

POSTEMERGENCE, NON-SELECTIVE HERBICIDES FOR LANDSCAPES AND NURSERIES

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Manual removal of weeds is time consuming, expensive, and often results in damage to landscape plants when intertwined roots of both the weed and the ornamental plant are pulled up. Consequently, postemergence herbicides are often used to remove weeds. Few selective postemergence herbicides are available for use in landscape plantings or nursery stock production. Consequently, nonselective herbicides (which must be selectively applied to avoid injury to desirable plants) are typically used for postemergence annual and perennial weed control. Choosing the right herbicide for the situation is an important decision. Nonselective herbicides (as the term indicates) are not selective about which plants they kill. Any green plant that they contact will be injured or killed. The level of weed control (or ornamental plant injury) resulting from these herbicides depends upon the chemical characteristics, mode of action of the herbicide, and the season of application.

Postemergence, nonselective herbicides are classified as either contact or systemic. Contact herbicides kill only the green tissues that are contacted by the spray. Systemic (sometimes also called translocated) herbicides move within the plant from the point of application to other plant parts. Some systemic herbicides are more mobile (move easily and farther) in plants than others. Also, in perennial weeds the amount of systemic movement of the herbicide often depends upon the season. Therefore, to

obtain optimum control, herbicides must be applied at the time of year when weeds are most susceptible.

Four postemergence, nonselective herbicides are labeled and commonly used in landscapes and nurseries. **Reward** and **Scythe** are contact herbicides, whereas **Finale** and **Roundup-Pro** are systemic. Some characteristics of each are compared in Table 1. None of these products have residual activity (i.e.: no root uptake and no preemergence weed control) in soils containing greater than 1% clay.

However, in sandy soils, muck soils or soilless media, root uptake of systemic herbicides is possible. Each product has a place in landscape management, but choosing the right herbicide for the right situation requires information and an understanding of each herbicide's strengths and weaknesses. The following descriptions should provide some background information to facilitate your herbicide selection.

Contact Herbicides: Reward and Scythe

Reward (diquat, Valent Corp.) is a postemergence contact weed killer. It kills small annual weeds. Large annual weeds and perennials will be injured but not killed. In our research, spray volumes of 2 gal per 1000 ft² were more effective than lower volume treatments. Advantages of Reward include rapid kill of small seedling weeds and relatively

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low cost. Also, small amounts of spray drift will cause only cosmetic damage to landscape plants and will not translocate to kill desirable plants. Additionally, Reward is not temperature sensitive, working well in cool and warm weather. Disadvantages of this herbicide are lack of control of perennial or well-established weeds and the relatively high mammalian toxicity (compared with Scythe, Finale and Roundup-Pro).

Scythe (pelargonic acid, Mycogen Corp.) is also a postemergence, contact herbicide that controls small seedling weeds but only injures larger annual weeds and perennials. In contrast to Reward, Scythe works better in warm (> 80 °F) than cool weather. In cold weather, Scythe is not as effective as Reward. Advantages of Scythe include lower toxicity (compared to Reward) and very rapid symptom development. Also, Scythe is perceived by many people to be an alternative to traditional herbicides. Customers who do not wish to have pesticides applied to their properties will sometimes accept the use of soaps (such as insecticidal soaps) and may accept the use of Scythe, often considered to be a "herbicidal soap." As with Reward, spray drift on desirable plants will cause cosmetic damage but will not translocate to kill the entire plant. In all applications, avoid contact with desirable

vegetation. The main disadvantages of Scythe are higher cost and it is somewhat less effective than Reward on larger weed seedlings. Additionally, the odor is persistent and offensive to some people, and spray drift can be a severe eye irritant.

Systemic Herbicides: Roundup-Pro and Finale

Roundup-Pro (glyphosate, Monsanto Corp.) is a systemic, postemergence herbicide which kills annual and perennial weeds. Advantages of Roundup-Pro are the systemic kill of annual and perennial weeds and low mammalian toxicity. The main disadvantage is that small amounts of spray drift can severely injure certain ornamentals. Table 2 provides guidelines for optimum doses and application timing for controlling several perennial weeds.

Recently, the formulation of Roundup was changed. The new formulation, Roundup-Pro, contains a new adjuvant mixture that has a lower dermal toxicity (changing the toxicological signal word from "Warning" to "Caution"), enhanced absorption and improved rain fastness to 1 1/2 hours (previously 6 hours). With improved absorption, Roundup-Pro has greater potential for injuring conifers than did Roundup. How great is the potential for injury?

Table 1. A comparison of postemergence, non-selective herbicides.

Herbicide	Mode of Action	Time to Symptoms	Rate for Spot Appl.	Toxicological Properties*	REI**
Reward	contact	2 to 24 hr	1/4 to 1/2 % + surfactant	WARNING: eye & skin irritant; LD ₅₀ = 230 mg/kg	24 hr
Scythe	contact	1/2 to 2 hr	5 to 10%	WARNING: severe eye irritant; LD ₅₀ >5000 mg/kg	24 hr
Finale	systemic	~2 days	1 1/4 to 3%	WARNING: may cause eye or mild skin irritation; LD ₅₀ = 3570 mg/kg	12 hr
Roundup-Pro	systemic	~7 days	1 to 3%	CAUTION: may cause mild skin or eye irritation; LD ₅₀ >5000 mg/kg	4 hr

*LD₅₀: the dosage required to kill 50% of the test animals, expressed as the milligrams (thousandths of a gram) of herbicide active ingredient per kilogram (1000 grams) of body weight. The larger the LD₅₀, the safer it is.

**REI: Worker protection standard prescribed Restricted-entry intervals for agricultural uses. These are applicable to nurseries but not for landscape uses. For this time interval following an herbicide application, agricultural workers are not to enter treated areas without wearing personal protective equipment (PPE) for activities that would bring them in contact with treated surfaces. Depending upon the herbicide, the PPE required may be as simple as shoes, socks, coveralls, and rubber gloves. Check the AGRICULTURAL USE REQUIREMENTS section of the label for required PPE.

Landscapers who learned to use Roundup around and over conifers have reported injury when Roundup-Pro was used in the same manner. At this point we do not have all the answers, but preliminary research suggests that fall applications may not have increased potential for injury, but spring and summer applications of Roundup-Pro will be more injurious than Roundup. Until more research is conducted, it is advisable to be extra careful to avoid contacting the foliage of trees and shrubs with Roundup-Pro.

Finale (glufosinate-ammonium, AgrEvo Co.) is also a non-selective, systemic, Postemergence herbicide. Finale is similar to Roundup-Pro, in that it is a translocated, non-selective herbicide with no soil activity in clay soils. However, in contrast to Roundup-Pro, Finale produces symptoms more rapidly (often within 48 hours, see Table 1) but may not control perennial weeds (such as bindweed, goldenrod, and mugwort) as well as Roundup-Pro. Reduced translocation of Finale in rhizomes and stolons may offer advantages over Roundup-Pro in some trim and edge applications.

Control of Herbaceous Perennials, Woody Vines, and Shrubs with Roundup-Pro (Glyphosate)

Roundup-Pro is labeled for control of annual and perennial weeds in ornamental plantings. For maximum weed control, use no more than 25 gal of final spray solution per acre,

apply when the foliage is not wet, allow at least 1 1/2 hours without rain or irrigation after application and apply Roundup-Pro at the time of year that weeds are most susceptible. A 1% solution (1.25 oz of Roundup-Pro per gal of water) will give excellent control of most weeds. For some species, increasing the percentage to 1.5% or 2.0% is advisable (see Table 2). For wick (or wiper) applications use one part Roundup-Pro and two parts water (33%, by volume). Glyphosate is currently available under many brand names which differ in many ways. The liquid products range from a 0.5% ready-to-use formulation to concentrates of up to 53.8% active glyphosate. There are also several formulations which contain additional herbicides such as acifluorfen which provide some rapid symptoms and short term soil residual. Check each label for specific instructions.

By taking advantage of periods of high and low susceptibility of ornamental plants and problem weeds, you can manage many difficult problems with glyphosate. In general, conifers and broadleaf evergreen shrubbery are most tolerant to glyphosate in late fall and early winter, whereas small quantities will cause severe damage in the spring. In contrast, deciduous plants are more tolerant in winter and spring, while much more severe damage results from glyphosate contact in the late summer and early fall. As little as a half dozen leaves on a 2-inch branch sprayed with a 1 percent solution can cause death of the entire branch. Table 2 has been developed based upon research and label guidelines.

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Table 2. Optimum application rates and timing of Roundup-Pro (glyphosate)**Amount of Roundup-Pro to Obtain 90% or Better Weedy Species Control One Season Later Application Timing for Best Control**

Our data suggest that the following plants can be controlled with Roundup-Pro, although the manufacturer does not claim effectiveness on the product label.

Plant(s)	Rate	Timing
Perennial grasses (johnsongrass, fescue, etc.)	1%	At time of first flowering
Bermudagrass	2%	At time of first flowering
Quackgrass	2%	Early spring, with 6 to 8 inches of new growth; or early fall
Blackberry	1 to 1.5%	Fall and early winter
Composites (asters, goldenrod, dogfennel, etc.)	1%	From first flowering to a few weeks before frost
Honeysuckle	1 to 1.5%	Full bloom and up to a month after (early summer)
Kudzu	1.5 to 2%	Full bloom and up to a month after (early summer)
Nutsedge	2%	Early summer, repeat treatments as new plants emerge
Poison Ivy	2%	Two weeks on either side of full bloom (early summer)
Sericea lespedeza	2%	Full bloom (midsummer)
Trumpet creeper (cow-itch vine)	1.5%	Late summer to mid-fall before frost
Clematis vine	1%	After bloom until frost
English ivy	2 or 3%	3 to 5 fully expanded new leaves (early spring)
Greenbrier	3%	5 fully expanded leaves (early spring)
Japanese knotweed	2%	Late summer to early fall but before frost
Mugwort	1.5 to 2%	Full flower (late summer to early fall)
Passion flower (maypop)	1%	Early bloom to first fruit
Virginia Creeper	1%	Late summer or first sign of fall color
Wisteria	1.5 to 2%	6 to 8 weeks after bloom (mid- to late summer)

In general, the application times given above have been more effective than applications made at other times of year.
