



Johnsongrass encroaching onto highway rights-of-way. Mississippi's johnsongrass control program begins about the middle of May in the southern portions of the state and nearly two weeks later in northern areas.

The Mississippi Method

A Weed Control Program

By JOHN L. SNUGGS*

We have encountered numerous obstacles in establishing a definite chemical weed control program for the Mississippi State Highway Department but, luckily, we have always been able to obtain the assistance of competent technical representatives from leading chemical companies in our area.

From the standpoint of selective weed control, the department began an experimental program of chemically treating undesirable roadside vegetation in 1964 under the direction of Lamar Hussey, former agronomist for the department. Not only did Hussey's initial chemical program prove to be successful and convincing; it also served as a guide for the other highway districts in developing their chemical weed control programs.

The year 1968 was probably the most significant year in chemical

weed control since that was when a continuous program of both broadleaf and johnsongrass control was first initiated by John McLeod, former agronomist for the Newton District. It was McLeod's tireless efforts which proved beyond any doubt that chemical weed control was here to stay and that it definitely deserved a place in the department's maintenance program. Our selective weed control program has now been expanded into all six districts with most emphasis being placed on broadleaf weed and johnsongrass (*Sorghum halepense*) control.

Problems

Probably, our most extensive weed problems encountered are found in the Mississippi delta especially since most of the soils there are very fertile. Almost every type weed adapted to the Southern U.S. will be found growing somewhere in the delta. Two of the most common and troublesome weeds found grow-

ing along roadsides in the delta area are dock (*Rumex spp.*) and johnsongrass; however, these two weeds are not limited to just this area and both are very prolific throughout the entire state of Mississippi. Another weed quite common in the delta and adjoining areas is coffeeweed (*Sesbania sp.*). Two unsightly broadleaf weeds commonly occurring along roadsides over the entire state are sowthistle (*Sonchus sp.*) and Canada thistle (*Cirsium sp.*). These two weeds produce small seed that are scattered many miles by wind and water.

In Roadside Development, our main concern actually centers around performing erosion control over the highway right-of-way by providing both a temporary and permanent vegetative cover usually in the form of selected grasses, shrubs, or trees. Our main grasses used for establishing permanent vegetative cover on new construction projects are bermudagrass (*Cynodon dactylon*), bahiagrass (*Paspalum notatum*), tall fescue (*Festuca arundinacea*), and weeping lovegrass (*Eragrostis curvula*). Crimson clover (*Trifolium repens*) is used to a lesser degree, primarily for temporary erosion control during the winter months.

Once an area of new construc-

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tion is taken over by state maintenance forces, the weed problem then becomes ours. Desirable grasses are then on their own since we do not ordinarily supply additional fertilizer on vegetation after the contractor is released from his responsibility of maintaining an area. These grasses are often planted on steep slopes that have no topsoil whatsoever; and, consequently, the only plant nutrients contained in these soils are those supplied by the contractor at planting which usually last from six months to one year. Along come numerous weeds and compete with the desirable grasses for sunlight, moisture, air and nutrients. A potential erosion problem is then staring us in the face. We must then decide on performing some type of selective weed control in order to eliminate the undesirable vegetation but leaving the desirable vegetation to perform its job. We try to develop a general plan of action which includes:

- Identification of specific weed problems
- Selection of the proper herbicidal treatment
- Utilization of proper equipment and trained personnel
- Strict observance of all safety precautions
- Follow up on all work

Equipment

It would be virtually impossible to give a comprehensive review of all the different types of equipment we use for applying herbicides. Some of the units are homemade and were transformed into spray rigs from war surplus material; thus, you might expect that we have experienced numerous mechanical problems from time to time using these rigs. Our most expensive equipment at the present is the ultramodern invert units that we use in both the broadleaf and johnsongrass control programs. We now have four of these units located in three of the six districts that comprise the state of Mississippi. These units enable the operator to reduce the drift problem, thus, covering a uniform spray pattern approximately fifteen feet more than is accomplished by the conventional type units. The invert unit forms a water in oil emulsion whereas the conventional unit forms an oil in water emulsion. The result is a spray particle formed with greater density and viscosity with

the resultant advantages previously stated. All of our invert units are permanently truck-mounted as are most of the conventional units; however, we do have some tractor rigs that are used in areas inaccessible to trucks. Our conventional units use a boomless nozzle cluster for delivery of the spray material. Due to all the numerous and various types of obstacles confronted along most highways, it would not be practical to use a boom. Most of the tanks on the conventional units have a capacity of 1,000 gallons.

Our spray crews must thoroughly familiarize themselves with the specific type equipment being used in order to obtain maximum performance and, thus, achieve good results. Only when the equipment operates properly can we expect to obtain satisfactory results.

Broadleaf Control Program

The primary target of our broadleaf weed control program is dock and thistles. Wild garlic (*Allium vineale*), kudzu (*Pueraria lobata*) and Japanese honeysuckle (*Lonicera japonica*) are problems in some areas of the state but are not considered to be as serious as the dock and thistles. This type treatment ordinarily is accomplished by using the hormone-type chemicals — 2,4-D and 2,4,5-T. The rates of application for control vary from one to two pounds active material per acre. We have used primarily the amine formulation of 2,4-D for conventional application with varying results; however, we have also had success using the ester formulation especially during the month of February when temperatures are still rather cool. We do not use the ester formulation after row crops and gardens are planted due, of course, to its high volatility. This past year, we made extensive use of an invert formulation of 2,4-D in our invert spray equipment which helped reduce drift and offset some adverse climatic conditions.

We have found that the success of the broadleaf weed control program is much more dependent upon climatic conditions than the other chemical programs. Fluctuating temperatures, high wind, and excessive rainfall all have severely hampered our broadleaf program on several occasions in the past.

Johnsongrass Control Program

Most of our emphasis on chemical weed control in the past has been

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on controlling johnsongrass; and, consequently, this is the area in which we have had our most success. Most of our experience in treating johnsongrass has been with the organic arsenicals, primarily MSMA. We have experimented considerably using MSMA by varying the rates as well as the formulations. Experience has revealed that in order to be successful in a program of this nature, we must perform these treatments according to location, season, and climatic conditions.

Ordinarily, our johnsongrass control program is initiated about the middle of May in south Mississippi and about two weeks later in the northern portion of the state. We have found that the seedling johnsongrass can be almost completely eliminated by one or two treatments provided the treatments are performed at the proper stage of growth and climatic conditions are favorable. The rhizome johnsongrass is another matter and occasionally takes not less than two treatments per year over a period of three years to provide satisfactory control. Once an area is satis-

factorily rid of johnsongrass, it must be observed for possible reinfestation from adjacent landowner's property and spot treatments must then be performed to keep down the johnsongrass.

Upon initiating a johnsongrass control program in an area previously untreated, we try to follow a general recommendation we have developed during the past five years. Assuming the areas involved to be heavily infested, we plan on performing three MSMA treatments the first year at intervals of approximately six weeks. We normally use a rate of three pounds MSMA per acre which is usually sufficient to kill the foliage of the johnsongrass without harming the desired grass such as bermudagrass. The second year of treatment involves two treatments of MSMA at the three pound rate. Ordinarily, these treatments would be performed in June and August or as local conditions dictate. By the third year, only one treatment should be required over most of the areas previously treated; however, some spot treatments will be necessary due mostly to factors beyond our control. After the third

year, some spot treatments will still be necessary; but for the most part, we feel that the worst part of the problem will have been solved. Our main problem in carrying out this continuous johnsongrass control program has been getting over all the intended areas each year with the desired number of treatments. This has been due in part to a lack of proper equipment and trained personnel.

One noticeable side effect in using MSMA to treat johnsongrass has been a partial elimination of bahiagrass in favor of bermudagrass, which ordinarily is not damaged by MSMA. Since the bahiagrass is well-adapted to south Mississippi and johnsongrass is less apparent in this area, we do not anticipate any great problem over the loss of some of our bahiagrass. We are fortunate that bermudagrass is well-adapted over the entire state.

We definitely believe that our selective chemical weed control program has proven to be worthwhile even though we have met with some failures, especially in the early phases of the program. The need for any mowing has been eliminated on some sections of secondary routes in the two central districts of the state; however, it should be stated here that our ultimate goal is not the complete elimination of mechanical mowing, for even where we have completely pure stands of bahiagrass and bermudagrass, there will still be a need for some mowing in order to provide a neater and more uniform appearance, especially in and around urban areas. We believe that by using a combination of mechanical and chemical control methods, a much more attractive roadside will be the result.

The Mississippi State Highway Department has a graduate agronomist or horticulturist who is located in each district, and it is his responsibility to carry out the chemical weed control program plus a number of other duties. One problem that we have encountered is that some of our men have become so well-trained in using chemicals that they are hired by large chemical companies; therefore, a new man has to be hired, and as a result, a successful chemical program may be temporarily interrupted since it usually takes a man at least two years to become thoroughly familiar with the various phases of chemical weed control.

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