

Many chemicals are available for brush control to reduce fire hazards around rural homes. These chemicals can also be used to reduce competition to desirable native trees and shrubs for landscaping. Livestock offer the preferred method of reducing the amount of dry grass and regrowth of brush seedlings. However, this article also discusses chemicals that can be used for this purpose.

BRUSH NEAR the rural home is a fire hazard in California. However, many of the native shrubs may become attractive ornamentals when competition from other shrubs is eliminated. Their natural adaptation to the site is also an important consideration in landscaping. Scattered shrubs do not present the same fire hazard that exists with dense stands of brush.

Shrubs may be either thinned out or eliminated from woodland areas with chemicals. Poison oak, frequently found beneath live oak trees, should be removed. In some cases it is also desirable to reduce the number of trees to allow those remaining to become larger and more attractive. The chemical pruning of low-hanging branches on live oak trees also helps to control fire since these branches

carry fire to the rest of the tree. Normal removal of dry plant residues from beneath the trees also increases the fire protection.

Reducing the quantity of dry grass helps to control the spread of fire. One satisfactory method for dry grass reduction is to use horses or other livestock to graze off the grass. For landscaping purposes, bushes that are least attractive to livestock can be selected. These include: manzanitas, madrone, sugar bush, laurel sumac, buckeye, redbud, and some of the *Ceanothus*. However, many other shrubs are also satisfactory if the stocking rate is not too heavy and after the bushes have become fairly large. Year-around use of stock is the easiest method of maintaining these areas (with light use in winter months). The livestock will help control brush seedlings and brush regrowth, thereby reducing the amount of spraying necessary.

When stocking is undesirable or impossible, the quantity of grass on the ground should be reduced chemically. Most native shrubs and trees (in unir-

CHEMICAL BRUSH CONTROL

For Fire Hazard Reduction and Natural Landscape Improvement Around the Rural Home



Harold Hollister's ranch home in El Dorado county with dense chamise and scattered toyon about 300 feet away, left photo. Area in the foreground near home, to left below, has been freed of all chamise, leaving a few toyon as ornamentals. Stems were cut off and removed and the stumps sprayed. A toyon and two live oak bushes are seen below where dense brush was removed and the soil was treated with simazine to control grass and reduce fire hazard.





Processes in the control of brush (mainly poison oak) as seen in a coast live oak woodland at Fort Ord. To left, heavy understory of brush typical of the area before control was initiated. Right photo shows appearance one year after control was started; note the abundance of dead stems. Photo below shows appearance several years after control was initiated; the dead stems have disappeared and have been replaced by grass. The area had not been grazed.



Spraying may be continued as long as plants are growing. When growth stops due to the exhaustion of soil moisture in the root zone, woody plants are less sensitive to sprays. Sprays should cover the entire plant, including the lower leaves and the stems. Some woody plants require as many as 3 annual applications to completely kill them.

If a fire has occurred, conditions are excellent for initiating a spray program because: (1) the sprays can be kept close to the ground, which reduces the danger of drift onto sensitive plants; (2) less foliage present means less spray is required to treat a bush or a given area; and (3) the fire-damaged plants are more susceptible to 2,4-D, 2,4,5-T and amitrole.

The plants may be sprayed with brush killer (2,4-D plus 2,4,5-T) or Ammate. Brush killer is used at the rate of one-half pound of actual chemical to 12.5 gallons of water. Ammate is generally used at the rate of 9 pounds of chemical to 12 gallons of water, with one-half ounce of sticker-spreader added.

Amitrole is especially valuable for killing poison oak and sometimes blackberries. It is more selective than either brush killer or Ammate. Use one-half pound of actual amitrole (1 pound of commercial 50 per cent) to 10 gallons of water and add one-half ounce of sticker-spreader. A greater concentration increases the effectiveness but decreases selectivity.

The back-pack mist blower is useful for applying sprays where drift problems are not important and for treating larger areas, especially where sensitive crops are relatively far away.

Brush killer is mixed with diesel fuel and sprayed or poured all around the first foot of the stems, using about 3 fluid ounces for each inch of stem diameter.

rigated areas) appear to tolerate low dosages of the soil sterilant, simazine. An application of simazine in the winter beneath the shrubs and trees would protect them against fire (4 pounds per acre is suggested). Some types of brush seedlings are not killed by this treatment, however, and some spraying with 2,4-D and 2,4,5-T (brush killer) will also be necessary. If the treated areas are not mechanically disturbed, and seeds brought near the surface where they can germinate, chemical treatments will be more effective.

Herbicides

The low volatile esters of 2,4-D and 2,4,5-T are commonly prepared as mixtures called brush killers. Similar mixtures of the oil-soluble amines are now available. Since the amine mixtures are essentially non-volatile, they would be safer to use when sensitive plants are close at hand. The esters, like these oil-soluble

amines, are soluble in oil and emulsifiable in water. The number of pounds of actual chemical per gallon of material varies, but the esters usually contain 4 pounds of actual 2,4-D and 2,4,5-T in each gallon. Water-soluble amines of 2,4-D normally come in preparations containing 4 pounds of actual 2,4-D in each gallon.

Ammate (ammonium sulfamate) is a water-soluble inorganic salt.

Amitrole (amino triazole) is a water-soluble chemical that is commonly used for controlling poison oak.

Several soil fumigants that can be used for controlling woody plants include ethylene dibromide, DD, Telone and SMD (Vapam or VPM).

Fenuron can be obtained in 25 per cent pellets for application to the soil.

Foliar sprays

Woody plants may be sprayed during the growing season after some leaves have become fully enlarged on all of the bushes.

Stems larger than 2 inches in diameter should be chopped through the bark near the base to facilitate penetration. Although the esters are superior to the oil-soluble amines, the latter should be used when fumes from esters might damage other plants. Applications in the winter or spring give best results.

Cut-surface treatment

The cut-surface method is effective, but it is of limited usefulness near the home where dead trees would be unsightly. Cuts should be made near the ground with a heavy hatchet or axe, through the bark, well into the wood and continuous around the tree. Cuts should be filled with undiluted water-soluble 2,4-D amine. If Ammate is used, cuts must be larger to hold an appreciable quantity of the dry salt. Applications made in the winter and spring give the best results.

Injury to near-by trees of the same species is not common but has been observed. This injury may occur because of root grafts which allow the chemical to pass from one plant to the next.

Stump control

Stumps may be sprayed with the basal spray mixtures already described. Tops and sides of stumps should be covered thoroughly with the spray as well as all sprouts that might be present. Effectiveness is increased by cutting into larger stumps near the base. Control is best when stumps are treated immediately after cutting.

Freshly cut stumps may be treated with 2,4-D water-soluble amine applied liberally to the tops of the stumps, and especially to the sapwood. Winter is the best season for making this treatment. Control is much more effective when the stumps are cut close to the ground. A similar

chemical, water-soluble 2,4,5-T amine, is slightly more effective than the 2,4-D amine for controlling sprouting on some stumps but it is more expensive. Ammate crystals placed on top of the stumps can also be used to control sprouting.

Soil applications

Fumigants are useful for killing woody plants when the number to be treated is limited. One-half cup of soil fumigant is poured or injected into holes 6 inches deep and spaced about 6 inches apart around the base of the bush or tree. Killing is most rapid during the period of active growth. Tests have demonstrated the effectiveness of fumigants against poison oak, blue oak, live oak, walnut, and the St. George Rupestris grape rootstock. Roots are normally killed about 10 inches from the point of application but occasionally roots have been killed as far as 30 inches away. The killing action of fumigants is similar to pruning.

Fenuron pellets have only a limited usefulness near the home. Applications should be made at the very base of the stems from November through January. The dosage required to effect control is variable, depending upon soil type and plant species. One ounce may be enough to kill a small bush but a large clump of live oak may require as much as a pound. Fenuron may wash off and kill grass. It will induce chlorosis on shrubs or trees having roots beneath the point of treatment and injury may result. Application is quite easy and in many cases no retreatment is needed. Chemical costs are probably greater than for the other chemicals discussed.

Precautions

Both 2,4-D and 2,4,5-T can damage surrounding plants due to drifting of the spray. Considerable care is necessary in making applications. A use permit from the County Agricultural Commissioner is required to purchase more than one-half pound of actual chemical within a 24-hour period. The spray equipment used in applying these materials is difficult to clean with certainty; therefore, it is safer not to use such equipment for applying insecticides or other chemicals that might be used on plants. Ammate is quite corrosive, so spray equipment should be washed immediately after use. Fumigants should be kept off the skin and not spilled onto the shoes.

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Carob Tree Stimulated Gibberellin

— *Salable nursery produced in less*

SLOW STEM elongation and the excessive time required for production of a salable plant have been problems with a number of nursery plants including the carob tree (*Ceratonia siliqua*). Aqueous spray applications of potassium gibberellate concentrations made at specific intervals, over a 20-week-treatment period, offer the possibility of producing salable plants more rapidly than would be possible under ordinary nursery management practices.

Two-month-old carob seedlings were planted in 1-gallon cans and treatments were begun out of doors in mid-October. Eight separate randomized treatments of five replications and five plants per replicate were used, as listed in the table. The foliage of each plant received approximately 5 ml of solution at each time of application.

Observations were made weekly on total stem elongation. At the end of 20 weeks, the treatments were discontinued and the plants were allowed to grow for an additional 10 weeks to determine their post-treatment response. At this time, total elongation, number of nodes, and number of leaflets were recorded.

Table

The table shows that shoot elongation was generally proportional to the concentration of gibberellin applied. Also, the number of leaflets produced and number of nodes produced were significantly greater in most gibberellin treatments.

Graph

The graph shows that the 50-1T/M treatment (50 milligrams per liter applied

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