ANNUAL REPORT
COMPREHENSIVE RESEARCH ON RICE
January 1, 1991 - December 31, 1991

PROJECT TITLE: Development of an Expert System for California Rice

PROJECT LEADER: Richard E. Plant and James E. Hill, Department of Agronomy and Range Science, UCD; Joyce F. Strand, IPM Implementation Group, UCD

PRINCIPAL UC INVESTIGATORS: Julie Young, Staff Research Associate, UCD; J. G. Real, Research Assistant, UCD; Farm Advisors, S. C. Scardaci (Colusa, Glenn, Yolo),B. L. Weir (Merced, Fresno), C. M. Wick (Butte), and J. F. Williams (Sutter/Yuba, Sacramento, Placer).

LEVEL OF 1991 FUNDING: $17,467

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

The overall objective of this project is to develop an expert decision support system for California rice management. The specific objectives in this project are:

I. To develop a CALEX/Rice integrated expert decision support system. Organize a development effort patterned after the structure that successfully developed CALEX/Cotton.

II. To continue development of the crop management module for CALEX/rice by adding fertility, water management and other components to the already developed weed management and variety modules. These components will include land formation and grading, harvesting and drying, and vertebrate and invertebrate pest management.

SUMMARY OF 1991 RESEARCH (MAJOR ACCOMPLISHMENTS BY OBJECTIVE):

Objective I

A The development team consisting of J. Hill, R. Plant, J. Young, S. Roberts, J. Real, S. Scardaci, J, Williams and C. Wick continued to meet on a regular basis.

Objective II

Preliminary versions of the variety selection, fertility management, and harvesting and drying modules were completed These were added to the already complete modules for herbicide selection and invertebrate management. The fertility module includes components for N, P, K, and Zn management. Estimates are made of crop demand for these nutrients based on soil nutrient status at the start of the season and expected crop demand. The harvesting module estimates the proper harvest date based on crop moisture content by correlating it with reference evapotranspiration and projecting evapotranspiration into the future.

The following is a sample of a session of the preliminary version of the fertility module. The system first asks the user whether certain items entered in the field's background file are correct:

```
Current field: FIELD2        5/1/92                    F3: CALC   ESC: EXIT

The program is using "5/05      *" for the Planting date
The asterisk indicates a default value.

Is this OK? (y/n/q) ('q' - quit verifying) YES

The program is using "M-202" for the Variety
Is this OK? (y/n/q) ('q' - quit verifying) YES

The program is using "Colusa      *" for the Field location
The asterisk indicates a default value.

Is this OK? (y/n/q) ('q' - quit verifying) YES

The program is using "Fallow" for the Previous crop
Is this OK? (y/n/q) ('q' = quit verifying)
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Next the system asks several questions of the user:

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Current field: FIELD2        5/1/92                    F3: CALC  ESC: EXIT

Which type of fallow system?
1. Bare
2. Weeds green when plowed
3. Weeds dry when plowed

Enter your selection followed by ENTER 1
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What implement was used in the primary tillage operation?
1. Moldboard plow, other deep plow
2. Chisel plow, disc plow, other shallow plow

Enter your selection followed by ENTER 1

What is your primary preplant N source?
1. Anhydrous
2. Aqua
3. Urea
4. Ammonium sulfate

Enter your selection followed by ENTER 1

Based on this information the system displays the following
screen of guidelines:

F2 for: Explain reasoning | View decision process | Vary parameters

                         CALEX/Rice 1.0

Report for FIELD2 on 5/1
Weather file: FIELD2 (Colusa)   Weather updated through: Not updated
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Fertility (1/2/92)
* You should apply about 30 lb/acre nitrogen as a starter fertilizer.

* A preplant application of 149.00 lbs/acre of nitrogen is suggested
(excludes starter N).

* Your soil test indicates P is adequate.

* Your soil test indicates K is adequate.

* Your soil test indicates Zn is adequate.

Press any key to continue

F2 for: Explain reasoning | View decision process | Vary parameters

    b) Rice Varieties: This section displays the
characteristics of California rice varieties including grain
type, seedling vigor, cold tolerance, heading dates (linked
to internal rice model to predict heading dates for planting
times and weather conditions), and other characteristics
important to specific varieties. Recommendations based on
grower's location and desired rice type are given.

PUBLICATIONS OR REPORTS:

Plant, R.E., and J.E. Hill 1990. Development of an expert
system for California rice. Annual Report, Comprehensive Rice
Research 34-37.

Real, J.G., J.A. Young, R.E. Plant, J.E. Hill, S.C. Scardaci,
C.M. Wick, and J. F. Williams 1991. Development of an expert
system for California rice. Rice Field Day Abstracts, Rice
Experiment Station, 14.

CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

The project leaders and principal investigators have organized
a Development Team consisting of several knowledgeable rice
scientists and advisors. The basic integrated crop management
expert system shell for CALEX/Rice has been programmed.
Modules for herbicide selection, invertebrate pest management,
variety selection, fertility, and harvesting and drying have
been programmed. The prototype expert system will be
distributed to cooperating rice farmers in early 1992 for their
preliminary evaluation of the modules.