ACTIVELY GROWING BERMUDAGRASS - ANNUAL WEED

General Information

USE INFORMATION

Unless otherwise specified, applications may be made in listed USE SITES to control any weeds listed in the annual, perennial, and woody brush tables (Tables 1, 2, 3, 4 and 5). Refer to the APPLICATION PROCEDURES section for additional rate information.

Refuge Herbicide is a nonselective foliar systemic herbicide for control of a broad spectrum of emerged annual and perennial grass and broadleaf weeds and unwanted woody brush and trees.

Refuge Herbicide is formulated as a liquid concentrate which contains 745 grams per liter (6.22 pounds per U.S. gallon) of the active ingredient glyphosate, in the form of its mono-potassium salt. Equivalent to 599 grams per liter (5 pounds per U.S. gallon) of glyphosate acid.

USE PRECAUTIONS AND RESTRICTIONS

- Do not apply this product through any type of irrigation system.

- DO NOT spray if conditions of thermal inversion exist, or if wind direction and speed may cause spray to drift onto adjacent nontarget areas. Drift minimization is the responsibility of the applicator. Consult with local and State agricultural authorities for information regarding avoiding or minimizing spray drift.

- The MAXIMUM USE RATES indicated for Refuge Herbicide have been determined based upon the concentration of glyphosate acid (expressed as acid equivalents) contained in this product. The actual maximum application rates stated apply to the total amount of glyphosate acid equivalents applied to a given site in any year either from the application of this product alone or in combination with other glyphosate containing products, applied either as mixtures with other products or separately.

Application rates must be calculated to ensure that the use of this and other

glyphosate containing products do not exceed the maximum use rate as specified below unless otherwise specified in the specific use directions.

- Do not exceed a total of 6.3 qt Refuge Herbicide/A equivalent to 8 lb glyphosate acid equivalents per acre per year.

- Do not exceed 0.6 qt/A by air unless otherwise specified on the label.

- For broadcast, do not feed treated vegetation for 8 weeks following application, unless otherwise specified.

- Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the plants, or other areas on which treatment was not intended. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. Avoid applying at excessive speed or pressure.

- Refuge Herbicide requires actively growing green plant tissue to function. Application to drought-stressed weeds or weeds with little green foliage (i.e. mowed, cut, or hailed on weeds); weeds covered with dust; weeds damaged by insects or diseases may result in reduced weed control.

- Refuge Herbicide does not provide soil residual control of weeds. Weeds emerging after application will require retreatment.

- Heavy rainfall or irrigation shortly after application may require retreatment.

- Tillage or mowing within 3 days following application may reduce weed control.

- Refuge Herbicide is not volatile and cannot move as a vapor after application onto nontarget vegetation.

- It is recommended that the spray system be thoroughly cleaned with water and a commercial tank cleaner after each use.

- Spray solutions of Refuge Herbicide should be mixed, stored, and applied using only plastic, plastic-lined steel, stainless steel, aluminum, or fiberglass containers. Concentrate should not be stored in galvanized steel, carbon steel, or unlined steel containers.

- There are no rotational restrictions following application of this product.

Severe damage or destruction may be caused by contact of Refuge Herbicide to any vegetation (including leaves, green stems, or exposed non–woody roots) of trees, and other desirable plants to which treatment is not intended.

GLYPHOSATE-RESISTANT WEED MANAGEMENT

Some naturally occurring weed biotypes resistant to glyphosate may exist through normal genetic variability in any weed population. The repeated use of herbicides with the same mode of action is known to lead under certain conditions to a selection of resistant weeds. Certain agronomic practices reduce the likelihood that resistant weed populations will develop and integrated strategies are known to manage such problem weeds.

Glyphosate is the active ingredient in the herbicide Refuge Herbicide. The primary mode of action of glyphosate involves inactivation of the target enzyme 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS). This enzyme is involved in the synthesis of several essential amino acids that are the building blocks for proteins needed for plant growth and development. In susceptible weeds glyphosate binds tightly to EPSPS rendering the enzyme inactive. With the inactivation of EPSPS, the plant is unable to produce certain essential amino acids resulting in plant death. Initial studies on the mechanistic basis of resistance to glyphosate in various weed species have to date; revealed EPSPS target site resistance, and involvement of differences in translocation as important. Other mechanisms by which plants can become resistant to herbicides include differences in uptake, metabolism and sequestration. Within the USA specific biotypes of a number of species including, horseweed/marestail (Conyza canadensis), hairy fleabane (Conyza bonariensis), rigid ryegrass, (Lolium rigidum), Palmer amaranth (Amaranthus palmeri), common waterhemp (Amaranthus rudis), common ragweed (Ambrosia artemisiifolia), giant ragweed (Ambrosia trifida) and johnsongrass (Sorghum halepense) have become resistant to glyphosate. The first incident reported to the Herbicide Resistance Action Committee (HRAC) of glyphosate resistance was in 1998 on rigid ryegrass.

Following is a list of Best Weed Management practices to be considered in glyphosate-based programs.

Diversify glyphosate-dependent weed control programs with alternative herbicides or cultural practices.

a. Use full label rates of glyphosate and tank mix partners. Minimize weed escapes.

b. Monitor treated weed populations for any loss of field efficacy.

c. Contact your local extension specialist, certified crop advisor, and/or manufacturer for herbicide resistance management and/or integrated weed management recommendations for specific resistant weed biotypes.

Since the occurrence of resistant weeds is difficult to detect prior to use, Syngenta Crop Protection accepts no liability for any losses that may result from the failure of Refuge Herbicide PP to control resistant weeds.

Cultural Considerations: Application to annual or perennial weeds that have been

mowed, grazed, or cut, and have not been allowed to regrow to the recommended stage for treatment may result in reduced control. Weeds covered with dust; weeds damaged by insects or disease may result in reduced weed control.

Rainfastness: Heavy rainfall or irrigation shortly after application may require retreatment.

No Soil Activity: Refuge Herbicide does not provide soil residual control of weeds. Only emerged weeds at the time of application will be controlled. Weeds germinating from seed after application will not be controlled. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected.

RATES

Follow specified rates for Refuge Herbicide listed in the WEEDS CONTROLLED, WOODY BRUSH AND TREES CONTROLLED sections.

Use the higher label rates when weeds are dense or large. Also, use higher application volumes and pressures when weed vegetation is dense.

APPLICATION PROCEDURES

BROADCAST APPLICATIONS

Ground

Applications should be made in 3 to 40 gallons of water per acre.

When foliage is dense, spray volume should be increased to ensure coverage of the target weeds. Flat-fan nozzles will result in the most effective application of Refuge Herbicide. Spray boom and nozzle heights must be adjusted to provide coverage of target weed. Flood nozzles may result in reduced weed control due to inadequate coverage.

Air

Applications should be made in 3 to 15 gallons of water per acre.

Spray should be released at the lowest height consistent with effective weed control and flight safety. Applications more than 10 ft above the canopy should be avoided.

Use the largest droplet size consistent with good weed control. Formation of very small droplets may be minimized by appropriate nozzle selection, by orienting nozzles away from the air stream as much as possible, and by avoiding inappropriate spray boom pressure. Solid stream or low shear nozzles may be utilized to reduce small droplet formation. These nozzles direct the fluid parallel to the existing airflow to reduce shear effects. Other techniques may include reducing the fan angle of flat fan nozzles if used, or reducing the deflector plate angle if deflector type nozzles are used. Ensure the spray is released at an appropriate distance below the airfoil.

For best results, each specific aerial application vehicle used should be quantifiably pattern tested for aerial application of Refuge Herbicide initially and every year thereafter. To minimize drift, it is suggested aerial application equipment produce the following minimum spray deposition characteristics:

Volume Median Diameter (VMD) › 400 microns

Volume Diameter (VD) {0.9} › 200 microns

Prolonged exposure of Refuge Herbicide to uncoated steel surfaces may result in corrosion and possible failure of the part. The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion. To prevent corrosion of exposed parts, thoroughly wash aircraft after each day of spraying to remove residues of Refuge Herbicide accumulated during spraying or from spills. Landing gear are most susceptible.

For aerial application in California, refer to the Federal Supplemental Label for aerial application for specific instructions, restrictions, and requirements. For aerial application, consult with State or local authorities regarding any additional requirements for aerial treatments. Banvel tank mixtures may not be applied by air in California.

SHIELDED/HOODED APPLICATION

Use shielded/hooded sprayers to control weeds between rows while protecting the crop from the herbicide. Keep shields/hoods as close to the ground as possible and

avoid ground speed in excess of 5 mph. Use appropriate nozzles, spacing, and pressure to achieve coverage without allowing spray to touch or drift onto the crop. Maintain equipment in good operating condition to prevent leakage or dripping onto the crop. Refer to state extension service recommendations and equipment manufacturers' guidelines for more information on proper operation of shielded/hooded sprayers.

SPOT TREATMENTS

For annual weeds less than 6 inches, use a 0.3 to 0.6% v/v solution. For annual weeds over 6 inches, use a 0.6 to 0.9% v/v solution.

Use a 0.6 to 1.25% v/v solution for most perennials (see Table 3 for specific rates and timing). When using motorized spot spray equipment (rider bar), use a 1.8% v/v solution. See Spot Spray Dilution Table below for rates of Refuge Herbicide /volume of finished spray solution. Spray the solution on actively growing weeds until uniformly wet but not to the point of runoff. Retreat 14 to 21 days later if regrowth occurs.

WIPER APPLICATION

Refuge Herbicide may be applied using a wiper or "wick" applicator (e.g. rope, sponge, or porous plastic applicators) for selective control or suppression of annual and perennial weeds which become taller than the crop or desirable vegetation. Mix 2.5 qt of Refuge Herbicide in 2 gallons of water unless directed otherwise in the label (See General Use Precautions for Berries, Fruits, Nuts, and Vines). Precautions must be taken to avoid contact with crops or desirable vegetation. Equipment should be operated at speeds of 5 mph or less. Use slower speeds where weeds are dense. For improved control, make two applications in opposite directions.

Hand-Held and High-Volume Equipment

For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff. Use coarse sprays only.

For control of weeds listed in Table 1 (Annual Weeds Controlled), apply a 0.4% solution of Refuge Herbicide to weeds less than 6 inches in height or runner length. For annual weeds over 6 inches tall, or unless otherwise specified, use a 1% solution. Apply prior to seedhead formation in grass or bud formation in broadleaf

weeds.

For harder-to-control perennials, such as bermudagrass, Canada thistle, dock, field bindweed, hemp dogbane, and milkweed, use a 1.7% solution.

For low volume directed spray applications, use a 4-8% solution of Refuge Herbicide for control or partial control of annual weeds, perennial weeds, or woody brush and trees. Spray coverage should be uniform with at least 50 percent of the foliage contacted. When spraying large woody brush and trees with dense and thick foliage or multiple sprouts, spray both sides to ensure adequate coverage.

Injection Systems

Refuge Herbicide may be used in aerial or ground injection spray systems. It may be used as a liquid concentrate or diluted prior to injecting into the spray stream. Do not mix Refuge Herbicide with the undiluted concentrate of other products when using injection systems unless specifically recommended.

CONTROL DROPLET APPLICATION (CDA) EQUIPMENT

For control of annual weeds with hand held equipment, apply a 17% solution of Refuge Herbicide at a flow rate of 2 fl oz per minute and a walking speed of 1.5 mph (0.8 qt/A). For perennial weeds, use a 17 to 25% solution of Refuge Herbicide at a flow rate of 2 fl oz per minute and a walking speed of 0.75 mph (1.67 to 2.5 qt/A). For vehicle mounted equipment, apply in 3 to 15 gallons of water per acre. Refer to the WEEDS CONTROLLED, WOODY BRUSH AND TREES CONTROLLED sections, for application rates and timing.

Precautions must be taken to avoid contact with crops or desirable vegetation.

LOW VOLUME EQUIPMENT

For low volume directed spray applications, use a 4-8% solution of Refuge Herbicide for control or partial control of annual weeds, perennial weeds, or woody brush and trees. Spray coverage should be uniform with at least 50 percent of the foliage contacted. When spraying large woody brush and trees with dense and thick foliage or multiple sprouts, spray both sides to ensure adequate coverage.

SELECTIVE EQUIPMENT

AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

Refuge Herbicide may be applied through recirculating spray systems, shielded applicators, hooded sprayers, wiper applicators, or sponge bars to listed weeds growing in any noncrop site specified on the label. A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation. Spray solution not intercepted by weeds is collected and returned to the spray tank for reuse. Shielded or hooded sprayers direct the herbicide solution onto weeds, while shielding desirable vegetation from the herbicide.

Adjust selective applicators so that the lowest spray stream or wiper contact point is at least 2 inches above the desirable vegetation.

Droplets, mist, foam, or splatter of the herbicide solution settling on desirable vegetation is likely to result in discoloration, stunting, or destruction.

Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. In dense clumps, severe infestations, or when the height of the weeds varies so that not all weeds are contacted, repeat treatment may be necessary.

Shielded and Hooded Applicators

For shielded and hooded applicators, use nozzles that provide uniform coverage within the treated area. Keep shields on these sprayers adjusted to protect desirable vegetation.

Wiper Applicators and Sponge Bars

Equipment must be designed, maintained, and operated to prevent the herbicide solution from contacting desirable vegetation.

Apply at ground speeds of 5 mph or less. Use slower speeds where weeds are dense. For improved control, make 2 applications in opposite directions.

Do not use wiper equipment when weeds are wet.

Use the spray solution within 24 hours of mixing.

For Rope or Sponge Wick Applicators: Mix 0.8 to 1.7 gallons of Refuge Herbicide in 2

gallons of water to prepare a 33 to 75% solution. Apply this solution to weeds listed in this section.

For Porous Plastic Applicators and Pressure Feed Systems: Mix 0.8 gallon of Refuge Herbicide in 2 gallons of water to prepare a 33% solution up to using the product undiluted as a 100% solution. Apply this solution to weeds listed in this section.

Refer in the label regarding tank mix information.

Limitations, Restrictions, and Exceptions

Actively Growing Bermudagrass

Refuge Herbicide may be used to control or partially control many annual and perennial weeds for effective release in actively growing, well established bermudagrass. Apply 10 to 30 fl oz of Refuge Herbicide in 10 to 40 gallons of spray solution per acre. Use the lower rate when treating annual weeds below 6 inches in height or runner length. Use the higher rate as weeds increase in size or as they approach flower or seedhead formation.

Use only on well established bermudagrass. Bermudagrass injury may occur but regrowth will occur under moist conditions.

Repeat applications are not recommended in the same season.

WEED CONTROLLED

Water volumes of 3-40 gallons per acre by ground equipment and 3-15 gallons by air are recommended. Use the minimum spray volume that provides adequate coverage.

When tank mixing with residual herbicides, refer to the individual crop section for recommendations.

Apply to actively growing weeds.

Annual Weeds

Use the higher end of the rate range when stressful growing conditions or dense plant populations exist.

Refer in the label regarding specific rates information of the weeds.

Method
Broadcast/Foliar Air
Broadcast/Foliar Ground
Rates
field_rates 0

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Restricted Entry Interval

12 hours

Timings
Postemergence (Weed)