

CHEMICAL WEED CONTROL along the NEW JERSEY TURNPIKE

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● AS TURNPIKES and throughways spread over the countryside, there is more and more public demand for well-groomed rights-of-way. By some standards, the 3,600 acres of New Jersey Turnpike right-of-way ought to look like a well-kept park approximately 300 feet wide and 118 miles long. But we are operating a commercial highway, not a scenic parkway, and we have to take a utilitarian point of view. Take weed control, for example. In our operations, weed control is not a beautification project. It is primarily part of the maintenance operation that keeps our turnpike safe and efficient for a heavy volume of commercial traffic. However, we do have to consider how various weed-control methods will affect the appearance of the countryside, and we also have to select methods that will fit our maintenance budget.

To budget weed control as wages and other costs keep rising, we are constantly looking for new devices, techniques, and materials which will hold down costs. Industrial management makes its manpower more productive by introducing more-efficient machinery, developing new processes, and utilizing new materials. Farmers have increased their production manifold by using machines, irrigation, fertilizers and pest-control chemicals, and other modern technology.

In highway management, we have likewise been able to increase the productivity of labor through new equipment and new techniques. As we have more and more right-of-way area to maintain, it becomes increasingly important to make every dollar spent on labor go as far as possible. The purpose of this discussion is to tell how we have attempted to achieve such economies in weed control along the turnpike.

Vegetation control can be divided into two broad categories. The first is general maintenance of the vegetation which is desirable, especially the grass cover that holds the soil and prevents erosion. The second is elimination of weeds. Weeds can be defined simply as "plants out of place." You might want to eliminate weeds in grass, or if grass itself is growing in the wrong place, it might be considered a weed to be eliminated.

The first step toward economic maintenance of desirable vegetation is usually better and more-efficient mowing equipment. New rotary gang mowers will cut 60 to 80 acres per day. As new and better models are developed, mowing costs may be reduced even more, particularly on large acreages, where big power equipment can be used efficiently.

Now we are looking to chemists to help us cut costs even further, especially where we cannot achieve much additional saving with mechanical equipment. Chemicals can help improve efficiency in a number of different ways. For example, if we use 5-10-5 fertilizer, the bulk of this material means we must store, handle, lift, and dump a total of twenty 100-lb. bags every time we use a ton of material, which gives us the equivalent nutrient of 100 lb. of nitrogen, 200 lb. of phosphorous, and 100 lb. of potash. With a highly concentrated fertilizer such as 15-30-15, we handle less than seven bags to supply the same amount of available nutrient. By giving us a greater proportion of nutrients in each bag, the fertilizer chemists have helped us to economize.

Another chemical development has made it possible to extend our planting season. By treating our grass seed with Arasan seed disinfectant at 8 oz. per 100 lb.

of seed, we can spread our planting season over another month of cold weather in the fall and start a month earlier in the spring. This helps level out seasonal labor peaks, thereby eliminating fluctuating manpower requirements and other associated inefficiencies.

Looking into the future, so far as chemicals are concerned, some of the new weed killers offer the greatest maintenance labor-savers that have come out of test tubes. They can be used in many places where other weed-control methods are impossible or impractical.

We have described weeds as "plants out of place." You know in how many wrong places plants can grow along a highway. Weeds along road shoulders threaten to break up the pavement surface and interfere with drainage. They may also make the surface slippery. Then, too, it takes a good deal of manpower to trim weeds and grass around guardrails, culverts, signs and signals, bridge approaches, and traffic islands. In such locations, vegetation may be a safety hazard and an eyesore and may shorten the life of pavement, curbing, and wood or metal fixtures. In dry months, vegetation along the road may be the tinder that spreads fire from a carelessly discarded cigarette or match. Furthermore, weeds and grass may catch wind-blown rubbish, keeping the roadside cluttered.

Another weed problem is frequently found along drainage ditches, where vegetation clogs the ditch, interfering with the flow of water. Since the ditch bottom cannot usually be mowed, digging and scraping is the only alternative. But this also is a costly hand operation. Worse than that, shoveling and scraping soon cuts away enough elevation to change the flow of water. Here, of course, we are making a distinction between rank weed growth, which is an obstruction in the ditch, and a good sod bottom where each blade of grass acts as a little check dam to prevent erosion and silt deposits.

If you decide to tackle your weed problems with chemicals, you will find that you have a choice of specialized compounds, each designed for a specific type of weed problem. In developing chemicals which affect the life processes of plants, research chemists have produced some complex molecules with complicated names. But you are probably not interested so much in the molecular structure and technical nomenclature as you are in what the compounds will do.

Some weed-control chemicals, such as 2,4-D and 2,4,5-T, are selective: they will kill some species and leave others unharmed. TCA, another chemical, will kill many grasses and some weeds, but it does not leave the soil permanently unproductive. Ammate weed and brush killer will kill tops and roots of woody plants when it is sprayed on the foliage, but grass and ground cover come back quickly. Selective chemical weed killers can be used to remove undesirable weed and brush species.

At the other extreme are the soil sterilants, designed for use only where you want to keep the ground free of vegetation for an entire season or longer. These include sodium chlorate, various borax materials, certain arsenical materials, and a new group of compounds called the substituted urea herbicides. This last is a chemist's term which simply means that the molecules of these compounds are built like a molecule of urea except that certain new atom groups have been substituted for some of the hydrogen atoms found in urea.

Soil sterilants may be used to keep large areas free of vegetation, or they may be used as an aid in making mowing operations more efficient. For example, if you clear a tiny area around each fence post in your guardrails, then power mowers can run along to cut the grass without any need for hand clipping around

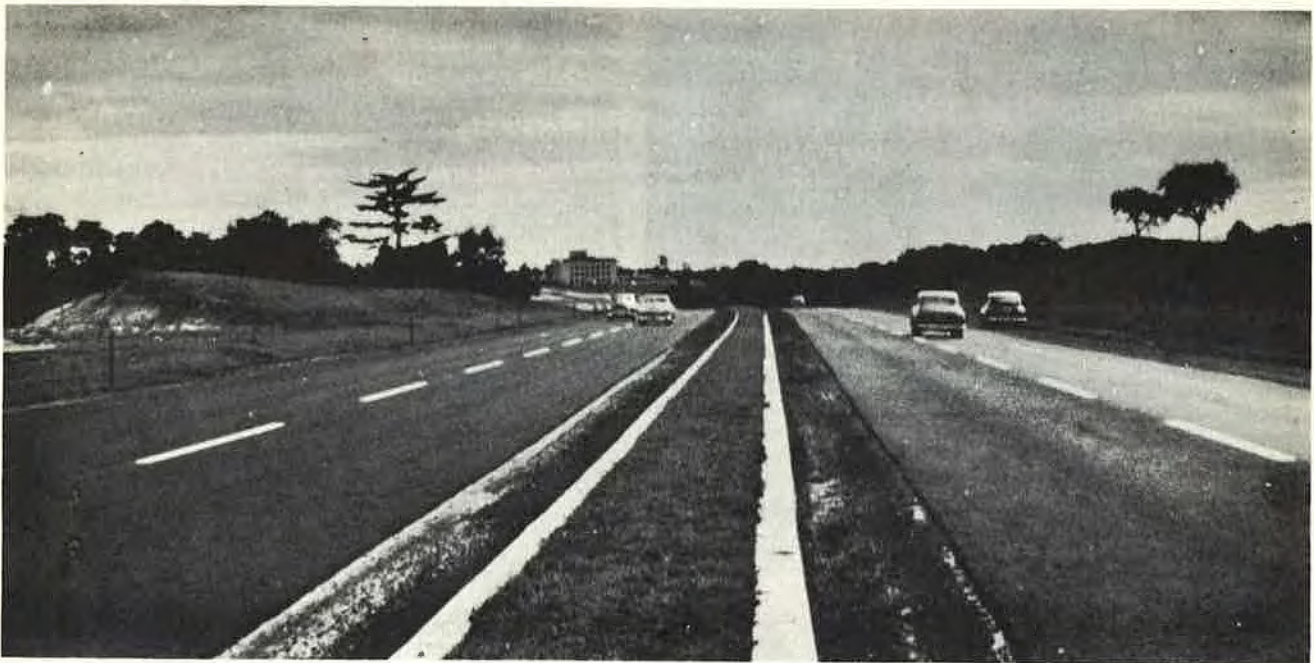


Figure 1. Inside shoulder of New Jersey Turnpike before application of weed killer.

each post. Thus, chemicals team up with power equipment for maximum efficiency. While several classes of soil-sterilant compounds have been available for a long time, many of them have serious disadvantages.

Fire hazard is the chief objection to the chlorate compounds, while toxicity to people and animals presents a problem in using any arsenical material. The high volume of any borax material required to obtain soil sterility makes it difficult to use such materials over long stretches of highway right-of-way. With one of the new substituted urea materials, 1 lb. will do the work of 75 lb. or more of a borax material.

Before you use any weed-control chemicals, you should be thoroughly familiar with the chemical you are using, because mistakes are costly, and some perhaps cannot be rectified at all. Fumes from 2,4-D or 2,4,5-T may drift from your roadside into some farmer's field of tomatoes or cotton, or a soil sterilant may kill a row of century-old shade trees as much as 50 feet away.

The great herbicidal potency of the substituted ureas is one reason for caution in using them. The usual reaction with a field man is, "I've handled weed killers before, so I know all about this one." If he is basing his knowledge of these potent materials on experience with selective chemicals like 2,4-D, he is heading for trouble. The old saying, "It is better to know nothing than to know something that is not so," certainly applies here. When you are using a material that is designed to keep ground free of vegetation for a whole season or longer, a little mistake may make a long-lasting eyesore or even involve you in litigation with landowners.

On the New Jersey Turnpike we have gone through the usual horticultural cycle. The turnpike was opened for its full length in January of 1952. The big problem in landscaping was to get roadside cover to grow. This has been accomplished by continual vigilance to repair erosion and improvement of poor sod areas by reseeding and fertilizing. As we have become successful in making the

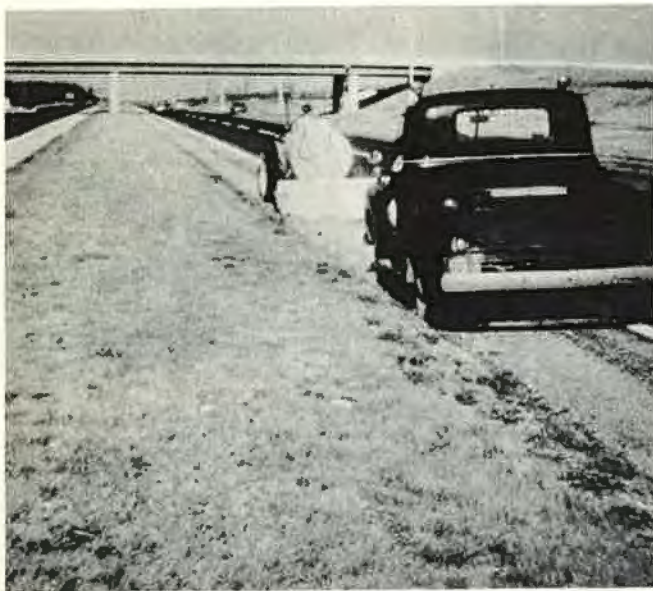


Figure 2. Applying weed killer.

tried was sodium arsenite. This was not used on a large scale, however, because control was short-lived, requiring several applications during the season. Fur-

vegetation grow, the weed problem has become serious. And in the summer of 1953, we began to be concerned about weeds along the inside shoulders of the turnpike. These shoulders consist of a 5-foot lane of bank gravel, sealed with a double bituminous surface treatment. This construction gives an inexpensive hard-surfaced safety lane for cars going off the main pavement.

To clear weeds out of this safety lane, both tops and roots had to be killed. The job could not be accomplished with mowing machines, and it was impractical for hand tools or power scrapers. We did get some control by scraping with a rotary wire broom and then applying a new surface treatment, but this was expensive and created a traffic impediment. The first chemical

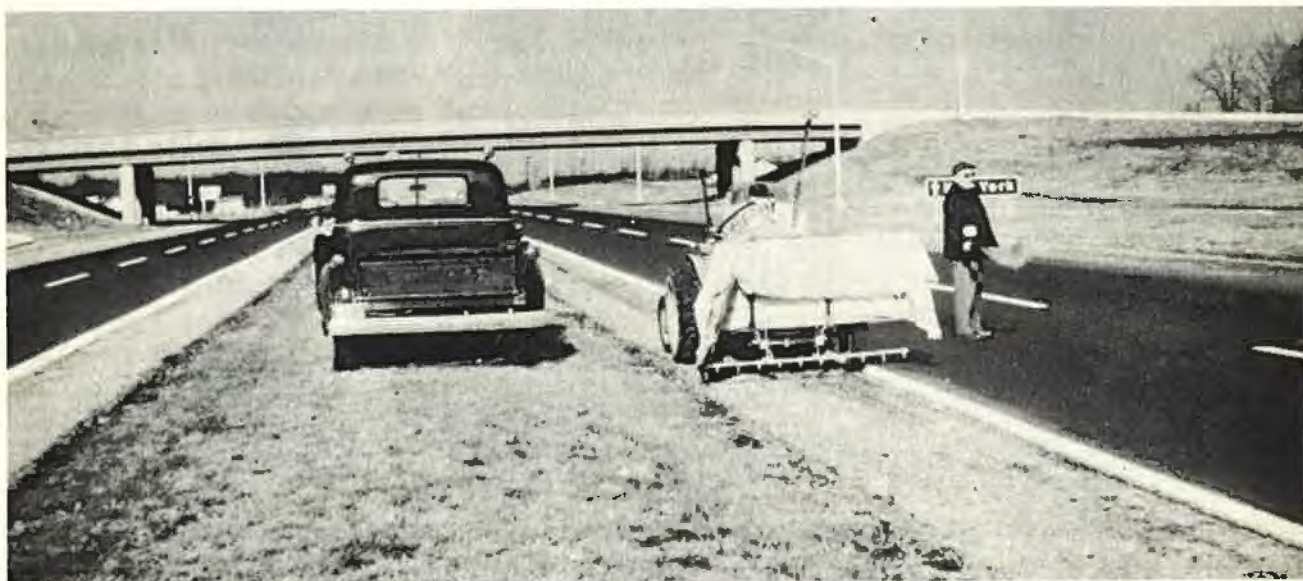


Figure 3. View of spray nozzles.

thermore, each application of this material needed large volumes of water for each acre sprayed, necessitating frequent stops to fill the spray tank. Then, of course, there was the toxicity problem associated with arsenical chemicals.

To overcome some of these disadvantages, we tried a substituted urea formulation in June of 1954. To be technically accurate, this should be called an 80-percent formulation of 3-(p-chlorophenyl)-1, 1-dimethylurea. From here on the tradename, which is Telvar—Telvar W weed killer will be used for simplicity.

This material is a wettable powder which mixes readily with water but does not dissolve. Our spray mixture consisted of 19 lb. of chemical in 29 gal. of

water for each mile of 5-foot right of way.

We made our first application of Telvar W weed killer in June 1954, treating both shoulders along an 80-mile stretch for a width of 5 feet. This one treatment gave control of all weed species for the remainder of the growing season.



Figure 4. Storage yard before application of Telvar W weed killer.

The chemical has been applied with a WC-200 Iron Age sprayer towed behind a rubber-tired tractor. The sprayer has a 200-gal. tank and a Hypro 750 pump.

Spray is applied through a boom fitted with several nozzles close to the ground, and one pass covers the entire shoulder width. Nozzles are shielded to prevent spray drift. A maintenance truck with safety lights follows the tractor as protection to traffic and, at the same time, to the operators. In addition to the two drivers, the crew includes a third man riding in the truck cab to watch the spray equipment.

One filling of the 200-gal. tank covers 7 miles of shoulder, an area of approximately $3\frac{1}{2}$ acres. Operating at 4 miles an hour, this equipment and crew sprayed the entire 160 miles of 5-foot shoulder in two weeks.

In addition to this road-shoulder work, we have treated 10 service areas and 25 interchanges with Telvar to eliminate weeds where we want to keep the ground bare. We have also made test applications in drainage ditches and found that one application kept the ditch free of vegetation for the entire season. Even where we wanted sod in the bottom of the ditch, we saved a good deal of mowing and hand clipping by careful use of a soil sterilant weed killer around culvert openings and catch basins.

Drainage-ditch treatment with a powerful water-borne chemical requires special care to be sure that there will not be any damaging wash. The only place where we got into trouble with Telvar W weed killer this year was where a flooded drain washed the chemical off the sprayed surface onto another area that was not intended for treatment. Of course, the high potency of the chemical really proved itself.

Our success in 1954 has led us to plan considerable expansion in our use of Telvar next season. We expect to use the material along guardrails; around culverts, bridge abutments, sign posts, and safety reflectors; and on hard-surfaced embankments.

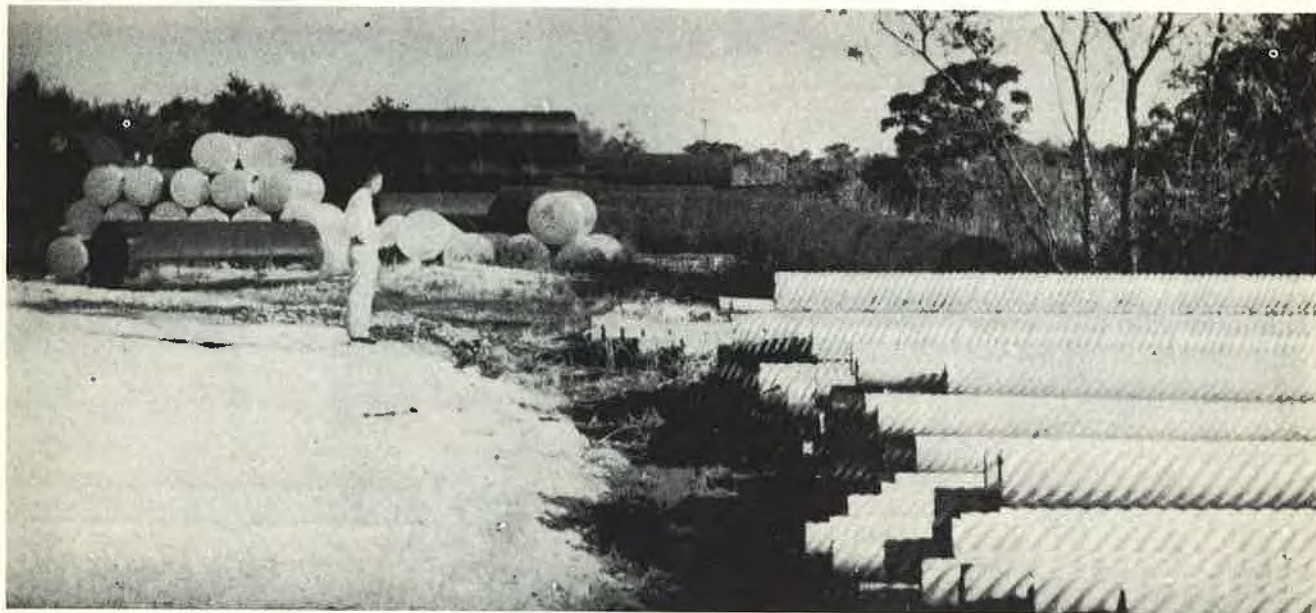


Figure 5. Effect of weed killer.

One advantage of this material is that you can use it before growth starts in the spring and not worry about weeds for the rest of the growing season. In storage areas and equipment yards, it is much easier to spray the whole area once than to keep going back all summer long to mow it.

Telvar W is a wettable powder, which mixes readily with water, but it does not dissolve. The sprayer needs continuous agitation to keep the chemical in suspension. We have a jet nozzle on the end of the bypass line and set this in the bottom of the spray tank, so that it keeps churning the mixture. A mechanical paddle agitator is even better. All openings in the screen and line strainers should be 50-mesh or larger.

This chemical is nonvolatile, noncorrosive, and low in toxic hazard to people and animals under conditions recommended for use. Furthermore, a little goes a long way. The total treated area on the New Jersey Turnpike this year amounted to nearly 100 acres, and we used only about 3,000 lb. of chemical.

This material works principally through the roots, and so it should be applied when there will be enough rainfall to carry the chemical down into the root zone.

If dense growth is to be controlled, it is best to mow first, cleaning away matted growth, and then apply the chemical on the ground.

Chemical weed killers are becoming an important tool in highway maintenance. In the hands of qualified crews, they do a thorough job with minimum labor cost.