

COMPREHENSIVE RESEARCH ON RICE  
ANNUAL REPORT

January 1, 1980 - December 31, 1980

PROJECT TITLE: "An Economic Analysis of Residue Management Alternatives to Open-Field Burning of Rice Straw in the Sacramento Valley Air Basin"

PROJECT LEADER AND PRINCIPAL UC INVESTIGATOR:

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LEVEL OF 1980 FUNDING: \$12,500.00

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

The general objective of this project is to evaluate proposed crop residue management schemes and policies for implementation which might serve as alternatives to dependence on open-field burning of rice straw as currently conducted in the Sacramento Valley Air Basin (SVAB). These alternatives are being analyzed in terms of economic efficiency and equity criteria primarily with respect to expected impacts on the rice industry. Impacts on Valley residents and price effects on rice consumers are also being identified and examined.

The research discussed herein is being conducted within the Department of Agricultural Economics, UC Davis. Technical assistance and information has been obtained from a number of sources, including Federal and State agencies, University libraries and researchers, and Sacramento Valley rice producers. Although substantial progress on the research project has been made, due to the nature of the research and the empirical models being employed, a detailed reporting of the findings must await project completion, when the final results of the empirical analysis are available.

SUMMARY OF 1980 RESEARCH (MAJOR ACCOMPLISHMENTS) BY OBJECTIVES:

The primary objective is to evaluate expected economic impacts on rice producers and on the rice-related agricultural economy of alternative strategies for rice straw management in the Sacramento Valley Air Basin.

Research work conducted during 1980 includes an extensive literature review of a number of topics including: pollution control policy instruments; equity, property rights, and liability in the use of the Sacramento Valley airshed; relevant background information and statistical data regarding the world rice industry and the California rice industry;

technical aspects of California rice production and rice straw disposal alternatives (economic and technical feasibility); and production and cost data for Sacramento Valley rice and alternative (potential substitute and rotation) crops.

Production budgets for rice in the major rice growing counties in the Sacramento Valley have been developed and updated for 1980 using the Cooperative Extension Budget Generator (CEBG) program available at UC Davis. CEBG budgets for possible substitute or alternative crops in these counties are also in the process of being updated and analyzed. Preliminary modifications of the rice budgets have been conducted and are on-going. These modifications are being undertaken in order to reflect various straw harvest operations (for utilization purposes) and soil incorporation operations, and to develop appropriate cost of production and technical coefficient information for use in the programming model. Modifications are also being made in which the basic assumptions underlying the CEBG budgets are changed to more accurately represent conditions actually present in the Sacramento Valley rice areas.

With regard to the programming model to be used to estimate economic impacts on the rice industry, the tentative choice of a Quadratic Programming (QP) mathematical model has been made. This model can be estimated by use of the MINOS computer algorithm, which is available on the UC Davis Burroughs computer system. Estimation of the QP model involves optimization of a quadratic objective function subject to a set of linear constraints. The nature of the QP model is such that it can be used in conjunction with demand functions developed for various crops and can be used to explicitly include several types of risk or uncertainty in production decisions.

Cost of production data required to define homogeneous production regions have been obtained and additional data sources have been identified. Data have been acquired from numerous sources, including: CEBG budgets; Cooperative Extension cost of production studies and bulletins for various counties; rice farm survey, production cost, and soils information (including feasibility of soil incorporation based upon soil type) from an ARB-funded project undertaken by Copley International Corp.; cost of production data from the California Agricultural Resource Model (CARM); land use maps and crop acreage figures from the Department of Water Resources; crop acreage figures from the USDA's Agricultural Stabilization and Conservation Service; soils information from the Soil Conservation Service; publications and drafts from past and present research projects being undertaken by various UC researchers; USDA Cost of Production survey (1979); water cost data from various Sacramento Valley water agencies; and field visits and other contacts with rice producers in the Robbins area.

Secondary objectives of this research include the qualitative identification and discussion of: the probable impacts on the public

health and welfare of residents of the SVAB resulting from decreased emissions from agricultural burning; and the economic impacts on consumers of rice which could be expected as new policies are implemented. An extensive literature review into the topic of valuation of environmental improvements has been undertaken and the findings will appear in a report detailing the results of the research. As to the question of price impacts, there is still a need for analysis of data from newly identified sources, but the preliminary indication is that this question can be largely ignored since these impacts are likely to be relatively quite small and distributed over a wide range of consumers, including foreign consumers. The final report will deal with this question in more detail when all of the available data have been properly analyzed.

#### PUBLICATIONS OR REPORTS:

1. Nelson, Richard L., and B. Delworth Gardner, "Rice Straw Burning and Crop Residue Management: An Economist's Viewpoint," (Department of Agricultural Economics, University of California, Davis, August 1980), forthcoming in a publication of papers by the Crop Residue Management Task Force, University of California, Davis.

#### CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

A comprehensive literature review has been completed and the problem has been placed in a conceptual and empirical framework. Data required for the quadratic programming model have been collected, especially the cost of production data. Various rice straw disposal techniques have been partially analyzed and put into the crop budgets. Much work has also been done in estimating rice acreage in various soil types to determine the feasibility of growing substitute crops or practicing soil incorporation.

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