

ANNUAL REPORT  
COMPREHENSIVE RESEARCH ON RICE  
Jan. 1, 1999 to Dec. 31, 1999

PROJECT TITLE: Rice Quality

PROJECT LEADERS:

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LEVEL OF 1999 FUNDING:

\$12,543

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO  
ACCOMPLISH OBJECTIVES:

(At the time of writing this report we had not received results from Japanese quality evaluation from California Pacific Rice, State quality from CDFA, nor head-space organic compounds results from USDA. We expect the results soon after the first of the new year. The Japanese quality and head space organic compound tests were done at the expense of the cooperating laboratories. The report below is based on the germination tests we conducted.)

1. Determine optimum harvest moisture for akitakomachi rice.  
We harvested akitakomachi rice at 26, 23, and 20% nominal moistures from the cooperating grower's fields. Across the range of drying treatments we used, harvesting at 26% moisture produced about a 6% reduction in germination compared with the other two harvest moistures, Table 1. The reduction was likely caused by a portion of the rice being immature at the higher moisture content.

Table1. Effect of harvest moisture on germination of Akitakomachi.

Actual moisture at harvest (% wb)	Germination (%)
25.4	86.9a
21.5	92.9b
19.4	93.1b

Numbers with different letters are statistically different, alpha =0.01

2. Determine suitable drying techniques for akitakomachi rice.

In a laboratory dryer we simulated the following drying regimes: 1) dry to 13% moisture using constant air temperatures of 70°, 85°, 100°, 115°, and 130°F, 2) dry using 115°F air with 25 or 35 min. exposure times or using 130°F air with 17 or 25 exposure times, 4 hour tempering times between passes, procedure was repeated until 18% moisture was reached, and finish drying to 13% with unheated air. Each of the tests above were done with rice harvested at 25.4%, 21.5%, and 19.4% moisture.

The 130° constant air temperature treatment reduced germination by about 2 to 4% over the control treatment (70°F constant air temperature). None of the other drying treatments caused any noticeable germination loss.

3. Additional studies on quality during short term storage. (This objective was not a part of the original research proposal.)

Japanese literature indicates that rice quality can be damaged if field moisture rice is held too long before drying. We constructed a constant-temperature incubator to test the effect of holding 23 or 25% moisture rice at 90° or 120°F. We also filled the incubator with high moisture rice and tracked the temperature rise and off odor development.

Germination was not affected when rice was held at 90°F for up to 24 hours. At 120°F the germination dropped rapidly after 4 hours. Off-odors are apparent after rice is held for 8 to 12 hours.

Akitakomachi rice at 26% moisture heated quite rapidly. It heated from 77°F to 97°F in 17 hours and continued to rise until we finished the test after two days. A similar test with 23% moisture M401 rice showed only about 10°F of heating after 2 days.

#### SUMMARY OF 1999 RESEARCH BY OBJECTIVE:

1. The data we have at the time of this report is too limited to make a clear recommendation of optimum harvest moisture. Based on germination, a characteristic that the Japanese industry uses to characterize table rice, 25% is too high.
2. Germination was only affected by continuous drying at 130°F. Head rice quality will likely show that other of the more extreme drying conditions cause damage.
3. Preliminary observations indicate that off-odors can develop in field moisture rice held for 8 to 12 hours and germination drops rapidly after more than 4 hours of storage at 120°F.

#### PUBLICATIONS AND REPORTS:

None

CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

At the time of this report an insufficient amount of quality was available to us from our cooperating laboratories to be able to make any firm conclusions. Preliminarily based only on germination data (the Japanese industry uses this as a measure of quality for table rice), 25 moisture is too high to harvest akitakomachi rice. Off-odors can develop in field moisture rice after 8 to 12 hours of temporary storage.

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