Around steam plants, such as these, TVA workers prefer to use soil sterilants to effect weed control.

TVA

Brush Control at TVA, Part Two

By JOHN R. ALDRED
Botanist, Tennessee Valley Authority
Chattanooga, Tennessee

THIS is the conclusion of a two-part article on brush control at the Tennessee Valley Authority. Last month, author Aldred discussed helicopter and basal spraying, application of pellets, and mechanical maintenance. Ed.

Pole Degrassing

Pole degrassing is considered a necessity on some of TVA's lines or sections of lines where past history indicates that the areas are burned annually and are so-called "hot spots." Two methods used in pole degrassing are manual "scalping" and chemical treatment.

The former is accomplished by scalping vegetation within a radius of 6 ft. around wooden poles with garden-type hoes. This method gives fire protection for one season and must be repeated annually; however, it should be used in pasture areas.

The chemical method is much more economical. For chemical degrassing, apply 2 lbs. of Chlorea granular or Ureabor to a radius of 6 ft. around the wooden pole, using a hand seeder. One treatment should normally render a sterile condition for about two years. After the second treatment, it should not be necessary to re-treat for three years or longer in most cases. This method should not be used in pastures or around houses or locations of this type; nor should it be used in areas where fire hazards do not exist.

How To Remove Trees

Mechanical cutting of dangerous trees is performed extensively and is effective. The one-man power saw is the most effective and economical tool used. This method, like mechanical clearing of rights-of-way, has its place; when more economical methods and techniques are adaptable, they should be used. All trees that could hit the line should be mechanically cut.

Various chemical methods may be used for removal of dangerous trees, and are more economical in some areas. Chemical methods should never be used in residential areas. If there are a number of trees in an area along main highways, the mechanical method should be used. Conifers, such as pine and cedar, should be cut. The two most common methods of chemical application are "frilling" and using a tree injector.

Generally, the most economical method of controlling dangerous trees is by application of a low concentration of 2,4,5-T esters (3%) in diesel oil to a frill, or overlapping axe cuts, encircling the tree at a height of not more than 12 in. above the ground line. Mix thoroughly 1½ gal. of 2,4,5-T esters in 48½ gal. of diesel oil in a used 55-gal. chemical drum. A knapsack sprayer should be used to wet exposed wood areas in the frill thoroughly at approximately 1 qt. to each 12-in. diameter tree, allowing the chemical to overflow freely from the frill and wet the bark and root crown below. The crew for this method consists of a foreman and two laborers, using a jeep for transportation. One laborer carries the axe and does the frilling of the tree, while the other man carries the knapsack sprayer.

For the tree injector method mix 2 qts. 2,4,5-T esters in 4½ gal. diesel oil or kerosene for a total mixture of 5 gal. Shake the container vigorously for one to two minutes in order to obtain a thorough mix. The tree injector is filled by pouring the mix into the cylinder of the injector at the top. Material is applied by jabbing the blade through the bark

near the base of the tree, forming a pocket and tripping the trigger; allow material to fill pocket before removing injector. These jabs should be placed approximately 2 in. apart.

Initial Stump Treatment

As a result of rising costs of labor, transportation, and materials, TVA was searching for some way to reduce unit cost and the total right-of-way budget. While reviewing the right-of-way program, it was found that many tracts of land (farms) were cleared several months before line construction was completed and the line energized. This interval resulted in a medium-to-dense stand of brush ranging from 6 to 20 ft. in height on the right-of-way at the time the line was energized, and a foliage treatment was required during the first summer the line was in service. Initial stump treatment on newly cleared rights-of-way was begun on an experimental basis in 1954 and resulted in a kill of 81% at a cost of $57 per acre of brush. In 1957, TVA established a stump treatment program, which has resulted in treating 12,517 acres of brush at an average cost of $65 an acre.

Chemicals consist of the 2,4,5-T esters and 97 gal. of diesel oil, applied at an average rate of 100 gal. of mixture per acre of brush.

The crew consists of a foreman, a truckdriver, and five laborers. Transportation consists of a 1-ton stake-body truck with no-spin differential and dual wheels to haul chemicals and a 6x6 IHC or Reo 1,000-gal. tank truck equipped with a Hypro pump operated from a PTO. A manifold is installed at the rear of the truck about 7 ft. from the ground to provide an individual hose attachment for each spray gun. This manifold eliminates use of wyes and extra hose lengths, and it also prevents delays due to hose failures and malfunction of guns. They use Bete spray guns attached to a $\frac{3}{8}$-in., lightweight neoprene hose. Protective clothing, consisting of neoprene overalls, overshoes, and neoprene-coated cotton gloves, are provided for these workers.

For initial stump treatment, TVA crew members apply specially formulated chemicals with equipment like that shown in this photograph.

The truck is driven down the center of the right-of-way with men walking behind and spraying small sections of the right-of-way. Where the truck cannot be driven, as is the case on a small percentage of our rights-of-way, hose is laid out or knapsack sprayers are used. All small growth is wetted thoroughly to the ground line. Stumps up to 12 in. in diameter are wetted to the ground line, including the cut surface. When stumps are 12 in. or larger in diameter, they are wetted thoroughly down the side to the ground line, including all exposed roots. The cut surface on larger stumps need not be sprayed except for a distance of 4 in. in from the edge of the stump. Spraying pressure should not be more than 50 psi to save material and to prevent splattering material on areas which should not be sprayed. Low pressure will also help eliminate drift to susceptible plants off the right-of-way.

In the early days of the stump treatment program, some people believed this method had to be used within 72 hours after trees were cut, while it was the opinion of others that it could be deferred two weeks. However,

Danger trees are removed from TVA grounds by using a tree injector which is filled with chemicals to remove unwanted, hazardous trees.

Soil sterilants are applied around steam and hydro plants by a mechanical spreader such as the one that is here operated by TVA crewmen.

TVA has treated stumps at various periods ranging up to a year later, treating all visible stumps and sprouts after the growing season. Results have been highly satisfactory, regardless of the length of time since the brush was cut. Rights-of-way treated by this method have not required re-treatment for at least three years. Work can be performed any time of year, even when the temperature is below freezing, except when ground is covered by snow or sleet. At present, stump treatment is scheduled when right-of-way crews are not engaged in foliage work; however, it is preferred that work be done shortly after the right-of-way has been cleared and before roads and fences are repaired after construction work.

TVA's Weed Control

In June 1959, TVA initiated a chemical weed and brush control program at 28 hydro plants and eight major steam plants. Steam plants have an average of 25 miles of railroad and approximately 20 acres of area which require weed and brush control, including switchyards, transformer yards, fences, and riprap on intake and discharge channels. Hydro plants have an average of four acres that require control.

In order to have an effective soil sterilization program, areas must be surveyed to determine plant growth, species, and density. Annual rainfall, temperature, and soil conditions are also important. We have found that Chlorea granular or Ureabor used at 1½- and 2-lb. rates per 100 sq. ft. are more effective and longer lasting than other soil sterilants. Numerous other chemicals are used in small quantities for treatment of specific problem areas. In projecting a long-range program, it appears that spot treatment will be required each year after initial treatment, using Chlorea granular, Ureabor, or similar material, with the major part of treated areas requiring a re-treatment every two years at a reduced rate of chemicals.

During the last few years, TVA has increasingly relied more heavily on herbicide chemicals for control of woody growth along transmission line rights-of-way. In order to maintain these rights-of-way in the most efficient manner and at the lowest cost, TVA conducts a year-round research program. This program includes studying and experimenting with various chemical formulations, application rates and techniques, equipment, and other conditions to determine methods and procedures for improving the program. It keeps currently informed on research and development of chemicals and equipment by chemical formulators, research institutions, manufacturers, and other utilities. In cooperation with various formulators and other research institutions, TVA establishes field test plots using various chemicals, formulations, and rates to determine their effectiveness on various species of brush. Various types of equipment are also tried on an experimental basis to determine their adaptability to the right-of-way program.

Considerable research has been done with invert or thickening materials, using both air and ground equipment; however, this has not been adopted into our program for large-scale use, since it is more expensive than standard spray mixtures. At present, one of the main concerns of the program is a study of resistant species now remaining on the rights-of-way.

Public Relations

TVA has derived considerable benefit from careful and regulated use of chemicals to control brush on rights-of-way. In con-

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Acres Maintained and Cost Per Acre

The following tabulation is a summary of the right-of-way maintenance work performed since fiscal year 1956

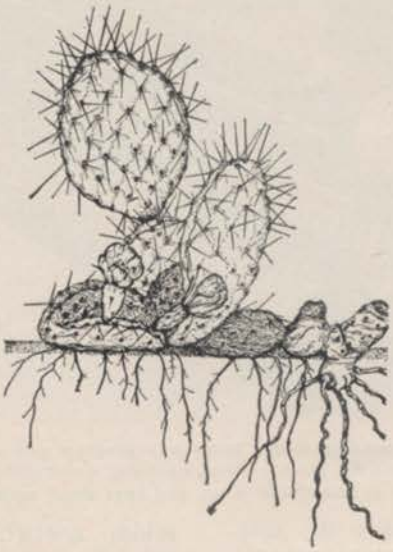
	Helicopter		ASN		Conventional		Basal		Mechanical	
F.Y.	Acres	Acre Cost	Acres	Acre Cost	Acres	Acre Cost	Acres	Acre Cost	Acres	Acre Cost
1956	—	—	—	—	9,894	$78	1,885	$62	2,005	$62
1957	—	—	—	—	7,232	94	1,663	96	1,179	61
1958	—	—	171	*	6,106	95	3,481	85	1,611	59
1959	3,199	$23	6,603	$26	3,038	94	1,153	63	727	67
1960	7,558	19	6,891	24	2,452	55	1,976	63	459	58
1961	10,968	13	5,727	28	2,492	58	1,854	70	612	66
1962	10,079	10	5,575	25	2,708	59	1,287	71	1,265	49
1963	8,126	11	5,266	27	2,337	50	3,096	64	881	46

*Work performed on experimental basis.

Know Your Species

PRICKLY PEAR

(*Opuntia* spp.)



Prickly pear is a cactus found on dry, sandy soils, but not restricted to arid regions. The cactus is a perennial and reproduces by seeds and by rooting stems (pads). Its growth characteristics are prostrate or semiprostrate. It sometimes ascends up to 3 feet. Prickly pear may be confused with other cactus species. Species of this plant may be found in Massachusetts, New York, west to British Columbia, and south to California, Texas, and Florida.

Stems of *Opuntia* cactus are flattened and fleshy; they may be described as padlike. There are no true leaves of cactus, but leaves are represented as sharp yellow spines, 1 inch long.

Flowers are bright yellow with long succulent petals. Some species have red centers. After pollination and maturation, the fruit is formed; this is a pear-shaped, fleshy protuberance on the spiny stem. Inside are many hard seeds.

This pest is troublesome on many overgrazed pastures and ranges. In extreme infestations, prickly pear may be plowed under and the area reseeded to grasses after one or more years of intertilled crops where the climate and soil are adapted to this practice.

Prickly pear cactus is resistant to sprays of 2,4-D. Sprays of 2,4,5-T in diesel oil will kill it on an individual-plant-treatment basis. Recent work indicates 2 to 4 lbs. per acre of silvex spray on prickly pear that had been run over by land roller gave good control.

Heavy infestations of this cactus in Australia in the 1930's were brought under control biologically, predominantly by importation of an Argentinian cactus moth, *Cactoblastis cactorum*. There are many other predators of cactus but their own predators in turn prevent them from being very effective.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

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Brush Control at TVA

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trast, careless and indiscriminate use of the same chemicals can result not only in unsatisfactory control but also in actual damage to desirable crops.

We believe that users of herbicides have a definite responsibility to the general public to exercise extreme discretion when using these chemicals, especially along rights-of-way conspicuously exposed to public view. This is particularly true in those areas where garden clubs, civic organizations, or government agencies have made special efforts to improve the landscape.

Use of discretion in applying these chemicals should result in public acceptance and reduced pressure for restrictive legislation. When inquiries are received concerning chemicals being used and reasons for using them, we should always discuss them thoroughly with the public or the person making the inquiry. We should explain our chemical program and economics involved in this type of maintenance.

Summary

Value of chemical brush control on rights-of-way has been definitely proved during the past few years. There are several effective methods that have been in use for herbicide application. These methods all have their merits and should be given consideration in planning an effective and economical chemical brush control program.

Today we know that chemical brush control is not a "one-shot cure-all" for the majority of our rights-of-way. Chemical brush control may be accomplished by several methods, from the ground as well as from the air, depending upon the specific problem. After the specific brush control problem has been determined, a successful right-of-way maintenance program at a reasonable cost will depend upon selecting the proper chemicals and equipment and making certain that the crews are thoroughly trained and adequately supervised in their proper use.