X	---	X		X

continued

used in tree plantings. Avoid herbicide contact with foliage, trunks or stems with green, yellow or red tissue of desired crops as damage can result from each of these materials.

AMITROLE (amino triazole)—is applied to the foliage of perennial broadleaved weeds and is absorbed and translocated to the stems and roots. It is very effective against poison ivy. If it should contact foliage of desired plants, leaves turn yellow, white, and then brown. Use only as a spot treatment for perennial weeds in or near landscape crops.

2,4-D and related compounds—the non-volatile forms of 2,4-D can be used among trees to control broadleaved weeds when there is no air movement. If grasses are also a problem, 2,4-D should not be used.

DOWPON (Dalapon)—in non crop areas, is recommended for control of quackgrass at the rate of 10-15 lbs. aia (13-19.5 lbs. of commercial product) and plowed down 10-14 days later. This treatment will also control common reed and cattails. DOWPON is available as an 85% wettable powder.

PARAQUAT—is used at the rate of .5 to 1.0 lb. aia or 1 to 2 qts. of the commercial formulation per sprayed acre for control of annual weeds and grasses and for top kill of perennial weeds and grasses around the base of trees. Avoid use on green barked trees including littleleaf linden. Repeat applications, as necessary, to control newly germinated seedlings and to control regrowth of perennials. A surfactant should be used. There is no soil residue. Use protective clothing and gloves while handling the concentrate to avoid contact with skin. PARAQUAT is a restricted use pesticide.

RAD-E-CAT 25 or PHYTAR 560 (Cacodylic Acid)—is used to control annual and perennial weeds around trees, for lawn renovation,

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TABLE 2. Ground covers and flowers tolerant to pre-emergence herbicides

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	BETASAN	CASORON	DACTHAL	DEVIRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Deciduous Shrubs												
Abelia	X		X	X							X	
Azalea	X	X	X	X	X	X	X			X	X	X
Azalea, Mollis		X	X									
Barberry		X	X		X	X	X		X	X	X	X
Beautybush		X			X							
Cinquefoil												X
Cotoneaster		X	X		X			X	X	X	X	X
Currant			X		X							
Deutzia		X										X
Dogwood, Red Osier										X		
Euonymus, Winged		X	X	X	X	X				X	X	X
Flowering Almond		X										
Flowering Quince		X										
Forsythia		X	X		X		X			X	X	X
Hibiscus				X	X		X				X	X
Honeysuckle		X	X		X		X	X	X	X	X	X
Hydrangea			X		X		X					
Hypericum				X	X							
Lilac		X	X		X	X	X			X	X	X
Mockorange		X	X		X		X				X	
Mockorange, Lemoine												X
Nandina		X		X				X				
Peashrub		X										
Photinia		X		X							X	
Privet	X	X	X	X	X		X			X	X	X
Rose		X	X	X	X		X	X		X	X	X
Spirea		X	X		X		X	X				
Spirea, Vanhoutte												X
Viburnum			X		X	X	X			X		X
Viburnum, Doublefile											X	
Weigela		X	X		X							

and general weed control in non-crop areas. A surfactant is not needed and it's inactivated upon contact with the soil. If regrowth occurs, re-apply as required. Apply at the rate of 3 gallons per acre.

ROUNDUP (Glyphosate)—controls annual and perennial weeds when used prior to planting and in established ornamentals. Registered as a directed spray toward the base of arborvitae, azalea, boxwood, crabapple, euonymus, fir, Douglas fir, holly, lilac, magnolia, maple, oak, privet, pine, spruce and yew. To control weeds apply to actively growing grasses and broadleaf weeds. Use 1 qt./A in 10-40 gallons of water if weeds are less than 6 in. tall. Apply 2-3 qts./A to control Canada thistle and 3-4 qts. for field bindweed control. Most effective control of perennial weeds is obtained when weeds are in the flower bud or bloom stage at treatment. There is no soil residue, however, a waiting period of 3-5 days, is necessary, following treatment and prior to tillage to obtain maximum weed control.

COMBINATION TREATMENTS—of post-emergence with pre-emergence herbicides are used to kill existing weeds and prevent emergence of others. The

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Lawn grass tolerance to herbicides in Georgia. (B.J. Johnson, Univ. of Georgia)

Turfgrasses	Herbicides									
	Benfenin	DCPA	Bensulide	Oxadiazon	Atrazine	DSMA MSMA	2,4-D ¹	Paraquat	Glyphosate	
Bermuda	T	T	T	T	S*	T	T	S*	S*	
Zoysia	T	T	T	T	S*	S-I	T	S	S	
Centipede	T	T	T	T	T	S	S*	S	S	
St. Augustine	T	T	T		T	S	S	S	S	
Tall fescue	T	T	T		T	S	T	S	S	
Bahia	T	T	T		S-I	S-I	T	S	S	

T = Tolerance; safe to use herbicide at recommended rates.

S = Sensitive; Do not use this herbicide.

S-I = Intermediately tolerant; use herbicide with care since grass may be injured.

*Tolerant to herbicides when turfgrass is dormant.

¹Includes mecoprop and/or dicamba.

Landscape

TABLE 3. Weeds controlled by pre-emergence herbicides

The following list of grasses and broadleaf weeds are labeled as being controlled by the pre-emergence herbicides. An (X) in the column indicates the weed is controlled for the herbicide listed.

	BETASAN	CASORON	DACTHAL	DEVIRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Grasses												
Annual Bluegrass	X	X	X	X	X	X	X		X	X		X
Barnyardgrass	X		X	X	X	X	X		X	X	X	X
Bermudagrass						X						
Cheat (Chess)				X	X							X
Crabgrass	X	X	X	X	X	X	X	X	X	X	X	X
Downy Bromegrass				X			X		X	X	X	X
Fall Panicum	X			X	X	X			X	X	X	X
Foxtail	X	X			X			X	X		X	X
Bristly Foxtail				X							X	X
Giant Foxtail				X		X					X	X
Green Foxtail			X	X		X			X	X	X	X
Yellow Foxtail			X	X		X				X	X	X
Goosegrass	X		X	X	X	X			X		X	X
Johnsongrass (from seed)			X	X	X	X		X			X	X
Nutsedge						X						
Quackgrass		X				X						
Ryegrass (annual)				X	X	X	X		X			
Sandbur			X		X	X						X
Stinkgrass (lovegrass)			X	X	X	X	X					X
Wild Oats				X		X	X		X		X	
Witchgrass		X	X		X	X	X		X			
Broadleaf Weeds												
Annual Morningglory						X			X			
Carpetweed		X	X	X	X	X	X		X	X	X	X
Chickweed		X	X	X	X	X	X	X	X	X	X	X
Common Groundsel				X			X		X	X		
Dandelion		X										
Deadnettle (Henbit)	X	X				X			X			X
Dodder			X				X					
Dogfennel		X										
Evening Primrose		X								X		
Galinsoga										X		
Knotweed		X		X	X		X					X
Lambsquarters	X	X	X	X	X	X	X	X	X	X	X	X
Lesser Bittercress											X	
Mugwort (Chrysanthemum Weed)		X				X						
Mustards		X						X	X			
Nightshades						X			X			
Peppergrass		X			X				X			
Pigweed					X			X	X			X
Prostrate Pigweed						X					X	X
Redroot Pigweed	X	X	X	X		X				X	X	X
Tumble Pigweed						X						
Plantain		X										
Prickly Lettuce				X								
Prickly Sida						X						
Purslane		X	X	X	X	X	X		X	X	X	X
Ragweed		X		X		X		X	X			

continued

combinations below have been used extensively in trees with excellent success.

PARAQUAT at 1-2 qt./A plus PRINCEP 80 W 1-2 lbs. aia (1.3-2.5 lbs.) Use as a directed spray and treat regrowth as needed with PARAQUAT only. Avoid contact with foliage and green, yellow or immature bark.

RAD-E-GATE or PHYTAR 560 at 3 gal./A plus PRINCEP 80 W 1-2 lbs. aia (1.3-2.5 lbs.) can be used in the same way as PARAQUAT and PRINCEP with the same precautions.

ROUNDUP at 1-3 qts./A plus SURFLAN 75 W at 2 1/2-5 1/3 lbs. is labelled for use on crops which appear on both labels.

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ANSWERS TO PHOTO QUIZ

- A. Mouse-ear chickweed
- B. Crabgrass
- C. Yarrow
- D. Goosegrass
- E. Prostrate knotweed
- F. Creeping speedwell
- G. Dandelion
- H. Goosegrass
- I. Broadleaved plantain
- J. Perennial white clover
- K. Yellow nutsedge
- L. Annual bluegrass
- M. Tall fescue
- N. Buckhorn plantain
- O. Corn speedwell
- P. Red sorrel
- Q. Mugwort
- R. Nutsedge
- S. Heal-all
- T. Prostrate spurge
- U. Black medic
- V. Ground ivy
- W. Oxalis

Photos courtesy of New York State Turfgrass Association.

Landscape

TABLE 3. Weeds controlled by pre-emergence herbicides

Continued

	BETASAN	CASORON	DACTHAL	DEVRIKOL	ENIDE	EPTAM	FURLOE	CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Broadleaf Weeds													
Red Sorrel					X		X						
Shepherdspurse	X	X			X	X				X			
Smartweed (Pennsylvania)		X			X		X	X		X	X		
Sow Thistle				X								X	
Speedwell			X							X	X		
Spurge, Leafy		X											
Spurge, Petty		X	X								X		
Spurge, Prostrate												X	
Thistle, Bull		X											
Thistle, Canada		X											
Timothy		X											
Velvetleaf								X					
Wild Aster		X											
Wild Carrot		X											
Yellow Rocket		X									X		
Yellow Woodsorrel (Oxalis)		X											

Precautions

Read the entire label on the container.

All directions and safety precautions should be followed, store herbicides in closed, clearly-labelled, original containers, in dry places, out of the reach of children and pets.

If herbicides are spilled on the skin, wash thoroughly with soap, if herbicides are swallowed, come in contact with the eyes or are absorbed to the point of showing symptoms, call a doctor immediately.

Emergency first aid directions and the telephone number of the nearest Poison Control Center should be posted in a conspicuous place in the workshop and in the truck.

Herbicide Manufacturers

The Anderson's
PO Box 119, Illinois Ave.
Maumee, OH
419-893-5050

BASF Wyandotte Corp.
100 Cherry Hill Rd.
Parsippany, NJ 07054
201-263-3400

BFC Chemicals Inc.
4311 Lancaster Pike
PO Box 2867
Wilmington, DE 19805

Ciba Geigy Corp.
PO Box 11422
Greensboro, NC 27409
919-292-7100

W.A. Cleary Chemical Corp.
1049 Somerset St.
Somerset, NJ 08873
201-247-8000

Crystal Chemical Co.
1525 N.
Post Oak Rd.
Houston, TX 77055

Diamond Shamrock
1100 Superior Ave.
Cleveland, OH 44114
216-694-5000

Dow Chemical USA
PO Box 1706
Midland, MI 48640
517-636-0968

Drexel Chemical Co.
2487 Pennsylvania
PO Box 9306
Memphis, TN 38109
901-774-2132

E.I. du Pont de Nemours
Wilmington, DE 19898
302-774-2132

Elanco Products Co.
730 S. Alabama St.
Indianapolis, IN 46285
317-261-3638

PBI Gordon Corp.
300 S. Third St.
Kansas City, KS 66118
816-421-4070

Hopkins Ag. Chemical Co.
PO Box 7532
Madison, WI 53707
608-222-0624

Lakeshore Eqpt. & Supply Co.
300 So. Abbe Road
Elyria, OH 44035
216-323-7544

Mallinckrodt Inc.
3600 N. Second St.
St. Louis, MO 63147
314-982-5043

MoBay Chemical Corp.
Box 4913
Hawthorn Rd.
Kansas City, MO 64120
816-242-2000

Monsanto
800 N. Lindbergh Blvd.
St. Louis, MO 63166
314-694-1000

Nor-Am Ag. Products
350 W. Shuman Blvd.
Naperville, IL 60540
312-961-6500

Ortho Div.
Chevron Chemical Co.
575 Market St.
San Francisco, CA 94105

Pennwalt Corp.
Three Parkway
Philadelphia, PA 19102
215-587-7000

PPG Industries Inc.
One Gateway Center
Pittsburgh, PA 15222
412-434-2252

Rhone Poulenc Chemical Co.
Box 125
Black Horse Lane
Monmouth Junction, NJ 08852
201-297-0100

Rohm & Haas Co.
Independence Mall West
Philadelphia, PA 19105
215-592-3000

Stauffer Chemical Co.
Ag. Chem Div.
Westport, CN 06880
203-222-3000

Thompson Hayward
5220 Speaker Rd.
Kansas City, KS 66101
913-321-3131

TUCO Div., Upjohn
9823-190-45
Kalamazoo, MI 49001
616-385-6609

Union Carbide, Ag. Prod. Co.
7825 Baymeadows Way
Jacksonville, FL 32216

Velsicol Chemical Corp.
341 E. Ohio
Chicago, IL 60611
314-670-4665

Vineland Chemical Co.
W Wheat Rd.
PO Box 745
Vineland, NJ 08360

WTT