

COMPREHENSIVE RESEARCH ON RICE  
ANNUAL REPORT

January 1, 1978 - December 31, 1978

PROJECT TITLE:

Residue Utilization - Straw Collection, Handling, Storage and Processing for Utilization as Feed, Fuel, or Fiber

PROJECT LEADER AND PRINCIPAL UC INVESTIGATORS:

John B. Dobie, Project Leader, Agricultural Engineer  
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LEVEL OF 1978 FUNDING: No new funds

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

Objective 1

Analyze and evaluate new potential harvesting systems for rice straw with respect to feasibility, capacity, weather, field conditions, handling methods, storage requirements, and economics for the grower and the potential user.

Weather data for 1976 and 1977 has been added to computer data tape for determining weather probabilities to develop predictions for recovering rice straw as a resource base for various utilization potentials.

Continued effort to obtain experience and operational data for rice straw with the new Hesston 4 ft. by 4 ft. by 8 ft. baler and associated bale handling system were unsuccessful. The system was in use in the Willamete Valley of Oregon with grass seed straw in August - September, 1978 and was scheduled for use near Woodland in late September. However, lack of any imminent plan for utilization of the straw after baling, plus an urgent need for updating the field test unit with redesigned components caused the Hesston company to delay any testing in rice straw until 1979. Recent cost comparisons for alfalfa indicate that the Hesston system may be somewhat lower cost per ton than the standard 3-wire bale system. Package density, handling, and transport look good for the Hesston system. The Hesston Corporation engineers continue to be interested in performance testing their equipment with rice straw.

There seems to be continued interest from varied sources regarding collection and handling of rice straw. There have been numerous requests for available information on the subject, requiring considerable consultation time.

## Objective 2

Study systems for handling rice straw packaging including standard bales, big roll bales, and large rectangular bales, and for processing rice straw into a form that can be used by the consumer. Survey potential users to determine optimum physical form of straw for utilization, and determine equipment, operational, and energy requirements to best serve this need.

The results of the storage trial with large roll bales of rice straw have been revised for presentation at the December meeting of the American Society of Agricultural Engineers in Chicago in December, 1978. The paper has been submitted for publication.

The investigators have participated in several meetings related to various possible uses of rice straw. A principal concern of potential users of rice straw is the optimum system for collection and handling of the straw and the cost of straw delivered to the utilization site. Possible uses being investigated include gasification by controlled burning in oxygen deficient atmosphere, methane production by anaerobic digestion, pyrolysis, mulch for reduction of erosion, direct burning for electric power generation, fiberboard and paper, alcohol production, and animal feed. Most of these uses are uneconomic or only marginally economic at the present time but may improve as shortages develop in other types of fuel, energy, or fiber sources.

Gasification of pelleted rice hulls in the laboratory downdraft gas producer resulted in the formation of large quantities of slag after about one hour of operation. As a result of this and other tests, it is concluded that this type of gasifier is unsuitable for the gasification of undiluted rice hulls that have been pelleted or rice straw that has been cubed. Other types of gasifiers have successfully gasified rice hulls and straw according to reports from Italy, Philippine Islands, and Japan.

Most proposed rice straw utilization schemes will require that the straw be chopped or ground for final processing. Information is needed on chopping and handling rice straw for localized use. Field chopping for local transport and use during the harvest season could improve the economics of collecting and handling the straw. Large capacity trailers with packing devices may permit longer economic transport distances. Storage studies with chopped straw are needed to determine feasibility of stockpiling in that form. In addition, performance characteristics of bale shredders or grinders are needed for rice straw to determine the cost of processing the straw from bales into the form required for the utilization operation. Lack of information in this area is a major impediment toward development of a market for rice straw.

## Objective 3

Prepare reports on evaluation of equipment and systems tested.

All studies have been completed and reports prepared with the exception of the study of weather data to determine probabilities of rice straw collection as the rice season progresses. These data are computer programmed but still require further interpretation.

#### SUMMARY OF 1978 RESEARCH BY OBJECTIVE:

No program of research was submitted for 1978 other than possible testing of the Hesston baling system. Since this equipment was not available in 1978, no progress can be reported.

#### PUBLICATION OR REPORTS:

Dobie, John D., and A. Haq. 1978. Storage of baled rice straw. ASAE Paper No. 78-1524, American Society of Agricultural Engineers, St. Joseph, Mich. 49085.

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

Lack of funding during 1977 and 1978 has resulted in discontinuation of studies on utilization of rice straw. There has been extensive dialogue with individuals and groups interested in various methods of utilizing rice straw. Available information on rice straw collection and handling has been disseminated readily. Other possible funding sources have been contacted, but with no positive results to date.