

PROJECT REPORT
COMPREHENSIVE RESEARCH ON RICE

January 1, 1991 - December 31, 1991

PROJECT TITLE: Rice genetics and germplasm development

PRINCIPLE UC INVESTIGATORS:

David J. Mackill, Research Geneticist, USDA-ARS
James Oard, Assistant Research Geneticist, UCD (left during year)
Miriam Weber, Graduate Research Assistant
Teresa Erickson, Biological Technician, USDA-ARS
Ed Redoña, Graduate Student

LEVEL OF 1991 FUNDING: \$70,775

***NOTE:** James Oard left in June of the year, and Mackill joined in July. Some activities were carried over from the previous project, but this year's funding was largely to begin new activities and develop a laboratory for rice genetics. The 1991 funding level included \$42,000 startup money for the laboratory.

OBJECTIVES:

The overall objective of the research is to integrate conventional and emerging technologies to develop improved germplasm and breeding methods useful for the California rice industry. Specific objectives include interspecific gene transfer, developing improved cold tolerant germplasm, developing germplasm more competitive with weeds, and identifying traits that will improve the prospects of commercialization of hybrid rice.

SUMMARY OF 1991 ACTIVITIES AND ACCOMPLISHMENTS

Genetic studies

Work on the *eui* gene (elongated uppermost internode or recessive tall) was continued. Genetic studies showed that this trait is controlled by a single recessive gene which is allelic in at least three mutants identified. This gene may be useful for hybrid rice seed production.

Breeding lines with photoperiod-sensitive genetic male sterility (PGMS) were evaluated in the field and promising selections harvested for more detailed studies.

Crosses were made and F₁ plants grown to study the following traits:

seedling vigor
submergence tolerance
cold tolerance

wide compatibility

Germplasm

Three hundred seventy-eight rice accessions were imported from the International Rice Research Institute (IRRI) in the Philippines. These included 31 F₁ hybrids between California cultivars and interesting donors, 24 accessions representing 13 wild *Oryza* species, the core collection of Asian cultivated rice (*Oryza sativa*), and potential donors for seedling vigor, cold tolerance, submergence tolerance, wide compatibility and cytoplasmic male sterility. Some of these were multiplied in a quarantine greenhouse at Davis.

A program was begun to introduce the wide compatibility gene into California germplasm. This gene will facilitate use of exotic parents for introducing new genes and exploitation of hybrid vigor in wide crosses.

Crosses made for genetic studies (described above) will generate useful germplasm for use in the California breeding program.

Laboratory development

Considerable effort was focused on developing a laboratory for rice molecular genetic studies and tissue culture. Equipment was purchased and renovation work begun on the laboratory. The lab should be fully operational in early 1992. Initial work will focus on characterization of California rice germplasm with molecular markers and genetic analysis of important agronomic traits.