SPECIAL PUBLICATION S JANUARY 1984

HERBICIDES FOR CLUMP AND STEM TREATMENT OF WEED TREES AND SHRUBS IN OREGON AND WASHINGTON

SUSAN G. CONARD
W. H. EMMINGHAM

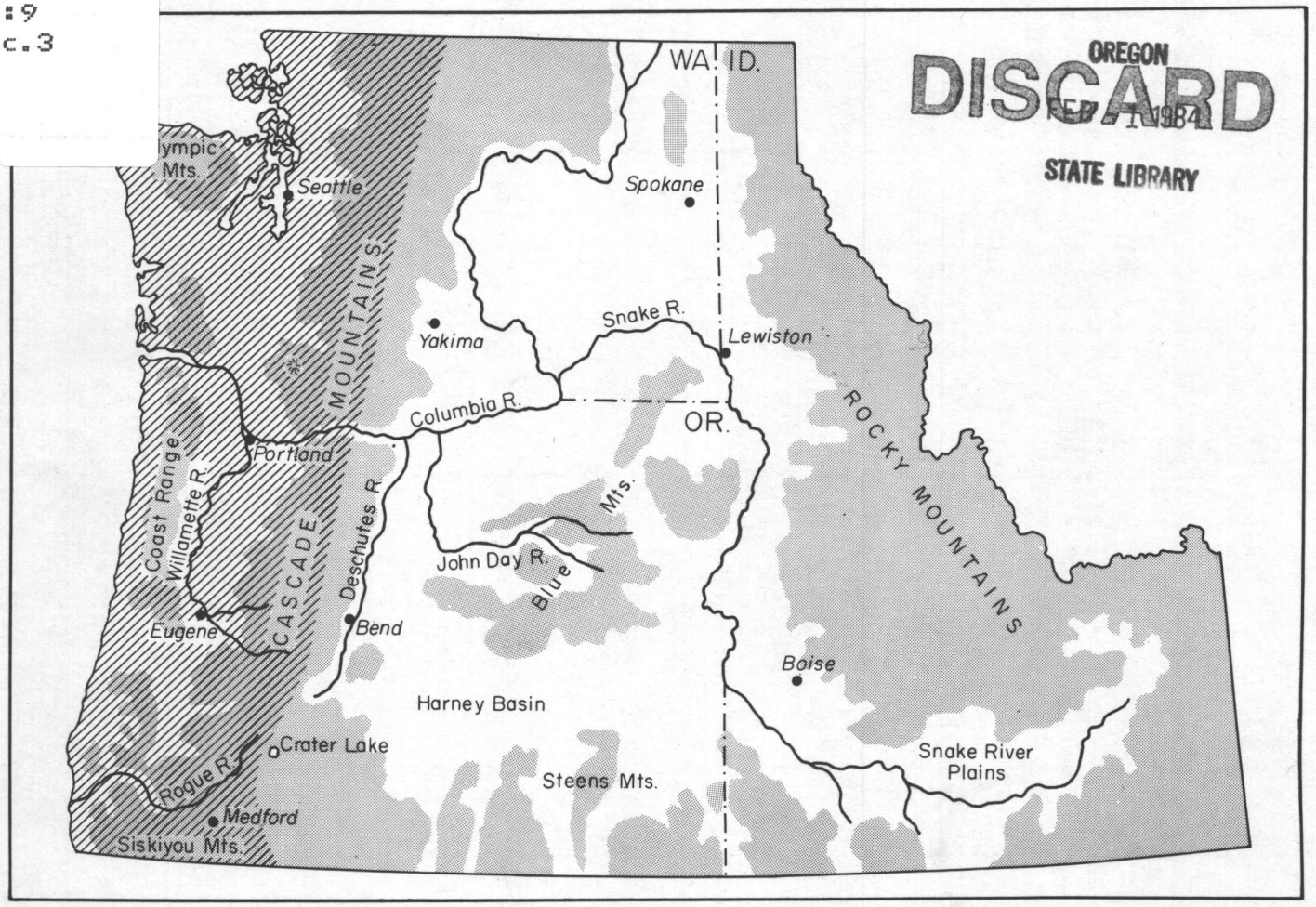

FIGURE 1.

SPECIES RESPONSES DESCRIBED IN THIS PUBLICATION BASED ON USE OF HERBICIDES IN AREA SHOWN ABOVE (DIAGONAL LINES). HOWEVER, TREATMENTS DESCRIBED SHOULD BE EQUALLY EFFECTIVE WHEN USED WHEREVER TARGET SPECIES OCCUR. SHADING INDICATES MOUNTAINS.

FOREST RESEARCH LABORATORY

OREGON STATE UNIVERSITY, COLLEGE OF FORESTRY
CORVALLIS, OR 97331-5704 503-753-9166

INTRODUCTION

The purpose of this publication is to supplement existing information on the effects of herbicides on individual shrub and conifer species that occur on forest sites 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) brush control in southwestern Oregon, (3) grass and herbaceous weed control in Oregon and Washington, and (4) shrub control in northeastern Oregon and northern Idaho. 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

The treatments described in this publication provide effective means of controlling clumps or single stems of many of the common weed trees and shrubs in Oregon and Washington (Fig. 1). These treatments are particularly useful in situations where trees or shrubs occur as isolated individuals or clumps, or where broadcast aerial application is not appropriate (such as in streamside buffer zones). The herbicide treatments described in this publication are based on aerial or ground applications in western Oregon and Washington, but the treatments should be appropriate for use wherever the target species occur.

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. For additional discussion on the influence of application methods, adjuvants, carriers, and other factors on herbicide effectiveness, refer to Newton and Knight (1981) and Bohmont (1981).

Susceptibility of shrub 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. This is particularly true of foliar applications. Therefore, proper timing of applications is crucial to success. Because weather patterns vary from year to year, the time during which plants are at the proper phenological stage for a particular herbicide treatment may change by several weeks from one year to the next. The information that follows, therefore, includes, whenever possible, phenological indicators to 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 that they 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 (injection tools, 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 included in this publication shows the types of information that should be collected.

CRAFTS Copies of this publication are available from the Forest Research Laboratory, Oregon State University, Corvallis, Oregon, 97331. Support for the compilation and publication of this information was provided in part by CRAFTS (Coordinated Research on Alternative Forestry Treatments and Systems) and the OSU Extension Service.

HERBICIDE TREATMENTS AND SPECIES RESPONSES

Figure 2 shows typical responses to various herbicides and herbicide combinations of many important competing shrub and hardwood species and of several conifer species[1]. Operators should first conduct pretreatment field surveys to determine the extent and species composition of competing vegetation, and to assess that vegetation's potential threat to growth and survival of crop species. Figure 2 can then be used as a guide in determining an appropriate treatment.

The guidelines below give detailed descriptions of the herbicide spray mixtures and comments on registration status, timing, rates, efficacy, and selectivity of herbicide treatments shown in Figure 2. 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 label.

GUIDELINES

BASAL AND STEM TREATMENT

These treatments usually involve the use of a backpack sprayer to apply an herbicide-oil mixture to the basal portion of the stems. No cuts through the bark are necessary. All stem surfaces from the ground to about 18 in. high should be covered with the chemical solution to the point of runoff. Moss-covered stems should be scraped to expose the bark before spray mixture is applied. Only oil-soluble ester formulations can be used for these treatments. Do not add water.

1

- SPRAY MIXTURE: Triclopyr ester (Garlon® 4). 1-3% by volume in oil.
- REGISTRATION STATUS: Federal and state registration for basal and stem treatments.
- COMMENTS: Can be used in all seasons, but control of tanoak during spring is in some cases not as effective as during other seasons. The lower rate (closer to 1%) is sufficient for small stems (<4-in. diameter at base); higher rates (closer to 3%) are better on large stems or during the summer season. Garlon® 4 has also been registered recently for thinline basal bark applications, which involve the application of a narrow band of undiluted chemical around each stem. Additional data may prove the efficacy of this treatment to be comparable to that of standard basal treatments.

CUT SURFACE TREATMENT

These include stem injection, ax frill, girdling and cut stump treatments. Injection involves the application of a chemical in wounds that are cut in the bark at regular intervals around the stem. Frills are overlapping ax cuts to which a chemical is applied. A girdle is a continuous groove that is cut around the stem; girdling may kill some trees without addition of chemicals. These three treatments must penetrate the outer bark and cambium to be effective.

Only water-soluble (non-emulsifiable) products should be used for cut treatments. See individual product labels for recommendations on the spacing of cuts for injection, injection volume, and dilution of chemicals.

Stump treatments involve the direct application of a chemical to the cambium area of a freshly cut stump. The cambium area is a narrow band just at the outer edge of the wood. The chemical must be applied immediately, within 20 minutes after felling; delays in treatment will decrease effectiveness significantly. The entire circumference of the cambium area must be treated.

[1]Common names follow Franklin and Dyrness (1973), pp. 352-376.

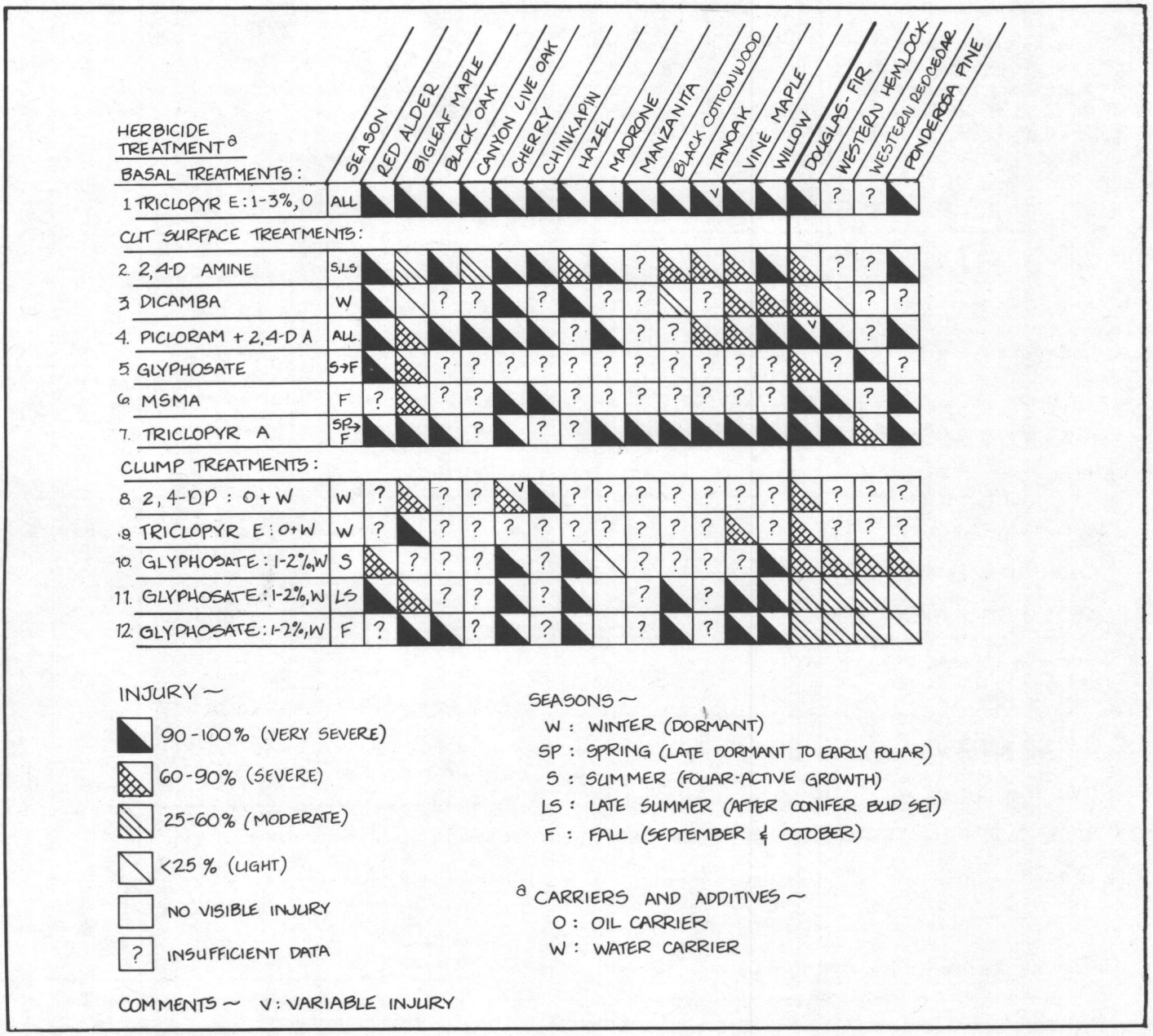

FIGURE 2.

EFFECTS OF HERBICIDE TREATMENTS ON CLUMPS OR STEMS OF WEED TREES AND SHRUBS AND ON CROP CONIFERS IN OREGON AND WASHINGTON.

2

- **SPRAY MIXTURE:** 2,4-D amine (Formula 40®, Weedar 64®). Full strength.
- **REGISTRATION STATUS:** Federal registration for cut surface treatments.
- **COMMENTS:** Data for tanoak are for summer only; may be less effective during other seasons. Peak efficacy on bigleaf maple is in July; August and September treatments produced poor results. For most species, efficacy is not as good during the dormant seasons as during other times of year. Closely spaced cuts may be required for dormant-season treatments.

3

- **SPRAY MIXTURE:** Dicamba (Banvel®). Full strength.

● REGISTRATION STATUS: Federal registration for cut surface treatments.

● COMMENTS: Success on bigleaf maple and black cottonwood has been limited. Some soil activity. Do not drip on ground near Douglas-fir; will injure trees.

4 ● SPRAY MIXTURE: Picloram and 2,4-D (Tordon® 101, Tordon® RTU, Tordon® 101 R). Full strength. Tordon® RTU is half-strength Tordon® 101.

● REGISTRATION STATUS: Federal registration for cut surface treatments. Tordon® 101 is a restricted-use pesticide; Tordon® RTU is not.

● COMMENTS: Black oak - Injection treatments have been most effective when applied in fall (no summer data on injection treatments); cut stump treatment excellent all year. Willow and cherry - Data for spring only. Bigleaf maple - Use Tordon® 101. Injection results are poor in winter; response indicated is for spring and summer treatments; cut stump excellent all year except during spring sap flow. Nearby conifers may be injured or killed by flashback from picloram.

5 ● SPRAY MIXTURE: Glyphosate (Round-up®). Full strength.

● REGISTRATION STATUS: Federal and state registration for frill and injection treatments.

● COMMENTS: Bigleaf maple - Summer application is sometimes more effective than indicated. Red alder - Half-strength solution seems as effective as full-strength. Best success reported thus far has been in August and September.

6 ● SPRAY MIXTURE: MSMA (Silvisar® 550, Trans-vert®). Full strength.

● REGISTRATION STATUS: Federal registration for Silvisar® 550 for injection. Trans-vert® is not registered for injection.

● COMMENTS: Only moderate control on bigleaf maple stems >12-in. diameter at base; most effective when applied in late summer-early fall (August through October). Will also control bark beetles when used to thin conifers.

7 ● SPRAY MIXTURE: Triclopyr amine (Garlon® 3A). Full strength.

● REGISTRATION STATUS: Federal registration for injection, frill and stump treatments.

CLUMP TREATMENT

These spot treatments can be made on the ground with backpack sprayers (for small clumps), or from a hovering helicopter using one or two high-volume nozzles. Aerial treatments may use inverted emulsions of the herbicide in oil and oil/water carriers.

8 ● SPRAY MIXTURE: 2,4-DP (Weedone® 2,4-DP). 5% 2,4-DP, 1% Bivert® TME, 16% diesel, 78% water. 1-1.5 gal/clump.

● REGISTRATION STATUS: Special Local Needs (SLN) registration for individual clump spray in Oregon and Washington.

● COMMENTS: Recommended only for aerial applications. Conifers contacted by spray will be injured severely. Better control during February-March than December-January. Complete coverage of clump base crucial for control. Resprouting may occur the second growing season after treatment.

9 ● SPRAY MIXTURE: Triclopyr ester (Garlon® 4). Approximately 1% Garlon® 4, 1% Bivert® TME, 16-18% diesel, 80-82% water. 1-1.5 gal/clump.

● REGISTRATION STATUS: SLN registration in Oregon and Washington.

● COMMENTS: Recommended primarily for aerial application. See Basal and Stem Treatments section and 1 for ground application. Conifer injury greater during February-March than December-January; conifer injury also greater with thin invert emulsion than with thick emulsion. Works well on young bigleaf maple resprouts.

10-12 ● SPRAY MIXTURE: Glyphosate (Round-up®). 1-2% by volume in water. Non-ionic surfactant at 0.25% may be added to improve wetting.

● REGISTRATION STATUS: Directed-spray applications have federal registration for release or site preparation.

● COMMENTS: Midsummer-fall application of 1% solution, sprayed to wet foliage surface, effectively controls maple, red alder, cherry, hazel, black cottonwood, and willow. Use of a 2% spray (with a small droplet size) can decrease the total volume applied per clump; this treatment requires less water than does the 1% solution and can be equally effective.

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).

CAMBIUM: The layer of living stem tissue inside the bark where radial growth occurs.

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 an herbicide 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.

LITERATURE CITED

BOHMONT, B. L. 1981. The new pesticide user's guide. B & K Enterprises, Fort Collins, Colorado.

FRANKLIN, J. F. and C. T. DYRNESS. 1973. Natural vegetation of Oregon and Washington. USDA Forest Service General Technical Report PNW-8. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

NEWTON, M. and F. B. KNIGHT. 1981. Handbook of weed and insect control chemicals for forest resource managers. Timber Press, Beaverton, Oregon.

WEED SCIENCE SOCIETY OF AMERICA. 1983. Herbicide Handbook, 5th ed. Champaign, Illinois.

THE AUTHORS

Susan G. Conard at the time of this study was a Research Associate in the Department of Forest Science, Oregon State University, Corvallis, Oregon. She is now an Ecologist with the Forest Fire Laboratory, USDA Forest Service, Riverside, California.

W. H. Emmingham is Extension Silviculture Specialist, Department of Forest Science, Oregon State University, Corvallis, Oregon.

CONVERSION TABLE

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

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.

FOREST RESEARCH LABORATORY
COLLEGE OF FORESTRY
OREGON STATE UNIVERSITY
CORVALLIS, OR 97331-5704

Non-Profit Org.
U.S. Postage
PAID
Corvallis, OR 97331
Permit No. 200

ADDRESS CORRECTION REQUESTED