

John Deere

1970-71 Report  
COMPREHENSIVE RESEARCH ON RICE  
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PROGRAM AREA Engineering

PROJECT NUMBER & TITLE 70-25 Stripper Harvesting of Rice

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Note: All extramural support for this project is provided by Deere and Company.

OBJECTIVES

Plant parameters affecting stripper harvester design have been measured for the Calrose variety, which is currently grown in California, and for 16 experimental varieties which cover the range of plant types for anticipated future rice varieties. The plant anchorage and straw strength appear to be strong enough to withstand forces due to stripping.

A stripper harvester has been developed which successfully removes rice spikelets from the pedicels; however, more work needs to be done on methods of introducing the panicles into the machine. Control of the panicle's position at the time of initial contact with the stripper is necessary before retrieval of all spikelets can be achieved.

Specific objectives are as follows:

1. Develop an improved method for retrieving rice spikelets after they are stripped from the plant.
2. Determine the effect of stripper harvesting on grain quality.
3. Measure the grain-to-straw ratio from stripper harvesting under various field conditions.
4. Predict operating speed and field capacity of a commercial rice stripper.
5. Study several new systems for lifting lodged grain.

#### WORK IN PROGRESS

1. Pedicle strength and straw bending strength were measured for five varieties to determine the effect of moisture content on plant strength. These data are still being analyzed.
2. A theoretical analysis of the lifting of lodged grain is being carried out.
3. Vibratory conveying is being studied as a possible means for lifting lodged grain.

#### EXPERIMENTS COMPLETED

1. An experimental stripper harvester was tested under many field conditions in the Sacramento Valley.
2. A vacuum device for lifting lodged grain was field tested.
3. The grain-straw ratio of material collected by the stripper was determined for several field conditions.
4. Harvester losses were determined.
5. Grain quality was measured for the stripper harvester and two conventional combines.

#### WORK PLANNED

A meeting with the funding agency, Deere & Company, is planned for February, 1972. At that time definite plans will be formulated for the 1972 rice harvest season.

#### MAJOR ACCOMPLISHMENTS

None.

#### IMMEDIATELY APPLICABLE RESEARCH RESULTS

None.

#### EVALUATION OF PROJECT

1. The current version of the experimental stripper harvester removes all rice spikelets from the plant. However, about ten percent of the spikelets are dropped on the ground. Planned modification of the harvester should reduce this loss to an acceptable level.
2. The stripper collects about 80 percent less straw than a conventional combine. This result implies a stripper harvester could have a greatly simplified cleaning system.
3. Power requirements for stripping grain are much lower than for threshing with a conventional cylinder.
4. Lodged grain probably can be lifted by a vacuum device. However, power requirements are so great that the cost of this technique would be prohibitive. No system for lifting lodged grain has been developed in this project which will perform better than a conventional reel.

5. Under wet straw conditions a stripper should have a higher ground speed than a conventional combine. However, under dry straw conditions there should be no difference in ground speed.
6. Since the stripper works well under wet straw conditions, the harvesting operation could be started earlier in the day and continue to a later time in the afternoon. Such a lengthening of the working day should shorten the harvest season.
7. Grain harvested by the stripper had negligible damage, while grain harvested in the same field by conventional combines contained nearly six percent broken kernels.

#### PUBLICATIONS OR REPORTS

1. Rice Plant Parameters Affecting Stripper Harvester Design. Sutton, R. L. A thesis in partial satisfaction of the requirements for the degree of Master of Science.
2. Rice Plant Parameters Affecting Stripper Harvester Design. Burkhardt, T. H., and R. L. Sutton. Paper No. 71-605, presented at the Winter Meeting of the American Society of Agricultural Engineers, Chicago, December 7-9, 1971.