

CHEMICAL CONTROL OF BRUSH  
IN OKLAHOMA

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There are many different brush problems in Oklahoma, each requiring different control methods. The success of most brush control programs will depend upon using the control method best adapted to each individual brush problem.

A large number of different kinds of undesirable woody plants are growing in the state. Some species are easy to control with chemicals. Others must have several treatments, and some are resistant to all chemicals now being used.

Some brush areas in Oklahoma should not be disturbed. Removal of this natural cover on steep slopes, stony or sandy land would result in severe soil erosion.

On some range land, the cost of killing brush may be too great to offset returns from increased grass production.

In some of the brush land, native grasses are present and ready to cover the soil when the brush is killed. The natural reseeding of grasses will allow treatment of standing trees, and it will not be necessary to remove them. Where good grasses are not present to take over, the brush must be removed to allow planting and fertilizing machinery to operate.

Some operators have only a few acres of brush to kill, and others may desire to destroy large areas on range land.

Thus it is impossible to recommend one general method of brush control that will be effective and suitable under all conditions. This publication summarizes presently available information resulting from the Experiment Station's current research on use of chemicals in controlling brush.

### RESEARCH UNDER WAY

Intensive tests on blackjack and post oak are in progress on the Lake Carl Blackwell area six miles west of Stillwater. Persimmons and oaks have been treated at the Pasture Fertility Research Station near Coalgate, and are now being treated in Lincoln County.

Several chemicals are being tested at each location. Each chemical is being applied at different rates to find the lowest rate that will be effective. Each is also applied at monthly intervals to find the time of year when it will do the best job of killing the brush.

Methods of application being tested include foliage sprays by ground equipment and airplanes, spraying in axe cuts on large trees and on the base of smaller trees, and application on stumps and sprouts. Airplane applications are being made at four locations in Oklahoma as part of a regional project in which the Station is cooperating with several units of the U. S. Department of Agriculture and with the

Aerial Applicator's Association. Tests are under way in cooperation with land-owners at two locations in Osage County and one location each in Creek and Grady counties.

Many other kinds of brush and trees have been treated at several other locations in the state. Some of these include sumac, buckbrush, willow, wild plum, sassafras, poison oak and ivy, and bois d'arc.

Agricultural engineers at this Station have research under way on equipment for applying chemicals in controlling brush. This work at present is aimed primarily at reducing the cost and increasing the effectiveness of such machinery.

Extensive research on the use of chemicals in brush control has also been done at Guthrie and Woodward in cooperation with the U. S. Department of Agriculture. Most recent report on the Guthrie work is given in Mimeographed Circular M-240, "Experiments on Brush Control of Hardwoods for Grass Production." The work at Woodward and vicinity is summarized in a mimeographed progress report by E. H. McIlvain and D. A. Savage, "Brush and Weed Control Investigations on Rangeland of the Southern Great Plains," dated February 13, 1952. The latter deals primarily with sand sagebrush, skunkbrush, and shinnery oak.

Major research on mesquite control has been done in Texas, where this shrub is much more of a pest than it is in Oklahoma. Control recommendations are summarized in the Texas Agricultural Experiment Station's mimeographed Progress Report 1465, "Mesquite Control."

### CHEMICALS FOR BRUSH CONTROL

#### 2, 4-D and 2, 4, 5-T

2, 4-D, which has been widely used for control of broadleaf weeds in crops and pastures, is also effective on certain kinds of brush. 2, 4, 5-T is similar to 2, 4-D and is receiving considerable attention for brush control. Both chemicals can be used as foliage sprays or for dormant treatments.

Commercial brush sprays usually contain a mixture of 2, 4-D and 2, 4, 5-T. The chemicals can also be purchased separately as either ester or amine formulations. The esters are used more often for brush control because they mix with oil readily and appear to be more effective on brush. These materials come in liquid form and usually contain about four pounds of the actual chemical per gallon. The cost of 2, 4, 5-T is about 2 1/2 times that of 2, 4-D. When 2, 4-D and 2, 4, 5-T are mixed commercially, the mixture is usually referred to as "brushkiller."

These materials are harmless to livestock and affect established grasses very little, even when used at the high rate necessary for brush control. The great danger in using 2, 4-D or 2, 4, 5-T is drifting of the chemical to susceptible crops at the time of spraying. Some of the esters form a gas that may be carried by the wind several hours after the spray is applied. The low volatile esters of 2, 4-D and 2, 4, 5-T now on the market have decreased the danger from volatilization and appear to be more effective on the brush.

### Ammate

"Ammate" (ammonium sulfamate) is a dry powder, soluble in water, used for foliage sprays. It is used occasionally on cut surfaces of trees and stumps. Heavy applications of Ammate will kill grasses. However, it is non-poisonous; and danger from drift to other crops is not as great as with 2,4-D and 2,4,5-T.

Ammate is generally too expensive to use as a foliage spray for brush on pasture lands. Its greatest use is along highways, highlines, fence rows, and in pecan groves, or near crops that 2,4-D and 2,4,5-T might damage. It is sprayed with ground equipment, because a large amount of spray is necessary to thoroughly cover all leaves.

### Arsenic

Arsenic compounds have been used widely for killing large trees. The poison is applied as a liquid, in gashes cut completely around the tree with an axe. Arsenic is extremely poisonous to man and animals. It can be applied best in the fall months, and livestock must be kept out of the area until the next grazing season or until rains have leached the poison into the soil. Arsenic stock solution can be purchased or prepared. Blackjack and post oak resprout after arsenic is used. The best use for it is on very large trees, applied during the growing season.

## METHODS OF APPLYING CHEMICALS

### Foliage Sprays

Results of both airplane and ground applications of 2,4-D and 2,4,5-T on leaves of scrub oak have been erratic in Oklahoma. Results of some applications are encouraging, while the same application at another location, or at another time, will be unsatisfactory.

Tests on oaks at the Lake Carl Blackwell area indicate that 2,4,5-T is more effective than 2,4-D. Two pounds (one-half gallon commercial material) in ten gallons of diesel oil per acre, applied by airplanes, caused most of the leaves to fall and permitted native grasses to grow. However, there was much resprouting, and the heavy growth of underbrush present was less effectively controlled by the spray. Retreatments will be necessary to keep the brush under control.

One and one-half to two pounds of low volatile ester 2,4,5-T in one gallon of oil and four gallons of water per acre is suggested for airplane treatments on oak. If a mixture of 2,4-D and 2,4,5-T is used, three pounds per acre is suggested. Retreatments will be necessary, but the time and amount of material used will depend on the results of the initial spraying. Retreatments may be delayed for two years if a good top kill was secured on the first flight.

Persimmons have been resistant to foliage sprays. The leaves will shed, but new growth soon appears.

Tests on sumac, buckbrush, locust, and sassafras show that 2,4-D alone is effective. One to two pounds of this chemical should be used per acre.

A good spray for mixed brush with ground equipment would be one pound each of 2, 4-D and 2, 4, 5-T, or one-half gallon (2 pounds) of commercial "brush-killer" in one hundred gallons of water. This material should be sprayed on all leaves until they are thoroughly wet. It is possible to spray underbrush more thoroughly with ground equipment than with the airplane.

The best time for foliage applications with 2, 4-D and 2, 4, 5-T apparently is when growing conditions are good and just after the leaves have reached full growth. May and June are usually the best months.

"Ammate" can be used over a longer period of time (May, June, and July) than either 2, 4-D or 2, 4, 5-T. Use one pound of "Ammate" in one gallon of water and wet all leaves thoroughly with the spray.

"Ammate" is recommended for controlling poison oak or poison ivy.

### Basal Treatments

Encouraging results are being obtained from the use of chemicals on brush during the fall and winter months. Basal applications are made by spraying the chemicals on all the bark of the trees near the ground surface, as shown in Figure 1. Basal treatments should be used only on trees four inches or less in diameter.

Tests on oak, persimmon and many other trees indicate that December, January, February and March are the best months for basal treatment. The best results were secured in December for persimmons and in December to March for oaks. Basal sprays in the spring and summer months have not been encouraging on oaks and persimmons.

Suggested rates are one gallon (four pounds) 2, 4, 5-T or brushkiller (2, 4-D and 2, 4, 5-T mixture), mixed with 30 to 40 gallons of oil. 2, 4, 5-T alone should be used on persimmons. Tests show that kerosene and diesel fuel oil are equally good as carriers; however, diesel oil has been used in most of the tests conducted by the Oklahoma Agricultural Experiment Station.

The amount of spray applied to each tree is important, and good coverage is necessary. The table on page 7 will be helpful in determining rates of application and amount of material needed.

A 3-gallon knapsack sprayer with a flat spray nozzle has been used for the Oklahoma Station tests. Some farmers are using a paint brush to apply the chemical; others are using a series of hoses from a motor-driven sprayer.

Persimmons resprout more after basal treatments than oak.

Spraying the branches during the dormant period has been disappointing on all brush species, with both ground and airplane applications.

Trees given basal treatment in the dormant period die slowly, and will usually leaf out the following spring. The trees should be allowed to stand for one year to secure a kill.

### Frill Treatments

Frill treatments are made by applying the chemical in shallow axe gashes (frills) cut all around the base of the tree near the ground, as shown in Figure 2.

This treatment is the surest way of killing trees, and is recommended for trees over 5 inches in diameter. Arsenic has been used this way in the past. For scrub oak and persimmons, 2, 4, 5-T in frills is superior to arsenic as it allows less resprouting. However, for very large trees, especially elm, arsenic will kill the top growth without too much resprouting.

For oaks and persimmons, one gallon (four pounds) 2, 4, 5-T in 20 to 25 gallons of oil is suggested. It will take more labor to make the gashes, but it takes less material to kill the trees.

Where both large and small trees are growing in the same area, both basal and frill treatments should be used.

Frill treatments can be made over a longer period of the year than basal applications. Frill treatments were effective in August, September, and October, as well as in December through March.

### Stump Treatments

Improvement of mechanical methods has encouraged the sawing of trees and complete removal of brush from the land. If tree stumps are not treated, they will quickly resprout, and each stump will produce from five to fifteen new plants. In four to five years the land will have a cover of brush that will be more difficult to control than the original trees.

In tests on the Lake Carl Blackwell area, oak resprouting has been reduced materially with 2, 4, 5-T plus 2, 4-D in diesel oil. Ammate kept down some of the sprouts, but was not as effective as the 2, 4, 5-T and 2, 4-D mixture. None of the chemicals has given complete control of sprouts on stumps, but partial control may justify stump treatment.

The tree should be sawed near the ground and the spray applied on the bark and outer edge of the stump, as shown in Figure 3. The amount used would be similar to that for frill treatment on a tree of the same size. The spray material should be applied immediately after the trees are sawed down. Test results are not conclusive enough to suggest the best time of year.

In many brush areas, especially in eastern Oklahoma, native grasses are not present to revegetate the soil after the trees are killed. Under those conditions it may be desirable to cut the trees near the ground, treat the stumps, and plant desirable pasture crops. If well fertilized and properly grazed, these crops will do much to keep the sprouts under control. A farmer can afford to mow this type of pasture once a year to keep the tree sprouts and weeds down.

Suggested Concentrations and Rates

Oak --

For airplane application, use 1 1/2 to 2 pounds 2, 4, 5-T low volatile ester in 1 gallon oil plus 4 gallons of water per acre when leaves reach full size (May or June). Treat only where good native grasses are present to revegetate the soils. Retreatments will be necessary.

For ground equipment, use 2 to 4 lbs. 2, 4, 5-T in 100 gallons of water for foliage spray. One gallon (4 pounds) 2, 4, 5-T or brushkiller (2, 4-D and 2, 4, 5-T mixture) in 30 to 40 gallons of diesel fuel for basal spray. For frills or stumps, use 1 gallon in 20 to 25 gallons fuel oil. Expect some resprouting from all treatments. First year sprouts are more difficult to control than older sprouts.

Persimmon -- 1 gallon 2, 4, 5-T (4 pounds) in 20 to 25 gallons diesel fuel applied in frills and on stumps.

Willow and Locust -- 1/2 gallon (2 pounds) 2, 4-D ester in 100 gallons of water. Spray all leaves thoroughly. Expect good top kill but resprouting from roots.

Buckbrush and Sumac -- 1 to 2 pounds of 2, 4-D ester per acre applied by most convenient method.

Hickory -- More resistant than oaks.

Sassafras -- 2 pounds of brushkiller or 2, 4-D alone in 100 gallons water, sprayed on leaves.

Large Trees -- Frill and use arsenic in gashes.

Bois d'arc -- Use only 2, 4, 5-T as outlined for oaks.

Mixed Brush -- Use 2 to 4 pounds brushkiller in 100 gallons of water and spray full grown leaves.

Brambles -- (blackberries, green briars, wild roses) Use only 2, 4, 5-T as foliage spray (2 to 4 pounds in 100 gallons of water).

Sand Sagebrush, Skunkbrush, and Shinnery Oak -- See Progress Report February 13, 1952, U. S. Southern Great Plains Field Station, Woodward, Okla.

Mesquite -- See Progress Report 1465, Texas Agricultural Experiment Station.

Brush in public utility high lines or other similar areas -- Use ammate (1 pound to 1 gallon of water) as a foliage spray; or, where sensitive crops are not present, a heavy concentration of brushkiller or 2, 4, 5-T can be used.

Number of Trees A Gallon of Mixture Will Treat

<u>Treatment</u>	<u>Size of Trees</u>	<u>Number of Trees Per Gallon</u>
Basal	1 to 2 inches in diameter	100 to 150
Basal	2 to 4 " " "	50 to 100
Frills or Stump	4 to 6 " " "	50 to 60
Frills or Stump	6 to 8 " " "	40 to 50
Frills or Stump	10 inches in diameter or larger	20 to 30