

THE GOAL of every rights-of-way maintenance supervisor is to create and maintain thoroughfares of maximum utility. In many instances he must concern himself with the control of unwanted brush. Mechanical clearance methods, because of their short-term effect and high cost, have given way in most areas to chemical methods of brush control. Chemical usage is under constant study in an attempt to discover new materials and new ways to use the old standards.

The phenoxy acid herbicides,

such as 2,4-D and 2,4,5-T, have been the cornerstone for most brush control programs for nearly 15 years. Their overall effectiveness, economy, and human and animal safety characteristics are such that they will probably be the standards for comparison for a long time to come. Their use, until recent years, was primarily as stem-foliage treatments with smaller varying amounts being applied as basal, stump, notch, and injection applications. It can be readily recognized that only the first-mentioned method lends it-

self to extensive large-scale broadcast applications.

However, the stem-foliage growing season applications contain certain inherent problems which limit their complete acceptance. In crop-growing areas, damage to sensitive crop plants by physical drift and/or volatility can sometimes create many complaints and much ill will. In urban and suburban areas, "brown-out" (the leaf browning which occurs 2-3 weeks following growing season applications of the phenoxy acid herbicides) again creates public dissatisfac-



tion with such spray programs. The stem-foliage method of herbicide application also involves the use of large amounts of spray solution and high pressures to force the spray through the leaf canopy.

This naturally tends to increase the intensity and extent of the first two problems mentioned. The stem-foliage spray program is limited only to certain portions of the growing season. Therefore, there are a relatively smaller number of working days available to the applicator. Because of the depth of foliage,

oftentimes inadequate chemical coverage is obtained and this leads to incomplete kill, and increased resprouting. Chemical "pruning" is less costly than mechanical cutting, but is still not a satisfactory end. It is the applicator's desire and need continually to reduce the total number of woody stems per acre.

The above problems associated with stem-foliage spraying have been known and discussed for years. The fact that basal treatments could be used at any time led some investigators to propose the use of an extensive overall

spray to be applied to woody stems during the dormant season (between leaf drop in the fall, and bud growth initiation in the spring). The question to be answered was whether a hormonal herbicide such as 2,4,5-T could be absorbed adequately, remain unbroken, in toxic concentrations in the stem tissue during the dormant period of the plant's life cycle, and still effect its physiological action the following growing season.

Research investigations and commercial applications over
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Dormant Season Brush Control

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Spraying brush after leaves have dropped can be an off-season moneymaker for many CAs.

Dormant season spraying has been tested, and is used, by railways (left). While it need not be the dead of winter to use "dormant cane broadcast," it is possible to apply chemicals when snow is on the ground (below). Actually, the brush at right is "dormant enough" to permit use of the process described in this article.



Dormant Season Brush Control

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the past ten years have conclusively answered this question in the affirmative. The following is a description of the dormant season spray technique, often referred to as "Dormant Cane Broadcast."

Materials

The toxicants used in this method are the oil-soluble formulations of 2,4-D and 2,4,5-T. In rights-of-way where more susceptible species such as willow predominate, a D/T mixture may be employed. However, for maximum kill, especially in areas where more resistant species such as ash, maple, and oak predominate, it is best to use a straight 2,4,5-T material.

The carrier used in dormant season spray programs is straight oil. The sole prerequisites for this oil is that it should be fairly clean, free of water, and not overly viscous during cold weather. Common oil carriers employed in the past have been diesel oil or number 2 fuel oil. The author has even employed used transformer oil effectively.

Rate of Application

Effective woody plant control has been obtained using concentrations of 4-12 lbs. acid equivalent per 100 gallons of oil. The lowest rate giving the most consistent control is 6 pounds aehg (acid equivalent per 100 gallons) of oil. Normal coverage is generally obtained with an average use of 150 gallons of the oil-toxicant mixture per acre. This will vary between 100-200 gallons per acre depending upon stem height, density, and the method of application used.

Equipment

Dormant season applications have been made with equipment ranging from a Hudson 2½-gallon garden sprayer to a specially built rig containing a spray tank with 3,000-gallon capacity. Naturally, the larger the spray program the greater the need for a relatively larger size spray tank. Pump pressures have ranged from the minimal produced with hand pumping to 150 pounds per



While there are no particular hazards in dormant cane methods, VPI researcher Ira Moore plays it safe by wearing a respirator while testing the system for spraying brush after leafdrop.

square inch. Usually 80-100 psi are sufficient to obtain adequate coverage. However, where one is spraying into a wind or covering a wider rights-of-way area, the "higher" pressures may be more suitable. A pump with the capacity of 5-10 gallons per minute would be adequate for most programs. The type of pump used is irrelevant and the applicator should use the one with which he is most familiar and which has given the best operating results in other spray programs. Gunjets with both the trigger-type and turning shut-off valves have been used effectively. Orifice disc numbers D-6, D-10, and D-12 have been employed successfully. It should be noted that the applicator need not be limited in his equipment and, in fact, equipment that he is already employing will in most instances be suitable for dormant season spraying. In foliage spraying, an emulsifiable concentrate is used so agitation in the spray tank is essential. In dormant season work, since an oil-soluble formulation is used, all that is really necessary is adequate initial mixing. However, even in this situation agitation would be beneficial. "If it will work for foliage applications, it will work for dormant season applications," is a good rule of thumb to keep in mind. The above-mentioned variables should be tested until the best

combination of equipment components is discovered for the given applicator's specific needs and goals.

Methods of Application

There are two proven methods of application available to the applicator:

First, there is the broadcast treatment which is aimed at covering the entire stem area of every woody plant. This method is best employed in dense stands of shorter material (4-6 feet tall) especially when one is spraying from a truck from above the woody plants to be sprayed. This method should also include a special effort to concentrate the spray around the root-collar area at the ground line.

Second, there is the modified basal treatment in which the aim is to concentrate the spray over the lower third of the woody plant stem, again with special emphasis on the root collar. This method is best employed on taller growth (15-20 feet) where it would be less feasible to cover the entire above-ground portion of the plant. When this method is followed, there may often be a lag in killing effect in the spring. Usually with the first method, budding out will be almost entirely eliminated. However, with the modified basal method some buds will develop and leafing out will occur. If coverage has been adequate,

though, these leaves will never develop but will wither and die. This phenomenon is often termed "flagging." It in no way approaches the unsightliness associated with "brown-out."

It should be noted that dormant basal sprays should *not* be expected to give a complete kill when the predominate brush species are the root-suckering types, such as black locust, sumac, sassafras, aspen, and persimmon. Dormant basal sprays give almost 100% top kill of these species and control root-collar sprouting, but do not prevent root suckering. Root suckering is best controlled with 6 lbs. aehg of amine D & T in water applied as a ground stem-foliage application during the growing season or by 6 lbs. per acre of D & T ester applied as a thickened material from helicopters.

The above-mentioned application methods should be used only on woody material with a diameter no greater than 5-6 inches. They are most effective when used on woody plants with stems in the 3-4 inch diameter range. Bark thickness may be a limiting factor in these applications. The greater the bark thickness the more difficulty will be encountered in getting adequate amounts of chemical into the live internal tissues to be killed. These treatments are geared for large-scale overall applications and not the more individual basal bark treatment which employs a more concentrated spray mixture. The coverage with all the above methods should also be such that the spray mixture completely encircles the circumference of the stems with special emphasis on hitting the root collar. On plants with smooth bark and only 1-2 inches in diameter, the "creep" of the oil often will accomplish this with normal coverage. However, on broader, rough-barked species, a special effort should be made to hit as many sides of the stem as possible, since the natural creeping tendency of the oil will be impeded. This may be accomplished by handling the spray gun in a sweeping motion and spraying any given stem

area (1) as one approaches the stem area, (2) when directly abreast of the stem area, and (3) as one passes it. Where more than one gun is mounted on a stand, the guns should be aimed at different heights and different angles. On mounted truck rigs, the rate of speed should be maintained at about five miles per hour.

Time of Application

There appears to be no best time of application during the dormant season. The first and last dates are fairly well defined, however. The first dormant season application should be made in the fall after the leaves have dropped. Once growth has stopped, material sprayed on the leaves will only be lost upon leaf drop. The last application should be made no later than two weeks prior to the initiation of bud growth in the spring. The reason is not clear, but treatments made just prior to or just following bud opening are relatively less effective and should be avoided.

Applications should not be made immediately following heavy rain. Bark absorption and penetration are greater when this oily material is applied to dry stems. It is also best if dry weather prevails for several hours following application. Successful applications have been made where an inch or two of

Conn. Ag Station Works On New Dutch Elm Study

Plant pathologists at Connecticut Agricultural Experiment Station, New Haven, are experimenting with a new group of chemicals that may provide one method to combat Dutch elm disease.

Among the materials being tested are mixtures of isomers of aminotrichlorophenyl acetic acid. Dr. Lloyd Edgington and investigators in Wisconsin have determined that the compound causes changes within the tree that mechanically block the spread of the fungus. The exact nature of this blocking action is now under intensive study.

snow has covered the ground. However, spray applications over deep snow should be avoided, since coverage of the critical root-collar area would be adversely affected.

A review of the ideas presented above will show the following advantages of a dormant season application:

1. Elimination of objectionable "brown out."
2. Elimination of crop damage complaints. Annual crops are not growing at the time of application, and by early spring the 2,4,5-T is broken down by soil microbes and is inactive.
3. Extension of the operational program in brush control to 6 to 8 months.
4. Less sprouting of resistant species as compared to stem-foliage or basal treatment (due often to more complete spray coverage).
5. One-half of the volume is required as compared to stem-foliage treatment.
6. Application requires less time than basal treatment (and often less than stem-foliage treatments).
7. Lower pressure and smaller hoses are required than used with stem-foliage treatment.

Dormant season spraying has proven to be a definite addition to the useful techniques the rights-of-way maintenance man has available to him. Therefore, it would be of extreme importance to everyone who cannot possibly control brush to his complete satisfaction using a summer spray program to consider and investigate spraying woody plants while they are in a dormant condition.

**Next Month:
Why a
National Organization
of Applicators?**