How Minnesota Uses

Invert Roadside Sprayer

By

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WEED CONTROL, required for many years in Minnesota, has been a part of the job during my 30 years as a highway engineer because weed-free roadsides are essential for traffic safety, road maintenance, winter travel, and beautification. Also, good weed control helps the farmer by cutting down the number of seeds available to infest his farmland and helps the hay fever sufferer by getting rid of weed pollen.

In the early days, we had no alternative but to mow weeds, chop brush by hand or with mechanical equipment, and burn when local conditions permitted. As everybody in the business knows, this was time-consuming, tedious, and never-ending. Roots remained and weeds and brush sprouted right back.

The first chemicals introduced for weed control removed all vegetation so that soil was easily eroded and blown away. We could use these materials only for special areas and heavy infestations of such weeds as ragweed, thistles, spurge, cattail, and milkweed. We still had to rely principally on mechanical controls.

Tremendous contributions to weed control were made by 2, 4-D, and subsequently 2,4,5-T, because they killed broad-leaved weeds and brush, yet left desirable grasses. But getting these materials to behave was sometimes a problem, since when applied as the conventional oil-in-water spray, some drift of fine particles occurs even in calm weather.

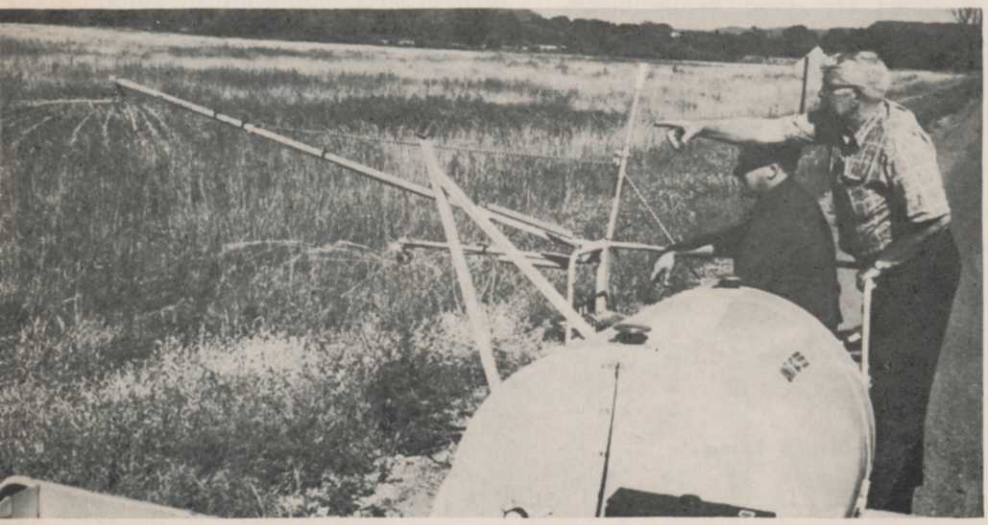
Wabasha County, located in southeastern Minnesota, is a scenic county with wooded hillsides, excellent cropland, and beautiful farms. It has ample rainfall, and conditions for plant growth are ideal. Such susceptible crops as soybeans, vegetables, fruit, and clover are grown adjacent to the roadsides. Of course, our citizens do not want their crops, ornamentals, and other desirable plants along the highways damaged.

For many years we sprayed our roadsides with 2,4-D and 2,4,5-T herbicides, successfully, using conventional-type sprayers, but we had to contend with a certain uncontrollable amount of damage from drift over adjoining areas. This resulted in a public demand for strict control over the use of herbicides. We had to come up with a safer method of application if we were to continue spraying our roadsides.

New Spray System

Early in the spring of 1964, we first learned of invert spray equipment that would produce and apply herbicides as heavy wind-resistant droplets having the appearance and consistency of mayonnaise. This water-in-oil spray, called an invert because it contrasts with the conventional oil-in-water spray, appeared to be the answer to our drift problem.

Lyon Chemicals, Inc., of St. Paul, Minn., introduced this new spray system for ground application of 2,4-D and 2,4,5-T products. The sprayer, engineered and manufactured by the Minnesota Wanner Co. of Minneapolis, is a complete bifluid unit mounted on a two-wheel trailer that can be pulled by truck or tractor. Arrangements were made for this equipment to be



Bert Pinsonneault inspects good coverage of right-of-way obtained from 9-ft. and 3-ft. booms. Both booms are attached to the trailer and can be turned on and off as needed.

demonstrated to the Board of County Commissioners and some of our maintenance personnel.

The demonstration unit was equipped with a handgun only, but it gave us a definite indication as to size of droplets it produced and assured us that the drift problem would be negligible. We determined that a 12-ft. boom with three or four adjustable nozzles would provide controlled roadside coverage. Using this boom and the handgun, our crews could reach all areas along our highways.

In the spring of that same year, we purchased the first boom-equipped Wanner Invert Roadside Sprayer commercially used in the United States. It has proved so successful that we now have two units in Wabasha County. The Minnesota State Highway Department and 18 other county highway departments are using these spray units. Rural electric cooperatives and private power utilities also have these invert ground spray units in operation.

As a matter of fact, I've worked with just about every method of weed control during my 30 years as a highway engineer in Minnesota, and the invert sprayer does the job better than anything we've tried before. The equipment gives a good spray pattern for killing weeds, and most important, controls the spray to prevent drift.

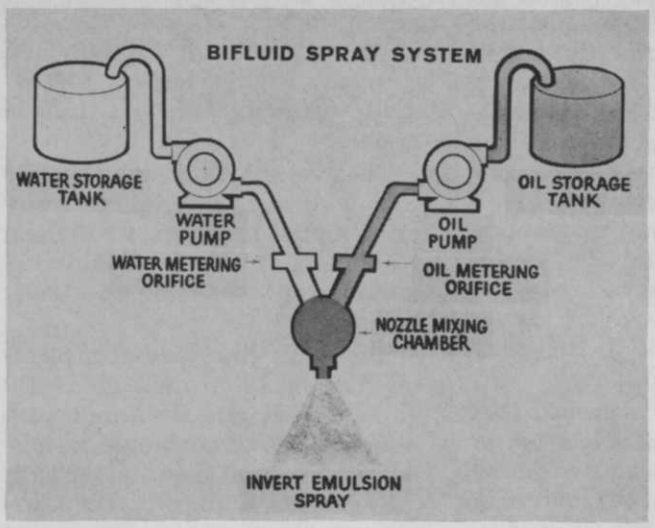
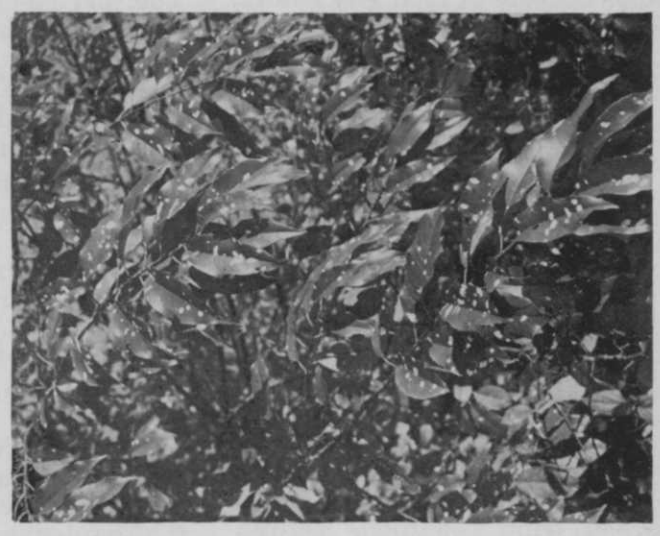


Fig. 1. (left) shows schematic drawing of the bifluid invert spray system. In practice, newer units use one tank with a divided compartment for the chemical.



Closeup (right) of typical pattern left by the invert sprayer, showing good coverage that results in effective control of roadside weeds and brush.

Use In The Field

From the beginning, the Wanner Roadside Sprayer gave good drift control, and this was our primary objective.

But, as with most new equipment for a special use, the first year under field conditions turned up some problems. The 12-ft. boom was too long and not flexible enough for the areas that required a shorter swath. Nozzles were too close together, causing overlap in the pattern and chemical waste. And, droplets were too large.

The manufacturer supplied newly designed tips, and we increased pressures slightly. The droplet size was reduced and can now be controlled to each job requirement. It was found that only two nozzles were required to do the job with the 12-ft. boom.

Our second unit, now in operation, has a "stub boom" only 3 ft. long, as well as a 9-ft. boom and a handgun. With the short and long boom and handgun, we have maximum flexibility to move around poles and mailboxes to reach all areas along the roadside with one trip. Also, we can keep the spray within the narrow sections of right-of-way.

We found the operation of the invert sprayer somewhat different from that of conventional equipment because the bifluid sprayer is really two systems in one. But our operators soon developed the skills needed to handle preparation and pressure adjustments.

The invert takes less water volume than the conventional 2, 4-D and 2,4,5-T sprays. We can start out with enough water to spray about 60 acres a day and do not usually have to waste spray time by returning to the shop to refill the tank.

The white color of the mayonnaiselike droplets helps the operator positively identify where he has sprayed. If wind velocity is questionable, crews can check to be sure the herbicide is falling only where weeds and brush are. If there is a question about good coverage, individual weeds and brush can be checked for the desired pattern.

With good drift control, our crews spray many days when we couldn't think of spraying with conventional 2,4-D formulations. This enables us to do more roadside spraying during the period that weeds are actively growing and are more easily killed. We can also spray closer to fence rows and farm lands with a much greater degree of safety.

The invert droplets resist

washoff. We know because showers have come up unexpectedly right after spraying without adverse effect. Resistance to washoff has enabled us to spray dew-covered weeds and brush in early morning with good kill. Fog is not uncommon during the day in the southeastern Minnesota valleys. Our crews using the invert never have to wait for it to lift; they go right on spraying.

Our crews have observed that the sticky invert droplets better control some species of weeds or brush that characteristically have a waxy or thick outer cuticle. Because of their oily nature, the invert droplets seem to stick and penetrate these leaf surfaces more effectively.

There is no better proof of drift control than the fact that we have had no damage claims from our invert spraying during the three-year period that it has been in use. And, each year we have used this equipment to cover an average of 230 miles of roadside adjacent to farmland.

Cost Comparison

We have continued to keep and use our conventional spray equipment on a limited basis when wind conditions permit. However, the invert equipment has proved so satisfactory that we are using the conventional less and less each season. Comparing costs between the two methods, we have found that the cost per acre is about the same. Even though the invert chemical costs slightly more, the reduced labor time per acre with the invert offsets the additional chemical costs.

About the Equipment

We learned from Cliff Schrader of Lyon Chemicals, Inc., that the idea of spraying invert formulations had been under development for some time. The major problem had been to engineer a spray system that could pump the thick invert emulsion to nozzles and release it with a uniform pattern.

The Wanner Roadside Sprayer does this with a bifluid system that pumps the water and herbicide from separate tanks to the nozzle, where a thick emulsion is simultaneously formed and sprayed. Figure I gives a schematic drawing of this bifluid system.

The Wanner Roadside Sprayer that we use is a complete spray unit mounted on a two-wheel trailer. It is also available skid mounted for installing on a truck bed.

The tank has two-compartments: the large tank holds 260 gal. of water and the small tank holds 40 gal. of herbicide formulation. The unit is equipped with a 10-gal.-per-minute positive displacement pump on the water side, and a 3-gal. piston pump on the chemical side. For optimum operation of the booms, pressures are maintained at 30-35 p.s.i. The handgun performs best with pressures of 100-125 p.s.i.

Invert roadside spray units are now available with a handgun and one or two booms that break-away for poles and other roadside obstructions and that are adjustable in height. The standard single boom is 13 ft. long with two nozzles and gives a 16 ft. to 20 ft. swath. This boom can be extended to 17 ft. which adds the third nozzle and increases the swath to 24 ft. to 30 ft. The double-boom units have a 9-ft. boom and a 3-ft. stub boom. The single nozzle on the longer boom is faced outboard and reaches 16 ft. to 20 ft. The stub boom nozzle faces inboard and covers an 8-ft. to 12-ft. swath.

The Hercules Low Volume nozzles are supplied to Minnesota Wanner from Hercules Incorporated, manufacturers of the herbicide formulations. The nozzle and special tips used in the bifluid spray system have been engineered and field tested to give the optimum spray pattern for weed and brush control with regulated drift.

Application Rate

The roadsides of Wabasha County are infested with a wide variety of brush including plenty of sumac and boxelder as well as a number of annual and perennial broad-leaved weeds. We have found that ¾ lb. of 2,4-D and ¾ lb. of 2,4,5-T acid equivalent per acre gives good weed and brush control.

The "Visko-Rhap" formulations used in the Wanner Roadside Sprayer, as well as the equipment, are distributed by Lyon Chemicals, Inc., of St. Paul. "Visko-Rhap" formulations containing 2,4-D and 2,4,5-T are recommended for normal spraying of a variety of weeds and brush. "Visko-Rhap" formulations containing 2,4,5-T are used for fall spraying and for hard-to-kill woody plants.

The recommended uniform travel speed for the Wanner Roadside Sprayer is 3 to 7 m.p.h., depending on the height, density, and type of weeds and brush. For dense brush or heavy infestation of noxious weeds, additional chemical may be applied with the handgun.

Heated Turf Grows Faster, Is Frost-Free, More Popular

With the installation of underground heating cables in the football field turf of the U. S. Air Force Academy's Falcon Stadium, The Singer Co., whose Climate Control Division made the cables, predicts increasing popularity of turf heating.

Cables were installed 1′ apart at 8″ below the surface, and are said to be designed for frost- and snow-free football, with fewer injuries from frozen field surfaces. A similar installation is planned for the new Civic Center Busch Memorial Stadium in St. Louis, and interest has reportedly been expressed in other areas. If used for baseball field turf, Singer says, heating cables would encourage faster growth, cut down on seeding and sodding, and allow the use of sturdy, southern grasses.

Experiments in turf heating have been conducted since 1962 at the varsity practice football field at Purdue University in Lafayette, Ind. Singer adds that heated playing fields have been in existence in Europe since 1959.

Write the Singer Co., Climate Control Div., Box 7047, Cleveland, Ohio 44128, for additional data on heating cables.