Project No. RM-2

COMPREHENSIVE RESEARCH ON RICE

ANNUAL REPORT

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

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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 tests were conducted throughout the rice growing areas of the state:

Very Early Maturity Group - Two uniform trials were conducted at each of the following on- farm sites: Geer and Sons (District 108, Yolo County), Lauppe Ranch (Sutter County), and the Brumley Ranch (San Joaquin County). Two additional tests were conducted by the plant breeders at the Rice Experiment Station (RES) in Butte County. The first test at each site included twenty entries (ten commercial varieties and ten advanced breeding lines) in four replications; and the second test included twenty preliminary breeding lines in two replications.

Early Maturity Group - Two uniform tests were conducted at each of the following on-farm sites: Dennis Ranch (Colusa County), Geer and Sons (District 108, Yolo County), and Quad 4 Ranch (District 10, Yuba County). Two additional trials were conducted at the RES. The first test at each site included twenty entries (ten commercial varieties and ten advanced breeding lines) in four replications; and the second test included twenty preliminary breeding lines in two replications.

Intermediate and Late Maturity Group - Two uniform tests were conducted at each of the following on-farm sites: Wylie Ranch (Glenn County) and Steve Lemenager Ranch (Sutter County). Two additional tests were conducted by the plant breeders at the RES. The first test at each site included fourteen entries (seven commercial varieties and seven advanced breeding lines) in four replications; and the second test consisted of twenty preliminary breeding lines in two replications.

Objective II

To conduct research on improved cultural practices:

Fertility Studies (RES): Two field experiments were conducted in cooperation with the RES. In one experiment, the performance of new and existing rice varieties was evaluated at seven rates of applied nitrogen fertilizer. In a separate experiment, the interaction effects of nitrogen and potassium fertilizers on the varieties M-204 and L-203 were studied.

Objective III

To provide professional assistance to field research projects of other principal investigators funded by the Rice Research Board; to maintain a UCD Agronomy Extension based pool of equipment for conducting field research in rice.

Equipment and assistance were provided to several projects as described later in this report.

SUMMARY OF 1994 RESEARCH OBJECTIVES

Objective I - Rice Variety Evaluation

Eight uniform advanced breeding line trials and eight preliminary breeding line trials were conducted throughout the major rice producing areas of California. Six additional tests, including two from each maturity group, were conducted by the rice breeders at the RES. Several of the experimental lines had been tested and screened in previous years. Some lines were in advanced stages (2 or more years) of testing. The seed for public varieties and experimental cultivars was provided by the RES. The following analyses provide single-location yield summaries for the advanced line tests and over-location agronomic performance summaries for each entry in each maturity category. For quick reference, grain yields of commercially available varieties tested in very early and early tests are summarized in Table 7. An Agronomy Progress Report, to be published later, will provide agronomic performance results for all entries in each experiment.

Very Early Tests (< 90 days to 50% heading at Biggs)

Ten advanced breeding lines and ten commercial varieties were compared in four very early tests. Twenty preliminary lines were also evaluated at each location. Commercial varieties at each location included Calmochi-101, M-103, Valencia 87, M-201, M-202, M-203, M-204, L-202, L-203 and S-201. Advanced lines at each location included ten entries from the RES breeding program.

Grain yields in the advanced tests averaged 9,900 lbs/A at Biggs, 10,900 lbs/A at Yolo, 9,870 lbs/A at Sutter, and 8,570 lbs/A at San Joaquin (Table 1). Over the four locations, the highest yielding entry was 91-y-171, a very early (86 days to 50% heading) short-grain (Table 2), which ranked 2nd in yield in all four test locations. Entry 93-y-195, an advanced short-grain waxy type (mochi), was the highest yielding entry at Biggs and ranked 2nd in the four location summary. Of the very early commercial varieties, M-202 and M-201 ranked 4th and 7th, respectively, over locations, however M-202 was the highest yielding variety in the Yolo and Yuba tests.

No entry produced yields statistically higher than M-202 at Yolo and Yuba. Yields of M-201 were similar to M-202 at Biggs, Yolo and San Joaquin, but 9% lower in the Yuba test. The early, premium quality variety, M-203, continued to perform very well in the San Joaquin test and in other locations where severe early lodging is avoided.

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

Ten advanced lines and ten commercial varieties were compared in four early tests. Twenty preliminary lines were also evaluated in separate tests at each location. Commercial varieties at each location were Calmochi-101, Valencia 87, M-103, M-201, M-202, M-203, M-204, L-202, L-203, and S-201. Advanced lines included ten entries from the RES breeding program.

Yields in the advanced line tests averaged 10,160 lbs/A at the RES, 10,880 lbs/A at Yolo, 7,270 lbs/A at Yuba, and 9,730 lbs/A at Colusa (Table 3). The medium-grain line 91-y-381 exceeded 10,000 lbs/A at Biggs, Yolo, and Colusa, and was the highest yielding entry over the four locations (Table 4). Other leading advanced lines were entries M-202, 92-y-521 and M-201. The variety M-202 ranked 2nd and 4th in yield at Yolo and Biggs, respectively, but was below average at Yuba and Colusa. L-203, released in 1991, continued to show improvement over L-202. Of the preliminary lines, 93-y-240, 93-y-589, 93-y-218, 93-y-421 (medium-grains) exceeded 10,000 lbs/A and showed improvement in other agronomic traits (Tables 3 and 4).

Intermediate-Late Tests(> 97 days to 50% heading at Biggs).

Seven advanced lines and seven commercial varieties were compared in three intermediate- late tests. Twenty preliminary lines were also evaluated in separate tests at each location. Commercial varieties at each location included M-401, S-301, A-301, M-202, M-203, M-204, and L-202. Advanced lines included seven entries from the RES breeders.

Average yields in the advanced line tests were 10,540 lbs/A at Biggs, 9,040 lbs/A at Sutter, and 8,810 lbs/A at Glenn (Table 5). An advanced premium quality medium grain, 90-y-686, was the highest yielding entry at Sutter, ranked 3rd at Biggs and was 1st in the over location summary (Table 6). This entry was the highest yielding variety over three locations in 1992 and the 4th highest in 1993. The commercial variety M-204 produced higher yields than M-202 at each location and ranked 1st in yield in the Glenn county test. Premium quality M-401 ranked 10th, 7th, and 4th in yield at Biggs, Sutter, and Glenn, respectively. M-203 was the lowest yielding entry in each of the three tests due to severe early lodging.

Objective II - Cultural Practices

Fertility Studies

Two fertilizer experiments were conducted at the RES. The first experiment consisted of six commercial varieties (M-201, M-202, M-204, L-202, L-203, and S-201)

evaluated at seven fertilizer-N levels ranging from 0 to 180 lbs N/A (30 lb increments) in four replications.

In a second test, rice (M-204 and L-203) response to applied potassium ranging from 0 to 160 lb/A K, (40 lb. increments) was evaluated at four levels of applied nitrogen (0 to 180 lbs N/A, 60 lb. increments) in four replications. This experiment was planted adjacent to the nitrogen x variety test. Results from these tests are presented in Tables 8 and 9.

In the nitrogen x variety experiment, grain yields of most varieties were not increased with more than 90 lb. N/A (Table 8). This unexpected response is probably due to an accumulation of residual fertility at the particular test site. For example, average yields where no N was applied were 7,160 lbs/A. Average grain yields with 0 N treatments in similar tests at this location were 5,510 lbs/A in 1991, 6,410 lbs/A in 1992, and 7,980 lbs/A in 1993. Grain moisture at harvest, days to 50% heading, plant height, and lodging were increased with increasing levels of applied N.

There was a positive response to applied nitrogen in the nitrogen x potassium study. Average yields of both M-204 and L-203 with 0 lb./A N exceeded 7,100 lbs/A. At 120 lbs/A applied N, M-204 yield increased to 8,700 lbs/A and L-203 to 9,700 lbs/A (Table 9), a 13% and 21% increase, respectively. Applied potassium (K) only had a significant effect on plant height.

Objective III - Assistance to Other Projects

The rice equipment pool, including a precision fertilizer applicator, SWECO 324 plot harvester, moisture meters, backpack CO_2 sprayers, and other equipment were used with labor and technical assistance for more than thirty field experiments in 1994.

The precision fertilizer applicator was used to establish one nitrogen x variety trial, one nitrogen x potassium trial, seven nitrogen x straw management trials and one nitrogen/green manure trial. It was also used for a water-seeded vs. drill-seeded experiment at the RES. The SWECO 324 plot combine was used to harvest sixteen variety experiments, all of the fertility experiments, weed control tests, and the green manure/straw project at Sills farm. The backpack sprayers were used to make precision applications of herbicides in numerous experiments. 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 was used to plant, collect samples, and monitor growth in many field and greenhouse experiments. The project also provided support in designing and analyzing rice field experiments.

PUBLICATIONS OR REPORTS

Hill, J.E., J.R. Webster, S.C. Scardaci, J.F. Williams, C.M. Wick, W.M. Canevari, and B.L. Weir. 1993. Cooperative Extension Rice Variety Adaptation and Cultural Practice Research. Annual Report. Comprehensive Rice Research. pp. 11-28.

Hill, J.E., J.F. Williams. 1994. Agriculture and the Environment: Case Studies in California Rice. In: Proceedings of the 1994 California Plant and Soil Conference. Jan 24-25, 1994, San Luis Obispo, CA pp97-106.

Scardaci, S.C., J.E. Hill, J.F. Williams. 1994. Rice Management Abstracts from Rice Field Day Program. CCRRFI, USDA and UC cooperating. August 30.

CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

Sixteen on-farm rice variety evaluation trials were conducted throughout the rice growing regions of California. Six similar tests were conducted on the Rice Experiment Station at Biggs, California. Several advanced and preliminary breeding lines showed promise in improved yields and other agronomic characteristics when compared to existing varieties. This project plays a vital role in supporting the efforts of RES plant breeders by evaluating, comparing and identifying potentially new rice varieties for the California rice industry.

Several experiments conducted in cooperation with other investigators received assistance with planting, fertilizing, herbicide application, harvesting, and data analysis from this project. These experiments included work on nitrogen and potassium fertility and straw management/nitrogen effects.

Table 1

1994 VERY EARLY RICE VARIETY TESTS - Single Location Grain Yield(lbs/A) Summaries:

Biggs RES, Yolo, Sutter, San Joaquin.

Variety	Grain Type	Biggs (RES)	Yolo	Sutter	San Joaquin	Average
Advanced Lines and Varieties						
91Y171	S	10630.(2)	11970.(2)	10640.(2)	9860.(2)	10770.(1)
93Y195	SWX	10740.(1)	11860.(3)	10370.(3)	9630.(3)	10650.(2)
93Y198	SWX	10210.(8)	11020.(9)	10070.(7)	10230.(1)	10380.(3)
M-202	M	9760.(13)	12040.(1)	11010.(1)	8660.(7)	10370.(4)
93Y43	L	10560.(3)	11770.(4)	10290.(4)	8360.(11)	10250.(5)
92Y207	M	9860.(11)	11020.(8)	10170.(6)	9450.(4)	10120.(6)
M-201	M	10550.(4)	11380.(6)	10060.(8)	7940.(17)	9980.(7)
92Y260	M	9780.(12)	11490.(5)	9760.(11)	8620.(8)	9910.(8)
92Y483	L	9920.(10)	11200.(7)	10190.(5)	8330.(12)	9910.(9)
M-204	M	10320.(6)	10870.(10)	9620.(15)	8220.(13)	9760.(10)
93Y23	MPQ	10060.(9)	10630.(13)	9710.(14)	8470.(9)	9720.(11)
CM-101	SWX	9670.(16)	10270.(17)	9510.(17)	9020.(6)	9620.(12)
93Y504	L	10340.(5)	10530.(14)	9600.(16)	7730.(19)	9550.(13)
M-203	M	8530.(20)	10390.(15)	10040.(9)	9150.(5)	9530.(14)
M-103	M	9170.(18)	10770.(11)	9430.(18)	8460.(10)	9460.(15)
L-203	L	10300.(7)	10310.(16)	8890.(19)	7950.(16)	9360.(16)
92Y231	M	9670.(15)	9800.(20)	9740.(13)	8190.(14)	9350.(17)
VAL 87	S	8900.(19)	10260.(18)	9970.(10)	8030.(15)	9290.(18)
S-201	S	9230.(17)	9850.(19)	9760.(12)	7760.(18)	9150.(19)
L-202	L	9700.(14)	10670.(12)	8470.(20)	7260.(20)	9030.(20)
MEAN		**9900.**	**10900.**	**9870.**	**8570.**	**9810.**
% CV		**6.35**	**6.27**	**5.39**	**7.26**	**6.31**
LSD (.05)		**890.**	**970.**	**750.**	**880.**	**430.**

S=short; M=medium; L=long; WX=waxy
Numbers in parentheses indicate relative rank in column.

Table 2

1994 VERY EARLY RICE VARIETY TEST - Four Location Summary
Biggs RES, Yolo, Sutter, San Joaquin

Variety	Grain Type	Grain Yield @ 14%	Grain Moisture	Seedling Vigor	Days to 50% Heading	Lodging	Plant Height
		(lb./ac)	(%)	(1-5)		(1-99)	(cm)
Advanced Lines and Varieties							
91Y171	S	10770.(1)	16.0(19)	4.2(14)	86.(1)	7.(9)	88.(10)
93Y195	SWX	10650.(2)	19.3(8)	4.3(8)	88.(5)	7.(8)	86.(5)
93Y198	SWX	10380.(3)	17.3(15)	4.5(2)	89.(6)	22.(16)	88.(12)
M-202	M	10370.(4)	21.2(2)	4.5(3)	94.(11)	13.(11)	92.(17)
93Y43	L	10250.(5)	15.7(20)	4.3(9)	88.(5)	3.(5)	87.(9)
92Y207	M	10120.(6)	19.3(7)	4.3(7)	88.(4)	13.(12)	88.(14)
M-201	M	9980.(7)	22.4(1)	4.1(17)	97.(16)	7.(7)	88.(13)
92Y260	M	9910.(8)	18.2(12)	4.1(17)	90.(8)	22.(17)	87.(8)
92Y483	L	9910.(9)	16.7(17)	4.2(13)	90.(7)	2.(3)	85.(4)
M-204	M	9760.(10)	20.6(5)	4.3(6)	97.(17)	10.(10)	88.(15)
93Y23	MPQ	9720.(11)	19.8(6)	4.2(12)	93.(10)	31.(19)	88.(10)
CM-101	SWX	9620.(12)	17.3(14)	4.2(10)	87.(2)	19.(14)	87.(7)
93Y504	L	9550.(13)	16.6(18)	4.1(16)	96.(14)	2.(4)	82.(3)
M-203	M	9530.(14)	20.7(4)	4.4(5)	96.(13)	52.(20)	93.(18)
M-103	M	9460.(15)	18.3(11)	3.9(19)	87.(3)	17.(13)	86.(6)
L-203	L	9360.(16)	17.8(13)	4.1(15)	97.(15)	1.(1)	80.(1)
92Y231	M	9350.(17)	18.9(9)	4.2(11)	95.(12)	24.(18)	94.(19)
VAL 87	S	9290.(18)	17.2(16)	4.4(4)	93.(9)	5.(6)	88.(11)
S-201	S	9150.(19)	20.9(3)	4.7(1)	102.(19)	20.(15)	92.(16)
L-202	L	9030.(20)	18.8(10)	4.0(18)	98.(18)	2.(2)	81.(2)
MEAN		**9810.**	**18.7**	**4.2**	**93.**	**14.**	**87.**
% CV		**6.31**	**7.44**	**6.40**	**1.66**	**114.72**	**4.68**
LSD (.05)		**430.**	**1.0**	**.2**	**1.**	**11.**	**3.**
Preliminary Lines							
93y160	S	10270.(1)	16.0(14)	4.3(11)	88.(6)	13.(11)	89.(13)
93y185	MPQ	10020.(2)	18.5(3)	4.4(5)	91.(10)	13.(12)	87.(7)
93y413	M	10000.(3)	17.9(6)	4.2(13)	93.(13)	13.(11)	88.(8)
93y265	M	9810.(4)	17.3(9)	4.4(7)	88.(5)	10.(9)	88.(10)
93y244	M	9720.(5)	18.7(2)	4.8(1)	91.(8)	23.(16)	92.(17)
92y200	SWX	9720.(6)	19.2(1)	3.9(18)	88.(6)	23.(17)	90.(16)
93y432	L	9620.(7)	15.1(18)	4.1(16)	86.(2)	4.(4)	83.(2)
93y353	M	9580.(8)	17.7(7)	4.4(8)	93.(12)	22.(15)	90.(14)
9233069	L	9560.(9)	15.8(17)	4.2(14)	93.(14)	1.(2)	83.(4)
93y268	M	9560.(10)	18.3(4)	4.5(4)	92.(11)	4.(4)	89.(11)
94y22	SPQ	9510.(11)	16.2(13)	4.0(17)	84.(1)	17.(14)	83.(3)
93y510	L	9430.(12)	16.9(12)	4.0(17)	95.(16)	1.(2)	88.(9)
9244900	L	9380.(13)	15.9(15)	4.1(15)	96.(17)	3.(3)	84.(5)
93y179	MPQ	9260.(14)	17.1(11)	4.4(6)	91.(9)	9.(7)	90.(15)
9238329	L	9260.(15)	15.8(16)	3.9(19)	94.(15)	4.(5)	89.(13)
93y256	M	9190.(16)	18.0(5)	4.6(3)	92.(11)	9.(8)	93.(18)
9232037	L	9170.(17)	14.9(20)	4.3(10)	89.(7)	8.(6)	89.(12)
93y203	M	9160.(18)	15.1(19)	4.8(2)	88.(4)	11.(10)	86.(6)
93y217	M	9110.(19)	17.3(10)	4.4(9)	87.(3)	15.(13)	86.(6)
L-203	L	8820.(20)	17.5(8)	4.2(12)	98.(18)	1.(1)	78.(1)
MEAN		**9510.**	**17.0**	**4.3**	**91.**	**10.**	**87.**
% CV		**5.45**	**3.86**	**6.55**	**1.42**	**93.64**	**3.08**
LSD (.05)		**520.**	**.7**	**.3**	**1.**	**9.**	**3.**

S=short; M=medium; L=long; WX=waxy
Subjective rating of 1-5 where 1=poor and 5=excellent seedling emergence.
Subjective rating of 1-99 where 1=none and 99=completely lodged.

Table 3

1994 EARLY RICE VARIETY TESTS - Single Location Grain Yield(lbs/A) Summaries: Biggs(RES), Yolo, Yuba, Colusa.

Variety	Grain Type	Biggs (RES)	Yolo	Yuba	Colusa	Average
Advanced Lines and Varieties						
91Y381	M	10750.(2)	12270.(1)	8230.(2)	10580.(3)	10460.(1)
M-202	M	10650.(4)	12040.(2)	7980.(5)	10080.(7)	10190.(2)
92Y521	LWX	10680.(3)	11690.(3)	7740.(7)	10320.(4)	10110.(3)
M-201	M	10410.(9)	11380.(6)	7190.(11)	10800.(1)	9950.(4)
92Y93	L	10350.(11)	11420.(5)	7550.(8)	10010.(8)	9830.(5)
92Y328	MPQ	10380.(10)	11570.(4)	8000.(4)	9110.(16)	9770.(6)
92Y91	L	11210.(1)	10870.(10)	6360.(18)	10610.(2)	9760.(7)
92Y624	M	10570.(6)	9850.(20)	8420.(1)	9920.(10)	9690.(8)
93Y92	L	9940.(15)	11310.(7)	7360.(10)	9870.(11)	9620.(9)
93Y312	S	10530.(7)	10950.(8)	7460.(9)	9490.(14)	9610.(10)
M-204	M	10580.(5)	10870.(9)	6380.(17)	10280.(5)	9530.(11)
L-203	L	10520.(8)	10310.(16)	7020.(14)	9710.(12)	9390.(12)
93Y308	MPQ	10310.(12)	10600.(13)	7140.(12)	9300.(15)	9340.(13)
VAL 87	S	9770.(16)	10260.(18)	7030.(13)	10100.(6)	9290.(14)
M-103	M	9000.(19)	10770.(11)	7980.(6)	8700.(18)	9110.(15)
CM-101	SWX	9150.(18)	10270.(17)	8030.(3)	8550.(20)	9000.(16)
M-203	MPQ	8970.(20)	10390.(14)	6880.(15)	9610.(13)	8960.(17)
S-201	S	9390.(17)	9850.(19)	6480.(16)	9930.(9)	8910.(18)
L-202	L	10040.(13)	10670.(12)	5860.(20)	9040.(17)	8900.(19)
93Y75	MPQ	9950.(14)	10320.(15)	6340.(19)	8630.(19)	8810.(20)
MEAN		**10160.**	**10880.**	**7270.**	**9730.**	**9510.**
% CV		**6.49**	**5.54**	**4.98**	**5.73**	**5.85**
LSD (.05)		**930.**	**850.**	**510.**	**790.**	**390.**

S=short; M=medium; L=long; WX=waxy
Numbers in parentheses indicate relative rank in column.

Table 4

1994 EARLY ADVANCED RICE VARIETY TEST - Four Location Summary: Biggs(RES), Yuba, Yolo, Colusa.

VARIETY	Grain Type	Grain Yield @ 14%	Grain Moisture	Seedling Vigor	Days to 50% Heading	Lodging	Plant Height
		(lb/ac)	(%)	(1-5)		(1-99)	(cm)
Advanced Lines and Varieties							
91Y381	M	10460.(1)	20.1(9)	4.2(8)	91.(5)	2.(7)	95.(10)
M-202	M	10190.(2)	20.2(7)	4.4(4)	93.(10)	10.(10)	99.(13)
92Y521	LWX	10110.(3)	16.6(19)	4.6(1)	93.(9)	2.(6)	95.(10)
M-201	M	9950.(4)	21.7(1)	4.0(13)	95.(16)	1.(3)	95.(9)
92Y93	L	9830.(5)	16.8(16)	4.1(11)	91.(6)	1.(1)	90.(3)
92Y328	MPQ	9770.(6)	20.1(8)	3.8(15)	95.(13)	13.(11)	102.(16)
92Y91	L	9760.(7)	16.8(15)	4.0(14)	90.(4)	2.(4)	95.(8)
92Y624	M	9690.(8)	19.5(11)	4.4(5)	95.(15)	34.(14)	101.(15)
93Y92	L	9620.(9)	16.0(20)	4.2(6)	92.(7)	1.(2)	94.(6)
93Y312	S	9610.(10)	21.3(3)	3.8(17)	96.(18)	2.(5)	98.(12)
M-204	M	9530.(11)	19.8(10)	4.1(12)	95.(17)	6.(9)	94.(6)
L-203	L	9390.(12)	16.8(17)	4.1(11)	92.(8)	1.(1)	84.(1)
93Y308	MPQ	9340.(13)	20.4(5)	4.2(7)	95.(16)	22.(12)	98.(11)
VAL 87	S	9290.(14)	16.6(18)	4.5(2)	89.(3)	3.(8)	94.(4)
M-103	M	9110.(15)	17.6(12)	3.8(16)	85.(2)	38.(15)	94.(7)
CM-101	SWX	9000.(16)	16.9(14)	4.1(10)	85.(1)	40.(16)	94.(5)
M-203	MPQ	8960.(17)	21.1(4)	4.1(9)	93.(11)	89.(18)	102.(17)
S-201	S	8910.(18)	20.3(6)	4.4(3)	101.(19)	26.(13)	100.(14)
L-202	L	8900.(19)	17.1(13)	3.8(15)	95.(14)	1.(1)	85.(2)
93Y75	MPQ	8810.(20)	21.4(2)	4.1(12)	94.(12)	48.(17)	105.(18)
MEAN		**9510.**	**18.9**	**4.1**	**93.**	**17.**	**96.**
% CV		**5.85**	**5.87**	**7.60**	**1.23**	**64.08**	**3.76**
LSD (.05)		**390.**	**.8**	**.2**	**1.**	**8.**	**3.**
Preliminary Lines							
93Y240	M	10720.(1)	19.0(12)	4.6(1)	92.(6)	6.(13)	101.(18)
93Y589	M	10320.(2)	19.3(8)	3.9(11)	94.(10)	3.(8)	95.(11)
93Y218	M	10090.(3)	18.4(13)	4.4(3)	85.(1)	3.(7)	93.(6)
93Y421	M	10010.(4)	19.1(9)	4.1(8)	95.(13)	4.(10)	95.(10)
93Y299	S	9880.(5)	19.1(11)	3.6(14)	86.(2)	14.(15)	91.(4)
93Y409	M	9750.(6)	19.5(6)	3.9(11)	90.(4)	4.(9)	98.(14)
93Y260	M	9750.(7)	18.2(14)	4.5(2)	87.(3)	6.(12)	94.(7)
L-203	L	9730.(8)	16.6(17)	4.1(9)	93.(7)	1.(2)	84.(1)
93Y306	MPQ	9680.(9)	20.3(2)	4.1(9)	96.(15)	2.(5)	99.(16)
93Y391	M	9630.(10)	19.1(10)	3.9(11)	94.(12)	6.(13)	95.(11)
93Y491	L	9620.(11)	16.2(19)	3.7(13)	92.(5)	2.(6)	90.(2)
93Y323	MPQ	9550.(12)	20.2(3)	4.3(5)	97.(19)	2.(6)	101.(19)
93Y549	L	9520.(13)	17.6(15)	4.3(6)	96.(16)	1.(2)	97.(13)
93Y294	S	9480.(14)	20.1(4)	4.1(7)	100.(20)	12.(14)	94.(8)
93Y587	M	9460.(15)	20.6(1)	4.3(4)	96.(14)	2.(4)	95.(9)
93Y548	L	9430.(16)	16.1(20)	4.4(3)	94.(8)	1.(3)	96.(12)
93Y705	M	9420.(17)	19.4(7)	3.6(15)	94.(11)	2.(5)	99.(17)
93Y317	MPQ	9310.(18)	19.9(5)	4.1(9)	94.(9)	5.(11)	98.(15)
9234442	L	9210.(19)	16.5(18)	4.1(10)	97.(18)	1.(2)	90.(3)
9232012	L	8310.(20)	17.5(16)	3.8(12)	97.(17)	1.(1)	91.(5)
MEAN		**9640.**	**18.6**	**4.1**	**93.**	**4.**	**95.**
% CV		**6.31**	**3.91**	**7.48**	**1.09**	**163.32**	**3.28**
LSD (.05)		**610.**	**.7**	**.3**	**1.**	**6.**	**3.**

S=short; M=medium; L=long; WX=waxy
Subjective rating of 1-5 where 1=poor and 5=excellent seedling emergence.
Subjective rating of 1-99 where 1=none and 99=completely lodged.

Table 5

1994 INTERMEDIATE-LATE RICE VARIETY TESTS - Single Location Grain Yield(lbs/A) Summaries: Biggs(RES), Sutter, Glenn.

Variety	Grain Type	Biggs (RES)	Sutter	Glenn	Average
Advanced Lines and Varieties					
90Y686	MPQ	11270.(3)	10820.(1)	9240.(5)	10440.(1)
92Y612	M	11530.(1)	9630.(2)	9130.(6)	10090.(2)
S-301	S	11500.(2)	9470.(4)	8650.(11)	9870.(3)
91Y581	S	10640.(6)	9370.(5)	9380.(2)	9800.(4)
M-401	MPQ	10320.(10)	9140.(7)	9320.(4)	9590.(5)
93Y567	MPQ	10960.(4)	8640.(10)	9010.(7)	9540.(6)
M-204	M	10770.(5)	8340.(12)	9420.(1)	9510.(7)
9234441	L	10290.(11)	9490.(3)	8720.(9)	9500.(8)
93Y569	MPQ	10600.(7)	9080.(9)	8790.(8)	9490.(9)
A-301	L	10120.(13)	9310.(6)	8710.(10)	9380.(10)
M-202	M	10580.(8)	8110.(13)	9350.(3)	9350.(11)
91Y631	L	10190.(12)	9120.(8)	8030.(13)	9110.(12)
L-202	L	10370.(9)	8450.(11)	8100.(12)	8970.(13)
M-203	M	8440.(14)	7550.(14)	7450.(14)	7810.(14)
MEAN		**10540.**	**9040.**	**8810.**	**9460.**
% CV		**4.91**	**5.57**	**5.35**	**5.26**
LSD (.05)		**740.**	**720.**	**670.**	**400.**

S=short; M=medium; L=long; WX=waxy
Numbers in parentheses indicate relative rank in column.

Table 6

1994 INTERMEDIATE-LATE RICE VARIETY TEST - Three Location Summary: Biggs(RES), Sutter, Glenn.

Variety	Grain Type	Grain Yield @ 14%	Grain Moisture	Seedling Vigor	Days to 50% Heading	Lodging	Plant Height
		(lb/ac)	(%)	(1-5)		(1-99)	(cm)
Advanced Lines and Varieties							
90Y686	MPQ	10440.(1)	18.9(2)	4.4(2)	100.(11)	2.(6)	97.(9)
92Y612	M	10090.(2)	18.0(6)	3.8(13)	92.(6)	2.(6)	96.(8)
S-301	S	9870.(3)	18.6(3)	4.3(4)	97.(9)	12.(9)	100.(10)
9IY581	S	9800.(4)	18.0(7)	4.5(1)	93.(7)	2.(4)	94.(4)
M-401	M	9590.(5)	21.4(1)	4.3(3)	106.(13)	33.(11)	106.(14)
93Y567	MPQ	9540.(6)	18.3(5)	4.1(10)	95.(8)	23.(10)	102.(13)
M-204	M	9510.(7)	16.7(11)	4.2(8)	90.(3)	9.(8)	95.(5)
9234441	L	9500.(8)	15.3(14)	4.0(12)	92.(4)	7.(7)	91.(3)
93Y569	MPQ	9490.(9)	18.5(4)	4.2(6)	104.(12)	2.(5)	96.(6)
A-301	L	9380.(10)	17.3(9)	3.5(14)	100.(10)	1.(1)	89.(2)
M-202	M	9350.(11)	17.6(8)	4.3(5)	89.(2)	53.(12)	100.(11)
91Y631	L	9110.(12)	15.5(13)	4.2(7)	92.(5)	2.(3)	96.(7)
L-202	L	8970.(13)	15.7(12)	4.0(11)	92.(4)	1.(2)	86.(1)
M-203	M	7810.(14)	16.8(10)	4.2(9)	87.(1)	89.(13)	101.(12)
MEAN		**9460.**	**17.6**	**4.1**	**95.**	**17.**	**96.**
% CV		**5.26**	**5.27**	**8.21**	**1.73**	**55.06**	**3.07**
LSD (.05)		**400.**	**.7**	**.3**	**1.**	**8.**	**2.**
Preliminary Lines							
93Y582	M	10590.(1)	15.9(11)	4.2(6)	93.(10)	3.(2)	95.(8)
93Y738	M	10420.(2)	16.3(8)	3.5(18)	94.(12)	8.(7)	99.(13)
93Y745	M	10270.(3)	17.0(4)	3.9(14)	95.(14)	5.(4)	98.(11)
9250840	L	10040.(4)	15.1(15)	3.8(15)	96.(16)	1.(1)	98.(11)
93Y420	M	10000.(5)	16.7(6)	3.9(12)	89.(3)	18.(12)	94.(6)
93Y584	M	9830.(6)	16.8(5)	3.9(10)	95.(13)	6.(5)	98.(11)
93Y410	M	9800.(7)	15.5(13)	3.9(14)	89.(4)	8.(8)	96.(10)
94Y118	MPQ	9690.(8)	16.3(9)	4.5(2)	100.(17)	4.(3)	98.(12)
92Y656	L	9560.(9)	15.6(12)	3.7(16)	96.(15)	15.(11)	99.(14)
93Y568	MPQ	9470.(10)	17.6(1)	4.3(5)	101.(18)	7.(6)	98.(12)
93Y325	MPQ	9400.(11)	17.0(2)	4.0(9)	92.(9)	13.(10)	96.(9)
93Y585	M	9210.(12)	16.4(7)	4.3(4)	91.(6)	18.(13)	95.(7)
93Y614	L	9180.(13)	14.9(16)	4.2(7)	91.(7)	1.(1)	91.(3)
93Y305	MPQ	9120.(14)	17.0(3)	3.9(13)	92.(8)	31.(14)	102.(15)
93Y422	M	8950.(15)	16.2(10)	4.2(8)	88.(2)	8.(7)	95.(8)
93Y246	M	8830.(16)	15.2(14)	4.8(1)	84.(1)	53.(16)	92.(4)
93Y609	L	8700.(17)	14.7(18)	4.4(3)	94.(11)	1.(1)	92.(5)
L-202	L	8670.(18)	14.8(17)	3.9(10)	92.(9)	1.(1)	84.(1)
93Y539	L	8340.(19)	14.1(20)	3.9(11)	90.(5)	9.(9)	89.(2)
9231508	L	8110.(20)	14.3(19)	3.6(17)	91.(7)	52.(15)	102.(15)
MEAN		**9410.**	**15.9**	**4.0**	**93.**	**13.**	**95.**
% CV		**4.40**	**4.29**	**7.65**	**1.17**	**70.06**	**4.09**
LSD (.05)		**480.**	**.8**	**.4**	**1.**	**10.**	**5.**

S=short; M=medium; L=long; WX=waxy
Subjective rating of 1-5 where 1=poor and 5=excellent seedling emergence.
Subjective rating of 1-99 where 1=none and 99=completely lodged.

Table 7

Grain Yield Comparison of Very Early and Early Varieties between Very Early and Early Test Locations.

Test / Location	Planting Date	CM-101	M-103	VAL.87	M-201	M-202	M-203	M-204	L-202	L-203	S-201
Very Early											
Butte(RES)	7-May	9670	9170	8900	10550	9760	8530	10320	9700	10300	9230
Yolo (Geer)	5-May	10270	10770	10260	11380	12040	10390	10870	10670	10310	9850
Sutter (Lauppe)	7-May	9510	9430	9970	10060	11010	10040	9620	8470	8890	9760
San Joaquin (Brumley)	28-Apr	9020	8460	8030	7940	8660	9150	8220	7260	7950	7760
Four Location Mean:		**9617**	**9457**	**9290**	**9983**	**10368**	**9528**	**9757**	**9025**	**9363**	**9150**
Early											
Butte(RES)	6-May	9150	9000	9770	10410	10650	8970	10580	10040	10520	9390
Yolo (Geer)	5-May	10270	10770	10260	11380	12040	10390	10870	10670	10310	9850
Yuba (Quad 4)	29-Apr	8030	7980	7030	7190	7980	6880	6380	5860	7020	6480
Colusa (Dennis)	3-May	8550	8700	10100	10800	10080	9610	10280	9040	9710	9930
Four Location Mean:		**9000**	**9112**	**9290**	**9945**	**10188**	**8963**	**9527**	**8902**	**9390**	**8913**
Eight Location Mean:		**9103**	**9170**	**9290**	**9951**	**10218**	**9057**	**9565**	**8922**	**9385**	**8952**

Table 8

Effects of Applied Nitrogen on Rice Variety Performance, Biggs RES, 1994.

VARIETY	NITROGEN RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
M-204	0	7180	16.8	82	2
	30	8090	17.5	84	1
	60	8710	18.4	84	8
	90	9010	19.4	72	65
	120	8680	19.6	73	86
	150	8570	19.3	87	93
	180	8440	18.7	88	95
M-201	0	7890	17.8	85	1
	30	8510	18.4	93	1
	60	9480	19.2	78	3
	90	9460	21.2	78	45
	120	9290	20.9	90	84
	150	8900	19.6	90	90
	180	7720	21.8	90	95
M-202	0	7300	16.9	95	1
	30	8600	17.7	84	8
	60	8420	18.8	78	60
	90	8430	19.8	91	93
	120	8990	19.2	92	89
	150	8510	19.4	93	94
	180	7260	19.3	98	94
L-203	0	6920	15.9	84	1
	30	7310	15.9	84	1
	60	8040	16.1	98	1
	90	8420	16.3	94	1
	120	8370	16.9	95	1
	150	8290	16.4	95	5
	180	8150	16.5	86	60
L-202	0	5950	16.1	86	1
	30	7140	16.2	101	1
	60	7730	16.5	94	1
	90	8200	16.9	96	1
	120	8470	17.2	94	1
	150	8060	17.1	87	1
	180	8030	17.4	86	20
S-201	0	7720	16.9	96	1
	30	8900	17.8	93	3
	60	8940	18.2	96	40
	90	8550	17.2	92	91
	120	8380	17.8	91	93
	150	8050	17.6	88	94
	180	7180	18.0	95	94

Table 8, continued

NITROGEN RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
0	7160	16.7	80	1
30	8090	17.2	85	3
60	8550	17.9	88	19
90	8680	18.5	91	49
120	8700	18.6	93	59
150	8400	18.2	92	63
180	7800	18.6	92	76

VARIETY	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
M-204	8380	18.5	90	50
M-201	8750	19.8	91	46
M-202	8220	18.7	93	63
L-203	7930	16.3	83	10
L-202	7660	16.8	82	4
S-201	8250	17.6	94	59

% CV	5.8	3.7	4	23.3
LSD: N-RATE	330	0.6	2	6.8
LSD:VARIETY	250	0.3	2	4.7
N-RATE X VARIETY				
:VARIETY FOR SAME N	670.0	0.9	NS	12.6
:ALL OTHER COMPARISONS	690.6	1.0	NS	13.3

ns= not significantly different at P < 0.05.

Table 9

Performance of M-202 and L-203 as Influenced by Nitrogen and Potassium Fertilizer, Biggs RES, 1994

VARIETY	N-RATE (lbs/A)	K-RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
M-204	0	0	7,157	16.2	88	5
		40	7,740	16.2	92	10
		80	7,587	16.5	89	10
		120	7,701	16.3	91	9
		160	7,557	17.4	89	25
	60	0	8,498	19.2	92	23
		40	8,346	19.1	95	35
		80	8,973	19.4	98	41
		120	8,781	18.3	96	20
		160	8,825	18.4	94	30
	120	0	8,872	21.3	98	43
		40	8,500	20.1	94	69
		80	8,915	20.7	98	70
		120	8,524	21.1	100	76
		160	8,758	21.2	97	75
	180	0	8,360	18.7	94	94
		40	8,419	19.3	102	91
		80	8,245	21.2	98	93
		120	8,882	19.4	104	94
		160	8,737	20.7	103	94
L-203	0	0	6,703	13.9	77	1
		40	7,138	13.7	88	1
		80	7,187	14.2	81	1
		120	7,510	14.0	85	3
		160	7,141	14.2	82	1
	60	0	8,759	14.9	90	1
		40	8,564	14.9	88	1
		80	8,810	14.6	87	1
		120	8,645	14.4	89	1
		160	8,395	14.9	87	1
	120	0	9,056	15.2	91	16
		40	9,207	14.9	95	1
		80	8,948	15.2	91	1
		120	8,994	15.7	90	2
		160	9,529	15.1	91	2
	180	0	8,432	15.1	90	53
		40	9,072	15.5	89	66
		80	8,621	15.3	92	63
		120	9,181	15.6	96	60
		160	8,843	15.1	97	74

VARIETY	N-RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
M-204	0	7,548	16.5	89	2
	60	8,685	18.9	94	10
	120	8,714	20.9	97	7
	180	8,529	19.9	100	3
L-203	0	7,136	14.0	83	2
	60	8,635	14.7	88	1
	120	9,147	15.2	92	4
	180	8,830	15.3	92	3

VARIETY	K-RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
M-204	0	8,221	18.9	93	41
	40	8,250	18.7	95	51
	80	8,429	19.4	95	54
	120	8,471	18.8	98	50
	160	8,469	19.4	96	56
L-203	0	8,237	14.8	87	18
	40	8,495	14.8	90	17
	80	8,391	14.8	88	16
	120	8,582	14.9	90	17
	160	8,476	14.8	89	19

N-RATE (lbs/A)	K-RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
0	0	6,930	15.0	83	3
	40	7,438	15.0	90	6
	80	7,387	15.3	85	6
	120	7,605	15.1	88	6
	160	7,349	15.8	86	13
60	0	8,628	17.1	91	12
	40	8,454	17.0	91	18
	80	8,891	17.0	92	21
	120	8,713	16.3	93	11
	160	8,610	16.6	91	16
120	0	8,964	18.3	94	29
	40	8,853	17.5	94	35
	80	8,931	17.9	95	36
	120	8,758	18.4	95	39
	160	9,143	18.2	94	39
180	0	8,395	16.9	92	73
	40	8,745	17.4	95	79
	80	8,433	18.3	95	78
	120	9,031	17.5	100	77
	160	8,789	17.9	100	84

Table 9, continued

VARIETY	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
M-204	8,368	19.0	95	50
L-203	8,436	14.8	89	18

N-RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
0	7,342	15.2	86	7
60	8,659	16.8	92	15
120	8,930	18.1	94	35
180	8,679	17.6	96	78

K-RATE (lbs/A)	YIELD (lbs/A)	MOISTURE (%)	HEIGHT (cm)	LODGING (1-99)
0	8,229	16.8	90	29
40	8,373	16.7	93	34
80	8,410	17.1	92	35
120	8,527	16.9	94	33
160	8,473	17.1	92	38

%CV		7.0	4.50	4.5	48.2
LSD:	N-RATE	422.5	0.96	3.8	9.8
	K-RATE	NS	NS	2.5	NS

NA = not available; ns = not significantly at P < .05.