USE OF CHEMICALS FOR CONTROLLING HIGHWAY VEGETATION

J. R. McCambridge
Chicago, Illinois
Chipman Chemical Company

A weed is a plant out of place! Plants out of place are costing America 5 billion dollars today. That means a personal bill of $29.00 per person per year for a populace of 170 millio npeople. $29.00 will buy a lot of spinach but what can you do with $29.00 worth of weeds?

Prior to 1945 there were three inorganic chemical herbicides on the market. These were: (1) Sodium Chlorate, (2) Borates and (3) Arsenic. With the tremendous advancement made by science since 1945, in developing a whole new field of herbicides, it is rather surprising to find these three old timers holding their position in the weed killer field. Sodium Chlorate, Borates and Arsenic are in wide use today, either used alone or in combination with some of the newer compounds and many of these combinations are in a top position in the weed control field as I will bring out later in discussing individual products and their uses.

Weed control research was triggered in 1945 when 2,4-D (2,4-dichlorophenoxyacetic acid) was successfully applied as a weed killer. During the past 12 years 2,4-D has gained such wide spread use that now this compound ranks as third-largest pesticide seller on a dollar volume basis and about 6th in tonnage volume. It is estimated that the annual 2,4-D tonnage sales are at 34 million pounds per year, worth $28.6 million. The rapid growth and interest in 2,4-D spurred research which lead to the discovery of many related and unrelated herbicides which are being marketed today.

2,4,5-T (2,4,5-Trichlorophenoxyacetic Acid) is one of the higher ranking herbicides which followed 2,4-D. 2,4,5-T has an estimated tonnage of 3 million pounds annually and an estimated value of $6.8 million.

Generally speaking, weed killers are put into three groups or classifications, according to their action on the vegetation.

1. *Soil Sterilants*:
   a. Sodium Chlorate
   b. Arsenicals
   c. Borates
   d. Substituted Ureas (these include Monuron, which is known by the trade name of Telvar "W" (3-(p-chlorophenyl)-1, 1-dimethylurea); Diuron, which is known by the trade name of Telvar "DW" (3-3,4 dichlorophenyl)-1, 1 dimethylurea; Fenuron—no trade name known 3-(phenyl)-1, 1 dimethyl-urea.
   e. Chlorea Granular—trade name for the combination of Sodium Chlorate; Sodium Metaborate and Telvar "W".
   f. Atlacide 2,4-D—trade name for the combination of Sodium Chlorate plus 2,4-D.
   g. D. B. Granules—trade name for the combination of Borates and 2,4-D.
   h. Ureabor—trade name for the combination of Borates and Telver "W".
   i. H-174—trade name for the combination of Borates and Telvar "W".
   j. Simazin—trade name for 2-chloro-4, 6-bis (ethylamino)-s-triazine.

A soil sterilant herbicide is one which is applied to the soil and is carried into the soil by moisture and is toxic to vegetation for at least one season or longer.

2. *Spstemic or Translocated Herbicides.*

This group includes many of the new herbicides and are generally referred to as "hormones."

a. 2,4-D (2,4-Dichlorophenoxyacetic Acid)—The most popular fromulations of Amine salts and the volatile and low volatile esters. Isopropyl Ester of 2,4-D is a volatile type and the Proplyene glycol butyl ether ester is a low volatile formulation.

b. 2,4,5-T (2,4,5-Trichlorophenoxyacetic Acid)—The most popular formulations of this chemical are the esters. There is an amine of 2,4,5-T but the amines have never gained popularity. The ester formulations are the same types as mentioned above for 2,4-D.

c. Low Volatile Bruch Killer (2 lbs. acid of 2,4-dichlorophenoxyacetic acid and 2 lbs. acid of 2,4,5-trichlorophenoxyacetic acid.)

d. Methoxone—trade name for (2 methyl, 4 chlorophenoxyacetic acid. This chemical is formulated as a liquid and there are 3 different types, (1) Sodium Salt, (2) Amine Salt, (3) Butyl Ester.

e. Ammate X (Ammonium Sulfamate)—Used primarily for brush control.

f. Amino-triazole—Trade name—Weedazol (3-amino-1, 2,4-triazole).

g. Radapon—trade name Dalapon (2,2-dichloropropionic acid)—Principally a grass killer.

The action of a systemic or translocated herbicide is very much as the name implies. The solution is sprayed on teh plant foliage and the chemical penetrates the plant tissue, and is taken into the system of the plant and is translocated throughout the conductive system. These chemicals upset the enzyme action in the plant causing cell break-down. Lesions open up on the roots, bacteria and fungi enter causing secondary break-down and the plants are killed.

The action of translocated herbicides are very interesting as they are selective in their action. 2,4-D will kill most broad leaf weeds and not injure the grass plants, while Radapon will not injure broad leaf plants and will kill grasses.Amino-triazoe tends to have a toxic action to both grass and broad leaf plant.

This group of chemicals have no residual effect in the soil, therefore, they are short lived and plants must be well emerged and have a good foliage surface in order to take in sufficient chemical for a kill, this is particularly important when eradicating perennial vegetation.

3. *Contact Herbicides.*

The results of this group of compounds are generally referred to as chemical mowing. Contact herbicides merely burn down the foliage without any translocation through the plant system and without any chemical deposit in the soil. The action is burn down only.

a. Herbicidal Oils. These are oils which are high in aeromatics.

b. Dinitro O' Secondary Butyl Phenol. This compound is referred to a "Dinitro general" and is used as a water spray or in an emulsion of water and oil.

c. Penta Chloraphenol. Generally called "penta" and is used about the same as Dinitro general.

d. Sodium Arsenite. Trade name Atlas "A"—used as a dilute soultion in water, also used for the control of water weeds in lakes and ponds.

Weed killing today, with all of the new compounds, is rapidly approaching a prescription procedure. Each chemical or combination has a very specific use. In some instances the use of a sterilant may be very desirable, while in another case it would be unwise to use a sterilant and a hormone type should be employed and visa versa.

It is just as important for the State Highway Maintenance Departments to be public relations conscious as it is for private enterprise.

Improper and misuse of chemicals can cause bad public relations between the user and the general public and his neighbors. Careless use, improper chemical and poor timing can and has brought about legislation that imposes hardships upon the manufacturers and potential users. This prevents the use of a good modern tool which can reflect a substantial savings to a community or a state. Therefore, know your products and use them properly and follow the manufacturers directions or consult the local agricultural authority in your area.

State Highway people generally want a chemical that meets the following requirements.

(1) Non-poisonous
(2) Non-flammable
(3) Safe to use for the applicator
(4) Non-damaging to painted surfaces (bridges, guard rails, etc.)

The major fields of use of chemicals in Highway Vegetation Control is as follows;

A. To kill all vegetation around maintenance points such as sign posts, guard rails, bridges, culverts and edge of black top on road shoulder.

B. To eradicate deep rooted noxious perennials, proclaimed as noxious by state and county weed laws, which are growing on State Highway rights-of-way.

C. To control brush species on State Highway rights-of-way which are objectional to the vacationing and traveling public such as poison oak. Also for the control of other tall growing species which interfere with telephone and power lines and obstruct the view of traffic entering an arterial highway.

D. Speciality uses for turf area on toll roads, seeded slopes, State parks, and recreation areas.

Specific recommendations on Soil Sterilization for vegetation control around maintenance points. Bridges, sign posts, guard rails, storage yards and around buildings.

1. Granular Chlorea—Chipman Chemical Company. Apply at the rate of ¾ to 1 pound per 100 square feet for general vegetation control Apply at the rate of 1½ to 2lbs. per 100 square feet to control Johnson Grass, Bermuda, Blue Grass and other deep rooted perennials. Time of application is early to late spring and applications are made by spreading by hand or use of any mechanical fertilizer spreader.

2. Ureabor and Concentrated Borascu—Pacific Coast Borax. For use rate and timing the manufacturer should be consulted.

3. H-174—National Aluminate. For use rate and timing the manufacturer should be consulted.

4. Telvar "W", Telvar "DW" and Fenuron—DuPont. For use rate and timing the manufacturer should be consulted.

Specific recommendations for the control of Noxious Perennial Weeds.

1. Atlacide 2,4-D—Chipman Chemical Company. Is effective on both broad leaf and grass species. Apply at the rate of 2½ to 3 lbs. per 100 square feet. This product is a soluable powder and can be applied as a spray or in its original dry form. When making a dry application uniformly apply at the rates above over the infested area. If it is desirable to spray Atlacide 2,4-D dissolve in water at the rate of 1 lb. per 1 gallon of water and spray uniformly 2½ to 3 gallons solution per 100 square feet. Apply in the late fall months or early spring. If 2,4-D is objectionable in your area, use regular Atlacide.

2. Telvar "W" or Telvar "DW"—DuPont. These compounds are effective on only the grass species of the deep rooted noxious perennials. For use rate and timing consult the manufacturer.

3. Radapon—Dow Chemical. This compound is specific on many of the grasses but not effective on broad leaf species. Dalapon and 2,4-D is used where there is a mixture of grass and broad leafed species. For use rate and timing consult the manufacturer.

4. 2,4-D. Use Amine or Low Volatile Ester. Mix one gallon with 100 gallons of water + .1% by weight, of a good wetting agent and spray to thoroughly wet the vegetation, when the plants are in the bud to full bloom stage. 2,4-D is not effective on the grass species.

Specific recommendations for brush control.

1. Foliage spray—preferrable to apply when brush is small 4-8 feet. Effective on large growth also. Use 1 gallon of Low Volatile Brush Killer in 100 to 150 gallons of water and spray to thoroughly wet the brush. May run from 200 to

600 gallons per acre depending on density of stand and height of growth. Ammate X at the rate of 60 lbs. per 100 gallons of water also very effective and is recommended to use in areas where susceptible crops, such as cotton, tobacco, soybeans and etc., are close by. For detailed information contact DuPont.

2. Dormant Basal. Best to make application in fall of year through to late winter. Use Low Volatile Brush Killer mixed with diesel oil at the rate of 1 gallon Low Volatile Brush Killer per 24 gallons of oil. Apply from soil line up to a height of 18 inches. Spray should be applied to point of run off so some of the solution runs down around the crown at the soil line.

3. Stump treatment. Use the same mix as recommended above "Basal Dormant." The application is normally made immediately after slashing or cutting. This treatment is preferred, in many cases, where the growth is large for "Foliage or Basal" treatment to prevent complaints from "Nature Lovers" who object to our killing or destroying the natural beauty along our public roads. This may be a factor for consideration concerning public relations.

Use of Contact Weed Killers.

The contact herbicides—Dinitro + Oil, or water; PentaChloro phenols in oil or water and the herbicidal oils are limited in their use on State Highway vegetation problems as they cause unsightly stains on painted surfaces. They are used to burn down vegetation which is blocking water movement in barrow pits and drains. Here they can render a quick and effective service at a reasonable cost.

Specialty Problems.

Use Amine 2,4-D as a selective herbicide to remove broad leaf weeds from turf areas (lawns, grass slopes, etc.). One-half to ¾ lbs. acid per acre basis in sufficient water to give coverage.

Dalapon used at 40 lbs. (10 gals.) in 100 gallons water per acre for removal of grasses in ornamental shrub plantings. Contact Dow Chemical for detailed information.

Carba-gran 10 (Chloro IPC Granular) for control of grasses in ornamental shrub planting. Use 40 per acre basis applied early in the spring just as the seedling grasses are germinating and before they are over 2 inches high. For more detailed information contact Chipman Chemical Company.

Use Chlorea Granular for all vegetation control in gravel walks and drives and around buildings and in parking areas of State parks. Use at the rate of ¾ to 1 lb. per 100 square feet applied in May and June. Contact Chipman Chemical Company for detailed information.

This is why we say "Prescription Weed Control", that is what we have today in chemical vegetation control when we compare today's picture with the situation prior to 1945.

In closing, I wish to point out that the arteries of American transportation which crisscross our nation are avenues of weed seed dissemination and consequently the means of introducing new weed problems to American agriculture, industry and transportation. Weeds follow men, animals and portage vehicles and are widely disseminated by wind and water.

You men in the American highway system can render a tremendous service to the nation by knowing your weeds or being weed conscious. You will find all county agents, county and state weed supervisors and U.S.D.A. weed workers or agronomists very cooperative. These men will welcome your calling on them for information on how to handle your vegetation problems, their identity, use of application equipment, hazards of certain herbicides and etc.

You also will find the men at the colleges in the Farm Crops or Agronomy Departments very cooperative and helpful. Due to the complexity of present day weed control—new chemicals, specific uses, state and county weed laws, state laws on herbicidal uses and etc., the chemical industry is well staffed with qualified personnel who also will be most willing to assist with your problems.

Thank you most kindly for your invitation to attend this conference. It has been a pleasure being with you. For the best weed control "Use Chipman's Prescriptions" with an added measure of value in each package.