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And, the TC30 lets you handle wider, heavier implements thanks to an impressive 1,635-pound three-point lift capacity. It's a tractor that's tough on work, but easy on your wallet. See your New Holland dealer.



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SUGGESTED WEED IDENTIFICATION GUIDES FOR TURF AND LANDSCAPE INDUSTRIES

Weeds of Southern Turfgrass

Publication Distributions Center
IFAS Building 664
P. O. Box 110011
University of Florida
Gainesville, Florida 32611
(904-392-1764)
\$8.00 / Particularly useful for weeds of turf and landscapes in the Coastal Plain but appropriate for turf throughout Southeastern US. Color photographs and brief descriptions of each species.

Weeds of the Northeast

Cornell University Press
P.O. Box 6525
Ithaca, NY 14851_6525
607-277-2211
\$29.95 (+ shipping) / Appropriate to the Northern tier of the US (south to North Carolina) and southern Canada. About 300 species are covered. Several color photographs and drawings for each species, descriptions, and identification keys.

Weeds of the West

University of Wyoming
U.W. Coop. Extension Service Bulletin Room
University of Wyoming
PO Box 3313
Laramie WY 82071-3313
\$24.50 / A full color guide focused primarily on weeds of western US agriculture. Multiple color photos of each weed and brief descriptions are included. There is no key.

Weed ID Guide

Southern Weed Science Society
1508 West University Ave.
Champaign, IL 61821_3133
\$97.00 (includes all six sets of weed sheets, index and a binder)
CD_ROM Weeds of the United States is \$120 A 'high-end' and relatively expensive resource, this is available in notebook form (so it can be continually updated) and also a CD_ROM. High quality photographs with brief descrip-

tions. No key is included.

Color Atlas of Turfgrass Weeds

Ann Arbor Press
310 North Main Street
P.O. Box 20
Chelsea Michigan 48118
800-487-2323
\$79.95 (plus shipping) / A color guide to turfgrass weeds. This guide covers weeds

of warm-season and cool-season areas. Several photographs of each species and brief descriptions. Control guidelines are included.

NEWSS web site

<http://www.ppws.vt.edu/newss/newss.htm>
The Northeastern Weed Science Society web site has a listing of internet sources for weed identification guides.

How to get maximum control of summer weeds

Maximum control of summer annual weeds with preemergence herbicides can be achieved by following these basic guidelines:

- 1. Apply the product at the recommended time and rate.** Weather varies from year to year and it may be necessary to apply earlier than normal. Reference to 30-day weather forecasts can help with this decision.
- 2. Apply the product before rain is expected or water it in with two inches of irrigation water.** Numerous instances of poor weed control occur each year because of the lack of rain or an irrigation event within seven days of preemergence application. Additionally, irrigating-in the herbicide is an excellent method to prevent losses due to volatility and lateral herbicide leaching. Turfgrass preemergence herbicides essentially do not leach in downward direction beyond a depth of one to three inches due to binding to soil colloids and organic matter. But they can move laterally, particularly if heavy rainfall occurs shortly after application. Thus, irrigation will usually improve weed control and will help to prevent lateral movement.
- 3. Calibrate all application equipment.** Uniform application is critical to achieving good weed control.
- 4. If fertilizer/herbicide formulations are to be used, select a product that has uniform particle size.** Be sure the product is applied with a sufficient number of particles to ensure even, uniform application. Also, be sure that the herbicide load is sufficient to apply the recommended rate of the product. Johnson and Murphy (1993) showed that dithiopyr rates can be reduced if applied on a dry granular carrier (Table 3). However, with most other preemergence herbicides the amount of active ingredient applied per acre should be the same either for sprayable or dry formulations.
- 5. Delay mowing until after a rainfall or irrigation event.** Studies have shown that mowing and bagging operations can remove significant quantities of a preemergence herbicide if conducted before the herbicide is moved into the soil by rain or irrigation water.
- 6. Properly maintain the turfgrass.** Following recommended cultural practices that promote normal turfgrass growth and development will enable the turfgrass to compete with weeds. The first line of defense against weed infestations has been, and probably always will be, a thick, healthy, properly maintained turfgrass. Adherence to recommended soil fertility and pH levels, proper irrigation, controlling other pests, and mowing at the correct height and frequency will improve the effectiveness of most chemical weed control programs.

***How do you get
more power to
the root of your
weed problem?***

Roundup
PRO
Herbicide



The proof is in the leaf.¹

Monsanto scientists used scanning-electron microscopy to photograph the effects of weeds sprayed with Roundup PRO and an imitator.

Taken just one hour after application, these images clearly show more formulation in the leaf sprayed with Roundup PRO.



Get Roundup PRO[®] herbicide with patented PROformance[™] technology.

In the first two hours, it delivers three times more power to the roots than Syngenta's latest imitator product.

The proof is in the roots.²

Scientists also used autoradiography to photograph and measure the amount of herbicide in the roots two hours after application. Time after time, at least three times more herbicide showed up in the weeds sprayed with Roundup PRO. With the imitator, barely any herbicide has moved to the roots.





This is a cross-section of a weed leaf magnified 1000x. The yellow droplets mean Roundup PRO is already at work inside.

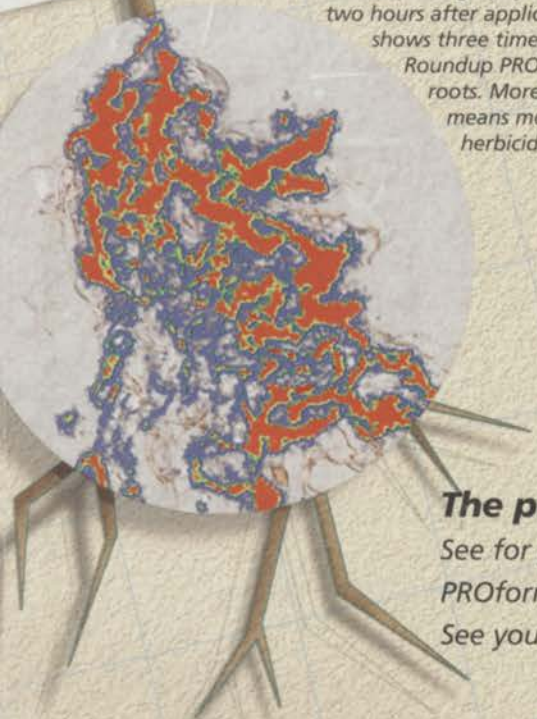
Roundup
PRO
Herbicide



This weed, sprayed with the imitator, has almost no droplets in the leaf.

Syngenta's latest imitator product

In the first two hours, almost no imitator herbicide has moved to the roots.



Scientific photography taken two hours after application shows three times more Roundup PRO in the roots. More color means more herbicide.



The proof is in your control.

See for yourself the difference Roundup PRO with patented PROformance technology can make in your weed management. See your dealer or call 1-800-ROUNDUP for more information.

Free video shows science in action.

See PROformance technology at work in a free, five-minute video. Scientists Dr. Tracey Reynolds and Dr. Jimmy Liu demonstrate the autoradiography and cryo-SEM techniques used to compare Roundup PRO with an imitator on two identical weeds.

Call **1-800-ROUNDUP** and ask for your free Roundup PRO video today!

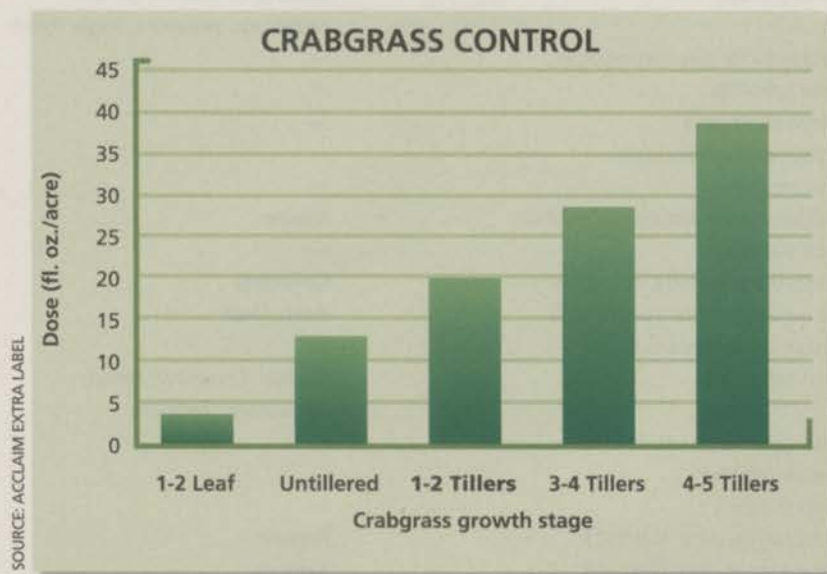


Always read and follow label directions. Test conducted with MON 77360, EPA Reg #524-475 with comparison to Syngenta product carrying EPA Reg. #10182-449. 1. Test methodology: In scanning-electron microscopy, Monsanto scientists identified penetrated formulations of both Roundup PRO and Touchdown Pro in the mesophyll cell layer. These micrographs support the evidence that formulations containing Monsanto's patented PROformance technology rapidly penetrate the leaf surface. 2. Test methodology: Radiolabeled formulations were applied at equal acid-equivalent rates. Radioactivity was visualized by autoradiography following a simulated rain event two hours after application. Monsanto laboratory tests, 2001. Roundup®, Roundup PRO® and PROformance™ are trademarks of Monsanto Technology LLC. [12748 jct 10/01 J. ©2001 Monsanto Company RUPRO-12748

Why herbicides fail

- Not reading and/or following label specifications
- Improper weed identification
- Improper herbicide selection
- Improper method of application
- Improper timing of application
- Unfavorable temperature and/or moisture conditions affecting poor weed growth
- Age and growth stage of the weed plant — young vs. mature target weed
- Temperature too hot or too cold
- Skipped area — spot treating/poor overlapping resulting in poor coverage
- Foliage not wet — product failed to penetrate leaf hairs
- Low concentration of mix — not enough active ingredient to manage weed
- High concentration of herbicide killed the top, not the roots
- Wind drift — failure to deliver herbicide to the target
- Rain following application washed off treatment
- Product too old — deactivated
- Product caked — spoiled
- Product separated into layers
- Chemical and/or physical incompatibility
- Alkaline (high pH of water) hydrolysis and herbicide degradation
- Droplet size too large — some herbicides perform better if particle size is finer
- Improper mixing sequence while using multiple products
- Insufficient agitation while mixing
- Past residue in the tank
- Improper tank cleaning — herbicide residues are difficult to rinse
- Failure to agitate or shake product containers to mix ingredients before using
- Failure to add surfactant as needed
- Weed is difficult to control — morphological, waxy cuticle
- Failure to incorporate into soil, if required
- Too much organic matter such as mulch ties up herbicide
- Product is a contact herbicide and not translocated
- Pre-emergent activity only
- Post-emergent activity only
- Poor systemic activity — foliar vs. root absorbed
- High temperature closed the stomata opening
- Large number of weed seeds remains viable in soil for a long time
- Open bare ground — no mulch or other cover
- Not post watered in, if needed
- Water quality of mix — muddy water ties up some herbicides
- Weed resistance from repeated use of a specific herbicide-resistant biotypes
- Host plant age — newly planted vs. established trees and shrubs
- Winter annual weeds in established plantings may need fall or early winter application
- Booster application not received
- Booster application not complimentary — e.g. Princep followed by Ronstar
- Application of herbicide over top of plants may cause injury
- A combination of pre- and post-herbicides may be needed
- Insufficient time for the herbicide to act — activity may start in a few days, weeks or may be delayed for a year
- Weeds blown or carried from nearby areas
- Susceptible plants — some ground covers may not be labeled
- Plant with deep growing parts in soil — rhizomes or tubers
- High weed pressure — too many weed seeds: crabgrass, dandelion or annual bluegrass

— Bal Rao, Ph.D.



As crabgrass grows, higher herbicide doses are required to obtain control. This chart illustrates the doses of Acclaim Extra recommended to control different sized crabgrass plants.

URBAN TOLERANT TREES

BOTANICAL NAME	VARIETY	COMMON NAME
■ <i>Abies concolor</i>	—	White fir
■ <i>Acer campestre</i>	'Evelyn'	Queen Elizabeth hedge maple
■ <i>Acer x freemanii</i>	Autumn blaze/celebration	Freeman maple
■ <i>Acer griseum</i>	—	Paperbark maple
■ <i>Acer nigrum</i> 'greencolumn'	Greencolumn	Black maple
■ <i>Acer rubrum</i> 'franksred'	Red sunset	Red maple
■ <i>Acer saccharum</i>	Fairview, legacy, green mountain	Sugar maple
■ <i>Acer tataricum</i>	—	Tatarian maple
■ <i>Acer truncatum</i> x <i>platanoides</i> 'warrenred'	Pacific sunset	Shantung maple
■ <i>Amelanchier x grandiflora</i> 'autumn brilliance'	Autumn brilliance	Serviceberry
■ <i>Betula utilis</i> var. <i>jacquemontii</i>	Whitebarked Himalayan	Birch
■ <i>Betula nigra</i> 'heritage'	Heritage	River birch
■ <i>Carpinus betulus</i> 'fastigata'	Pyramidal	European hornbeam
■ <i>Cercidiphyllum japonicum</i>	—	Katsura tree
■ <i>Cladrastis lutea</i>	—	Yellowwood
■ <i>Cornus hybrid</i>	Aurora, celestial, stellar	Stellar series
■ <i>Cornus kousa</i> 'Milky Way'	Pink constellation, Ruth Ellen, star dust	Kousa dogwood
■ <i>Corylus colurna</i>	Milky Way	Turkish hazelnut
■ <i>Eucommia ulmoides</i>	—	Hardy rubber tree
■ <i>Ginkgo biloba</i> 'PNI 2720'	—	Ginkgo
■ <i>Gleditsia triacanthos inermis</i>	Princeton sentry	Honeylocust
■ <i>Halesia tetraptera</i>	Moraine, shademaster, skyline	Carolina silverbell
■ <i>Kalopanax pictus</i>	—	Castor-aralia
■ <i>Koelreuteria paniculata</i>	—	Goldenrain tree
■ <i>Lagerstroemia indica</i>	Apalachee, biloxi, Byers white, centennial spirit	Crape myrtle
■ <i>Maackia amurensis</i>	—	Amur maackia
■ <i>Magnolia hybrid</i>	—	Galaxy magnolia
■ <i>Magnolia virginiana</i>	—	Sweetbay magnolia
■ <i>Malus species</i>	Adams, centurion, golden raindrops, prairifire, sugar tyme	Crabapple
■ <i>Metasequoia glyptostroboides</i>	—	Dawn redwood
■ <i>Nyssa sylvatica</i>	—	Black tupelo
■ <i>Ostrya virginiana</i>	—	American hop hornbeam
■ <i>Oxydendrum arboreum</i>	—	Sourwood
■ <i>Parrotia persica</i>	—	Persian parrotia
■ <i>Phellodendron amurense</i> 'macho'	Macho	Amur corktree
■ <i>Pinus parviflora</i>	—	Japanese white pine
■ <i>Platanus x acerifolia</i> 'columbia'	Columbia	London planetree
■ <i>Prunus subhirtella</i> 'rosy cloud'	Rosy cloud	Cherry
■ <i>Pseudotsuga menziesii</i>	—	Douglas fir
■ <i>Pyrus calleryana</i>	Capital, Cleveland select, Edgewood, redspire	Callery pear
■ <i>Pyrus calleryana</i> var. <i>fauriei</i>	—	Pea pear
■ <i>Quercus bicolor</i>	—	Swamp white oak
■ <i>Quercus rubra</i>	—	Northern red oak
■ <i>Sophora japonica</i> 'PNI 5625'	Regent	Scholar tree
■ <i>Syringa reticulata</i> 'ivory silk'	Ivory silk	Tree lilac
■ <i>Taxodium distichum</i> 'mickelson'	Shawnee brave	Bald cypress
■ <i>Tilia tomentosa</i>	Green mountain, sterling	Silver linden
■ <i>Ulmus americana</i> 'princeton'	Princeton	American elm
■ <i>Zelkova serrata</i> 'village green'	Village green	Zelkova

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Kubota



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CONVENTIONAL INSECTICIDES FOR TURF PESTS

Insects	acephate	bendiocarb (Turcam)1	carbaryl (Sevin)1	cyfluthrin (Tempo)1	ethoprop (Mocap)1	halofenozide	imidacloprid (Merit)1
white grubs		x	x		x	x	x
Ataenius	x	x			x	x	x
bluegrass billbug	x l	x l	x a	x a,l		x l	x l
sod webworms	x	x	x	x	x	x	
cutworms	x		x	x	x	x	
armyworms			x	x		x	
leafhoppers	x	x	x				
greenbugs	x						
chinch bugs	x	x	x	x	x		
ants		x	x	x			

a=adult, l=larvae, 1=an example of a trade name, inclusion does not imply endorsement

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