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HERBICIDES FOR GRASS AND HERBACEOUS WEED CONTROL IN OREGON AND WASHINGTON

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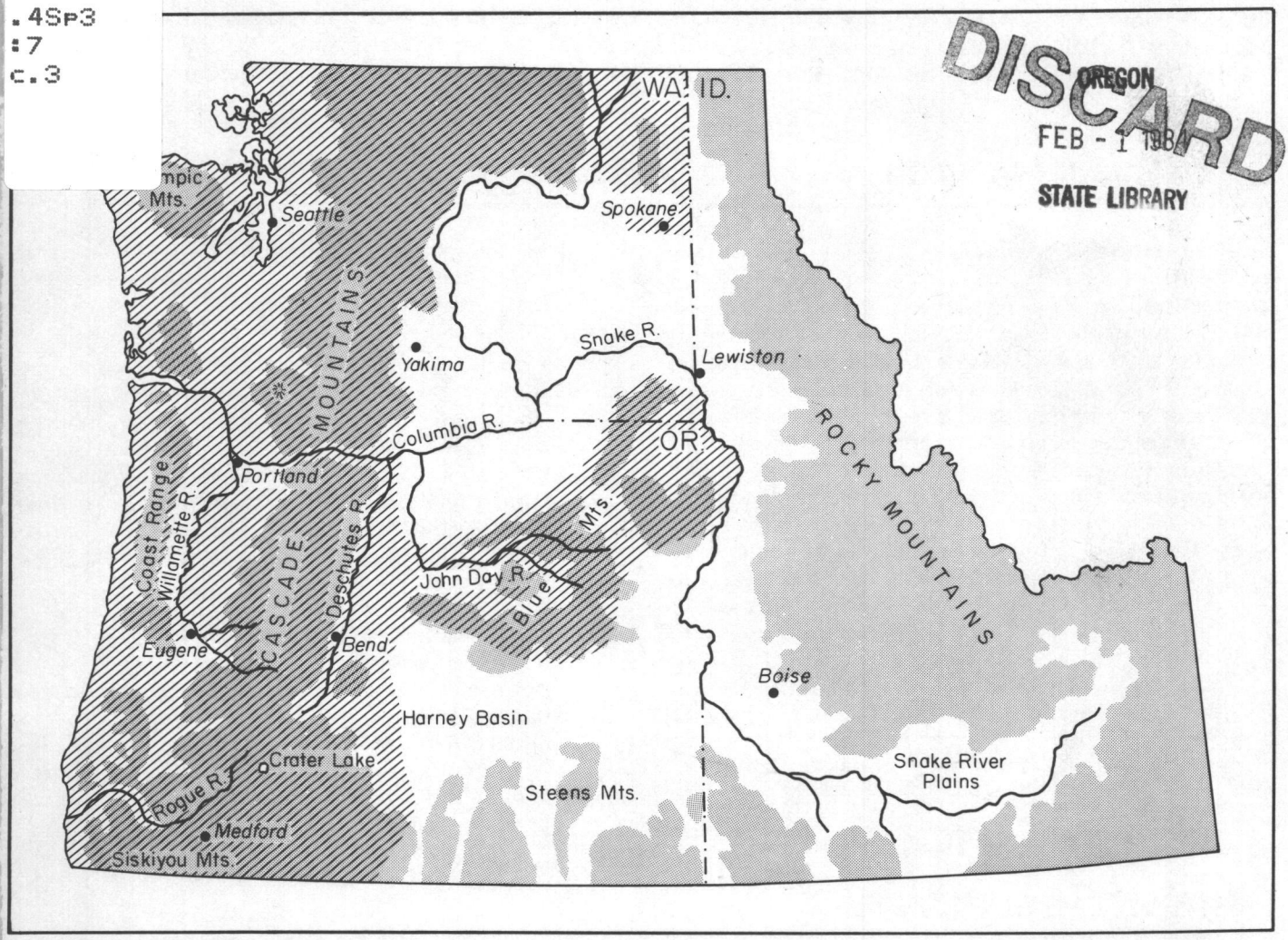

FIGURE 1.

AREAS (DIAGONAL LINES) DISCUSSED IN THIS PUBLICATION. SHADED AREAS INDICATE MOUNTAINS.

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INTRODUCTION

The purpose of this publication is to provide a supplement to existing information on the effects of herbicides used in forest vegetation management on grasses and herbaceous weeds common in Oregon and Washington. It is intended to assist foresters in selecting appropriate herbicides. A glossary of terms used in the publication is included.

This is one of a series of five publications concerned with efficacy and selectivity of major forestry herbicides in the Pacific Northwest. The other four publications deal with: (1) brush and fern control on forest sites in western Oregon and Washington, (2) forest brush control in southwestern Oregon, (3) shrub control in northeastern Oregon and northern Idaho, and (4) clump and stem treatments for weed trees and shrubs in Oregon and Washington. The five publications compile operational and experimental observations obtained from researchers and foresters who use herbicides. Some responses reported are based on only a small number of observations; therefore, injury ratings may be revised as more information becomes available.

GEOGRAPHIC AREA AND VEGETATION COMPLEXES

The herbicide treatments covered in this publication are appropriate for aerial or ground application on forest sites in Oregon and Washington (Fig. 1). Three of the most important competitive herbaceous-vegetation complexes that commonly invade cutover areas within this region are listed below. These complexes are characterized by species that frequently become dominant on forest sites following silvicultural disturbance.[1]

1. Himalayan blackberry/grass complex. Major associated species include poison oak, annual and perennial grasses, evergreen and trailing blackberry, and herbs and forbs common in the Willamette Valley of Oregon. This complex occurs in and around the Willamette Valley. The most common crop conifers in this area are Douglas-fir, western hemlock and western redcedar.

2. Complexes dominated by beargrass and sedge. Major associated species include huckleberry species and Pacific rhododendron. This complex is found at upper elevations (2,500-5,500 ft) of the Cascade Mountains. Common crop conifer species in this area are western white pine, noble fir, Shasta red fir and Pacific silver fir.

3. A pinegrass/elk sedge complex. Major associated species include huckleberry species. This complex is found on the upper slopes of the Blue and Rocky Mountains. Common conifer crop species in this area are ponderosa pine, grand fir, lodgepole pine and Engelmann spruce.

[1]Common names follow Franklin and Dyrness (1973), pp. 352-376, with the exceptions of evergreen blackberry (*Rubus laciniatus*) and Himalayan blackberry (*Rubus procerus*).

USING THIS GUIDE

There are many possible combinations of herbicides, carriers, rates, and adjuvants that might be effective in particular situations. This publication does not attempt to provide information on every possible combination, or to provide detailed information on application techniques. Addition of drift-control agents or surfactants, or application of chemicals with nozzles outside the standard 350- to 400-micron mean droplet-diameter range can substantially affect results. For additional discussion on the influence of application methods, adjuvants, carriers, and other factors on herbicide effectiveness, refer to

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Newton and Knight (1981) and Bohmont (1981).

Susceptibility of target species and conifer seedlings to specific chemical treatments may vary from one location to another. In addition, efficacy and selectivity of herbicide treatments are dependent on the phenology of both shrub and conifer. Therefore, proper timing of applications is crucial to success. Because weather patterns vary from year to year, the date when plants are at the proper phenological stage for a particular herbicide treatment may change by several weeks from one year to the next. Thus, the information that follows includes, whenever possible, phenological indicators that aid in achieving proper timing. Local pesticide representatives and forest extension agents may be able to provide additional information to help individual operators determine appropriate treatments for particular situations.

We recommend strongly that operators establish a system to survey sites prior to treatment and to maintain accurate records of application dates, phenological condition of shrubs and conifers at the time of spraying, weather (temperature, wind speed, humidity), herbicide rates, carrier volumes, and detailed descriptions of application methods (nozzles, pressure, etc.). Such surveys and records can provide an important information source for improving local herbicide prescriptions in the future. The Herbicide Effectiveness Report in this publication shows the types of information that should be collected.

HERBICIDE TREATMENTS AND SPECIES RESPONSES

Figure 2 shows typical responses of grasses, herbs and forbs, several blackberry species, and some of the major crop conifers to several herbicides and herbicide combinations. This figure can be used as a guide in determining an appropriate treatment based on the target species present and on the importance of protecting crop conifers, if present.

The guidelines below provide detailed descriptions of the herbicide spray mixtures and comments on registration status, timing, rates, efficacy, and selectivity of treatments shown in Figure 2. Rates are for aerial application unless otherwise noted. Aerial application produces less effect for the same rate than does evenly applied ground application; therefore, rates may be reduced 10-20 percent for ground treatments in uniform terrain. Even lower rates may be appropriate for ultra low volume (ULV) applications (<.5 gallons of spray mixture per acre).

Products are listed by Weed Science Society of America common names; trade names of representative products registered for forestry use are shown in parentheses (a.i. = active ingredient, a.e. = acid equivalent.) Operators should note that a given herbicide may be available under various trade names, in various concentrations, and from various manufacturers.

A U.S. Environmental Protection Agency (EPA) ruling allows the use of mixtures of herbicide as long as individual components of the mix are registered and the combination is not specifically forbidden by the individual product labels. Tank mixtures of some chemicals can increase the number of weed and grass species controlled.

GUIDELINES

1-3

- SPRAY MIXTURE: Atrazine (Aatrex®). 4-5 lb/A (a.i.) with water, or with water and 1 qt Moract® surfactant, to make 10 gal/A (A = acre). Ground applications were 4 lb/A (a.i.) in water to make 200 gal/A.
- REGISTRATION STATUS: Registered for conifer release.
- COMMENTS: Fall and Winter Treatments - Fall or winter applications are most appropriate for areas of low rainfall (e.g.,

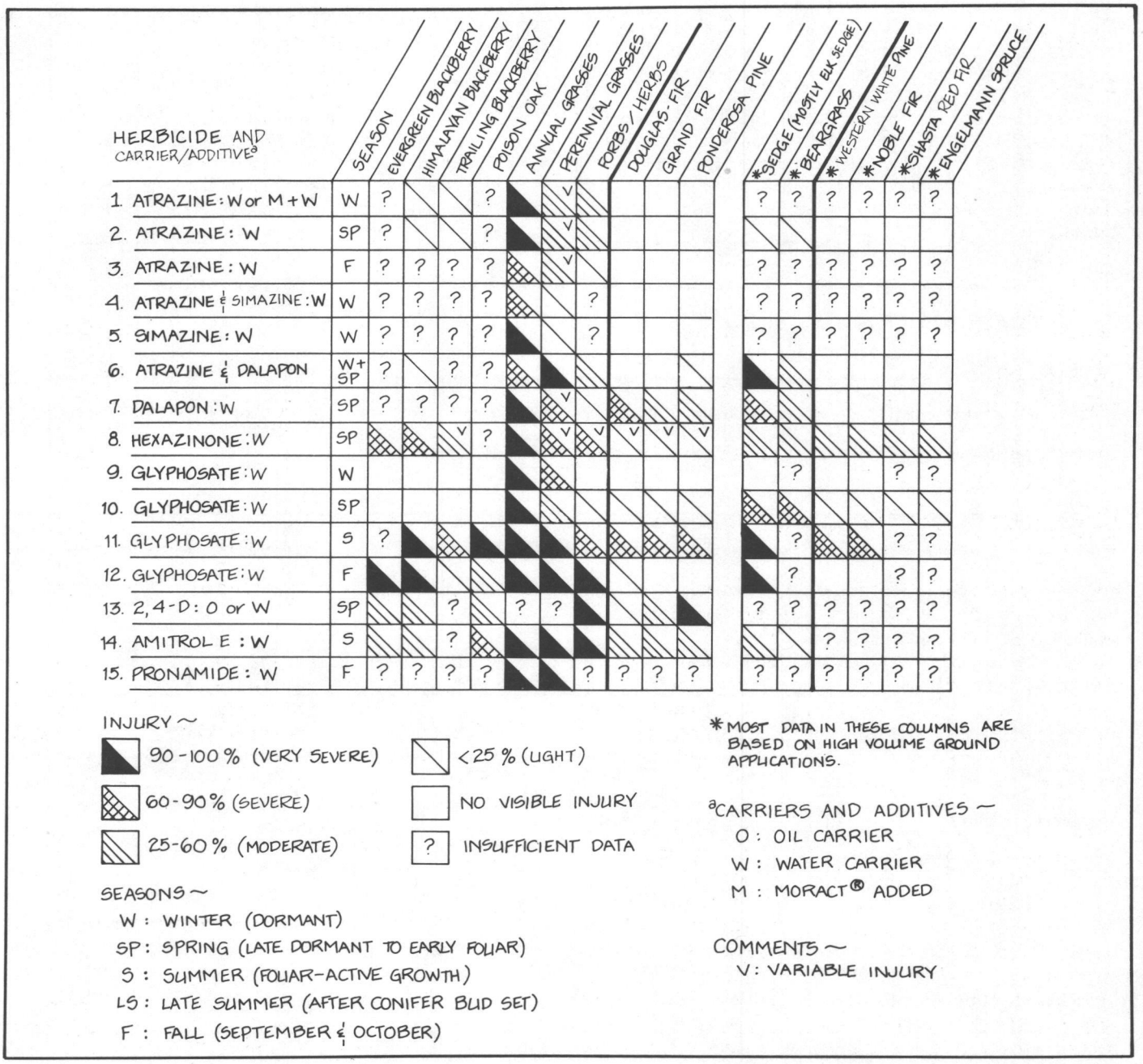

FIGURE 2.

EFFECTS OF HERBICIDES ON GRASSES, FORBS/HERBS AND ASSOCIATED TARGET SPECIES, AND ON CROP CONIFER SPECIES THAT OCCUR ON FOREST SITES IN OREGON AND WASHINGTON.

southwestern Oregon and east of Cascades) where spring rains may not be adequate for activation. Fall applications apparently do not control orchard grass and smooth brome as well as they control other grass species. Spring Treatments - Spring applications may be more effective than shown on most introduced and native perennial grass species in the pinegrass/elk sedge complex. However, atrazine causes little or no injury to pinegrass and elk sedge. Addition of surfactant does not measurably increase efficacy. Spring applications are most effective on grass species.

Volume of water carrier used to apply atrazine and simazine is not critical. Atrazine is less effective in soils that are high in organic matter. Atrazine is likely to injure plug seedlings; allow 1 year after planting plugs before using atrazine.

4

- SPRAY MIXTURE: Atrazine (Aatrex®) and simazine (Princep®). 2 lb/A (a.i.) + 2 lb/A (a.i.) in water to make 10 gal/A.

- REGISTRATION STATUS: Registered for conifer release.

- COMMENTS: See comments on atrazine (1-3) and simazine (5).

5

- SPRAY MIXTURE: Simazine (Princep®). 4 lb/A (a.i.) in water to make 10 gal/A.

- REGISTRATION STATUS: Registered for release.

- COMMENTS: Simazine is less soluble than atrazine and therefore requires more rainfall to leach into the soil to a depth adequate for effective weed control. As with atrazine, effectiveness is decreased by high levels of soil organic matter. May injure plug seedlings; see precautions in comments on atrazine (3).

6

- SPRAY MIXTURE: Atrazine (Aatrex®) plus dalapon (Dowpon® M). 3-5 lb/A (a.i.) of each chemical in water to make 10 gal/A.

- REGISTRATION STATUS: Registered for conifer release.

- COMMENTS: This mixture will control a greater number of perennial grass species than will atrazine alone. Control of annual grass species has ranged from intermediate to nearly complete control. Light injury to pine at higher rates (i.e., nearing 5 lb/A). See comments on atrazine (1-3).

7

- SPRAY MIXTURE: Dalapon (Dowpon® M). 8 lb/A (a.i.) in water to make 10 gal/A. Ground applications were 8 lb/A (a.i.) in water to make 200 gal/A.

- REGISTRATION STATUS: Special Local Needs (SLN) registration for conifer site preparation in Oregon, Washington, Idaho and California.

- COMMENTS: More likely to damage conifers than are atrazine/dalapon mixtures. Efficacy reported on perennial grasses ranged from intermediate to nearly complete control.

8

- SPRAY MIXTURE: Hexazinone (Velpar®, Velpar® L). 2 lb/A (a.i.) in water to make 15-20 gal/A. Ground applications were 2 lb/A (a.i.) in water to make 200 gal/A.

- REGISTRATION STATUS: SLN registration for use on reforestation areas and Christmas trees in Washington and Oregon.

- COMMENTS: Best results if applied in low-rainfall areas. Too much rain after application may decrease effectiveness on target species and injure conifers. Appropriate rate is also a function of soil type. Not recommended for use over small transplant stock.

9-12

- SPRAY MIXTURE: Glyphosate (Round-up®). 1.5 lb/A (a.i.) in water to make 10 gal/A. Ground applications were 2 lb/A (a.i.) in water to make 200 gal/A.

- REGISTRATION STATUS: Registered for conifer release and site preparation.

- COMMENTS: Higher rates appropriate either for site preparation or for release east of the Cascade crest. Efficacy on annual grasses and forbs is excellent when plants are green,

poor if they are senescent. Efficacy on trailing blackberry and poison oak probably higher in June, July and early August than in later months. Efficacy on Himalayan blackberry greatest during August-October. Blackberry species must have green leaves when they are sprayed. Control on elk sedge before it has grown at least 4 in. is poor, very good after 6-8 in. of growth. Spring treatment will injure conifers if buds have started to expand. No significant soil residual activity.

13

- SPRAY MIXTURE: 2,4-D low volatile ester (Weedone®, Esteron®). 2 lb/A (a.e.) in water or diesel to make 10 gal/A.
- REGISTRATION STATUS: Registered for release and site preparation.
- COMMENTS: Frequently applied in combination with any one of a number of grass-control chemicals to increase control of forbs.

14

- SPRAY MIXTURE: Pronamide (Kerb®). 2 lb/A (a.i.) in water to make 10 gal/A.
- REGISTRATION STATUS: Is a restricted use pesticide. Registered for use on Christmas tree plantations.

15

- SPRAY MIXTURE: Amitrole (Amitrol®-T). 2 lb/A (a.i.) in water to make 10 gal/A.
- REGISTRATION STATUS: SLN registration for site preparation and Douglas-fir release in Oregon and Washington.

GLOSSARY

ADJUVANT: Any substance added in relatively small quantity to a spray mixture for increased effectiveness or drift control.

BUD HARDENING: After fall bud has been formed and is dark brown. Needles fully expanded and hardened (fall).

BUD SET: Formation of final resting bud on conifers (late summer to early fall).

CARRIER: A substance used in relatively large amounts to dilute an herbicide product for ease of application or increased effectiveness.

DORMANT: The period in late winter before buds have broken on shrubs.

DRIFT CONTROL: Any application methodology that reduces herbicide drift. Includes use of certain adjuvants, nozzle types or configurations.

EARLY FOLIAR: Leaves not yet fully expanded on shrubs (spring).

EFFICACY (effectiveness): The degree to which a pesticide controls target plant species.

INJURY: The amount of reduction in live canopy or foliage as compared to untreated plants of the same species.

LATE FOLIAR: More than two-thirds of leaves on shrubs fully expanded.

PHENOLOGY: The stage of seasonal growth of a plant species. Includes stages such as flowering, fruiting, bud set, foliar growth, stem elongation, etc.

SELECTIVITY: The degree to which an herbicide controls target plant species with minimal injury to non-target (or conifer) species.

SURFACTANT: A substance added to a spray mixture to decrease surface tension.

HERBICIDE EFFECTIVENESS REPORT

Carefully collected field data on the effectiveness of herbicides are essential to updating recommendations on herbicide use. Take data systematically, sampling at least 10 plots or observing at least 10 plants per species. Report 2nd yr data only. Use additional sheets, if necessary, for further remarks.

Photocopy this form, complete copy and return information to:

Dr. Steven Radosevich
CRAFTS, Department of Forest Science
Oregon State University
Corvallis, Oregon 97331

Name _____ Affiliation _____

Address _____ Phone _____

OPERATIONAL OBJECTIVES: ☐ Site prep ☐ Pre-burn ☐ Release ☐ Other (specify) _____

Location of site _____ Time since disturbance _____

Please specify units (e.g., lb/acre, gal/acre, lb/100 gal carrier, ml/cut or injection, etc.).

HERBICIDE(S) USED: Trade name(s): _____

Amount _____ /Units _____

Amount of herbicides is based on: ☐ Active ingredient ☐ Acid equivalent ☐ Formulated product

CARRIER: ☐ Water ☐ Diesel ☐ None _____ Volume(s) _____ /Units _____

ADDITIVES: Trade name(s) _____ Volume(s) _____ /Units _____

Purpose of additive _____

SPRAY VOLUME _____ ☐ Per acre ☐ Per clump ☐ Other _____

DATE APPLIED _____ **WEATHER:** Temperate range _____ to _____ Wind (mph) _____

Humidity range: _____ to _____ Sky condition: _____

APPLICATION METHOD: ☐ Aerial ☐ Backpack ☐ Injection ☐ Hack & Squirt ☐ Other _____

SPRAY PATTERN: ☐ Broadcast ☐ Spot or clump ☐ Waving wand ☐ Other _____

DAMAGE EVALUATION: Date observed _____ **SAMPLING METHODS:** ☐ Roadside

☐ Walk-through ☐ Systematic plots ☐ Other (specify) _____

TARGET SPECIES ——— % Dead	Average % foliar-injury (nearest 5%)	Phenology[1] of plant at time of application	Observations type[2]/number
1.			
2.			
3.			
CROP SPECIES ———			
1.			
2.			

[1]Give code (d = dormant [winter], b = bud swelling, a = active growth, e = early dormant [late summer/fall]); detail phenology further, if possible.

[2]P = plot, I = individual, C = clumps.

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CONVERSION TABLE

1 acre (A)	=	0.4047 hectare (ha)
1 pound (lb)	=	0.4536 kilogram (kg)
1 gallon (gal)	=	3.785 liters
1 quart (qt)	=	0.946 liter

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DISCLAIMER

Mention of specific compounds or trade names neither constitutes recommendation for their use nor excludes the possibility that other products or treatments may be equally or more effective. Always read product labels to be sure that the products you purchase are registered for their intended use.

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