

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT

LAST COPY
DO NOT REMOVE FROM LIBRARY
June 30, 1965

To: R. L. Greenman, Secretary
Committee for Investigation of New Materials

From: E. A. Finney

Subject: Evaluation of "Rhap-Trol" Herbicide Spray System. Research Project
65 NM-141. Research Report No. R-531.

The "Rhap-Trol" herbicide spray system, a product of the Hercules Power Co., Inc., was discussed at the March 23, 1965 meeting of the Committee for Investigation of New Materials, and referred to the Research Laboratory Division for study. On May 7, 1965 a 1-gal sample of "Visko-Rhap Low Volatile 1D-1T" herbicide for use in this spray system was received for analysis from Hercules.

Formulation of the herbicide is described in the Hercules literature and an analysis was not performed. Spray equipment and laboratory facilities were not available for actual spray system testing. Instead, it was evaluated by study of available literature and by obtaining comments from various persons. This report summarizes the information obtained.

As stated in the Hercules literature, Rhap-Trol is a bifluid spray system depending on the action of a special bifluid nozzle to combine and spray herbicide and emulsifiers in an invert emulsion. The herbicide used in the system can be any desired mixture of 2,4-D and 2,4,5-T. The Department has used herbicides of this type and their effectiveness has been established. The Rhap-Trol system does not alter the effectiveness of the herbicide, but does offer a means of dispensing it in an emulsion form which can be more effectively controlled. Application control by limiting spray drift is obviously important when an herbicide is used near fruit and vegetable plantings. One method of gaining drift control is through the use of an invert emulsion form of the herbicide. Such emulsions have the consistency and structure of mayonnaise and obviously a spray of this material would tend to contain large, heavy droplets.

Invert emulsions are difficult to handle because of their high viscosity. Hercules has solved this problem by using a system which forms the viscous emulsion in the spray nozzle. The nozzle is unique and may be patented, but according to S. K. Ries of the Michigan State University Horticulture Dept. other methods of handling invert emulsions are available. He suggested contacting American Chemical Co. and Dow Chemical Co. for further information.

According to Dr. Ries the use of invert emulsions offers a safer form of applying herbicides than conventional sprays, but he had not actually used the Hercules bifluid nozzle nor did he have facilities for performing tests for the Department.

Irwin Pintcke of American Chemical was contacted, and stated that his company introduced invert emulsions for herbicide sprays in 1951. American Chemical has a special applicator--a spinner disc--which is especially recommended for aerial herbicide application. The herbicide emulsion is premixed.

Mr. Pintcke stated that some advantages of invert emulsions are lost when applied from a boom-type sprayer such as those commonly used on railroad and highway right-of-way. He suggested that A. Steinbrecker of the Northern Michigan Electrical Cooperative be contacted because he had used the Hercules bifluid nozzle as well as the American Chemical spinner disc.

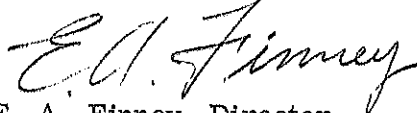
Mr. Steinbrecker confirmed his experience of aerial application using both systems. He preferred the rotating disc applicator for powerline right-of-way and indicated that he had not sprayed invert emulsions from mobile ground equipment. He had experienced some problems with the bifluid nozzle in obtaining satisfactory mixing, and had concluded that this nozzle produced smaller droplets than the rotating disc. Mr. Steinbrecker suggested that other emulsion systems carefully applied would be satisfactory for highway use and stated that such systems would be more economical. He also stated that Leon Nugent, Cadillac District Forester, had observed the effects of the two systems.

Dr. Gowell of the Dow Chemical Co. was also contacted, and recalled demonstrating the bifluid system of applying invert emulsions (in cooperation with the John Bean Co.) to E. C. Eckert of the Department in 1958. He stated that a Mr. Stull had invented the bifluid system, that Dow had worked with it for a number of years with dissatisfaction, and that Hercules finally purchased the system from Stull. Dow learned that spray drift was predominately caused by particles of less than 200 microns in size and that oil emulsions have a greater tendency to drift. For this reason, in 1960 Dow began studying the feasibility of using inert polymer materials that would uniformly assume a controlled particle size in water. The material is called "Norbak" and is used with Dow's latest herbicide, "Tordon 101." According to Dr. Gowell, Messrs. Rathfoot, Oravec, Badalucco, and Wolfe observed an application of this material in the Jackson area sometime during May 1965. Spray drift can be very efficiently controlled using Norbak and Dr. Gowell advised that the Department evaluate such systems. Apparently Hercules also has a system based on an inert material, such as hydroxy-ethyl-cellulose.

June 30, 1965

Rhap-Trol does present a unique system of handling invert emulsions. At least one user experienced some dissatisfaction with the system. Difficulties might be expected since concentration of oil and water, temperature of the solutions, and pressure at the spray nozzle are among the factors not easily controlled in the field. They can interact to determine the ability of the system to form an invert emulsion, as well as its spray characteristics. Spraying invert emulsions from boom-type sprayers is not recommended and their use for highway right-of-way application is doubtful.

OFFICE OF TESTING AND RESEARCH



E. A. Finney, Director
Research Laboratory Division

EAF:MHJ:nl