

Highway Vegetation Control With Chemicals

J. H. DAVIDSON
Dow Chemical Company
South Haven, Michigan

Vegetation control has become a vital part of highway maintenance. Fast-moving vehicles and a greater appreciation of safety on the part of the public require good visibility along roadsides. This applies not only to highways maintained by the state but also to county and township roads where intersections frequently become hazardous due to brush and vine growth.

Noxious weeds and brush growing adjacent to highways have long been recognized as a serious problem by highway maintenance engineers. Present-day highways represent an enormous investment, and the land adjoining the pavement should be maintained in accordance with the best landscape practices consistent with the funds available for this purpose. The advent of chemical methods for controlling vegetation has permitted a cheaper and more effective approach to this problem than has been afforded by hand methods in the past. Chemical vegetation control is not only easier and quicker but also there is a definite carry-over effect in reducing weed and brush growth from season to season that does not occur with hand methods. Proper use of available materials, equipment and techniques are necessary for the success of such a program. In this discussion an attempt will be made to cover the more important items which should be considered in vegetation control sprays.

MATERIALS

The plant growth regulating type of herbicides are the ones being used most extensively for the selective control of vegetation. The introduction of 2, 4-D for weed control in 1944 opened up a new group of chemicals which have been effective in selectively removing broadleafed vegetation from grasses. 2, 4-D is available in several forms: sodium salt, amine salts and esters. At the present time it is used mostly as either the amine salt or as an ester. Ester formulations are available in two types: (1) high volatile esters and (2) low volatile esters. The

former are generally cheaper, but on many plant species are slightly less effective, and their use in the vicinity of desirable crop plants presents more of a hazard. The low volatile esters are generally more effective and safer to use in areas where crops are being grown.

Many species of woody plants are difficult to kill with 2, 4-D. A similar compound, 2, 4, 5-T has been much superior for killing many woody plants. This material is now available as a low volatile ester for use alone or in combination with 2, 4-D for woody plant control. Its cost per unit of acid is more than 2, 4-D, but the improved kill from its use results in cheaper vegetation control where woody plants are concerned.

Silvex is another plant growth regulator type of herbicide which has shown promise for the control of certain plant species which are not easily controlled with 2, 4-D or 2, 4, 5-T. Certain species of oak have been more readily killed with silvex. In addition, the control of other woody plant species is equivalent to that obtained with 2, 4, 5-T. Another advantage of silvex over 2, 4-D or 2, 4, 5-T is that in areas where cotton is grown there has not been the leaf malformation of cotton noted from traces of silvex. This feature has not been investigated thoroughly with other 2, 4-D sensitive crops such as beans, soybeans and tomatoes.

It should be noted here that the ester formulation materials are liquids in an oil with an emulsifier. For foliage sprays they are used in water with sufficient agitation to maintain a good emulsion in the spray tank. The amount of active ingredient in the various formulations may be stated as amount of ester or amine per gallon. For purposes of cost comparison the total acid equivalent figure should be used.

Other materials which may be used for highway vegetation control are: ammonium sulfamate, Sodium TCA, dalapon and maleic hydrazide. Ammonium sulfamate may be used with somewhat greater safety than 2, 4-D in areas where very sensitive crops are growing in close proximity to the highway. Sodium TCA is a recognized grass-killing herbicide that may be used when grass control is wanted. Its action is dependent upon soil moisture and rainfall after application. Dalapon is a new herbicide that is being sold for the control of grass on industrial right-of-ways. At rates of 20 pounds per acre and above it shows promise for killing grass. At lower rates it appears promising for grass suppression. Further tests with this material will be made this coming season. In many respects it appears to be more reliable in activity than TCA. Maleic hydrazide is another new chemical which has shown some grass-suppression properties when sprayed on foliage.

METHODS OF APPLICATION

Sprays for control of herbaceous annual and perennial weeds should be applied on foliage that is actively growing and fully expanded.

Two methods of application may be employed for applying sprays to control woody vegetation: (1) foliage sprays, and (2) basal and stump sprays.

Some of the advantages and disadvantages of each are listed below:

Foliage Spraying. Many people in the past have considered only foliage applications when talking about sprays for vegetation control. Such sprays consist of emulsions, solutions, or suspensions of the weed-killer material in water. The season when these sprays may be successfully employed in the northern states consists of only two or three months during the summer. Control of woody vegetation resulting from better root kill is generally accomplished when the sprays are applied on plants carrying a large percentage of mature or nearly mature foliage. At this time food reserves formed in the leaves are being transported to the roots and will carry the weed killer downward. Applications made earlier will give good foliage kill the current season, but frequently there is considerable regrowth from the roots. Foliage sprays to be most effective should thoroughly wet the leaves and stems of the plants.

Advantages:

1. Permits rapid coverage of large areas, using motorized equipment to carry operator and material.
2. It is an operation that requires less exacting care in application than basal treatments, but still requires proper supervision.
3. Dense brush may be easily treated.
4. It is the only satisfactory method of controlling herbaceous broadleaved weeds in addition to woody brush.

Disadvantages:

1. Foliage sprays often leave large areas of brown foliage. The appearance of these dead leaves may be objectionable in certain areas such as resorts.
2. Foliage sprays carelessly applied or using improper materials may result in injury to crops in nearby areas. This may be reduced to a minimum by using low volatile materials and equipment which will apply a coarse droplet spray at low pressures.

3. Large volumes of water are required, but in most areas along highways this is not a serious problem.
4. Certain hardwoods are difficult to kill with foliage sprays of any chemical.

Basal and Stump Treatments. Basal treatments consist of using the brush killer concentrates in No. 1 fuel oil and spraying the oil solution on cut stumps or the basal 15- to 20-inch portion of standing stems. No water is required, so the operation may be done at temperatures below freezing if desired.



Fig. 1. Basal bark treatment with 2, 4, 5-T in oil. It is important to thoroughly wet the bark completely around the tree from the ground level to a height of 15" to 18".

If it is necessary to kill trees larger than six to eight inches in diameter, it is generally better to cut the tree and treat the stump. If this is not possible, a frill cut around the tree trunk near the ground and treated with the oil-brush killer solution is satisfactory for killing the tree top.



Fig. 2. Weed tree control with Esteron 245 in oil, showing frill method of treatment. Used primarily on trees larger than 8 inches in diameter.



Fig. 3. Stump spraying, 2, 4, 5-T in oil. Stump method of treatment. Cut surfaces and bark should be thoroughly wet with spray to the ground level.

Advantages:

1. May be done at any time of the year, which allows employing well-trained crews on a year-around basis, thus utilizing workers in slack periods.
2. Dormant season control reduces complaints of unsightly vegetation in vacation and resort areas.
3. Winter spraying with small low volume equipment permits better control of spray and thus reduces possibility of drift on sensitive crops.
4. Requires less expensive equipment.
5. Properly applied basal sprays may be expected to give excellent top kill of even the more resistant plants. Root kill of certain species of maples is also better from basal treatments.
6. Some selective killing of unwanted brush in desirable plantings is possible.

Disadvantages:

1. Requires careful application to thoroughly wet the basal 15 to 20 inches of the stem. This is essential for results. Snow, grass and leaves must be removed from around the stem so complete coverage to the ground is possible. Water standing around the stem at time of spraying will allow shoots to arise later from below the water level line.
2. Where brush is small and the stand thick basal spraying is time consuming and requires large amounts of material.
3. Does not give satisfactory root kill of brush species that send up shoot from roots.

EQUIPMENT

Foliage spraying is the principal method employed in applying vegetation control sprays. It is a quick, effective method that requires a minimum of manpower when suitable equipment is available. In general, high-pressure spray pumps mounted on trucks with 500- to 1,000-gallon tanks make a satisfactory unit. Various nozzle and boom arrangements are available. The exact type of equipment used is dependent upon the vegetation to be treated. Orchard spray guns are adaptable when it is desired to have spray carry some distance. Fan type washing nozzles are good for certain operations where drift must be reduced to a minimum. A rapid action trigger shut-off on the gun frequently aids the operator in having better control of the spray.

The point to remember and emphasize to operators is the necessity of minimizing spray drift. Certain types of nozzles are better

than others in producing spray of large droplet size. Pump pressures should be held to a minimum consistent with sufficient carrying power of the spray. Liquid under high pressure passing through small orifices produces fine spray which is subject to wind borne drift and may travel several hundred feet. When spraying brush up to six to eight feet in height it is advisable to spray down on the brush rather than direct the gun upward, thus the operator should be up high on the sprayer unit.

PROGRAM

Efficient use of manpower, equipment and materials require that a definite program be established during the spring, well in advance of the foliage spraying season. Large volumes of chemical are required in addition to the equipment. The type of vegetation and location will determine whether 2, 4-D or 2, 4, 5-T formulations will be necessary. These items should be considered in the budget and be on hand early in the summer. The season available for satisfactory foliage spraying is short and to utilize the equipment and manpower efficiently a definite program should be set up beforehand and followed. The active spraying season frequently conflicts with other highway operations and unless everything is in readiness at the right period valuable time will be lost.

A good public educational program prior to spraying will aid in acceptance of the practice by local residents. Articles in newspapers might describe the program as used in other areas. Additional information on the advantages and economy of chemical vegetation control will serve as an explanation of the brown foliage that will occur later. In brushy areas it is frequently advantageous to enlist the help of property owners in cutting down the brush and larger trees as a part of the program to improve the appearance of the highway after spraying.

Another item which is worthy of consideration by highway engineers is a cooperative project with the utility companies for vegetation control. Frequently a mutual agreement can be worked out where a custom applicator will do the job and both utility and highway department benefit by the treatment.

PRECAUTIONS

Vegetation control sprays in areas where crops are grown close to the highway present a continual hazard to roadside spraying. Selection of proper materials, the use of suitable equipment and careful instructions to the operator can reduce this hazard to a minimum. Wind direction and velocity should be considered during application.

Certain crops such as tomatoes, beans, soybeans, grapes and pears are extremely sensitive to small amounts of 2, 4-D. This material should therefore be used with caution in areas where there is any likelihood of drift reaching these crops.

Success of a vegetation control program on highways is dependent upon economical control of objectionable vegetation. This must be accomplished with little or no damage to nearby crops and a minimum of unsightly dying foliage. Such a program is possible by following the latest recommended procedures and having a definite program of mapping the areas sprayed and recording dates of application and type of vegetation controlled. This information will aid in evaluating the program the year following treatment and suggest possible alterations to improve results in the future.