

COMPREHENSIVE RESEARCH ON RICE
ANNUAL REPORT
January 1, 1988 - December 31, 1988

PROJECT TITLE: Cooperative Extension Rice Variety Adaptation and Cultural Practice Research

PROJECT LEADER AND PRINCIPAL UC INVESTIGATORS:

J. E. Hill, Extension Agronomist, UC Davis
S. R. Roberts, Research Associate, UC Davis
C. M. Canevari, Farm Advisor, San Joaquin County
M. L. Feyler, Farm Advisor, Stanislaus County
S. C. Scardaci, Farm Advisor, Colusa County
D. E. Snell, Farm Advisor, Fresno County
C. M. Wick, Farm Advisor, Butte County
J. F. Williams, Farm Advisor, Sutter/Yuba Counties

LEVEL OF 1988 FUNDING: \$45,641

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

Objective I

To evaluate experimental cultivars in cooperation with public and private plant breeders for the purpose of new variety development, the following statewide uniform evaluation tests were conducted.

Very Early Maturity Group - Two uniform tests were conducted: at the Lauppe Ranch (Natomas District, Sutter County) and the Hoffman Ranch (Stanislaus County). One similar test was conducted by the plant breeders at the Rice Experiment Station (Biggs, Butte County). Twenty-one advanced breeding lines (1 proprietary) and 11 varietal standards were included in the off-station tests.

Early Maturity Group - Four uniform tests were conducted: at the Wyler Ranch (Glenn County), Geer and Son (District 108, Yolo County), the Mohammed Ranch (District 10, Yuba County) and Britz, Inc. (Fresno County). One similar test was conducted by the plant breeders at the Rice Experiment Station (Biggs, Butte County). Twenty experimental lines and 10 commercially available varieties were included in each of the four off-station tests.

Late Maturity Group - Two tests were conducted: one at the Dennis Ranch (Colusa County) and one at the Yank Ranch (Sutter County). One test was conducted by the plant breeders at the Rice Experiment Station (Biggs, Butte County). Twenty advanced breeding lines and four commercially available varieties were tested at all locations.

Short and Medium Grain Special Tests - Two tests were conducted: one at the Erdman Ranch (Colusa County) and one by the plant breeders at the Rice Experiment Station (Biggs, Butte County). These tests provide a preliminary screen for selecting superior lines for further testing in the statewide trials. Twenty experimental lines and ten commercially available varieties were tested at the Colusa location. Twenty experimental lines and five commercially available varieties were tested at the Rice Experiment Station.

Objective II

To provide research on new and improved cultural practices, several experiments were conducted.

Fertility Management - Five studies comparing the response of several new varieties to nitrogen were conducted on growers' farms and at the Rice Experiment Station, Biggs. Two of the largest studies with six varieties and nine N rates and a nitrogen/weed control study will be reported in the Rice Experiment Station annual report. Several smaller studies are reported herein.

Temperature Data Collection - At seven experimental sites, including all of the Early Statewide Variety Trials, water, air and soil temperatures were monitored daily for maximum and minimum temperature. This data will be used to correlate rice growth and development, especially heading date, to local air and water temperatures.

Objective III

This project maintained an equipment pool to provide service to other principal investigators funded by the Rice Research Board.

SUMMARY OF 1987 RESEARCH OBJECTIVES

Objective I: Rice Varieties

Statewide Uniform Evaluation of Advanced Breeding Lines

Nine uniform trials were conducted in the locations and maturity groups described previously in this report and at four additional locations by the rice plant breeders at the Rice Experiment Station. Several experimental lines have been tested in previous years. Seed for these tests were provided by the Rice Experiment Station or in the case of proprietary cultivars, by their respective owners. The following analysis and tables are reported for over-location averages for each group of tests (maturity, grain type). An Agronomy Progress Report, to be published later, will provide the results at each location.

Summary of the Very Early Tests (less than 90 days to 50% heading at Biggs)

Thirty-two cultivars were compared in three very early tests. Commercial standards at all locations included M-101, M-102, M-201, M-202, M-203, S-101, Calmochi-101, L-202, S-201, and Valencia 87. Two proprietary cultivars were also included in the on-farm trials.

Table 1 shows the average yields and agronomic characteristics for the 30 cultivars common to all locations. M-102 and M-201 were among the highest yielding commercially available cultivars. L-202, M-202, S-201, and Valencia 87 ranked 16 through 18, respectively. M-203 and M-101 ranked lowest in these trials, as a result of lodging susceptibility.

Summary of the Early Tests (90-97 days to 50% heading at Biggs)

Twenty experimental lines and ten commercially available varieties including S-101, S-201, M-101, M-102, M-201, M-202, M-203, L-202, Calmochi-101, and Valencia 87 were tested at all locations. Thirty cultivars were tested in all.

The five-location summary for agronomic performance is shown in Table 2 for the 30 entries common to all locations. M-201, L-202, M-102 and Valencia 87 were among the highest ranking cultivars. M-101 and M-203 ranked lowest of the commercial varieties, again most likely as a result of severe lodging.

Summary of the Intermediate and Late Rice Variety Tests (more than 97 days to 50% heading at Biggs)

Four commercially available standard cultivars A-301, M-7, M-302 and M-401, were compared to 20 experimental cultivars, at all three locations.

M-401 and M-7 ranked intermediate in yield compared to all cultivars and M-302 and A-301 ranked somewhat lower as shown in Table 3. A-301, an aromatic long grain, ranked 17 out of 24, somewhat better than in previous years. Several experimental cultivars were superior in yield to M-401 and M-7. Heading, for all cultivars, ranged from 97 to 125 days after planting.

Summary of the Short and Medium Grain Special Test

Twenty experimental lines and five commercial varieties including S-101, S-201, M-101, M-202 and Calmochi-101 were tested at both locations previously described. M-202 was the highest ranking commercial variety; M-102 and S-101 were ranked intermediate in yield.

Objective II. Cultural Practices

Summary of 1988 Nitrogen Rate Studies

Fresno County

The nitrogen response of L-202 at nine nitrogen rates was tested in this trial. The rates ranged from 0 to 200 lb N/A, applied as ammonium sulfate. This trial experienced some weed pressure from smallflower umbrellaplant through harvest.

The significantly highest yield was reached at an application of 150 lb N/A, which was a significantly higher rate than last year's test. Overall yields were also higher than last year's test. Percent grain moisture, at harvest, increased slightly with increasing nitrogen rates. There was no lodging at any nitrogen rate.

San Joaquin County

The nitrogen response of two very early maturing rice cultivars, M-101 and 84-Y-9, were tested at eight nitrogen rates. The rates ranged from 0 to 210 lb N/A in 30 lb N/A increments. This trial also experienced severe early season weed pressure.

The significantly highest yield for M-101 was reached at an application of 90 lb N/A preplant. The significantly highest yield for 84-Y-9 was reached at an application rate of between 90 and 120 lb N/A. For both varieties combined, the highest yield was reached at an application rate of 90 lb N/A. Percent moisture at harvest increased slightly with increasing nitrogen. There was no lodging in this trial.

Objective III. Assistance to Other Projects

The rice equipment pool, including a precision fertilizer applicator, plot harvester, moisture meters, temperature collecting microloggers, backpack CO₂-driven sprayers, and other equipment were used with labor and technical assistance in approximately 25 field experiments in 1988.

The precision fertilizer applicator was used to establish five fertility trials in four counties. The plot harvester was used to harvest nine variety trials, six nitrogen trials and ten weed control trials.

Seven microloggers were used to collect on-site daily air and water temperatures at various experimental locations. This data is made available to interested researchers associated with rice production.

The backpack sprayers were used to make precision applications of herbicides and growth regulators in four experiments. The backpack sprayers were also used to provide weed control on levees during the growing season.

In addition to assisting in the above, labor from this project is used to plant, collect samples, and monitor growth in many trials. This project also provides support in designing and analyzing rice field experiments.

PUBLICATIONS OR REPORTS:

- ✓ Hill, J. E., S. R. Roberts, S. C. Scardaci, J. F. Williams, C. M. Wick, D. E. Snell, W. M. Canevari, and M. L. Feyler. 1989. California rice varieties: Description and performance summary of the 1986 and multi-year statewide rice variety tests in California. Agronomy Progress Report. (in press)

- ✓ Hill, J. E., S. C. Scardaci, S. R. Roberts, J. F. Williams, C. M. Wick, D. E. Snell, and C. M. Canevari. 1987. Cooperative Extension rice variety adaptation and cultural practice research. Annual Report - Comprehensive Rice Research, p. 58-76.
- ✓ Hill, J. E., S. R. Roberts, S. C. Scardaci, J. F. Williams, C. M. Wick, D. E. Snell, W. M. Canevari, and M. L. Feyler. 1989. California rice varieties: description of the 1987 and multi-year statewide rice variety tests in California. Agronomy Progress Report, University of California, Davis. (in press)
- ✓ Roberts, S. R., S. C. Scardaci, D. M. Brandon, and J. E. Hill. 1988. The effect of nitrogen on the performance of early maturing rice varieties. 1988 Rice Field Day Program, p. 18-21.
- ✓ Scardaci, S. C., J. E. Hill, S. R. Roberts, and J. F. Williams. 1988. Rice development and water management. Proceedings, 1988 Rice Technical Working Group, Davis, California (in press).

CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

Nine rice variety trials were conducted on farm sites throughout the rice-growing regions of California. Four similar tests were conducted at the Rice Experiment Station in Biggs, California. The 1988 growing season proved challenging for growers and researchers alike. Early season cool temperatures and rain delayed planting, stressed emerging seedlings and caused thin stands. As a result, many trials suffered increased weed pressure and delayed heading. Late season high temperatures and high winds contributed to severe lodging at many locations. The severe effects of weather and the interactions of weather and location on many cultivars points to the importance of yearly statewide trials on both established and experimental cultivars. M-102 and M-201 both proved resistant to the rigors of California weather.

Numerous experiments conducted in cooperation with other projects received assistance with planting, fertilizing, herbicide application, harvesting, and data analysis from investigators on this project.

Table 1. 1988 Very Early Variety Trials - Three Location Summary.

Entry	Grain ¹ Type	Grain Yield at 14% Moisture (lbs/a)	Grain Moisture at Harvest (%)	Seedling ^{2,4} Vigor (1-5)	Days to 50% ⁴ Heading	Lodging ³ (1-99)	Plant Height (inches)
4 M-102	M	8970	21.4	4.8	89	1	33.6
18 87-Y-760	S	8950	18.2	4.0	83	34	33.6
24 87-Y-384	L	8850	17.4	4.3	87	11	32.7
30 M-201	M	8780	22.8	4.4	93	5	32.7
22 87-Y-22	M	8740	18.7	4.2	86	26	33.6
3 86-Y-3	L	8730	20.4	4.8	85	9	34.3
2 86-Y-2	M	8720	19.7	4.8	84	3	33.7
23 87-Y-364	M	8720	17.7	4.4	87	13	34.6
11 87-Y-125	L	8680	18.0	3.5	83	32	34.3
19 87-Y-19	S	8660	22.8	3.9	87	27	34.8
16 87-Y-188	W	8640	21.3	4.2	86	25	33.0
15 87-Y-188	M	8600	18.1	4.8	82	22	33.5
5 87-Y-101	M	8570	18.7	4.6	83	16	32.9
6 87-Y-104	S	8510	18.3	4.0	81	20	33.2
27 L-202	S	8480	20.3	4.7	96	3	30.5
10 M-202	L	8440	21.0	4.6	91	25	33.6
29 S-201	M	8320	22.8	5.0	94	17	33.5
26 Valencia	S	8160	18.0	3.6	85	7	33.3
13 87-Y-13	S	8130	17.9	3.8	84	13	30.3
7 87-Y-109	S	8110	19.8	4.6	82	2	34.2
21 Calmochi-101	W	8040	18.4	4.1	82	31	33.4
20 87-Y-352	L	7980	17.7	4.4	88	7	32.9
17 87-Y-209	M	7950	21.0	4.6	82	28	35.5
25 87P271G	M	7930	19.3	4.9	89	37	34.6
8 87-Y-8	M	7880	16.7	4.1	81	34	32.5
12 S-101	S	7860	17.8	4.4	86	32	32.3
9 86-Y-9	M	7820	19.0	4.3	82	21	32.3
14 87-Y-14	S	7730	21.4	4.6	82	33	30.9
28 M-203	M	7190	20.8	4.6	93	61	34.8
1 M-101	M	6600	19.1	4.8	82	58	33.3
Mean		8290	19.5	4.4	86	22	33.3
CV (%)		8.3	8.1	11.2	2.3	86.2	4.9
LSD (.05)		560	1.3	0.5	2	15	1.3

¹S = short; M = medium; L = long; W = waxy.

²Subjective rating of 1-5, where 1 = poor and 5 = excellent seedling emergence.

³Subjective rating of 1-99, where 1 = none and 99 = 99% lodged over.

⁴Biggs and Sutter only.

Table 2. 1988 Early Variety Trials - Five Location Summary.

Entry	Grain ¹ Type	Grain Yield at 14% Moisture (lbs/a)	Grain Moisture at Harvest (%)	Seedling ² Vigor (1-5)	Days to 50% ⁴ Heading	Lodging ³ (1-99)	Plant Height (inches)
57 M-201	M	9130	20.1	3.7	96	3	36.6
51 87-Y-285	M	9020	18.2	3.7	91	11	36.0
44 L-202	L	8930	17.5	3.6	99	8	34.2
45 87-Y-456	L	8880	17.2	3.2	99	2	38.8
46 87-Y-419	L	8830	16.3	3.5	96	1	33.9
42 87-Y-278	M	8810	20.5	3.6	92	34	36.2
33 M-102	M	8790	19.3	3.8	92	23	39.5
60 Valencia	S	8740	14.8	4.0	90	7	36.2
54 87-Y-196	M	8690	15.8	4.0	91	61	39.1
43 87-Y-43	M	8600	19.7	3.8	95	41	38.0
48 87-Y-3710	L	8520	17.2	3.5	101	9	38.5
49 87-Y-4011	L	8470	17.8	3.3	103	2	33.7
36 87-Y-130	S	8410	14.8	4.2	89	40	37.2
55 87-Y-3338	L	8340	19.0	3.3	102	1	33.6
56 M-202	M	8300	18.9	4.0	91	44	37.8
52 87-Y-52	M	8290	18.1	3.9	94	51	39.5
32 87-Y-15	S	8180	19.8	3.7	92	33	35.4
40 87-Y-249	S	8170	17.9	3.8	94	65	37.3
47 87-Y-479	L	8160	16.1	3.6	100	30	39.2
38 87-Y-38	S	8130	18.9	4.0	92	49	36.4
39 87-Y-238	S	8110	19.9	4.0	94	57	37.9
31 S-201	S	8080	19.4	4.1	95	56	37.1
41 87-Y-275	M	8070	19.5	3.9	91	52	37.5
34 S-101	S	7900	15.3	4.1	87	56	36.4
37 87-Y-191	M	7820	18.9	3.8	92	39	39.4
58 Calmochi-101	W	7490	16.2	3.7	87	53	36.3
53 87-Y-417	M	7400	17.9	3.8	88	61	36.3
50 87-Y-50	L	7370	16.5	3.2	96	61	43.9
59 M-101	M	7340	16.3	3.8	85	61	38.1
35 M-203	M	6920	18.9	4.0	92	79	39.2
Mean		8260	17.9	3.7	94	36	37.3
CV (%)		8.4	7.5	7.5	1.7	41.5	5.1
LSD (.05)		430	0.8	0.2	1	9	1.2

¹S = short; M = medium; L = long; W = waxy.
²Subjective rating of 1-5, where 1 = poor and 5 = excellent seedling emergence.
³Subjective rating of 1-99, where 1 = none and 99 = 99% lodged over.
⁴Does not include Yuba County.

Table 3. 1988 Late Variety Trials - Three Location Summary.

Entry	Grain ¹ Type	Grain Yield at 14% Moisture (lbs/a)	Grain Moisture at Harvest (%)	Seedling ² Vigor (1-5)	Days to 50% Heading	Lodging ³ (1-99)	Plant Height (inches)
72 87-Y-530	M	8390	19.0	3.6	116	22	43.1
75 87-Y-75	M	8340	19.2	3.7	119	21	43.8
66 87-Y-488	M	8210	17.2	3.7	110	17	40.9
70 87-Y-70	S	8210	18.7	3.7	114	9	43.9
80 87-Y-80	M	8190	19.3	3.3	117	13	43.5
79 87-Y-79	M	8120	19.2	3.3	116	23	44.1
68 87-Y-68	S	8040	18.9	3.4	109	17	41.7
69 86-Y-502	S	8030	19.3	3.8	111	26	42.1
67 87-Y-511	M	7950	21.2	3.8	124	2	43.8
63 M-401	M	7720	21.0	4.0	121	2	42.0
61 M-7	M	7690	21.2	3.8	125	1	43.8
82 87-Y-4012	L	7670	17.1	2.9	111	1	38.1
64 87-Y-2271	M	7290	16.6	3.8	117	15	45.5
77 87-Y-77	M	7250	17.7	3.5	109	29	43.3
78 87-Y-78	M	7240	17.4	3.8	108	29	41.5
62 M-302	M	7200	17.7	3.6	109	28	41.9
83 A-301	L	7150	16.5	2.5	111	1	38.2
73 87-Y-2121	S	7060	19.4	3.8	101	33	38.1
84 87-Y-3988	L	6930	15.1	3.2	107	28	38.0
76 87-Y-242	S	6820	16.9	3.7	97	23	36.8
65 87-Y-243	M	6770	17.0	4.2	98	39	38.6
71 87-Y-524	M	6760	17.3	3.6	107	29	39.5
74 86-Y-495	S	6630	16.8	4.0	99	28	38.8
81 87-Y-553	L	6400	15.7	3.0	104	36	39.3
Mean		7500	18.1	3.6	111	20	41.3
CV (%)		6.7	5.7	10.1	1.9	33.4	5.5
LSD (.05)		400	0.8	0.3	2	5	1.8

¹S = short; M = medium; L = long; W = waxy.

²Subjective rating of 1-5, where 1 = poor and 5 = excellent seedling emergence.

³Subjective rating of 1-99, where 1 = none and 99 = 99% lodged over.

Table 4. 1988 Special Short and Medium Grain Trial - Two Location Summary.

Entry	Grain ¹ Type	Grain Yield at 14% Moisture (lbs/a)	Grain Moisture at Harvest (%)	Seedling ² Vigor (1-5)	Days to 50% Heading	Lodging ³ (1-99)	Plant Height (inches)
774 87-Y-2915	L	9520	17.2	4.2	91	1	36.8
763 87-Y-167	M	9010	18.3	4.2	88	21	38.2
753 M-202	M	8980	18.0	4.4	89	8	38.1
775 87-Y-2926	L	8900	17.0	3.9	96	1	33.7
773 87-Y-2914	L	8870	17.1	4.2	89	35	39.0
760 87-Y-19	W	8830	20.1	3.5	89	14	37.6
771 87-Y-2930	L	8800	16.3	4.1	93	5	40.4
768 87-Y-288	M	8790	17.4	4.4	90	7	37.7
752 M-102	M	8760	17.5	4.3	88	3	37.8
765 87-Y-247	S	8720	19.0	4.3	93	6	37.3
754 S-101	S	8720	14.8	4.2	86	7	34.4
769 87-Y-332	M	8680	20.0	4.4	98	1	36.8
751 S-201	S	8640	19.5	4.4	95	2	36.5
766 87-Y-252	S	8600	17.4	4.2	90	33	38.5
755 87-Y-9	M	8560	16.1	4.1	84	6	36.7
767 87-Y-279	M	8520	19.0	4.2	92	5	35.8
759 87-Y-259	S	8380	18.8	4.1	90	20	37.1
762 87-Y-105	S	8350	15.6	4.4	85	9	37.3
757 Calmochi-101	S	8340	15.0	4.2	84	8	37.2
764 87-Y-180	M	8260	14.9	4.2	84	7	36.2
761 86-Y-215	M	8220	18.6	4.1	90	5	37.5
772 87-Y-3360	L	8130	18.0	3.5	99	2	36.1
758 87-Y-119	S	8070	17.7	3.9	88	30	36.7
770 87-Y-343	M	7990	20.6	4.2	101	1	39.2
756 87-Y-118	S	7910	15.7	4.1	84	10	37.7
Mean		8580	17.6	4.1	90	10	37.2
CV (%)		5.5	7.9	5.5	2.2	118.4	4.1
LSD (.05)		470	1.4	0.2	2	11	1.5

¹S = short; M = medium; L = long; W = waxy.

²Subjective rating of 1-5, where 1 = poor and 5 = excellent seedling emergence.

³Subjective rating of 1-99, where 1 = none and 99 = 99% lodged over.

Table 5. L-202 at nine levels of nitrogen,
Fresno County, 1987.

Preplant N Rate	Grain Yield @ 14% Moisture	Grain Moisture	Lodging
(lb/A)	(lb/A)	(%)	(%)
0	5510	18.5	1
25	6450	18.4	1
50	7790	18.9	1
75	8450	19.0	1
100	8890	19.6	1
125	8630	20.2	1
150	9170	19.8	1
175	8650	20.3	1
200	9690	20.2	1
LSD (.05)	750	1.5	NS
CV (%)	6.33	5.42	--

Table 6. M-101 versus 84-Y-9 at eight levels of nitrogen, San Joaquin County, 1988.

Preplant N Rate	M-101		84-Y-9		Mean of both varieties	
	Yield @ 14% Moisture	% Moisture	Yield @ 14% Moisture	% Moisture	Yield @ 14% Moisture	% Moisture
(lb/A)	(lb/A)		(lb/A)		(lb/A)	
0	3330	19.6	2530	20.4	2930	20.0
30	4410	21.5	3430	20.5	3920	21.0
60	5040	22.5	3970	22.4	4500	22.4
90	6420	22.3	4230	21.8	5320	22.0
120	5790	23.1	4850	23.2	5320	23.1
150	6010	23.6	4390	24.3	5200	23.9
180	6240	23.8	5000	22.9	5620	23.3
210	6160	24.2	4610	22.8	5390	23.5
LSD (.05)						
Nitrogen					650	.77
Varieties					320	.62
Nitrogen x Variety					910	1.46
CV (%)						
Nitrogen					13.14	3.32
Variety					12.85	5.35