COMPREHENSIVE RESEARCH ON RICE

ANNUAL REPORT

January 1, 1975 - December 31, 1975

I. PROJECT NUMBER AND PROJECT TITLE: RP-1 Weed Control in Rice

II. PROJECT LEADER AND PRINCIPAL UC INVESTIGATORS:

Project Leader: David E. Bayer, Botany Department.
Principal UC Investigators: Ernie Roncoroni, Staff Research Associate, Carl Wick, Bill Fischer, Jack Williams, Ken Mueller, Farm Advisors, and Marlin Brandon, Extension Agronomist.

III. LEVEL OF 1975 FUNDING: $16,065

IV. OBJECTIVES ACCORDING TO 1975 PROPOSALS AND EXPERIMENTS BY LOCATION CONDUCTED TO ACCOMPLISH THESE OBJECTIVES:

Objective I. To develop safe, effective and economical weed control measures for rice production in California.

1. Primary screening trials to evaluate new promising herbicides- UC Davis, Firebaugh.

2. Experiments to develop detailed procedures for the safe use of herbicides showing promise for controlling weeds under California rice growing conditions - Marysville, Maxwell, UC Davis, Firebaugh.

3. Determine fate of these herbicides in the rice culture environment- UC Davis.

Objective II. Determine the time and extent of damage and yield loss caused by various infestations of weeds.

1. Weed competition experiments - Richvale, UC Davis.

V. SUMMARY OF CURRENT YEARS WORK (MAJOR ACCOMPLISHMENTS) BY OBJECTIVE:

Objective I.

Fifteen new potential herbicides plus eight herbicides from last years trials were evaluated.

Drepamon® applied either preflood or early postflood was the most promising herbicide for the control of barnyardgrass in our screening trials. Perfluridone (Destun®) applied postflood when the rice plants were well rooted and in the 2 leaf stage and before the weeds were well established provided good weed control with

little or no injury to the rice plants. Laboratory studies suggests this herbicide desorbs readily and may be lost in the flood water. This suggests the water must be held static to obtain maximum herbicidal effect.

A timing trial was established on rice 'M-3' heavily infested with river bulrush. Perfluridone applied preflood and postflood and bentazon (Basagran®) applied postflood were evaluated throughout the growing season. Although all dates of application of bentazon gave excellent river bulrush control, the early application dates gave significantly higher yields of rice than the later applications, (Table 1).

Table 1. River bulrush control and yield of rice 'M-3' treated with bentazon.

Herbicide	Lb/A	Timing[1/]	CWT/A[2/]	River bulrush control[3/] 6-75	10-75
bentazon	4	34	76	8.0	10
bentazon	2	34	73	8.0	10
bentazon	4	43	69	9.5	10
bentazon	2	43	67	9.0	10
control	-	--	67	0	0
control	-	--	66	0	0
bentazon	4	84	63	-	10
bentazon	2	114	62	-	10
bentazon	4	114	61	-	10
bentazon	2	84	61	-	10

[1/] Days after planting

[2/] Average of 4 replications at 14% moisture.

[3/] Weed control ratings: 0= no control, 10= 100 percent, average of 4 replications.

River bulrush stand averaged one plant per 1.5 sq ft of area.

Control of river bulrush by perfluridone was limited and early injury to the rice plants was significant.

Bentazon continued to look promising for the control of seedling cattails when applied prior to the time when the cattail plant initiates its rhizome system. This years studies suggest that established cattail competition can be reduced but multiple applications were necessary.

Evaluation of glyphosate (Roundup®) for cattail control was continued. Applications made in early spring when the cattail foliage was 2 to 3 feet tall or less did not provide satisfactory control. Maximum foliage production on fully mature cattail plants are necessary for maximum translocation of glyphosate into the rhizome system.

Benthiocarb (Bolero®) continues to look the most promising for the control of barnyardgrass when application is made at the 1 1/2 to 2 leaf stage of the rice plant and when it is well rooted. Laboratory studies suggest this herbicide is taken up by both the shoot and root and that it is inherently more toxic to rice than is molinate (Ordram®). Early studies also suggest it is more strongly adsorbed onto the soil than molinate and resists leaching and desorption more effectively. Temperature influences the phytotoxicity of this herbicide primarily by its effect on the growth and development of the rice plant. Once the rice plant is well rooted into the soil its tolerance to benthiocarb increases.

Cooperative studies with the Department of Plant Pathology and the Cooperative Extension Service on predisposing rice to stem rot following an application of MCPA has strongly implicated a positive interaction suggesting an increased incidence of stem rot with increased MCPA injury. The significance of this interaction depends on the level of the stem rot organism and the amount of injury resulting from the MCPA.

Three trials were established in Yuba County with Jack Williams to evaluate MCPA injury on rice in relation to different fertilizers as they influence the root development of the rice plant. Two major trends were apparent in these trials. Late applications, 65 days after seeding, were more injurious to the rice plant as reflected in the yield than were the earlier applications, 35 to 45 days after seeding. The second trend suggested that top-dressing with nitrogen 10 days before, at the time of, or 10 days after an application of MCPA had no effect on yield of rice. Laboratory studies have shown a high correlation between root development of the rice plant and injury related to MCPA. Healthy rice plants with a well developed root system shows little or no injury while rice plants with a reduced root system shows more severe symptoms.

Cooperative studies with the Department of Agricultural Engineering on ways to control or reduce drift has suggested that thickeners such as Nalco-Trol® aid in reducing but do not eliminate drift. The use of the Helicopter equipped with the Microfoil Boom® was used to apply propanil for barnyardgrass control in rice. Although drift of propanil was reduced it was not eliminated as evidence by yellow spotting on young prune trees. (For further information see report by Norm Akesson, Department of Agricultural Engineering).

Studies on the dissipation of herbicides in rice flood water were continued with the cooperation of the Department of Environmental Toxicology. (See report of Dr. D. Crosby, Department of Environmental Toxicology).

Objective II. Weed Competition.

Competition between barnyardgrass plants and rice plants is most severe during the early stage of development of the rice plant. Control of barnyardgrass during the first 28 to 30 days of growth of the rice plant is the most critical. Control following this period becomes progressively less critical.

VI. PUBLICATIONS OR REPORTS:

Akesson, Norman B., David E. Bayer and Wesley E. Yates. 1975. Reducing Airborne Drift Losses with Nalco-Trol. Agri- Fieldman, Volume 31, Number 3, March 1975. pp 31-33.

Bayer, D. E. 1975. Weed Control in Rice. Farm Advisor's Winter Rice Meetings.

Bayer, D. E. 1975. Rice Field Day. Rice Experiment Station, Biggs, California.

VII. CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

Previous work has assisted in the development of four new herbicides to control weeds in rice. Each herbicide is at different stages of EPA clearance for use in rice. Benthiocarb (Bolero®) and molinate (Ordram®) are similar in many respects however benthiocarb will control sprangletop as well as some broadleaf weeds. Work with bentazon (Basagran®) this year for the control of river bulrush and seedling cattails has been very effective. Glyphosate (Roundup®) is very effective for the control of mature cattails on rice levees. Drepamon® applied preflood and early postflood looks very promising for the control of barnyardgrass and sprangletop as well as some activity on redstem and roughseed bulrush.

As soon as Bolero®, Roundup®, Basagran® and Drepamon® become available for use in California rice production details on how and when to use each herbicide will be available for the rice growers.