

Herbicide Fate and Worker Exposure

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A conference of state and federal highway personnel and university researchers was held in Auburn, Alabama, to ascertain interest in and the feasibility of a regional approach to studying the safety of vegetation management practices for workers, the general public, and the environment. It was agreed that a cooperative research project should be developed to obtain the needed information and develop it into a form useful to highway roadside personnel, to better prepare them to deal with questions from regulatory officials and the general public about the safety and environmental aspects of their state's vegetation management program. It was further agreed that Alabama and Georgia personnel would develop a draft of the proposal for a regional project using a regional pooled-funding approach through the Federal Highway Administration, with Alabama as the lead state for consideration.

Vegetation management along roadsides is especially demanding of equipment and labor in the southeastern United States. The mild temperatures and abundant rainfall in that region combine to create ideal conditions for rapid growth of a very dense and tall vegetative cover. Control of species such as kudzu and Johnsongrass by mowing is very difficult and expensive. Therefore, most states in the Southeast have resorted to the use of herbicides. The application of these materials along roadsides has led to numerous questions from the public concerning the effects of these materials on the environment. Additional concern is also voiced regarding any effects of exposure to these chemicals on workers or the traveling public. Unless factual information is readily available to support the safety of these practices to workers, the traveling public, and the environment in general, it is very likely that pressure brought to bear by activist groups will result in the elimination of herbicides as tools for vegetation management on roadsides.

Information is available to support the safety and efficacy of these vegetation management materials, but there

is presently no single source of reference available to state highway personnel for this information. A second problem is that most of the testing has been done in other use situations, such as forestry or utility rights-of-way. The development of definitive data under highway use situations is probably too expensive for an individual state because of the number of materials and methods of application involved. A possible solution to this problem is the development of a cooperative effort among the southeastern states to share the costs of obtaining these data.

ASSESSMENT OF NEEDS

A 2-day conference involving southeastern transportation and highway department personnel, along with university researchers involved in vegetation management, was held at Auburn University to ascertain the interest in and feasibility of a regional approach to conducting the needed studies. Ten states—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia—sent representatives. Representatives from state and regional offices of the Federal Highway Administration also participated in the meetings. Information was presented by each state concerning its current vegetation management programs and the perceived need for development of exposure, toxicology, and environmental fate data. Research needs addressed involved-worker and public exposure hazards, along with the effects of these vegetation management practices on the environment.

Experts in the fields of applicator and public exposure, movement and persistence, and pesticide toxicology were invited to make presentations concerning needs for specific information and methods of obtaining this information.

Potential for Movement of Pesticides in Surface and Groundwater

Although most of the drinking water for rural areas comes from groundwater, much of the drinking water in urban areas is derived from surface water containments such as reservoirs. It is estimated that as much as 95 percent of the drinking water for some major metropolitan areas comes from reservoirs. Turfgrass nutrients and pesticides are transported to surface water in runoff water and eroded sediment. Erosion and surface runoff processes have been examined in relation to water quality and environmental impacts. The movement of pesticides in surface water is considered the major source of potential pesticide movement into drinking water sources.

Using the best estimated parameters for predicting groundwater contamination potential (GWCP) according to the equation presented by Weber (soil scientist, North Carolina State University) on 37 soil series common to roadsides in the southeastern United States, 11 soil series would have a soil leaching potential (SLP) rating of high and 10 soil series would have a rating of moderate. The GWCP for the acid herbicides (i.e., 2,4-D; dicamba; MCPA; mecoprop; and triclopyr) with high herbicide leaching potential (HLP) would be classed as hazardous for use on the 11 soils with the high SLP rating and risky for the 10 soils with a moderate SLP rating.

Results of research conducted at the University of Georgia using lysimeters in the greenhouse and in the field containing a sandy soil subtending bermudagrass and bentgrass sod indicated that the models such as the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) mathematically overestimate by a factor of 10 the quantity of 2,4-D found to pass through the sandy-soil system. Similar research conducted outside using larger lysimeters indicated that the mathematical models, developed for agronomic (row crop) situations, have a tendency to overestimate the potential for herbicides, used on grassed areas, to move into groundwater.

Research on Worker and Bystander Exposure

Pesticides are biologically active chemicals, often not uniquely specific to the target pest, and thus they potentially pose a threat to human health and wildlife. To assess the risks associated with pesticide exposure, it is necessary to determine the likely level of exposure, the extent to which pesticide is absorbed, and the toxicity of the pesticide. Most research on human exposure to pesticides has

been obtained from worker application and reentry exposure in forest ecosystems, orchards, vineyards, or airboat application to aquatic sites. However, because of the differences in spraying equipment and procedures, occupational exposure levels cannot be equated with exposure levels on roadsides or residential lawns. Once a pesticide has been applied to the turfgrass surface, pesticide loss occurs through volatilization to the air, leaching through the soil, degradation, or some combination of these. Environmental, edaphic, management, and other factors affect pesticide loss. Because of the complexity of this system, it is important to use a systems analysis and a modeling approach to summarize all findings that can potentially be used for predictive applications under diverse systems such as roadsides. To develop dependable data for predicting bystander and reentry exposure for roadsides, much research must be conducted.

PROPOSED RESPONSE TO PROBLEM

Other discussions at the conference included proposed costs and possible methods of sharing expenses among states with common needs. At the conclusion of the conference an informal business meeting was held, presided over by Ray Dickens of Auburn University. It was agreed that the lack of scientific data to support the safety of vegetation management programs is a serious problem in all of the states. The lack of supporting data has already caused problems in some states and represents a threat to the continued existence of the programs in many states.

It was further agreed that the group should develop a proposal for a regional project using a regional pooled-funding approach through the Federal Highway Administration, with Alabama to be the lead state for the administration of the project. Alabama and Georgia personnel agreed to work together and develop a draft of the proposal for consideration by all states involved. It was suggested that another meeting similar to this one be held to exchange information between state personnel, work out any problems in the draft, and prepare the proposal for submission to the appropriate organizations for possible funding. It was understood that the proposal would rely on the expertise of researchers in the various member states in a unified, comprehensive research program to provide the needed information and prepare the necessary publications and other educational materials for use by all the states involved.

PROGRESS TO DATE

Researchers from Georgia and Alabama met in Auburn, Alabama on May 20, 1994, and developed a draft proposal for a regional research project dealing with aspects of roadside pesticide applications as they relate to the

exposure of workers and the traveling public, both during and subsequent to the application of the material. Approval and support of the basic principles and procedures of the proposed research by an adequate number of states will result in a formal request for a pooled-funds program administered by the Federal Highway Administration and the Alabama Department of Transportation.