

## COMPREHENSIVE RESEARCH ON RICE

PROJECT NUMBER & TITLE RP-1 Weed Control in Rice by Herbicides and Cultural Management

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### OBJECTIVES

1. To develop safe, effective and economical weed control measures for rice production in California.
  - a. Evaluate new promising herbicides.
  - b. Develop detailed procedures for the use of herbicides showing promise for controlling weeds under California rice growing conditions.
  - c. Determine fate of these herbicides in the rice cultural environment.
2. Determine the time and extent of damage and yield loss caused by various infestations of weeds.

### WORK IN PROGRESS

Laboratory and greenhouse work in progress this fall and winter is aimed primarily at working out the physiology of rice injury resulting from applications of molinate during periods of high temperature and conditions leading to severe leaf and tiller burn of rice following MCPA applications.

The most promising new herbicides are being studied to determine site of uptake, effect on certain associated crop plants (particularly those growing in close association with rice), leaching, behavior in water, and persistence.

We are continuing the work on IMC 3950 as indicated in last years report. Both soil and water samples collected during the 1972 growing season are being analyzed to determine the disappearance from the soil and water under field conditions.

Continuing research on methods of reducing drift is being pursued in cooperation with the Department of Agricultural Engineering.

### EXPERIMENTS COMPLETED

Four primary screening trials were conducted, two preemergence and two postemergence. The postemergence trials included several dates of application. One preemergence and one postemergence screening trial was conducted at U.C. Davis Rice Facility and the other set was conducted in Fresno County in cooperation with Mr. St. Andre. Twenty-two new potential herbicides plus 17 promising herbicides from previous years trials were evaluated. Eight herbicides showed sufficient activity to warrant some further study. Of these herbicides three gave indication of real promise for controlling either weedy grasses or broadleaved weeds.

Continued effect is being expended in the search for a broad spectrum herbicide. MC 4379 gave some indication of controlling both grassy weeds and broadleaved weeds. AC 87528, a herbicide warranting further study from last years screening trial continues to look promising. OCC 188-50 the other herbicide warranting further study from last years trial has been dropped at least for the present as indicated in a letter from Occidental Chemical Company dated June 13, 1972.

Eleven developmental trials were conducted in the various rice growing counties in cooperation with the Agricultural Extension Service (Butte County, Carl Wick; Colusa County, Marlin Brandon; Fresno County, Gerald St. Andre; San Joaquin County, Ron Baskett; Sutter and Yuba Counties, Jack Williams). IMC 3950 (BOLERO<sup>R</sup>) was emphasized in these studies and comparison of formulations were included. Again as last year early postemergence applications of IMC 3950 gave better weed control than preemergence applications. However, the yield of rice grain was generally equal and both treatments were superior to the untreated control or equivalent to the standard molinate treatment.

### WORK PLANNED

Herbicide screening trials will be continued using both pre and post-emergence applications. The primary objective will be to search for a broad spectrum herbicide that will control the rice growers major weed problems with one application. These trials will be conducted at U.C. Davis Rice Facility and in Fresno County in cooperation with Bill Fischer.

Developmental trials will be conducted in the rice growing counties in cooperation with the Agricultural Extension Service. Details of proper timing, rates of application, disappearance from soil and/or water, etc. will be developed. Included will be IMC 3950, MC 4379, and AC 87528. Phytotoxicity of the herbicides to major crops growing in close association with rice will be evaluated.

Work will continue on the problem of excessive leaf and tiller burn from MCPA applications. Field trials will be established to check out leads found in the laboratory and greenhouse on the problem of rice injury resulting from applications of molinate during periods of high temperature.

Plans at the present are to continue the study on the influence of rice straw residue incorporation on subsequent algal growth for at least this coming year. (This study has been carried-on the last two years under a grant from AB-16.)

#### MAJOR ACCOMPLISHMENTS

Since the experimental label petition for IMC 3950 in California has not been passed by the Environmental Protection Agency (EPA) additional data from our 1972 trials have been submitted in support of the claim. Again as last year, preemergence applications of IMC 3950 did not provide as good weed control as did postemergence applications.

In general it required at least 4 lb/A of IMC 3950 to obtain satisfactory weed control when applied preemergence. In heavy clay soils 4 lb/A was marginal and often weed control was poor. Adequate sprangletop control was obtained with 4 lb/A applied preemergence.

Barnyardgrass and sprangletop control was good when IMC 3950 was applied at 4 lb/A postemergence 4 to 14 days after seeding. Best results were obtained with the granular formulation when applied 4 to 14 days after seeding, (rice in the 2 to 3 leaf stage and barnyardgrass and sprangletop in the 1 to 2 leaf stage). Best results with the liquid formulation was obtained when it was applied 7 to 12 days after seeding (rice in the 2 to 3 leaf stage and barnyardgrass and sprangletop in the 2 leaf stage).

Both formulations of IMC 3950 at 4 lb/A were phytotoxic to rice during the early stages of growth. The granular formulation applied 2 to 4 days after seeding caused stand reduction and delayed heading. The liquid formulation applied 2 to 7 days after seeding caused stand reduction, some stunting, and delayed heading. Maximum weed control and selectivity was obtained when IMC 3950 was applied when the rice was in the 3 leaf stage and the barnyardgrass or sprangletop in the 1 to 2 leaf stage and completely submerged.

When IMC 3950 at 4 lb/A was compared to molinate at 3 lb/A applied pre-emergence the molinate was more effective in controlling barnyardgrass. However, when applied postemergence, IMC 3950 gave equal or slightly better barnyardgrass control.

IMC 3950 did not appear to be a broad spectrum herbicide for broadleaved weeds and sedge control, but it does control sprangletop on which molinate has little or no activity. Timing of application does seem to be critical to get maximum weed control and no rice injury under California rice growing conditions.

AC 87528 did not perform as well in 1972 trials as expected. Preemergence (pre-flood) and very early post-seed applications show some promise but selectivity seemed to be limited.

Cooperative studies with the Department of Plant Pathology on predisposing rice to stem rot following an application of MCPA suggested further work needs to be done especially in regards to timing of application. Another cooperative study with the Department of Entomology showed that bromoxynil applied by aircraft under field conditions has some promise as a potential broadleaved weed herbicide. Cultural practices will have to be modified since bromoxynil has limited translocation in plants and kills only that portion of the plant in which it comes in contact.

Cooperative studies with the Department of Agricultural Engineering suggested that foam did not eliminate drift from airplane applications. However, satisfactory weed control was accomplished from MCPA applied in foam without increased MCPA injury to the rice.

Algal populations in the rice straw residue incorporation plots in Butte and Yolo Counties could not be correlated with incorporation techniques similar to the report in 1972. Soil samples showed significant numbers of resting bodies present. Again as was reported in 1972 a blue-green algae bloom immediately followed the copper sulfate treatment demonstrating the resistance of these species to this treatment.

#### IMMEDIATELY APPLICABLE RESEARCH RESULTS

As soon as IMC 3950 receives label clearance through EPA details of its use in rice under California conditions will be available for the growers.

#### EVALUATION OF PROJECT

The growers are on the verge of realizing significant benefit from their accelerated research program in weed control. Cooperative research with other Departments is providing an overall dimension to the project. New herbicides are becoming available and research insurng safer and more efficient weed control with existing herbicides are in the offering.

#### PUBLICATIONS OR REPORTS

Report to Rice Growers, 1972.

Report at County Rice Grower Meetings, 1972.

Report on propanil at Rice Grower Tech. Working Group, June 1972.