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PRESENTATIONS TO THE COMMITTEE ON ROADSIDE MAINTENANCE

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**Presentations to the Committee
on Roadside Maintenance**

FOREWORD

The papers published in this Circular were presented to the Committee on Roadside Maintenance during a committee meeting on Monday, January 13, 1986. Although it was recognized that the papers did not present research findings of the nature typically published in the Transportation Research Record series, the committee believed the information to be useful to an audience larger than those present at the committee meeting. Thus the committee members recommended that the papers be published in the Transportation Research Circular series.

It should be noted that the Transportation Research Board does not endorse specific products or manufacturers and that no such endorsement is intended in this publication. However, the trade names or manufacturers' mentioned in this circular represent products in common use in roadside maintenance, and the committee believes that this information contributes to the understanding of the report.

Georgia DOT Vegetation Management Program

by
Percy B. Middlebrooks, Jr.
Chief, Operations Research Branch
Office of Materials and Research
Georgia Department of Transportation

Roadside Maintenance Committee, A3C07
Transportation Research Board Annual Meeting
Monday, January 13, 1986

Georgia's roadside maintenance program consisted almost entirely of mowing before 1974. The mowers started mowing in the spring and continued through summer and fall. When one round of mowing was finished, the mowers started over again and did not stop until after frost. In 1974, because of the oil embargo, mowing was limited to four rounds per year and remained this way until 1976. In 1977, as a way to further reduce costs, a pilot herbicide mowing program was initiated. Four sprayers were purchased and 14,000 acres were covered.

The program has come a long way since then and the Georgia DOT now has 34 sprayers and in 1985, 200,000 acres were covered. Machine mowing has undergone a gradual decline in acreages starting at about 400,000 in 1976 to 250,000 in 1985. (Figure 1).

Equipment

The sprayers consist of a truck-mounted 1,200 gal stainless steel tank with two 20- or 30-ft booms mounted just behind the cab. They cover 40 acres with one load at a pressure of 25 psi and operate at a speed of 18-22 mph. The boom is mounted 62 in. from the ground with flexible tubes that drop the nozzle height down to 30 in. The nozzles are spaced 5 ft apart and the boom must be capable of moving from a horizontal position up to a 45 degree angle and back down again in 10 sec. The boom folds back against

the tank for storage. On some roads, the boom is not used. Instead, an off-center nozzle is mounted on the side of the cab. The water-handling system is powered by a Defco 2500 pump. After experimenting with a number of different types of pumps, the Defco pump was determined to be the best in terms of longevity and maintenance. The boom and the spray systems are operated in the cab, electric over hydraulic. Boom design has changed - the latest one is a stainless steel boom with a chemical carrier pipe integral as part of the boom. The basic boom now is 20 ft long.

MSMA Program

The chemical used for the majority of the herbicide program is MSMA (monosodium acid methan arsenate) at a rate of 2 lbs/ai/acre. There are several good reasons for continuing the use of MSMA, such as it (a) is effective, (b) gives a good appearance, (c) is relatively safe, and (d) has an extremely low cost - about \$2.50 per acre.

The primary objective of the program in south Georgia is to control the seedhead height of Bahia grass and to control some problem weeds. The primary species being looked for is Bermuda grass and the Georgia DOT has been successful in eliminating 1-2 mowings. The schedule now is generally 1-2 mowings and 1-3 spray applications. (In north Georgia, the Department is controlling some Bahia grass and other weeds in a turf of tall fescue Bermuda grass.)

The sequence of the program is as follows: Mow in the spring, generally May or early June, then return in 2-3 weeks with a spray application. This process is repeated as needed during the summer. In north Georgia, it generally takes 1-2 applications whereas in south Georgia, up to three applications may be required. In the fall, a final cleanup mowing takes place to even up the turf for the winter. This is not necessary in some areas where excellent control with MSMA has been experienced - the final mowing is then deleted.

Savings

Figure 2 shows chemical and machine mowing cost data for 1985. The total program cost is now up to \$9.6 million with plenty room for reduction of machine mowing with the figure still at \$8.2 million. Figure 3 shows the unit cost for chemical and machine mowing. The chemical mowing costs are much less than machine mowing costs. Chemical mowing costs are fairly stable and machine mowing costs are increasing dramatically. Figure 4 shows a chart of savings since the program began.

In 1985, over 5 million dollars was saved. Total savings since the program began are \$16 million. Savings from this program have been beyond the Department's wildest expectations. In addition, the roadsides look even better than they did when mowing was taking place all the time. Because old habits die hard, however, there is still some mowing going on that is not needed. In the fall of any year, there may be a uniform stand of Bermuda grass from 6-9 in. in

FIGURE 1. CHEMICAL VS. MACHINE MOWING - ACRES COVERED

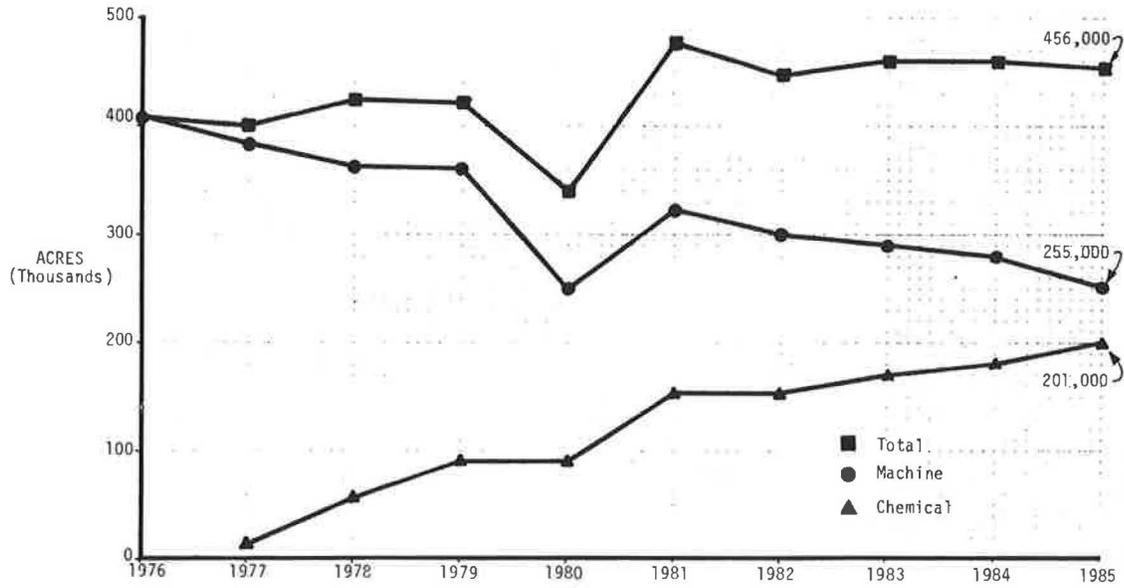


FIGURE 2. CHEMICAL VS. MACHINE MOWING - TOTAL COST

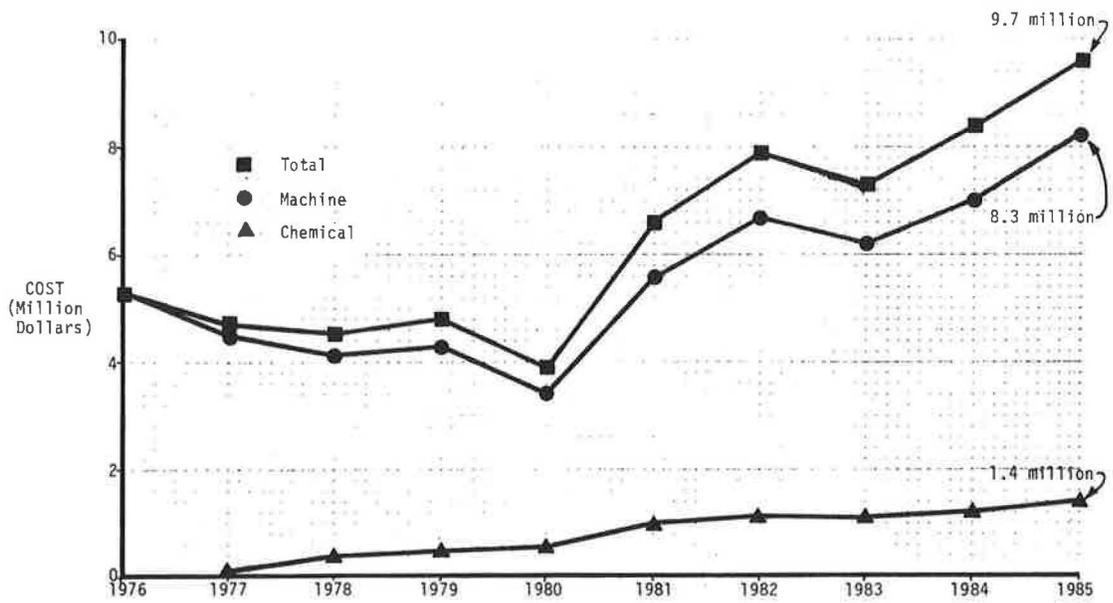


FIGURE 3. CHEMICAL VS. MACHINE MOWING - UNIT COST

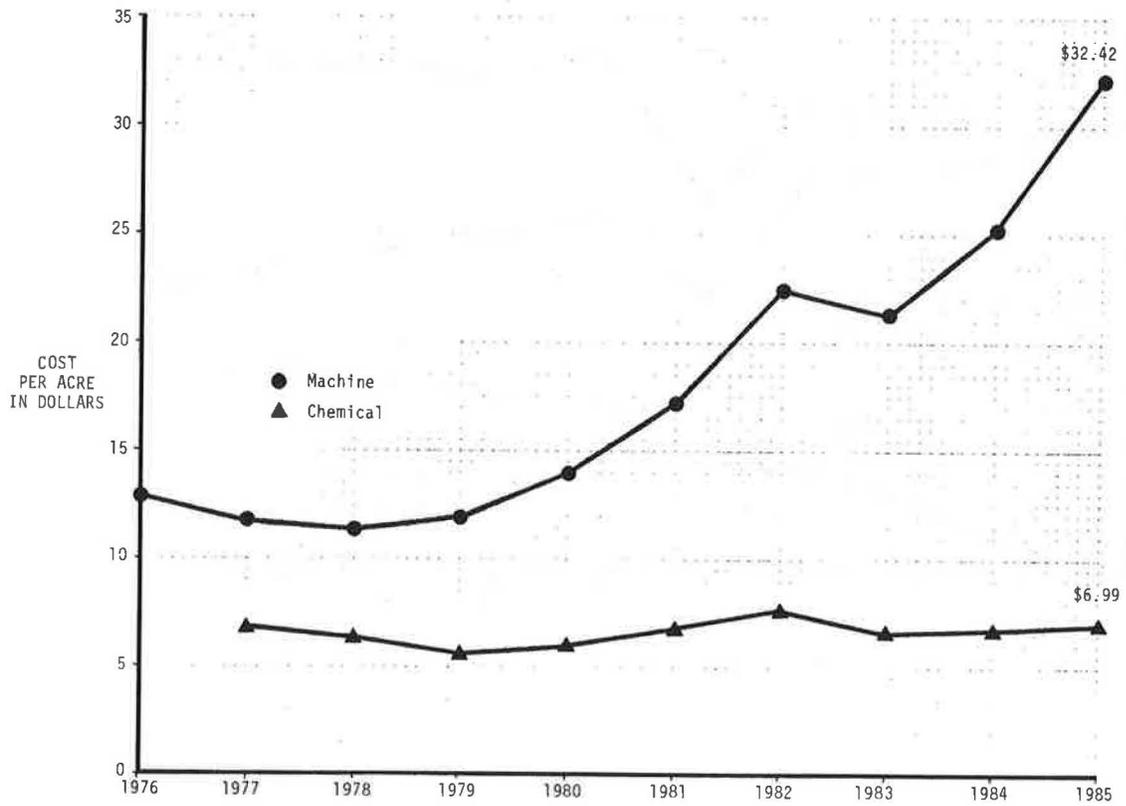
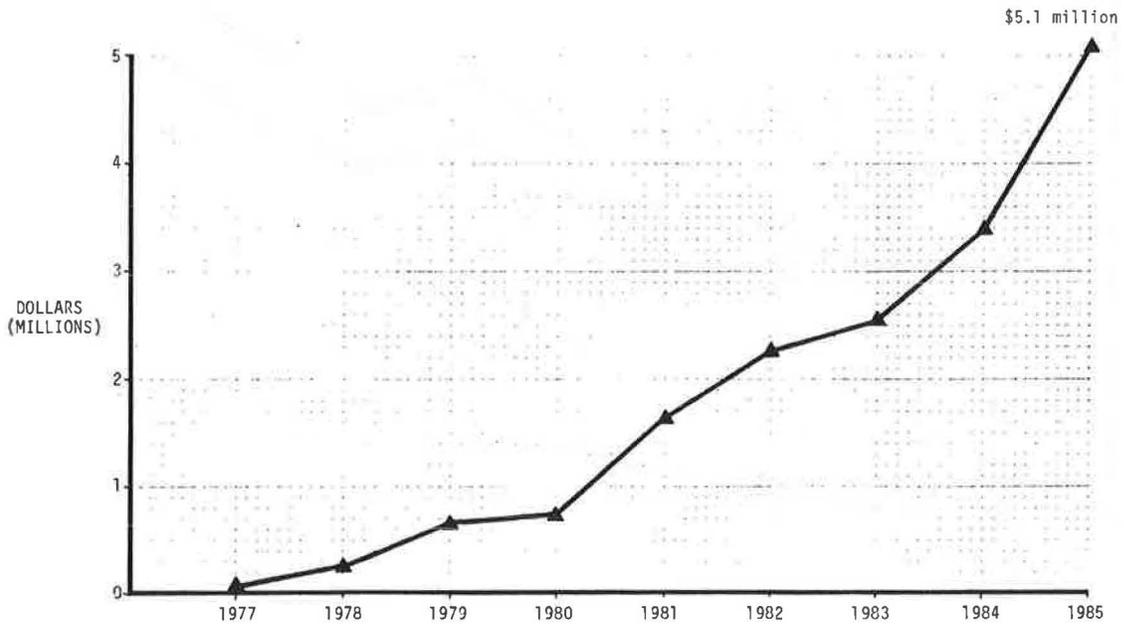


FIGURE 4. CHEMICAL MOWING SAVINGS



height but some people still insist on mowing to bring it down to a uniform height of 4-6 in. In the process, a lot of litter is generally uncovered and the piles of clippings make the freshly mowed area look unsightly for a period of several weeks. A transition is being observed as new people come onboard - the newcomers do not see the need for mowing like some of the old-timers do.

There are a number of side benefits to the program in addition to cost savings and appearance. The use of MSMA has been successful in keeping back kudzu and Johnson grass. It does not kill either one of these species, but it does help keep them under control during the season. Another benefit to the program is that there has been a reduction in the spot spray program for guardrails and signs, and around drainage structures because of the control capabilities of MSMA. The Department is able to cover 150 acres per day with a sprayer. If this area was being mowed, it would take a 5-man crew 2 weeks. Significant savings have been observed in the number of personnel required to do the work. The program came at a perfect time when the Department was forced to undergo an overall reduction of personnel through attrition.

County Spray Programs

With such a successful program, local governments in Georgia are developing a lot of interest in similar programs. The Department has been concerned that it may reflect on its program if the local governments begin similar programs and make mistakes. The Department is not prepared to advise cities and counties on what they should or should not do in developing a spray program, but it was felt that correct information needed to be given and the programs closely monitored. The state Cooperative Extension Service has taken the responsibility to assist local government employees and county agents to try to inform them of the facts on operating a good spray program. Three excellent meetings were held in 1985 in which much information was disseminated on topics such as spray safety, types of equipment and materials to use, cautions, political problems in initiating such a program, and safety of the traveling public. The meetings included talks by county personnel who operate successful spray programs to give firsthand information on how best to set up a spray program. The meetings have been well attended with good attention and participation from those present. Several counties have already set up successful programs and more are in the process of initiating programs.

Safety

The Department has been fortunate to have a safe spray program. In the 9 years since the program began, over 1 million acres have been sprayed and only one claim has been paid (approximately \$3,000). Several other complaints have been filed and investigated, but there have been no other claims paid. The Department is pleased with the results of the program - especially the safety record. The Department operates the program very conservatively and is cautious in adding new

chemicals to the program. Whenever mixtures or chemicals are changed, it is done on a trial basis and gradually expanded. Drift control agents are used. The Department tries to keep the program about the same each year so that the equipment operators can rely on rates and procedures being about the same. The Department insures that all the equipment is calibrated, that the best people are selected as operators, and that these operators are retrained each year. The Department encourages a pesticide certification. There is no state law that requires certification, but all of our District coordinators and agronomists as well as many operators are certified. The Department maintains complete records of all spray work.

Research Program

Our spray program would not be the success that it is without the research and development program that is ongoing. The spray program and research effort were initiated at the same time and research has guided the spray program throughout its 9-year history. Much of the successful research has been due to the excellent cooperation between the people involved in research and the agronomists and maintenance personnel involved in the actual spraying. Dr. James Miller, of the University of Georgia Cooperative Extension Service, has worked with the Department throughout the period and there is an excellent working relationship among the Department, Dr. Miller, the maintenance agronomists, and the District coordinators. The maintenance agronomists are on hand for all the Department's meetings and discussions. They help plan the plot work for the upcoming year and are encouraged to (and they generally do) participate in the establishment of plots and conduct plot ratings with the Department when the time comes to evaluate the results. Implementation of results is not a problem because the agronomists see the results and talk it over with Department representatives, and they generally make the same conclusions as the researchers. They will then go ahead and implement the results on the statewide spray program.

Tall Fescue Seedhead Program

The results of the last 2 years of research and development have been significant. The Department has developed a method for controlling tall fescue seedheads in north Georgia. During 1984, 125 plots were installed on two application dates using a number of compounds, and it was found that Poast®, Oust® and Fusilade® (fluazifop), at several rates, gave excellent seedhead control without excessive injury to fescue. Those tests were repeated in 1985 zeroing in on the compounds that gave the best results to see if the excellent results in 1984 could be duplicated. Two applications were made, one in mid-March and another in mid-April, to try to bracket the timing for best results. Table 1 gives the compounds that were tested and the results of the ratings and discussion.

Poast® and Oust® gave excellent results and the visual results agree with that. The roadsides looked very good in the locations of plots. The

TABLE 1 HALL COUNTY

Treatments Applied March 14, 1986 and Rated April 2, 1985 on Interstate 985

	% Injury				General Appearance				Broadleaf Control			
	Rep.3	Rep.2	Rep.1	Ave.	Rep.3	Rep.2	Rep.1	Ave.	Rep.3	Rep.2	Rep.1	Ave.
1. Poast 0.12 lb	20	20	30	27	90	90	80	87	0	0	0	0
2. Poast 0.25 lb	30	30	30	30	80	80	80	80	0	0	0	0
3. Poast 0.5 lb	30	30	40	33	80	80	70	77	0	0	0	0
4. Poast 0.25 lb Oust 0.5 oz	30	30	30	30	70	70	80	73	30	*	30	30
5. Poast 0.12 lb Oust 0.25 oz	20	20	20	20	90	90	80	87	70	70	50	63
6. Poast 0.06 lb Oust 0.12 oz	10	10	10	10	90	90	90	90	70	70	80	73
7. Fusilade 0.25 lb Oust 0.25 oz	10	10	10	10	80	80	90	83	90	90	50	77
8. Fusilade 0.12 lb Oust 0.5 oz	10	10	10	10	70	80	90	80	90	90	90	90
9. Poast 0.25 lb Atrazine 1.0 lb	80	90	90	87	20	10	10	13	90	90	90	90
10. Poast 0.12 lb Atrazine 2.0 lb	80	80	90	83	20	20	10	17	90	90	90	90
11. Oust 0.5 oz	30	10	10	17	50	90	90	76	70	50	50	57
12. Oust 0.75	40	20	10	23	40	90	90	73	90	50	50	63
13. Escort 0.25 Oust 0.25	30	20	10	20	50	90	90	76	70	70	70	70
14. Check	0	0	0	0	100	100	100	100	0	0	0	0

*Vetch stunted, not vining Check = vetch vining

Vetch 12" tall
Cranesbill 6" tall
Crimson clover 4" tall

Department also put in a large test section (1 mi of shoulder) with a truck-mounted sprayer. Oust@ at 1/2-oz and Poast@ at .25 lbs were used in those tests. The roadside in these areas looked excellent all spring and summer. A few weeds came late in the season but, for the most part, the roadside appeared excellent. There are, however, some problems with weeds in fescue turf, some of which are not controlled by Oust@ or Poast@. The combination of Poast@ and atrazine for weed control was the best-looking treatment in the tests. Some of the weeds that have proven to be a problem with Oust@ and Poast@ are horseweed, wild carrot, clover and wild garlic (Poast@ only).

The Department plans to go system-wide this year with Poast@ or Oust@ for fescue seedhead control. Rates are likely to be 0.5 oz/acre with Oust@ and 0.25 lb/acre with Poast@. The cost of this program will be higher than the MSMA program. It is estimated that chemical costs will run about \$7 an acre, which brings the total cost to about \$12 per acre. However, this is a lot less than the cost of machine mowing.

Radiarc

During the fall of 1985, the Department conducted some work with the Radiarc spraying system. Because of the late timing, there was no opportunity to spray any chemical; however, a good bit of water was sprayed to try out the system. The Department feels the system may have potential but was not completely satisfied with the pattern that was obtained (only 18' and it was not as uniform as was desired). Several combinations of nozzle spacing and sizes were used including both the 0.70 and the .105 tips;

the system will be investigated more in 1986 using some herbicide.

Summary

In summary the Georgia DOT found that the spray program has been a benefit beyond anything that was expected and fits in well with the Department's roadside maintenance operation. It has been accepted, even praised, by adjacent property owners. The vast majority of them are pleased with the program and feel that the roadsides look better and protect their property interests even more than with frequent mowing. The suppression of weed species and Pensacola Bahia grass is a great benefit.

Fescue Trials - 1985

Hall County Fescue Seedhead Suppression

Results from first-year trials in 1984 utilizing postemergence grass herbicides for the suppression of fescue seedhead development were very encouraging. Certain treatments and rates were selected for further investigations in 1985 including two dates of application. A summary of average ratings for each date of application and for four rating dates follows, with a discussion of date and results.

The first plot treatments including Poast@, Fusilade@, Oust@, atrazine, or Escort@ (metsulfuron methyl), were applied on March 14, 1985. These plots were rated on April 2, May 16, June 14. The same plot treatments were repeated on the opposite side of the median on April 18, 1985. These plots were rated on May 16, June 14, and July 10.

TABLE 2

AVERAGE OF THREE RATING DATES

General Appearance

	14 March Application Date					18 April Application Date				
	2Apr	16May	14June	10July	Ave	2Apr	16May	14June	10July	Ave
1	87	83	67	-	79	-	73	90	95	86
2	80	87	73	-	80	-	70	90	95	85
3	77	80	83	-	80	-	70	93	95	86
4	73	88	87	-	83	-	67	95	100	87
5	87	82	73	-	81	-	70	95	100	88
6	90	50	43	-	61	-	73	95	100	89
7	83	53	50	-	62	-	70	95	100	88
8	80	62	57	-	66	-	70	95	100	88
9	13	90	87	-	63	-	57	100	97	85
10	14	83	83	-	60	-	63	100	97	87
11	76	63	50	-	66	-	73	95	100	89
12	73	63	60	-	65	-	73	95	100	89
13	76	63	53	-	64	-	73	95	100	89
14	-	-	-	-	-	-	90	87	83	87
15	-	-	-	-	-	-	80	88	77	82

Fescue Seedhead Suppression

1	-	85	88	-	87	-	95	98	99	97
2	-	99	93	-	96	-	95	100	99	98
3	-	100	100	-	100	-	95	100	99	98
4	-	98	97	-	97	-	95	100	100	98
5	-	82	82	-	81	-	95	99	100	98
6	-	53	43	-	48	-	95	99	100	98
7	-	53	53	-	53	-	95	98	100	98
8	-	62	57	-	60	-	95	100	100	98
9	-	99	98	-	98	-	95	98	100	98
10	-	90	92	-	91	-	93	98	100	97
11	-	50	47	-	49	-	95	99	100	98
12	-	57	57	-	57	-	95	99	100	98
13	-	50	47	-	49	-	93	99	100	97
14	-	-	-	-	-	-	83	67	90	80
15	-	-	-	-	-	-	73	80	83	79

% Injury

1	27	0	0	-	9	-	30	30	0	20
2	30	0	0	-	10	-	43	67	0	37
3	33	0	0	-	10	-	47	90	0	46
4	30	0	0	-	10	-	47	73	0	40
5	20	0	0	-	7	-	33	53	0	29
6	10	0	0	-	3	-	27	53	0	20
7	10	0	0	-	3	-	30	53	0	28
8	10	0	0	-	3	-	27	70	0	32
9	87	0	0	-	29	-	53	3	0	19
10	83	0	0	-	28	-	40	3	0	18
11	17	0	0	-	6	-	30	63	0	31
12	23	0	0	-	8	-	23	73	0	33
13	20	0	0	-	7	-	23	57	0	20
14	-	-	-	-	-	-	13	13	0	7
15	-	-	-	-	-	-	18	30	0	16

Injury Ratings

The March 14 and April 18 treatment dates both gave light to moderate injury to fescue from all treatments except combinations with atrazine at the first rating dates (April 2 and May 16, respectively). Greater injury was expressed at both treatment dates Poast@ (20 to 47%) than for Fusilade@ (10 to 30%) or Oust@ (13 to 40%). Greater injury to fescue resulted from the April 18 treatments as compared with the March 14 treatments. Combinations with Oust@ did not seem to adversely affect Poast@ or Fusilade@ injury. Poast@, in combinations with atrazine, caused severe injury to fescue at both dates of application but injury was more severe for the early application (87% versus 50%).

By the date of the second rating for March 14 treatment, all symptoms had disappeared. Fescue stand reduction was recorded on May 16, which showed a range of 10 to 60 percent stand reduction for certain treatments. Poast@ + atrazine, Poast@ + Oust@ and the highest rate of Poast@ caused a noticeable loss of fescue cover. Leaf injury to fescue actually increased between the first and second rating of the April 18 treatment date for most treatments. The exceptions were Poast@ + atrazine, Escort@ at two rates, and the lowest rate of Poast@. By the third rating date, all injury symptoms had disappeared from the April 18 treatments.

Fescue Seedhead Suppression

Several treatments and combinations gave good-to-excellent fescue seedhead suppression, with greater suppression resulting from the April 18 treatment date than from the March 14 date. Seedhead suppression was almost 100 percent for all treatments and combinations, except Escort@, which rated 90 percent and 83 percent for two rates.

Weed Control

Treatment combinations with Oust@, Escort@ and atrazine gave excellent control of broadleaf weeds at the April 18 date of treatment, but relatively less control or suppression at the March 14 date. Vetch and crimson clover suppression or control followed a similar pattern indicating that these species had not germinated at the March 14 treatment date. Oust@ gave good-to-excellent control of wild garlic at all rates for the April 18 treatment date, but less control at the March 14 treatment date.

Summary

The most successful treatment in this series when seedhead control, injury, and general appearance of the roadside is considered appears to be a combination of Poast@ and atrazine. This treatment should be included in 1986 trials at the different rate than in 1985. Poast@ + Oust@ combinations also look promising.

Roadside Maintenance Considerations in the Texas Wildflower Program

Wayne G. McCully
Texas Transportation Institute
College Station, Texas

The Texas Highway System incorporates slightly more than 1 million acres of right-of-way. To develop and implement the most cost-effective, practical and appropriate methods and concepts for managing roadside vegetation, the Texas State Department of Highways and Public Transportation (SDHPT) has installed a vegetation management system (VMS). VMS will integrate applicable maintenance methods (mechanical and chemical mowing, use of herbicides,); basic objectives of the maintenance activities (safety, protection of investment, user comfort, and aesthetics); sound agricultural principles (range management concepts, soil chemistry, erosion control, wildflower preservation, and propagation,); and the Department policies ("Good Neighbor" policy, control of noxious weeds,.....).

VMS is a logical management tool to apply the technology gained through long experience and supporting research. Soon after the Texas Highway Department was organized in 1917, it was realized that highways were never built on natural ground - it was either cut or fill. In many cases, the first vegetation to reappear on the disturbed land was wildflowers. They were attractive in appearance and were regarded as beneficial for erosion control, and thus led in 1929 to the recognition of a beautification heritage.

This awareness proved to be the single-most important development in highway beautification in Texas. It led to the maintenance, preservation, and encouragement of natural landscapes along highway rights-of-way when highway construction and automobile transportation were still in their infancy.

In 1932, the SDHPT hired the first landscape architect to make highway personnel, as well as the public, aware of landscape needs. By 1934, plans to shape the future beautification of Texas highways were being put into action. Directives were issued to delay all mowing, except safety mowing, of the rights-of-way until the spring and early summer flower season was over. Today, this policy is still in effect and is an integral part of the new VMS.

Because wildflower seeds were not available commercially in large quantities during the 1930s, they were gathered from prominent wildflower areas after securing written permission from landowners. This was accomplished by one of two methods: (a) the flowering area was cut with a sickle mower after the peak blooming period and before seeds had dropped (the mowed "flower hay" was then transported to the desired location and scattered over the ground) and (b) where permissible, a more successful method was to blade up a thin layer of topsoil containing the wildflower seeds and then transport this soil