HERBICIDES FOR FOREST BRUSH CONTROL IN SOUTHWESTERN OREGON

SUSAN G. CONARD
W. H. EMMINGHAM

FIGURE 1.
AREAS (DIAGONAL LINES) DISCUSSED IN THIS PUBLICATION. SHADED AREAS INDICATE MOUNTAINS.
INTRODUCTION

This publication supplements existing information on the effects of herbicides used in forest vegetation management on various plant species that occur on southwest Oregon forest sites. It is intended to assist foresters in making appropriate herbicide prescriptions. 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) grass and herbaceous weed control in Oregon and Washington, (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 a small number of observations; additional observations may lead to revisions of the injury ratings reported in this publication.

GEOGRAPHIC AREA AND VEGETATION COMPLEXES

The herbicide treatments covered in this publication are appropriate for aerial or ground application in southwest Oregon (Fig. 1). The treatments are particularly appropriate for dry sites in the mountains of southwest Oregon, including the western slopes of the Cascade Mountains, the Klamath and Siskiyou Mountains, and the eastern side of the Coast Range.

Two groups of evergreen species\(^1\) dominate the most common successional vegetation on dry sites in this area:

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

1. Evergreen shrubs, such as manzanita and snowbrush ceanothus.

2. Evergreen hardwoods, including tanoak, madrone, chinkapin and canyon live oak.

Deciduous species associated with both groups include oceanspray, deerbrush ceanothus, poison oak, vine maple and bigleaf maple; associated evergreen species include salal and Pacific rhododendron.

The major conifer crop species\(^1\) in this area are Douglas-fir, ponderosa pine, sugar pine, grand fir and incense-cedar.

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 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 time period when plants are at the proper phenological stage for a particular herbicide treatment may change by several

CRAFTS

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weeks from one year to the next. Therefore, the information that follows 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 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 important information for improving local herbicide prescriptions. The Herbicide Effectiveness Report included in this publication shows the types of information that should be collected.

**HERBICIDE TREATMENTS AND SPECIES RESPONSES**

Figure 2 shows typical responses to several herbicides and herbicide combinations of many of the important competing brush and conifer crop species in the vegetation complexes described above. This figure can be used as a guide to determining an appropriate treatment based on the target species present and on the importance of protecting crop conifers, if present.

The guidelines listed below provide detailed descriptions of the herbicide spray mixtures and comments on registration status, timing, rates, efficacy, and selectivity of herbicide treatments shown in Figure 2. Rates are for aerial application. Because aerial application produces less effect for the same rate than does evenly applied ground application, 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.

**GUIDELINES**

<table>
<thead>
<tr>
<th></th>
<th>SPRAY MIXTURE: 2,4-D low-volatile ester (Esteron®, Weedone®). 2-3 lb/A (A = acre) (a.e.) in oil or oil/water mixture (at least 5% oil) to make 10 gal/A.</th>
<th></th>
<th>SPRAY MIXTURE: 2,4-D plus 2,4-DP (Weedone® 170). 2 lb/A be sprayed just prior to or at conifer bud break.</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>REGISTRATION STATUS: Both products registered for site preparation and release. Esteron® 99 has Special Local Needs (SLN) registration for release and forest site preparation in Oregon and Washington. Check individual product labels for maximum rates for release.</td>
<td>2 &amp; 3</td>
<td>REGISTRATION STATUS: See 1 above.</td>
</tr>
<tr>
<td></td>
<td>COMMENTS: Timing is critical to avoid Douglas-fir injury. Should</td>
<td></td>
<td>COMMENTS: Summer data are based on July applications. Late summer and fall data are based on August and September applications.</td>
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FIGURE 2.

EFFECTS OF HERBICIDES ON SHRUB AND CROP CONIFER SPECIES THAT OCCUR ON FOREST SITES IN SOUTHWESTERN OREGON.
(a.e.) of 2,4-D and 2 lb/A (a.i.) of 2,4-DP in oil to make 10 gal/A.

REGISTRATION STATUS: Registered for forest site preparation only.

5 & 6 SPRAY MIXTURE: Triclopyr ester (Garlon® 4). 1.5 lb/A (a.e.) in oil and water, water, or 1 gal Moract® plus water, to make 10 gal/A of solution.

REGISTRATION STATUS: Registered for forest site preparation. Registered for conifer release in the dormant, early foliar, and late foliar seasons in the Pacific Northwest and California.

COMMENTS: For release treatments, do not add oil or Moract® to mix for use during foliar seasons. Dormant and early foliar applications at this rate cause light (<10%) foliar injury on grand fir. No injury to grand fir from dormant and early foliar applications at 1 lb/A rate.

7 & 8 SPRAY MIXTURE: Triclopyr ester (Garlon® 4). 1-2 lb/A (a.e.) in water to make 10 gal/A.

REGISTRATION STATUS: This rate has federal registration only for site preparation or for directed spray.

COMMENTS: The 2-3 lb/A rate is more effective on some species than is the 1.5 lb/A rate. More information is needed on responses to each rate during late summer and fall. Adding oil or surfactant may cause unacceptable injury to conifers.

9 SPRAY MIXTURE: Picloram (Tordon® K) and 2,4-D ester (Weedone®, Esteron®) or picloram and 2,4-D amine (Tordon® 101). Approximately 0.5 lb picloram plus 2 lb 2,4-D/A (a.e.) in water to make 10 gal/A.

REGISTRATION STATUS: Both combinations have SLN registration for site preparation in Washington and Oregon. Picloram is a restricted-use pesticide.

COMMENTS: Data are from August applications. Follow planting recommendations on label to avoid injury to seedlings.

10 SPRAY MIXTURE: Picloram (Tordon® K) and triclopyr ester (Garlon® 4). 1-2 lb/A (a.e.) of each compound in water to make 10 gal/A solution. Oil or Moract® added to the mix will increase effectiveness.

REGISTRATION STATUS: Both compounds are registered for forest site preparation. Picloram is a restricted-use pesticide.

COMMENTS: Sprayed during active foliar growth in the summer. Observe planting delays recommended by labels to avoid injury to new seedlings.

11 SPRAY MIXTURE: Glyphosate (Roundup®). 1.5 lb/A (a.i.) in water to make 10 gal/A.

REGISTRATION STATUS: Registered for conifer release and site preparation.

COMMENTS: Data based on September application. Earlier application may give better control of some species. Summer applications are more effective on poison oak. Vine maple response varies, for unknown reasons, from light or moderate injury to nearly complete control.
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.

LITERATURE CITED


CONVERSION TABLE

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<thead>
<tr>
<th>1 acre (A)</th>
<th>0.4047 hectare (ha)</th>
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<tr>
<td>1 pound (lb)</td>
<td>0.4536 kilogram (kg)</td>
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<tr>
<td>1 gallon (gal)</td>
<td>3.785 liters</td>
</tr>
<tr>
<td>1 quart (qt)</td>
<td>0.946 liter</td>
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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.

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.
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.

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) ________________________________

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<tr>
<th>TARGET SPECIES</th>
<th>% Dead</th>
<th>Average % foliar-injury (nearest 5%)</th>
<th>Phenology(^1) of plant at time of application</th>
<th>Observations type(^2)/number</th>
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CROP SPECIES |        |
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\(^1\)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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