

1970 Project Report

COMPREHENSIVE RESEARCH ON RICE

PROGRAM AREA Engineering

PROJECT NUMBER & TITLE 69-14; Increasing Efficiency and Reducing Contamination of Chemical Applications to Rice

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OBJECTIVES

To develop methods and equipment whereby applications of herbicide and other pest control chemicals can be safely and effectively applied to rice fields without damage to nearby crops and contamination of the environment. To increase the efficiency and accuracy and reduce costs of applying fertilizer materials to rice fields by aircraft.

WORK IN PROGRESS

The research work, field and laboratory, can be divided into 3 headings:

1. Laboratory studies on the development and testing of atomizers which is done in our wind tunnel built this past year. Here we have developed the LTN (low turbulence nozzle) which in air velocity up to about 80 mph will produce nearly one size, coarse, low drift spray droplets. Here we have also tested the Microfoil(R) nozzle as developed by Amchem Corp., and other atomizers which had added to our knowledge and assisted in the next step in our test procedure.

2. We have run field tests in two steps. (a) A series of propanil tests using the Microfoil(R) boom for field test plots to determine propanil efficacy in the relatively large drops produced by this device, and (b) drift or aerial transport tests of three different machines, a ground rig, a helicopter with the LTN nozzle, and a fixed wing plane with LTN. Data analysis is incomplete as yet, but from the propanil efficacy tests it has been found that the coarse spray (around 750-1000 microns average drop size) from the Microfoil(R) boom will do an adequate, although not the most effective weed control job.

The (b) tests show that ground rig spray drift can be significant if fine atomizing nozzles are used, but that coarse nozzles will reduce drift. The LTN tests were very effective in reducing drift on the helicopters, but less so on the fixed wing aircraft. We feel we can do better on the fixed wing plane with some minor adjustments of the nozzle system in relation to the slipstream of the propeller and in relation to the higher speed of the fixed wing aircraft.

The continued monitoring studies of air burden of propanil in the Firebaugh area during the application season levels were less than 1969, but full evaluation is not yet complete. Test prune trees were also set out to determine the pattern of aerial transport in this multi-crop area when large acreages of rice are planted alongside melons, cotton, peppers, sugar beets and a few orchards. Thus, the effect on these crops by the propanil applications to the rice is of primary importance to the continued use of propanil in the area.

3. Work continued on the centrifugal fertilizer spreaders, both single and double blade types, for spreading seeds and granular fertilizer materials. Granular herbicides could also be spread with these machines. Tests were run on several types and refinements were suggested and put into effect. Further studies were conducted on the New Zealand rotary spreader and continued development of the device would appear to be warranted, although no commercial interests have been developed thus far.

EXPERIMENTS COMPLETED

Cooperative tests (with the Botany Department) on the effect of closed house treatments of prune trees by propanil indicate the material will cause yellow spotting, leaf shed and severe set-back to the prunes.

WORK PLANNED

We plan to continue the work on the nozzle tests in the wind tunnel for production of smaller (more coverage per unit of spray volume) drops, but with limited numbers of small easily transportable size. Tests indicate we can do this with the LTN device.

We will also put on some large scale tests (1000 to 2000 acres) of propanil on rice with the Microfoil and LTN booms and carefully monitor this by air, fall-out, and live prune trees for aerial transport effects. If these prove as successful as our tests to date show, we expect to see the use of propanil again expanded. Further, we should be able to use 2,4-D and MCP with these booms in areas presently under severe limitation and in some instances completely under ban of these materials.

We plan to work further with the centrifugal and the rotary granule spreaders and hope to get further commercial development of these devices.

MAJOR ACCOMPLISHMENTS

Development of the LTN low drift atomizers is a major break-through in herbicide spray work. Full recognition must be given to the Microfoil^(R) device which pointed the way to our further research on the LTN nozzle. However, limitation of the Microfoil^(R) will eventually make some more durable, practical, and better drop (smaller) size device necessary.

EVALUATION OF PROJECT

Continued work will produce results of significance to weed control in rice and to more efficient means for applying granular materials such as fertilizer.

PUBLICATIONS

Dispersal of Granular Materials in the Wake of Agricultural Aircraft, W. E. Yates, J. Stephenson, K. Lee, and N. B. Akesson, ASAE Paper No. 70-659, December, 1970.

New Concepts in Aircraft Granular Applications, R. W. Brazelton, K. C. Lee, S. Roy, N. B. Akesson, ASAE Paper No. 70-756, December, 1970.

The Distribution of Solid Materials, N. B. Akesson, K. C. Lee and J. Stephenson, Paper for The Fourth International Agricultural Aviation Congress, Ontario, August 1969.

Controlling Spray Atomization, N. B. Akesson, W. E. Yates, and Stephen Wilce, Agrichemical Age, December 1970.