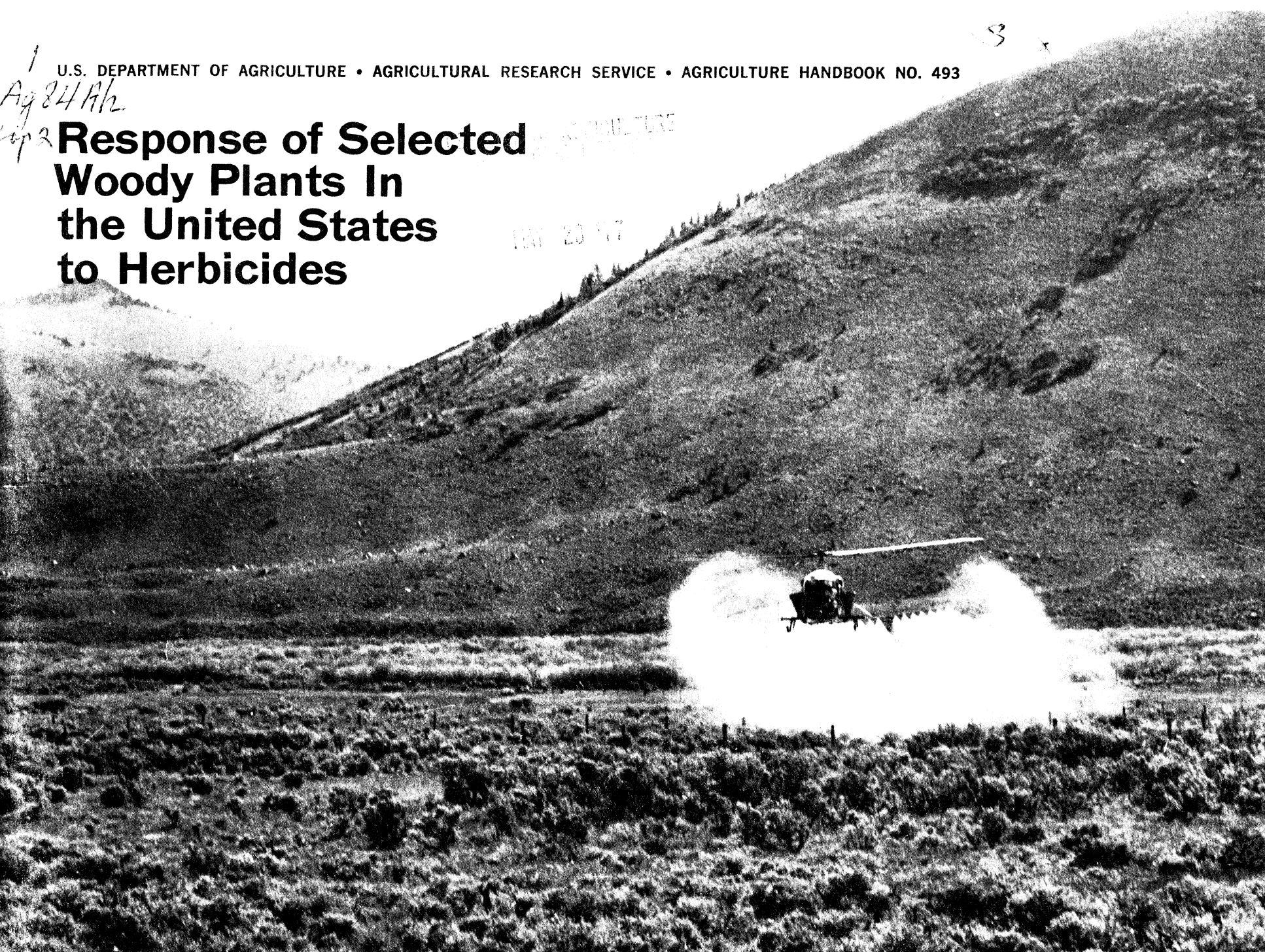
U.S. DEPARTMENT OF AGRICULTURE • AGRICULTURAL RESEARCH SERVICE • AGRICULTURE HANDBOOK NO. 493



# Response of Selected Woody Plants In the United States to Herbicides



# Response of Selected Woody Plants in the United States to Herbicides

By

Rodney W. Bovey
Research Leader
USDA, ARS
Department of Range Science
Texas A&M University
College Station, Texas 77843

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## CONTENTS

This handbook reports current research findings on the response of brush and trees to the most promising herbicides available. It is not intended as a list of recommended herbicides. The herbicides listed in this handbook include older, well established herbicides such as the phenoxy compounds, as well as several new materials. Research in chemical control of brush and trees is conducted by scientists in private industry and in State and Federal agencies. As research continues, new herbicides and methods of application are being developed. Consult your local County Agent or Extension Specialist, State Agricultural Experiment Station, or the U.S. Department of Agriculture for the latest recommended and approved herbicides for woody plant control.

## ENVIRONMENTAL PROTECTION

**NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Environmental Protection Agency (EPA), consult your County Agricultural Agent or State Extension Specialist to be sure the intended use is still registered.**

## COMMON NAME AND CHEMICAL NAME OF HERBICIDES INCLUDED

The herbicides included in this handbook are:

| COMMON NAME | CHEMICAL NAME |
|---|---|
| 2,3,6-TBA | 2,3,6-trichlorobenzoic acid |
| 2,4-D | (2,4-dichlorophenoxy) acetic acid |
| 2,4-DB | 4-(2,4-dichlorophenoxy) butyric acid |
| 2,4-DP | see dichlorprop |
| 2,4,5-T | (2,4,5-trichlorophenoxy) acetic acid |
| 2,4,5-TP | see silvex |
| Amitrole | 3-amino-s-triazole |
| AMS | ammonium sulfamate |
| Benzoic Acids | See 2,3,6-TBA<br>See Dicamba |
| Bromacil | 5-bromo-3-*sec*-butyl-6-methyluracil |
| Cacodylic Acid | hydroxydimethylarsine oxide |
| Dicamba | 3,6-dichloro-*o*-anisic acid |
| Dichlorprop | 2-(2,4-dichlorophenoxy) propionic acid |
| DSMA | disodium methanearsonate |
| Fenuron | 1,1-dimethyl-3-phenylurea |
| Fenuron-TCA | 1,1-dimethyl-3-phenylurea mono(trichloroacetic acid) |
| Glyphosate | *N*-(phosphonomethyl) glycine |
| Karbutilate | *tert*-butylcarbamic acid ester with 3-(*m*-hydroxyphenyl)-1,1-dimethylurea |
| MCPA | [(4-chloro-*o*-tolyl) oxy]acetic acid |
| Monuron | 3-(*p*-chlorophenyl)-1,1-dimethylurea |
| Monuron-TCA | 3-(*p*-clorophenyl)-1,1-dimethylurea mono(trichloroacetic acid) |
| MSMA | monosodium methanearsonate |
| Organic Arsenicals | see Cacodylic Acid<br>see DSMA<br>see MSMA |
| Paraquat | 1,1′-dimethyl-4,4′-bipyridinium ion |

Phenoxy Compounds
see 2,4-D
see 2,4-DB
see 2,4,5-T
see Dichlorprop
see MCPA
see silvex

Picloram _____ 4-amino-3,5,6-trichloropicolinic acid

Silvex _____ 2-(2,4,5-trichlorophenoxy) propionic acid

Substituted Ureas, Uracils and Carbamates
see Bromacil
see Fenuron
see Fenuron-TCA
see Karbutilate
see Monuron
see Monuron-TCA

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Mention of any trademark or proprietary product in this handbook does not constitute a warranty or guarantee of the product by the U.S. Department of Agriculture and does not imply approval of that product to the exclusion of any other product that may also be suitable.

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# Response of Selected Woody Plants in the United States to Herbicides

By Rodney W. Bovey, Southern Region, Agricultural Research Service

## ACKNOWLEDGEMENTS

This handbook is a cooperative study by the U.S. Department of Agriculture, Agricultural Research Service, and the Texas Agricultural Experiment Station.

Contributors to this publication are individually listed on page 98. They include colleages from the Federal Government as well as scientists from private companies and State universities. All contributors may be contacted for information on specific woody plant problems in their area. Without the assistance of these many contributors, the scope and usefulness of this handbook for the American public would not be as wide and as general as planned.

# INTRODUCTION

## General

Herbicides are effective and economical for controlling unwanted brush and trees. They can be used to—

- Improve pastures, rangelands, forests, recreational areas, and orchards.
- Maintain fence rows, drainage ways, roadsides, and right-of-ways.
- Kill poisonous plants or noxious weeds.
- Destroy alternate hosts of plant diseases and insects that could harm crops or carry pathogens harmful to animals or humans.

If herbicides are applied carefully, they can save money and labor. If applied carelessly, they can kill crops and other desirable plants.

In general—

- Those effective in small amounts are more economical to use.
- Those effective only in large amounts are safer on vegetation since there is less likelihood of accidentally damaging desirable plants with spray-drift.

## Effects of Herbicides

Herbicides differ from each other in how they kill plants, in the kinds of plants they kill, and in the amounts needed to kill plants.

Some herbicides can kill plants by translocation—by movement or systemic transport within the plant from the roots to foliage or from foliage to roots as a result of soil or foliar application. Some herbicides are contact herbicides. They kill plant tissue by direct exposure of the herbicide from foliar application rather than as a result of translocation. Contact herbicides are usually nonselective, and usually not as effective on woody plants as translocated-type herbicides. However, some translocated (systemic) and contact herbicides can be very effective when injected into the sapwood of the tree. The particular species, environmental conditions, and cost usually determine which herbicide and application technique will be used.

Some herbicides are selective and kill only certain plants, but have little or no effect on others. Some plants may be killed by very small amounts of one herbicide, while almost unaffected by large amounts of another. Other herbicides are non-selective and kill all kinds of plants. Most of the selective herbicides used for control of brush, weeds, trees, and broadleaf plants do little harm to grasses. However, some herbicides classed as selective may become nonselective if applied during the wrong season or at concentrations or rates higher than recommended.

*In addition,* vapors from some ester formulations can kill desirable, susceptible plants growing near the area to which the formulation is applied. Heat causes ester formulations to release vapors. Low-volatile esters vaporize at much slower rates than high-volatile esters. At temperatures below 90°F, there may be significant hazard from vapors of high-volatile esters, but only slight hazard from low-volatile ones.

At temperatures above 90°F, vapors from low-volatile esters may also be a hazard to

susceptible plants growing nearby. Nevertheless, the low-volatile esters maintain a relative margin of safety at higher temperatures.

The chart on page 30 lists the susceptibility of many common woody plants to various herbicides and herbicide treatments.

**Everytime you use a herbicide, double check and follow all precautions in this handbook and on container label regarding vapors, spray drift, and cleanliness of equipment. Pesticides used improperly can be injurious to man, animals, and plants.**

## APPLICATION METHODS

### General

Woody plants can be killed with herbicides in different ways. Herbicides can be applied by—

- Spraying onto foliage.
- Spraying basal bark or stumps.
- Injection into the sapwood of trees by mechanical devices or through frills or notches cut into the tree.
- Soil application.

Basal sprays and injection/cut-surface treatments on woody plants usually are more effective than foliage sprays. Foliage sprays, however, are easier to apply and are often more economical. Soil applications with granules or sprays of certain herbicides around and under woody plants can also effectively control them by root uptake of the herbicide. This method is useful on plants resistant to foliar sprays, or in areas where foliar sprays may damage surrounding vegetation by spray drift.

Sometimes foliage sprays and basal sprays are both used. For instance: dense stands of brush are difficult to basal spray because of the large number of stems to be treated. At the same time, a foliage spray would be only partially effective. The methods to use would be a foliage spray to thin the stand, and the next year or two kill the remaining plants with a basal spray.

Mechanically cleared or burned-over brush areas, less than 2 years old, often yield sprouts resistant to brush control methods. These sprouts should be allowed to grow for 3 or 4 years before they are treated with herbicides. There are exceptions to this; some sprouts can be treated sooner. Check with local agricultural authorities if questions arise.

Use management practices that favor the establishment and maintenance of desirable vegetation. After controlling brush and trees in an area, treat the area periodically to control sprouts and seedlings. They are less costly to control as soon as they appear than after they form a thicket.

### Calibration of Sprayer

Accurate application of herbicides is extremely important to obtain the desired weed control and prevent environmental damage. A typical field-type boom sprayer may be calibrated by several methods. However, the most accurate method is to actually spray an area of known size as follows:

- Fill the spray tank with a known quantity of spray solution (water).
- Refill the tank after spraying an area of known size.
- Calculate the gallons used and determine sprayer output *in gallons per acre.*

For example: If swath width of the sprayer is 20 feet, and 2 gallons of spray is used after traveling 218 feet, then 20 × 218 = 4,360, the number of square feet sprayed (1/10 of an acre), and *sprayer output would be 20 gallons per acre* (43,560 square feet = 1 acre). Spray volume per acre will vary according to the speed of the spray vehicle, spray pressure, type of nozzles, or width of booms. Hand-carried or

aerial sprayers can be calibrated in a similar manner.

## Foliage Sprays

The best time to apply growth-regulator herbicides is soon after the leaves reach their full size in the spring. However, satisfactory results may be obtained with some herbicides if foliage is sprayed during the summer when there is active growth.

Herbicides may be applied to foliage as a drench or as a low-volume spray. A large amount of dilute herbicidal spray is needed for applying foliage spray as a drench. A small amount of herbicide spray—usually between 1 and 10 gallons per acre—is used in applying a low-volume spray.

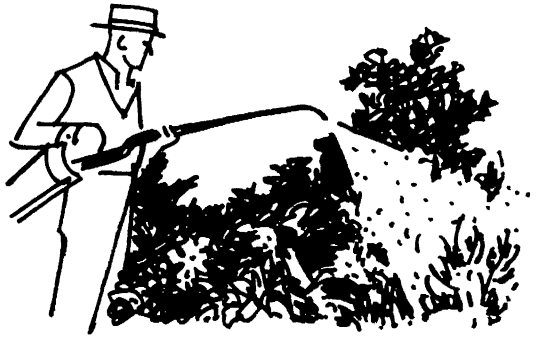
### Drench

All foliage, twigs, and terminal limbs should be wetted thoroughly. Drenching is used to kill brush along roads, rights-of-way, and fence rows.

Drenches are usually applied to foliage with power equipment. The power sprayer should be capable of maintaining pressures up to 100 pounds per square inch. This pressure is enough to force the spray through the foliage and to the tops of taller trees. Pressure higher than 100 pounds tends to form fine spray droplets that may drift and damage susceptible crops nearby.

Adjustable hand operated sprayers are suitable for applying drenches to low-growing brush. Best coverage is obtained with a fan- or cone-type nozzle that has a spray angle of about 40 degrees. The nozzle should be attached at a 45-degree angle to an extension tube generally about 24 to 36 inches long. To reach the tops of tall trees or brush too far away for a wide-angle spray, adjust the gun to deliver a narrow-angle stream. Adequate pressures for hand-operated equipment vary from 25 to 40 pounds per square inch.

Because of the large volume of spray necessary for this method, it is impractical for treating areas where water supply is limited, large areas, or areas where truck- or tractor-mounted spray tanks cannot be taken.



### Low-Volume Sprays

A small amount of herbicide spray—usually between 1 and 10 gallons per acre—is used in applying a low-volume spray. The application is quicker and easier than drench application. It can be used where drench is impractical.

Ground equipment is practical for applying low-volume sprays to low-growing brush on uncleared land, and for regrowth on land that was cleared mechanically.

Low-volume sprays applied in swaths up to 50 feet wide with either a spray boom

with several nozzles or a large, boomless nozzle have produced satisfactory coverage of plant foliage.

Spray boom or ground sprayers should be mounted to clear the tallest brush by 2 to 3 feet. Use an operating pressure of 30 to 40 pounds per square inch.

Boomless nozzles should be mounted to clear all brush by 3 or 4 feet. Use spray pressures from 30 to 60 pounds.

Aerial spraying is best for treating large areas or tall and dense stands of brush on rough terrain. Aircraft, both fixed wing (airplanes) and rotary winged (helicopters) are used for aerial spraying. Helicopters are particularly useful for spraying rough terrain and small, irregular areas. They often are used for rights-of-way spraying.

Aerial spraying can give good coverage of the area being treated because much of the spray will cover upper foliage layers. However, the spray that penetrates to the lower levels often is inadequate to kill understory plants. A second aerial spraying may be necessary a year or two after the first.

When applying spray by aircraft, instruct the pilot to fly as close to the top of the brush as safety allow. Use experienced flag men or guides on the ground to mark individual flight swaths for the pilot's guidance. Proper swath width should not exceed 1½ times the wingspan or bladespan of the aircraft.

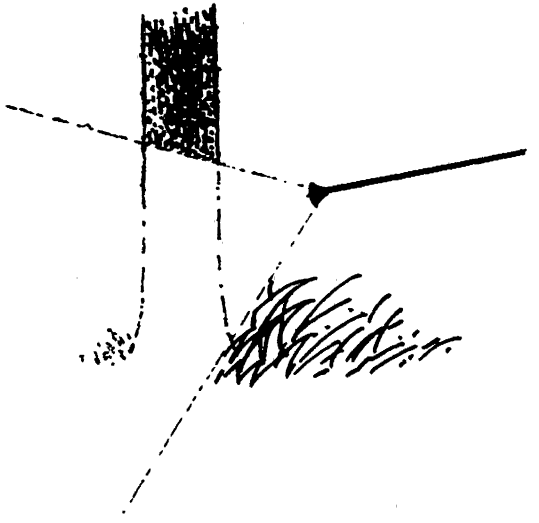
**WARNING**

**Be extremely careful when spraying herbicides from the air. Spray may drift and harm desirable plants, downwind of the area being treated. Apply spray in droplet sizes large enough to minimize drift. Do not treat when wind velocity exceeds 6 miles per hour or when strong inversion layers of air exist.**

## Basal Sprays

Basal sprays are used to treat the bark at the base of individual plants. Commonly used basal sprays are prepared by mixing esters of 2,4-D, 2,4,5-T or Silvex with diesel oil or kerosene.

Basal sprays can be used to kill brush and trees up to 5 inches in diameter, and obtain good results throughout the year. However,



if the bark or soil is wet, effectiveness is usually lost. Thorough wetting of the base of the plant with the spray is necessary.

Apply basal sprays to the lower 18 inches of the plants you want to kill. Wet the bark thoroughly all around the stem. Apply spray material until it runs down the stem of the plant and into the soil at the base.

One gallon of spray material is enough to treat about 50 trees, 2 inches in diameter or 33 trees, 3 inches in diameter.

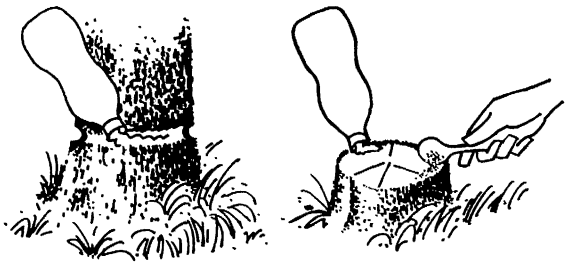
Apply the herbicide mixture with compressed air sprayers, knapsack sprayers, or power sprayers. Pressures from 10 to 100 pounds are adequate. Equipment for basal spraying should have hoses and gaskets that are oil resistant. A 15- to 20-degree fan-type nozzle is preferred.

## Injection/Cut-Surface Treatments

Trees larger than about 5 inches in diameter often have bark too thick for basal sprays to penetrate. Herbicide can be applied to the sapwood of such trees through frills or notches cut into the bark, or it can be injected mechanically into the tree.

Frills are cuts made into the sapwood. They encircle the tree and act as cups to hold the herbicide. Make the frill by ringing the trunk of the tree with over-lapping ax cuts that penetrate sapwood at least ¼ of an inch. The frill can be filled with the same type of solution as is used for basal sprays. Undiluted herbicide can also be used.

The same spray equipment can be used for frills and notches as is used for basal sprays. The solution also can be applied with a plastic squeeze bottle such as dish washing soap containers or a small can that has a pouring spout or lip. This is a good idea, particularly with ammonium sulfamate solution because it corrodes equipment badly. It is better to use a container that can be discarded after use.



Injection treatments are very effective in killing unwanted woody plants, but are expensive due to labor requirements. Also, to be effective, correct amounts of liquid herbicide must be placed in properly spaced cuts. In winter months, resistant species may need higher concentrations or closer spacings of herbicide. Follow the directions on the container label.

There are mechanical injection tools available that make a cut in tree bark and inject the herbicide in one operation. Directions for using these tools are furnished by manufacturers.

Mechanical injection equipment should be well constructed of corrosion-resistant materials. The blade should be heavy and hardened so that it can be driven into trees repeatedly without becoming dull, and so that it can be resharpened successfully.

If trees are felled, the freshly cut surface of the stump should be treated with herbicide to prevent sprouting of certain species.

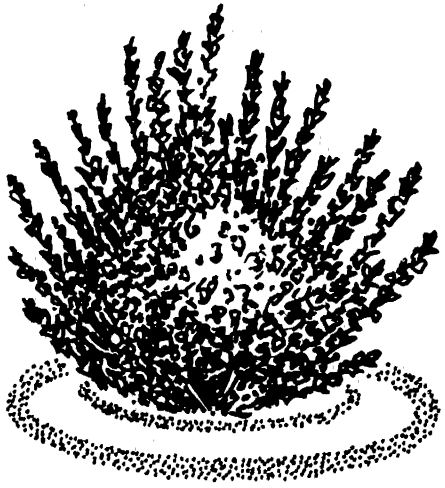
It is more efficient to prevent sprouting than to try to kill the sprouts. Use a solution such as the ester of 2,4,5-T; 2,4-D + 2,4,5-T in oil, as for basal sprays; an undiluted herbicide applied directly on the fresh cuts; a solution of 2 to 4 pounds of ammonium sulfamate per gallon of water; or amonium sulfamate crystals.

If oil solutions are used, apply spray to the cut surface and also drench the bark thoroughly from the cut to the ground.

## Soil Treatments

Certain herbicides applied to the soil around and under woody plants as dry granules or as solutions can very effectively and efficiently kill woody plants. The soil should be moistened either by rainfall or irrigation shortly after granule application for best results, and in some cases must be moist before application. There is usually a reduced kill during hot, dry seasons.

Granules may be broadcast around the base of a plant. They may also be placed in small, strategically placed piles around the base of the plant and over apparent root systems, distributed in grid patterns around the base of the plant, spread in narrow-width bands encircling the plant, or any other suitable design or placement that will maximize brush control and minimize damage to desirable grasses, plants, etc., growing under or near the plant to be killed. Refer to herbicide container label for specific application directions.



## PRECAUTIONS

Use herbicides only as recommended.

Graze animals on treated pastures and ranges in accordance with recommendations on herbicide label.

| | |
|---|---|
| 2,4-D, 2,4,5-T: | May injure desirable plants near area being treated. Wind velocity should be less than 6 miles per hour blowing away from sensitive crops. Air temperature should be less than 90°F. |
| AMS: | Will kill or suppress forage plants. Corrosive to equipment. |
| Bromacil: | May persist in soil several months. Injurious to forage plants. |
| Cacodylic Acid: | May injure desirable plants if sprayed. |
| Dicamba: | Spray drift to sensitive crops, conifers, certain woody plants and ornamentals should be prevented. |
| DSMA: | May injure desirable plants if sprayed. |
| Glyphosate: | Sprays will injure desirable forage plants. |
| Karbutilate: | May persist in soil several months. Injurious to forage plants. |
| MSMA: | May injure desirable plants if sprayed. |
| **Paraquat:** | HIGHLY TOXIC. Do not ingest, breathe in spray mist, or spill concentrate on skin. Use protective clothing. |
| Picloram: | Persists in soil. Prevent movement into irrigation water for broadleaf crop plants. Do not use if it can be leached or moved to adjacent areas by rainfall. |
| Silvex: | May injure desirable plants near area being treated. Wind velocity should be less than 6 miles per hour blowing away from sensitive crops. Air temperature should be less than 90°F. |
| 2,4-D + 2,4,5-T (1:1) | As above. |
| 2,4-D + Picloram (4:1): | As above. |
| 2,4,5-T + Picloram (1:1): | As above. |

Some crops and ornamental plants are extremely sensitive to some herbicides. They are severely injured or killed by even small traces of the herbicides, such as spray drift or vapors.

Sensitive crops and ornamental plants include, cotton, grapes, tomatoes, cucumber, tobacco, mimosa, roses, and dogwood. For

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**Before using any herbicide, always double check precautions on the herbicide container label and in this publication.**

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more information about sensitivity of your crops to any herbicide, always double check the container label and ask your county or agricultural extension agent.

For safe and effective control of woody plants—

- Get professional advice before applying herbicides—ask the county agricultural agent, State extension specialist, or other agricultural authorities for control recommendations.
- Use herbicides wisely—*follow label precautions.*
- Do not apply herbicides for any use for which they are not registered.
- Do not spray with ground equipment or from airplanes when the wind velocity is more than 6 miles per hour or wind direction is toward sensitive crops.
- Do not apply ester formulations when the temperature is above 90°F.
- Use low pressures—no more than 35 pounds per square inch for boom sprayers, 100 pounds for spray guns.
- To reduce drift hazards, use special spray adjuvants, formulations, or application equipment designed to reduce drift near sensitive areas. Get professional advice before using these.
- Use a low-volatile formulation.
- Use a coarse spray.
- Check sprayer output frequently to prevent over-application of herbicides. Adjust as necessary.
- Avoid sprayer skips or overlapping of swaths.
- Clean spray equipment immediately after use.
- Before using any spray equipment for applying insecticides or fungicides to crops, test it for injurious traces of herbicides.

Some herbicides are highly toxic. They should be applied only by experienced persons familiar with the hazards involved—and willing to take responsibility for use of the herbicide.

**Masks and protective clothing are required when using some herbicides. They are recommended when using any herbicide where there is danger of prolonged inhalation or contact with the skin.**

Some herbicides can remain active in the soil for long periods of time. They should not be used in areas where there is danger of surface runoff into water sources, crop areas, or leaching into ground water.

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**Precautions pertaining to specific herbicides are included in the "characteristics of the herbicides" section of this handbook. Always double check these precautions and precautions listed on herbicide container before using any herbicide.**

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## CHARACTERISTICS OF THE HERBICIDES

### 2,3,6–TBA
**See Benzoic Acids**

### 2,4–D
See Phenoxy Compounds

### 2,4–DB
See Phenoxy Compounds

### 2,4–DP
See *dichlorprop*

### 2,4,5–T
See Phenoxy Compounds

### 2,4,5–TP
See *silvex*

### Amitrole

Amitrole is more effective for poison ivy and for poison oak than it is for many other plants. If sprays directed at poison ivy accidentally get on desirable plants, the plants are less likely to be severely injured by amitrole than by 2,4-D, 2,4,5-T, or silvex.

Amitrole is available as a powder that contains 50 percent active ingredient. It is also available as a liquid formulation. Another formulation is Amitrole-T, which contains 2 pounds per gallon ammonium thicyanate in addition to 2 pounds per gallon of 3-amino-*s*-triazole. Amitrole is effective through the roots and aerial parts of plants.

PRECAUTION: Amitrole cannot be used where there is any possibility of residues on food or feed crops. It must be used strictly in accordance with instructions on the Federal approved label. SEE PRECAUTIONS SECTION.

### Ammonium Sulfamate (AMS)

Ammonium Sulfamate (AMS) is a nonselective herbicide. It is used extensively to kill all plants growing on rights-of-way. AMS may be used to kill trees. It can be used as a foliage spray or in cuts through the bark. When applied to stumps it prevents sprouting.

AMS is not poisonous to animals when used as recommended on the label. It is safe to use near crops because it does not vaporize and because large amounts are needed to injure plants.

PRECAUTION: However, AMS is not a desirable chemical to use on grazing lands because it kills or suppresses forage plants as readily as it kills woody plants. If used, be careful to treat only the undesirable plants. It is corrosive. Spray equipment should be cleaned immediately and coated with diesel oil or similar light oils after use. SEE PRECAUTIONS SECTION.

#### Benzoic Acids

The Benzoic Acids include:
2,3,6-TBA, and
Dicamba.

2,3,6-TBA is primarily a nonselective chemical to control certain woody plants and vines.

High rates are required to control woody plants. Foliage and root absorption contribute to killing plants. This herbicide may be applied in water when sprayed. It is noncorrosive.

PRECAUTION: Spray drift will injure susceptible crops and ornamentals. High rates may result in a relatively long residual in the soil. The compound has a low order of toxicity and is moderately persistent in soil. SEE PRECAUTIONS SECTION.

Dicamba is a selective translocated herbicide. It can be used to control many broadleaf weed and brush species.

It is similar to the phenoxy herbicides in use except that it is absorbed through roots as well as foliage. Dicamba may be applied by either ground or aerial sprays or as granules, depending upon the plants to be treated and their proximity to susceptible crops. Dicamba may be applied in mixtures with 2,4-D or 2,4,5-T to enhance its effectiveness. It is available in an oil-soluble acid formulation in addition to the water-soluble amines. It does not accumulate in the environment.

PRECAUTION: Spray drift to sensitive crops, conifers, certain woody plants, and ornamentals should be prevented. Granules may be preferred where drift from spray would be hazardous to crops. Dicamba has a low order of toxicity to wildlife, fish, livestock, and humans. Follow safety precautions of other herbicides with which dicamba might be mixed. Dicamba has a low order of corrosion to spray equipment. SEE PRECAUTIONS SECTION.

## Bromacil

See Substituted Ureas, Uracils, and Carbamates.

## Cacodylic Acid

See Organic Arsenicals.

## Dicamba

See Benzoic Acids.

## Dichlorprop

See Phenoxy Compounds.

## DSMA

See Organic Arsenicals.

## Fenuron

See Substituted Ureas, Uracils, and Carbamates.

## Fenuron-TCA

See Substituted Ureas, Uracils, and Carbamates.

## Glyphosate

Glyphosate is a recently developed compound under study for weed and brush control. It is nonselective, and found effective against grasses and broadleaf weeds.

Glyphosate will translocate from foliage and stems to roots resulting in a high degree of kill on many species. It is essentially inactivated by contact with the soil. It will not leave residue in the soil to injure plants. Glyphosate is sprayed in water solution. It is also showing promise as an injection/cut-surface treatment herbicide. It is not corrosive to equipment.

PRECAUTION: Broadcast sprays over woody species will injure desirable forage plants. Applications should be limited to noncrop areas or areas to be renovated. Glyphosate has a very low order of mammalian toxicity. SEE PRECAUTIONS SECTION.

## Karbutilate

See Substituted Ureas, Uracils, and Carbamates.

## MCPA

See Phenoxy Compounds.

## Monuron

See Substituted Ureas, Uracils, and Carbamates.

## Monuron-TCA

See Substituted Ureas, Uracils, and Carbamates.

## MSMA

See Organic Arsenicals.

## Organic Arsenicals

The Organic Arsenicals include:

DSMA,
MSMA, and
Cacodylic Acid.

They are nonselective herbicides that can be used for quick dieback of herbaceous and woody species.

The organic arsenicals are applied in water sprays. Complete coverage by spray is required for best results. Nevertheless, woody plants tend to recover from foliage sprays. The organic arsenicals are useful as injection treatments for killing unwanted trees. They are inactivated by soil contact.

PRECAUTION: These materials may injure desirable plants if sprayed. By directed spraying, desirable plants can be avoided. Organic arsenicals have a moderate to low mammalian toxicity. They are mildly corrosive to spray equipment. SEE PRECAUTIONS SECTION.

## Paraquat

Paraquat is a desiccant (drying agent) and defoliant herbicide used for general contact activity against weeds and brush. In some situations paraquat may be used as a selective herbicide, in other situations it

cannot. Study container label instructions carefully before using this compound.

Woody species will usually resprout from foliar sprays of paraquat. Paraquat may be more effective against undesirable trees as an injection/cut-surface treatment herbicide. Paraquat is water soluble. It is inactivated by soil contact.

PRECAUTION: *PARAQUAT IS HIGHLY TOXIC WHEN INGESTED.* Care must be taken to avoid breathing the spray mist or getting the concentrate on the skin. Use protective clothing when preparing formulations and when making applications. Get immediate medical care in the event of accidental spills. SEE PRECAUTIONS SECTION.

## Phenoxy Compounds

Phenoxy Compounds include:

2,4-D,
2,4-DB,
2,4,5-T,
Dichlorprop,
MCPA, and
Silvex.

They are selective herbicides. Small doses of these herbicides can be effective on many kinds of broadleaf plants.

The Phenoxy Compounds are absorbed readily by the leaves of most plants. The oil soluble formulations applied in kerosene or diesel oil will penetrate the bark of most woody plants. These herbicides should be sprayed on above-ground parts and foliage of plants. They are not effective as soil applied herbicides.

These compounds are inexpensive and easy to use. At the rates used for brush control they are not poisonous to humans, domestic animals, or game. They do not accumulate in the soil and have no unfavorable effects on soil organisms. They do not corrode equipment.

The Phenoxy Compounds are usually marketed as salts and esters that differ somewhat in their ability to kill plants. Types of phenoxy herbicides commonly available are:

SALTS, such as:
- Amine (derived from ammonia) (triethanolamine, diethanolamine, trimethylamine, diethylamine, and isopropanolamine)
- Ammonium
- Potassium
- Sodium

ESTERS
- *High-Volatile, such as:*
  - Amyl
  - Butyl
  - Ethyl
  - Isopropyl
- *Low-Volatile, such as:*
  - Butoxyethanol
  - Butoxyethoxypropanol
  - Isooctyl
  - Propylene glycol butyl ether

Salt and ester formulations usually are supplied as liquid concentrates, and the buyer dilutes them before use.

The salt concentrates form liquid solutions when mixed with water. When mixed with water, the ester solutions form a milky-white emulsion. The esters are soluble

in oil, whereas the salt formulations are not. However, special oil-soluble amine salt formulations of the phenoxy herbicides are commercially available.

To provide a uniform basis for describing the concentration of the active ingredient, the "acid equivalent" is indicated on the label as pounds-per-gallon. For example, if an ester concentrate has an acid equivalent of 2 pounds per gallon, then 1 gallon of the concentrate contains 2 pounds by weight of the parent herbicidal acid, regardless of formulation. Usually the strongest concentrates are the most economical to use; they usually cost less per pound of acid equivalent than weaker concentrates.

*The esters are usually best as foliage sprays for killing brush and trees.* Low-volatile esters are preferable over high-volatile esters to minimize evaporation and vapor drift during and after application. Also, ester formulations in oils remain in moist contact on foliage longer and may penetrate better than salts mixed with water. Since they are oily, esters are less likely than salts to be washed off foliage if rain falls soon after application. Amine formulations, however, are usually more effective than esters for injection/cut-surface treatments.

Silvex and 2,4,5-T cost more than 2,4-D. Therefore, it is frequently more economical to use 2,4-D, when appropriate. See Susceptibility Table, page 30, for specific information.

PRECAUTIION: Wind-carried spray droplets or vapors of 2,4-D, 2,4,5-T, or silvex may injure desirable plants growing near the areas being treated. SEE PRECAUTIONS SECTION.

## Picloram

Picloram is a selective, translocated herbicide that effectively controls many weed and brush species on grasslands. It is effective in soil or foliage application, and can also be applied by injection/cut-surface treatments.

Picloram can be applied in liquid sprays and as granules to brush species in spring or fall months, depending upon the species to be controlled. It is both foliar and root absorbed. Most perennial grasses are resistant. It can be sprayed in mixtures with 2,4-D or 2,4,5-T to reduce picloram rates and sometimes broaden the spectrum of species controlled. Its high activity against many woody plants at moderate rates makes picloram a desirable brush killer.

PRECAUTION: Care must be taken to prevent drift of picloram to desirable plants and water sources. Picloram is relatively persistent in soil and is water soluble. Care should be taken to prevent its movement into water sources used in irrigating broadleaf crop plants. It should not be applied **where it can be leached or moved in significant amounts to adjacent areas by rainfall.** Picloram has a low mammalian toxicity. It is only slightly corrosive. **When used with other compounds, follow safety precautions indicated for them.** SEE PRECAUTIONS SECTION.

## Silvex

See Phenoxy Compounds

## Substituted Ureas, Uracils, and Carbamates

These compounds include:

Bromacil,
Fenuron,
Fenuron-TCA,
Karbutilate,
Monuron, and
Monuron-TCA.

They are nonselective and are usually formulated as wettable powders and granules for liquid sprays and pellet application. These herbicides are used primarily for weed and brush control on industrial sites, rights-of-way, and noncrop farm areas.

Bromacil will control a wide variety of woody species.

Fenuron is no longer produced commercially. But, Fenuron-TCA (trichloroacetic acid) combination is commercially available.

Karbutilate is a relatively new herbicide found effective on a large number of plant species.

Monuron and Monuron-TCA combination are both commercially available, but have limited use since high rates are usually required for effectiveness.

These materials are absorbed primarily through the roots. They may be applied in spring or fall when weeds and brush are actively growing. They may kill trees a great distance from the point of application, depending upon the size of the root system and whether it extends into the treated zone. The compounds are nonvolatile. They do not corrode equipment.

PRECAUTION: These herbicides are injurious to forage plants of pastures and rangeland. New methods of application are being investigated to reduce damage to forage species. They may persist in the soil for several months, but are very low in acute oral toxicity to warm blooded animals. SEE PRECAUTIONS SECTION.

# SELECTION AND PREPARATION OF HERBICIDES FOR TREATMENTS

## General

Herbicide preparations can be made with selective or nonselective herbicides. Table 1 shows the amount of herbicide concentrate that should be applied for various applications. See table 4 for susceptibility of specific species to specific herbicides and treatments. Follow directions on the herbicide

label. If questions arise, contact the nearest agricultural authority.

## Basal Sprays

Basal sprays are prepared by mixing esters of 2,4-D, 2,4,5-T, silvex, or similar herbicides with oil; either kerosene or diesel fuel. For most species, 2,4,5-T is best. However, 2,4-D alone or mixed with 2,4,5-T is better on some kinds of brush. Mix basal sprays in the proportions in table 1.

## Foliage Sprays

Drench (high-volume) or Low-Volume-Spray preparations can be made with selective or nonselective herbicides. Always double check label instructions.

### Drench

To prepare a drench containing 2,4-D, mix spray concentrate with water in the proportions shown in table 1.

To prepare a drench containing:

Amitrole, mix 1½ pounds of 50 percent amitrole powder with each 25 gallons of water.

Ammonium sulfamate (AMS), mix 0.6 to 1 pound of the chemical with each gallon of water.

Other wettable powders such as bromacil, or karbutilate, prepare similar to amitrole.

If increased wetting and penetration of the spray is desired, add 4 ounces of surfactant (surface active agent) to each 100 gallons of solution.

**Table 1.—Guide for preparing sprays**

| Acid equivalent of concentrate *in pounds per gallon* is: | Amount (fluid measure) of concentrate to use for: | | |
|---|---|---|---|
| | *Basal Spray:* Mix with 1 gallon of kerosene or diesel fuel: | *2,4,-D Drench:* Add to each 10 gallons of water: | *Low-Volume Spray:* To use for 2 pounds per acre application: |
| 2.0 | 10 ounces | 1 pint | 1 gallon |
| 2.6 | 8 ounces | 12 ounces | 3 quarts |
| 3.3 | 6 ounces | 10 ounces | 5 pints |
| 4.0 | 5 ounces | 8 ounces | 2 quarts |

### Low-Volume-Sprays

Low-volume-spray preparations are made with 2,4-D, 2,4,5-T, dicamba, picloram, silvex, or certain mixtures of these herbicides. Table 1 shows the amount of various herbicide concentrates that should be used for a 2-pounds per acre application.

To prepare the spray, mix the concentration with the carrier (water, oil, oil-in-water, water-in-oil) in the proper proportions. Since rate of treatment is 2 pounds per acre, the per acre discharge rate of the sprayer must be known. For example: if the sprayer discharges at the rate of 10 gallons per acre, and if the acid equivalent of the concentrate is 2 pounds per gallon, then mix 1 gallon of concentrate with enough carrier to make 10 gallons of spray. See the Calibration of Sprayer section on page 4.

#### *Oil-in-Water Emulsions*

When preparing oil-in-water emulsions for low-volume spraying:

- Use an ester formulation whose label specifies compatibility with oil-in-water emulsion carriers.
- Add about ½ of the required volume of water to a clean, dry spray tank.
- In a separate tank, mix the required volumes of herbicide and oil with agitation.
- Add the herbicide-oil mixture while agitating the water.
- With continued agitation, add the remaining water.
- During use, agitate the emulsion frequently to prevent separation of the oil and water.

#### *Water-in-Oil Emulsions*

Water-in-oil emulsions—invert emulsions—are usually viscous and thick with the consistency of mayonnaise. They were developed to reduce drift in spraying weeds because of the larger spray droplets produced. Invert emulsion sprays require special handling, equipment, and experienced personnel to be successful.

## Injection/Cut-Surface Treatments

Preparations for injection/cut-surface treatments can be made from amines and esters of 2,4-D, 2,4,5-T, silvex, or other herbicides. Treatments can be made with concentrated formulations of the herbicides. For best results follow the directions on the herbicide label. See table 4 for specific herbicides and species controlled by injection/cut-surface treatments.

Ammonium sulfamate, in solution or as crystals, can be used for cut-surface treatments. The solution is prepared by mixing 2 to 4 pounds of AMS into 1 gallon of water.

Research has shown that the amine salts of the phenoxy herbicides are more readily translocated from injection/cut-surface treatments than are the esters. The amines can be applied undiluted or diluted in water. The esters can be diluted in oil. They can be mixed with kerosene or diesel fuel in the same proportions as for basal or cut-stump sprays. See table 1, page 17.

## Soil Treatments

Some herbicides are formulated as granules or small pellets, or as wettable powders, for application to the soil. Granules

and small pellets may be spread by hand, tractor-drawn, or aerial equipment. Wettable powders are usually mixed with water and sprayed on soil beneath woody plants.

Uniform coverage of the soil is essential for best results from soil treatments. If individual plant treatment is made, the amount of chemical needed will depend on the size and kind of plant to be killed. Consult the herbicide label and latest suggestions from the nearest extension specialists or research personnel of the State Agricultural Experiment Stations. Do not apply within 50 to 100 feet of desirable vegetation. The herbicide concentration is indicated on the label as a percent of the active agent in the formulation.

The granule or powder formulations of different herbicides vary in percent of active ingredient, from 2, 4, 10, 50 or more percent. Therefore, the required amount of formulation to use per acre must be determined. For instance, if a 2-pound per acre of herbicide application is desired with a formulation containing a 10-percent herbicide concentration, the required amount of formulation to use per acre would be 20 pounds.

Table 2 indicates various required amounts of formulation to use per pound of application rate desired at different percents of herbicide concentration. Read the row across from the herbicide concentration percentage to the column under the pounds of herbicide desired to be applied per acre to find the required—or necessary—pounds of formulation to apply per acre. For instance, a 2-pound per acre application rate is desired with a formulation containing a herbicide concentration of 10 percent: the required amount of formulation to use per acre would be 20 pounds.

For application rates over 3 pounds, simply add the additional required amount of formulation *per half pound increase in application rate* indicated in the last column in table 2 to the figure in the 3-pound column.

Example:

For a 5-pound per acre application rate desired of a 10-percent herbicide concentration formulation:

50 pounds of formulation would be required.

1) *Note in 3 Pounds Column of the 10 percent concentration row:* 30 pounds forquired.
2) The last column of table 2 indicates that each additional ½ pound of herbicides requires 5 more pounds of formulation.
3) An additional 2 pounds equals 4 halves.
4) 4 x 5 pounds equals 20 additional pounds required.
5) 30 pounds plus 20 pounds totals 50 pounds of formulation required to be used per acre at the desired application rate.

A method to calculate other unlisted required amounts is included in table 2.

Often it is necessary to prepare only small quantities of formulations for use. Table 3 may be useful in preparing such small quantities. It also includes Metric System equivalents of the same and other common U.S. measures that are more and more frequently found on container labels.

**Table 2.—Formulation requirements and application rates**

| NOTE: 0.1 pound (1/10 of a pound) is slightly over 1½ ounces. | (H) Herbicide concentration percentage | (P) Pounds of herbicide desired to be applied per acre | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | For each additional ½ pound of herbicide desired to be applied per acre, *ADD an additional*: |
| | 2 | 50 | 75 | 100 | 125 | 150 | 25 pounds of formulation. |
| | 4 | 25 | 37.5 | 50 | 62.5 | 75 | 12 pounds, 8 ounces of formulation. |
| | 5 | 20 | 30 | 40 | 50 | 60 | 10 pounds of formulation. |
| | 10 | 10 | 15 | 20 | 25 | 30 | 5 " " " |
| | 15 | 6.7 | 10 | 13.3 | 16.7 | 20 | 3 pounds, 5 ounces of formulation. |
| | 20 | 5 | 7.5 | 10 | 12.5 | 15 | 2 pounds, 8 ounces of formulation. |
| | 25 | 4 | 6 | 8 | 10 | 12 | 2 pounds of formulation. |
| | 30 | 3.3 | 5 | 6.7 | 8.3 | 10 | 1 pound, 10½ ounces of formulation. |
| | 35 | 2.9 | 4.3 | 5.7 | 7.1 | 8.6 | 1 " 6½ " " " |
| | 40 | 2.5 | 3.75 | 5 | 6.25 | 7.5 | 1 " 4 " " " |
| | 45 | 2.2 | 3.3 | 4.4 | 5.6 | 6.7 | 1 " 1½ " " " |
| | 50 | 2 | 3 | 4 | 5 | 6 | 1 pound of formulation. |
| | 55 | 1.8 | 2.7 | 3.6 | 4.5 | 5.4 | 14½ ounces of formulation. |
| | 60 | 1.7 | 2.5 | 3.3 | 4.2 | 5 | 13 ounces of formulation. |
| | 65 | 1.5 | 2.3 | 3.1 | 3.9 | 4.7 | 13 " " " |
| | 70 | 1.4 | 2.1 | 2.8 | 3.6 | 4.3 | 11 " " " |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 75 | 1.3 | 2 | 2.7 | 3.3 | 4 | 11 | " | " | " |
| 80 | 1.3 | 1.9 | 2.5 | 3.1 | 3.7 | 9½ | " | " | " |
| 85 | 1.2 | 1.8 | 2.4 | 3 | 3.6 | 9½ | " | " | " |
| 90 | 1.1 | 1.7 | 2.2 | 2.8 | 3.3 | 8½ | " | " | " |
| 95 | 1.1 | 1.6 | 2.1 | 2.6 | 3.2 | 8 | " | " | " |

(R) Required pounds of formulation to use per acre

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Use the following calculation to determine unlisted required amounts of formulation to use per acre:

$$R = 100 \times P \div H.$$

This means merely to multiply the pounds of herbicide desired to be applied per acre (P) by 100.

Then, simply assume the herbicide concentration percentage (H) to be a whole number (i.e., 10% = 10, 25% = 25, etc.).

Finally, divide to find the required pounds of formulation to be applied per acre to obtain the desired herbicide application rate.

For example:

Pounds desired to be applied is 2, and Herbicide Concentration is 10 percent.

Therefore, P = 2, and
H = 10. (10% = 10)

Now, if $R = 100 \times P \div H$, then
$R = 100 \times 2 \div 10$, or
$R = 200 \div 10$. Since $200 \div 10 = 20$, then
$R = 20$.

Or, the required amount of formulation to apply per acre is 20 pounds. Always double check the figures before applying any formulation, AS WELL AS REVIEW THE CALIBRATION OF EQUIPMENT SECTION ON PAGE 4.

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Often it is necessary to prepare only small quantities of formulations for use. The following table may be useful in preparing such small quantities. It also includes Metric System equivalents of the same and other common U.S. measures that are more and more frequently found on container labels.

## Table 3.—Common measures and their approximate metric equivalents

3 liquid teaspoons = 1 liquid tablespoon
2 liquid teaspoons = 1 liquid ounce
8 liquid ounces = 1 liquid cup
2 liquid cups = 1 liquid pint
2 liquid pints = 1 liquid quart
3 teaspoons, dry = 1 tablespoon, dry
2 tablespoons, dry = 1 ounce, dry
16 tablespoons, dry = 8 ounces, dry = 1 cup, dry
2 cups, dry = 1 pint, dry

| Common measure | Metric equivalent |
|---|---|
| Teaspoon, liq. | 5.0 milliliters (ml) |
| Tablespoon, liq. | 15 ml |
| Ounce, liq. | 30 ml |
| Cup, liq. | .24 liter (l) |
| Pint, liq. | 0.47 l |
| Quart, liq | 0.9463 l |
| Gallon, liq., U.S. | 3.7854 l |
| Teaspoon, dry (level full) | 4.66 grams (g or gm) |
| Tablespoon, dry (level full) | 14 gm |
| Ounce, dry | 28 gm |
| Cup, dry | 224 gm |
| Pint, dry | 448 gm |
| Quart, dry | 1.101 l |
| Peck, U.S. | 8.10 l |
| Bushel, U.S. | 35.24 l |
| Grain | 0.0648 gm (or 65 milligrams (mg)) |
| 437.5 grains = 1 ounce, avoirdupois | |
| Ounce, avoirdupois | 28.35 gm |
| Pound, avoirdupois | 0.4536 kilogram (kg or kilo) |
| Inch | 2.54 centimeters (cm) |
| Foot | 0.3048 meter (m) |
| Yard | 0.9144 m |
| Mile | 1.6093 kilometers (km) |
| Square inch | 6.452 square centimeters (sq cm or $cm^2$) |
| Square foot | 0.0929 square meter (sq m or $m^2$) |
| Square yard | 0.836 $m^2$ |
| Acre | 0.4047 hectare (ha) |
| Square mile | 259 ha |
| Cubic inch | 16.39 cubic centimeters (cu cm, $cm^3$, or cc) |
| Cubic foot | 0.0283 cubic meter ($m^3$) |
| Cubic yard | 0.7646 $m^3$ |
| Cord | 3.625 steres (s) |
| Ton, long | 1.0160 metric tons (MT or t) |
| Ton, short | 0.9072 MT |

480 grains = one (1) troy ounce

| | |
|---|---|
| Ounce, troy | 31.103 gm |
| Pound, troy | 0.3732 kilo |

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The Metric System is a decimal (numbered or progressing by tens) system of weights and measures. Basic and derived quantities are in terms of three basic units: *grams, liters, and meters.*

## MASS AND WEIGHTS

One (1) grain = 0.648 gram.

*BASIC UNIT:* grams (g or gm) for mass and weights

| | | |
|---|---|---|
| 10 milligrams | = | 1 centigram |
| 10 centigrams | = | 1 decigram |
| 10 decigrams | = | 1 gram |
| 1,000 grams | = | 1 kilogram |
| 1,000 kilogram | = | 1 metric ton |

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| Unit and abbreviation | Number of grams | Approximate U.S. equivalent |
|---|---|---|
| milligram (mg) | 0.001 | 0.015 grain |
| centigram (cg) | 0.01 | 0.154 grain |
| decigram (dg) | 0.10 | 1.543 grains |
| gram (g or gm) | *BASIC UNIT* | 0.035 ounce |
| kilogram (k or kilo) | 1,000 | 2.2046 pounds |
| metric ton (MT or t) | 1,000,000 | 1.1 tons |

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**Table 3.—Continued**

CAPACITIES

One (1) liter = 1,000 cubic centimeters.

*BASIC UNIT:* liters (1) for capacities

10 milliliters = 1 centiliter
10 centiliters = 1 deciliter
10 deciliters = 1 liter
1,000 liters = 1 kiloliter

| Unit and abbreviation | Number of liters | Approximate U.S. equivalent | | |
|---|---|---|---|---|
| | | Cubic | Dry | Liquid |
| milliliter (ml) | 0.001 | 0.06 cubic inch | | 0.27 liquid drams |
| centiliter (cl) | 0.01 | 0.6 cubic inch | | 0.338 liquid ounce |
| deciliter (dl) | 0.10 | 6.1 cubic inches | 0.18 pint | 0.21 pint |
| liter (l) | *BASIC UNIT* | 61.02 cubic inches | 0.908 qt. | 1.057 quarts |
| decaliter (dkl) | 10 | 0.35 cubic foot | 1.14 pecks | 2.64 gallons |
| hectoliter (hl) | 100 | 3.53 cubic feet | 2.84 bushels | |
| kiloliter (kl or stere(s)) | 1000 | 1.31 cubic yards | | |

LENGTH

One meter = 1,000 millimeters

*BASIC UNIT:* meters (m) for lengths, areas, and volumes

10 millimeters = 1 centimeter
10 centimeters = 1 decimeter
10 decimeters = 1 meter
1,000 meters = 1 kilometer

| Unit and abbreviation | Number of meters | Approximate U.S. equivalent |
|---|---|---|
| millimeter (mm) | 0.001 | 0.04 inch |
| centimeter (cm) | 0.01 | 0.39 inch |
| decimeter (dm) | 0.1 | 3.94 inches |
| meter (m) | *BASIC UNIT* | 39.37 inches |
| kilometer | 1,000 | 0.62 mile |

## AREA

One (1) square meter = 1,000,000 square millimeters

| | | |
|---|---|---|
| 100 square millimeters | = | 1 square centimeter |
| 100 square centimeters | = | 1 square decimeter |
| 100 square decimeters | = | 1 square meter |
| 100 centaires | = | 1 are |
| 100 ares | = | 1 hectare |
| 100 hectares | = | 1 square kilometer |

| Unit and abbreviation | Number of square meters | Approximate U.S. equivalent |
|---|---|---|
| square millimeter (sq mm or $mm^2$) | 0.000,001 | 0.00155 square inch |
| square centimeter (sq cm or $cm^2$) | 0.0001 | 0.155 square inch |
| square decimeter (sq dm or $dm^2$) | 0.01 | 15.499 square inches |
| square meter (sq m or $m^2$) | *BASIC UNIT* | 1,549.9 square inches or 1.196 square yards |
| are (a) | 100 | 119.60 square yards |
| hectare (ha) | 10,000 | 2.47 acres |
| square kilometer (sq km or $km^2$) | 1,000,000 | 247.1 acres or 0.386 square mile |

## VOLUME

One (1) cubic meter = 1,000,000,000 cubic millimeters
One (1) cubic meter = 1,000,000 cubic centimeters

| | | |
|---|---|---|
| 1,000 cubic millimeters | = | 1 cubic centimeter |
| 1,000 cubic centimeters | = | 1 cubic decimeter |
| 1 cubic decimeter | = | 1 decistere |
| 10 decisteres | = | 1 stere |
| 1 stere | = | 1 cubic meter |
| 10 stere | = | 1 decastere |

| Unit and abbreviation | Number of cubic meters | Approximate U.S. equivalent |
|---|---|---|
| cubic millimeter (cu mm or $mm^3$) | 0.000,000,001 | |
| cubic centimeter (cu cm, $cm^3$, or cc) | 0.000,001 | 0.0610 cubic inch |
| cubic decimeter (cu dm or $dm^3$) | 0.001 | 61.023 cubic inches or 0.0353 cubic feet |
| decistere (ds) | 0.10 | 3.53 cubic feet |
| cubic meter (cu m or $m^3$) | *BASIC UNIT* | 1.31 cubic yards |
| decastere (dks) | 10 | 13.10 cubic yards |

## CLEANING SPRAY EQUIPMENT

Clean spray equipment immediately after use for applying herbicides.

If the sprayer used for herbicides is also to be used to apply insecticides or fungicides, special cleaning and care is required. Use a suspension of activated carbon in at least ⅓ of a tank of water. For each 10 gallons of water, add ¼ pound of activated carbon and ⅛ to ¼ pound of laundry detergent. Agitate this mixture vigorously to distribute it through the water.

Wash the equipment for at least 2 minutes by swirling the liquid around in the tank so that it reaches all parts of the tank. Pump the liquid through the hose and nozzles. Drain the tank and rinse the equipment with clean water.

Spray equipment also can be cleaned with household ammonia. First, rinse the sprayer thoroughly with clean water. If an ester formulation has been used, rinse with a small quantity of kerosene or diesel oil. Follow this by a rinse with clean water to which has been added about 1 teaspoon of laundry detergent per gallon of water.

After rinsing the sprayer, fill it with a solution of 1 part household ammonia to 99 parts water (1 quart ammonia to 25 gallons of water). Leave the solution in the tank, booms, and hoses for 12 to 14 hours. Then, empty the ammonia solution and rinse the equipment with clean water. Other commercial preparations are also available for cleaning spray equipment. Information on their availability and use is available from local agricultural authorities. SEE PRECAUTIONS SECTION.

**WARNING**

Even after thorough cleaning, spray equipment may contain traces of herbicide that can kill highly susceptible crops. To determine whether crops can be sprayed safely with equipment that has been used for herbicides, test the equipment for herbicide traces. Fill the tank with water and spray a few crop plants. Sensitive plants such as tomato, cotton, and tobacco are good test plants.

Wait several days after spraying, and if the plants show no distorted growth, the equipment can be used safely for spraying the crop. If the plants are distorted, clean the spray equipment again and retest before using on crops. FOR ADDED SAFETY, DO NOT USE SPRAY EQUIPMENT FOR ANY OTHER MATERIALS AFTER USING IT FOR HERBICIDES.

## SUMMARY OF CONTROL METHODS

A summary of methods that can be used for brush control is as follows:

- Basal Spraying.—Usually the most effective way to kill brush and small trees. Can be applied at any time of the year. Safe because spray is confined to individual plants, but more laborious than foliage spraying.
- Foliage Spraying.—For best results, spray should be applied as soon as leaves are fully grown and when plants are actively growing. *Drench* applications are used for control of brush along rights-of-way and fence rows. *Low-volume* applications are used to kill broadleaf plants on pastures and rangeland, and, with special precautions, on some rights-of-ways. Spray drift and fumes from foliage sprays may injure crops in adjoining areas. SEE PRECAUTIONS SECTION.
- Injection/Cut-Surface Treatments.—Most effective method of killing large trees. Can be used any time of the year. Used to prevent sprouting from stumps of felled trees. Herbicide should be applied to freshly cut surface.
- Soil Treatments.—Consists of application to the soil of granules or sprays of herbicides effective through root absorption. May be harmful to desirable plants through drift or root uptake. SEE PRECAUTIONS SECTION.

## SUSCEPTIBILITY OF PLANTS TO HERBICIDE TREATMENTS

Brush and tree species vary in their reaction to herbicides and the method of herbicide application.

For instance, most kinds of brush and trees are more susceptible to 2,4,5-T than to 2,4-D, though a few kinds are more susceptible to 2,4-D. For treating a mixture of these species, 2,4,5-T and 2,4-D can be mixed together. Silvex is about equal to 2,4,5-T on some woody plants. It is the most effective herbicide on some species of oak, but is less effective on others.

The control ratings of the herbicides in the susceptibility table, Table 4, are as follows:

**Susceptible (S)**

Brush and tree species are considered SUSCEPTIBLE (S) to a herbicide if one application of the herbicide kills more than 70 percent of a stand.

**Susceptible to Intermediate (S-I)**

The species is considered SUSCEPTIBLE TO INTERMEDIATE (S-I) in its response to a herbicide if two applications of the herbicide are needed to kill at least 70 percent of a stand.

**Intermediate (I)**

Species considered INTERMEDIATE (I) in their response to a herbicide generally are top-killed by one or two treatments, but several more treatments are usually required to kill plants.

**Intermediate to Resistant (I-R)**

The species is INTERMEDIATE TO RESISTANT (I-R) in its response to a herbicide if the tops and sprouts of a species can be killed, but the roots continue to sprout—even after repeated application of the herbicide.

**Resistant (R)**

Species virtually unaffected by a herbicide.

## ADDITIONAL REFERENCES

Farmers' Bulletin No. 2183, *Using Phenoxy Herbicides Effectively,* U.S. Department of Agriculture.

Farmers' Bulletin No. 2223, *Power Sprayers and Dusters,* U.S. Department of Agriculture.

Local Extension Agent or Specialist, State Agricultural Experiment Stations, or the U.S. Department of Agriculture.

Write directly to any of the contributors to this bulletin listed on page 98. Bulletins may also be obtained by writing Office of Communication, U.S. Department of Agriculture, Washington, D.C. 20250.

## SUSCEPTIBILITY TABLE—TABLE 4

The Susceptibility Table, table 4, lists the reactions of a number of common brush species to herbicides and methods of applications. The table can be used to determine which combination of material and method of application is best suited for each woody species. The phenoxy herbicides are usually the ester formulations in the table, unless otherwise indicated.

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If any reader has self-developed, or has knowledge of, a "home recipe" type of herbicide formulation, herbicide combinations, or application method that has proven useful, the reader is invited to submit pertinent information on it to any contributor listed on page 98, or the U.S. Department of Agriculture, Agricultural Research Service, Washington, D.C. 20250 or the Texas Agricultural Experiment Station, College Station, Tex 77843 for evaluation and possible publication for general public use.

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**Table 4.—Susceptiblity of common woody**

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | Dicamba | |
| | | | | Yes | | | Yes | | | No | | | No | | | No | | Yes | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | No | |
| | | | | No | | | No | | | No | | | Yes | | | No | | Yes | |
| SPECIES | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Acacia (*Acacia* spp.) | | | | | | | | | | | | | | | | | | | | |
| blackbrush (*A. rigidula*) | | | | | R | | S | R | | | | | | | | | R | | | |
| catclaw (*A. greggii*) | | | | | R | | S | R | | | | S | S | S | | | I-R | | R | |
| guajillo (*A. berlandieri*) | | | | | | | | S | | | | | | | | | | | | |
| huisache (*A. farnesiana*) | | | | R | R | | S | R | | R | R | S | S | S | | | I | | | |
| twisted (*A. tortuosa*) | | | | | R | | S | R | | | | | | | | | R | | | |
| Agarito (*Berberis trifoliolata*) | | | | | R | | S | R | | | | | | | | I-S | R | | R | |
| Alder (*Alnus* spp.) | | | | | | | | | | | | | | | | | | | | |
| common (*A. serrulata*) | | | | S-I | S-I | | S | S-I | | I | S-I | S | S | S | | S | S | | | |
| red (*A. rubra*) | | | | S-I | S-I | S | S-I | S-I | S | S-I | S-I | S | | R | S | S | S | S | S | |
| Sitka (*A. sinuata*) | | | | | | | | S | | | | | | | | | | | | |

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

**plants to herbicide treatments***

| Dichlorprop | | | DSMA | | | Fenuron | | | Glyphosate | | | Karbutilate | | | MSMA | | | Picloram | | | Silvex | | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | SPRAY IN: MAY RESPROUT | SPRAY AT FULL FOLIAGE | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | No | | | No | | | No | | | No | | | No | | | Yes | | | Yes | | | Yes | Yes | Yes | Yes | | | |
| No | | | Yes | | | Yes | | | Yes | | | Yes | | | Yes | | | No | | | No | | | No | No | No | No | | | |
| No | | | No | | | Yes | | | No | | | Yes | | | Yes | | | No | | | No | | | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | Spring | Fall | | |
| | | | | | | | | | | S | | S | | | | | S | X | X | X | X | | | | Spray after April and when adequate soil moisture. Reduced granule kill during hot, dry months. |
| | R | | S | | | | S | | | S | | S | | R | | | S | X | | X | X | | | | Apply granules to individual plants. Apply when adequate soil moisture. |
| | | | | | | | | | | S | | | | | | | | | | | | | | | | | | | |
| R | R | | | | S | | S | | | S | | S | I | R | | | S | X | | X | X | | | | S to *monuron* by ST. BS effective with oil or *2,4,5-T* in oil. Spray after April. Reduced granule kill during hot, dry months. |
| | | | | | | | | | | S | | | | | | | S | X | | X | X | | | | |
| | | | | | | | | | | R | | S | | | | | | | | | | | | | | |
| S | S | | | S | S | | | | S | S | | | S-I | S-I | S | | | | X | | | | | | Spray before fruit forms. |
| S-I | S | | R | | S | | S | S | S | S | S | S | S | S-I | S-I | | | X | | | | | | | | *2,4-D* amine growing season only. I/CS effective August–October. R to *amitrole* by FS. S to *2,4-D+2,4,5-T*(1:1) by BS. |
| | | | | | | | | | | | | | | I-R | | | | | | | | | | | | |

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | Yes | No | No | No | Yes | |
| | | | | No | No | Yes | Yes | Yes | No | |
| | | | | No | No | No | Yes | No | Yes | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Alder (Continued) | | | | | | | | | | | | | | | | | |
| speckled (*A. rugosa*) | S-I | S-I | | S-I | S-I | | I | I | S | | S | | | | | | |
| Apple (*Malus* spp.) | | | | | | | | | | | | | | | | | |
| common (*M. sylvestris*) | S-I | S-I | | S | S | | I | I | S | S | S | | S | S | | | |
| crab (*M. ioensis*) | S-I | S-I | | S | S | | S | S | S-I | S | I | | S | S | | | |
| Ash (*Fraxinus* spp.) | | | | | | | | | | | | | | | | | |
| blue (*F. quadrangulata*) | I-R | I-R | S | S | S | | S | S | S | | S | | | | | | |
| green (*F. pennsylvanica*) | R | R | S | I-R | I-R | | S | S | S | | S | | | R | | | |
| Oregon (*F. oregona*) | | S | | | S | | S | S | | | | | | | | | |
| white (*F. americana*) | R | R | I | I | I-R | | S | S-I | S | S-R | S | S | S-I | S-R | S | | |
| Aspen, quaking (*Populus tremuloides*) | S-I | S-I | | S | S-I | | I | I | S | S | | | S | I | S | | |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | Spring | Fall | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | S | | | | | S | | | | | | | X | | | | | |
| S-I | S | | | S | S | | | | S | S | | | S-I | S | | | X | | | | | |
| S-I | S | | | S | S | | | | S | S | | | S-I | S | | | | | | | | |
| | | | | | S | | | | | | | | | | | S | | | | | | |
| R | R | | | S | S | | | | | | | | R | R | R | S | X | | | | | I to *2,4,5-T+picloram*(2:1) by FS. Treat summer foliage. |
| | | | | | S | | | | | | | | | | | | X | | | | | |
| R | R | | I-R | S-I | S | | S | S | S-I | S-R | | I | R | I-R | I-R | | X | X | | | | I/CS effective August–October. Wide range of response to *bromacil*, *dicamba*, and *picloram* by FS according to location, and suggest consult local authorities before such use. |
| S-I | S-I | | | S | S | | | | S | S-R | | | S-I | S-I | S | | X | X | | | | Wide range of response to *picloram* by FS according to location, and suggest consult local authorities before such use. |

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Azalea (*Rhododendron* spp.) | | | | | | | | | | | | | | | | | | | | | | |
| piedmont (*R. canescens*) | | | | S-I | I | | S | S | | I | I | S-R | S | S | | R | S | | | | | |
| western (*R. occidentale*) | | | | | I-R | | | I-R | | I | I | S | | S | | | | | | | | |
| Baccharis (*Baccharis* spp.) | | | | | | | | | | | | | | | | | | | | | | |
| kidneywort (*B. pilularis*) | | | | S | S | | S | S | | R | R | S | | S | | | | | | | | |
| willow (*B. salicina*) | | | | S | S | | I | I-R | | | | | | | | I | I-R | | | | | |
| Barberry (*Berberis* spp.) | | | | S | I | | S | S | | I | I | S | S | S | | | S | | | | | |
| Basswood, American linden (*Tilia americana*) | | | | R | R | | I-R | I-R | | S-I | S-I | S | S | S | | | S | S | | | | |
| Bayberry (*Myrica* spp.) | | | | | | | | | | | | | | | | | | | | | | |
| northern (*M. pensylvanica*) | | | | S | S | | S | S | | S | S | S | | S | | | | | | | | |
| southern (*M. cerifera*) | | | | | I-R | | R | I-R | | R | I | I | | I | | | R | | | | | |
| Bearberry (*Arctostaphylos uva-ursi*) | | | | | I-R | | | I | | | | S | | S | | | | | | | | |
| Bearmat (*Chamaebatia foliolosa*) | | | | | S-I | | | S-I | | | I-R | | | | | | S | | | | | |

APPLICATION METHODS
BS = Basal Spray
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HERBICIDE†

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | DSMA | | | Fenuron | Glyphosate | Karbutilate | | | MSMA | | | Picloram | | | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | No | | | No | No | No | | | No | | | Yes | | | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | | | Yes | | | Yes | Yes | Yes | | | Yes | | | No | | | No | No | No | No | No | | | | | |
| No | | | No | | | Yes | No | Yes | | | No | | | Yes | | | No | No | Yes | Yes | No | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | Spring | Fall | | |
| S | S | | | S | | | | R | S | | | | S-I | | | | X | X | | | | | | | Wide range of response to *bromacil* by BS according to location, and suggest consult local authorities before such use. |
| | S | | | | | | | S | S | | | | | | | | | | | | | | | | |
| | I | | | S | S | | | | S | | | | S-I | S-I | | | | | | | | | | | |
| | R | | | S | S | | | | S | | | | I-R | R | | | X | X | | | | | | | |
| | | | | | S | | | | S | | | | S | | | | | | | | | | | | |
| | I-R | | | S | S | S | | | S-I | | | | I-R | R | | | X | | | | | | | | |
| | | | | | | | | S-I | S-I | | | | S-I | S | | | | | | | | | | | | Regrowth following a fire is easily killed with the herbicides indicated. Old growth is much more difficult to kill. |

| SPECIES | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | Yes | | | No | | | Yes | | | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | BS | FS | ST | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| Beautyberry, American (*Callicarpa americana*) | | R | | | R | | | | | | | I-R | | | | | | | | | | | | | | | |
| Beech, American (*Fagus grandifolia*) | S-I | R | I-R | S-I | I-R | | S-I | S-I | | S | S | S | S-I | | | S | | | S-R | S | | | | | | | |
| Birch (*Betula* spp.) | S | S-I | | S | S | | S | S | | S | S | S | | | | | | | S | | | | | | | | |
| paper (*B. papyrifera*) | | S | | | S-I | | | | | | | | | | | | | | | | | | | | | | |
| yellow (*B. alleghaniensis*) | S-I | S-I | | S | S | | S-I | S-I | | S | S | S | | | | | | | S | S | | | | | | | |
| Blackberry (*Rubus* spp.) | R | R | | S-I | S-I | | I | I-R | | S | S | S | | | | | | S | S-I | | | | | | | |
| Blackgum (*Nyssa sylvatica*) | R | R | S | S-I | I | S | S-I | S-I | | S | S | S | | | | | | S | S-I | S | | | | | | |
| Blueberry (*Vaccinium* spp.) | S-I | I-R | | S | I | | I | I | | S | S | I | | | | | | S | S-R | | | | | | | |
| Boxelder (*Acer negundo*) | S | S-I | | S | S-I | | S-I | | | S | S | S | | | | | | S | | | | | | | | |
| Broom, Scotch (*Cytisus scoparius*) | S-I | I | | S | I | | | I-R | | S | | S | | | | | | | S-I | | | | | | | |
| Buckbrush (*Symphoricarpos orbiculatus*) | | S | | | I-R | | | | | | | | | | | | | | I-R | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | Glyphosate | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | No | No | | | | No | | | | Yes | | | | Yes | Yes | Yes | Yes | MAY RESPROUT | | | |
| No | | | | Yes | | | | Yes | Yes | Yes | | | | No | | | | No | | | | No | No | No | No | | | | |
| No | | | | No | | | | Yes | No | No | | | | Yes | | | | No | | | | No | No | Yes | Yes | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | Spring | Fall | |
| | | | | | | | | | | S | | S | | | | | | | | | | | | | | | | | |
| | I-R | | | S | S | | S | S-I | | S-I | S-I | | | I-R | I | | | X | | | | | | | | | | | Wide range of response to *dicamba* by FS according to location, and suggest consult local authorities before such use. |
| | S<br>S | | | S | S | | S | | | S | | | | S | S-I | | | | X | | | | | | | | | |
| | S-I | | | S | S | | | | | S | | | | S | | | | X | X | | | | | | | | | | |
| I-R | I-R | | | S | S | | S | | S | S | | S | S-I | S-I | | | | X | X | | | | | | | | | | |
| I-R | I-R | | S | S | S | | S | | S | S | | | I-R | I-R | I | | | X | X | | | | | | | | | | |
| S | I-R | | | S | S | | | | S | S-I | | | S | I | I | | | X | X | | | | | | | | | | Wide range of response to *dicamba* by FS according to location, and suggest consult local authorities before such use. |
| S | I-R | | | S | S | | | | S | S-I | | | S | I-R | S-I | | | | X | | | | | | | | | | do |
| | I-R | | | | | | | | | S-I | | | | I-R | | | | X | X | | | | | | | | | | |
| | | | | | | | | | | R | | | | R | | | | | | | | | | | | | | | Must use *2,4-D* ester formulation. |

APPLICATION METHODS
BS = Basal Spray
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HERBICIDE†

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | AMS | | | Bromacil | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | No | | | No | | No | | | Yes | | | |
| | | | | No | | | No | | Yes | | | Yes | | Yes | | | No | | | |
| | | | | No | | | No | | No | | | Yes | | No | | | Yes | | | |
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Buckeye (*Aesculus* spp.) | | | | S-R | R | | S | I-R | | I-S | I | S | S | | | | S-I | | | |
| California (*A. californica*) | | | | | | S | | | | | | | | | | | | | | |
| Buckthorn (*Rhammus* spp.) | | | | | | | | | | | | | | | | | | | | |
| California (*R. californica* var. *ursina*) | | | | I | I-R | | I | I-R | | R | R | | | | | | | | | |
| common (*R. cathartica*) | | | | I | I | | S | | | R | R | S | | S | | | | | | |
| hollyleaf (*R. crocea* var. *ilicifolia*) | | | | S | I | | S | S-I | | R | R | S | | S | | | | | | |
| Bumelia, gum (*Bumelia lanuginosa*) | | | | | | | S | S | | S | | | | | | | | | | |
| Bunchberry (*Cornus canadensis*) | | | | | R | | | I-R | | | | | | | | | | | | |
| Bushhoneysuckle, dwarf (*Diervilla lonicera*) | | | | | S | | | | | R | R | | | | | | | | | |
| Buttonbush, common (*Cephalanthus occidentalis*) | | | | I | I-R | | I | I | | I | R | I | | I | | | | | | |
| Cactus (*Opuntia* spp.) | | | | | | | | | | | | | | | | | | | | |
| Cholla (*Opuntia* spp.) | | | | | | | S | S | | | | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | DSMA | | | Fenuron | | | Glyphosate | | | Karbutilate | | | MSMA | | | Picloram | | | Silvex | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | SPRAY AT FULL FOLIAGE | MAY RESPROUT | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | No | | | No | | | No | | | No | | | No | | | Yes | | | Yes | | Yes | Yes | Yes | | | | |
| No | | | Yes | | | Yes | | | Yes | | | Yes | | | No | | | No | | | No | | No | No | No | | | | |
| No | | | No | | | Yes | | | No | | | Yes | | | Yes | | | No | | | No | | No | Yes | Yes | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | Spring | Fall | |
| I | R | | S | | S | | | | S-I | | | | S | R | | | | X | X | | | | | | | | | | Wide range of response to *2,4-D* by BS according to location, and suggest consult local authorities before such use.<br>*Picloram* most effective by I/CS. |
| | | | | | | | | | | S | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | I | | | | | | | | | | | | | | | | | | | | Spray sprouts after burning. Usually killed by two repeat treatments with *2,4-D*. |
| | | | I | | S | | S | | | | | S | | | | | | | | | | | | | | | | | Spray sprouts after burning. |
| | | | | | | | | | S | | | S | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | I-R | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | I-R | | | X | | | | | | | | | | | |
| | | | | | | | | | S | | | S | S | S | | | | | | | | | | | | | | | Small plants most susceptible. S to *MSMA* by FS. |

HERBICIDE†

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

| | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soil Effective | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| Nonselective | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| Selective | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | | |
| Cactus (Continued) | | | | | | | | | | | | | | | | | | | |
| pricklypear (*Opuntia* spp.) | | R | | S | I | | | | R | R | R | | S-I | | | I-R | | | |
| Tasajillo (*O. leptocaulis*) | | R | | | I | | | | R | R | R | | | | | | | | |
| California-holly (See Christmasberry) | | | | | | | | | | | | | | | | | | | |
| Camelthorn (*Alhagi camelorum*) | | S-I | | | | | | | | | | | | | | | | | |
| Catalpa (*Catalpa* spp.) | I | I-R | | S-I | S-I | | I | I | S | S | S | | | S | | | | | |
| Ceanothus (*Ceanothus* spp.) | | S-I | | | S | | | I | | | | | | | | | | | |
| blueblossom (*C. thyrsiflorus*) | S | S-I | | S | S | | | | S | | S | | | | | | | | |
| chaparral whitethorn (*C. leucodermis*) | S | S-I | | S | S | | I | I | S | | S | | | | | | | | |
| deerbrush (*C. integerrimus*) | S | S | | S | S | | I | I | S | | | | | | | | | | |
| desert (*C. greggii*) | | | | | S | | | | | | S | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | Spring | Fall | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | S | S | | S | S | I | | | S | | | Wet plants. Bruise before spraying with phenoxys during rapid growth. I-S to *silvex* on *O. polyacantha* in Wyoming when sprayed late in season. |
| | | | | | | | | | S | S | | S | | I | | | S | | | |
| | I-R | | | S | | | | | | S | | | | I-R | I | | | X | X | | Repeat treatment necessary. S to *2,3,6-TBA* by FS. |
| | | | | | S | | S | | | | | | | | | | | | | | Spray when soil moisture is plentiful and plant actively growing. |
| | | | | | | | S-I | | | | | | | | | | | | | | |
| | | | | | | | | | | S | | | | | I | | | X | | | S-I to *amitrole* and I to *2,4-DB* amine by FS |
| | | | S | | | | S | | | | | S | | S | | | | | | | |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | AMS | | Bromacil | | Cacodylic Acid | | Dicamba | | |
| | | | | | | | | | | Yes | | | Yes | | No | | No | | No | | Yes | | |
| | | | | | | | | | | No | | | No | | Yes | | Yes | | Yes | | No | | |
| | | | | | | | | | | No | | | No | | No | | Yes | | No | | Yes | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Ceanothus (Continued) | | | | | | | | | | | | | | | | | | | | | | | |
| mountain whitethorn (*C. cordulatus*) | S | S-I | | S | S-I | | | | | | | | | | | | | | | | | | |
| redstem (*C. sanguineus*) | | S | | | S | | | | | | | | | | | | | | | | | | |
| snowbrush (*C. velutinus*) | S-I | I | | S | S | | | | | | | | | | | | | | | | | | |
| varnishleaf (*C. velutinus* var. *laevigatus*) | S-I | S-I | | S | S | | | | | | | | | | | | | | | | | | |
| wedgeleaf (*C. cuneatus*) | | | | | S | | | | | | | | | | | | | | | | | | |
| Cedar, incense (*Libocedrus decurrens*) | | I-R | | | I-R | | | | | | | | | | | | | | | | | | |
| Cedar, northern-white (*Thuja occidentalis*) | R | I | | I-R | I | | S-I | S | S | S | S | | | | | | S | | | | | | |
| Chamise (*Adenostoma fasciculatum*) | S-I | S-I | | S | S-I | S-R | S-R | | | I | | | | | | | S-R | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | DSMA | | | Fenuron | | | Glyphosate | | | Karbutilate | | | MSMA | | | Picloram | | | Silvex | | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | | | No | | | No | | | No | | | No | | | No | | | Yes | | | Yes | | Yes | Yes | Yes | | | | |
| No | | | Yes | | | Yes | | | Yes | | | Yes | | | Yes | | | No | | | No | | No | No | No | | | | |
| No | | | No | | | Yes | | | No | | | Yes | | | Yes | | | No | | | No | | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | Spring | Fall | | |
| | | | | | | | | | | | | | | | | | | | | | X | | | | | | | I to *amitrole* by FS. |
| | | | | | | | | | | | | | | S-I | | | | | | | X | | | | | | | I to *2,4-DB* amine by FS. Retreatment may be needed. R to *amitrole* by FS. |
| | | | | | | | | | | S | | | | | | | | | | | | | | | | | | Retreatment may be needed. |
| | | | | | | | | | | S | | | | | | | | | | | | | | | | | | Trees 1–4 years old show little if any injury with 1–4 pounds per acre *2,4,5-T*, while brush is controlled. |
| R | S-I | | | S | | | | | | S | | | I | I | | | | | | | X | | | | | | With *AMS:* drench foliage. |
| | I-R | | S-I | S | S | | S | | | S | | S-I | | I-R | S-I | | | | | | | | | | | | Wide range of response to *AMS* by BS or FS and *dicamba* by FS according to location, and suggest consult local authorities before such use. Foliage treatment: early spring. Spray sprouts after burning or mechanical top removal. Old growth readily removed by *picloram* or other soil treatments. |

HERBICIDE†

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

| | Soil Effective | Nonselective | Selective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | Yes | No | No | No | Yes | |
| | | | | No | No | Yes | Yes | Yes | No | |
| | | | | No | No | No | Yes | No | Yes | |

| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cherry (*Prunus* spp.) | I-R | I-R | | S | S-I | | S | S | S-I | S-I | S-I | | S | S | | |
| bitter (*P. emarginata*) | | | S | | | | | | | | | S | | | | |
| black (*P. serotina*) | | | | | | | | | | | S | | | | | |
| Chestnut, American (*Castanea dentata*) | I-R | S-I | | S | S | | S | S-I | S-I | S | S-I | | S | S | | |
| Chinaberry (*Melia azedarach*) | | | | R | | | | I | | | | | | | | |
| Chinkapin | | | | | | | | | | | | | | | | |
| Allegheny (*Castanea pumila*) | | R | | S | S | | I | S-I | S | S | S | | | S | | |
| golden (*Castanopsis chrysophylla*) | | I-R | | | I | | | | | | | | | | | |
| golden evergreen (*Castanopsis chrysophylla* var. *minor*) | | I | | | I | | | R | | | | | | | | |
| Sierra evergreen (*Castanopsis sempervirens*) | | R | | S | I | | | | | | | | | | | |
| Chokeberry, black (*Pyrus melanocarpa*) | | S-I | | | | | | | | | | | | | | |
| Cholecherry, common (*Prunus virginiana*) | S-I | I-R | | S | S-I | | S | S | S | S | S | | | S | | |

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| Dichlorprop | | | DSMA | | | Fenuron | | | Glyphosate | | | Karbutilate | | | MSMA | | | Picloram | | | Silvex | | | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | No | | | No | | | No | | | No | | | No | | | Yes | | | Yes | | | Yes | Yes | Yes | Yes | | | | |
| No | | | Yes | | | Yes | | | Yes | | | Yes | | | Yes | | | No | | | No | | | No | No | No | No | | | | |
| No | | | No | | | Yes | | | No | | | Yes | | | Yes | | | No | | | No | | | Yes | Yes | | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | Spring | Fall | |
| S | I-R | | I | S | S | S | | S | S | S | S | | S | | I | I | | | X | X | | | | | | | | | Effective August–October. |
| | | | S | | | | S | | | | | S-I | | | | | | | | | | | | | | | | | |
| S-I | S-I | | I | S | S | | | | S | S | | S | | | S | S | | | X | X | | | | | | | | | |
| | | | | | S | | | | | S | | S | | | | R | | | | | | | | | | | | | |
| | | | | | | | | | | S | | | | | S | S-I | | | X | | | | | | | | | | |
| | | | | | | | | | | | | | | | I-R | | | | X | | | | | | | | | | I to *amitrole* and *2,4-DB* amine by FS. |
| | | | | | | | | | | I | | | | | I | | | | | | | | | | | | | | I to *2,3,6-TBA*, *2,4-DB* amine, and *amitrole* by FS. |
| | I | | | S | S | | | | | S | | | S | I | I | | | | X | | | | | | | | | | Spray early summer after leaves fully expand. Repeat treatment in 1 or 2 years. |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

| | Selective | Nonselective | Soil Effective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | Yes | No | Yes | Yes | No | No | No | Yes | |
| | No | No | Yes | No | No | Yes | Yes | Yes | No | |
| | No | No | No | No | No | No | Yes | No | Yes | |

| SPECIES | 2,4-D BS | 2,4-D FS | 2,4-D I/CS | 2,4,5-T BS | 2,4,5-T FS | 2,4,5-T I/CS | AMS BS | AMS FS | Bromacil BS | Bromacil FS | Bromacil ST | Cacodylic Acid I/CS | Dicamba BS | Dicamba FS | Dicamba I/CS | Dicamba ST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Christmasberry (*Photinia arbutifolia*) | S-I | I | | I | I | | S-I | I-R | S | | S | | | | | |
| Coffeetree, Kentucky (*Gymnocladus dioicus*) | I-R | I-R | | S-I | S-I | | S | S | S | | S | | | | | |
| Condalia (*Condalia* spp.) | | | | | | | | | | | | | | | | |
| lotebush (*C. obtusifolia*) | S-I | R | | R | R | | | | S | | S | | S-I | I-R | | I-R |
| southwestern (*C. lycioides*) | | | | | | | | | | | | | | S | | |
| Cottonwood (*Populus* spp.) | | S-R | S | | S-R | S | | S | | | | | | R | | |
| eastern (*P. deltoides*) | | | S-I | | | S-I | | | | | | | | | | |
| plains (*P. sargentii*) | S | S-I | | S | S | | | S | S | | S | | | S | | |
| Rio Grande (*P. fremontii* var. *wislizenii*) | S | I | | S | S | | S | S | S | | S | | | S | | |
| Coyotillo (*Karwinskia humboldtiana*) | | | | S | | | | | | | | | | | | R |
| Cranberry (*Vaccinium* spp.) | | | | | | | | | | | | | | | | |

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| Dichlorprop | | | | DSMA | | | Fenuron | Glyphosate | Karbutilate | | MSMA | | | Picloram | | | Silvex | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | SPRAY AT FULL FOLIAGE | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | No | No | No | | No | | | Yes | | | Yes | Yes | Yes | Yes | MAY RESPROUT | | | |
| No | | | | Yes | | | Yes | Yes | Yes | | Yes | | | No | | | No | No | No | No | SPRAY IN: | | | |
| No | | | | No | | | Yes | No | Yes | | No | | | Yes | | | No | No | Yes | Yes | Spring | Fall | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | |
| | | | | | | | S | | | I | | | | | | | | | | | | | | Treat sprouts after burning. Plants killed by re-treatment. |
| | | | | | | | | | | | | | | | | | | X | | | | | | |
| | R | | S-I | | | | | | S | I-R | | S | | R | | | | | | | | | | S to *monuron* by ST. |
| | | | | | | | | | | | | | | | | | | | | | | | | Spray at same time as creosotebush or tarbush. Aerial spray with 1½ to 2 pounds per acre in successive years; or 3 to 4 pounds per acre in a single application. |
| | R | | | | | | S | | S | | | | | R | S | | | | | | | | | Wide range of response to *2,4-D* and *2,4,5-T* by FS according to location, and suggest consult local authorities before such use. |
| | | S | | | | | | | | | S | | | | | | | | | | | | | |
| S | S | | | | S | | | | | S | | | | S | | | | X | | | | | | |
| S | S | | | | S | | | | | S | | | | | | | | X | | | | | | |
| | | | S | | | | | | | | | S | S | | | | | | | | X | | | Spray base during period of rapid growth. |
| | | | | | S | | | | | | | | | | | | | | | | | | | |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | Nonselective | | Selective | | 2,4-D | | 2,4,5-T | | AMS | | Bromacil | | Cacodylic Acid | | Dicamba | | | |
| | | | | | | | Yes | | Yes | | No | | No | | No | | Yes | | | |
| | | | | | | | No | | No | | Yes | | Yes | | Yes | | No | | | |
| | | | | | | | No | | No | | No | | Yes | | No | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | | | |
| Creosotebush (*Larrea tridentata*) | | R | | | I-R | | | S-I | | | S | | | S-I | | S | | | | |
| Currant (*Ribes* spp.) | | | | | | | | | | | | | | | | | | | | |
| gooseberry (*R. montigenum*) | | S | | | S | | I | I | S | | S | | | | | | | | | |
| nutmeg (*R. glutinosum*) | S | | | S | S | | I | I | S | | S | | | | | | | | | |
| prickly (*R. lacustre*) | | | | | S | | I | I | S | | S | | | | | | | | | |
| Sierra (*R. nevadense*) | S | S | | S | S | | I | I | S | | S | | | | | | | | | |
| sticky (*R. viscosissimun*) | S | | | S | S | | I | I | S | | S | | | | | | | | | |
| stink (*R. bracteosum*) | S | S | | S | | | I | I | S | | S | | | | | | | | | |
| trailing black (*R. laxiflorum*) | S | | | S | S | | I | I | S | | S | | | | | | | | | |
| wax (*R. cereum*) | S | S | | S | S | | I | I | S | | S | | | | | | | | | |
| western black (*R. petiolare*) | S | S | | S | S | | I | 1 | S | | S | | | | | | | | | |

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| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | Spring | Fall | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | | S | | | | S | | | S-I | | S | | R | | | | | | S-I to *2,3,6-TBA* by FS. S-I to *monuron* by ST. Treat in successive years with *dicamba* for best results. Spray 30 to 50 days after significant summer rain. Apply granules prior to expected rainfall. |
| | | | | S | S | | | | | S | | | | S | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | X | | Soil treatment in spring; uniform, complete coverage necessary. |
| | | | | | S | | | | | | | | | | | | | | | |

| SPECIES | HERBICIDE† | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | Soil Effective | | | Nonselective | | | Selective | | | | | | | | | | | |
| | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | |
| | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | |
| | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | |
| | No | | | No | | | No | | | Yes | | | No | | | Yes | | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| Currant (Continued)<br>winter (*R. sanguineum*) | S | S | | S | S | | I | I | S | | S | | | | | | | |
| Cypress (*Taxodium distichum*) | | | | R | | | | I | S | | | | | | | | | |
| Dangleberry (*Gaylussacia frondosa*) | I | I | | I | I | | I | I | S | | S | | | | | | | |
| Deervetch, broom (*Lotus scoparius*) | | S | | | | | I | I | S | | S | | | | | | | |
| Devil's-walking-stick (*Aralia spinosa*) | S | R | | S | S-I | | S | S | S | | S | | | S | | | | |
| Dewberry (*Rubus* spp.) | I-R | I-R | | S | S-I | | I-R | I-R | S | I | S | | S | S-I | | | | |
| grapeleaf (*R. unsinus*) | I-R | | | S-I | S-I | | | | | | R | | I | I | | R | | |
| Dogwood (*Cornus* spp.) | S-I | S-I | S-I | S-I | S-I | S-I | S-I | S-I | | S | | | | S-I | S | | | |
| bunchberry (*C. canadensis*) | | R | | | I-R | | | | | | | | | | | | | |
| flowering (*C. florida*) | | | S-I | | | S | | | | | S | | | | | | | |
| roughleaf (*C. drummondii*) | | | S-I | | | S-I | | | | | | S | | | | | | |
| Douglas-fir (*Pseudotsuga menziesii*) | | I-R | R | | I-R | | | | | | | S | | S | | S | | |
| Eastern redcedar (*Juniperus virginiana*) | R | R | R | I-R | R | R | S | I | S | S | S | S | S-I | I-R | | S-I | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | Glyphosate | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | 2,4-D+2,4,5-T (1:1) | | 2,4-D+Picloram (4:1) | | 2,4,5-T+Picloram (1:1) | | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | No | No | | | | No | | | | Yes | | | | Yes | | Yes | | Yes | | Yes | | | | | | |
| No | | | | Yes | | | | Yes | Yes | Yes | | | | Yes | | | | No | | | | No | | No | | No | | No | | | | | | |
| No | | | | No | | | | Yes | No | Yes | | | | No | | | | Yes | | | | No | | No | | Yes | | Yes | | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | | | Spring | Fall | | |
| | | | | | S | | | | | | | | | | R | | | | | X | | | | | | | | | | | | S to *2,3,6-TBA* by FS. |
| | S | | | | | | | | | S | | | | S | S-I | | | | | | | | | | | | | | | | | |
| S | I | | | I | S | | | | S | S-I | | S | | S-I | | | | X | X | | | | | | | | | | | | | |
| I-R | | | R | | | | S | | S-I | S-I | | S-I | S-I | S-I | | | | X | | | | | | | | | | | | | | | |
| | | | | S | | S | | | | S-I | | | | I-R | S-I | S-I | | X | X | | | | | | | | | | | | | |
| | | | | | | | | | | | S | S | | | | S | | | | | | | | | | | | | | | | | |
| | | S | | | | | | S | | | S | | | | | | | | | | | | | | | | | | | | | | |
| | | | S | | | | S | S | | S | S | S | | I-R | | | | | | | | | | | | | | | | | | | Most S during growing season, least S in spring (pre-bud-burst). S to *picloram* anytime. |
| R | R | S | S | S | S | | S-I | S | S | S | S | S | R | R | R | | | | X | | | | | | | | | | | | | S to *2,3,6-TBA* by FS. Spray entire plant. S to *paraquat* by I/CS. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | | |
| Elder (*Sambucus* spp.) | S-I | S-I | | S | S-I | | I | I | | S | S | | S | | | S | S | | | | | | | | | | | |
| American (*S. canadensis*) | | | | R | | | | R | | S | | | | | | | | | | | | | | | | | | |
| Pacific red (*S. callicarpa*) | | | | | | | | | | | | | R | | | | | | | | | | | | | I | | |
| Elm (*Ulmus* spp.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| American (*U. americana*) | S-I | I | S-I | S | I | S | S-I | S-I | | S | S | | S | S-I | | S | I | | S-I | | | | | | | S-I | | |
| Chinese (*U. parvifolia*) | | | | R | | | | I | | S | | | | | | | | | | | | | | | | | | |
| Siberian (*U. pumila*) | | | | S | | | | | | | | | | | | | | | | | | | | | | | | |
| slippery red (*U. fulva*) | I | I | | S | I | | S-I | I | | S-I | | | S | | | | I | | | | | | | | | | | |
| winged (*U. alata*) | S-I | R | S | S | I | S | I | I | | I | | | I | S | | S | I-R | | | | | | | | | S-I | | |
| Eucalyptus (*Eucalyptus* spp.) | | | I | | | I | | | | | | | | | | | | | | | | | | | | | | |
| Fern-bush (*Chamaebatiaria millefolium*) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fir (*Abies* spp.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| balsam (*A. balsamea*) | I | R | | I | R | | S | S | | S | | | S | | | | | | | | | | | | | | | |

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

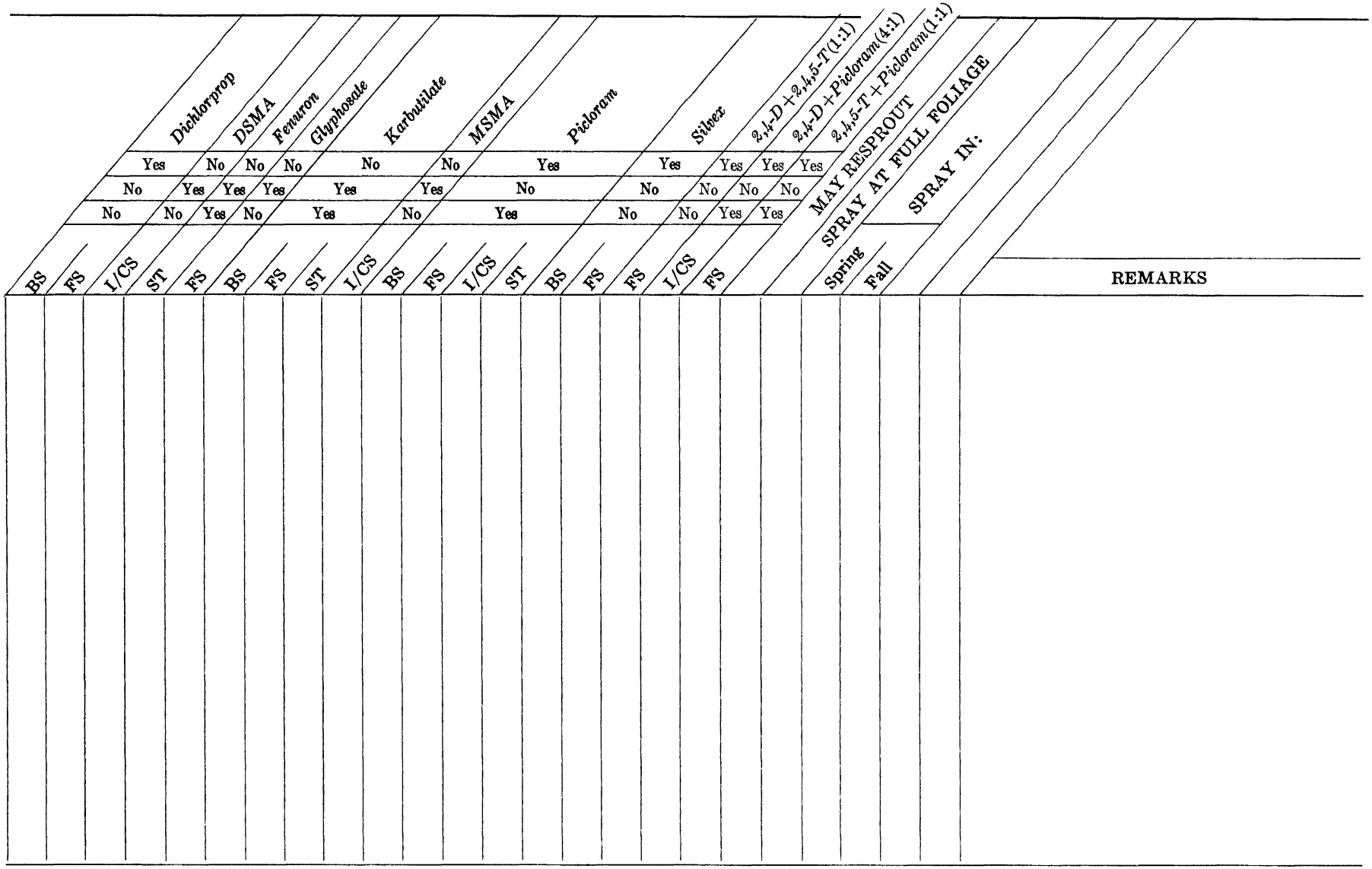
| Dichlorprop | | | | DSMA | | | | Fenuron | Glyphosate | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | 2,4-D + 2,4,5-T (1:1) | 2,4-D + Picloram (4:1) | 2,4,5-T + Picloram (1:1) | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | No | No | | | | No | | | | Yes | | | | Yes | | Yes | Yes | Yes | | | | |
| No | | | | Yes | | | | Yes | Yes | Yes | | | | Yes | | | | No | | | | No | | No | No | No | | | | |
| No | | | | No | | | | Yes | No | Yes | | | | No | | | | Yes | | | | No | | No | Yes | Yes | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | Spring | Fall | |
| S | I | | | S | S | S | | | S | S | | | | S-I | R | | | X | X | | | | | | | | | | |
| | | | R | | | | S | | | | | S | | | | | | X | | | | | | | | | | | I to *amitrole-T* by FS. |
| S-I | I | S-I | S | S | S | S | S-I | S-I | S | S-I | S | S | R | I | I | | | X | X | | | | | | | | | | | |
| | | | | | | | | | | | | | | | R | | | | | | | | | | | | | | | Foliage application of phenoxy herbicides generally ineffective because of root sprouting. |
| | S-I | | | | S | | | | | S-I | | S | | I | I | | | X | | | | | | | | | | | | |
| S-I | R | S | S | | S | | S-I | S | S | S | S | S | I-R | I-R | I-R | | S-I | X | | | | | | | | | | | | |
| | | | | | | | | | | | S | | | | | | | | | | | | | | | | | | | Very S to *picloram* by I/CS. |
| | | | | | | | | | S-I | | | | | | | | | | | | | | | | | | | | | |
| | | | | | S | | | | | S-I | | | | | | | | X | | | | | | | | | | | | |

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | Yes | No | No | No | Yes | |
| | | | | No | No | Yes | Yes | Yes | No | |
| | | | | No | No | No | Yes | No | Yes | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Fir (Continued) | | | | | | | | | | | | | | | | | |
| Douglas (See Douglas-fir) | | | | | | | | | | | | | | | | | |
| white (*A. concolor*) | | S-I | | | S-I | | | | | | | | | | | | |
| Goldenweed, fleece (*Haplopappus arborescens*) | | S | | | | | | | | | | | | | | | |
| Gooseberry (*Ribes* spp.) | | | | | | | | | | | | | | | | | |
| California (*R. californicum*) | | | | | S | | | I | | | | | | | | | |
| Canada (*R. oxyacanthoides*) | | S | | | | | | I | | | | | | | | | |
| desert (*R. velutinum*) | | | | | S | | | I | | | | | | | | | |
| Hupa (*R. marshalli*) | | | | | S | | | I | | | | | | | | | |
| Lobbs (*R. lobbii*) | | S | | | S | | | I | | | | | | | | | |
| Menzies (*R. menziesii*) | | | | | S | | | I | | | | | | | | | |
| Sierra (*R. roezlii*) | | S | | | I | | | I | | | | | | | | | |
| Siskiyou (*R. binominatum*) | | I | | | S | | | I | | | | | | | | | |
| Tulare (*R. tularense*) | | | | | S | | | I | | | | | | | | | |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*


Dichlorprop
DSMA
Fenuron
Glyphosate
Karbutilate
MSMA
Picloram
Silvex
2,4-D+2,4,5-T(1:1)
2,4-D+Picloram(4:1)
2,4,5-T+Picloram(1:1)
Yes No No No No No Yes Yes Yes Yes Yes
No Yes Yes Yes Yes Yes No No No No No
No No Yes No Yes No Yes No No Yes Yes
MAY RESPROUT
SPRAY AT FULL FOLIAGE
SPRAY IN:
Spring
Fall
BS FS I/CS ST FS BS FS ST I/CS BS FS I/CS ST BS FS FS I/CS FS
REMARKS

HERBICIDE†

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

| | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Diamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | No | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | No | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| Gooseberry (Continued) | | | | | | | | | | | | | | | | | | | | | | |
| whitestem (*R. inerme*) | | | | | S | | | I | | | | | | | | | | | | | | |
| Gorse, common (*Ulex europaeus*) | | | S | I | | | | S | | S | S-R | | | | | | | | | | | |
| Grape (*Vitis* spp.) | | | | | | S | | | S | | | | | | | | | | | | | |
| riverbank (*V. vulpina*) | | | | S-I | | | | S-I | | I | S-I | | | | | | | I-R | | | | |
| Greasewood, black (*Sarcobatus vermiculatus*) | | | | S | | | S | S | | R | R | | | | | | | S | | | | |
| Greenbrier (*Smilax* spp.) | | | I | R | | | I | I-R | | R | I-R | | R | R | | R | | R | | | R | |
| Guayacan (*porlieria angustifolia*) | | | | R | | | | R | | | | | | | | | | R | | | | |
| Hackberry (*Celtis* spp.) | | | S | I-R | S | | S | S-I | S | S | I | S | | | S | | | I | | | | |
| netleaf (*C. reticulata*) | | | | | S | | | | S | | | | | | S | S | | | | | S-I | |
| spiney (granjeno) (*C. pallida*) | | | | R | | | | R | | | | | | | | | | R | | | | |
| Hawthorn (*Crataegus* spp.) | | | I | I-R | R | | I | R | R | I | I | S | | | S-R | R | S-R | R | | | R | |
| black (*C. douglasii*) | | | | S-I | | | | S-I | | | | | | | | | | | | | | |

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | SPRAY AT FULL FOLIAGE | MAY RESPROUT | SPRAY IN: | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | Spring | Fall | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | | | | | | S | | | | | | | | | | After burn, spray regrowth when 2 feet tall. Wide range of S to *AMS* by FS according to location, and suggest consult local authorities before such use. |
| | S-I | | | S | S | | | | | S-I | | | | S-I | | | | | | |
| | R | | | | | | | | | S | | | | S | | | | X | | Spray during rapid growth. |
| | R | | | | S | | | | I-R | I-R | | R | I | R | I | | | X | | |
| | | | | | | | | | | R | | | | | | | | | | |
| S | I-R | | S | S | S | | | | | S-I | | S | S | S-I | I | | S | X | | |
| | | S | S | | | | R | S | | | S | S | | | | | | | | |
| | | | S | | | | | | | S-I | | S | | | | | S-I | | | |
| S-R | R | R | R | S | S | | S-I | R | S | I | S-I | S | S-R | R<br>I-R | I-R | | | X | | Wide range of response to *bromacil* by ST, and *dicamba*, *dichlorprop*, and *silvex* by BS, and suggest consult local authorities before such use. |

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| APPLICATION METHODS: BS = Basal Spray; FS = Foliar Spray; I/CS = Injection/Cut Surface Treatment; ST = Soil Treatment | | | | Yes / No / No | Yes / No / No | No / Yes / No | No / Yes / Yes | No / Yes / No | Yes / No / Yes | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Hawthorn (Continued) | | | | | | | | | | | | | | | | | |
| little-hip (*C. spathulata*) | | | | | | | | | | | S | | | | | | |
| parsley (*C. marshallii*) | | | S-I | | | | | | | | | | | | | | |
| Hazel (*Corylus* spp.) | | | | | | | | | | | | | | | | | |
| American (*C. americana*) | | S | | | S | | | | | | | | | | | | |
| beaked (*C. cornuta*) | S-I | S | | S | S | | I | I | S | | S | | | | | | |
| California (*C. cornuta* var. *californica*) | S-I | S-I | | S-I | S | | I | I | S | | S | | I | I-R | | | |
| Hemlock (*Tsuga* spp.) | S-R | I-R | | I | I-R | | S | S | S | | | | S | S | | | |
| eastern (*T. canadensis*) | | | R | | | | | | | | | I | | | | | |
| western (*T. heterophylla*) | | I-R | R | | I-R | | | | | | | S | | | | S | |
| Hickory (*Carya* spp.) | I-R | I-R | S-I | S | S-I | S-I | S | S-I | S | S | S | S | S-I | I-R | I | | |
| black (*C. texana*) | | | S-I | | | S-I | | | | | | I-R | | | | | |
| mockernut (*C. tomentosa*) | | | S-I | | | | | | | | S | | | | | | |
| Hogplum (*Colubrina texensis*) | | | | | | | | | | | | | | | | | |
| Holly, American (*Ilex opaca*) | | | | | | | | I | I | | | | | | | | |

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| Dichlorprop | | | | DSMA | | | | Fenuron | Glyphosate | Karbutilate | | | MSMA | | | | Picloram | | | | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | No | No | | | No | | | | Yes | | | | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | | | | Yes | | | | Yes | Yes | Yes | | | Yes | | | | No | | | | No | No | No | No | | | | | | |
| No | | | | No | | | | Yes | No | Yes | | | No | | | | Yes | | | | No | No | Yes | Yes | | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | Spring | Fall | |
| | | | | | | | | | | | | S | | | | S | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | S | | | | | | | | | | | | | |
| | | | | S | | | | | | | | | | | S | | | | | | | | | | | | | | Spray in May and June. |
| | | | | | S | | | | | | | | | | S | | X | | | | | | | | | | | | |
| I | S-I | | | | S | | | S-I | S | | | I | I | S | | | X | | | | | | | | | | | | Spray in May and June. |
| S | S | | | S | S | | S | | S | S | | | I-R | | | | | | | | | | | | | | | | Spray entire plant. R to phenoxy herbicides when dormant. Wide range of S to *2,4-D* by BS, and suggest consult local authorities before such use. |
| | | | | | | | | S | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | S | S | | | S | S | | | | | | | | | | | | | | | | | |
| I-R | I-R | S | S | S | S | S | S | S | S | S-I | S-I | | S | I-R | S-I | I-R | S | | X | | | | | | | | | | |
| | | | | | | | I | | | | S | | | | | | S | | | | | | | | | | | | |
| | | | | | | | | | | | | S | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | S | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | I-R | | | | | | | | | | | | | |

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Honeylocust, common (*Gleditsia triacanthos*) | | | | I | I-R | | S | S | | S-I | S-I | S | S | S | | | S-I | | | | | |
| Honeysuckle (*Lonicera* spp.) | | | | S | S-I | | S | S-I | | R | I | I-R | S | I-R | | S | I | | | | | |
| Hophornbeam, eastern (*Ostrya virginiana*) | | | | S-I | S-I | | S-I | S-I | | S-I | S-I | S | | S | S | | S | | | | | |
| Hornbeam, American (*Carpinus caroliniana*) | | | | S | S | S-I | S | S | | S | S | S | | I | | | | | | | | |
| Horsebrush (*Tetradymia* spp.) littleleaf (*T. glabrata*) | | | | | S<br>I-R | | | I-R | | I | I | S | | S | | | | | | | | |
| Huckleberry, black (*Gaylussacia baccata*) | | | | | | | | | | | | | | I-R | | | | | | S | | |
| Hydrangea, smooth (*Hydrangea arborescens*) | | | | S | S | | S | S | | S | S | S | | S | | | | | | | | |
| Inkberry, gallberry (*Ilex glabra*) | | | | I | I | | I | S | | I | I | | S | | | | I | | | | | |
| Javelinabrush (*Microrhamnus ericoides*) | | | | | R | | | R | | | | | | | | | R | | | | | |
| Juniper (*Juniperus* spp.) | | | | R | R | | R | I-R | | S-I | I | S | | S | | S | I | | | | | |

APPLICATION METHODS
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ST = Soil Treatment

HERBICIDE†

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | Fenuron | Glyphosate | Karbutilate | | MSMA | | Picloram | | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | No | No | No | | No | | Yes | | Yes | Yes | Yes | Yes | | | | | |
| No | | | | Yes | | | Yes | Yes | Yes | | Yes | | No | | No | No | No | No | | | | | |
| No | | | | No | | | Yes | No | Yes | | No | | Yes | | No | No | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | Spring | Fall | | |
| I | I | | | S | S | | | | | S | | | | I | I | | | X | | | | | |
| S | S-I | | | S | S | | | | S | S-I | | | S | S-I | | | | X | | | | | |
| | S-I | | | S | S | | | S | | S | | | | | S-I | | | X | | | | | |
| | | | I-R | S | S | S | | | | S | | S-I | | | S | S | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | X | | | Treat individual plants.<br>Treat individual plants in spring. |
| | | | | S | | | | | | | | S | | | | | | | | | | | |
| S-I | S-I | | | | | S | | | | S | | | | S-I | S-I | | | X | | | | | Treat in August. |
| | | | | | | | | | | R | | | | | | | | | | | | | |
| I-R | I-R | | S | S | S | | S | | S | S-I | | S | R | I-R | I-R | | | | | | | | S to *2,3,6-TBA* by FS and ST. High spray volume and complete coverage needed. |

HERBICIDE†

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

| | Soil Effective | Nonselective | Selective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | Yes | No | No | No | Yes | |
| | | | | No | No | Yes | Yes | Yes | No | |
| | | | | No | No | No | Yes | No | Yes | |

| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Juniper (Continued) | | | | | | | | | | | | | | | | |
| oneseeded (*J. monsperma*) | | | | | | | | | | | | | | | | |
| redberry (*J. pinchotii*) | | R | | | R | | | | | | | | R | | I-R | |
| Kalmia (*Kalmia* spp.) | | | | | | | | | | | | | | | | |
| lambkill (See sheeplaurel) | | | | | | | | | | | | | | | | |
| mountainlaurel (*K. latifolia*) | R | R | | R | R | | R | R | S | S | S | | | R | | |
| sheeplaurel (*K. angustifolia*) | R | I-R | | R | I-R | | R | R | S | | S | | | | | |
| Larch (*Larix* spp.) | S | R | | S | R | | R | R | S | | S | | | | | |
| Laurel, California (*Umbellularia californica*) | | | S | | | | | | | | | | | | | |
| Leatherstem (*Jatropha dioica*) | | R | | | R | | | | | | | | | R | | |
| Leatherwood, Atlantic (*Dirca palustris*) | | S | | | S | | I | I | S | | S | | | | | |
| Lilac, common (*Syringa vulgaris*) | I | I-R | | S | S-I | | S | S | S | | S | | | | | |
| Locust, black (*Robinia pseudoacacia*) | I | S-I | S | I | S-I | S | I-R | I | S | S | S | S | S-I | S | | |
| water (*Gleditsia aquatica*) | | | S | | | | | | | | | | | | | |

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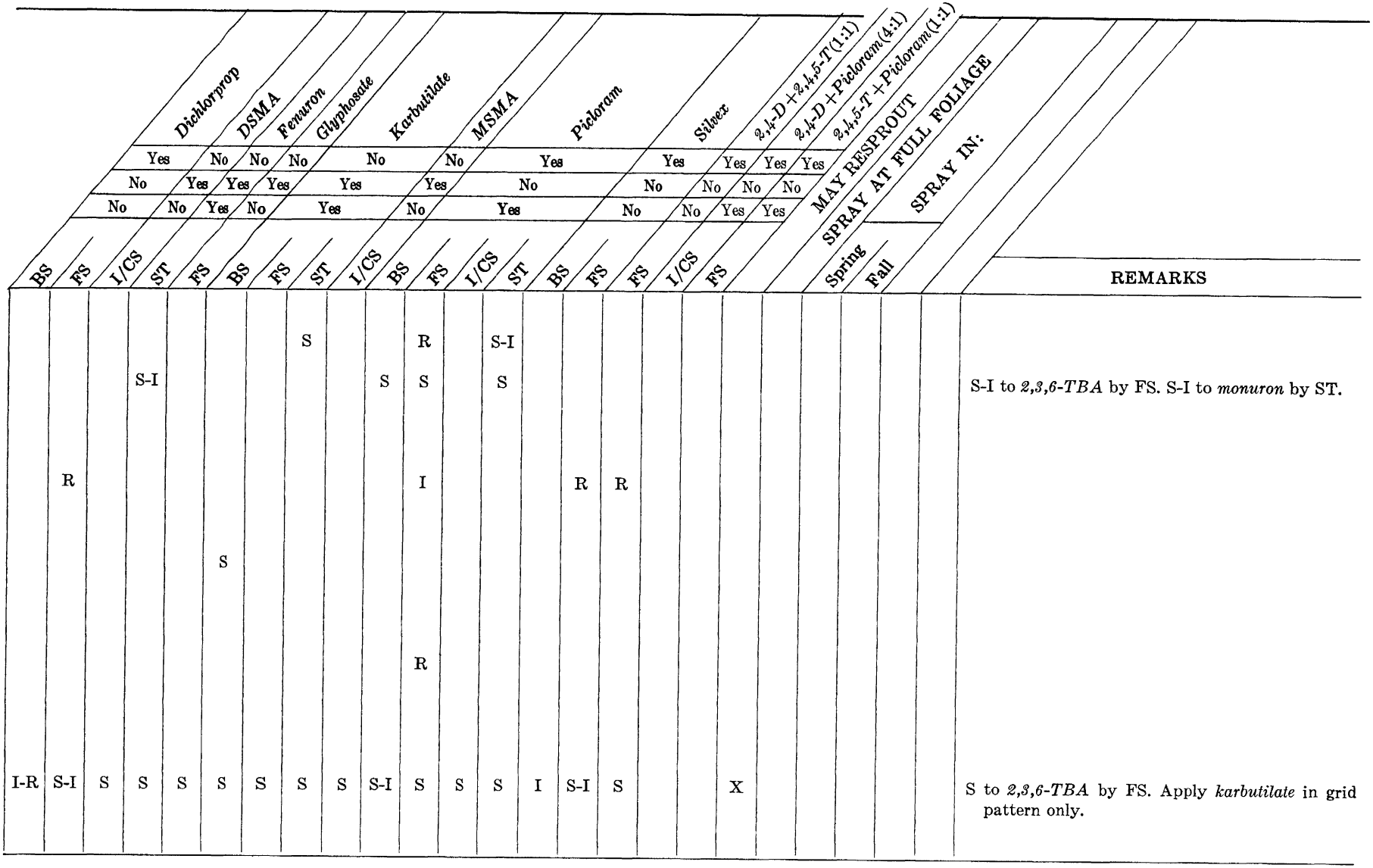
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*


Dichlorprop
DSMA
Fenuron
Glyphosate
Karbutilate
MSMA
Picloram
Sidex
2,4-D+2,4,5-T(1:1)
2,4-D+Picloram(4:1)
2,4,5-T+Picloram(1:1)
MAY RESPROUT
SPRAY AT FULL FOLIAGE
SPRAY IN:
Spring
Fall
REMARKS
Yes No No No No No Yes Yes Yes Yes Yes
No Yes Yes Yes Yes Yes No No No No No
No No Yes No Yes No Yes No No Yes Yes
BS FS I/CS ST FS BS FS ST I/CS BS FS I/CS ST BS FS FS I/CS FS
S R S-I
S-I S S S
R I R R
S
R
I-R S-I S S S S S S S S-I S S S I S-I S X
S to 2,3,6-TBA by FS. Apply karbutilate in grid pattern only.
S-I to 2,3,6-TBA by FS. S-I to monuron by ST.

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | Yes | No | No | No | | | No | | | No | | | No | | | No | No | | | Yes | | |
| | No | Yes | No | Yes | | | Yes | | | Yes | | | Yes | | | Yes | Yes | | | No | | |
| | No | No | Yes | Yes | | | Yes | | | Yes | | | Yes | | | No | No | | | Yes | | |
| Lotebush (See Condalia) | | | | | | | | | | | | | | | | | | | | | | |
| Madrone, Pacific (*Arbutus menziesii*) | S | S-I | S | S | S-I | S | | R | | | | | | | | | | | | | | |
| Magnolia (*Magnolia* spp.) | | | | | | | | | | | | | | | | | | | | | | |
| cucumbertree (*M. acuminata*) | I | I | | I | S-I | | S-I | S | S | | | S | | | | | | | | | | |
| sweetbay (*M. virginiana*) | SR | R | S | S-R | I-R | | R | I-R | I | | | I | S-I | | | R | | | | | | |
| Mahonia, red (*Mahonia haematocarpa*) | | | | | S | | | | | | | | | | | | | | | | | |
| Manzanita (*Arctostaphylos* spp.) | S | S | | S | S | | R | R | | | | | | | | | | | | | | |
| Del Norte (*A. cinerea*) | | S | | | S | | | | | | | | | | | | | | | | | |
| greenleaf (*A. patula*) | | I | | | I | | | I | | | | | | | | | | | | | | |
| hairy (*A. columbiana*) | | S | | | S | | | | | | | | | | | | | | | | | |
| hoary (*A. canescens*) | | S | | | S | | | | | | | | | | | | | | | | | |
| Howell (*A. hispidula*) | | S | | | S | | | | | | | | | | | | | | | | | |

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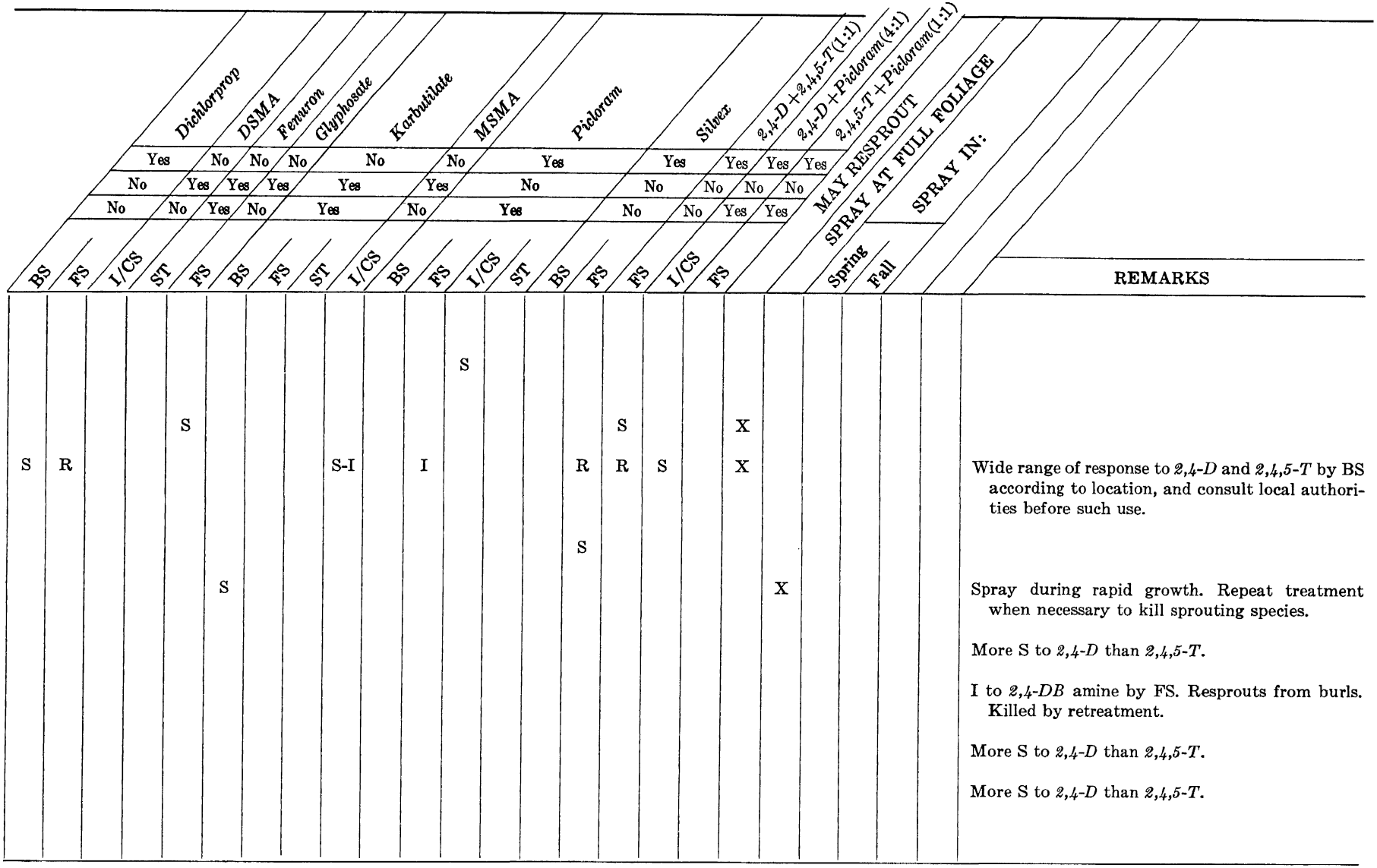
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*


Dichlorprop
DSMA
Fenuron
Glyphosate
Karbutilate
MSMA
Picloram
Silvex
2,4-D+2,4,5-T(1:1)
2,4-D+Picloram(4:1)
2,4,5-T+Picloram(1:1)
MAY RESPROUT
SPRAY AT FULL FOLIAGE
SPRAY IN:
Spring
Fall
REMARKS
Yes No No No No No Yes Yes Yes Yes Yes
No Yes Yes Yes Yes Yes No No No No No
No No Yes No Yes No Yes No No Yes Yes
BS FS I/CS ST FS BS FS ST I/CS BS FS I/CS ST BS FS FS I/CS FS
S R S S S-I I S R S X X X
S
S
Wide range of response to 2,4-D and 2,4,5-T by BS according to location, and consult local authorities before such use.
Spray during rapid growth. Repeat treatment when necessary to kill sprouting species.
More S to 2,4-D than 2,4,5-T.
I to 2,4-DB amine by FS. Resprouts from burls. Killed by retreatment.
More S to 2,4-D than 2,4,5-T.
More S to 2,4-D than 2,4,5-T.

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | | |
| Manzanita (Continued) | | | | | | | | | | | | | | | | | | | | | | |
| pine (*A. parryana* var. *pinetorum*) | | | | | S | | | S | | | | | | S | | | | | | | | |
| pointleaf (*A. pungens*) | | | | | | | | S-I | | | | | | S | | | | | | | | |
| pringle (*A. pringlei*) | | | | | | | | S-I | | | | | | | | | | | | | | |
| Maple (*Acer* spp.) | | | | | | | | | | | | | | | | | | | | | | |
| bigleaf (*A. macrophyllum*) | | | | | I-R | R | I | I-R | R | | | | | | I-R | | | | | | | |
| mountain (*A. spicatum*) | | | | | I-R | | | I | | | | | | | | | | | | | | |
| red (*A. rubrum*) | | | | R | R | I-R | I | I-R | | I | I | S | S | S | S-I | S | I-R | S-I | | | | |
| silver (*A. saccharinum*) | | | | I | I-R | | S | S-I | | S | S | S | S | S | | | | | | | | |
| sugar (*A. saccharum*) | | | | | I-R | R | S | S-R | | | S | S | | | S-I | | | S | | | | |
| vine (*A. circinatum*) | | | | | | | S | S-I | | | | | | R | | I-R | R | | R | | | |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | Spring | Fall | |
| | | | | | | | | | | | | | | | | | | | | | | | More S to *2,4-D* than *2,4,5-T*. |
| | | | I | | | | S | | | | | S | | S-I | | | | | | | | | Spray during active growth. |
| | | | | | | | | | | | | | | S-I | | | | | | | | | Spray during active growth. |
| | | | | | | | | S | | | S-I | | S-I | I | | | | | | | | | Use water/oil carrier in March. |
| | | | | | | | | | | | | | | | I | | | | | | | | |
| R | R | | I | S | S | | S | S-R | S | S-I | S-I | S-I | R | I-R | I-R | S | | X | | | | | Requires *2,4-D+2,4,5-T(1:1)* for fair control. Wide range of response to MSMA according to location and suggest consult local authorities before such use. |
| | | | S-I | | | | | | | S | | I | | | I | | | | | | | | |
| | | | | | | | | S-I | | | S-I | | | | R | | | | | | | | Wide range of S to *2,4,5-T* by FS according to location and suggest consult local authorities before such use. |
| I-R | R | | R | | | | I | | S | S | | I | S | I | | | | | | | | | Spray in May and June. |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Mesquite (*Prosopis juliflora*) | | | | I | I-R | | S | S | | R | R | R | | R | | S-I | S | | R | | | |
| honey mesquite (*P. juliflora* var. *glandulosa*) | | | | | S-I | S-I | S | S | S-I | | S | | | R | S | | S | S | | | | |
| Mountainmahogany (*Cercocarpus montanus*) | | | | | I | | | I | | | | | | I | | | | | | | | |
| birchleaf (*C. betuloides*) | | | | | | | | I-R | | | | | | I | | | | | | | | |
| hairy (*C. breviflorus*) | | | | | | | | I-R | | | | | | | | | | | | | | |
| Mulberry, red (*Morus rubra*) | | | | I-R | I-R | | I | I | | I | I-R | I | | I | | S | S-I | | | | | |
| Ninebark (*Physocarpus opulifolius*) | | | | | | | | | | | | | | | | | | | | | | |
| Oak (*Quercus* spp.) | | | | | | | | | | | | | | | | | | | | | | |
| bigelow (bigleaf shin) (*Q. durandii* var. *breviloba*) | | | | | | | | S | | | | | | | | | | | | | | |
| black (*Q. velutina*) | | | | S-I | I-R | R | S | S-I | S-I | S | S-I | S | S | S | S | S | S-I | | | | | | |
| blackjack (*Q. marilandica*) | | | | I | I-R | S | S | S-I | S | S | S | S | S | I | S | S | I-R | S | R | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | I | | I | | S-I | | S | | R | S | | R | S-I | S-I | S | | S | X | | | | | S to *monuron* by ST. Apply before expected rainfall. Foliar retreatment necessary in New Mexico and Arizona. S to *2,4,5-T+picloram(4:1)* by BS. |
| | S-I | S | | | | | S | S | | S | S | R | | S-I | | | S | X | | | | | R to most soil applied herbicides. Killed by basal treatment with diesel oil or kerosene. |
| | | | S-I | | | | | | | | | | | S-I | | | | X | | | | | |
| | | | I | | | | S | | | | | S | | I-R | | | | X | | | | | I-R to *2,3,6-TBA*. |
| | | | | | | | | | | | | | | I-R | | | | X | | | | | |
| I-R | I-R | | | | S | S | S | | S | S-I | | | I-R | I-R | I | | | X | | | | | |
| | | | | | | | | | | | | | | R | | | | | | | | | |
| | S | | | | | | | | | S | | | | S | | | | | X | X | | | Regrowth highly S to retreatment. |
| S-I | I-R | | S | S | S | | S | S | S | S-I | S | S-I | S | S-I | S-I | | | X | | | | | S to *silvex* by I/CS. |
| S-I | I | S | S | S | S | | S-I | S | S | I | S-I | I | S | S-I | S-I | S | | X | X | | | | S-I to *paraquat* by I/CS. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Oak (Continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| blue (*Q. douglasii*) | S | R | S | S | S-I | S | S | | I | | | R | | S | | | | | | | | | | | | | | | |
| bur (*Q. macrocarpa*) | I | I | | S | S-I | | S | S | S | | S | | | | | | | | | | | | | | | | | | |
| California black (*Q. kelloggii*) | | | S | S | I | S | I | R | | | | R | | | | | | | | | | | | | | | | | |
| California live (*Q. agrifolia*) | | | S | | | | | | | | | R | | | | | | | | | | | | | | | | | |
| California scrub (*Q. dumosa*) | I | I | | S | I | | S | S-I | S | | S | | | | | | | | | | | | | | | | | | |
| canyon live (*Q. chrysolepis*) | | I | S-I | | I | | | I | | | | R | | | | | | | | | | | | | | | | | |
| chestnut (*Q. prinus*) | S-I | I-R | I-R | S | I | S-I | S | S | S | S-I | S | S | S | S-I | S | | | | | | | | | | | | | | | |
| Emory (*Q. emoryi*) | I-R | | | | I-R | | | | | | S | | | | | | | | | | | | | | | | | | |
| Gambel (*Q. gambelii*) | | I-R | | S | I | | I | | S | | | | | I | | | | | | | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | | | | Glyphosate | | | | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | | | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | | | | No | | | | No | | | | No | | | | Yes | | | | Yes | | | | Yes | Yes | Yes | | | | |
| No | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | No | | | | No | | | | No | No | No | | | | |
| No | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | No | Yes | Yes | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | | | | | | | Spring | Fall | |
| S | S-I | | | | S-I | | | | S-R | | S | | S-I | S-I | | | | | | | | | | | | | | | | | | | | | Wide range of response to *picloram* and *fenuron* by BS and ST according to location, and suggest consult local authorities before such use. S-I to *karbutilate* by ST in sandy soils. S to *silvex* by I/CS. *Picloram* effective at lower dosage than *2,4-D* or *2,4,5-T*. Amines better than esters. Spray when growth most active and repeat in 2 years. |
| | | | | | | | | | | | | | | | S-I | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | S | | | I | | | | | | | | | | | | | | | | | | | | Use *2,4-D* amine. Killed by retreatment with *2,4,5-T* or *silvex*. |
| | | | | | S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Burn, then spray sprouts annually. Usually killed by two retreatments. |
| | | | | | | | | | | I | | | | | | | | | | | | | | | | | | | | | | | | | Killed by retreatment. |
| S-I | I-R | I | S | S | S | | S | S-I | S | I | S | S-I | | I-R | S-I | | | | | | | | | | | | | | | | | | | | |
| | | | I | | | | S | | | | | I | | I-R | | | | | | | | | | | | | | | | | | | | | I-R to *2,3,6-TBA*. |
| | | | | | | | | | S | | | S-I | S | I | | | | | | | | | | | | | | | | | | | | | S to *silvex*+*picloram* by FS. Repeat treatments. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | | |
| Oak (Continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| interior live (*Q. wislizenii*) | | I-R | S | S | I-R | S | I | R | | | R | R | | R | | | | | | | | | | | | | | |
| leather (*Q. durata*) | | I-R | | | I-R | | | | | | I | | | R | | | | | | | | | | | | | | |
| live (*Q. virginiana*) | I | R | | S-I | I-R | | S | I-R | S | S-I | S | | R | R | | | | | | | | | | | | | | |
| northern red (*Q. rubra*) | I | I-R | R | S | I-R | S-I | S | S-I | S | S | S-I | S | S | I | S | | | | | | | | | | | | | | |
| Oregon white (*Q. garryana*) | | | S | S | I | | | | | | | | | | | | | | | | | | | | | | | |
| overcup (*Q. lyrata*) | | | S | | | | | | | | | | | | | | | | | | | | | | | | | |
| Palmer (*Q. Chrysolepis* var. *palmeri*) | | I-R | | | I-R | | | | | | I | | | | | | | | | | | | | | | | | |
| pin (*Q. palustris*) | I | I | | S | I | | S | S | S | | S | | | I | | | | | | | | | | | | | | |
| post (*Q. stellata*) | S-I | I-R | S | S | S-I | S | S | S | S | S | S | S | S | S-I | S | R | | | | | | | | | | | | |
| red (See northern red) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| | Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D + 2,4,5-T (1:1) | 2,4-D + Picloram (4:1) | 2,4,5-T + Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| | No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| | No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |
| BS | | | | | | | | | | | | | | Spring | Fall | REMARKS |
| | I-R | | | | | | I-R | R | | | S | R | | S-I | S | | | | | | | | | Readily killed with retreatment. |
| | I-R | | R | | | | S-I | | | | | R | | I-R | | | | | | | | | | Readily killed with retreatment. |
| | R | | | S | S | S | | | | S-I | | S | | I-R | R | | | X | | | | | | Most S to *picloram* and *bromacil*. |
| I | I-R | | S-I | S | S | | S | | S | I | S | S-I | R | I | I-R | | | X | | | | | | Badly damaged in northwest by *2,4-D* or *2,4,5-T*, and cannot be used silviculturally (in forest management). |
| | | | | | | | | | | | | | | | | | | | | | | | | Use *2,4-D* amine. Stump spray. |
| | | | | | | | | | | | | | | | | S | | | | | | | | |
| | | | S-I | | | | S | | | | | I | | I-R | | | | X | | | | | | I-R to *2,3,6-TBA*. |
| R | I-R | | | | S | | | | S | S-I | | | R | I-R | I | | | X | | | | | | |
| S-I | S-I | S | S | S | S | S | S | S | S | I | S-I | S-I | S | S-I | S | S | S | X | X | X | | | | S-I to *paraquat* by I/CS. |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

| SPECIES | HERBICIDE† | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | Yes | | | No | | | Yes | | | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Oak (Continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| sand shinnery (*Q. havardii*) | I | I | | S-I | S-I | | I | I | | S | | | S | | | I | | R | | | | | | | | | | |
| scarlet (*Q. coccinea*) | S-I | I-R | S | S-I | I | S | S-I | I | | S | | | S | S | S | I | S | | | | | | | | | | | | |
| shrub live (*Q. turbinella*) | | I-R | | | I | | | | | | | | S | | | | | I | | | | | | | | | | | |
| Spanish (*Q. shumardii* var. *texana*) | I-R | I-R | | S-I | I | | S-I | S-I | | S | | | S | | | I | | | | | | | | | | | | | |
| swamp white (*Q. bicolor*) | I | I | | S-I | S-I | | S | S | | S | | | S | | | | | | | | | | | | | | | | |
| turkey (*Q. laevis*) | | I | | | S-I | | | | | S | | | S | | | | | | | | | | | | | | | | |
| valley (*Q. lobata*) | | | S | | | S | | | | | | | | | | | | | | | | | | | | | | | |
| Vasey shin (*Q. pungens* var. *vaseyana*) | | | | | S | | | | | | S | | | | | | | | | | | | | | | | | | |
| water (*Q. nigra*) | | R | S | | I-R | | | | | | | | S | | | | | | | | | | | | | | | | |
| white (*Q. alba*) | S-I | I-R | I | S | S-I | S | S | S | | S | S | | S | S-I | S | I | S | | | | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | Glyphosate | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | SPRAY AT FULL FOLIAGE | | MAY RESPROUT | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | No | No | | | | No | | | | Yes | | | | Yes | | Yes | Yes | Yes | | | | | |
| No | | | | Yes | | | | Yes | Yes | Yes | | | | Yes | | | | No | | | | No | | No | No | No | | | | | |
| No | | | | No | | | | Yes | No | Yes | | | | No | | | | Yes | | | | No | | Yes | Yes | | SPRAY IN: | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | Spring | Fall | | | |
| | I-R | | S-I | | | | | | | S-I | | S-R | | S | S-I | | S | | X | | | | | | | | | | Wide range of S to *picloram* by ST according to location, and suggest consult local authorities before such use. Spray during rapid growth. Repeat treatment as necessary. |
| S-I | I-R | S | | S | S | S | | S-I | S | S-I | S | | S | I | I | | | X | | | | | | | | | | | | |
| | | | S-I | | | | S | | | | | I | | I | | | | X | | X | | | | | | | | | | Spray during rapid growth. Repeat treatment following year. |
| | I-R | | S | | S | | | | | I | | | | I | | | | X | | | | | | | | | | | | Regrowth highly S to retreatment. |
| | | | | | S | | | | | | | | | | | | | X | | | | | | | | | | | | |
| | | | | | | | | | | S | | | | | | | | | | | | | | | | | | | | |
| | S | | | | | | | | | | | | | S | | | | X | X | X | | | | | | | | | | Regrowth highly S to retreatment. |
| | | | S-I | | | | | | | | | S-I | | I-R | | S | | | | | | | | | | | | | | |
| S-I | I | S | S | S | S | | S | S | S | S-I | S | S-I | S-R | I | I | S | | X | | | | | | | | | | | | Wide range of S to *silvex* by BS according to location, and suggest consult local authorities before such use. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Osageorange (*Maclura pomifera*) | I | I-R | S-I | S | S | S | I | R | I | | R | S | | I-R | | | | | | | | | | | | | | | |
| Pecan (*Carya illinoensis*) | I | I-R | | S | I-R | S | I | I-R | I | | I | | | | | | | | | | | | | | | | | | |
| Pecan, bitter (*Carya X lecontei*) | | | S-I | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Persimmon (*Diospyros* spp.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| common (eastern) (*D. virginiana*) | I-R | I | I | I | I | I-R | S-I | I | I | | I | S | S | S-I | S | S | | | | | | | | | | | | | |
| texas (*D. texana*) | | R | | S-I | R | | | R | | | | | S-I | R | | R | | | | | | | | | | | | | |
| Pinchot Juniper (See Redberry Juniper) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pine (*Pinus* spp.) | I | R | | I | R | | S | S | S | S | S | | S | I | | S | | | | | | | | | | | | | |
| digger (*P. sabiniana*) | | | S | | | S | | | | | | | | | | | | | | | | | | | | | | | |
| eastern white (*P. strobus*) | | | S | | | | | | | | | S | | | | | | | | | | | | | | | | | |
| loblolly (*P. taeda*) | | R | | | R | | | | | | | | | | | | | | | | | | | | | | | | |
| lodgepole (*P. contorta*) | | | | | | | | | | | | S | | | | | | | | | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | | | | Glyphosate | | | | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | | | | No | | | | No | | | | No | | | | Yes | | | | Yes | | Yes | Yes | Yes | | | | |
| No | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | No | | | | No | | No | No | No | | | | |
| No | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | No | Yes | Yes | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | | | | | Spring | Fall | |
| R | R | S | I-R | | | | | S | S | | S-I | | R | R | S | | | X | | | | | | | | | | | | | | | S-I to *paraquat* by I/CS. |
| | I-R | | | | | | | | | | | | | I-R | I-R | | | X | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | S | | | | | | | | | | | | | | | | | |
| R | I-R | S | S-I | | R | | S-I | S | S | S-I | S | S | I | I-R | | S | | X | | | | | | | | | | | | | | | S to *2,3,6-TBA* by FS. S to *paraquat* by I/CS. |
| | | | | | | | | | S | I | | S-I | | | | | | X | | | | | | | | | | | | | | | S to stump treatment. |
| I | R | | | S | S | S | S | | S | S | | S | R | R | I-R | | | | | | | | | | | | | | | | | | | S to *2,3,6-TBA* by FS. S to *fenuron* by BS. S to *monuron* by ST. Some defoliation but will recover from phenoxy herbicides. |
| | | | | | | | | | | | S | | | | | | | | | | | | | | | | | | | | | | | *2,4-D* and *picloram* equivalent in effectiveness. |
| | | | | | | | | S | | | S | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | S | | | | | | S-I | | | | R | | | | | | | | | | | | | | | | | | | | Some defoliation but will recover from phenoxy herbicides. |
| | | | | | | | | S | | | S | | | | | | | | | | | | | | | | | | | | | | | |

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | 2,4,5-T | AMS | Bromacil | Cacodylic Acid | Dicamba | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | Yes | No | No | No | Yes | |
| | | | | No | No | Yes | Yes | Yes | No | |
| | | | | No | No | No | Yes | No | Yes | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Pine (Continued) | | | | | | | | | | | | | | | | | |
| longleaf (*P. palustris*) | | | | | R | | | | | | S | | | | | | |
| pinyon (*P. edulis*) | | R | | | R | | S | S | | | | | | | | | |
| ponderosa (*P. ponderosa*) | | I-R | S | | I-R | | | | | | | S | | | | | |
| shortleaf (*P. echinata*) | | I | | | R | | | | | | S | | | | S | | |
| sugar (*P. lambertiana*) | | S | | | S | | | | | | | | | | | | |
| western white (*P. monticola*) | | | | | | | | | | | | | | | S | | |
| Plum, wild (*Prunus* spp.) | S-I | S-I | | S | I | | S | I | S | | S | | S | | | | |
| Poison ivy, common (*Rhus radicans*) | I | I | | S | S | | S | S | S | S | S | | | S | | | |
| Poison oak (*Rhus toxicodendron*) | I | I | | S | S-I | | S | S-R | S | S-I | S-I | | | | | | |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | Spring | Fall | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | S-I | S | | | | | | S-I | | S | | R | | | | | | |
| | | | S | | | | | | | | | | | R | | | | | | |
| | | | | | | | | S | | S-I | S | | | | | | | | | More sensitive than many pines but effectiveness minimized if treated after shoot growth, or by using lower dosages. |
| | | | S-I | S | | | | | | S-I | | S | | R | S-I | | | | | | Some defoliation but will recover from phenoxy herbicides. |
| | | | | | | | | | | | | | | | | | | | | S in spring and summer. |
| S-I | I | | | S | S | | S | | S | S | | | S | I | I-R | | X | | | |
| | I | | | S | S-I | | | | | S | | | | S-I | S | | X | | | S to *amitrole* by FS. |
| | S-R | | | S | S | | | | S | | | | | S-I | I | | | | | S-I to *amitrole* by FS. *Amitrole* and *glyphosate* are most effective when spraying is delayed until shoot elongation is slowed. Wide range of S to *AMS* and *dichlorprop* by FS, and suggest consult local authorities before such use. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | Bromacil | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | No | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | Yes | Yes | | | No | | | |
| SPECIES | | | | | | | | | | No | | | No | | | No | | Yes | No | | | Yes | | | |
| | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| Poison oak (Continued) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pacific poison oak (*R. diversiloba*) | | | | S | S-I | | R | R | | | | | | | | | | | | | | | | | |
| Poplar, balsam (*Populus balsamifera*) | S-I | I | | I | I | | S | S | S | | | S | | | | | | | | | | | | | |
| Prickly-ash, common (*Zanthoxylum americanum*) | I-R | R | | S-I | R | | S | I | S | | | S | | | | | R | | | | | | | | |
| lime (*Z. fagara*) | | R | | | R | | | | | | | | | | | | R | | | | | | | | |
| Privet, swamp (*Forestiera acuminata*) | | | S-I | | | | | | | | | | | | | | | | | | | | | | |
| Rabbitbrush (*Chrysothamnus* spp.) | | S-I | | | I-R | | R | R | S | | | S | | | | | S-I | | | | | | | | |
| big (rubber) (*C. nauseosus*) | | S | | | | | | | | | | | | | | | | | | | | | | | |
| Douglas (*C. viscidiflorus*) | | | | | | | | | | | | | | | | | | | | | | | | | |
| little (small) (*C. viscidiflorus* var. *stenophyllus*) | | S | | | | | | | | | | | | | | | | | | | | | | | |
| Raspberry, red (*Rubus idaeus*) | I-R | I-R | | S | S-I | | R | I-R | S | | | S | | | | | | | | | | | | | |
| Redbud, eastern (*Cercis canadensis*) | I-R | R | | S-I | I-R | | I | S-I | S | S | | | | | S | I | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | | | | Glyphosate | | | | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | | | | No | | | | Yes | | | | No | | | | Yes | | | | Yes | | | | Yes | Yes | Yes | | | | | |
| No | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | No | | | | No | | | | No | No | No | | | | | |
| No | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | Yes | Yes | | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | | I/CS | FS | | | | | | | | | | | | | | | | Spring | Fall | | |
| | | | | | | | | | S | S | | | | S | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | S | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| | R | | | | | | | | | R | | | | R | R | | | | | | | | | | | | | | | | | | | | S to *2,3,6-TBA* by FS. |
| | | | | | | | | | | R | | R | | R | | S | | | | | | | | | | | | | | | | | | | |
| | R | | | | S | | | | | S | | | | R | | | | | | | | | | | | | | | | | | | | | S to *2,4-D+picloram(6:1)* 2 pounds+⅓ pound per acre. Treat in spring when new growth is 3 inches long with *2,4-D*. |
| | | | | | S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | S | S | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| R | R | | | S | S | S | S | | S | I | | | | I-R | I-R | | | | | | | | | | | | | | | | | | | | | |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

| | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | AMS | | Bromacil | | Cacodylic Acid | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | No | | No | | No | | Yes | | | |
| | | | | No | | | No | | Yes | | Yes | | Yes | | No | | | |
| | | | | No | | | No | | No | | Yes | | No | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| Rhododendron (*Rhododendron* spp.) | | | | | | | | | | | | | | | | | | |
| rosebay (great laurel) (*R. maximum*) | | R | | S-I | R | | S | I | S | S | S | | | I-R | | | | |
| Rhodora (*R. canadense*) | | R | | | I-R | | S | S | S | | S | | | | | | | |
| Rose (*Rosa* spp.) | | R | | | S | | | R | | | | | | | | | | |
| Arkansas (*R. arkansana*) | R | R | | I-R | I | | R | R | R | | R | | | | | | | |
| California (*R. californica*) | | | | S-I | I | | R | R | R | | R | | | | | | | |
| Cherokee (*R. laevigata*) | | I | | | I | | R | R | R | | R | | | | | | | |
| Macartney (*R. bracteata*) | S | S-I | | | I | | R | R | R | | R | | | S-I | | | | |
| multiflora (*R. multiflora*) | | | | | S | | | | | | | | | | | | | |
| sunshine (*R. arkansan* var. *suffulta*) | | | | | S-I | | R | R | R | | R | | | | | | | |
| wild (*R. pisocarpa*) | | I | | | R | | | | | | | | | | | | | |
| woods (*R. woodsii*) | R | R | | I | S-I | | R | R | R | | R | | | | | | | |

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |

| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | Spring | Fall | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | | | S | | | | | | I-R | | | | R | R | | | | | |
| | R | | | S | | | | | | | | | | R | | | | | | |
| | | | | | S | | | | S-I | I | | | | I | | | | | | |
| | | | | | S | | | | | S | | S | | I | | | | | | S to *2,4-D+picloram(4:1)* by FS. S to *2,3,6-TBA* by BS. Spray from full leaf to bud stage with *2,4-D*. *Picloram* sprays effective in spring and fall, granules most months. |
| | | | | S | | | | | | S | | | | | S | | | | | Spray from full leaf to bud stage. Repeat treatment when necessary. |
| | | | | | | | | | | | | S | | | | | X | | | S to *2,3,6-TBA* and to *2,4-D+2,3,6-TBA(1:1)* by FS. Make two foliage treatments per growing season. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | Nonselective | | Selective | | 2,4-D | | 2,4,5-T | | AMS | | Bromacil | | Cacodylic Acid | | Dicamba | | |
| | | | | | | | Yes | | Yes | | No | | No | | No | | Yes | | |
| | | | | | | | No | | No | | Yes | | Yes | | Yes | | No | | |
| | | | | | | | No | | No | | No | | Yes | | No | | Yes | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | | |
| Russian-olive (*Elaeagnus angustifolia*) | | I | | | | | | | | | | | | | | | | | |
| Sagebrush (*Artemisia* spp.) | | | | | | | | | | | | | | | | | | | |
| big (*A. tridentata*) | | S | | | S | | R | R | | | | | | S | | | | | |
| California (*A. californica*) | | S | | | | | | | | | | | | | | | | | |
| fringed (*A. frigida*) | | S | | | | | | | | | | | | | | | | | |
| low (*A. arbuscula*) | | S | | | S | | | | | | | | | | | | | | |
| sand (*A. filifolia*) | | S | | | S | | R | R | S | | S | | | | | | | | |
| silver (*A. cana*) | | S | | | | | | | | | | | | | | | | | |
| threetip (*A. tripartita*) | | S | | | | | | | | | | | | | | | | | |
| Salal (*Gaultheria shallon*) | | R | | | R | | | | | I | | | | R | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | | DSMA | | | | Fenuron | | | | Glyphosate | | | | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | | | | No | | | | No | | | | No | | | | Yes | | | | Yes | | | | Yes | Yes | Yes | | | | |
| No | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | No | | | | No | | | | No | | | | No | No | No | | | | |
| No | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | No | | | | No | | | | No | Yes | Yes | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | | | | | | | Spring | Fall | |
| | | | | | | | | | | | | | | I | S-I | | | X | | | | | | | | | | | | | | | | | Repeat treatment following year for complete control. |
| | R | | | | S | | S | | | I | | | | I | | | | | | X | X | | | | | | | | | | | | | | S to *glyphosate* by BS. Spray during rapid growth. |
| | | | | | | | | | | S | | | | S | | | | | | | X | | | | | | | | | | | | | | Soil moisture and timing critical with phenoxy herbicides. Spray when new growth is 2 inches or more tall. Spray during rapid growth. |
| | S | | S | | S | | | | | S | | | | S | | | | | | | X | | | | | | | | | | | | | | Spray during rapid growth and when 6–8 inches new twig growth. Repeat if necessary. Spray after 3–4 inches new growth and when growing rapidly. |
| | | | | | | | | | | R | | | | S | | | | | | | | | | | | | | | | | | | | | Soil moisture and timing critical with phenoxy herbicides. |
| | R | | | | | | | | | I | | | | R | | | | | | | | | | | | | | | | | | | | | More S to *2,4,5-T* and *silvex* applied in diesel or fuel oil at bud break. |

HERBICIDE†

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

| | 2,4-D | | | 2,4,5-T | | | AMS | | Bromacil | | Cacodylic Acid | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soil Effective | Yes | | | Yes | | | No | | No | | No | | Yes | | | |
| Nonselective | No | | | No | | | Yes | | Yes | | Yes | | No | | | |
| Selective | No | | | No | | | No | | Yes | | No | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Salmonberry (*Rubus spectabilis*) | S | I-R | | S | S-I | | | | | | R | | | R | | R | |
| Saltcedar (five-stamen tamarisk) (*Tamarix pentandra*) | S | S-I | | S | S-I | | S | | S | | S | | R | S | | S | |
| Sassafras (*Sassafras albidum*) | S-I | S-I | | S-I | S-I | | S-I | S-I | I | S | I | | S | I | | | |
| Saw-palmetto (*Serenoa repens*) | | | | | S | | | | | | | | | | | | |
| Serviceberry (*Amelanchier* spp.) saskatoon (*A. alnifolia*) | | S-I | | S | S-I | | | S-I | S | | S | | | | | | |
| shadblow (*A. canadensis*) | S | S-I | | S | S-I | | | | S | I | S | | | S | | | |
| Silktassel (*Garrya* spp.) Wright (*G. wrightii*) | | | | | I-R | | | | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | REMARKS |
| | R | | | | | | S-I | | | S | | S-I | | S-I | | | | X | | | | | S-I to *amitrole* by FS. Treat in midsummer. |
| R | S-I | | S | | S | | S | | S | | | S | R | S-I | R | | | X | | | | | S to *monuron* by ST. More effective on young than old plants. Mechanical removal followed by treatment of regrowth more effective than herbicide alone. S to phenoxy herbicides when sprayed with ⅛ to ¼ pound per acre twice a year for 2 years. |
| S-R | I | | I | S | S | S | S | S-I | S | S | | S-I | S | I | I | | | X | | | | | S to *2,3,6-TBA* by FS. |
| | | | | | | | | | | | | | | | | | | | X | | | | S to kerosene by FS. Spray in summer months. |
| | | | | | | | | | | | | | | | S | | | | | | | | S-I to *2,4-DB* amine by FS. R to *2,3,6-TBA* and *amitrole* by FS. |
| | S-I | | | | | S | | | | S | | | | S-I | S | | | | | | | | |
| | | | I | | | | | | | | | | | I-R | S | | | X | | X | | | Treat regrowth in spring after burning. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | Dicamba | |
| | | | | Yes | | | Yes | | | No | | | No | | | No | | Yes | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | No | |
| | | | | No | | | No | | | No | | | Yes | | | No | | Yes | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | |
| Silktassel (Continued)<br>yellowleaf (*G. flavescens*) | | | | | I-R | | | | | | | S-I | | | | | | | |
| Silverberry (*Elaeagnus commutata*) | | S | | | S | | | | | | | | | | S | | | | |
| Snakeweed, broom (*Gutierrezia sarothrae*) | | S | | | I-R | | | | | | | | | | | | | | |
| Snowberry, western (*Symphoricarpos occidentalis*) | S-I | S | | S-I | I-R | | S-I | S-I | S | | S | | | R | | | | | |
| Soapweed, small (*Yucca glauca*) | | R | | S | I-R | | | | | | | | | | R | | | | |
| Sourwood (*Oxydendrum arboreum*) | S-I | I-R | I | S | I | | R | R | S | S | S | S | S | I-R | | | | | |
| Spicebush (*Lindera benzoin*) | S-R | I | | S | S-I | | S | S | S | | S | | | S | | | | | |
| Spirea (*Spiraea* spp.) | | R | | S | R | | | | | | | | | | | | | | |
| hardhack (*S. tomentosa*) | I | I | | I | I | | S-I | S-I | S | | S | | | | | | | | |
| narrowleaf meadowsweet (*S. alba*) | S-I | S-I | | S | S | | S-I | S-I | S | | S | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | DSMA | Fenuron | Glyphosate | Karbutilate | MSMA | Picloram | Silvex | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | | | | | |
| No | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | | | | | |
| No | No | Yes | No | Yes | No | Yes | No | No | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | Spring | Fall | |
| | | | I-R | | | | S-I | | | | | S | | I-R | | | | X | | | | | | |
| | | | | | | | | | | | | | | S | | | | | | | | | | Treat in early summer and repeat the following year. |
| | | | | | | | | | | S | | | | I | | | | | | X | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | S to *2,4,5-T+picloram(1:2)* by FS. Treat early spring. Timing of application critical with phenoxy herbicides. May treat in late summer or fall with *picloram*. |
| | S | | | | | | | | | R | | | | I-R | | | | | X | X | | | | |
| | R | | | | | | | | | R | | | S | S | | | | | | X | | | | Retreatment following year sometimes necessary. |
| S-I | I-R | | I | S | | | | S | S | S | | I | | I-R | I-R | | | | | | | | | Spray soon after full bloom. |
| | S-I | | | | | | | | | S | | | | S | S | | | X | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Wide range of S to *2,4-D* by BS according to location, and suggest consult local authorities before such use. |
| | | | | | | | | | | S | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | X | | | | | | |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Spruce (*Picea* spp.) | R | I-R | | I | I-R | | R | R | S | | S | | | I-R | | | S | | | | | | | | | | |
| Sitka (*P. sitchensis*) | | I-R | | | I-R | | | | | | | | | | | | | | | | | | | | | | |
| Sumac (*Rhus* spp.) | R | S | | S | S | | R | S-I | S | S | S | | S | S | | | | | | | | | | | | | |
| laurel (*R. laurina*) | S-I | S-I | | S-I | S-I | | S-I | S-I | S | | S | | | | | | | | | | | | | | | | |
| littleleaf (*R. microphylla*) | | S | | | S | | | | | | | | | S | | | | | | | | | | | | | |
| shining (*R. copallina*) | | | | R | | | | I | S-I | | S | | | | | | | | | | | | | | | | |
| skunkbush (*R. trilobata*) | | S-I | | S | S | | | | | | S | | | S-I | | | | | | | | | | | | | |
| sugar (*R. ovata*) | | | | | S-I | | | | | | S | | | | | | | | | | | | | | | | |
| Sweet-fern (*Comptonia peregrina*) | I | I | | S-I | S-I | | | S-I | S | | S | | | | | | | | | | | | | | | | |
| Sweetgum (*Liquidambar styraciflua*) | I-R | I-R | S | S | S-I | | S | S-I | S | S | S | | | S-I | S | | | | | | | | | | | | |
| Sycamore, American (*Platanus occidentalis*) | S-I | I | | S | S-I | | S-I | S-I | I | S | I-R | | S | S | | | | | | | | | | | | | |
| Tanoak (*Lithocarpus densiflorus*) | S | I-R | S-I | | I-R | S-I | | | | | | | | | | | | | | | | | | | | | |
| scrub (*L. densiflorus* var. *echinoides*) | | I | S | | I | S | | | | | | | | | | | | | | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | DSMA | | | Fenuron | | | Glyphosate | | | Karbutilate | | | MSMA | | | Picloram | | | Silvex | 2,4-D+2,4,5-T (1:1) | 2,4-D+Picloram (4:1) | 2,4,5-T+Picloram (1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | | | No | | | No | | | No | | | No | | | No | | | Yes | | | Yes | Yes | Yes | Yes | Yes | | | | |
| No | | | Yes | | | Yes | | | Yes | | | Yes | | | Yes | | | No | | | No | No | No | No | | | | | |
| No | | | No | | | Yes | | | No | | | Yes | | | Yes | | | No | | | No | No | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | Spring | Fall | | |
| | R | | | | | | S | | | I | | | S | | | R | R | | | | | | | | | | | | Most R when dormant. |
| R | S | | | S | S | | S | | S | S | | | | | | S | S I | | | X | | | | | | | | Top kill only—spray annually. |
| | | | | | | | | | | S | | S | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | S | | | | | S-I | | | | | | | | | | | S to *2,3,6-TBA* by FS. |
| | S-I | | I | | | | S | | | S | | S | | | S-I | | | | | X | | | | | | | | Spray during rapid growth. Repeat as necessary. |
| | | | S-I | | | | S | | | | | S | | | S-I | | | | | X | | | | | | | | |
| | | | | | S | | | | | | | | | | | | | | | | | | | | | | | | |
| I-R | I-R | | R | S | S | | S | | S | S-I | | S-I | S | | S-I | S-I | S | | | X | | | | | | | | |
| S | I | | | S | S | | S | | S | S | | | S | | S-I | S-I | | | | | | | | | | | | |
| | | | | | | | | S | | | S | | | | | | | | | X | | | | | | | | More than one treatment needed. |
| | | | | | | | | | | | | | | | | | | | | X | | | | | | | | |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | | | Nonselective | | | Selective | | | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | |
| | | | | | | | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | | | | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | | | | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| SPECIES | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | ST | I/CS | BS | FS | I/CS | BS | FS | I/CS | BS | FS | I/CS | ST | |
| Tarbush (*Flourensia cernua*) | | S-I | | | S-I | | | | | S-I | | | | | | S | | | | | I | | | | | S | | | |
| Thimbleberry, western (*Rubus parviflorus*) | | I-R | | I-R | S-I | | | | | | S | | | | | R | | | I-R | | I-R | | | | | | | | |
| Toyon (See Christmasberry) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tree-of-heaven (*Ailanthus altissima*) | S-R | S-I | | S | S-I | | I | I | | S | S | | S | S | | S | | | S | | S-I | | | | | | | | |
| Tree tobacco (*Nicotiana glauca*) | | S | | | | | S | S | | S | | | | | | S | | | | | | | | | | | | | |
| Tuliptree (See Yellow-poplar) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Viburnum (*Viburnum* spp.) | | | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |
| nannyberry (*V. lentago*) | R | R | | I | I-R | | I | I | | S-I | | | | | | S | | | | | | | | | | | | | | |
| rusty blackhaw (*V. rufidulum*) | R | I-R | | I | I | | I | I | | S-I | | | | | | S | | | | | | | | | | | | | | |
| southern arrowwood (*V. dentatum*) | R | I | | I | S-I | | I | I | | S | | | | | | S | | | | | S | | | | | | | | |

*S = Susceptible S-I = Susceptible to Intermediate I = Intermediate I-R = Intermediate to Resistant R = Resistant.
†Always check and double check *precautions* in this publication and on container label *before using any herbicide*

| Dichlorprop | | | | DSMA | | | | Fenuron | | | | Glyphosate | | | | Karbutilate | | | | MSMA | | | | Picloram | | | | Silvex | | | | 2,4-D+2,4,5-T(1:1) | | | | 2,4-D+Picloram(4:1) | | | | 2,4,5-T+Picloram(1:1) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | | No | | | | No | | | | No | | | | No | | | | No | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | | | | |
| No | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | Yes | | | | No | | | | No | | | | No | | | | No | | | | | | | |
| No | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | Yes | | | | No | | | | Yes | | | | Yes | | | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | | | | | | | | | | | | SPRAY IN: | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | MAY RESPROUT | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | SPRAY AT FULL FOLIAGE | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Spring | Fall | | REMARKS |
| | R | | S | | | | | | | | | S-I | | R | | | | | | | | | | | | | | | | | | | | | | | | | S to *fenuron-TCA*, *monuron*, and *monuron-TCA* by ST. S-I to *2,4-D+dicamba(4:1)* by FS. Spray in pre-bud or bud stage. ST before expected rainfall. |
| I-R | I-R | | | | | | | | | S | | | I-R | S-I | S | | | X | | | | | | | | | | | | | | | | | | | | | I-R to *amitrole* by FS. Treat in mid-summer. |
| S-I | S-I | | | S | S-I | | | | S | S-I | | | | I | S | | | X | | | | | | | | | | | | | | | | | | | | | Wide range of S to *2,4-D* by BS according to location, and suggest consult local authorities before such use. |
| | | | | S | S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | R | | | X | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | R | | | | | | | | | | | | | | | | | | | | | | | | |
| | I | | | | | | | | | S | | | | S-I | S-I | | | X | | | | | | | | | | | | | | | | | | | | | |

APPLICATION METHODS
BS = Basal Spray
FS = Foliar Spray
I/CS = Injection/Cut Surface Treatment
ST = Soil Treatment

HERBICIDE†

| SPECIES | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | | Dicamba | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | | Yes | | | No | | | No | | | No | | | Yes | | | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | | No | | | |
| | | | | No | | | No | | | No | | | Yes | | | No | | | Yes | | | |
| | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | | | |
| Virginia creeper (*Parthenocissus quinquefolia*) | | | | | S | | | S | | R | R | R | | R | | | | | | | | |
| Wait-a-minute-bush (*Mimosa biuncifera*) | | | | | R | | | I | | | | | S | S | | | S | | | | | |
| Walnut (*Juglans* spp.) | | | | S | S | | S | S | | S | S | S | S | S | | | S | | | | | |
| Waterlocust (*Gleditsia aquatica*) | | | | | | S | | | | | | | | | | | | | | | | |
| Waxmyrtle, southern (*Myrica cerifera*) | | | | | I-R | | R | I-R | | R | I | I | | I | | | R | | | | | |
| Weaversbroom (*Spartium junceum*) | | | | S | S | | S | S | | | | | | | | | | | | | | |
| Whitebrush (*Aloysia lycioides*) | | | | | I | | S | R | | | | | I | S | | S-I | I | | R | | | |
| Willow (*Salix* spp.) | | | | S | S | S | S | S-I | S | S | S-I | | | | | | | | | | | |
| black (*S. nigra*) | | | | S | S | | S | S | | S | S | S | S | S | | | S-I | | | | | |
| coyote (*S. exigua*) | | | | S | S | | S | S | | S | S | S | | S | | | | | | | | |
| peachleaf (*S. amygdaloides*) | | | | S | S | | S | S | | S | S | S | | S | | | | | | | | |
| sandbar (*S. interior*) | | | | S | S | | S | S | | S | S | S | | S | | | | | | | | |

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†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*

| Dichlorprop | | | DSMA | | | Fenuron | | | Glyphosate | | | Karbutilate | | | MSMA | | | Picloram | | | Silvex | | 2,4-D+2,4,5-T(1:1) | 2,4-D+Picloram(4:1) | 2,4,5-T+Picloram(1:1) | MAY RESPROUT | SPRAY AT FULL FOLIAGE | SPRAY IN: | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | | | No | | | No | | | No | | | No | | | No | | | Yes | | | Yes | | Yes | Yes | Yes | | | | | |
| No | | | Yes | | | Yes | | | Yes | | | Yes | | | Yes | | | No | | | No | | No | No | No | | | | | |
| No | | | No | | | Yes | | | No | | | Yes | | | No | | | Yes | | | No | | No | Yes | Yes | | | | | |
| BS | FS | I/CS | ST | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | BS | FS | FS | I/CS | FS | | | | | | | | | | Spring | Fall | |
| | | | | S | | | | | | | | | S | | | | | | | | | | | | | | | | |
| | R | | R | | | | S | | | S | | S | | I-R | | | S | | X | X | | | | Apply to individual plants when adequate soil moisture. |
| | S | | | | S | | | | | S | | | | S | S | | | | | | | | | | | | | |
| | I-R | | | | S | S | S | | | | S-I | | | | I-R | R | | | X | | | | | | | | | |
| | | | | | | | | | S | S | | S | | R | | | | X | X | | | | | | | | | I to *MCPA* by FS. |
| S | | | | | S | | S | . | | S | | | S | S-I | | | | | X | X | | | | | | | Retreatment often necessary. |
| | S | | | | | S | | | | S | | | | S | S | | | | X | | | | | | | | | |
| | S | | | | | | | | | | | | | | | | | | X | | | | | | | | | Retreatment often necessary. |

| APPLICATION METHODS<br>BS = Basal Spray<br>FS = Foliar Spray<br>I/CS = Injection/Cut Surface Treatment<br>ST = Soil Treatment | HERBICIDE† | | | | | | | | | | | | | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil Effective | Nonselective | Selective | 2,4-D | | | 2,4,5-T | | | AMS | | | Bromacil | | | Cacodylic Acid | | Dicamba | |
| | | | | Yes | | | Yes | | | No | | | No | | | No | | Yes | |
| | | | | No | | | No | | | Yes | | | Yes | | | Yes | | No | |
| | | | | No | | | No | | | No | | | Yes | | | No | | Yes | |
| SPECIES | | | | BS | FS | I/CS | BS | FS | I/CS | BS | FS | BS | FS | ST | I/CS | BS | FS | I/CS | ST | |
| Willow (Continued)<br>whiplash (*S. caudata*) | | | | S | S | | S | S | | S | S | S | | S | | | | | | |
| Witchhazel, common (*Hamamelis virginiana*) | | | | | | | S | | | | S | S | | S | | | | | | |
| Wolfberry (*Lycium trifoliolata*) | | | | | R | | | R | | | | | | | | | R | | | |
| Wormwood, common (*Artemisia absinthium*) | | | | | S-I | | | S | | | | | | | | | | | | |
| Yaupon (*Ilex vomitoria*) | | | | S-I | R | | S-I | I-R | | S-I | I | S-I | S-I | S-I | | S-I | R | | | |
| Yellow-poplar (*Liriodendron tulipifera*) | | | | | | S-I | S | | S-I | | S | S | | S | | | | | | |
| Yerbasanta (*Eriodictyon* spp.)<br>California (*E. californicum*) | | | | | S-I | | | | | | | | | | | | | | | |
| narrowleaf (*E. angustifolium*) | | | | | | | | S | | | | | | | | | | | | |
| Yucca (*Yucca* spp.) | | | | | | | S | I | | | | | | | | | | | | |

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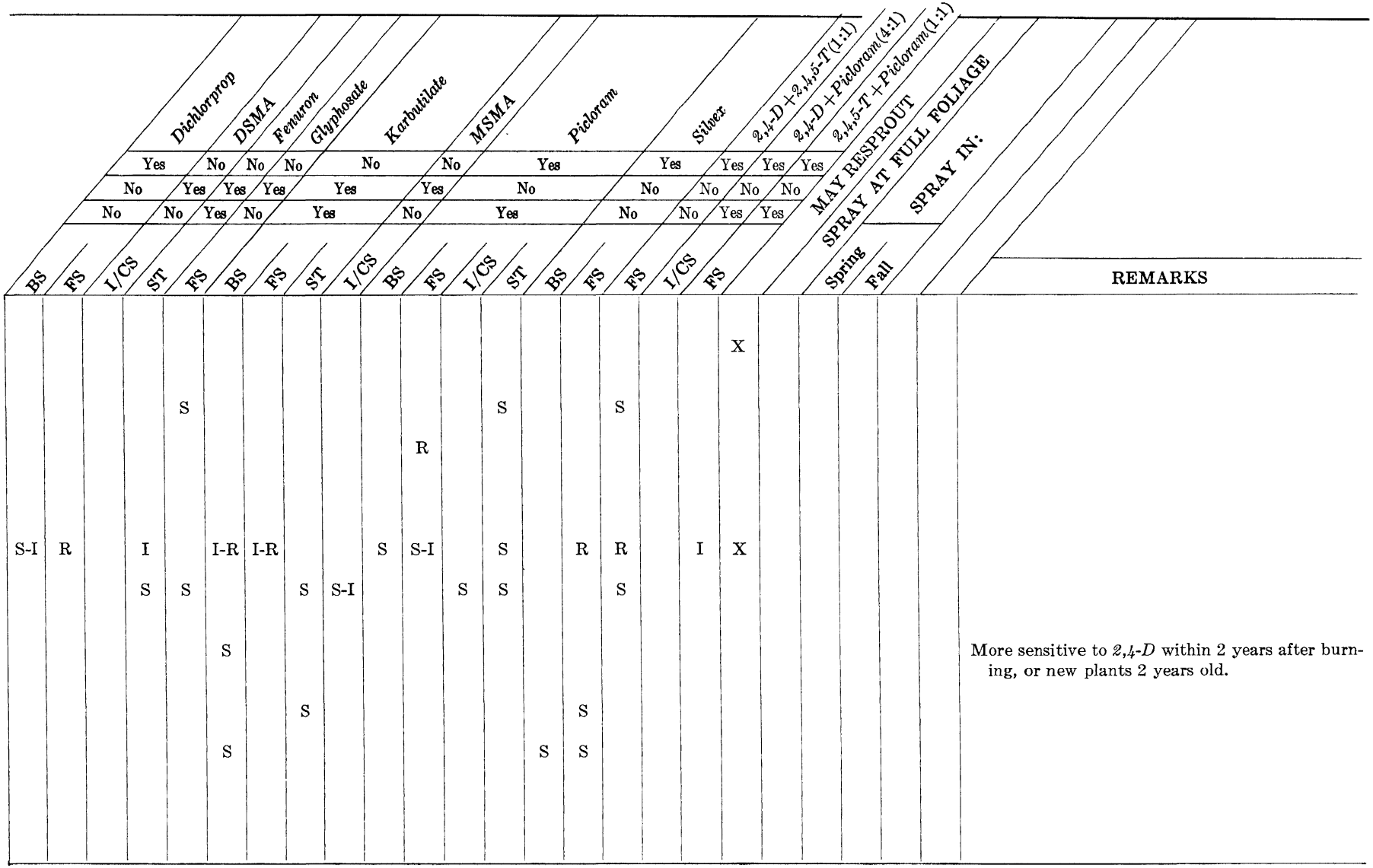
†Always check and double check *precautions* in this publication and on container label *before using any herbicide.*


Dichlorprop
DSMA
Fenuron
Glyphosate
Karbutilate
MSMA
Picloram
Silvex
2,4-D+2,4,5-T(1:1)
2,4-D+Picloram(4:1)
2,4,5-T+Picloram(1:1)
MAY RESPROUT
SPRAY AT FULL FOLIAGE
SPRAY IN:
Spring
Fall
REMARKS
Yes No No No No No Yes Yes Yes Yes Yes
No Yes Yes Yes Yes Yes No No No No No
No No Yes No Yes No Yes No No Yes Yes
BS FS I/CS ST FS BS FS ST I/CS BS FS I/CS ST BS FS FS I/CS FS
S-I R I S S I S I-R S I-R S S-I S S-I S S S R S R S I X X
More sensitive to 2,4-D within 2 years after burning, or new plants 2 years old.

## CONTRIBUTORS

Harold P. Alley
Professor, Weed Science
Plant Science Division
*The University of Wyoming*
Laramie, Wyo. 82071

R. W. Bovey
Research Leader
*USDA, ARS*
Dept. of Range Science
Texas A&M University
College Station, Tex. 77843

Homer A. Brady
Research Soil Scientist
*USDA, Forest Service*
Southern Forest Experiment Station
2500 Shreveport Highway
Pineville, La. 71360

W. E. Chappell
Professor, Plant Physiology
Dept. of Plant Pathology and Physiology
*Virginia Polytechnic Institute and State University*
Blacksburg, Va. 24061

H. O. Coble
Assistant Professor, Extension
Dept. of Crop Science
Weed Science Center
*North Carolina State University*
Raleigh, N.C. 27607

E. H. Cronin
Plant Physiologist
*USDA, ARS*
Dept. of Range Science
Utah State University
Logan, Utah 84322

Bill E. Dahl
Professor
Dept. of Range & Wildlife Management
*Texas Tech University*
Lubbock, Tex. 79409

Robert A. Darrow
Research Leader
*USDA, ARS*
Weed Physiology and Growth Regulator Research
Frederick, Md. 21701

E. A. Davis
Plant Physiologist
*USDA, Forest Service*
Rocky Mountain Forest and Range
Experiment Station
Forest Hydrology Laboratory
Arizona State University
Temple, Ariz. 85281

Harry M. Elwell (Retired)
Research Agronomist
USDA, ARS
Dept. of Agronomy
*Oklahoma State University*
Stillwater, Okla. 74074

Lambert C. Erickson (Retired)
Professor & Agronomist
Dept. of Plant and Soil Sciences
*University of Idaho*
Moscow, Idaho 83843

C. E. Fisher (Retired)
Professor, Brush Control
*Texas A&M University*
Agricultural Research and Extension Center
Lubbock, Tex. 79401

Walter L. Gould
Associate Professor
Dept. of Agronomy
*New Mexico State University*
Las Cruces, N. Mex. 88003

H. J. Gratkowski
Research Forester
*USDA, Forest Service*
Pacific Northwest Forest and Range Experiment
Station
Portland, Oreg. 97208

Carlton H. Herbel
Research Leader
*USDA, ARS*
Dept. of Animal, Range & Wildlife Sciences
New Mexico State University
Las Cruces, N. Mex. 88003

T. J. Hernandez
Product Manager
Agrichemicals & Biochemicals Dept.
*E.I. duPont de Nemours & Company*
Wilmington, Del. 19898

Robert E. Higgins
Extension Agronomist
*University of Idaho*
634 Addison Ave. W.
Twin Falls, Idaho 83301

G. O. Hoffman
Range Brush & Weed Control Specialist
*Texas Agricultural Extension Service*
Dept. of Range Science
Texas A&M University
College Station, Tex. 77843

Harvey A. Holt
Assistant Professor
Dept. of Horticulture & Forestry
*University of Arkansas*
Fayetteville, Ark. 72701

Dayton L. Klingman
Chief, Turfgrass Laboratory
Plant Genetics & Germplasm Institute
*USDA, ARS*
Beltsville, Md. 20705

E. F. Koldenhoven
Project Manager—Herbicides
*FMC Corporation*
Agricultural Chemical Division
100 Niagara Street
Middleport, N.Y. 14015

Oliver A. Leonard (Deceased)
Lecturer & Professor of Botany
Dept. of Botany
*University of California*
Davis, Calif. 95616

M. K. McCarty
Research Agronomist
*USDA, ARS*
Dept. of Agronomy
University of Nebraska
Lincoln, Nebr. 68503

E. H. McIlvain
Research Leader
*USDA, ARS*
U.S. Southern Great Plains Field Station
Woodward, Okla. 73801

R. E. Meyer
Plant Physiologist
*USDA, ARS*
Dept. of Range Science
Texas A&M University
College Station, Tex. 77843

Robert C. Moreau
Project Manager
*Velsicol Chemical Corporation*
341 East Ohio Street
Chicago, Ill. 60611

Howard L. Morton
Research Leader
*USDA, ARS*
2000 East Allen Road
Tucson, Ariz. 85719

Michael Newton
Associate Professor, Forest Ecology
School of Forestry
*Oregon State University*
Corvallis, Oreg. 97331

Fred. A. Peevy
Research Forester
*USDA, Forest Service*
Southern Forest Experiment Station
2500 Shreveport Highway
Pineville, La. 71360

E. J. Peters
Research Agronomist
*USDA, ARS*
Dept. of Agronomy
University of Missouri
Columbia, Mo. 65201

W. C. Robocker
Research Agronomist
*USDA, ARS*
Dept. of Agronomy & Soils
Washington State University
Pullman, Wash. 99163

Robert M. Romancier
Assistant Director
*USDA, Forest Service*
Pacific Northwest Forest & Range Experiment Station
Portland, Oreg. 97208

J. L. Schuster
Professor & Head
Dept. of Range Science
*Texas A&M University*
College Station, Tex. 77843

C. J. Scifres
Associate Professor
Dept. of Range Science
*Texas A&M University*
College Station, Tex. 77843

John P. Sterrett
Plant Physiologist
*USDA, ARS*
Weed Physiology and Growth Regulator Research
Frederick, Md. 21701

Ronald Stewart
Project Leader
*USDA, Forest Service*
Pacific Northwest Forest & Range Experiment Station
Portland, Oreg. 97208

Jim Stritzke
Associate Professor
Dept. of Agronomy
*Oklahoma State University*
Stillwater, Okla. 74074

John F. Vallentine
Professor of Range Science
Dept. of Range Science
*Brigham Young University*
Provo, Utah 84601

## WARNING

Herbicides are safe when stored, handled, mixed, and used in accordance with label instructions and sound agricultural practices. Most herbicides are low in toxicity. However, some are poisonous to man, many domestic animals, and fish and wildlife.

Keep herbicides away from children, livestock, and pets. Store herbicides in closed, well-labeled containers in a dry place where they cannot contaminate food, feed, seed, plant material or water. Follow the directions and heed all precautions on labels.

When handling herbicides, wear clean, dry clothing. Launder clothing after each spraying operation before wearing it again.

Do not inhale herbicides and avoid contact with spray mist and drift. Avoid repeated or prolonged contact of herbicides with the skin. Avoid spilling herbicides on any part of the body—especially the eyes, nose and mouth. If there is a herbicide spill on any part of the body, wash with soap and water immediately and remove contaminated clothing.

To protect fish, wildlife, and livestock, do not spray, clean spray equipment of dump excess spray material in or near lakes, streams, or ponds.

Dispose of empty pesticide containers at a sanitary land-fill dump, or crush and bury them at least 18 inches deep in a level, isolated place where they will not contaminate water supplies. Do not burn herbicide containers.



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