TESTS OF SOME CHEMICAL HERBICIDES IN CONTROLLING BRUSH, WEED TREES, AND GRASSES ON THE McDONALD FOREST

by

DEXTER GOULDIN HEUSCHKEL

A THESIS

submitted to

OREGON STATE COLLEGE

in partial fulfillment of
the requirements for the
degree of

MASTER OF SCIENCE

June 1956

APPROVED:

Redacted for privacy

Assistant Professor of Forest Management

In Charge of Major

Redacted for privacy

Head of Department of Forest Management

Redacted for privacy

Chairman of School Graduate Committee

Redacted for privacy

Dean of Graduate School

Date thesis is presented April 28, 1956

Typed by Verna Anglemier

ACKNOWLEDGEMENT

Field tests for chemical control of brush, grass, and weed tress on the McDonald Forest were started in 1952 through cooperation of the School of Forestry, the Department of Farm Crops, and the Department of Agricultural Chemistry. Professors Virgil Freed and William Furtick rendered advice and helpful service at this time and have continued to support the work through succeeding years. David Chilcote has given considerable advice over the past year. In 1954, the project was expanded through financial support of the Ethyl Corporation to test some of the products manufactured by this company. Chemicals were contributed during and since 1954 by the Dow Chemical Company, the California Spray-Chemical Corporation, and the Pittsburgh Coke and Chemical Company. Professor Ray Yoder established the field trials and observed results during 1954. Professor Robert Malcolm continued the field work in 1955.

The author participated in some of the later field testing, but it must be emphasized that the thesis is based substantially on the field work of the earlier participants.

Finally, the advice and constructive criticism of Professors Ray Yoder and George Barnes on writing the

report and summarizing the results are gratefully acknowledged. Doctor George Barnes has been in charge of the project since its beginning.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF TABLES AND FIGURES
(continued)

TESTS OF SOME CHEMICAL HERBICIDES IN CONTROLLING BRUSH, WEED TREES, AND GRASSES ON THE McDONALD FOREST

INTRODUCTION

Brush[1], weed trees and grasses occupy large areas of the forest lands of the Pacific Northwest. Although the total area of land so held is unknown, these types of vegetation are responsible for serious losses in regional wood production and for increased costs of land management.

Four methods by means of which such vegetation may be eliminated and its development controlled are: (1) chemical applications, (2) mechanical methods, (3) burning techniques, or (4) combinations of these. Due to recent developments of effective chemical herbicides for a wide variety of species, chemical methods offer great promise from the standpoint of economy and permanence in comparison to the alternate methods of control. Because adequate information was not available on the extent to which Western-Oregon brush species could be controlled, the School of Forestry initiated a program of field

---

[1] The term "brush" is used in this report to include all woody plants below an arbitrary height of 20 feet. Weed trees are considered to be those trees presently unmerchantable because of poor form, wood defect or lack of market for the species.

trials in 1952 with the cooperation of the departments of farm crops and agricultural chemistry. This report presents a preliminary evaluation of herbicidal tests made by the school between 1952 and 1956 to control the brush as a step toward more complete land utilization.

The experiments covered in this paper were designed to test relative efficiencies of some of the more recently developed herbicidal products recommended by representatives of producing firms. All tests were of small scale and limited to ground applications of the chemicals. The butoxy ethoxy propanol esters of 2,4-D and 2,4,5-T, the base chemicals of which are producted by the Ethyl Corporation, were tested most intensively. This corporation financed the tests of 1953-1954 to a large extent.

The major source for comparison of results from similar chemical applications on Western-Oregon plant species is W. G. Dahms and G. A. James' Brush Control on Forest Lands (2). Such comparisons provide checks on results and guides to further experimentation. Until this report was published in 1955 no summary of the research on, or of pertinent references to, chemical brush control in the Northwest had been made.

THE BRUSH, GRASS, AND WEED TREE PROBLEMS ON McDONALD FOREST

Physiography of the test area

Since all but two of the experiments (one plot on the Hospital Lot of the Adair Tract and one plot on the Siuslaw National Forest) were on the McDonald Forest, a brief description of the latter will be given. The McDonald Forest is a 6,809-acre tract of forest land under the jurisdiction of the Oregon State College School of Forestry. It lies on the east side of the Coast Range seven miles northwest of Corvallis, has a typically mild coastal climate with dry summers, and varies in elevation from 500 to 2050 feet. No weather record is available for the forest, so the following record for nearly Corvallis is given as an approximation (3, p.5): rainfall is approximately 39 inches per year; snowfall averages about six inches per year; the mean relative humidity is about 64.4 per cent; and the temperature ranges from an average monthly low of 32.9 degrees Fahrenheit to a high of 82.3 degrees Fahrenheit.

Explanation of the problems

For the purposes of this report, the plants sprayed are divided into grasses, shrubs, and weed trees.

A dense cover of grass is considered to retard

coniferous reproduction, particularly on the treeless south slopes wherever summer soil moisture tends to become a factor limiting seedling survival. Brush and trees encroach very slowly on these areas. The larger, sod-forming grasses which seem most prevalent on the plots sprayed are meadow fescue, Reed canary-grass, and colonial bent-grass. Detriments to grazing (which has been tried) are the steep slopes and the shallow, rocky soils. It is not definitely known that these areas have ever supported coniferous stands, but experiments have been made to determine the possibilities of grass control should it become feasible to grow trees on these localities.

The brush control problem in McDonald Forest is primarily concerned with the following species: vine maple, the smaller specimens of alder and bigleaf maple, thimbleberry, snowberry, poison oak, bracken fern, and the Rubus species. The importance of the individual species varies considerably with their locations in the forest. The less important species (table 2) were sprayed largely because it was convenient, but partly because they too may become the major weed species as the now important ones are eliminated.

The main weed trees are bigleaf maple, Oregon white oak, alder, and madrone. The majority of the bigleaf maples and the Oregon oaks are of very scrubby forms and

are not merchantable. Alder has a good market in some localities and will probably be more valuable as other species are utilized and depleted. Alder should not be removed where it is on favorable sites, but it grows on many of the drier areas to which it is not well adapted. Madrone has no markets at the present time.

There are several ways in which the present growth of brush and weed trees have developed in the area: (1) early settlers cleared land on the forest fringes and then abandoned it; the hardwood species which already existed on the areas usually produce seed every year while Douglas-fir produces good seed crops only once every four or five years; the hardwoods covered the land and effectively suppressed conifer seedlings; (2) part of the forest edge is a transition zone from the agricultural land of the Willamette Valley to the Douglas-fir forests of the Coast Range; here again the hardwoods are given the initial advantages of the farmers' land clearing practices; (3) the last pattern is that resulting from brush spreading over logged areas before coniferous regeneration is either adequate or large enough to suppress the hardwoods; the clearcutting method of logging permits full light to reach the ground with the latter promoting rapid development of undamaged plants and resprouting and increased growth of shoots

from stumps and roots of damaged plants.

Why an improvement program is needed

In a 1954 management plan (4, p.16) for the McDonald Forest, approximately 463 acres or nearly seven per cent of the total acreage were classified as non-productive. Included in the latter were 120 acres of oak-madrone which is about 90 per cent white oak and ten per cent madrone mixed with young Douglas-fir, and 343 acres of grasses, herbs, and shrubs. In addition to this area, there also exists the possibility that some of the more recently cutover land may be dominated by brush.

The majority of this oak-madrone stand is scrubby and unmarketable. Some of the patches have coniferous reproduction developing underneath which will eventually claim the site. In other cases, reproduction is lacking or very sparse; final stocking will be poor. The chance of getting a well-stocked Douglas-fir stand on any of the brushlands is decreasing with time, and many of the future crop trees will be wolf trees.

There are five main problems on McDonald Forest that have aroused interest in herbicides. They are: (1) the monopolizing of growing space by weed trees and grasses, (2) the retarding of coniferous regeneration by grasses and brush, (3) the encroaching of brush on fire roads and trails, (4) the susceptibility of many individuals to

poison oak, and (5) the limited possibilities for selling the weed species.

It may be observed that many of the larger individual oaks and bigleaf maples occupy the area that might support two young-mature conifers. Grasslands are serving no useful purpose at present while this grass combined with the type of soil present is prevent coniferous regeneration. Chemical grass control would eliminate the need for scalping the ground surface before planting and would restrain grass competition with the young conifers for surface soil moisture during the first few years after planting.

Killing or controlling the fast growing, sprouting hardwoods would not only make planting easier, but it might also eliminate the need for planting if sufficient Douglas-fir seed trees were present.

The chemical killing of species encroaching on roads decreases the hazards of driving and lowers maintenance costs.

The eradication of poison oak would make the forest more usable both to student classes and to the public.

Removal of the poorer unmerchantable weed-tree specimens of maple, white oak, madrone, and alder would make more space available to the conifers and reduce further hardwood propagation. The possibility of a

market developing for the better specimens cannot be ignored, but trees of good form are a small minority on McDonald Forest. On some of the more severe sites, a light cover of hardwoods may serve a useful purpose as a nurse crop to coniferous regeneration. It may be observed that most of the more open stands have an understory of young conifers, but that the latter rarely grow beyond the seedling stage.

The experimental program

Because chemicals can give economical and relatively permanent control of brush, they could prove very useful over wide areas of forest land. These possibilities were just in sight when the school inaugurated the herbicidal trials in 1952. Whether the new chemicals could control the species found in the McDonald Forest area and what formulations would be most effective were questions to which answers were desired. The field of chemical control has developed rapidly since then, but not until Dahms and James (2) published their report on methods and references in 1955 was any concise summary made of the varied work done and the results achieved in the Northwest. Considerable work had been done in the South on such species as the scrub oaks.

In 1953, a variety of esters and amines of 2,4-D and 2,4,5-T were applied to several species of weed

trees, with poor results. In 1954, financial support by the Ethyl Corporation and the contribution of chemicals by other interested companies accelerated the program considerably.

PROCEDURES

Purposes of tests made

Tests were designed to determine the relative effectiveness of the different herbicides with respect to: (1) date of treatment, (2) concentration, (3) species, (4) method of application, and (5) their proposed use. Tests were not designed especially to determine costs, examine the different diluents, or find efficient rates. Small circles of grass were sprayed prior to planting to determine how long grass competition could be retarded and the residual effect on seedlings planted after a lapse of time on the treated plots. Roadside areas were sprayed so that the variety of woody plants found there would be covered, and so that, by simulating aircraft spraying, the effectiveness of a falling spray on the hardwoods and conifers might be judged. Spraying of poorly formed white oaks was done to determine what increase in conifer stocking might occur. One additional test was made with maleic hydrazide to test its ability as a growth inhibitor on coniferous saplings of Christmas tree size.

Chemicals and methods used

All tests were limited to ground applications of the chemicals. The following products were tried on grasses

in the form of sprays, dusts, or pellets: Dalapon, CMU, Chlorax, Chloro IPC, and calcium cyanamid. Brush and weed trees were either basally sprayed on the lower two feet of the bole or foliage sprayed. Basal applications were made with a back pump can until the spray was running off and onto the ground. All foliage sprays except the roadside sprays were also made with the back pump can and were applied until complete wetting of the foliage was attained. To simulate aircraft spraying, a pressure pump was placed on a truck, and the spray was directed up in a moderate mist on a series of roadside plots. This mist then drifted down on all plants except the large trees which received spray only on their lower portions. This spraying was done in early morning to minimize drifting and get an even spray distribution. All chemicals applied to brush and weed trees were esters or amines of either 2,4-D or 2,4,5-T or mixtures of the two in diesel oil. All the Dow and Du Pont chemicals contained four pounds of acid equivalent per gallon. The Ortho products contained 3.7 pounds of acid equivalent per gallon. Brushkiller products of the three companies all contained equal weights of acid equivalent per gallon of both 2,4-D and 2,4,5-T.

Examination procedures

All species of brush and weed trees treated are sprouters except the red-flowering currant so all but the last had to be examined for root kill. Root kill was inferred by the lack of sprouts or by death of the lower stems, the latter being determined by cutting tests. Whenever a complete ring of the lower cambium layer was dead, that individual was also considered dead. Indications of damage include such characteristics as leaf curling, shring, and browning, and bark splitting. Because an excess concentration of a chemical may cause defoliation (1, p.42) and yet do little permanent damage, first observations were made relatively soon after spraying when possible. The time intervals between dates of spraying and observation are given in the tables to help evaluate the results. Most of the observations have been made after only one growing season, so the results should not be considered as final; additional observations are to follow.

EVALUATION OF RESULTS

Effectiveness of the chemicals on individual plant species was considered to be more important than their overall efficiency. In rating effectiveness, these factors were considered (6, p.873): (1) complete elimination, (2) relative permanence, and (3) cost of retreatment.

Complete elimination of weed trees, of poison oak, and of brush is necessary along roads but not for release of the coniferous understory. Too heavy a kill may be followed by grass invasion.

Permanence of treatment is desirable on weed trees, but is not possible on roadsides where brush species can seed in from the forest understory. Until poison oak is eliminated from the forest and the adjacent fringe, it will probably continue to reseed into the forest. The degree of brush and grass control that is necessary for plantation establishment or release varies with such local conditions as age of seedlings, amount and type of brush or grass, site, and stocking. Sufficient release is necessary in order that the coniferous stock will be able to outgrow and suppress the brush and become a well-stocked stand.

Control of brush and weed trees

Table 1 is a tabulation of the most effective controls found by species. Treatments resulting in less than 80 to 90 per cent or variable kill can be found in table 8 in the appendix and may prove, after further experiments or later observations, to be quite satisfactory. In compiling table 1, more reliance has been placed on results obtained where the number of observations is known. Where this number is not known, results should be considered less conclusive and perhaps even questionable. This table could be used for recommending chemicals for controls, but the previously noted limitations on the data should be kept in mind.

The following remarks are supplementary to table 1. They include comments on the controls by species and, where possible, comparisons with other workers' results. Comparisons are desirable both as a check and as a guide to future research needs. They are, however, difficult because of: (1) differences in methods of reporting concentrations, (2) failure to report diluents, (3) failure to report time of application and the interval between application and observation, and (4) the lack of standards for control analysis. Furthermore, there is simply not enough comparable data on applications with similar diluents and concentrations.

Table 1. Summary of Successful Treatments of Shrubs and Trees[1]

Species	Spray[2]	Concentration[3]	Type[4]	Time & Period[5]	Number of Specimens[6]	Control[7]
alder	BEP BK Du Pont BK Ortho 2,4,5-T Kuron	13.2	f	7/29/54 14 mo.	r	I
ash	BEP BK	21.0	b	7/54 12 mo.	3	I
blackberry (general)	Du Pont BK	25.0	b	2/21/55 14 mo.	-	100% defoliation, 70% of stems dead
	Esteron 2,4,5-T	16.7	b	2/21/55 4 mo.	-	100% defoliation
blackcap	Ortho BK	8.4	f	7/30/54 11 mo.	r	I
evergreen blackberry	Kuron	13.2	f	7/29/54 14 mo.	r	I
buckbrush	Du Pont BK	4.3	f	7/28/54 11 mo.	r	80/0
cascara	BEP BK	4.3	f	7/28/54 11 mo.	r	90/0
cherry	Du Pont BK	21.0	b	7/54 12 mo.	1	I
		19.4	c	3/20/54 16 mo.	1	I

Table 1, continued

Species	Spray[2]	Concentration[3]	Type[4]	Time & Period[5]	Number of Specimens[6]	Control[7]
chinquapin	BEP 2,4,5-T	21.0	b	7/54 12 mo.	1	I
dogwood	Ortho 2,4,5-T	4.3	f	7/28/54 11 mo.	r	I on 1 plot; 50% I, and 50% III on 2nd plot
	Du Pont BK	21.0	b	7/54 12 mo.	3	67% I, 33% 100/0
elderberry	BEP 2,4,5-T	25.0	b	3/54 7 mo.	6	95% top kill, no sprouting
	Ortho BK	4.3	fs	7/28/54 11 mo.	r	100/90 on 1 plot, 90/0 on 2nd plot
	BEP 2,4-D	4.3	fs	7/28/54 11 mo.	r	I
hawthorne	Du Pont BK	25.0	bs	3/54 7 mo.	2	100% top kill, no sprouting
	BEP BK	4.3	fs	7/28/54 11 mo.	r	90/0 on 1 plot, 70/0 on 2nd plot
hazel	BEP 2,4,5-T	21.0	bs	7/54 12 mo.	9	78% I, 11% 75/0, 11% III
	Kuron	4.3	fs	7/29/54 14 mo.	r	100/0
Indian Plum	BEP 2,4,5-T	21.0	bs	7/54, 12 mo.	1	I
	Du Pont BK	21.0	bs	7/54 12 mo.	2	I
Madrone	BEP BK	21.0	bs	7/54 12 mo.	1	I

Table 1, continued

Species	Spray[2]	Concentration[3]	Type[4]	Time & Period[5]	Number of Specimens[6]	Control[7]
Madrone	Du Pont BK	19.4	css	3/20/54 16 mo.	1	I
	Du Pont BK	19.4	bs	3/20/54 16 mo.	3	33% I, 67% 73/33
bigleaf maple	Kuron	21.0	bs	7/6/54 12 mo.	10	98% kill of trees 5" + less
	BEP BK	21.0	bs	7/6/54 12 mo.	32	28% I, 64% 82/20, 8% 45/12
		13.2	fs	7/29/54 14 mo.	r	100/0
	Kuron	25.0	bs	3/54 7 mo.	37	92% 99% defoliated, 10 sprouts; 8% III
ocean spray	Kuron	25.0	bs	3/54 7 mo.	6	92/no sprouts
	Esteron 2,4,5	17.7	bs	3/54 7 mo.	1	100/no sprouts
	Du Pont BK	19.4	bs	3/20/54 16 mo.	9	44% I, 44% 82/69, 12% III
	BEP 2,4,5-T	21.0	bs	7/54 12 mo.	6	83% I, 17% III
	BEP BK	21.0	bs	7/54 12 mo.	4	75% I, 25% 70/0
poison oak	Kuron	25.0	bs	3/54 7 mo.	3	100% defoliation, no sprouting
	BEP 2,4,5-T	25.0	bs	3/55 4 mo.	-	100% defoliation, some sprouting
	Esteron 2,4,5	16.7	bs	3/55 4 mo.	-	100% defoliation, some sprouting

Table 1, continued

Species	Spray[2]	Concentration[3]	Type[4]	Time & Period[5]	Number of Specimens[6]	Control[7]
poison oak	Du Pont BK	25.0	bs	7/54 12 mo.	-	100% defoliation, no sprouting on 1 plot; weak sprouting on a 2nd plot
	Ortho BK	8.4	fs	7/30/54 11 mo.	r	100/90
red-flowering currant	Du Pont BK	4.3	fs	7/28/54 11 mo.	r	I
	Ortho 2,4,5-T	4.3	fs	7/28/54 11 mo.	r	90/20
rose	BEP BK	4.3	fs	7/28/54 11 mo.	r	I on 1 plot, 90/5 on 2nd plot
	BEP 2,4,5-T	13.2	fs	7/54 12 mo.	1	I
	Du Pont BK	21.0	bs	7/54 12 mo.	5	20% I, 80% 90/17
salmonberry	Ortho 2,4,5-T	13.2	f	7/29/54 14 mo.	r	100/50
serviceberry	Du Pont BK	25.0	b	3/54 7 mo.	2	100% defoliation, no sprouting
	BEP 2,4,5-T	21.0	b	3/54 7 mo.	10	60% I, 40% 80/20
snowbrush	BEP BK	13.2	f	3/54 7 mo.	1	I
		4.3	f	7/28/54 11 mo.	r	90/0
	Ortho BK	4.3	f	7/28/54 11 mo.	r	90/0

Table 1, continued

Species	Spray[2]	Concentration[3]	Type[4]	Time & Period[5]	Number of Specimens[6]	Control[7]
vine maple	BEP 2,4,5-T	4.3	f	7/28/54 11 mo.	R	100/60
	Du Pont BK	4.3	f	7/28/54 11 mo.	r	100/90
white oak	Du Pont BK	21.0	b	7/5/54 12 mo.	10	I
		25.0	b	3/54 7 mo.	2	100/ no sprouts
	BEP 2,4,5-T	21.0	b	7/6/54 12 mo.	13	92% I, 8% III
	BEP BK	21.0	b	7/6/54 12 mo.	13	85% I, 15% II
	Ortho BK	4.3	f	7/30/54 11 mo.	r	100/50
willow	BEP 2,4,5-T	21.0	b	7/54 12 mo.	5	I
	Ortho 2,4,5-T	13.2	f	7/29/54 14 mo.	r	100/90 on 1 plot, 90/90 on 2nd plot
	BEP 2,4-D	4.3	f	7/28/54 11 mo.	r	90/50

[1] The subject of adequate control is discussed on page 13. The data in this table have been selected from that of table 8. Chemical names for the sprays symbolized in this and the following tables are listed in Table 15 in the appendix.

[2] BK (brushkiller) is a 1:1 mixture of 2,4-D and 2,4,5-T.

[3] diluent is diesel oil in all cases; concentrations in ahg (pounds acid per 100 gallons diluent)

Table 1, continued

[4] f (foliage spray); b (basal spray); c (surface cut and sprayed)

[5] date sprayed and time interval between spraying and observation

[6] r (roadside spray) one treatment

[7] I (complete kill), II (51-100% top kill, some or no root kill), III (0-50% top kill, some or no root kill); fractions represent the per cent of top kill to the per cent of root kill unless otherwise specified

alder

Ortho 2,4,5-T was nearly as effective at 4.3 ahg as it was at 13.2 ahg. The former gave 90 per cent top kill while the latter gave complete kill.

Three chemicals proved to be nearly as effective at 4.3 ahg as they were at 13.2 ahg. This indicates that alder is a sensitive species.

blackberry

Blackcap was the easiest of the blackberry species to control. Basal sprays of Kuron and BEP 2,4,5-T at 25.0 ahg appear promising on the other species but there has not been a sufficient time lapse at this date to justify any final conclusions.

Hazel

A. W. Smelser (2, p.40) found hazel to be very sensitive to a 20 ahg application of brushkiller on cut stumps. A replication of this formulation also in an oil carrier (table 8) by both stump and basal sprays gave poor results.

madrone

Leonard and Lusk (5, p.81) got complete kill with a basal spray of 2,4,5-T at 13.2 ahg of diesel oil. The current experiment resulted in 70 per cent top kill with a foliage spray of the same formulation at 4.3 ahg

which indicates that some point in between should be found for economical control.

bigleaf maple

Cut-surface or stump treatments were not generally successful. Basal sprays were most effective; the most susceptible trees were those of the one to two inch diameter class. Kill decreased rapidly with increase in size, and no trees over seven inches were killed. Clumps were very difficult to kill.

ocean spray

Basal sprays of Kuron and Esteron 245 established in February, 1954, gave poor results compared to applications of the same formulations made in March, 1955. Although the number of specimens in the first test was very limited, these chemicals have nevertheless been recommended in table 1 for use in March.

poison oak

Juhren (5, p.81) reports complete kill resulting from a foliage spray of brushkiller at 20 ahg in diesel oil. The present test used the same formulation at 4.3 ahg and got 80 per cent top and root kill which indicates the latter is nearer the economical concentration. Leonard and Lusk tried a basal spray of 2,4,5-T at 13.2 ahg and got complete kill. Present replications of the same spray resulted in good kill at a concentration

of 25.0 ahg but no control at 21.0 ahg. Only further experiments can resolve this disparity. Esteron 245 and Kuron treatments at 16.7 and 25.0 ahg respectively show promise but have not been under observation long enough. Basal sprays gave better results than foliage sprays, and basal sprays in March gave much better results than the same sprays made in July.

vine maple

General observations of vine maple treatments indicate that stems which have been bruised or damaged in logging or construction operations are affected by herbicides to the greatest extent. Treatment immediately after logging would therefore seem to offer the greatest success.

white oak

More white oak specimens were treated than any other species except bigleaf maple. As with the maples, most of the formulations gave satisfactory control only over the smaller trees. Basal sprays were by far the most effective. Time of spraying seemed to make little difference. Spraying immediately after falling or girdling rather than waiting one to two weeks resulted in less sprouting. Scraping moss off the root collars did not aid control. One researcher (2, p.41) using a cut surface spray of brushkiller at 13.2 ahg reports that the

species is hypersensitive. This was definitely not found to be so in the present tests. Du Pont brushkiller applied to cut surfaces gave the best overall control (21.0 ahg), but the number of specimens was limited.

Table 2 is a general summary of the effectiveness of ten formulations applied to 34 different species of common occurrence on the McDonald Forest. Effective control has been considered here as at least 80 per cent top and root kill of the individuals.

By the number of chemicals giving good control, alder, elderberry, madrone, and willow seem to be the more sensitive species. Table 2 shows that foliage sprays and basal sprays control about an equal number of species. Time of application does not generally seem to be related to the effectiveness of basal sprays. Nine of the 34 species sprayed were not controlled.

Grass control

Tables 3 through 7 summarize the grass-control experiments. The chemicals of tables 3 and 4 were sprayed in July, 1953 on areas having dense grass covers. These areas were then planted the following winter. Effectiveness in table 3 is rated by the least amount of sprouting 26 months after spraying. A rating of 1 is complete kill while 5 represents no kill.

Table 2. General Summary of Effectiveness of Specific Herbicides on McDonald Forest Brush and Tree Species

BEP 2,4,5-T					BEP BK				BEP 2,4-D		BEP 2,4-D + Kuron	Kuron				Ortho 2,4, 5-T		Ortho BK		Du Pont BK						Est-eron 2,45	Species Sprayed
5 f	3 f	8 b	9 b	8 c	5 f	3 f	8 b	8 c	3 f	8 b	f[3]	9 b	5 f	3 f	8 b	5 f	3 f	3 f	4 f	5 f	3 f	7 b	8 b	9 b	8 c	7 c	b[6]	
*					*				*		/		*			*	*	/		*								alder
	/						*																/				ash
						/			/			*	*			/		/					/				*	blackberry
*														*				*	*									blackcap
																							/					bracken fern
																					*							buckbrush
						*					/												/					cascara
	*					/					/	/	/			/		/					*			*		cherry
	*																											chinquapin
		*				/			*		/	*	/			/		*					/				*	elderberry
	/					/			/				/			/		/					*					dogwood
	/										/												/					fireweed
	/					*	*				/													*				hawthorne
	*					*			/		/	/	*			/		*	*				/					hazel
						/					/					/							/					huckleberry
	*					/			/														*					Indian plum
	/						*			*								/				*			*			madrone[10]
	*	*					*		/		/	*		*		/		/				*	*	*			*	big leaf maple[10]
																							/					ninebark

Table 2, continued

BEP 2,4,5-T					BEP BK				BEP 2,4-D		BEP 2,4-D + Kuron	Kuron				Ortho 2,4, 5-T		Ortho BK		Du Pont BK						Est-eron 2,4,5	Species Sprayed
5 f	3 f	8 b	9 b	8 c	5 f	3 f	8 b	8 c	3 f	8 b	f[3]	9 b	5 f	3 f	8 b	5 f	3 f	3 f	4 f	5 f	3 f	7 b	8 b	9 b	8 c	7 c	b[6]	
		*				/			/		/	*		/		/		/					*				*	ocean spray
		/																					/				Oregon grape
			*			/					/	*							*					*		*	poison oak
									/					/			*	/		*							red flowering currant
*						*					/			/		/							*				rose
		/				/					/			/				/					/				salal
		/				/			/		/					*							/				salmonberry
		*					*																	*				serviceberry
		/				/			/		/			/		/		/					/				snowberry
	*				*	*					*					/			*				/				snowbrush
		/				/					/			/		/							/				sword fern
		/				/			/		/			/		/		/					/				thimbleberry
*					*						/			/			*	*		*	*	*	*		*	*		vine maple
			*				*	*	/			/	/					*									/	white oak[10]
		*				/			*		/		*			*		/									willow
5		10	1		7		6	1	3	1	1	5	5			5		7		4		11					number of species controlled

1 * indicates that at least 80% kill was achieved. / indicates less than 80% kill. The degree of control can be found in Table 3. The only diluent used was diesel oil.

Table 2, continued

[2] f:foliage spray; b:basal spray; c:cut surface spray

[3] concentration of 4.3 ounces per gallon

[4] concentration of 8.4 ahg

[5] concentration of 13.2 ahg

[6] concentration of 16.7 ahg

[7] concentration of 19.4 ahg

[8] concentration of 21.0 ahg

[9] concentration of 25.0 ahg

[10] size of trees in Table 8

Table 3. Effectiveness Ratings of Various Grass Herbicides

Herbicide	Rating
CMU (wet)[1]	1.0
Chlorax[2]	1.1
Chloro IPC[3]	1.2
CMU (pellet)[4]	2.0
Calcium Cyanamid (pellet)[5]	2.6

1 80% active ingredient; estimated rate, 4 - 16 pounds per acre

2 unknown

3 4 pounds active per gallon; estimated rate, 8 - 16 pounds per acre

4 25% active ingredient; estimated rate, 4- 16 pounds per acre

5 standard fertilizer grade, not less than 20% nitrogen; estimated rate, 800 - 2000 pounds per acre

Table 4. Mortality Rates of Douglas-fir Seedlings Planted in Previously Treated Spots

Herbicide	% Mortality
CMU (wet)	40.0
Chloro IPC	40.0
Calcium Cyanamid (pellets)	63.6
Chlorax	66.7
CMU (pellet)	90.0

Table 5 summarizes an experiment initiated in March, 1955 to determine the relative effectiveness of Chloro IPC and brushkiller individually and combined. The brushkiller was applied at a 4.2 ahg concentration in water, and the Chloro IPC was applied at a concentration of four ahg and a rate of eight to sixteen pounds per acre.

Table 5. Experiment No. 1 with Chloro IPC and Brushkiller

Spray	Location	Time Between Spraying and Observing	Sprouting No	Sprouting Yes
Chloro IPC	Hospital Lot	7 months	1	29
Brushkiller				30
Chloro IPC & Brushkiller				30
Control				30

The above three experiments were the first plots established to examine the possibility of achieving some degree of grass control. Because of the uncertainly involved, no exact records of rates were kept; hence, usefulness of the data is limited.

Table 6 summarizes a study similar to that recorded in table 5. Here, 2-0 Douglas-fir seedlings were planted approximately two months after the area was sprayed. The Chloro IPC was applied at 32 ounces per gallon of water on the hospital lot and at 16 ounces per gallon on the

Oak Creek plots. The concentration of the brushkiller was 4.2 ahg of water.

Table 6. Experiment No. 2 with Chloro IPC and Brushkiller

Spray	Location	Time interval	% Seedling mortality	Sprouting No	Sprouting Yes
Chloro IPC	Hospital Lot	22 months	55	11	89
Brushkiller			39	0	100
Chloro IPC & Brushkiller			48	21	79
Control			34	0	100
Chloro IPC	Oak Creek	6 months	35	80	20
Brushkiller			46	76	34
Chloro IPC & Brushkiller			37	40	60
Control			43	1	99

In general, the addition of brushkiller has retarded resprouting of the broadleafed weeds as well as the grasses. The former return first but are not believed to offer nearly as much competition.

Charts 1 and 2 in the appendix are based on the Hospital Lot data of table 6. In general, more harm than good was done to the seedlings by spraying the grasses. Chart 2 indicates that the rate of grass kill by the more powerful sprays of Chloro IPC and the combination of Chloro IPC and brushkiller began a slow decline six months

after application of the chemicals. Coniferous seedlings were not adversely effected during this first period when the grasses were dying most rapidly. The rates of seedling mortality increased characteristically during the first two summers but were much higher on the areas where the grasses had been heavily damaged.

Table 7 includes the experiments done with the newer chemical, Dalapon. The area involved here was sprayed in the fall of 1954 and planted in 1955. Water was the only diluent used with the chemicals.

200 seedlings of the same stock used in the herbicidal trials recorded on table 7 were planted on an adjacent tract under identical surface conditions but with the vegetation scalped rather than sprayed. Mortality in this area was 76 per cent compared to 91 per cent on the spray control plot. Because of the high mortality on the latter, conclusions are hard to reach.

Where spraying and planting were combined on another experiment, all tree seedlings were dead after 17 months. These trials are not tabulated.

Damage to coniferous seedlings (Douglas-fir and white fir)

BEP brushkiller did the most damage to seedlings when the latter were sprayed coincidentally with the brush. Up to 20 per cent of the seedlings were killed or seriously injured. The Du Pont brushkiller varied

Table 7. Experiments with Brushkiller, Chloro IPC, and Dalapon on Grasses

Spray	Concentration	Location	Time Interval	% Mortality (seedlings)	Sprouting no	Sprouting yes
Chloro IPC	16 ounces/gal	Hospital Lot	7 months	100	0	100
Brushkiller & Dalapon	2 ounces/gal			96	2	98
Dalapon[1]	6½ ounces/gal			97	0	100
Dalapon[1]	6½ ounces/gal			100	0	25
Dalapon[1]	6½ ounces/gal			100	10	15
Dalapon[2]	6½ ounces/gal			100	0	20
Control	6½ ounces/gal			91	0	100

1 chemicals applied for five seconds to three foot diameter circle

2 chemicals applied at rates varying from five to 25 seconds on plots

from killing or damaging 39 per cent on one roadside plot to doing no harm on a second. Where seedlings were in the open, BEP 2,4,5-T killed or injured nearly 18 per cent. Silvex burned a few. The combination of BEP 2,4-D and Silvex did no harm. These fluctuations probably result from variations in the protective cover and spray drift.

SUMMARY

This paper is a summary of herbicidal experiments established by the Oregon State College School of Forestry to test a variety of the newer herbicidal products on 37 plant species common to the school forest. It is essentially a preliminary report since most of the conclusions are based on the results of only one growing season; too, the number of observations for many species are limited or unrecorded.

Weed-control problems encountered on the school forest are characteristic of those of Northwest Oregon. Grass and brush competition inhibit coniferous seedling establishment; encroaching brush makes road maintenance costly; weed trees monopolize space without furnishing income; and poison oak exists as a major nuisance to both students and sportsmen.

The grasses tested were best controlled by a mixture (4.2 ahg of water) of brushkiller and Chloro IPC. Douglas-fir seedlings were planted several months after the grasses had been sprayed. In all cases, seedling mortality was higher on sprayed plots than on unsprayed plots so further research is yet necessary to find a new chemical or a concentration of the above chemicals that will control the grasses but be relatively harmless to

the seedlings.

Table 1 lists the most effective controls found for the brush and weed tree species. The only major species for which no controls were found are snowberry and thimbleberry. By number of species controlled, foliage and basal sprays were nearly equal in effectiveness. The latter were found to be more effective on the larger specimens, and degree of control was found to be independent of season of application. The best results by number of species controlled were given by basal sprays of BEP 2,4,5-T and Du Pont brushkiller and by foliage sprays of the Ortho and BEP brushkillers.

This is a field where continuous experimentation is necessary to test new chemicals and to discover most efficient concentrations, rates, and methods of applications. The results in this paper, then, are no final answer, but should be useful at least as a guide to further experimentation. Important, also, is the fact that what is satisfactory control for one species or situation is not necessarily satisfactory for another. Adequate control varies both with the species and with the results desired.

The chemicals tested were originally developed for agricultural uses and then later applied to woody plants by foresters. These chemicals give satisfactory control over the more sensitive species such as alder, elderberry,

madrone, and willow, but give variable results on the less sensitive and larger species. Tests have shown both the value of herbicides to forest management and the need for improvements by the producing companies. A chemical which is developed principally for the control of woody species should logically give broader control of a larger variety of the weed species at lower concentrations and costs.

BIBLIOGRAPHY

1. Carvell, Kenneth L. Translocation of ammate. Forest science 1:41-44. 1955.

2. Dahms, Walter G. and George A. James. Brush control on forest lands. Portland, Oregon, 1955. 81p. (Pacific N.W. forest and range experiment station. Research paper no. 13)

3. Gartz, Jack Frederick. A management plan for the McDonald Forest. Master's thesis. Corvallis, Oregon state college, 1954. 110 numb. leaves.

4. Hawkes, Carl. Planes release tree plantation. Journal of forestry 51:345-349. 1953.

5. Leonard, O. A. Classification of woody plant responses to herbicides. Western weed control conference research progress report 14:40-61. 1954.

6. Stoeckler, Joseph H. and M. L. Heinselman. The use of herbicides for the control of alder brush and other swamp shrubs in the lake states. Journal of forestry 48:870-875. 1950.

7. Strege, Bob. Chemicals prove effective in brush control. The Lumberman 80:58-59. 1953.

8. Wiksten, Ake. Chemical brush control experiments, 1951 - 1955. Centralia, Washington, Forestry research center, 1955. 21p.

9. Zehngraff, Paul and John von Bargen. Chemical brush control in forest management. Journal of forestry 47:110-113. 1949.

A P P E N D I X

Table 8. Chemical Treatments Made on Shrubs and Weed Trees

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
				ALDER		
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	I, variable
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/30
BEP BK	fs	13.2	7/29/54 11 mo.	r	Siuslaw N.F.	I
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	70/10
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	I
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0, edge of plot
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/30, better top kill where all sprayed
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	100/90
Du Pont BK	fs	13.2	7/29/54 14 mo.		Siuslaw N.F.	I
Kuron	fs	13.2	7/29/54 14 mo.		Siuslaw N.F.	I
				ASH		
BEP E 2,4,5-T	bs	21.0	7/54 12 mo.	4	n. of sawmill	50% I, 50% 50/0
BEP E BK	bs	21.0	7/54 12 mo.	3	n. of sawmill	I

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			ASH, continued			
Du Pont BK	bs	19.4	3/21/54 16 mo.	1	Jackson Place	10/0
Du Pont BK	cs	21.0	7/54 11 mo.	2	Oak Creek Saddle	III trees 16" & 17" dbh
			BLACKBERRY			
BEP BK	fs	13.2	7/6/54 12 mo.	1	Soap Creek	III
BEP BK	fs	4.3	7/28/55 11 mo.	r	Soap Creek	III
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP BK	bs	21.0	7/54 12 mo.	3	n. of sawmill	III
Du Pont BK	bs	21.0	7/54 12 mo.	3	n. of sawmill	III
Du Pont BK	bs	19.4	3/21/54 16 mo.	8	Jackson Place	III
Du Pont BK	fs	13.2	7/6/54 12 mo.	1	Soap Creek	III
Du Pont BK	fs	4.3	7/28/55 11 mo.	r	Soap Creek	III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4,5-T	fs	13.2	7/6/54 12 mo.	1	Soap Creek	III
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	I

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			BLACKBERRY, continued			
BEP 2,4,5-T	fs	4.3	7/28/55 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4,5-T	bs	21.0	7/54 12 mo.	1	n. of sawmill	III
BEP 2,4-D	fs	4.3	7/28/55 11 mo.	r	Soap Creek	III
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	4.3	7/28/55 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	R	N. Ridge Road	III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/28/55 11 mo.	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	I evergreen blackberry
Kuron	fs	4.3	7/28/55 11 mo.	r	Soap Creek	III
Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% II, 50% III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			BLACKBERRY (HIMALAYA, BLACKCAP, WILD, AND EVERGREEN)			
BEP E 2,4,5-T	bs	25.0	2/21/55 4 mo.	-	Hospital Lot	100% defoliated; 30% of stems have red trace
Esteron 2,4,5	bs	16.7	2/21/55 4 mo.	-	Hospital Lot	100% defoliated
Kuron	bs	25.0	2/21/55 4 mo.	-	Hospital Lot	100% defoliated; 40% of stems killed
Du Pont E BK	bs	25.0	2/21/55 4 mo.	-	Hospital Lot	100% defoliated; 70% of stems killed
				BLACKCAP		
Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	100/20
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	R	Soap Creek	90/10
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/10
Ortho BK	fs	8.4	7/28/54 11 mo.	r	N. Ridge Road	I
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	90/20, resprouting
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
				BRACKEN FERN		
Du Pont BK	bs	21.0	7/54 12 mo.	7	n. of sawmill	43% 70/30; 57% III
Du Pont BK	bs	19.4	3/21/54 16 mo.	8	Jackson Place	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			BUCKBRUSH			
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/0
			CASCARA			
BEP E BK	bs	21.0	7/54 12 mo.	r	n. of sawmill	III
BEP E BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Du Pont BK	bs	19.4	3/21/54 16 mo.	r	Jackson Place	25% I; 75% III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
			CHERRY			
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Du Pont BK	css	19.4	3/20/54 16 mo.	1	Jackson Place	no sprouts
Du Pont BK	bs	21.0	7/54 12 mo.	1	n. of sawmill	I, killed 25% of conifer understory
BEP 2,4,5-T	bs	21.0	7/54 12 mo.	5	n. of sawmill	80% I, 20% III
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4,5-T	bs	25.0	3/55 7 mo.	1	Peavy Cabin	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			CHERRY, continued			
Kuron	bs	25.0	2/55 5 mo.	r	lower Oak Creek	III
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% I, 50% 30/0
Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	33% II, 67% III
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	III
			CHINQUAPIN			
BEP E 2,4,5-T	bs	21.0	7/54 12 mo.	1	n. of sawmill	I
			ELDERBERRY			
Du Pont BK	bs	25.0	3/55 7 mo.	2	Peavy Cabin	50% 100/no sprouts; 50% III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 60/0, 50% III
Du Pont BK	fs	4.3	7/28/55 11 mo.	r	Soap Creek	90/0

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			ELDERBERRY, continued			
Ortho BK	fs	4.3	7/28/55 11 mo.	r	Soap Creek	100/90
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	90/0
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	40/0
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	100/0
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 100/0, 50% III
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	I
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	60/0
Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 80/0, 50% III
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	80/10
BEP 2,4,5-T	bs	25.0	3/55 7 mo.	6	Peavy Cabin	95% top kill, no sprouts
Kuron	bs	25.0	3/55 7 mo.	1	Peavy Cabin	80/no sprouts
Esteron 2,4,5	bs	16.7	3/55 7 mo.	5	Peavy Cabin	88/no sprouts
			DOGWOOD			
Du Pont BK	bs	21.0	7/54 12 mo.	3	n. of sawmill	67% I, 33% 100/0

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			DOGWOOD, CONTINUED			
Du Pont BK	bs	25.0	3/55 7 mo.	2	Peavy Cabin	III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% I, 50% III
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4,5-T	bs	25.0	3/55 7 mo.	4	Peavy Cabin	52/no sprouts
BEP 2,4,5-T	bs	21.0	7/54 12 mo.	1	n. of sawmill	III
BEP E BK	bs	21.0	7/54 12 mo.	6	n. of sawmill	33% I, 17% II, 50% III
BEP E BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	I
BEP E BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% I, 50% III
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	100/0
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	60/0
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 90/10, 50% III
Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			FIREWEED			
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
			HAWTHORNE			
BEP E BK	bs	21.0	7/54 12 mo.	1	n. of sawmill	80/0
BEP E BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0
BEP E BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	70/0
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Du Pont BK	bs	25.0	3/54 7 mo.	2	Peavy Cabin	100% top kill, no sprouting
			HAZEL			
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	60/0
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	70/0
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			HAZEL, continued			
BEP 2,4,5-T	bs	21.0	7/54 12 mo.	9	n. of sawmill	78% I, 11% 75/0, 11% III
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	60/0
BEP 2,4,5-T	bs	25.0	3/55 7 mo.	2	Peavy Cabin	50% 80/no sprouting, 50% III
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/50
BEP BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
BEP BK	bs	21.0	7/54 12 mo.	13	n. of sawmill	36% I, 18% II, 46% III
BEP BK	fs	13.2	7/6/54 12 mo.	2	Soap Creek	I
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 80/0, 50% III
Du Pont BK	bs	21.0	7/54 12 mo.	14	n. of sawmill	14% II, 86% III
Du Pont BK	bs	19.4	3/20/54 16 mo.	14	Jackson Place	14% M, 86% H
Du Pont BK	css	19.4	3/20/54 16 mo.	14	Jackson Place	43% 0, 57% H
Du Pont BK	fs	4.3	7/28/54	r	Soap Creek	III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	60/20
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			HAZEL, continued			
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	60/0
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	f	Siuslaw N.F.	10/20
Ortho BK	fs	4.3	7/28/54	r	Soap Creek	80/0
Ortho BK	bs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	90/0
Kuron	bs	25.0	3/55 7 mo.	2	Peavy Cabin	50% 80/no sprouts, 50% III
Kuron	fs	4.3	7/28/54	r	Soap Creek	100/0
			HUCKLEBERRY			
BEP E BK	bs	21.0	7/54 12 mo.	2	n. of sawmill	50% 80/10, 50% III
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
			INDIAN PLUM			
Du Pont BK	bs	21.0	7/54 12 mo.	2	n. of sawmill	I

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			INDIAN PLUM, continued			
BEP E 2,4,5-T	bs	21.0	7/54 12 mo.	1	n. of sawmill	I
BEP E BK	bs	21.0	7/54 12 mo.	1	n. of sawmill	III
			MADRONE			
BEP E BK	bs	21.0	7/54 12 mo.	1	n. of sawmill	I
Du Pont BK	css	19.4	3/20/54 16 mo.	1	Jackson Place	100/no sprouting
Du Pont BK	bs	19.4	3/20/54 16 mo.	3	Jackson Place	33% I, 67% 73/33
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	70/0
Ortho BK	fs	4.3	7/28/54 11 mo.	1	Soap Creek	60/0
			BIGLEAF MAPLE			
Du Pont BK	cs	21.0	7/54 11 mo.	3	Oak Creek Saddle	III (8-17" dbh)
Du Pont BK	bs	25.0	3/54 7 mo.	33	Peavy Cabin	67% 95/10 sprouts, 33% III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 70/0, 50% III
Du Pont BK	bs	21.0	7/6/54 12 mo.	17	n. of sawmill	30% I, 35% II, 35% III
Du Pont BK	css	19.4	3/20/54 16 mo.	7	Jackson Place	14% 0, 14% L, 14% M, 58% H
Du Pont BK	bs	19.4	3/20/54 16 mo.	25	Jackson Place	20% I, 28% 50/20, 52% III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			BIGLEAF MAPLE, continued			
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP E 2,4,5-T	cs	21.0	7/54 11 mo.	5	Oak Creek Saddle	III (4-8" dbh)
BEP E 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP E 2,4,5-T	bs	25.0	3/54 7 mo.	54	Peavy Cabin	85% 99/no sprouts, 15% III
BEP E 2,4,5-T	bs	21.0	7/6/54 12 mo.	3	n. of sawmill	23% I, 44% II, 33% III
BEP E 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP E 2,4,5-T	fs	13.2	7/6/54 12 mo.	1	Soap Creek	II
BEP BK	cs	21.0	7/54 11 mo.	3	Oak Creek Saddle	III (4-8" dbh)
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	60/0
BEP BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	100/0
BEP BK	bs	21.0	7/6/54 12 mo.	32	n. of sawmill	28% I, 64% 82/20, 8% III
Kuron	cs	21.0	7/54 11 mo.	5	Oak Creek Saddle	40% II, 60% III (2-4" dbh)
Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			BIGLEAF MAPLE, continued			
Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Kuron	bs	21.0	7/6/54 12 mo.	10	Peavy Cabin	50% I, 30% 83/0, 20% III (2-7" dbh)
BEP 2,4-D	fs	4.3	7/30/54	r	N. Ridge Road	III
BEP 2,4-D	fs	4.3	7/28/54	r	Soap Creek	100/0
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Kuron	bs	25.0	3/54 7 mo.	37	Peavy Cabin	92% 99/10 sprouts, 8% III
Esteron 2,4,5	bs	16.7	3/54 7 mo.	17	Peavy Cabin	76% 96/no sprouts, 24% III
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
			NINEBARK			
Du Pont BK	bs	21.0	7/54 12 mo.	4	n. of sawmill	25% I, 25% II, 50% III
			OCEAN SPRAY			
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			OCEAN SPRAY, continued			
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
Du Pont BK	fs	13.2	7/6/54 12 mo	2	Soap Creek	III
Du Pont BK	css	19.4	3/20/54 16 mo.	18	Jackson Place	22% M, 78% H
Du Pont BK	cs	19.4	3/20/54 16 mo.	20	Jackson Place	45% 0, 5% M, 50% H
Du Pont BK	bs	19.4	3/20/54 16 mo.	9	Jackson Place	44% I, 44% 82/69, 12% III
Du Pont BK	bs	25.0	2/55 5 mo.	r	lower Oak Creek	60% defoliation
Du Pont BK	bs	25.0	3/54 7 mo.	2	Peavy Cabin	50% 100/no sprouts, 50% III
Du Pont BK	bs	21.0	7/54 12 mo.	8	n. of sawmill	12% III
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4,5-T	fs	13.2	7/6/54 12 mo.	r	Soap Creek	75% I, 25% III
BEP 2,4,5-T	bs	21.0	7/54 12 mo.	6	n. of sawmill	83% I, 17% III
BEP 2,4,5-T	bs	25.0	2/55 5 mo.	r	lower Oak Creek	60% defoliation
BEP BK	bs	21.0	7/54 12 mo.	4	n. of sawmill	75% I, 25% 70/0
BEP BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			OCEAN SPRAY, continued			
BEP BK	fs	4.3	7/30/54	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/30/54	r	N. Ridge Road	50% 60/0, 50% III
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Kuron	bs	25.0	3/54 7 mo.	6	Peavy Cabin	92/no sprouts
Kuron	bs	25.0	2/55 5 mo.	r	Lower Oak Creek	20% defoliation
Esteron 2,4,5	bs	16.7	2/55 5 mo.	r	lower Oak Creek	30% defoliation
Esteron 2,4,5	bs	16.7	3/54 7 mo.	1	Peavy Cabin	100/no sprouts
			OREGON GRAPE			
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			POISON OAK			
BEP E 2,4,5-T	bs	25.0	3/21/55 4 mo.	-	Hospital Lot	100/some sprouts
BEP E 2,4,5-T	bs	21.0	7/54 12 mo.	2	n. of sawmill	III
BEP E 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	80/50
BEP BK	bs	21.0	7/54 12 mo.	14	n. of sawmill	8% I, 21% II, 71% III
Du Pont BK	bs	21.0	7/54 12 mo.	9	n. of sawmill	22% II, 78% III
Du Pont BK	bs	21.0	3/20/54 16 mo.		Jackson Place	0/0 on majority, I on 2 bushes
Du Pont BK	bs	25.0	3/21/55	-	Hospital Lot	100/weak sprouting
Du Pont BK	bs	25.0	3/54 7 mo.	1	Peavy Cabin	100/no sprouts
Du Pont BK	css	19.4	3/20/54 16 mo.		Jackson Place	Heavy sprouting
Du Pont BK	css	19.4	3/20/54 16 mo.		Jackson Place	Heavy sprouting
Esteron 2,4,5	bs	16.7	3/21/55 4 mo.	-	Hospital Lot	100/some sprouts
Kuron	bs	25.0	3/21/55 4 mo.	-	Hospital Lot	100/no sprouts
Kuron	bs	25.0	3/54 7 mo.	3	Peavy Cabin	100/no sprouts
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			POISON OAK, continued			
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	100/90
			RED-FLOWERING CURRANT			
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	I
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/20
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Du Pont BK	bs	21.0	7/54 12 mo.	5	n. of sawmill	20% I, 80% 90/17
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	13.2	7/54 12 mo.	1	Soap Creek	I
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	90/50
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	90/5
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	I
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			RED-FLOWERING CURRANT, continued			
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
			SALAL			
BEP BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
			SALMONBERRY			
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	30/0, variable

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			SALMONBERRY, continued			
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	100/50
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	20/0
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
			SERVICEBERRY			
Du Pont BK	css	19.4	3/20/54 16 mo.	1	Jackson Place	M
Du Pont BK	bs	19.4	3/20/54 16 mo.	4	Jackson Place	25%II, 75% 15/0
Du Pont BK	bs	25.0	3/54 7 mo.	2	Peavy Cabin	100/no sprouts
Du Pont BK	bs	21.0	7/54 12 mo.	3	n. of sawmill	67% 75/0, 33% III
BEP E 2,4,5-T	bs	21.0	7/54 12 mo.	10	n. of sawmill	60% I, 40% 82/0
BEP E BK	bs	21.0	7/54 12 mo.	2	n. of sawmill	50% I, 50% 65/40
			SNOWBERRY			
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/0
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			SNOWBERRY, continued			
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	60/20
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	33% 90/40, 67% III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Kuron	fs	4.3	7/30/54 11 mo.	R	N. Ridge Road	III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Du Pont BK	bs	19.5	3/21/54 16 mo.	24	Jackson Place	12% I, 42% 92/12, 46% III
			SNOWBRUSH			
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/0
BEP BK	fs	13.2	7/54 12 mo.	1	Soap Creek	I
BEP BK	bs	21.0	7/54 12 mo.	2	n. of sawmill	III
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/0
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/0

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			SNOWBRUSH, continued			
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho BK	fs	8.4	7/28/54 11 mo.	r	Soap Creek	90/0
			SWORDFERN			
BEP E BK	bs	21.0	7/54 12 mo.	2	n. of sawmill	III
BEP E BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	40/0
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	30/0
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	20/0
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	30/0
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	20/0
Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	20/0
			THIMBLEBERRY			
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			THIMBLEBERRY, continued			
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	70/25, variable
BEP 2,4,5-T	fs	13.2	7/6/54 12 mo.	9	Soap Creek	III
BEP 2,4,5-T	bs	21.0	7/54 12 mo.	15	N. of sawmill	7% I, 33% II, 60% III
BEP E BK	bs	21.0	7/6/54 12 mo.	4	n. of sawmill	50% 65/25, 50% 40/0
BEP E BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	20/0
BEP E BK	fs	13.2	7/6/54 12 mo.	1	Soap Creek	100/90
BEP E BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP E BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 80/20, 50% III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/10, some I
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	20/0
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	10/0
Ortho 2,4,5-T	fs	4.3	7/28/54	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	50% 60/30, 50% III
Du Pont BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			THIMBLEBERRY, continued			
Du Pont BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Du Pont BK	fs	13.2	7/6/54 12 mo.	9	Soap Creek	III
Du Pont BK	bs	19.4	3/21/54 16 mo.	5	Jackson Place	20% 70/0, 80% III
Du Pont BK	bs	21.0	7/6/54 12 mo.	10	n. of sawmill	III
Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	0/0
Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Kuron	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	8.4	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
			VINE MAPLE			
BEP BK	fs	13.2	7/6/54 12 mo.	1	Soap Creek	80/20
BEP BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	80/10
BEP 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	100/60
BEP 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			VINE MAPLE, continued			
BEP 2,4-D + Kuron	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
Ortho 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	70/0
Ortho BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	80/0
Du Pont BK	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	100/90
Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	60/0, some I
			WHITE OAK			
Du Pont BK	cs	21.0	7/54 11 mo.	5	Oak Creek Saddle	20% I, 60% 83/0, 20% III (7-17" dbh)
Du Pont BK	css	19.4	3/20/54 16 mo.	48	Jackson Place	8% 0, 21% L, 27% M, 44% H (1-9" dbh)
Du Pont BK	cs	19.4	3/20/54 16 mo.	30	Jackson Place	10% 0, 13% L + 100% defol., 18% M, 59% H (1-7" dbh)
Du Pont BK	bs	19.4	3/20/54 16 mo.	19	Jackson Place	11% I, 26% II, 63% III
Du Pont BK	bs	21.0	7/6/54 12 mo.	10	n. of sawmill	I
Du Pont BK	bs	25.0	2/26/55 5 mo.	-	lower Oak Creek	5% of trees 1-8" dbh 100% defol., 50% of all canopy defol.
Du Pont BK	bs	25.0	3/54 7 mo.	2	Peavy Cabin	100/no sprouts
BEP 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			WHITE OAK, continued			
BEP 2,4,5-T	cs	21.0	7/54 11 mo.	5	Oak Creek Saddle	60% I, 40% 10/0 (6-22" dbh)
BEP 2,4,5-T	bs	25.0	2/26/55 5 mo.	-	lower Oak Creek	10-90% defol., average 50% (1-8" dbh)
BEP 2,4,5-T	bs	21.0	7/6/54 12 mo.	13	n. of sawmill	92% I, 8% III
BEP E BK	bs	21.0	7/6/54 12 mo.	13	n. of sawmill	85% I, 15% II
BEP E BK	cs	21.0	7/54 11 mo.	6	Oak Creek Saddle	66% I, 17% II, 17% III (5-11" dbh)
Kuron	cs	21.0	7/54 11 mo.	5	Oak Creek Saddle	20% I, 20% II, 60% III (9-13" dbh)
BEP 2,4-D	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	100/50
Esteron 2,4,5	bs	16.7	2/26/55 5 mo.	r	lower Oak Creek	30% of canopy defoliated
Kuron	bs	25.0	2/26/55 5 mo.	r	lower Oak Creek	10% of canopy defoliated
			WILLOW			
BEP E 2,4,5-T	bs	21.0	7/54 12 mo.	5	n. of sawmill	I
BEP E 2,4,5-T	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	III
BEP E 2,4,5-T	fs	4.3	7/28/54 11 mo.	r	Soap Creek	III
BEP E 2,4,5-T	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III

Table 8, continued

spray[1]	type[2]	conc.[3]	date & time[4]	no.[5]	location[6]	control[7]
			WILLOW, continued			
BEP E 2,4,5-T	css	19.4	7/30/54 16 mo.	1	Jackson Place	M
BEP E 2,4,5-T	bs	19.4	7/30/54 16 mo.	1	Jackson Place	0/0
BEP 2,4-D + Kuron	fs	13.2	7/29/54 14 mo.	r	Siuslaw N.F.	60/30
BEP 2,4-D + Kuron	fs	4.3	7/54 11 mo.	r	Soap Creek	III
BEP 2,4-D + Kuron	fs	4.3	7/30/54 11 mo.	R	N. Ridge Road	50% 60/0, 50% III
Ortho BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Ortho 2,4,5-T	fs	13.2	7/29/54 14 mo.	2	Siuslaw N.F.	95/90
BEP 2,4-D	fs	4.3	7/28/54 11 mo.	r	Soap Creek	90/50
BEP BK	fs	4.3	7/28/54 11 mo.	r	Soap Creek	100/0
BEP BK	fs	4.3	7/30/54 11 mo.	r	N. Ridge Road	III
Kuron	fs	4.3	7/29/54 14 mo.	r	Siuslaw N.F.	80/0

1 BK (brushkiller, a mixture of 2,4-D and 2,4,5-T)

2 bs (basal spray), fs (foliage spray), cs (cut surface), csc (cut surface cups), css (cut surface spray)

3 concentrations in ahg (pounds acid per 100 gallons diluent); diesel oil is the diluent in all cases

Table 8, continued

[4] date sprayed and time interval between spraying and observation

[5] r (roadside sprays - no record of number of treatments), no (number of treatments)

[6] all locations are in McDonald Forest unless in the Siuslaw National Forest

[7] I (complete kill), II (51 - 100% top kill, some or no root kill), III (0 - 50% top kill, some or no root kill), 0 (no sprouting), L (light sprouting), M (medium sprouting), H (heavy sprouting), fractions represent the % of top kill over the % of root kill unless the denominator is specified as the number of sprouts

Table 9. Results of Cut-surface Treatments[1] on Bigleaf Maple

spray	dbh classes	method	no trees	location	extent of defoliation: none	light	medium	severe
amine	18" +		9	N	0	67	11	22
	8-17"	cs	2	Ridge	0	0	100	0
	1-7"		2	Road	0	0	0	100
ester BK	18" +		11	N	82	18	0	0
	8-17"	cs	1	Ridge	100	0	0	0
	1-7"		1	Road	0	100	0	0
ammate	18" +		11	N	73	27	0	0
	8-17"	csc	3	Ridge	67	0	33	0
	1-7"		1	Road	0	100	0	0
amine	2-18",		6	E of	0	0	17	83
ester BK	clumps	cs	4	Lewis-	75	25	0	0
ammate	of 3 to		5	burg	40	60	0	0
	13 stems			Saddle				

[1] no data available on concentrations or diluents; plots established 3/23/54, examined 16 months later

Table 10. Results[1] of Basal-spray Treatments on Bigleaf Maple

spray	dil	conc.	% kill by number of trees and d.b.h. 1-2"	3-4"	5-6"	7-8"	9-10"	average % kill
Kuron	do	25.0 ahg	94% / 16t	80% / 15t	100% / 3 t	33% / 3t		84%
Du Pont BK	do	25.0 ahg	100% / 3t	71% / 14t	11% / 9t	0% / 2t	0% / 3t	45%
BEP 2,4,5-T	do	25.0 ahg	92% / 36	79% / 14	40% / 5t			45%
Esteron 2,4,5	do	16.7 ahg	100% / 6t	45% / 9t	100% / 1t	0% / 1t		65%

[1] This table is an elaboration of data previously presented that was arranged by Dr. G. H. Barnes, associate director of the O.S.C. forest experiment station. Plots were established March 20, 1954 and examined seven months later.

Table 11. Oak Release Plots[1]

unsprayed trees, stumps[3]		sprayed[2] trees, stumps		
felled	girdled	felled & stumps sprayed 7-14 days later	girdled & sprayed immediately	felled & stumps sprayed immediately
92% of stumps[3] sprouting	trees have normal leaves & vigorous sprouts	38% sprouting	nearly 100% defoliation and weak sprouting	45% of stumps sprouting

[1] 85 trees; av. d.b.h. 4.2"; d.b.h. range 1.0 - 8.0"
[2] BEP E 2,4,5-T @ 16.7 ahg do
[3] experiment established 4/55; examined 7/55

Table 12. Results[1] of Cut-surface Treatments[2] with Oregon White Oak

spray	size classes by d.b.h. in inches												
	5	6	7	8	9	10	11	12	13	15	17	22	av.
Du Pont BK			100/0		90/0			70/0		90/0	20/0		74/0
no of trees			1		1			1		1	1		
BEP 2,4,5-T		100/0		0/0			100/100					10/0	62/40
no		1		1			2					1	
BEP BK	100/100				100/100	90/0	40/0						
no	1				2	1	1						
							100/100						88/67
no							1						
Kuron					10/0		100/0	10/0	100/100				
no					1		1	1	1				
							10/0						46/20
no							1						
average	100/100	100/100	100/0	0/0	75/50	90/0	75/0	40/0	100/100	90/0	20/0	10/0	68/33

[1] treated 7/54; examined 6/55
[2] conc. was 21.0 ahg do

Table 13. Maleic Hydrazide Treatments

spray[1]	conc.	species	no.	effects
MH 30	.05 %	D-fir saplings	3	none
MH 30	.05 %	white fir	1	40% of needles yellow
MH 30	.25 %	white fir	1	5% of needles yellow
MH 30	.25 %	grass + thimbleberry	-	no effect on grass, thimbleberry vigor reduced
MH 30	.25 %	Douglas-fir	4	none
MH 30	1.00 %	grass + thimbleberry	-	none
MH 30	1.00 %	Douglas-fir	2	1 tree has a very drooping habit, 1 tree has slightly drooping branches + leader
MH 30	1.00 %	Douglas-fir	1	slight drooping
MH 40	.025%	grass + thimbleberry	-	none
MH 40	1.50 %	Douglas-fir	4	slight drooping of current growth on top half of tree

[1] foliage spraying on 3/23/55, drizzling, cold day, examined 4 months later

[2] basal spraying

Table 14. Common and Scientific Names of Plants Sprayed

Common Name	Scientific Name
alder, red	Alnus rubra
ash, Oregon	Fraxinus latifolia
blackberry	Rubus spp.
blackcap	Rubus leucodermis
bracken fern	Pteridium aquilinum
buckbrush	Ceanothus sanguineus
cascara	Rhamnus purshiana
cherry	Prunus sp.
chinquapin	Castanopsis chrysophylla
colonial bent-grass	Agrostis tenuis
dogwood	Cornus sp.
elderberry	Sambucus sp.
fireweed	Epilobium augustifolium
hawthorne	Crataegus sp.
hazel	Corylus
huckleberry	Vaccinium parvifolium
Indian peach	Osmaronia cerasiformis
madrone, Pacific	Arbutus menziesii
maple, bigleaf	Acer macrophyllum
maple, vine	Acer circinatum
meadow fescue	Festuca elatior
ninebark	Physocarpus capitatus
ocean spray	Holodiscus discolor
Oregon grape	Berberis aquifolium
poison oak	Toxicodendron diversilobum
red flowering currant	Ribes sp.
Reed canary-grass	Phalaris arundinacea
rose	Rosa sp.
salal	Gaultheria shallon
salmonberry	Rubus spectabilis
serviceberry	Amelanchier sp.
snowberry	Symphoricarpos albus
snowbrush	Ceanothus velutinus
sword fern	Polystichum munitum
thimbleberry	Rubus parviflorus
white oak	Quercus garryana
willow	Salix sp.

Table 15. Key to Chemicals

Symbol	Chemical Name
BEP-2, 2,4-D	Butoxy ethoxy propanol ester of 2,4-dichloro-phenoxy acetic acid
BEP-2,4,5-T	Butoxy ethoxy propanol ester of 2,4,5-trichloro-phenoxy acetic acid
BEP-BK	A 1-1 mixture of BEP -- 2,4-D and BEP --2,4,5-T
Kuron	Propylene glycol butyl ether ester of 2,4-5 trichloro alpha propionic acid
Ortho 2,4,5-T	An experimental long chain water miscible glycol ester of 2,4-5 trichloro phenoxy acetic acid
Ortho 2,4-D	An experimental long chain water miscible glycol ester of 2,4 dichloro phenoxy acetic acid
Ortho BK	1-1 mixture of the Ortho 2,4-D and Ortho 2,4,5-T
Esteron 2,4-5	Propylene glycol butyl ether ester of 2,4-5 trichloro phenoxy acetic acid
duPont BK	A 1-1 mixture of the above with the same ester of 2,4-D
Amine	Tri-ethanol amine of 2,4-dichloro phenoxy acetic acid
CMU	3-(p-chlorophenyl)-1, 1-dimethylurea
Chlorax	40% Sodium chlorate and 58% Sodium metaborate
Chloro IPC	Isopropyl N-3 chlorophenyl carbamate
Calcium cyanamid	Calcium cyanamide
Ammate	Ammonium sulfamate
Dalapon	Sodium salt of alpha alpha dichloro propionic acid
MH-30	Ammonium salt of maleic hydrazide
MH-40	Sodium salt of maleic hydrazide

Chart 1. Effect of Grass Sprays on Douglas-fir Seedling Mortality

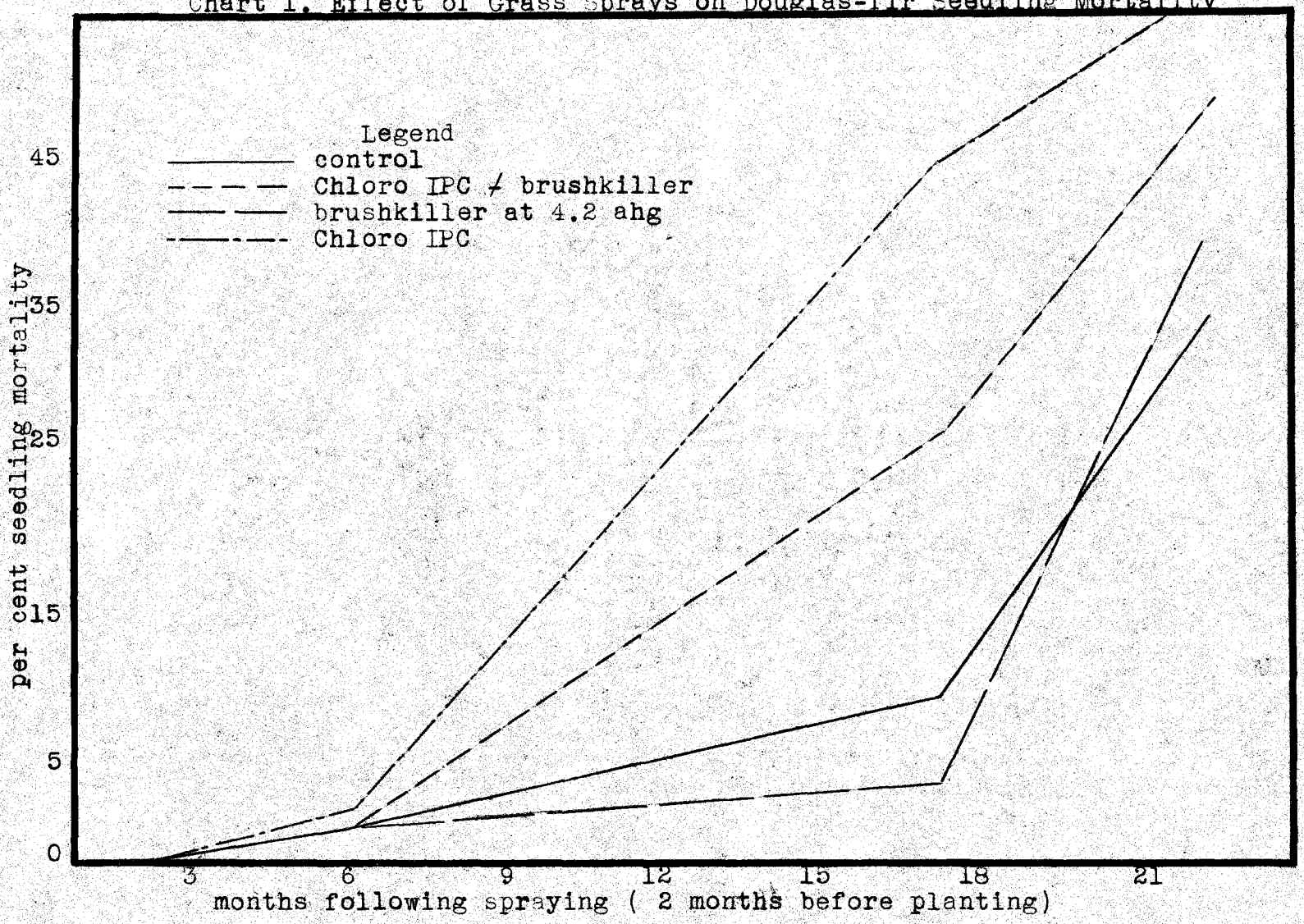

Chart 2. Residual Effects of Various Grass-Control Chemicals