78th Annual Research Report
RICE RESEARCH STATION

Crowley, Louisiana
1986

LOUISIANA
AGRICULTURAL EXPERIMENT STATION
C. Oran Little, Vice Chancellor & Director

LOUISIANA STATE UNIVERSITY
AGRICULTURAL CENTER
H. Rouse Caffey, Chancellor

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURE RESEARCH SERVICE
COOPERATING

TABLE OF CONTENTS

I N T R O D U C T I O N

Research work at the Louisiana State University Rice Research Station, Crowley, Louisiana, is conducted cooperatively by the Louisiana Agricultural Experiment Station and the United States Department of Agriculture, Agricultural Research Service. The 1986 rice research program included breeding, variety testing, production and distribution of foundation seed, fertilization, soil and water management, cultural practices, weed control, insect studies, disease investigations, rice drying, bird control in rice, and physiology studies. Forages and crops grown in rotation with rice were evaluated relative to increasing the efficiency of land use. The research program of the Rice Station also includes experiments in the nutrition and management of beef cattle and aquacultural experiments. The aquaculture research program places emphasis upon production practices, crawfish forages, and multi-cropping of crawfish with agronomic crops. Although most of the research work was performed by members of the Rice Station staff, several staff members from Baton Rouge conducted research at this station.

The research activities of this station include both fundamental and applied research, although the latter predominates due to the objectives of branch station work. Research accomplishments and general progress of the Rice Station during 1986 are presented in this report representing the 78th Annual Report of the LSU Rice Research Station.

In addition to research responsibilities of the Rice Research Station staff and cooperators, a large number of farmers, extension personnel, and others were trained and otherwise contacted during 1986. Approximately 650 persons attended the annual Rice Research Station field day to view plots and participate in discussions of research findingsand about 400 attended the Crawfish field day. Field days were also conducted in East Carroll and Vermilion parishes. In addition, the staff participated in industry meetings, both on and off the station, and worked individually with farmers and others in solving immediate problems. Several thousand people received services from the LSU Rice Research Station during 1986.

Projects at this station are conducted under the supervision of research workers from the Rice Station and also by cooperating personnel from certain campus departments. Following the reports is a list of station personnel and cooperators in 1986.

MONTHLY RAINFALL DATA
RICE RESEARCH STATION -- CROWLEY, LA
1986

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Total
1		.10					.05						-
2							.14		.03				-
3					.54	.10	1.03		.02				-
4	.24	.70	.72			.88	.32						-
5		.72									1.46		-
6		.12					1.16	.05		.34			-
7	.13							.10			.27		-
8						.22	.02						-
9	.04					.09	.15	.04		.97			-
10	.57	.25		.02		.16	.16	.29		.41		.78	-
11	.25			.08			.05	.28				.79	-
12			.75			.10	.28	1.27		.45		.02	-
13			.62	.24					.02	.60			-
14				.22		.20				1.12			-
15		.20										.80	-
16					.02				.18			1.40	-
17	.05	.10							1.50			.03	-
18	.25				.36				.01		.01	.06	-
19			1.64		1.02							.68	-
20				1.35		.15					.27		-
21						.77	.03		.79		.39		-
22						.03		.10	.53			.22	-
23	.02							.51	.49	.72	.19	2.17	-
24							.08		.05	1.16	1.23	.01	-
25	.38				.53				.20	.02	4.26		-
26	.02				2.10	.17	.09		.09		.12		-
27					.04	1.30	.57		.01				-
28				.10	.25				.15				-
29				.12	.08	.87							-
30					.79	.21			.03				-
31					.10								-
Mo. Total	1.95	2.19	3.73	2.13	5.83	5.25	4.13	2.64	4.10	5.79	8.20	6.96	52.90
1985	6.13	5.59	3.70	2.30	5.71	3.85	4.62	6.03	5.38	17.13	3.40	4.12	67.96

RICE BREEDING

DEVELOPING IMPROVED RICE VARIETIES FOR LOUISIANA[1/]

K.S. McKenzie, F. Jodari, R.K. Collins, R. Pollingue,
R.J. Guidry, and P. Brandt

INTRODUCTION

LAES Project 2288 was initiated at the Rice Research Station in 1982. The objectives of this project are as follows:

1. To develop improved rice varieties for Louisiana having increased yielding ability, resistance to lodging, fertilizer responsiveness, disease and insect resistance, improved seedling vigor, herbicide tolerance, and improved grain, milling, and culinary qualities.

2. To develop and/or improve methods of rice breeding, selection, and evaluation.

3. To conduct basic rice genetic studies of interest to rice varietal improvement.

This report describes the research conducted by the Louisiana rice breeding project including the results of experiments and varietal tests conducted in 1986.

SUMMARY

An accelerated rice breeding program for Louisiana was initiated in 1982 to develop improved rice varieties for Louisiana. The 1986 rice breeding nursery covered approximately 19 acres including 20,000 breeding rows, four acres of F_2 populations, and 1,500 yield plots. X_1 seed of eight different lines was also produced. Since its inception, over 800 new crosses have been made of which about 350 were made in 1986. The increased nursery size and breeding activities reflect a large expansion of rice varietal improvement activities for Louisiana. A strong emphasis is continuing to be placed on developing lodging resistant semidwarf lines with high yield potential. Yield testing continues to include both water- and drill-seeded tests, and laboratory seedling vigor testing is conducted on all advanced progeny rows. Pest resistance of promising selections is being evaluated by cooperating research projects. Particular emphasis is being placed on trying to incorporate higher levels of disease resistance, especially to sheath blight. On-farm tests of advanced selections were continued in Vermilion and Rapides parishes. These tests provide needed information of the performance of experimental selections in different environments. Four advanced experimental lines were tested in N rate and timing studies by the Rice Fertilization and Agronomic Practices Project. Experimental 2213 is an early maturing semidwarf medium-grain

1/ This research is supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

selection that has shown yield advantages over Mars in several tests. A 5-acre increase of 2213 was planted in the late spring by the Rice Research Station Foundation Seed Project. The decision was made in the Fall of 1986 to release this line under the name 'Mercury'. Experimentals 2201 and 2203 are early semidwarf long grains which have compared favorably to Lemont. A fourth selection, a semidwarf mutant of Della, is being increased and will be evaluated in additional tests in 1987. Two disease resistant germplasm lines obtained from mutation breeding were registered in 1986 and additional improved germplasm lines will be registered in 1987.

COOPERATIVE UNIFORM REGIONAL RICE NURSERY

Description. Public rice breeders in the U.S. conduct cooperative yield nurseries in which commercial varieties and experimental lines are grown and evaluated at experiment stations in Arkansas, Louisiana, Texas, and Mississippi. This test is coordinated through the USDA in cooperation with the state agricultural experiment stations. The nurseries are grown to test adaptation of the entries in the diverse rice producing environments in the southern U.S. The entries in the 1986 nursery included material from Arkansas, California, Louisiana, Texas, and a number of cultivars from foreign countries. Information on performance characteristics is compiled and stored in the LSU Rice Data Bank by the LSU Department of Experimental Statistics.

Experimental design. The nursery contains seven test groups organized by maturity. All groups were grown in a randomized complete block design with four replications in groups I to IV and two replications in groups V to VII. Entry numbers from each state were assigned in sequence (e.g., 1, 21, 41, 61, 81, 121, and 161 were from Arkansas; 2, 22, 42, 62, 82, 122, and 162 were from Louisiana; and 3, 23, 43, 63, 83, 123, and 163 were from Texas).

Agronomic practices. Fertilizer was incorporated preplant at a rate of 120-60-60 lb/A total NPK. Experimental plots were 53 inches wide and 18 feet long. Treated, presoaked, germinating seed was hand broadcast into the water and all plots were seeded at 150 lb/A rate. The plots were drained to allow seedlings to anchor and a shallow permanent flood applied until harvest. Seeding dates were as follows: groups I, II, V, VI, April 4 and groups IV and VII, April 7. Visual subjective seedling vigor ratings were made as the rice emerged through the water and other agronomic data collected during the growing season. Propanil, Bolero®, Basagran®, carbofuran, and methylparathion were applied at recommended rates for weed, water weevil, and green stink bug control, respectively. At maturity, the plots were trimmed to 16 feet and the entire plot (71 ft^2) harvested with a small plot combine for groups I, II, III, IV, VII. In groups V and VI, the plot center (29 ft^2) was harvested. A small milling sample was taken from the borders of the plots of two replications for each entry. Samples were dried to approximately 12% moisture on a small sample dryer and yields, moisture, and milling determined. All yield results are reported at 12% moisture.

Comments. Tables 1 through 7 show the mean values for the acronomic characters measured. Heavy winds made seeding difficult April 4, 1986. Seedling vigor differences were quite distinct. Severe blast and bird damage were responsible for the low yield of 'M-201' (Table 5). Entry 25 (Mercury) also had some pest damage and one plot was in an area that was infested by green stink bugs before heading. Entries 42 and 45 are the advance experimental

Table 1. Agronomic performance of 1986 Uniform Rice Nursery, Group I. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
1	L	6	84	49	27	7091	A	64-70
11	L	2	82	38	0	7069	A	66-70
5	L	3	83	39	15	6813	AB	66-69
4	L	5	84	47	22	6581	ABC	61-69
TEBONNET	L	7	85	54	38	6578	ABC	63-70
3	L	3	76	39	0	6571	ABC	64-71
6	L	5	81	36	0	6544	ABC	62-70
8	L	2	81	37	3	6539	ABC	66-70
SKYBONNET	L	6	88	50	8	6421	ABC	65-71
7	L	4	83	44	8	6368	ABC	63-71
9	L	4	80	36	13	5962	BCD	63-72
12	L	5	83	37	0	5917	BCD	63-71
2	L	3	79	36	3	5916	BCD	61-71
LABELLE	L	7	83	52	27	5545	CDE	64-70
10	L	3	79	44	35	5237	DE	58-70
BOND	L	5	82	45	63	4593	E	60-68
C.V., (%)		14.2	2.3	4.1	-	10.2		2.1-1.1

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 2. Agronomic Performance of 1986 Uniform Rice Nursery, Group II. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
28	L	5	88	36	0	7047	A	60-71
MARS	M	4	90	48	25	6865	AB	68-71
26	L	6	89	37	0	6822	AB	66-72
30	L	5	90	43	57	6711	AB	48-70
25	L	3	87	38	0	6706	AB	67-71
24	L	5	86	45	17	6676	AB	61-71
31	L	6	88	40	0	6519	ABC	56-71
LEAH	L	4	93	45	13	6408	ABC	50-72
27	L	3	88	46	15	6140	BCD	57-70
22	L	3	84	41	0	6126	BCD	65-70
23	L	7	88	37	0	6041	BCDE	64-71
REXMONT	L	5	87	37	27	5769	CDE	62-70
21	L	3	83	50	32	5473	DEF	61-67
29	L	6	94	51	32	5312	EF	63-70
LEBONNET	L	5	91	51	82	4965	F	63-71
PECOS	M	3	84	47	90	3063	G	66-70
C.V.. %		13.8	2.1	3.5		8.4		8.2-1.0

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 3. Agronomic Performance of 1986 Uniform Rice Nursery, Group III. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
41	L	5	86	44	13	7416	A	53-73
42	L	5	83	38	0	7031	AB	62-71
NEWBONNET	L	6	92	48	0	6949	AB	61-69
45	L	5	85	39	0	6878	ABC	61-71
43	L	6	90	40	0	6769	BC	61-71
47	L	5	97	43	0	6750	BC	50-70
TORO-2	L	4	90	48	32	6681	BC	61-72
52	L	6	86	40	3	6630	BC	59-71
49	L	5	86	40	3	6528	BC	59-72
LEMONT	L	4	90	39	0	6519	BC	57-71
44	M	3	88	51	38	6475	BC	64-69
GULFMONT	L	4	86	40	0	6421	BC	58-71
48	L	4	83	37	0	6311	CD	65-71
46	L	6	85	39	0	6272	CD	59-71
51	L	5	82	40	0	6260	CD	59-70
50	L	4	87	48	85	5816	D	51-70
C.V., %		8.8	1.6	2.7		5.6		8.7-0.6

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 4. Agronomic performance of 1986 Uniform Rice Nursery, Group IV. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
63	L	5	88	40	0	7177	A	59-71
62	L	5	85	38	0	6890	AB	58-72
66	L	5	85	37	0	6862	AB	55-70
73	L	4	89	47	13	6783	AB	49-69
65	L	5	85	42	0	6410	ABC	59-70
69	L	4	84	36	0	6404	ABC	60-71
71	L	5	92	40	0	6348	BC	57-70
74	L	5	95	39	0	6330	BC	64-70
61	L	5	98	42	0	6237	BCD	45-70
72	L	5	82	40	0	6235	BCD	62-71
RICO 1	M	6	92	48	85	6146	BCD	68-73
68	L	5	90	36	0	5974	CD	61-69
67	L	4	92	49	0	5540	DE	56-68
64	L	4	92	50	0	5536	DE	58-68
STARBONNET	L	4	97	52	0	5124	E	63-68
70	L	4	92	49	0	4921	E	57-68
C.V., %		10.1	1.4	3.4		7.8		4.1-0.9

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 5. Agronomic Performance of 1986 Uniform Rice Nursery, Group V. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
113	L	6	85	39	5	7253	A	60-69
104	L	8	94	41	0	7148	A	61-70
L-202	L	3	82	38	0	6777	AB	54-68
101	L	5	88	37	0	6753	AB	62-71
97	M	3	88	40	5	6702	AB	68-71
NANJING 11	M	3	84	39	70	6594	AB	48-69
95	L	7	90	37	0	6361	ABC	62-71
103	M	3	82	39	15	6294	ABC	64-70
116	L	8	89	38	0	6218	ABCD	60-69
107	L	6	88	45	0	6215	ABCD	59-70
106	M	3	82	43	0	6206	ABCD	64-71
87	L	4	86	46	25	6198	ABCD	56-70
91	L	5	87	38	0	6187	ABCD	63-71
92	L	4	82	38	0	6101	ABCD	64-71
98	L	8	91	45	0	6089	ABCD	63-70
89	L	6	85	38	0	6070	ABCD	62-70
S-201	S	4	87	41	70	5996	ABCD	69-72
93	L	4	76	37	10	5888	ABCDE	58-69
111	L	4	88	40	0	5879	ABCDE	59-70
114	L	5	85	48	0	5863	ABCDE	63-67
81	L	3	82	50	35	5739	ABCDE	61-67
105	L	4	85	44	0	5715	ABCDE	60-68
94	L	3	82	34	0	5581	ABCDE	64-71
100	L	4	81	38	5	5479	ABCDE	60-71
96	L	4	86	51	55	5420	ABCDE	64-71
110	L	7	78	36	0	5403	ABCDE	59-70
86	L	4	79	47	5	5257	ABCDE	61-71
84	L	3	86	51	10	5251	ABCDE	59-69
108	L	3	88	44	90	5160	ABCDE	59-69
88	L	5	86	40	0	5094	ABCDE	58-70
90	L	4	84	51	50	5035	ABCDE	62-69
85	L	6	84	39	0	4891	BCDE	60-70
115	L	5	85	35	0	4635	BCDE	60-71
109	M	4	82	40	0	4616	BCDE	61-70
102	L	4	88	47	90	4241	CDEF	58-70
112	L	6	84	35	0	4191	CDEF	55-72
82	M	3	82	45	30	4002	DEF	62-70
99	L	4	83	38	40	3731	EFG	61-68
83	L	4	84	34	0	2309	FG	60-68
M-201	M	4	73	33	0	1846	G	47-68
C.V.		15.7	1.5	4.3		16.3		3.3-1.3

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 6. Agronomic Performance of 1986 Uniform Rice Nursery, Group VI. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
130	L	4	92	48	40	7419	A	63-69
124	L	4	88	47	45	7067	AB	58-69
122	L	4	93	44	0	7056	AB	44-72
154	L	4	92	46	15	6754	AB	59-69
145	L	3	95	46	25	6657	ABC	57-67
140	L	4	90	38	0	6613	ABC	66-71
144	L	8	90	39	50	6514	ABC	62-69
147	L	5	84	37	0	6439	ABC	65-73
136	L	4	88	40	0	6380	ABC	58-71
128	L	4	88	40	0	6376	ABC	46-71
146	L	5	90	39	0	6314	ABC	62-69
127	L	5	90	48	25	6181	ABC	64-70
134	L	3	93	38	0	6178	ABC	63-72
131	L	4	88	41	0	6139	ABC	63-70
148	L	3	93	48	15	6122	ABC	64-70
BRAZOS	M	4	89	49	90	6071	ABC	67-72
151	L	4	93	50	75	6068	ABC	59-71
129	L	6	91	40	0	6050	ABC	65-71
150	L	7	88	39	0	6025	ABC	64-71
142	L	3	93	45	60	5946	ABC	55-69
133	L	4	89	46	70	5941	ABC	57-71
125	L	5	89	37	0	5887	ABC	49-71
135	L	5	86	37	0	5863	ABC	68-73
132	L	5	88	35	0	5844	ABC	53-71
153	L	6	82	38	0	5804	ABC	49-70
126	L	6	89	36	0	5801	ABC	63-72
156	L	5	80	35	0	5711	ABC	52-70
141	L	5	89	36	0	5676	ABC	67-72
137	L	4	89	41	0	5575	ABC	66-71
152	L	5	89	42	0	5566	ABC	60-69
155	L	8	94	48	10	5538	ABC	61-70
139	L	4	95	50	10	5526	ABC	63-71
143	L	6	91	37	0	5492	ABC	53-69
121	L	4	90	43	55	5456	ABC	61-70
138	L	5	89	38	0	5404	ABC	64-71
149	L	5	88	34	0	5320	ABC	60-70
123	L	5	81	37	0	4986	BC	62-71
NEWREX	L	5	86	49	35	4349	CD	60-70
NATO	M	4	89	57	90	2801	D	69-72
DELLA	L	4	93	56	85	2521	D	58-71
C.V.		10.9	2.1	3.8		16.3		5.1-1.4

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 7. Agronomic Performance of 1986 Uniform Rice Nursery, Group VII. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
186	L	4	83	36	0	7323	A	55-72
GUI CHOW	S	4	92	43	80	7313	A	46-68
161	L	4	90	45	0	7254	AB	56-67
166	L	5	85	37	0	6947	ABC	61-71
174	L	5	91	40	0	6944	ABC	34-70
175	L	5	86	37	0	6766	ABCD	55-69
163	L	6	84	36	0	6753	ABCD	45-69
172	L	5	88	37	0	6674	ABCD	54-71
176	L	5	96	43	0	6656	ABCD	45-69
169	L	5	87	38	0	6532	ABCDE	61-70
180	L	5	94	42	0	6481	ABCDE	47-67
193	L	4	82	41	25	6459	ABCDE	32-67
188	L	5	95	51	0	6444	ABCDE	59-69
183	L	4	87	40	0	6413	ABCDE	46-67
181	L	5	89	38	0	6396	ABCDE	58-70
162	L	5	85	34	0	6356	ABCDE	47-71
196	L	5	82	39	0	6349	ABCDE	51-70
173	L	6	97	41	0	6307	ABCDE	43-69
189	S	5	99	44	15	6270	ABCDEF	53-70
178	L	5	86	37	0	6263	ABCDEF	55-69
177	L	5	83	37	45	6250	ABCDEF	45-70
185	L	5	95	47	0	6206	ABCDEF	62-69
192	S	4	99	45	60	6148	ABCDEF	53-69
170	L	6	93	43	0	6083	BCDEF	54-70
165	L	4	93	44	0	6054	CDEF	41-68
IRGA409	L	3	93	44	55	6037	CDEF	58-65
191	L	5	96	46	0	6017	CDEF	52-69
168	L	5	89	37	0	5995	CDEF	49-70
184	L	6	90	40	0	5883	CDEF	57-71
171	L	4	84	41	0	5826	CDEF	34-71
BONNET 73	L	4	95	53	20	5779	CDEF	54-66
167	L	4	86	51	40	5747	CDEF	52-67
182	L	3	86	47	65	5683	DEF	53-69
179	L	4	90	48	0	5643	DEF	58-68
164	L	3	90	51	35	5570	DEF	54-67
NORTAI	S	5	93	45	55	5336	EFG	67-70
194	L	4	90	47	80	5085	FG	49-69
190	L	4	80	41	65	4319	GH	45-70
187	L	5	80	43	50	4015	H	37-66
197	L	5	89	47	90	3988	H	52-69
C.V.		9.9	1.4	3.6		7.9		5.2-1.2

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

lines 8502203 and 8502201, respectively. Entry 155 is an induced semidwarf mutant of the aromatic variety 'Della'. Entries 189 and 192 are induced short stature mutants of a water weevil tolerant plant introduction which are being released as germplasm.

COMMERCIAL VARIETY TESTS

Description. The breeding program annually conducts yield trials on commercial rice varieties grown in Louisiana. Included in the test are the major commercial varieties and advanced experimentals in the final stages of testing before release from the cooperating public and the private breeding programs. This test supplies comparative information on adaptation and performance of the varieties and experimentals.

Experimental design. The commercial variety test contained 26 entries divided in two maturity groups. The experimental design was a randomized complete block with four replications. The test was grown at three locations, the Rice Research Station (RRS), Crowley, LA; the Northeast Research Station (NRS), St. Joseph, LA; and the Macon Ridge Research Station (MR), Winnsboro, LA. Tests were conducted at NRS and MR by Mr. Ken Vines and Dr. M. Milam. The entries 86AS2058, 86AS2088, AS862862, AS866383, and 85AS3058 are from the Alexandria Seed Company, Alexandria, LA. RAX 2001 is an F_1 hybrid from the Ring-Around Seed Company, Plainview, TX. Entries SI43A7529, SI40A7339, and 'CB801' were from Farms of Texas, Alvin, TX.

Agronomic practices. All entries were drill seeded at 100 lb/A except RAX 2001 which was seeded at 50 lb/A. At the RRS, preplant fertilizer was applied and incorporated at a rate of 60-60-60 lb/A total NPK with 100 lb/A of N as ammonium sulfate applied preflood. Entries were seeded April 1, 1986, flushed to initiate germination, and a permanent flood was applied as soon as seedlings were tall enough for a shallow flood. Propanil, Bolero®, Basagran®, and carbofuran were applied for weed and rice water seevil control. Plots consisted of seven 8-in rows, 16 ft in length. At harvest, plots were trimmed to 12 ft in length and the entire plot harvested with a small plot combine. Harvested samples were dried to approximately 12% moisture in a sack drier. All yields are reported at 12% moisture and are means of four replications.

At NRS, the test was planted April 10, 1986 and 90 lb N/A was applied preflood. Herbicide applications included Ordram® (3 lb/A) preplant incorporated and a propanil (3 qt/A) Bolero® (3 pt/A) tank mix. A second application of propanil (3 qt/A) was applied June 1986. The entire plot (6.25 x 25') was harvested at maturity, yield determined, and reported as means of four replications at 12% moisture. At MR, the test was planted on April 28, 1986. 0-60-60 lb NPK/A was preplant incorporated and 120 lb/A of N was applied preflood. Herbicides included a tank mix of propanil (3 qt/A) and Bolero® (3 pt/A).

Comments. Performance results for the 1986 commercial variety test are summarized in Tables 8 to 13. Some severe animal damage occurred at the RRS in the plots of the first two replications of Group IX, and yield estimates were used based on the other replications. Milling yield favored later maturing entries in Group IX which may reflex to harvest moisture on earlier entries. Bird feeding damage was severe in the very early group at St. Joseph, and the yield differences are not statistically significant. Yield differences in the early group at Macon Ridge were not statistically significant.

Table 8. Agronomic performance of 1986 commercial variety tests, Group VIII. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
RAX2001	L	4	85	41	47	8410	A	40-70
L-202	L	4	89	38	0	6637	B	55-68
TEBONNET	L	5	95	53	0	6557	BC	59-69
86AS2057	L	5	83	43	0	6512	BC	61-69
AS862862	L	5	87	42	0	6221	BC	57-71
86AS2058	L	5	88	49	0	6091	BC	65-70
SI43A7523	L	5	88	40	0	6078	BC	53-70
BOND	L	5	91	46	0	6004	BC	58-68
LABELLE	L	6	92	52	0	5981	BC	62-70
SI43A7529	L	5	88	39	0	5980	BC	51-67
SKYBONNET	L	6	96	49	0	5844	C	59-69
AS866383	M	5	87	44	0	5174	D	58-69
C.V., %		11.6	1.4	2.5		7.2		5.4-1.3

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 9. Agronomic performance of 1986 commercial variety tests, Group IX. Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
RICO 1	M	6	98	43	0	7877	A	65-71
8502213	M	4	94	39	0	7085	B	62-71
L18502203	L	5	93	36	0	7029	B	52-69
MARS	L	3	95	46	8	6884	B	60-70
SI40A7339	M	4	94	37	0	6730	BC	66-72
GULFMONT	L	5	96	39	0	6551	BCD	47-70
CB801	L	7	103	34	0	6492	BCD	56-69
LEMONT	L	5	98	37	15	6444	BCD	47-71
8502201	L	5	97	36	0	6432	BCD	52-70
TORO-2	L	5	96	41	0	6413	BCD	58-72
86AS3058	M	4	88	45	32	6363	BCD	63-69
SATURN	L	3	96	52	88	6150	CD	62-69
NEWBONNET	L	6	98	45	0	6050	CD	54-67
REXMONT	L	6	93	35	0	5926	D	49-67
C.V., %		10.5	1.3	3.4		6.6		4.4-1.2

* L = Long grain, M = Medium grain, S = Short, I = Intermediate.
** Subjective rating = 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 10. Agronomic performance of 1986 Commercial Variety Tests, Group VIII. St. Joseph, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)**
SI43A7529	L	93	35	3	8828
L-202	L	90	32	0	7663
RAX2001	L	89	41	27	7143
TEBONNET	L	95	46	0	6815
AS866383	M	85	38	3	6673
SKYBONNET	L	95	43	0	6227
SI43A7523	L	93	32	3	5915
86AS2057	L	86	37	0	5829
86AS2058	L	93	44	3	5798
BOND	L	89	41	3	5794
LABELLE	L	90	45	3	5700
AS862862	L	90	38	0	5679
C.V., %		2.8	5.2		25.9

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Not statistically significant at the 0.05 level.

Table 11. Agronomic performance of 1986 Commercial Variety Tests, Group IX. St. Joseph, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's Test**
NEWBONNET	L	97	41	0	8561	A
RICO 1	M	96	38	22	8364	AB
TORO-2	L	97	41	0	8311	AB
MARS	M	95	39	0	8228	AB
SI40A7339	M	95	32	0	7853	AB
REXMONT	L	96	31	0	7837	AB
8502201	S	96	31	0	7797	AB
LEMONT	L	100	31	0	7762	AB
8502213	M	95	32	0	7623	AB
GULFMONT	L	97	31	0	7483	AB
8502203	L	97	31	0	7211	AB
86AS3058	M	92	39	0	7208	AB
CB801	L	104	33	0	6911	B
SATURN	M	96	48	67	3666	C
C.V., %		0.8	3.6		11.7	

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 12. Agronomic performance of 1986 Commercial Variety Tests, Group VIII. Macon Ridge, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**
L-202	L	99	32	0	5239	A
AS862862	L	99	34	0	4078	AB
SI43A7523	L	102	34	0	3978	ABC
86AS2057	L	95	34	0	3562	ABC
RAX2001	L	95	35	0	3463	ABC
86AS2058	L	99	40	0	3447	ABC
TEBONNET	L	107	37	0	3208	ABC
AS866383	M	97	34	0	3205	ABC
SKYBONNET	L	105	37	0	3068	ABC
LABELLE	L	103	38	0	3059	ABC
BOND	L	103	36	0	2826	BC
SI43A7529	L	104	32	0	2604	C
C.V.		3.1	7.7		24.8	

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 13. Agronomic performance of 1986 Commercial Variety Tests, Group IX. Macon Ridge, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)**
SI40A7339	M	103	30	0	5615
RICO 1	M	102	32	0	5528
LEMONT	L	104	28	0	5465
MARS	M	101	36	0	5286
8502213	M	101	30	0	5158
REXMONT	L	101	32	0	4967
86AS3058	L	97	33	0	4899
TORO-2	L	101	32	0	4858
8502201	L	101	31	0	4795
NEWBONNET	L	103	36	0	4772
CB801	L	105	31	0	4771
8502203	L	101	30	0	4597
SATURN	M	100	41	0	4507
GULFMONT	L	102	31	0	3868
C.V.		2.3	4.5		14.3

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Not statistically significant at the 0.05 level.

ADVANCED YIELD TESTS

Description. On-farm yield testing of advanced experimental lines from the rice breeding program was initiated in 1984. The goal of this activity is to sample additional environments in yield testing new promising selections from the breeding program. These additional yield evaluations are needed to identify the performance characteristics, strengths, and weaknesses of the test entries. Multi-location and multi-year testing is essential to proivde the information needed to make decisions on releasing new varieties.

Experimental design. The 1986 advanced yield tests were conducted at three locations in Louisiana in cooperation with commercial growers and the RRS rice fertilization and entomology projects. Ten early maturing entries were tested at the RRS, the Errol Lounsberry farm near Lake Arthur, and A.W. Bollich farm near Cheneyville. Experimental design was a randomized complete block with four replications. Plots at Lake Arthur and Cheneyville were 7 x 25 ft and 4.75 x 22 ft at the RRS.

Agronomic practices. Rice was water-seeded (150 lb/A) at Lake Arthur, broadcast dry-seeded (100 lb/A) at Cheneyville, and drill-seeded (100 lb/A) at the RRS, respectively. Fertilization included 120-60-60 lb/A NPK preplant preflood at Lake Arthur, 120 lb/A N preflood at Cheneyville, and 60-60-60 lb/A NPK preplant with 100 lb/A N preflood at the RRS. A second crop was grown at Lake Arthur. Sixty lb/A N was applied to the plots before reflooding. Planting date for Lake Arthur, Cheneyville, and the RRS were March 26, April 7, and May 15, respectively. At Lake Arthur, a tank mix of propanil (3 lb ai/A) and thiobencarb (3 lb ai/A) was applied for weed control April 14, carbofuran (0.6 lb ai/A) May 5 for water weevil control, 2,4-D March 17 for weed control, and benomyl (1 lb ai/A) June 12 for sheath blight control. At the RRS, weed control included propanil (3 lb ai/A) June 3, thiobencarb (3 lb ai/A granular) June 13, and Basagran® July 21. Carbofuran (0.6 lb ai/A) was applied July 16. At Cheneyville, herbicide control included propanil (4 lb ai/A) plus 1 pt Bivert® May 5 and propanil (4 lb ai/A) plus acifluorfen (1 pt/A) June 13, 1986.

Comments. Tables 14 through 17 show the mean values for the agronomic characters measured. The test at the RRS was severely infected with rice blast and was responsible for the low yields on those entries (Table 14). Cool weather during stand establishment, herbicide damage, and weed problems reduced the yields at Lake Arthur. Stand establishment, herbicide damage, and growth problems contributed to the disappointing yield at Cheneyville. Some selective pest damage also occurred in Mars and entry 202 (Mercury). Plans are being made to water seed the 1987 advance yield test at Cheneyville.

PRELIMINARY YIELD TESTS

Description. The preliminary yield tests provide the first stage of replicated testing of promising experimental lines in field plots. Many of those lines are discarded before harvest or after laboratory evaluation. The more promising entries will be reselected and advanced for further testing.

Experimental design. The preliminary yield test used a randomized complete block design with two replications. The 219 entries were grouped into five groups by maturity and grain type. Each plot consisted of seven 8-in rows 16 ft in length. At harvest, the plots were trimmed to 12 ft, and all seven

Table 14. Agronomic performance of 1986 Advanced Yield Tests, Group XVIII. Rice Research Station, Crowley, LA.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***	Milling % (whl-tot)
MARS	M	4	78	44	0	6511	A	65-69
LEMONT	L	5	82	36	0	5844	AB	55-69
204	L	5	80	36	0	5577	B	56-68
206	L	4	80	37	0	5566	B	53-67
201	L	5	81	34	0	5464	BC	52-67
203	L	5	79	33	0	5376	BC	51-67
202	M	4	77	36	0	5357	BC	61-70
205	L	5	78	36	0	4980	C	48-64
NEWBONNET	L	6	81	43	0	3921	D	39-60
C.V.		7.2	19.0	2.9		6.6		5.2-1.8

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Subjective rating 1 to 9, where 1 = excellent, 9 = poor
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 15. Agronomic performance of 1986 Advanced Yield Tests, Group XVII. Lake Arthur, LA. - First crop.

1986 Entry	Grain type*	Seedling vigor**	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's Test***	Milling % (whl-tot)
202	M	3	88	38	0	6585	A	70-73
206	L	4	89	36	0	6557	A	62-70
203	L	5	88	34	0	6337	A	64-71
201	L	6	91	35	0	6296	AB	63-71
LEMONT	L	5	91	35	0	6132	ABC	66-73
204	L	5	90	36	0	6079	ABC	63-71
NEWBONNET	L	7	94	45	0	5876	ABC	58-67
205	L	5	88	35	0	5528	BC	62-70
MARS	M	4	92	46	0	5466	C	68-71
207	L	5	93	44	0	4300	D	55-68
C.V.		12.5	0.9	3.3		8.1		3.6-1.7

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Subjective rating 1 to 9, where 1 = excellent, 9 = poor
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 16. Agronomic performance of 1986 Advanced Yield Tests, Group XVII. Lake Arthur, LA. - Second crop.

1986 Entry	Grain type*	Yield (lb/A @ 12%)	Duncan's test**	Milling (whl-tot)
201	L	2639	A	50-66
LEMONT	L	2592	A	51-65
203	L	2552	A	53-67
206	L	2508	A	55-67
205	L	2458	A	54-66
204	L	2440	A	56-68
MARS	M	2374	A	63-70
202	M	2348	A	60-70
NEWBONNET	L	1789	B	55-65
207	L	1434	B	48-63
C.V., %		13.7		6.1-2.4

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 17. Agronomic performance of 1986 Advanced Yield Tests, Group XVII. Cheneyville, LA.

1986 Entry	Grain type*	Seedling vigor	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test***
206	L	4	30	0	5280	A
205	L	5	31	0	5144	AB
203	L	5	29	0	4954	ABC
LEMONT	L	5	29	0	4923	ABC
NEWBONNET	L	7	35	0	4764	BCD
204	L	5	30	0	4605	BCDE
201	L	5	28	0	4537	CDE
207	L	6	31	0	4289	DEF
MARS	M	3	33	0	4141	EF
202	M	4	30	0	4041	F
C.V.		10.5	4.3		6.7	

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Subjective rating 1 to 9, where 1 = excellent, 9 = poor.
*** Numbers followed by the same letter are not significantly different at the 0.05 level.

rows were harvested with a small plot combine. Samples were dried to approoimately 12% moisture and yields determined and reported at a 12% moisture basis. Milling samples were obtained from the seed harvested for yield.

Agronomic practices. Entries were drill-seeded at 100 lb/A April 16, 1986. Preplant fertilizer was applied and incorporated at a rate of 60-60-60 lb/A total NPK and 100 lb N/A applied preflood. The entries were flushed to initiate germination and a permanent flood was applied as soon as seedlings were tall enough for a shallow flood. Propanil, Basagran®, and carbofuran were applied at recommended rates for weed and insect control, respectively.

Comments. Performance of the 1986 preliminary yield entries are summarized in Tables 18 through 22. Many of the entries out-performed the check varieties. A severe infestation of sheath rot occurred in Group XV and significantly reduced plot and milling yields. Many of these selections are being placed in the Advanced Yield and Cooperative Uniform Regional Rice Nursery tests in 1987. This was in part made possible by a new small plot combine which can maintain seed purity between plots. All these lines still show considerable segregation. The best are being advanced, reselected, and purified.

Table 18. Agronomic Performance of 1986 Preliminary Yield Tests, Group XI, Rice Research Station, Crowley, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
538	L	79	36	0	7739	A	40-72
519	L	83	39	0	7673	AB	63-71
520	L	83	38	0	7630	ABC	49-65
507	L	82	36	0	7580	ABC	62-72
515	L	83	38	0	7515	ABCD	61-70
531	L	87	39	0	7496	ABCDE	26-71
506	L	82	34	0	7494	ABCDE	57-70
TEBONNET	L	80	53	0	7438	ABCDEF	55-72
521	L	83	44	0	7431	ABCDEF	51-71
542	L	90	35	0	7412	ABCDEF	55-66
526	L	85	36	0	7402	ABCDEF	60-72
504	L	82	38	0	7388	ABCDEFG	55-69
530	L	82	41	0	7387	ABCDEFG	45-69
533	L	86	35	0	7382	ABCDEFG	48-72
522	L	85	39	0	7376	ABCDEFG	56-71
501	L	81	36	0	7366	ABCDEFG	52-70
518	L	85	39	0	7294	ABCDEFGH	63-71
514	L	80	38	0	7237	ABCDEFGH	58-71
554	L	81	36	0	7216	ABCDEFGH	37-69
550	L	78	41	0	7175	A-I	51-68
L-202	L	77	38	0	7174	A-I	51-68
516	L	84	36	0	7120	A-J	60-71
503	L	84	36	0	7100	A-J	49-72
541	L	85	45	0	7085	A-J	47-70
508	L	82	35	0	6981	A-K	56-70
510	L	85	37	0	6957	A-K	52-71
552	L	88	35	0	6952	A-K	50-71
537	L	78	39	0	6947	A-K	49-70
529	L	84	41	0	6931	A-K	41-68
547	L	76	43	0	6914	A-K	42-68
502	L	78	42	0	6913	A-K	54-70
517	L	81	39	0	6880	A-K	55-72
523	L	83	37	0	6879	A-K	53-70
540	L	84	44	0	6858	A-K	51-73
535	L	85	33	0	6854	A-K	47-71
544	L	79	42	0	6792	A-L	46-67
527	L	81	40	0	6763	B-M	45-72
525	L	83	36	0	6721	B-M	60-70
528	L	84	40	0	6711	C-M	38-70
534	L	85	35	0	6681	C-M	46-71
509	L	85	37	0	6621	D-M	38-70
543	L	81	37	0	6601	D-M	57-69
551	L	77	37	0	6596	D-M	41-73
553	L	78	34	0	6589	D-M	32-69

Continued.

Table 18. Continued.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
532	L	88	29	0	6576	D-M	57-72
513	L	80	39	0	6563	D-M	61-70
512	L	85	35	0	6538	E-M	54-69
549	L	82	38	0	6524	E-M	45-71
524	L	84	40	0	6509	E-M	58-70
548	L	77	40	0	6502	F-M	45-70
504	L	81	31	0	6434	G-M	65-72
511	L	85	35	0	6384	G-M	48-71
555	L	76	42	0	6360	H-M	47-69
536	L	84	44	0	6219	I-M	39-73
LABELLE	L	77	53	0	6168	J-M	60-71
539	L	84	40	0	6054	K-M	50-70
545	L	81	31	0	5885	L-M	38-69
546	L	80	46	0	5829	M	50-68
C.V.		1.1	5.4		5.5		7.1-1.6

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 19. Agronomic performance of 1986 Preliminary Yield Tests, Group XII, Rice Research Station, Crowley, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
591	L	84	38	0	7853	A	54-71
571	L	84	33	0	7725	AB	58-73
562	L	86	37	0	7469	ABC	63-70
579	L	85	36	0	7410	ABC	61-69
578	L	84	36	0	7406	ABC	61-70
583	L	88	37	0	7372	ABC	57-69
GULFMONT	L	85	37	0	7296	ABCD	57-72
590	L	86	38	0	7291	ABCD	57-70
577	L	85	36	0	7221	ABCD	57-71
588	L	85	37	0	7215	ABCD	58-72
574	L	83	37	0	7207	ABCD	63-72
575	L	85	39	0	7199	ABCD	57-72
580	L	87	36	0	7175	ABCD	56-73
564	L	88	36	0	7162	ABCD	55-69
576	L	83	36	0	7149	ABCD	62-72
570	L	85	39	0	7097	ABCD	66-72
589	L	84	37	0	7026	ABCD	54-71
LEMONT	L	89	37	0	7002	ABCD	57-72
NEWBONNET	L	91	46	0	6962	ABCD	58-69
561	L	85	40	0	6924	ABCD	47-67
584	L	88	46	0	6899	ABCD	52-69
572	L	84	34	0	6883	ABCD	56-71
582	L	88	41	0	6773	ABCDE	60-68
569	L	86	36	0	6739	ABCDE	60-72
567	L	82	38	0	6734	ABCDE	59-71
573	L	84	33	0	6718	ABCDE	63-71
565	L	89	35	0	6559	BCDE	58-71
566	L	89	35	0	6457	BCDE	59-71
563	L	86	34	0	6392	CDE	50-72
587	L	88	44	0	6317	CDEF	56-68
585	L	85	37	0	6315	CDEF	55-71
586	L	91	38	0	6027	DEF	55-70
581	L	85	43	0	5581	EF	41-72
592	L	89	53	0	5168	F	53-67
C.V.		1.1	3.1		7.6		2.4-0.7

* L = Long grain, M = medium grain, S = Short, and I = intermediate.

** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 20. Agronomic performance of 1986 Preliminary Yield Tests, Group XIII,Rice Research Station, Crowley, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
668	L	84	39	0	8398	A	48-71
606	L	85	38	0	8225	AB	61-70
644	L	89	38	0	8177	ABC	38-65
643	L	91	40	0	8077	ABCD	46-68
667	L	82	39	0	7920	ABCDE	31-72
642	L	85	40	5	7866	ABCDEF	38-70
670	L	86	39	0	7778	ABCDEFG	60-72
673	L	85	44	0	7758	ABCDEFGH	28-71
614	L	83	37	0	7740	A-I	45-72
613	L	85	35	0	7737	A-I	55-73
619	L	82	40	0	7695	A-J	55-72
669	L	86	37	0	7642	A-K	55-71
661	L	86	42	0	7575	A-L	49-71
607	L	84	36	0	7558	A-M	58-70
628	L	85	39	0	7519	A-M	59-72
612	L	85	35	0	7514	A-M	44-72
626	L	86	37	0	7472	A-M	53-70
620	L	85	38	0	7440	B-M	37-73
638	L	85	46	0	7418	B-M	36-71
633	L	85	38	0	7389	B-N	44-72
631	L	84	39	0	7362	B-N	43-72
635	L	84	41	0	7355	B-N	35-72
603	L	86	38	0	7295	B-N	34-71
616	L	84	39	0	7294	B-N	47-71
664	L	88	40	0	7287	B-N	56-71
608	L	85	37	0	7281	B-0	58-72
637	L	84	35	0	7250	C-0	54-73
659	L	84	38	0	7245	C-0	37-71
604	L	84	37	0	7241	C-O	55-68
618	L	88	38	0	7226	C-0	55-72
LEMONT	L	88	37	0	7164	D-P	43-72
GULFMONT	L	86	39	0	7163	D-P	43-72
676	L	88	37	0	7146	D-Q	31-72
623	L	88	36	0	7103	D-R	51-73
639	L	85	37	0	7089	D-R	59-71
624	L	86	37	0	7082	D-R	43-71
666	L	88	37	0	7071	D-R	38-72
651	L	83	37	0	7055	D-R	31-72
665	L	85	38	0	7031	D-R	29-70
652	L	85	38	0	7030	D-R	33-72
602	L	85	34	0	7022	D-R	35-71
657	L	84	37	0	6969	D-S	35-71
653	L	83	37	0	6948	E-S	30-72
622	L	88	38	0	6934	E-S	56-71

Continued.

Table 20. Continued.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
658	L	85	36	0	6927	E-S	39-71
671	L	89	44	0	6923	E-S	33-69
610	L	84	37	0	6899	E-S	42-72
647	L	83	39	0	6895	E-S	47-69
660	L	83	39	0	6892	E-S	38-55
625	L	86	38	0	6884	F-S	55-71
674	L	87	37	0	6878	F-S	45-71
650	L	85	35	0	6867	F-S	37-70
601	L	85	34	0	6855	F-S	36-68
663	L	84	43	0	6803	F-T	27-71
662	L	82	39	0	6798	G-T	25-73
621	L	86	36	0	6776	G-T	47-72
627	L	85	36	0	6768	H-T	38-71
655	L	83	37	0	6766	H-T	25-72
672	L	86	38	0	6762	H-T	40-69
675	L	84	38	0	6756	I-T	33-71
611	L	83	38	0	6749	I-T	41-72
656	L	85	36	0	6734	I-T	29-71
641	L	84	41	0	6731	J-T	38-67
630	L	83	39	0	6707	K-T	34-71
615	L	88	37	0	6693	K-T	40-71
646	L	85	37	0	6679	K-T	52-68
617	L	86	36	0	6626	K-T	33-71
634	L	83	36	0	6617	L-T	35-73
605	L	84	35	0	6590	M-T	54-69
632	L	82	37	0	6422	N-T	21-72
654	L	84	37	0	6303	O-T	31-70
649	L	84	38	0	6208	P-T	27-72
629	L	85	39	0	6169	Q-T	50-70
648	L	85	41	0	6146	Q-T	44-69
640	L	87	39	0	6134	Q-T	54-71
645	L	84	35	0	6130	R-T	36-72
609	L	86	39	0	6040	S-T	40-72
NEWBONNET	L	91	46	0	5883	T	50-64
C.V.		0.9	2.4		5.5		6.9-3.7

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 21. Agronomic performance of 1986 Preliminary Yield Tests, Group XIV, Rice Research Station, Crowley, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
GUI CHOW	M	92	44	35	9293	A	46-71
703	M	92	41	0	8611	AB	64-69
715	M	85	38	0	8444	ABC	46-68
712	L	87	39	0	8364	ABC	57-68
716	L	92	42	0	8232	ABC	66-70
708	L	85	36	0	8214	ABC	51-67
707	L	85	40	0	8000	BCD	53-67
711	L	81	35	0	7993	BCD	27-66
709	L	88	44	0	7970	BCD	56-69
706	L	85	40	30	7876	BCDE	46-69
714	L	88	44	0	7731	BCDEF	61-71
704	L	77	40	35	7650	BCDEFG	54-71
713	M	84	42	0	7648	BCDEFG	53-71
705	L	83	40	70	7343	CDEFGH	57-72
724	L	89	37	0	7042	DEFGH	44-72
723	L	89	36	0	7042	DEFGH	52-73
LEMONT	L	89	38	0	6963	DEFGH	53-73
719	L	92	35	0	6913	DEFGH	59-71
710	L	85	42	55	6770	EFGHI	47-69
718	L	88	35	0	6644	FGHI	53-72
717	L	83	40	0	6595	FGHIJ	35-74
721	L	90	46	0	6523	FGHIJ	50-70
701	L	90	35	0	6495	GHIJ	58-71
720	L	89	46	0	6460	HIJ	49-71
722	L	92	40	0	6412	HIJ	49-71
702	L	89	38	0	6200	HIJ	54-70
NEWBONNET	L	91	47	0	5727	IJ	56-68
DELLA	L	92	56	20	5461	J	49-70
C.V.		0.7	2.9		6.7		7.5-1.0

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

Table 22. Agronomic performance of 1986 Preliminary Yield Tests, Group XV, Rice Research Station, Crowley, LA.

1986 Entry	Grain type*	Days to 50% heading	Plant hgt (in)	Lodging (%)	Yield (lb/A @ 12%)	Duncan's test**	Milling % (whl-tot)
811	M	79	38	0	5657	A	57-70
812	M	78	41	0	5543	AB	54-72
814	M	80	38	0	5260	ABC	42-69
817	M	88	40	0	5024	ABC	39-70
813	M	78	33	0	4736	ABC	54-70
801	M	88	40	0	4710	ABC	41-68
802	M	89	41	0	4385	ABCD	40-68
808	M	88	41	0	4373	ABCD	40-68
815	M	83	40	0	4210	ABCD	47-70
MARS	M	88	48	0	4071	BCD	40-67
809	M	90	44	0	3922	CDE	34-67
816	M	80	41	0	3879	CDE	42-69
807	M	89	41	0	3767	CDEF	41-68
803	M	90	39	0	3149	DEFG	31-66
804	M	92	39	0	2500	EFG	27-65
RICO 1	M	93	40	0	2403	EFG	58-70
806	M	92	37	0	2348	FG	24-63
805	M	92	37	0	2039	G	26-62
810	M	103	37	0	0		-----
C.V.		0.9	3.4		16.7		11.3-2.5

* L = Long grain, M = medium grain, S = Short, and I = intermediate.
** Numbers followed by the same letter are not significantly different at the 0.05 level.

MULTIPLE GENERATION RICE BREEDING NURSERY[1/2/]

(A Progress Report)

K.S. McKenzie, F. Jodari, R.K. Collins, R.J. Guidry,
L.M. White, and C.T. Ramirez[3/]

INTRODUCTION

Continuing efforts to increase rice production and quality through plant breeding is essential for the maintenance of a prosperous Louisiana rice industry. Genetic potential to elevate yields of adapted Louisiana rice cultivars exists and is being utilized by the current LSU rice breeding program. Sources of resistance to environmental stresses as well as to disease and insect pests are being identified and are available for use in rice breeding programs. Development of high yielding rice cultivars that efficiently utilize plant nutrients, are resistant to pests and lodging, and having good milling and cooking qualities will greatly improve the profitability of rice production in Louisiana.

A major limitation to the speed at which desirable genetic characters can be transferred into adapted lines in inbred crops such as rice, is the number of generations that can be produced per year. For many complex and economically important characters it may require four or more generations before breeding lines have reached a sufficient level of homozygosity to allow even a preliminary evaluation. Production of only one generation of breeding material per year after the initial hybridization makes varietal development a very slow process. The production of two or more generations of breeding material per year decreases the time required to advance breeding lines to the point where they can be evaluated for complex characteristics such as yield, milling quality, and other important varietal characteristics.

A winter nursery is an essential and integral feature of a modern rice breeding program. The nursery allows the production of additional generations of breeding material per year thus hastening the time required to develop new varieties. The winter nursery also permits an opportunity to practice disruptive selection in another environment and the growing of elite selections

1/ Cooperative investigations, Louisiana Agricultural Experiment Station, Crowley, LA; University of Puerto Rico Agricultural Experiment Station, Lajas, PR; Texas Agricultural Experiment Station, Beaumont, TX; and Arkansas Agricultural Experiment Station, Stuttgart, AR.

2/ This research is supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

3/ Associate Professor, Instructor, Research Associate, Lab Tech. Asst.-Agribu., and Research Associate, Rice Research Station, La. Agri. Exp.. Stn., L.S.U. Agricultural Center, Crowley, LA; and Associate Researcher, University of Puerto Rico, Lajas, PR.

of germplasm not adapted to the Louisiana environment. The primary purpose and advantages of planting this off-season nursery have been discussed previously (see 1974 La. State Univ. Rice Exp. Rt. 66:32).

The Agricultural Experiment Stations of Arkansas, Louisiana, Puerto Rico, and Texas have renewed the cooperative agreement to operate a year-round rice nursery on the Puerto Rico Experiment Station located at Lajas for the purpose of advancing and seed increase of breeding lines. This cooperative venture has made possible the expansion of nursery facilities, equipment, and labor and is allowing these rice breeding programs to grow more breeding lines to expedite the development and release of improved rice varieties for the southern United States. Efforts are being made to improve efficiency and address the difficulties that have been experienced in the nursery.

1986-87 ACTIVITIES

A September 1985 planting was scheduled, however, heavy rainfall and flooding occurred at Lajas just prior to planting. Planting was delayed until December 1985 when F. Jodari traveled to Lajas to try to expedite a December planting. A heavy growth of weeds had infested the nursery site. The weeds were mowed and several diskings were used to prepare a seedbed. K.A. Moldenhauer and J.E. Scott, cooperators from Arkansas and Texas, were then able to plant the nursery (9,000 rows) December 18, 1985. The rice had emerged by January 1986. Harvest was completed in May 1986. Some problems in water depth control were encountered and the 1986 nursery site was leveled during the summer months. Approximately 500 rows of the semidwarf medium-grain experimental 2213 were harvested by L. White and a 5-acre increase planted in June at the Rice Research Station. An additional 2,100 panicle selections from the Louisiana nursery at Lajas were planted in June at Crowley for further advancement and selection.

A second planting of 6,000 rows was completed by Louisiana and Texas September 25, 1986. The Louisiana nursery includes a seed increase of experimental semidwarf aromatic line, breeding lines, sheath blight resistant lines provided by the Rice Research Station genetics and pathology projects, and somaclonal lines from the Rice Research Station tissue culture project. This material should be ready for harvest in January 1987. Plans are being made to make a planting in January 1987. Selected material harvested from the September 1986 nursery will be replanted in the January 1987 nursery which in turn should be ready for harvest in May of 1987 could be returned to Louisiana and Texas for advancement during the summer of 1987.

THE EFFECT OF CALLUS CULTURE ON GENE EXCHANGE IN INTERSPECIFIC CROSSES OF *ORYZA*

E.M. Nowick

INTRODUCTION

Transfer of desirable traits, such as stem rot resistance, from wild species of *Oryza* into cultivated rice is often prevented by the failure of embryos to mature after pollination. Culture of immature embryos and regeneration can be used to produce interspecific hybrid plants under these circumstances.

Chromosome changes often accompany the process of tissue culture. Although chromosome aberrations are generally an undesirable side effect of the culturing process, translocations and aneuploidy occurring in culture may provide a means of accomplishing genetic exchange between species in which abnormalities in meiosis prevents normal recombination. Results are presented here on the regeneration of three interspecific crosses in *Oryza*.

MATERIALS AND METHODS

Six crosses have been tested using one *O. sativa* marker line and three related species. The species used were *O. alta* (CCDD), *O. officinalis* (CC), and *O. glumaepatula* ($A^{cu}A^{cu}$). Plants were crossed and F_1 embryos placed in culture 7 to 10 days post-pollination. Plants were regenerated at from one month to three months in culture. Pollen mother cells are being collected at meiosis in the regenerants and stained with pinacyanol chloride. The number of chromosomes, number of bivalents or higher chromosome associations, and the presence of translocations or any other chromosome irregularities are noted. The relation between chromosomal rearrangement, aneuploidy, and morphological variation and time in culture is being determined.

The effect of culture on somatic crossing-over is being studied using genetic markers carried in the *O. sativa* line. The *O. sativa* parent used carries recessive markers for two of the twelve linkage groups of rice. The line carries the 'c' and 'bls' markers on group I and 'an' and 'gl' of group XII. Crossovers between the centromere and the marker genes can be recognized by the recessive phenotype in the regenerants.

After 30 days on callusing media, the tissue was divided, one-half was placed on regeneration media with IAA and kinetin only, the other half to be maintained on MS media and 2,4D. After 30 days on regeneration media, plantlets were transferred to distilled water for 7 to 10 days and then transplanted into soil in the greenhouse. Some very small plantlets were transferred to MS media with no hormones for an extra 30 days to allow time for growth.

RESULTS AND DISCUSSION

Callus formation. Seed was set on reciprocal crosses of the genetic marker stock to *Oryza glumaepatula*. Seed set, however, has only occurred in the *O. alta* and *O. officinalis* crosses when the marker line was used as the maternal parent. Reciprocal crosses continue to be made. Embryos were placed on MS media with 2,4D at 7 to 13 days after pollination. Best callus formation occurred when embryos were between 8 and 10 days of age. Callusing rate for the c bls wx an gl x *O. glumaepatula* cross was 35%; the rate for the reciprocal cross was around 73%. However, age of embryos was a compounding factor. The callusing rate for the marker stock x *O. alta* crosses was 43%, while the rate for the *O. officinalis* cross was around 50% although the sample size was small.

Seventeen plants have been regenerated from the marker x *O. glumaepatula* crosses. This would indicate around a 25% regeneration rate. Regeneration rates fell off very quickly in these crosses and no plants were regenerated after 90 days (Table 1).

All regenerants from the *O. glumaepatula* crosses have flowered to date. Morphological traits among these lines are characteristic for conventionally produced F_1 plants. Meiotic anthers have been collected and chromosome stains are now being made.

Callus from *O. alta* and *O. officinalis* crosses have been maintained for 90 days with no apparent loss of the ability to regenerate. Plantlets continue to form on regeneration media. However, the plantlets are lacking in vigor and survival rate in transplanting to soil is low.

Meiotic chromosomes have been stained in the *O. glumaepatula* and *O. officinalis* crosses. No aneuploidy has been noted, but a number of meiotic abnormalities have been observed.

Table 1. Results of embryo culture and regeneration for several interspecific crosses of *Oryza*. Rice Research Station, Crowley, LA. 1986.

Cross	Embryo cultured	No. forming callus	No regenerated 30 days	60 days	90 days	No surviving
c bls wx an gl/ *O. glumaepatula*	22	8	15	0	0	9
O. glumaepatula/ c bls wx an gl	11	8	4	13	0	12
c bls wx an gl/ *O. alta*	7	3	2	6	--	2
c bls wx an gl/ *O. officinalis*	2	1	6	12	--	4

SELECTION OF SHEATH BLIGHT RESISTANCE IN BACKCROSS PROGENY FROM TETEP X LEMONT CROSSES

E.M. Nowick and D.E. Groth

INTRODUCTION

Sheath blight caused by Rhizoctonia solani Kuhn is the most serious disease affecting rice in Louisiana. In 1985, the results of selection for sheath blight resistance in backcrosses of the susceptible variety 'Lemont' to the resistant germplasm line 'Tetep' based on infection cushion number and lesion type were reported (Nowick, 1985). In 1986, progeny tests of lines derived from the BC1 to BC3 generations were conducted in replicated field trials.

MATERIALS AND METHODS

Inoculum. A virulent isolate of R. solani (LR172), which was isolated from a naturally infected rice cultivar (cv. 'Lebonnet') in Louisiana, was used. The fungal inoculum was produced on a moist autoclaved rice seed/rice hull mixture (2:1, v/v). The fungus was incubated for 12-14 days at 30 C and the grain-hull inoculum was broken apart by hand into small (1-4 mm) particles.

Field evaluations. Individual plants in 156 progeny lines from the BC1-3 generations were transplanted into the field at the 5-leaf growth stage. Ten plants per replicate per line were planted into each of two replicates. Fertilizer was preplant incorporated at the level of 93 kg/ha. The plants were spaced 25 cm apart with 25 cm between rows. Each plant was inoculated 33 days after transplanting.

Disease rating (DR) of plants in the field were scored on a 0-9 scale (Groth and Rush, 1985), where 0 indicated no infection and 9 indicated that the whole plant was dead, 30 to 35 days after heading. Vertical disease progression was measured at the same time as disease rating. This distance was divided by the plant height to give a disease index (DI) between 0 and 1.

RESULTS AND DISCUSSION

There was a high correlation between DR and DI on a line mean basis (r=.79), and both criteria gave similar results in statistical tests. The parents were statistically different in both DR and DI while the means of the three generations were intermediate between the two parents (Table 1). Although the mean disease rating dropped at each generation, no significant differences were seen from the BC1 to the BC3. Significant differences were seen among the progeny lines at each generation. Although the progeny line means were generally intermediate between the two parents, a number of plants as susceptible as Lemont or as resistant as Tetep was seen.

Table 1. Means and range of progeny lines in disease index (DI) and disease ratings (DR) from backcrosses of Lemont/Tetep scored for resistance to sheath blight. Rice Research Station, Crowley, LA. 1986.

		DI†		DR‡	
	N	x	Line range	x	Line range
Lemont	1	.88 A		6.67 A	
Lemont*4/Tetep	33	.62 B	.84-.42	4.53 B	6.00-2.80
Lemont*3/Tetep	51	.58 B	.87-.39	4.11 B	6.30-2.77
Lemont*2/Tetep	60	.51 B	.72-.38	3.62 B	4.94-2.55
Tetep	1	.26 C§		2.15 C§	

† DI = vertical disease progression/plant height.
‡ DR = disease reaction of plants rated visually on a 0-9 scale.
§ Means with different letters are statistically different in a Duncan's multiple range test.

Correlation between appressoria number and lesion type in the BCF_1 parent plants tested in the greenhouse and their field tested progeny lines was low (Table 2). However, selection was apparently effective enough to maintain resistance levels through the three backcross generations. A number of individual plants was selected as having relatively high resistance levels and a semidwarf plant type. These selections are under increase and will be further evaluated.

Table 2. Summary of stepwise regression procedure for effects of lesion type and infection cushion number in BC(1-3)F1 parent plants on disease rating (DR) in selfed progeny lines from a cross of Lemont/Tetep rated for sheath blight resistance. Rice Research Station, Crowley, LA. 1986.

	Variable	Model r^2	F
BC1	rep	.07	8.35**
	infection cushion number	.13	7.11**
	lesion type	.15	1.39 NS
BC2	rep	.00	.18 NS
	infection cushion number	.01	.64 NS
	lesion type	.02	1.19 NS
BC3	lesion type	.09	4.50*
	rep	.16	4.41*
	infection cushion number	.24	4.63*

* Significant at the 5% level.
** Significant at the 1% level.

LITERATURE CITED

Nowick, E.M. and D.E. Groth. 1985. Selection of sheath blight resistant backcross progeny based on infection structure number. Ann. Prog. Rpt., Rice Res. Stn., La. Agri. Exp. Stn., L.S.U. Agricultural Center, 77:56-57.

Groth, D.E. and M.C. Rush. 1985. Rice disease assesment keys. Ann. Prog. Rpt., 77:250-257

INHERITANCE OF MODERATE RESISTANCE TO RICE WATER WEEVIL
(Lissorhoptrus oryzophilus Kuschel)

E.M. Nowick and J.F. Robinson

INTRODUCTION

The rice water weevil (RWW) is the most serious insect pest of rice in the United States and causes significant yield losses each year in Louisiana. Several sources of moderate resistance have been identified in screening of the world rice collection and sources of tolerance are also available. In previous years, the results of heritability studies of crosses among these lines have been reported. In 1986, F_2 derived lines in the F_4, selected for low water weevil counts in the F_2 and F_3 were tested in replicated field trials.

MATERIALS AND METHODS

Lines which fell into the lowest 25% for larval counts in both the F_2 and F_3 generations were tested in the F_4, along with the parental lines. The selected lines were planted in 2 m rows with .3 m spacing and 5 g of seed per row. Each line was replicated four times. Core samples were collected at six weeks after planting and larval counts determined. The root core samples were washed in a 40-mesh copper seive, the residue floated in a saturated salt solution and the number of larvae floating to the surface of the water counted. The selected line means, the means of the selections from individual crosses, and the parental line means were analyzed using a PC-SAS general linear model analysis of variance.

RESULTS AND DISCUSSION

The means of the selected lines in the F_4 from each of the Mars x resistant crosses were statistically better than the Mars parent (Table 1). Several lines were identified with resistance levels as good as the moderately resistant parent. Of lines selected from the resistant x resistant crosses, however, none had higher levels of resistance than the parental lines. The best selections from these lines are not significantly different from the best parent lines, even in those crosses with relatively high heritabilites.

Although estimates of heritability for RWW resistance in the Mars x resistant crosses were found to be only moderate, results from this study suggest that it would be feasible to incorporate some level of resistance into the Mars cultivar. It is recommended that farmers treat their rice crop for RWW control when the average number of larvae in root samples is five or more (Smith et al., 1986). Even with moderate levels of resistance, it may be possible for the crop to withstand higher adult weevil population pressure before the larval counts reach this point. However, this will depend on the mechanism of resistance and further study is needed in this area.

The observation that none of the resistant lines combined to provide higher levels of protection than the parental sources is interpreted to indicate that resistance in these lines is controlled by the same gene or genes or by duplicate genes controlling similar mechanisms.

Table 1. Mean larval counts and ranges of F_4 lines selected in F_2 and F_3 generation from resistant x resistant and resistant x susceptible crosses, each selected line and parent line tested in four replicates. Rice Research Station, Crowley, LA. 1986.

	F_2/F_3	F_4	
Cross	Number selected	Range of selected lines	x of selected lines
PI210387/321294	5	2.67-9.50	5.98
PI210387/321294	3	6.25-10.50	7.92
PI210387/321308	2	9.00-15.25	12.13
PI210387/321278	2	5.5	5.50
PI321294/321308	7	2.00-10.25	7.14
PI321294/321278	9	4.50-9.25	6.67
PI321264/321308	2	11.00-14.75	12.88
PI321264/321278	3	9.75-14.75	11.92
PI321308/321278	3	5.00-28.75	17.00
PI210387/Mars	6	3.50-10.25	7.83
PI321264/Mars	7	4.75-17.25	10.86
PI321308/Mars	3	9.50-12.50	10.83

Means of parental lines tested with F_4 lines: PI210387 = 6.25, PI321294 = 1.75, PI321264 = 8.00, PI321278 = .5, PI321308 = 3.75, Mars = 17.25.

RICE TISSUE CULTURE RESEARCH

TISSUE CULTURE PRODUCTION OF COMMERCIAL RICE VARIETIES RESISTANT TO HERBICIDES EFFECTIVE ON RED RICE[1/]

(A Progress Report)

T.P. Croughan, M.M. Pizzolatto, and D.B. Trumps

Activities in this project included a screening of R_2 seed from rice tissue culture lines for resistance to the preemergence grass herbicide Dual (metolachlor). Seed harvested from a total of 453 regenerated rice plants and checks was planted in the greenhouse to provide 5 R_1 transplants for each line for field planting. Transplants were spaced 30 cm apart in rows 1 m apart. At maturity, seed was harvested and threshed for use in screening for herbicide resistance.

Twenty seeds of each line were placed in a glass Petri dish containing two sheets of filter paper and 10 mls of a 3 ppm Dual solution containing Dithane. Check dishes contained 10 mls of water with Dithane. Following germination at 30°C in the dark for 14 days, the dishes were examined for seedling growth despite the herbicide.

A total of 80 lines was identified which showed preliminary evidence of some degree of resistance. Seed produced by these plants will be tested further.

1/ This research supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

IMPROVEMENT OF WHEAT AND FORAGE CROPS THROUGH TISSUE CULTURE

(A Progress Report)

T.P. Croughan, S.A. Harrison, D.E. Groth, and M.M. Pizzolatto

Activities in this project have included: 1) the field evaluation of 204 regenerated wheat lines developed from embryo-derived cell lines of the wheat varieties Coker 762, Coker 916, and Roy; and 2) the regeneration of an additional 315 plants from the above varieties, as well as Omega 78, McNair 1003, Coker 93-23, Milburn, Probrand 812, and Florida 302.

The field evaluation of the Coker 916, Coker 762, and Roy regenerated lines consisted of a replicated randomized transplanting to the field of check plants and seven R_1 plants for each line, spacing individual plants 1 m apart. Independent scoring for leaf rust was conducted by a plant pathologist and wheat breeder.

Both ratings identified four lines which uniformly showed decreased disease incidence across all replicate plants compared to the checks of that variety. Among the over 1,400 individual plants in the study, some 270 possessed apparent genetic changes of agronomic interest. R_2 seed from these individuals have been planted in a total of 500 rows three meters in length for further evaluation.

CELLULAR AND MOLECULAR GENETICS FOR CROP IMPROVEMENT

(A Progress Report)

T.P. Croughan, Chu Qi Ren, and M.M. Pizzolatto

Activities in this project included an evaluation of anther culturability by Mr. Chu Qi Ren of the rice varieties Tetep, Lemont, Guichow, IR36, Cica 6, Cica 8, Nanjing 11, and Costa Rica 1113. A total of 27,892 anthers were plated and the varieties Tetep, Lemont, Guichow, and IR36 were identified as having complementary traits with respect to callus formation and plant regeneration. A diallele cross has been made between these four lines to determine the genetic basis of the observed differences, involving 84 crosses which yielded 1,070 F_1 seed. Anther culture of F_1's grown from this seed entailed the plating of 31,803 anthers. A total of 83 backcrosses to the parental material has been made, yielding 1,589 backcrossed seed. The above materials will be used to evaluate the genetic basis for callus formation and plant regeneration in rice.

THE USE OF ANTHER CULTURE TO EXPEDITE THE BREEDING AND RELEASE OF NEW VARIETIES OF RICE

(A Progress Report)

T.P. Croughan, Chu Qi Ren, and M.M. Pizzolatto

Activities in this project entailed anther culture of plants regenerated from immature panicle derived cell lines of the rice variety Lemont. Regenerated plants were transplanted from the greenhouse to the field and spaced 1 m apart. When the spacing from the flag to penultimate leaf collars was 3-5 cm, shoots were harvested, sealed in plastic bags and incubated in the dark at 6°C for 7 days. Following this cold shock treatment, shoots were surface sterilized and the anthers plated onto Chaleff's R-4 medium in 60 x 15 cm plastic Petri dishes. Following incubation in the dark at 27°C for 2 weeks, the dishes were transferred to a 16:8 light:dark fluorescent light regime. Plants which regenerate from the anther derived callus will be grown to maturity in the greenhouse to provide seed for testing. Plants grown from this seed will be compared with plants grown from seed collected from the immature panicle derived regenerated plants from which anthers were obtained, to evaluate the effect of anther culture on somatically derived regenerated plants.

RICE FERTILIZATION AND CULTURAL MANAGEMENT[1/]

EFFECT OF N RATE AND N TIMING ON PERFORMANCE AND YIELD OF SELECTED RICE VARIETIES AND EXPERIMENTAL LINES IN DIFFERENT RICE PRODUCING AREAS OF LOUISIANA

P.K. Bollich, W.J. Leonards, Jr., S.M. Rawls, and D.M. Walker

INTRODUCTION

Nitrogen (N) fertilization is a major requirement for successful rice production in Louisiana. Efficiency of applied N fertilizer is influenced by numerous management practices. Maximization of N fertilizer efficiency depends on rate, placement and timing of N application, rice variety, and water management.

Proper placement and timing of fertilizer N is dependent upon the cultural system used. In the water-seeded, permanently flooded system, the optimum N rate should be placed 2 to 3 inches below the soil surface within 5 to 7 days before establishing a permanent flood. In the dry-seeded system, the optimum N rate should broadcast onto a dry soil surface prior to establishing the permanent flood. Previous research has shown that there is generally no advantage to applying split applications of fertilizer N in either cultural system and may be less efficient than a single preplant or preflood application of the total N requirement. It may be desirable to apply split applications of fertilizer N when the optimum requirement is not known. When applying split applications, it is important to apply an adequate amount of basal N to maintain the plant through tillering and panicle formation. Generally, this consists of two-thirds of the estimated total N requirements applied preplant in water-seeded rice and preflood in dry-seeded rice, followed by a topdressing of the remaining one-third N at either panicle initiation or panicle differentiation.

Rice varieties may differ in both the amount and time of N application required for maximum yield. Plant lodging, disease, inherent N utilization efficiency, or other factors that affect yield potential of some varieties are influenced by N levels. Requirements of applied N should depend somewhat on these considerations. There also appear to be environmental influences on varietal performance. Soil type, growing conditions, and weather may affect varietal performance. Therefore, it is important to conduct field research in the major rice producing areas of Louisiana to develop fertilization and management strategies for new varieties and experimental lines. Information generated from these studies is invaluable in maintaining efficient and profitable rice production.

The objectives of these variety x N trials are to 1) determine yield potential and agronomic performance of new rice varieties and experimental lines in different environments, and 2) determine the optimum N rate and time of application for each variety and experimental line.

1/ This research is supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

MATERIALS AND METHODS

Fourteen rice varieties and/or advanced experimental lines were grouped by maturity and grain type into four groups for testing purposes:

1. Early medium grain: Mars, 2213

2. Very early long grain: Tebonnet (TBNT), Skybonnet (SKBT), Bond, and L-202

3. Early long grain: Rexmont (RXMT), Lemont (LMNT), Newbonnet (NWBT), Gulfmont (GFMT), 2201, and 2203

4. Mid-season long grain: Della (DLLA), 2186

Mars is a tall, early season medium grain with good yield potential. It is susceptible to lodging, especially at high N rates. The experimental line 2213 is a semidwarf medium grain developed from the breeding program in Louisiana. Straw strength of 2213 is similar to that of Mars but is more resistant to lodging than Mars at high N rates, due mainly to its shorter height. Yield potential of 2213 appears to be similar to that of Mars. Mars and 2213 have shown good second crop potential.

The long-grain, semidwarf variety, L-202 was developed in California and was the earliest maturing variety in the very early long-grain trials. It has exhibited high yield potential and is very responsive to high levels of fertilizer N. L-202 has also shown excellent second crop potential. Tebonnet is a tall variety that was developed in Arkansas. It has displayed high yield potential and is susceptible to lodging. Skybonnet, a Texas variety, was the latest maturing in this group and has displayed less yield potential than Tebonnet. It has good lodging resistance and produced excellent second crop yields in 1986, outyielding Tebonnet by 1000 lb/A. Bond, an Arkansas variety, appeared to have yield potential similar to that of Tebonnet, and is susceptible to lodging.

The early long-grain group includes the Rexmont, Lemont, and Gulfmont varieties developed in Texas. Rexmont is a semidwarf rice variety; however, it is susceptible to lodging. Lemont has consistently shown excellent yield potential in this group. Lemont is resistant to lodging and responds well to high levels of fertilizer N. Gulfmont is very similar to Lemont in growth habit, and is 3 to 5 days earlier. It has yield potential similar to Lemont, and both have produced excellent second crop yields. Newbonnet, a tall Arkansas variety, has also displayed high yield potential and good lodging resistance but is late maturing and does not have second crop potential. The two experimental lines, 2201 and 2203, were developed in the Louisiana breeding program. Both lines are semidwarfs with good lodging resistance and have displayed good yield potential in both the first and second crops. Height and maturity are similar to that of Lemont.

Della is a tall, aromatic long grain with lower yield potential and is susceptible to lodging. An experimental line, 2186, developed in the Louisiana breeding program is shorter than Della and has displayed somewhat higher yield potential and better lodging resistance. Maturity of these is similar to that of Newbonnet.

Nitrogen rates of 0, 30, 60, 90, 120, and 150 lb/A were banded approximately 2 inches deep 1 to 2 days prior to flooding in the water-seeded experiments. In soils requiring P and K, approximately 60 lb/A P_2O_5 and K_2O were also banded with N as either urea or ammonium sulfate. The 90 lb N/A rate was also split to provide 60 lb N/A preplant with 30 lb N/A applied at either panicle initiation (green ring) or panicle differentiation (panicle 2 mm) growth stages. In drill-seeded experiments, basal N treatments were applied as a broadcast application prior to establishment of the permanent flood with split applications of the 90 lb N/A rate applied as in the water-seeded experiments.

Water-seeded experiments were seeded at the rate of 150 lb/A with presoaked seed. After 3 to 4 days, the experiments were drained briefly to promote seedling anchorage. A permanent flood was established 2 to 3 days after drainage, never allowing the soil to dry.

In drill-seeded experiments, varieties were seeded at 100 lb/A and flushed periodically until the permanent flood was established (4 to 5 weeks after planting).

Pest control (weeds, insects, disease), when necessary, was practiced according to current recommendations. Individual whole plots were combine-harvested at field maturity. Days to 50% heading, plant height, lodging, grain moisture, and grain yield were measured.

Second crop data were generated in the Vermilion Parish and Rice Research Station variety x N trials. After main crop harvest was completed, stubble was clipped to a uniform height (8 to 12 inches, depending on trial). Approximately 60 lb/A N was applied broadcast to the dry soil surface, and a shallow flood was established immediately. Individual whole plots where combine-harvested at field maturity. Grain moisture and grain yield were determined.

Experiment: Early medium grain x nitrogen trial

Location: Rice Research Station

Soil Type/Analysis: Crowley silt loam; pH: 6.3; O.M.: 0.85%; extractable nutrients (ppm): P-16, Na-47, K-55, Ca-1116, Mg-214, Zn-0.81

Variety/Seeding Rate: Mars, 2213, 150 lb/A

Planting Method/Date: Water seeded, Apr 11, 1986

Fertilization: 60 lb/A P_2O_5 and K_2O ppi; nitrogen source, ammonium sulfate; second crop, 60 lb/A (urea)

Plot Size: 7 x 25 ft

Emergence Date: 2213, Apr 19; Mars, Apr 20

Water Management: Initial flood , Apr 10; drained, Apr 14; reflooded, Apr 16; drained, May 11; permanent flood, May 13; harvest drainage, Aug 7; second crop flooded, Aug 15; harvest drainage, Oct 23

Herbicides: 4 lb ai/A, Stam (propanil), May 12

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), May 15 and June 13

Fungicides: None

Harvest: Main crop, Aug 7; second crop, Oct 31

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Mars and 2213 each displayed good seedling vigor during emergence and establishment. Nitrogen deficiency was noted at 0 N in each variety 2 weeks after emergence. The experimental line 2213 appeared to be slightly more N responsive than Mars. Deficiency symptoms also appeared at 30 and 60 lb/A N later during the season. Days to 50% heading of Mars and 2213 was delayed at 0 N and 150 lb/A N (Table 1). Mars lodged at 150 lb/A N. A single N application of 90 lb/A was more efficiently utilized than either split application treatment. A basal amount of N of 60 lb/A was not sufficient to maintain the rice plants until the topdressing application, and yields were decreased. Optimum N rate for Mars and Mercury was 120 and 150 lb/A, respectively.

Treatments receiving no N in the main crop showed depressed yields in the second crop for each variety. Second crop grain yield of Mars was also decreased when the main crop was fertilized with 150 lb/A N. Second crop yield potential appeared to be excellent for both varieties when the main crop was fertilized with optimum N.

Table 1. Effect of N rate and timing in main crop on performance and on main crop, second crop, and total grain yields of water-seeded early medium-grain rice varieties. Rice Research Station, Crowley, LA. 1986.

Time of N*				Days to 50% heading			Plant height			% Lodging /type**		Main crop grain yield at 12% moisture			Second crop grain yield at 12% moisture			Total grain yield at 12% moisture		
Total N	PP	PI	PD	MARS	2213	N*** Mean	MARS	2213	N*** Mean	MARS	2213	MARS	2213	N*** Mean	MARS	2213	N*** Mean	MARS	2213	N*** Mean
lb/A							cm					lb/A								
0	--	--	--	86	82	84^{cd}	80	73	76^{f}	0/0	0/0	3848	3789	3819^{g}	1443	1371	1407^{b}	5291	5160	5226^{e}
30	30	--	--	83	81	82^{f}	90	76	83^{e}	0/0	0/0	5827	5746	5786^{f}	1956	1873	1914^{a}	7782	7619	7701^{d}
60	60	--	--	85	81	83^{ef}	100	85	93^{d}	0/0	0/0	7121	7268	7194^{e}	2171	2228	2199^{a}	9292	9496	9394^{bc}
90	90	--	--	86	83	85^{bc}	110	86	98^{c}	2/1	0/0	7758	8089	7923^{bc}	1901	2142	2022^{a}	9659	10231	9945^{ab}
90	60	30	--	85	82	84^{de}	101	86	94^{d}	0/0	0/0	7576	7621	7599^{cd}	2134	2169	2151^{a}	9710	9790	9750^{abc}
90	60	--	30	85	81	83^{ef}	103	86	94^{d}	0/0	0/0	7405	7615	7510^{de}	1751	1734	1743^{ab}	9157	9349	9253^{c}
120	120	--	--	87	83	85^{b}	111	91	101^{b}	0/0	0/0	8047	8367	8207^{ab}	1773	2043	1908^{a}	9819	10411	10115^{a}
150	150	--	--	89	85	87^{a}	115	95	105^{a}	17/2	0/0	7881	8793	8337^{a}	1486	2033	1760^{ab}	9368	10826	10097^{a}
Variety mean***				86^{a}	82^{b}		101^{a}	85^{b}				6933^{b}	7161^{a}		1827^{a}	1949a		8760^{b}	9110^{a}	
C.V., %				0.94			2.96					4.24			17.90			6.43		

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.
** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.
*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Very early long grain x nitrogen trial

Location: Rice Research Station

Soil Type/Analysis: Crowley silt loam; pH: 6.3, O.M.: 0.85%; extractable nutrients (ppm): P-16, Na-47, K-55, Ca-1116, Mg-214, Zn-0.81

Variety/Seeding Rate: TBNT, SKBT, BOND, L-202, 150 lb/A

Planting Method/Date: Water seeded, Apr 11

Fertilization: 60 lb/A P_2O_5 and K_2O ppi; nitrogen source, ammonium sulfate; second crop, 60 lb/A N (urea)

Plot Size: 7 x 25 ft (175 ft^2)

Emergence Date: L-202, Apr 19; TBNT, BOND, Apr 20; SKBT, Apr 21

Water Management: Initial flood, Apr 10; drained, Apr 14; reflood, Apr 16; drained, May 11; permanent flood, May 13; harvest drainage, July 24; second crop flooded, Aug 15; harvest drainage, Oct 27

Herbicides: 4 lb ai/A, Stam (propanil), May 12

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), May 15 and June 13

Fungicides: None

Harvest: Main crop, Aug 4; second crop, Nov 18

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: TBNT and L202 displayed the most seedling vigor of the four varieties. L202 was the first to emerge, followed by TBNT and BOND, and SKBT. Two weeks after emergence, growth and vigor of TBNT decreased, probably due to cool temperatures after emergence. All varieties became N deficient 4 weeks after emergence at the 0 and 30 lb/A N rate, and at the 60 lb/A N rate 5 weeks after emergence. Days to 50% heading for TBNT and L202 was decreased by suboptimum N rates, and suboptimum and excessive N rates influenced days to 50% heading for SKBT and BOND (Table 2). TBNT and BOND lodged when more than 90 lb/A N was applied. A single preplant N application of 90 lb/A was more efficiently utilized than either split application treatment for all varieties (Table 3). TBNT and L202, however, required 120 lb N/A for optimum grain yield.

L202 produced excellent second crop grain yields, even with no N application to the main crop. Second crop grain yields of TBNT and BOND were low in comparison to SKBT and L202, and produced very poor grain yields when the main crop was not N fertilized. Total grain yields for SKBT and L202 were superior to those of TBNT and BOND.

Table 2. Effect of N rate and timing on performance of water-seeded very early long-grain rice varieties. Rice Research Station, Crowley, LA. 1986.

Total N	Time of N* PP	PI	PD	Days to 50% heading TBNT	SKBT	BOND	L202	N*** Mean	Plant height TBNT	SKBT	BOND	L202	N*** Mean	% Lodging/type** TBNT	SKBT	BOND	L202
-----lb/A-----									-----cm-----								
0	--	--	--	80	83	76	74	78^{de}	84	80	70	64	75^{g}	0/0	0/0	0/0	0/0
30	30	--	--	78	81	74	73	77^{e}	102	91	77	66	84^{f}	0/0	0/0	0/0	0/0
60	60	--	--	81	81	77	74	78^{de}	112	103	93	72	95^{e}	0/0	0/0	0/0	0/0
90	90	--	--	83	84	78	75	80^{c}	119	112	98	83	103^{c}	5/1	0/0	5/1	0/0
90	60	30	--	81	84	77	75	79^{cd}	115	106	95	77	98^{d}	0/0	0/0	0/0	0/0
90	60	--	30	81	82	77	74	79^{cd}	116	108	93	75	98^{d}	0/0	0/0	0/0	0/0
120	120	--	--	86	86	80	77	82^{b}	129	119	107	88	111^{b}	17/1	0/0	22/2	0/0
150	150	--	--	87	89	83	78	84^{a}	132	123	114	91	115^{a}	72/3	0/0	15/1	7/1
Variety mean***				82^{b}	84^{a}	78^{c}	75^{d}		114^{a}	105^{b}	94^{c}	77^{d}					
C.V., %					1.29					4.00							

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.
** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.
*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Table 3. Effect of N rate and timing in main crop on main crop, second crop, and total grain yields of water-seeded very early long-grain rice varieties. Rice Research Station, Crowley, LA. 1986.

	Total of N*			First crop grain yield at 12% moisture					Second crop grain yield at 12% moisture					Total grain yield at 12% moisture				
Total N	PP	PI	PD	TBNT	SKBT	BOND	L202	N** Mean	TBNT	SKBT	BOND	L202	N** Mean	TBNT	SKBT	BOND	L202	N** Mean
0	--	--	--	3235	3787	3933	4520	3869^{f}	1072	1378	760	2182	1348^{b}	4307	5166	4692	6702	5217^{e}
30	30	--	--	5402	5725	5717	5930	5694^{e}	1402	1976	954	2522	1714^{ab}	6804	7701	6671	8452	7407^{d}
60	60	--	--	6835	6986	7024	7024	6967^{d}	1245	2423	1476	2780	1981^{a}	8080	9410	8500	9804	8948^{c}
90	90	--	--	7774	7501	7577	7782	7659^{a}	1389	2140	1750	2771	2013^{a}	9163	9642	9328	10553	9671^{ab}
90	60	30	--	6986	7140	7291	7293	7178^{cd}	1275	2144	1396	2701	1879^{a}	8261	9285	8687	9994	9057^{bc}
90	60	--	30	7343	7079	7387	7317	7281^{bc}	1080	2265	1468	2736	1887^{a}	8423	9344	8855	10052	9169^{abc}
120	120	--	--	7998	7512	7045	8445	7750^{a}	1126	2246	1534	3000	1977^{a}	9124	9557	8579	11446	9727^{a}
150	150	--	--	7923	7050	6434	8577	7497^{ab}	917	2091	1755	2917	1920^{a}	8845	9141	8190	11494	9417^{abc}
Variety mean**				6688^{b}	6598^{b}	6551^{b}	7111^{a}		1188^{d}	2083^{b}	1387^{c}	2701^{a}		7876^{c}	8681^{b}	7938^{c}	9812^{a}	
C.V., %					5.96					16.16					5.53			

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.

** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Table 4. Effect of N rate and timing on performance of water-seeded early long-grain rice varieties. Rice Research Station, Crowley, LA. 1986.

Total	Time of N*			Days to 50% heading							Plant height							% Lodging/type**					
N	PP	PI	PD	RXMT	LMNT	NWBT	GFMT	2201	2203	N*** Mean	RXMT	LMNT	NWBT	GFMT	2201	2203	N*** Mean	RXMT	LMNT	NWBT	GFMT	2201	2203
----------lb/A---------											--------------------cm--------------------												
0	--	--	--	88	88	91	83	84	80	86^{b}	61	57	76	61	60	59	62^{f}	0/0	0/0	0/0	0/0	0/0	0/0
30	30	--	--	83	83	90	80	80	79	82^{c}	67	65	87	70	64	65	70^{e}	0/0	0/0	0/0	0/0	0/0	0/0
60	60	--	--	82	85	88	81	82	79	83^{c}	77	71	93	72	77	72	77^{d}	0/0	0/0	0/0	0/0	0/0	0/0
90	90	--	--	83	89	90	86	85	82	86^{b}	79	81	105	84	81	79	85^{b}	12/1	0/0	0/0	0/0	0/0	0/0
90	60	30	--	84	86	90	82	84	79	84^{bc}	77	76	98	80	75	70	79^{cd}	0/0	0/0	0/0	0/0	0/0	0/0
90	60	--	30	85	86	90	83	83	80	85^{bc}	77	75	101	79	78	73	80^{c}	0/0	0/0	0/0	0/0	0/0	0/0
120	120	--	--	87	91	92	88	88	85	88^{a}	78	85	108	88	81	83	87^{b}	22/1	0/0	0/0	0/0	0/0	0/0
150	150	--	--	86	91	93	90	89	86	89^{a}	83	84	114	91	87	84	90^{a}	40/3	0/0	0/0	0/0	0/0	0/0
Variety Mean***				85^{c}	87^{b}	91^{a}	84^{c}	84^{c}	81^{d}		75^{cd}	74^{cd}	98^{a}	78^{b}	76^{c}	73^{d}							
C.V., %						1.71								4.03									

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.
** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.
*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Early long grain x nitrogen trial

Location: Rice Research Station

Soil Type/Analysis: Crowley silt loam; pH: 6.7, O.M.: 0.72%; extractable nutrients (ppm): p-11, Na-69, K-56, Ca-1182, Mg-265, Zn-0.74

Variety/Seeding Rate: RXMT, LMNT, NWBT, GFMT, 2201, 2203, 150 lb/A

Planting Method/Date: Water seeded, Apr 10

Fertilization: 60 lb/A P_2O_5 and K_2O ppi; nitrogen source, ammonium sulfate; second crop, 60 lb/A N (urea)

Plot Size: 7 x 25 ft (175 ft^2)

Emergence Date: 2201, 2203, GFMT, Apr 19; LMNT, NWBT, Apr 20; RXMT, Apr 21

Water Management: Initial flood, Apr 9; drained, Apr 13; reflood, Apr 16; drained, May 11; permanent flood, May 13; harvest drainage, July 29; second crop flooded, Aug 15; harvest drainage, Oct 27

Herbicides: 4 lb ai/A, Stam (propanil), May 12

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), May 15 and June 13

Fungicides: None

Harvest: Main crop, Aug 13; second crop, Nov 19

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: RXMT and NWBT exhibited poor seedling vigor and seedling growth. Deficiency symptoms for N appeared in all varieties 2 weeks after emergence. Four weeks after emergence, all varieties except NWBT became N deficient with only 30 lb/A of basal N. All varieties were N deficient 5 weeks after emergence with only 60 lb/A of basal N. Severe N deficiency and excessive N fertilization both influenced days to 50% heading, depending on variety (Table 4). RXMT lodged when fertilized with more than 90 lb N/A. Split applications of N decreased yield for most varieties when compared with a single preplant application of 90 lb/A (Table 5). RXMT and NWBT required 120 lb N/A for optimum grain yield, and all other varieties required 90 lb N/A.

RXMT and NWBT produced poor second crop grain yields when compared with the other varieties. Second crop grain yields were decreased by N deficient main crops. Total grain yields of LMNT, GFMT, 2201, and 2203 were superior to those of RXMT and NWBT.

Table 5. Effect of N rate and timing in main crop on main crop, second crop, and total grain yields of water-seeded early long-grain rice varieties. Rice Research Station, Crowley, LA. 1986.

Total N	Time of N* PP	PI	PD	First crop grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean	Second crop grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean	Total grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean
											lb/A													
0	--	--	--	4225	4396	3812	4321	4207	4292	4209^{e}	690	1789	447	1464	1818	1972	1363^{d}	4915	6185	4259	5784	6026	6264	5572^{d}
30	30	--	--	6192	6532	5608	6235	6163	5789	6087^{d}	1172	1870	589	1820	1941	2221	1602^{bcd}	7364	8402	6198	8055	8104	8011	7689^{c}
60	60	--	--	7794	7794	7278	7671	7840	7919	7716^{c}	1223	1982	1174	2194	2149	2398	1853^{abc}	9017	9776	8453	9865	9989	10317	9570^{b}
90	90	--	--	8461	8453	8308	8273	8725	8932	8526^{a}	1724	2205	1020	2254	1902	2476	1930^{ab}	10185	10658	9329	10528	10627	11409	10456^{a}
90	60	30	--	7566	7919	7276	8048	7878	7895	7764^{c}	1311	1633	1154	1806	1932	2481	1719^{abcd}	8877	9552	8430	9854	9810	10376	9483^{b}
90	60	--	30	7876	8586	7709	8071	7984	8117	8057^{bc}	783	1725	652	1955	1670	2084	1478^{cd}	8659	10311	8360	10025	9654	10202	9535^{b}
120	120	--	--	8639	8296	8524	8004	8683	8795	8490^{ab}	1381	2365	859	2352	2020	2457	1906^{ab}	10020	10661	9384	10356	10703	11252	10396^{a}
150	150	--	--	8683	8037	8032	7843	8019	8888	8250^{ab}	1854	2353	911	2726	2264	2304	2069^{a}	10537	10390	8942	10568	10283	11192	10319^{a}
Variety mean**				7430^{ab}	7502^{a}	7068^{c}	7308^{b}	7437^{ab}	7579^{a}		1267^{c}	1990^{b}	851^{d}	2071^{b}	1962^{b}	2299^{a}		8697^{c}	9492^{b}	7919^{d}	9380^{b}	9400^{b}	9878^{a}	
C.V., %						4.34								13.73							4.68			

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.

** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Specialty mid-season long grain x nitrogen trial

Location: Rice Research Station

Soil Type/Analysis: N/A

Variety/Seeding Rate: DLLA, 2186, 100 lb/A

Planting Method/Date: Drill seeded, Apr 1

Fertilization: 60 lb/A P_2O_5 and K_2O ppi; nitrogen source, urea

Plot Size: 5 x 25 ft

Emergence Date: DLLA, 2186, Apr 15

Water Management: Flushed, Apr 3, Apr 17, May 1; permanent flood, May 8; harvest drainage, Aug 5

Herbicides: 3 lb ai/A, Stam (propanil), Apr 29

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), May 15

Fungicides: None

Harvest: Aug 19

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Seedling vigor was poor, especially for 2186. Both varieties showed N deficiency symptoms before PF N was applied. A N response was observed within 7 days of flooding. Suboptimum N increased days to 50% heading for DLLA more than 2186 (Table 6). Plant height of each variety responded similarly with increasing N. Lodging was observed for DLLA when applied N exceeded 60 lb/A. Extreme lodging occurred with a single PF application of 120 lb N/A for DLLA. Applying a split application reduced lodging severity. Optimum N rate for DLLA and 2186 was 90 lb/A. Grain yield of DLLA decreased when 120 lb N/A was applied, probably due to increased lodging. A split N application for DLLA performed comparable to a single application of 90 lb/A.

Table 6. Effect of N rate and timing on performance of grain yields of drill-seeded specialty mid-season long-grain rice varieties. Rice Research Station, Crowley, LA. 1986.

	Time of N*			Days to 50% heading			Plant height			% Lodging/ type**		Grain yield at 12% moisture		
Total N	PF	PI	PD	DLLA	2186	N*** Mean	DLLA	2186	N*** Mean	DLLA	2186	DLLA	2186	N*** Mean
-----------lb/A---------							--------cm--------					---------lb/A---------		
0	--	--	--	89	89	89^{a}	102	80	91^{c}	0/0	0/0	4650	4530	4590^{c}
60	60	--	--	87	88	88^{b}	115	94	105^{b}	0/0	0/0	5757	5325	5541^{ab}
90	90	--	--	86	88	87^{bc}	124	101	113^{a}	15/1	0/0	5854	5767	5811^{a}
120	120	--	--	86	88	87^{bc}	125	101	113^{a}	62/4	0/0	5223	5748	5485^{b}
120	90	30	--	86	87	87^{c}	120	102	111^{a}	17/2	0/0	5718	5787	5752^{ab}
Variety mean				87^{b}	88^{a}		117^{a}	96^{b}				5440^{a}	5432^{a}	
C.V., %				0.63			3.78					3.48		

* Time of N: PF = preflood; PI = panicle initiation; PD = panicle differentiation.

** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.

*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Early medium grain x nitrogen trial

Location: East Carroll Parish, Buford Perry Farm

Soil Type/Analysis: Sharkey clay; pH: 6.7, O.M.: 2.11%; extractable nutrients (ppm): p-123, Na-42, K-461, Ca-4000, Mg-1000, Zn-7.69

Variety/Seeding Rate: MARS, 2213, 100 lb/A

Planting Method/Date: Drill seeded, Apr 1

Fertilization: Nitrogen source, urea

Plot Size: 7 x 25 ft

Emergence Date: MARS, 2213, Apr 19

Water Management: Flushed, Apr 7, Apr 17, Apr 26, May 5; permanent flood, May 23; harvest drainage, Aug 11

Herbicides: 3 lb ai/A, Stam (propanil), May 3, May 22

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), June 14

Fungicides: None

Harvest: Aug 29

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Seedling emergence and stand establishment was decreased by cool temperatures after planting. There was little noticeable difference in vigor between MARS and 2213. Slight N deficiency was observed in the 0 and 30 lb N/A treatments prior to establishment of the permanent flood. Days to 50% heading was increased with N applications greater than 90 lb/A (Table 7). Lodging was significant for MARS when applied N exceeded 60 lb/A. Lodging in 2213 was slight until applied N exceeded 120 lb/A. Optimum N rate for both varieties was 90 lb/A. Split applications of a 90 lb/A total had little influence on grain yield of MARS; however, grain yield of 2213 was significantly reduced when only 60 lb N/A was applied preflood. Increasing applied N above 90 lb/A decreased grain yield of MARS. Grain yield of 2213 was not affected by excessive N.

Table 7. Effect of N rate and timing on performance and grain yields of drill-seeded early medium-grain rice varieties. Buford Perry Farm, East Carroll, LA. 1986.

Total N	Time of N* PF	PI	PD	Days to 50% heading MARS	2213	N*** Mean	Plant height MARS	2213	N*** Mean	% Lodging/ type** MARS	2213	Grain yield at 12% moisture MARS	2213	N*** Mean
-----------lb/A---------							--------cm--------					---------lb/A---------		
0	--	--	--	87	84	86^{b}	91	75	83^{e}	0/0	0/0	6829	6490	6660^{e}
30	30	--	--	84	83	84^{c}	92	84	88^{d}	0/0	0/0	8259	7578	7919^{d}
60	60	--	--	85	84	84^{c}	102	86	94^{c}	12/2	0/0	8736	8260	8498^{abc}
90	90	--	--	87	84	86^{b}	108	85	97^{bc}	40/3	10/1	8716	9041	8879^{a}
90	60	30	--	84	84	84^{c}	102	86	94^{c}	45/3	25/1	8579	8336	8457^{abc}
90	60	--	30	85	84	84^{c}	101	89	95^{c}	55/4	17/1	8804	8553	8678^{ab}
120	120	--	--	88	87	88^{a}	113	90	102^{a}	67/4	15/1	7465	8987	8226^{bcd}
150	150	--	--	89	88	88^{a}	104	97	100^{ab}	82/5	35/2	6940	9180	8060^{cd}
Variety mean				86^{a}	85^{b}		102^{a}	87^{b}				8041^{a}	8303^{a}	
C.V., %				1.03			5.04					6.92		

* Time of N: PF = preflood; PI = panicle initiation; PD = panicle differentiation.

** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.

*** Means across and down columns followed by the same letter are not significantly different ($P<0.05$) according to Duncan's multiple range test.

Experiment: Very early long grain x nitrogen trial

Location: East Carroll Parish, Buford Perry Farm

Soil Type/Analysis: Sharkey clay; pH: 6.7, O.M.: 2.11%; extractable nutrients (ppm): p-123, Na-42, K-461, Ca-4000, Mg-1000, Zn-7.69

Variety/Seeding Rate: TBNT, SKBT, BOND, L202, 100 lb/A

Planting Method/Date: Drill seeded, Apr 1

Fertilization: Nitrogen source, urea

Plot Size: 7 x 25 ft

Emergence Date: TBNT, SKBT, BOND, L202, Apr 20

Water Management: Flushed, Apr 7, Apr 17, Apr 26, May 5; permanent flood, May 23; harvest drainage, Aug 4

Herbicides: 3 lb ai/A, Stam (propanil), May 3, May 22

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), June 14

Fungicides: None

Harvest: Aug 27

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Seedling emergence and stand establishment was decreased by cool temperatures after planting. There were no apparent visual differences in seedling vigor among varieties. Slight N deficiency was observed in the 0 and 30 lb/A N rates prior to establishment of the permanent flood. Suboptimum and excessive N rates influenced days to 50% heading in all varieties (Table 8). Lodging was observed in TBNT and BOND when N was applied at 150 lb/A. Applying a split application of N had little influence on grain yield in any variety. A single preflood application of 90 lb N/A performed as well as either split application. Optimum N rates for TBNT, SKBT, BOND, and L202 were 120, 90, 120, and 150 lb/A, respectively. Performance and grain yield of TBNT and L202 were superior to that of SKBT and BOND.

Table 8. Effect of N rate and timing on performance and grain yields of drill-seeded very early long-grain rice varieties. Buford Perry Farm, East Carroll Parish, LA. 1986.

Total N	Time of N*			Days to 50% heading					Plant height					% Lodging/type**				Grain yield at 12% moisture				
	PF	PI	PD	TBNT	SKBT	BOND	L202	N*** Mean	TBNT	SKBT	BOND	L202	N*** Mean	TBNT	SKBT	BOND	L202	TBNT	SKBT	BOND	L202	N*** Mean
---------lb/A---------									------------cm------------									---------------lb/A---------------				
0	--	--	--	80	85	80	78	81^{ef}	91	89	80	71	83^{f}	0/0	0/0	0/0	0/0	5213	4578	5415	5655	5215^{d}
30	30	--	--	81	84	80	78	81^{f}	103	91	87	77	90^{e}	0/0	0/0	0/0	0/0	7098	5953	6070	6602	6431^{c}
60	60	--	--	81	86	80	79	82^{de}	111	100	95	82	97^{d}	0/0	0/0	0/0	0/0	7762	7385	7171	7423	7435^{b}
90	90	--	--	84	87	82	81	84^{c}	115	110	106	90	105^{c}	0/0	0/0	0/0	0/0	8515	7531	7609	7925	7895^{ab}
90	60	30	--	82	86	81	80	82^{d}	117	107	103	82	102^{c}	0/0	0/0	0/0	0/0	8406	7571	7770	7777	7881^{ab}
90	60	--	30	82	86	80	79	82^{de}	113	110	102	88	103^{c}	0/0	0/0	0/0	0/0	8300	7581	7501	7816	7799^{ab}
120	120	--	--	85	90	84	82	85^{b}	125	118	107	95	111^{b}	5/1	0/0	0/0	0/0	8821	7439	7773	8445	8120^{a}
150	150	--	--	88	91	86	83	87^{a}	133	126	110	99	117^{a}	32/3	0/0	10/3	0/0	8596	7571	7104	9043	8078^{a}
Variety mean				83^{b}	87^{a}	82^{c}	80^{d}		114^{a}	106^{b}	99^{c}	86^{d}						7839^{a}	6951^{c}	7052^{c}	7586^{b}	
C.V., %					1.19						5.26									6.30		

* Time of N: PF = preflood; PI = panicle initiation; PD = panicle differentiation.
** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.
*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Early long grain x nitrogen trial

Location: East Carroll Parish, Buford Perry Farm

Soil Type/Analysis: Sharkey clay; pH: 6.7, O.M.: 2.11%; extractable nutrients (ppm): p-123, Na-42, K-461, Ca-4000, Mg-1000, Zn-7.69

Variety/Seeding Rate: RXMT, LMNT, NWBT, GFMT, 2201, 2203, 100 lb/A

Planting Method/Date: Drill seeded, Apr 1

Fertilization: Nitrogen source, urea

Plot Size: 7 x 25 ft

Emergence Date: LMNT, GFMT, Apr 20; 2201, 2203, Apr 21; RXMT, NWBT, Apr 22

Water Management: Flushed, Apr 7, Apr 17, Apr 26, May 5; permanent flood, May 23; harvest drainage, Aug 11

Herbicides: 3 lb ai/A, Stam (propanil), May 3, May 22

Insecticides: 0.6 lb ai/A, Furadan (carbofuran), June 14

Fungicides: None

Harvest: Aug 28

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Seedling emergence and stand establishment was decreased by cool temperatures after planting, especially for RXMT and NWBT, which displayed poor vigor. Slight N deficiency was observed in the 0 and 30 lb/A N rates prior to establishment of the permanent flood. Suboptimum N rates slightly decreased days to 50% heading for most varieties (Table 9). Lodging occurred in RXMT and NWBT at 150 lb N/A. Split applications of N had little influence on grain yield of most varieties; however, NWBT and 2201 did respond somewhat to 30 lb N/A applied at PD (Table 10). Optimum N rate for all varieties was 120 lb/A, except for NWBT, which showed no yield advantage when fertilized with more than 90 lb/A applied as a split application. Performance and grain yield of LMNT were superior to all other varieties.

Table 9. Effect of N rate and timing on performance of drill-seeded early long-grain rice varieties. Buford Perry Farm, East Carroll Parish, LA. 1986.

	Time of N*			Plant height							% Lodging/type**					
Total N	PF	PI	PD	RXMT	LMNT	NWBT	GFMT	2201	2203	N*** Mean	RXMT	LMNT	NWBT	GFMT	2201	2203
--------lb/A---------				-------------------cm-------------------												
0	--	--	--	70	68	92	71	70	72	74^{g}	20/1	0/0	0/0	0/0	0/0	0/0
30	30	--	--	75	75	90	82	75	71	78^{f}	0/0	0/0	0/0	0/0	0/0	0/0
60	60	--	--	81	80	97	77	79	74	81^{e}	0/0	0/0	0/0	0/0	0/0	0/0
90	90	--	--	85	83	102	87	81	78	86^{c}	0/0	0/0	7/1	0/0	0/0	0/0
90	60	30	--	78	80	101	83	78	80	83^{d}	0/0	0/0	0/0	0/0	0/0	0/0
90	60	--	30	76	85	102	84	78	84	85^{d}	10/1	0/0	0/0	4/1	0/0	0/0
120	120	--	--	87	84	109	87	89	80	89^{b}	0/0	0/0	10/2	0/0	1/1	0/0
150	150	--	--	87	89	110	90	88	90	92^{a}	29/2	0/0	30/2	0/0	0/0	0/0
Variety mean***				80^{bc}	81^{bc}	100^{a}	83^{b}	80^{c}	79^{c}							
C.V., %						5.53										

* Time of N: PF = preflood; PI = panicle initiation; PD = panicle differentiation.

** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.

*** Means across and down columns followed by the same letter are not significantly different ($P<0.05$) according to Duncan's multiple range test.

Table 10. Effect of N rate and timing on performance and grain yield of drill-seeded early long-grain rice varieties. Buford Perry Farm, East Carroll Parish, LA. 1986.

Total	Time of N			Days to 50% heading							Grain yield at 12% moisture						
N	PF	PI	PD	RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean	RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean
-------lb/A-------											-------------------lb/A-------------------						
0	--	--	--	88	87	90	84	86	84	87[cd]	6828	6939	5917	7000	6440	5720	6474[d]
30	30	--	--	86	87	88	84	86	83	86[e]	7244	7930	7453	8185	7391	7062	7544[c]
60	60	--	--	86	88	88	85	86	84	86[de]	8343	8576	8423	7881	8174	7583	8163[b]
90	90	--	--	87	89	89	87	87	85	87[c]	8993	8929	9325	8945	8678	8422	8882[a]
90	60	30	--	86	87	88	85	86	84	86[de]	8422	8770	8466	8541	8367	8036	8434[b]
90	60	--	30	85	87	88	85	86	85	86[de]	8825	9123	9553	8912	8874	8367	8942[a]
120	120	--	--	88	92	90	87	88	86	89[b]	9330	9615	9260	9233	9013	8733	9197[a]
150	150	--	--	89	92	91	91	90	88	90[a]	9240	9481	9582	9054	8731	8800	9148[a]
Variety mean**				87[b]	89[a]	89[a]	86[c]	87[b]	85[d]		8403[b]	8670[a]	8497[ab]	8469[b]	8209[c]	7840[d]	
C.V., %						0.97							4.51				

* Time of N: PF = preflood; PI = panicle initiation; PD = panicle differentiation.

** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Early medium grain x nitrogen trial

Location: Vermilion Parish, Errol Lounsberry Farm

Soil Type/Analysis: Crowley silt loam; pH: 4.9, O.M.: 1.17%; extractable nutrients (ppm): p-34, Na-19, K-46, Ca-611, Mg-104, Zn-2.59

Variety/Seeding Rate: MARS, 2213, 150 lb/A

Planting Method/Date: Water seeded, Mar 26

Fertilization: 60 lb/A P_2O_5 and K_2O ppi, nitrogen source, ammonium sulfate; second crop 60 lb/A N (urea)

Plot Size: 7 x 25 ft

Emergence Date: MARS, 2213, Apr 3

Water Management: Initial flood, Mar 25; drained, Mar 30; reflood, Apr 2; drained, Apr 12; permanent flood, Apr 15; harvest drainage, July 16; second crop, flooded, Aug 2; harvest drainage, Oct 6

Herbicides: 3 lb ai/A, Stam (propanil) + 3 lb ai/A Bolero (thiobencarb), Apr 14; 1 lb ai/A 2,4-D, May 17

Insecticides: 0.6 lb ai/A, Furadan (thiobencarb), May 5

Fungicides: 1 lb ai/A Benlate (benomyl), June 12

Harvest: Main crop, Aug 31; second crop, Oct 21

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: MARS and 2213 each displayed good seedling vigor and early growth. Excessive N increased days to 50% heading (Table 11). No lodging occurred, even at excessive N rates. Optimum N rate for MARS and 2213 was 90 lb/A. MARS did respond to a split application of N. Grain yield of 2213 was not increased by applying N splits. Main crop grain yields did show an advantage for 2213. Both varieties produced excellent second crop grain yields, with average yield of MARS slightly higher than 2213. Average total grain yields favored the experimental line 2213.

Table 11. Effect of N rate and timing in main crop on performance and on main crop, second crop, and total grain yields of water-seeded early medium-grain rice varieties. Errol Lounsberry Farm, Vermilion Parish, LA. 1986.

Total N	Time of N* PP	PI	PD	Days to 50% heading MARS	2213	N*** Mean	Plant height MARS	2213	N*** Mean	% Lodging/ type** MARS	2213	Main crop grain yields at 12% moisture MARS	2213	N*** Mean	Second crop grain yields at 12% moisture MARS	2213	N*** Mean	Total grain yields at 12% moisture MARS	2213	N*** Mean
--------lb/A--------							--------cm--------					----------lb/A----------								
0	--	--	--	90	87	88^{cd}	80	67	74^{e}	0/0	0/0	4882	4752	4817^{c}	3033	2708	2870^{a}	7915	7459	7687^{d}
30	30	--	--	89	86	87^{e}	85	73	79^{d}	0/0	0/0	5660	5858	5759^{b}	3061	2904	2983^{a}	8721	8762	8742^{c}
60	60	--	--	89	86	87^{e}	91	75	83^{c}	0/0	0/0	6350	6610	6480^{a}	3327	2730	3028^{a}	9677	9341	9509^{a}
90	90	--	--	90	87	89^{c}	95	79	87^{b}	0/0	0/0	6150	6942	6546^{a}	2799	2872	2835^{a}	8948	9814	9381^{ab}
90	60	30	--	89	87	88^{de}	91	78	85^{bc}	0/0	0/0	6317	6807	6562^{a}	3127	2910	3018^{a}	9444	9718	9581^{a}
90	60	--	30	90	86	88^{de}	94	77	85^{bc}	0/0	0/0	6514	7006	6760^{a}	2811	2806	2808^{a}	9325	9812	9568^{a}
120	120	--	--	93	88	90^{b}	102	82	92^{a}	0/0	0/0	6346	6743	6544^{a}	2869	2759	2814^{a}	9215	9502	9358^{ab}
150	150	--	--	94	89	91^{a}	104	85	95^{a}	0/0	0/0	6154	6613	6383^{a}	2510	2589	2550^{b}	8664	9202	8933^{bc}
Variety mean***				90^{a}	87^{b}		93^{a}	77^{b}				6046^{b}	6416^{a}		2942^{a}	2785^{b}		8989^{b}	9201^{a}	
C.V., %				0.77			2.97					5.41			7.91			4.14		

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.

** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.

*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Early long grain x nitrogen trial

Location: Vermilion Parish, Errol Lounsberry Farm

Soil Type/Analysis: Crowley silt loam; pH: 4.9, O.M.: 1.17%; extractable nutrients (ppm): p-34, Na-19, K-46, Ca-611, Mg-104, Zn-2.59

Variety/Seeding Rate: RXMT, LMNT, NWBT, GFMT, 2201, 2203, 150 lb/A

Planting Method/Date: Water seeded, Mar 26

Fertilization: 60 lb/A P_2O_5 and K_2O ppi, nitrogen source, ammonium sulfate; 4.1 lb/A Zn metal, Apr 15; second crop, 60 lb/A N (urea)

Plot Size: 7 x 25 ft

Emergence Date: RXMT, LMNT, NWBT, GFMT, 2201, 2203, Apr 3

Water Management: Initial flood, Mar 25; drained, Mar 30; reflooded, Apr 2; drained, Apr 12; permanent flood, Apr 15; harvest drainage, July 16; second crop, flooded, Aug 2; harvest drainage, Oct 6

Herbicides: 3 lb ai/A, Stam (propanil) + 3 lb ai/A Bolero (thiobencarb), Apr 14; 1 lb ai/A 2,4-D, May 17

Insecticides: 0.6 lb ai/A, Furadan (thiobencarb), May 5

Fungicides: 1 lb ai/A Benlate (benomyl), June 12

Harvest: Main crop, Aug 31; second crop, Oct 21

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Seedling vigor was slightly less for RXMT and NWBT than the other varieties. Days to 50% heading of some varieties was influenced by suboptimum and excessive N (Table 12). No lodging was observed. Optimum N rate and timing for all varieties was variable, with GFMT requiring only 60 lb N/A for optimum yield, and 2201 responding positively to a split application (Table 13). RXMT and GFMT displayed less main crop yield potential than the other varieties. Second crop yield potential of GFMT, LMNT, 2201, and 2203 was superior to RXMT and NWBT. Experimental line 2201 produced the highest total grain. Total grain yields of LMNT, GFMT, and 2203 were similar.

Table 12. Effect of N rate and timing on performance of water seeded early long-grain rice varieties. Errol Lounsberry Farm, Vermilion Parish, LA. 1986.

Total	Time of N*			Days to 50% heading							Plant height							% Lodging/type**					
N	PP	PI	PD	RXMT	LMNT	NWBT	GFMT	2201	2203	N*** Mean	RXMT	LMNT	NWBT	GFMT	2201	2203	N*** Mean	RXMT	LMNT	NWBT	GFMT	2201	2203
----------lb/A----------											----------cm----------												
0	--	--	--	85	88	93	87	87	85	88[de]	61	60	79	62	60	58	63[e]	0/0	0/0	0/0	0/0	0/0	0/0
30	30	--	--	86	88	92	86	87	85	87[e]	65	63	84	66	64	64	68[d]	0/0	0/0	0/0	0/0	0/0	0/0
60	60	--	--	85	89	92	87	87	86	88[de]	69	67	85	73	69	68	73[c]	0/0	0/0	0/0	0/0	0/0	0/0
90	90	--	--	87	91	94	88	88	86	89[c]	71	71	95	73	72	71	76[b]	0/0	0/0	0/0	0/0	0/0	0/0
90	60	30	--	86	89	93	88	87	86	88[cd]	70	70	91	73	70	69	74[c]	0/0	0/0	0/0	0/0	0/0	0/0
90	60	--	30	86	89	93	88	87	86	88[de]	72	70	91	71	69	69	74[c]	0/0	0/0	0/0	0/0	0/0	0/0
120	120	--	--	88	90	95	90	89	88	90[b]	72	72	98	78	74	74	78[a]	0/0	0/0	0/0	0/0	0/0	0/0
150	150	--	--	88	93	97	92	91	89	92[a]	75	76	102	77	76	71	80[a]	0/0	0/0	0/0	0/0	0/0	0/0
Variety mean***				86[d]	90[b]	94[a]	88[c]	88[c]	87[d]		69[c]	69[cd]	91[a]	71[b]	69[c]	68[d]							
C.V., %						0.95							2.86										

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.
** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.
*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Table 13. Effect of N rate and timing in main crop on main crop, second crop, and total grain yields of water-seeded early long-grain rice varieties. Errol Lounsberry Farm, Vermilion Parish, LA. 1986.

Total N	Time of N* PP	PI	PD	First crop grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean	Second crop grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean	Total grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	2201	2203	N** Mean
													lb/A											
0	--	--	--	4340	5191	4992	4541	4743	4480	4724^{c}	2201	2971	2041	2776	3443	3077	2751^{ab}	6600	8162	7033	7316	8186	7556	7476^{c}
30	30	--	--	5689	6503	6032	5897	6306	5580	6001^{b}	2420	2878	1789	3047	3369	3192	2782^{ab}	8109	9380	7820	8945	9675	8772	8783^{b}
60	60	--	--	6334	7136	6871	6986	6793	6568	6781^{b}	2659	3161	1890	3272	3163	3180	2888^{a}	8994	10297	8761	10258	9956	9752	9670^{a}
90	90	--	--	7016	7178	7302	6850	7180	7342	7148^{a}	2401	2615	1719	2769	3048	2795	2558^{bc}	10026	9793	9021	9619	10248	10137	9807^{a}
90	60	30	--	6800	7027	6875	6906	7178	6988	6962^{a}	2444	2780	1973	2973	2904	2905	2663^{abc}	9243	9806	8848	9879	10081	9893	9625^{a}
90	60	--	30	6621	7313	7174	6831	7451	6949	7056^{a}	2357	2472	1513	2790	2986	3113	2539^{bcd}	8978	9785	8687	9621	10437	10062	9595^{a}
120	120	--	--	6678	7101	7013	7036	6983	7152	6994^{a}	2407	2468	1465	2738	2755	2674	2418^{cd}	9085	9569	8477	9774	9738	9826	9412^{a}
150	150	--	--	7225	6776	7187	6820	7116	7500	7104^{a}	2503	2280	1194	2644	2739	2385	2291^{d}	9728	9056	8380	9465	9856	9885	9395^{a}
Variety mean**				6345^{d}	6778^{a}	6681^{ab}	6483^{cd}	6721^{ab}	6570^{bc}		2424^{d}	2703^{c}	1698^{e}	2876^{b}	3051^{a}	2915^{b}		8846^{c}	9481^{b}	8378^{d}	9359^{b}	9772^{a}	9485^{b}	
C.V., %						5.88							10.17							5.68				

* Time of N: PP = preplant; PI = panicle initiation; PD = panicle differentiation.
** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Early long grain x nitrogen trial

Location: Rapides Parish, Will Bollich Farm

Soil Type/Analysis: Moreland clay; pH: 7.3, O.M.: 2.18%; extractable nutrients (ppm): p-138, Na-38, K-367, Ca-4000, Mg-1000, Zn-3.91

Variety/Seeding Rate: RXMT, LMNT, NWBT, GFMT, 100 lb/A

Planting Method/Date: Drill seeded, Aug 7

Fertilization: Nitrogen source, urea

Plot Size: 7 x 25 ft

Emergence Date: LMNT, GFMT, Apr 25; RXMT, Apr 26; NWBT, Apr 27

Water Management: Flushed, Apr 8, Apr 18, Apr 25, May 10; flooded June 5; drained June 13; permanent flood, June 13; harvest drainage, Aug 17

Herbicides: 4 lb ai/A, Stam (propanil) + 1 pt bivert, May 5; 4 lb ai/A Stam + 1 pt blazer (acifluorfen), June 13

Insecticides: None

Fungicides: None

Harvest: Sep 3

Experimental Design: Split plot in a randomized complete block with four replications, nitrogen treatments assigned to main plots and varieties to subplots

Comments: Seedling emergence and stand establishment was poor for all varieties. Poor growth and weed problems delayed application of preflood N and establishment of the permanent flood. Preflood N was applied to a saturated soil surface during adverse weather conditions, which contributed to large losses of applied N. Limited uptake of preflood N was evident from low grain yields and reduced plant height (Table 14).

Table 14. Effect of N rate and timing on performance and grain yields of drill-seeded early long-grain rice varieties. Will Bollich Farm, Rapides Parish, LA. 1986.

Total N	Time of N* PF	PI	PD	Days to 50% heading RXMT	LMNT	NWBT	GFMT	N*** Mean	Plant height RXMT	LMNT	NWBT	GFMT	N*** Mean	% Lodging/type** RXMT	LMNT	NWBT	GFMT	Grain yield at 12% moisture RXMT	LMNT	NWBT	GFMT	N*** Mean
---------lb/A---------									-------------cm-------------									---------------lb/A---------------				
0	--	--	--	97	95	90	90	93^{a}	65	64	79	64	68^{d}	0/0	0/0	0/0	0/0	3042	3609	2568	2857	3019^{c}
30	30	--	--	97	93	90	91	93^{ab}	65	65	80	67	69^{d}	0/0	0/0	0/0	0/0	3482	3804	2974	3788	3512^{d}
60	60	--	--	97	95	91	91	93^{a}	68	68	83	69	72^{c}	0/0	0/0	0/0	0/0	3988	4238	3881	4176	4071^{c}
90	90	--	--	96	92	90	90	92^{ab}	72	68	86	73	75^{bc}	0/0	0/0	0/0	0/0	4879	5031	4188	4858	4739^{b}
90	60	30	--	96	95	90	91	93^{a}	73	70	86	73	76^{b}	0/0	0/0	0/0	0/0	4927	4817	4566	4960	4818^{b}
90	60	--	30	95	92	89	89	91^{b}	73	70	87	75	76^{b}	0/0	0/0	0/0	0/0	4849	5154	4456	4984	4861^{b}
120	120	--	--	95	92	90	90	92^{ab}	71	70	85	76	76^{b}	0/0	0/0	0/0	0/0	5329	5232	5030	5540	5283^{a}
150	150	--	--	96	95	91	90	93^{ab}	75	74	94	76	80^{a}	0/0	0/0	0/0	0/0	5414	5708	5520	5682	5581^{a}
Variety mean				96^{a}	94^{b}	91^{c}	90^{c}		70^{b}	69^{c}	85^{a}	72^{b}						4489^{b}	4699^{a}	4148^{c}	4606^{bc}	
C.V., %					1.25						3.58								7.10			

* Time of N: PF = preflood; PI = panicle initiation; PD = panicle differentiation.
** Lodging rate in percent/lodging type on a scale of 0 to 5, where 1 = leaning and 5 = complete.
*** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

SUMMARY AND CONCLUSIONS

Field experiments were conducted at the Rice Research Station (RRS) and in East Carroll, Vermilion, and Rapides parishes to determine N response patterns of new rice varieties and experimental lines when grown in different environments.

Nitrogen requirements in the water-seeded experiments in Vermilion and at the RRS were similar. Most varieties yielded well at moderate levels of fertilizer N. Yields were higher at the RRS, probably due to less weed and disease pressure than that encountered in Vermilion. Excellent second crop yields were observed at each of these two locations for most varieties. Second crop yields were higher in Vermilion, which was probably a reflection of lower main crop yields and higher carbohydrate reserves in the ratoon. Average total yields in Vermilion for MARS, 2213, LMNT, GFMT, 2201, and 2203 were 8989, 9201, 9481, 9359, 9772, and 9485 lb/A, respectively, when averaged over all main crop N treatments. Average total yields at the RRS for these same varieties (previous order) were 8760, 9110, 9492, 9380, 9400, and 9878 lb/A. Grain yield at optimum N for 2213, RXMT, LMNT, GFMT, 2201, and 2203 exceeded 10,000 lb/A at the RRS. Grain yield at optimum N for RXMT, LMNT, GFMT, 2201, and 2203 also exceeded 10,000 lb/A in Vermilion. Highest total grain yield in a water-seeded experiment was 11,409 lb/A, produced by the experimental line 2203 at the RRS.

Main crop grain yields were somewhat higher in the drill-seeded experiments in East Carroll. Average yield across N rates for MARS, 2213, RXMT, LMNT, GFMT, 2201, and 2203 were 8041, 8303, 8403, 8670, 8469, 8209, and 7840 lb/A, respectively. Varieties of the very early long-grain group did not perform as well. Highest total grain yield in a drill-seeded experiment was at this location for Lemont, 9615 lb/A.

Fertilization and management problems contributed to poor performance by all varieties in Rapides. Poor efficiency and loss of fertilizer N contributed to low yields. All varieties required 150 lb N/A for maximum yield.

These experiments show that N response of rice varieties varies by location because of environmental differences. Information regarding the performance of any particular variety is more appropriately compared on a regional or environmental basis.

EFFECT OF PHOSPHORUS AND POTASSIUM ON PERFORMANCE AND GRAIN YIELD OF WATER-SEEDED LEMONT

P.K. Bollich, W.J. Leonards, Jr., S.M. Rawls, and D.M. Walker

INTRODUCTION

Phosphorus (P) and potassium (K) are required for optimum grain yields of rice in Louisiana. Many soils of the southwest rice-producing area have low to moderate levels of these nutrients. An important rotational crop to rice producers in previous years has been soybeans, which require considerable amounts of P and K, and may place a high demand on soil P and K which would otherwise be available to a rice crop. An investigation was conducted to determine the response of water-seeded Lemont rice to increasing levels of fertilizer P_2O_5 and K_2O.

MATERIALS AND METHODS

A preplant nitrogen (N) application of 120 lb/A was band-placed in preparation for water-seeding. Rates of 0, 30, 60, 90, and 120 lb/A P_2O_5 and 0, 60, 120, and 180 lb/A K_2O were also banded. A shallow flood (2 to 3 in) was established, and presoaked Lemont rice seed was hand-broadcast at the rate of 150 lb/A. The flood was removed from the experiment 4 days after seeding to allow for seedling anchorage. A permanent flood of 2 to 4 inches was established 2 days later, never allowing the soil to dry.

Pest control (weeds and insects), when necessary, was practiced according to current recommendations. Individual whole plots were combine-harvested at field maturity. Days to 50% heading, plant height, grain moisture, and grain yield were measured.

Experiment: P and K rate study

Location: Rice Research Station

Soil Type/Analysis: Crowley silt loam; pH: 6.4; O.M.: 0.85%, extractable nutrients (ppm): p-15, Na-50, K-59, Ca-1201, Mg-241, Zn-0.77

Variety/Seeding Rate: Lemont, 150 lb/A

Planting Method/Date: Water seeded, Apr 16

Fertilization: 120 lb/A N (Ammonium sulfate) ppi; P_2O_5 and K_2O

Plot Size: 7 x 25 ft

Emergence Date: Apr 24

Water Management: initial flood, Apr 15; drained, Apr 21; reflooded, Apr 23; drained, May 11; permanent flood, May 13; harvest drainage, Aug 4

Herbicides: 4 lb ai/A Stam (propanil), May 12

Insecticides: 0.6 lb ai/A Furadan (carbofuran), May 15, June 13

Fungicides: None

Harvested: Aug 14

Experimental Design: Randomized complete block with four replications and a factorial arrangement of treatments

Comments: Three weeks after emergence, P deficiency was observed where no P_2O_5 fertilizer was applied. Only slight P deficiency was observed when P_2O_5 was applied at 30 lb/A. No visual response occurred above 60 lb P_2O_5/A. No visual response to K_2O fertilizer was observed in any treatment. Days to 50% heading did not appear to be influenced by rate of P_2O_5 or K_2O, and an average of 86 days to 50% heading was recorded. Where no P_2O_5 was applied, plant height increased when 60 lb K_2O/A was added (Table 1). Increasing rate beyond 60 lb/A had no influence on plant height. Grain yield was not affected by application rate of either P_2O_5 or K_2O.

Table 1. Effect of phosphorus and potassium on plant height and grain yield of water-seeded Lemont rice. Rice Research Station, Crowley, LA. 1986.

Application rate P_2O_5	Application rate K_2O	Plant height cm	Grain yield at 12% moisture lb/A
0	0	78[b]	7544
0	60	83[a]	7893
0	120	80[ab]	7544
0	180	82[ab]	7571
30	0	80	7704
30	60	80	7694
30	120	81	7647
30	180	81	7747
60	0	80	7747
60	60	80	7587
60	120	80	7522
60	180	83	7524
90	0	79	7695
90	60	81	7683
90	120	81	7645
90	180	82	7522
120	0	79	7690
120	60	80	7657
120	120	80	7707
120	180	83	7618
		Main effects	
P_2O_5			
0		81	7635
30		81	7698
60		81	7595
90		81	7636
120		80	7668
K_2O			
0		79	7676
60		81	7700
120		81	7613
180		82	7596

SUMMARY AND CONCLUSIONS

Visual P deficiency symptoms were observed during early season growth when 30 lb/A P_2O_5 or less was applied. The deficiency symptoms disappeared later during the growing season. No response in grain yield was observed to any P or K combination. Plant height was increased where no P_2O_5 was applied when 60 lb K_2O/A was added. The corresponding yield in this treatment was 350 lb/A higher than other K_2O rates at 0 P_2O_5, although not significant. Soil tests (dry soil) had shown a low level of P in this soil, as evidenced by the deficiency symptoms that occurred. Upon flooding, availability of P may have increased, and the early season deficiency disappeared.

COMPARATIVE EFFECTS OF UREA AND DICYANDIAMIDE ON PERFORMANCE AND GRAIN YIELD OF LEMONT RICE

P.K. Bollich, W.J. Leonards, Jr., S.M. Rawls, and D.M. Walker

INTRODUCTION

Profitable rice production in Louisiana is greatly influenced by uptake and efficiency of applied nitrogen (N). Uptake and efficiency of fertilizer N is influenced by N source, rate, time of application, placement, rice variety, water management, and environmental conditions.

Denitrification, volatilization, and leaching can lead to large losses of applied N during the growing season. Proper management of fertilizer N in relation to water management can decrease the potential for these losses to occur.

Rate and timing of applied N depends primarily on the type of cultural system used for seeding. Previous research has shown that increased efficiency and uptake of applied N resulting in better performance and higher grain yields can be realized in either cultural system with proper management. In the water-seeded cultural system, when the total N requirement is known, a single preplant application incorporated into a dry soil followed by immediate flooding generally produces the highest yields. In the dry-seeded system, a single preflood N application to a dry soil surface gives comparable results. In either system, when the total N requirement is not known, applying the majority of the estimated N requirement preplant or preflood, followed by a topdressing application of the remaining N at panicle initiation (PI) or green ring or panicle differentiation (PD) will generally produce satisfactory results.

Intermittent wetting and drying cycles in a rice soil encourages nitrification. It is this process that causes increased N loss once a rice soil is flooded, by converting ammonium (NH_4+) fertilizer N to a less stable form, resulting in denitrification losses. Therefore, large amounts of preplant N cannot be effectively utilized in the dry-seeded system. A nitrification inhibitor could maintain preplant N in a stable, plant available form. This would eliminate early seedling N deficiency symptoms usually encountered in either cultural system when preplant N is not applied.

The objectives of the 1986 studies were to: 1) determine the relative efficiency in the dry-seeded system of dicyandiamide (DCD) in relation to urea and the influence of time of application on relative efficiency of the two N sources in two different Louisiana rice producing areas and 2) determine the relative efficiency of DCD in relation to urea in the water-seeded system.

MATERIALS AND METHODS

The DCD (10%) used was provided by SKW Trostberg. Sulfur-coated urea (SCU) with a 25% dissolution rate was used only in the water-seeded experiment. Preplant nitrogen treatments of 0, 30, 60, 90, 120, and 150 lb/A were banded for the urea and DCD materials in the drill-seeded experiments. All N materials and N rates were applied preplant in the water-seeded experiment. Approximately 60 lb/A P_2O_5 and K_2O were also banded with the preplant N in the two experiments conducted in Crowley. In drill-seeded experiments, preflood N treatments were applied as a broadcast application prior to establishment of the permanent flood. Urea was also applied in 2- and 3-way splits. The 2-way split consisted of 2/3 of the total N requirement applied preflood, followed by a topdressing application of the remaining 1/3 at PI. The 3-way split, which is commonly recommended in Arkansas, consisted of 50% of the total N requirement applied preflood, followed by a topdressing application of 25% of the remaining N at PD and a topdressing of 25% at PD plus 10 days.

In drill-seeded experiments, Lemont was seeded at 100 lb/A and flushed periodically until the permanent flood was established (4 to 5 weeks after planting). In the water-seeded experiment, presoaked Lemont was seeded at 150 lb/A. After 3 to 4 days, the experiment was drained briefly to promote seedling anchorage. A permanent flood was established 3 days after drainage, never allowing the soil to dry.

Pest control (weeds and insects), when necessary, was practiced according to current recommendations. Individual whole plots were combine-harvested at field maturity. Days to 50% heading, plant height, grain moisture, and grain yield were measured.

Experiment: Nitrogen source x time and rate study

Location: Rice Research Station

Soil Type/Analysis: Crowley silt loam; pH: 6.2; O.M.: 0.85%; extractable nutrients (ppm): P-14, Na-58, K-58, Ca-1164, Mg-216, Zn-0.77

Variety/Seeding Rate: LMNT, 100 lb/A

Planting Method/Date: Drill seeded, Apr 15

Fertilization: 60 lb/A P_2O_5 and K_2O ppi; nitrogen source, DCD, urea

Plot Size: 7 x 25 ft

Emergence Date: Apr 28

Water Management: Flushed, Apr 17, Apr 25, May 6, May 13; permanent flood, May 16

Herbicides: 4 lb ai/A Stam (propanil), May 12

Insecticides: 0.6 lb ai/A Furadan (carbofuran), June 13

Fungicides: None

Harvest: Aug 18

Experimental Design: Split plot in a randomized complete block with four replications. Nitrogen rates assigned to main plots and N source and time to subplots.

Comments: Visual N deficiency symptoms occurred at the 0 N rate 2 weeks after emergence. Response to applied N was visible in the preplant treatments 2 to 3 weeks after emergence. Source and time of application and N rate had little influence on days to 50% heading (Table 1). Inclement weather prior to permanent flood establishment resulting in applying preflood N treatments to a saturated soil surface caused N loss and decreased efficiency and utilization. Preplant N treatments were more efficiently utilized, increasing plant height and grain yield. A preplant application of DCD urea increased grain yield over preplant urea. DCD applied preflood gave no yield advantage when compared with urea preflood. Performance of all single application treatments was superior to either split application.

Table 1. Effects of N source, rate, and timing on performance and grain yield of drill-seeded Lemont rice. Rice Research Station, Crowley, LA. 1986.

Source and time of application*	Days to 50% heading: Total N 0	30	60	90	120	150	Source time mean**	Plant height: Total N 0	30	60	90	120	150	Source time mean**	Grain yield at 12% moisture: Total N 0	30	60	90	120	150	Source time mean**
	lb/A							cm							lb/A						
Urea: 100% PP	77	76	75	76	76	77	76^{b}	58	62	68	75	72	82	70^{b}	3755	4631	6124	7112	7709	8329	6277^{b}
Urea: 100% PF	77	76	75	76	76	77	76^{b}	58	60	68	70	72	74	67^{cd}	3755	4724	5761	6429	6681	6940	5715^{c}
Urea: 50% PF + 25% PD + 25% PD + 10 days	77	76	75	76	75	75	76^{b}	58	62	63	65	68	71	65^{e}	3755	4508	5178	6434	6210	6524	5435^{d}
Urea: 67% PF + 33% PI	77	76	76	75	75	76	76^{b}	60	62	64	69	71	73	67^{d}	3619	4397	4971	6038	6243	6616	5314^{d}
DCD: 100% PP	77	76	75	76	77	79	77^{a}	60	64	71	75	80	83	72^{a}	3619	4867	6723	7717	8053	7969	6491^{a}
DCD: 100% PF	77	76	75	76	76	76	76^{b}	60	62	69	68	75	76	68^{bc}	3619	5019	5609	6388	6940	7049	5771^{c}
N rate mean**	77^{a}	76^{b}	75^{c}	76^{b}	76^{b}	77^{a}		59^{f}	62^{e}	67^{d}	70^{c}	73^{b}	77^{a}		3687^{e}	4691^{d}	5728^{c}	6686^{b}	6973^{b}	7238^{a}	
C.V., %				0.81							3.61							6.37			

* Time of N: PP = preplant; PF = preflood; PI = panicle initiation; PD = panicle differentiation.

** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Nitrogen source x time and rate study

Location: East Carroll Parish, Buford Perry Farm

Soil Type/Analysis: Sharkey clay; pH: 6.7; O.M.: 2.11%; extractable nutrients (ppm): P-123, Na-42, K-461, Ca-4000, Mg-1000, Zn-7.69

Variety/Seeding Rate: LMNT, 100 lb/A

Planting Method/Date: Drill seeded, Apr 2

Fertilization: Nitrogen source, DCD, urea

Plot Size: 7 x 25 ft

Emergence Date: Apr 21

Water Management: Flushed, Apr 7, Apr 17, Apr 26, May 5; permanent flood, May 23; harvest drainage, Aug 11

Herbicides: 3 lb ai/A Stam (propanil), May 3, May 22

Insecticides: 0.6 lb ai/A Furadan (carbofuran), June 14

Fungicides: None

Harvest: Aug 28

Experimental Design: Split plot in a randomized complete block with four replications. Nitrogen rates assigned to main plots and N source and time to subplots.

Comments: Visual N deficiency symptoms appeared at the 0 N rate 2 weeks after emergence. Response to applied N in the preplant treatments was visible 3 weeks after emergence. Days to 50% heading was decreased slightly at suboptimum N (Table 2). Plant height was also decreased at lower levels of N. Nitrogen source and time of application had no influence on grain yield with the exception of preplant urea, which resulted in decreased grain yields. A single application of 120 lb N/A of DCD applied either preplant or preflood, or 120 lb N/A as urea applied preflood, was more efficiently utilized than was the higher rate of preplant urea.

Table 2. Effects of N source, rate, and timing on performance and grain yield of drill-seeded Lemont rice. Buford Perry Farm, East Carroll Parish, LA. 1986.

Source and time of application*	Days to 50% heading							Plant height							Grain yield at 12% moisture						
	Total N						Source time mean**	Total N						Source time mean**	Total N						Source time mean**
	0	30	60	90	120	150		0	30	60	90	120	150		0	30	60	90	120	150	
	lb/A							cm							lb/A						
Urea: 100% PP	88	87	86	85	86	87	86^{d}	73	73	75	77	81	76	76^{b}	6000	7067	7450	7970	8288	8886	7610^{b}
Urea: 100% PF	88	87	88	90	93	93	90^{a}	73	73	78	85	89	91	82^{a}	6000	7684	8167	8515	8802	8884	8009^{a}
Urea: 50% PF + 25% PD + 25% PD + 10 days	88	87	87	87	87	88	87^{c}	73	77	80	79	81	84	79^{a}	6000	7132	7969	8383	9054	9422	7993^{a}
Urea: 67% PF + 33% PI	87	87	87	87	88	91	88^{b}	63	70	74	79	82	85	76^{b}	6199	7157	8056	8493	8897	9182	7998^{a}
DCD: 100% PP	87	87	86	86	86	88	87^{d}	63	67	75	74	79	82	74^{b}	6199	6990	7949	8223	9064	9114	7923^{a}
DCD: 100% PF	87	87	87	90	91	94	89^{a}	63	76	79	83	88	87	80^{a}	6199	7210	8431	8768	8923	8984	8086^{a}
N rate mean**	87^{cd}	87^{cd}	87^{d}	88^{c}	89^{b}	90^{a}		69^{e}	73^{d}	77^{c}	79^{b}	83^{a}	84^{a}		6100^{e}	7207^{d}	8004^{c}	8392^{b}	8838^{a}	9079^{a}	
C.V., %				1.04							6.65							4.49			

* Time of N: PP = preplant; PF = preflood; PI = panicle initiation; PD = panicle differentiation.

** Means across and down columns followed by the same letter are not significantly different (P<0.05) according to Duncan's multiple range test.

Experiment: Nitrogen source x rate study

Location: Rice Research Station

Soil Type/Analysis: Crowley silt loam; pH: 6.4; O.M.: 0.85%; extractable nutrients (ppm): P-15, Na-50, K-59, Ca-1201, Mg-241, Zn-0.77

Variety/Seeding Rate: LMNT, 150 lb/A

Planting Method/Date: Water seeded, Apr 16

Fertilization: 60 lb/A P_2O_5 and K_2O; nitrogen source, DCD, urea, SCU

Plot Size: 7 x 25 ft

Emergence Date: Apr 24

Water Management: Initial flood, Apr 15; drained, Apr 21; reflooded, Apr 23; drained, May 11; permanent flood, May 13; harvest drainage, Aug 4

Herbicides: 4 lb ai/A Stam (propanil), May 12

Insecticides: 0.6 lb ai/A Furadan (carbofuran), May 15, June 13

Fungicides: None

Harvest: Aug 14

Experimental Design: Split plot in a randomized complete block with four replications. Nitrogen rates assigned to main plots and N source to subplots.

Comments: Nitrogen source had little influence on days to 50% heading (Table 3). Suboptimum N affected maturity. Nitrogen source did not affect plant height; however, plant height increased with increasing N. Grain yield was influenced by N source. Optimum N rate with urea or DCD as the source was 90 lb/A. Grain yields increased with SCU with additional N, the optimum N rate being 120 lb/A.

Table 3. Effects of N source, rate, and timing on performance and grain yield of water-seeded Lemont rice. Rice Research Station, Crowley, LA. 1986.

Source	Days to 50% heading: Total N 0	30	60	90	120	150	Source mean*
	---lb/A---						
DCD	85	83	84	86	87	87	85^{a}
SCU	85	83	84	84	85	86	84^{b}
Urea	85	83	83	86	87	88	85^{a}
N rate mean*	85^{b}	83^{c}	83^{c}	85^{b}	86^{a}	87^{a}	
C.V., %				1.09			

Source	Plant height: Total N 0	30	60	90	120	150	Source mean*
	---cm---						
DCD	57	62	72	79	82	83	72^{ab}
SCU	57	66	71	79	81	84	73^{a}
Urea	57	65	68	75	82	82	71^{b}
N rate mean*	57^{e}	64^{d}	70^{c}	78^{b}	81^{a}	83^{a}	
C.V., %				2.99			

Source	Grain yield at 12% moisture: Total N 0	30	60	90	120	150	Source mean*
	---lb/A---						
DCD	3601	5578	6789	7403	7465	7606	6407^{b}
SCU	3601	5743	7176	7774	8216	8263	6795^{a}
Urea	3601	5564	6772	7598	7491	7541	6428^{b}
N rate mean*	3601^{d}	5628^{c}	6912^{b}	7592^{a}	7724^{a}	7803^{a}	
C.V., %				4.36			

* Means across and down columns followed by the same letter are not significantly different ($P<0.05$) according to Duncan's multiple range test.

SUMMARY AND CONCLUSIONS

Three field experiments were conducted to study the influence of N source and time of application on the performance and grain yield of dry- and water-seeded Lemont rice. DCD and urea applied preplant were more efficient than the preflood or split treatments. Preflood urea is usually more efficient than preplant urea. Preflood urea and DCD were not efficiently utilized since the materials were applied to a wet soil, resulting in loss of N. The split applications were also not effective in the Crowley silt loam because of N loss, resulting in suboptimum levels of available N and early N deficiency. In the more fertile Sharkey clay, less N was required for optimum grain yields. Source of N and time of application had little influence on grain yield. Preplant urea, however was less efficiently utilized than all other treatments.

Sulfur-coated urea was more efficiently utilized in the water-seeded experiment than was DCD or urea. More SCU was required for optimum grain yield than either DCD or urea. The additional N in the form of SCU resulted in higher yields. Average yields of Lemont were higher in the water-seeded experiment than in the drill-seeded experiment. DCD does not appear to increase N efficiency in the water-seeded system.

FOUNDATION SEED RICE PROGRAM

Lawrence M. White, III

INTRODUCTION

Foundation seed rice has been produced by the Rice Research Station for distribution to Louisiana farmers since 1949. The station's seed rice program was instituted in response to the critical shortage of pure planting stocks which existed during and after World War II. Since its inception, the program has made available to Louisiana growers over 91,000 cwt. of pedigreed stock of 20 rice varieties.

Concurrent with the distribution of pure seed by the Rice Research Station, there developed in Louisiana an industry comprised of independent seed dealers through whom farmers could conduct trade in registered and certified classes of pedigreed rice.

Foundation seed rice, the planting stock from which registered and certified seed are produced, is the farmers link with the work of the plant breeder. It is the product of hybridization and of successive generations of selection and testing to establish its value as crop seed and eventually as a commercial commodity. For this reason, foundation seed and the basic stocks from which it is produced, must be grown and conditioned in a manner which will insure that viability is maintained and that it be genetically pure and free from mechanical mixtures or contamination by noxious weeds.

Through the Rice Research Station's seed program, Louisiana farmers may obtain seed rice of improved varieties developed through the cooperative LSU-USDA breeding program and of established commercial varieties originating either at Crowley or at research centers in neighboring states.

In order to fulfill the objectives of the seed program, the Rice Research Station utilizes the personnel, land, machinery, and other facilities needed to plant, harvest, condition, and store its annual seed rice crop. The production of breeder seed, planting stock for the foundation fields, and the maintenance of purity in commercial rice varieties are functions of the seed program. Breeder seed is sometimes grown within fields of foundation rice, or in a special nursery, set aside for propagating the Rice Research Station's seed stocks. The nursery also serves as a site for evaluating, purifying, and increasing selections from the cooperative breeding program which show promise as new varieties.

The distribution of pedigreed seed rice produced by the Rice Research Station is done according to a formula adopted by the Louisiana Seed Rice Growers Association. For each rice producing parish, the amount of seed allotted to an individual parish is determined by the percentage of the states total rice acreage grown in that parish during the previous crop year.

Personnel of the LSU Extension Service in cooperation with parish committees of the Seed Rice Growers Association assist in the allocation of foundation seed rice. It is at the parish committee level that the allocation of seed to individual growers is decided. The county agents receive applications for seed rice from growers and handle information and publicity for the pure seed program.

In this state, the official seed certifying agency for all crops is the Louisiana Department of Agriculture. The rules and regulations pertaining to the certification of agricultural seeds are part of the Louisiana Seed Law. They are formulated by the Louisiana Seed Commission and enforced by the Agronomic Programs Division of the Louisiana Department of Agriculture. Personnel of the Agronomic Programs Division, operating from district offices conduct field inspections of growing rice and sampling of bagged rice for laboratory analyses which consist of purity determinations and germination tests.

PRODUCTION PRACTICES

Each year, the Rice Research Station devotes approximately 80 acres of land to the production of foundation seed rice. In order to eliminate noxious weeds, especially red rice, which can disqualify rice from certification, the fields are fallowed for a 2-year period preceding planting. This also enables the fields to meet the crop history requirements specified in the seed rice regulations.

Following seedbed preparation, foundation fields are planted by means of a 16-runner grain drill which is equipped for separate placement of seed and fertilizer. A basal application of fertilizer (60-60-60 lb/A of NPK) is made at the time of seeding. The breeder stock is planted at the rate of approximately 100 lb/A. The rice receives a preflood application of ammonium sulfate in which the rate of N may vary from 30 to 90 lb/A.

Seedling grasses and weeds are controlled by means of commercially available herbicides, applied by airplane. Similarly, aerial applications of insecticides are used to protect the fields from outbreaks of harmful insects.

Roguing of the rice fields for the removal of off-types, varietal mixtures, and noxious weeds, begins at the onset of heading and continues until the rice is harvested. During this interval, the headed rice is inspected by personnel of the Agronomic Programs Division to determine whether or not it meets minimum field standards of the certifying agency.

The rice is harvested with a conventional combine, and dried in the Rice Research Station's continuous flow drier to a moisture level of approximately 12%. During the storage period between drying and cleaning, the rice is treated with an insecticide in order to protect it from stored-grain insects.

Cleaning of foundation and breeder seed usually commences in late October and continues until late December. The rice first moves through an air-and-screen cleaner which removes chaff, straw, and other foreign material and grades the grain according to width and thickness.

It then flows through two sets of length grading machines which consist of rotating, indented metal cylinders. The first set of cylinders removes stemmy rice, grains which have very long awns or which are attached to portions of the panicle. The second set removes small grains and broken or dehulled kernels of rice.

In the final phase of cleaning, the rice moves through a machine which performs diameter grading of the grain by means of rapidly oscillating perforated screens. This machine is designed to separate medium-grain and/or red rice from long-grain rice. It is also capable of removing shrivelled and other slender kernels from medium-grain rice.

From the cleaning machines, foundation and breeder seed rice flow directly into a treater which applies a measured quantity of liquid fungicide for protection of young rice plants from seedling disease. The rice is bagged as it comes from the treater, assigned a lot number, and placed in storage in the Station's seed rice warehouse where it remains until the time that it is distributed to Louisiana farmers.

The field and laboratory purity standards for foundation seed rice are very strict with regard to varietal mixtures and noxious weeds. In all phases of production, therefore, great care must be exercised in order to prevent these impurities from contaminating the seed stocks. To that end, it is routine procedure at the Rice Research Station to partially disassemble all planting and harvesting equipment and to clean it thoroughly with water and/or compressed air before using it in the field. The drier and cleaning plant, including all elevators and other conveying equipment, are also subjected to meticulous cleaning and inspection before and after each variety of rice is handled. The machineries used in fallow plowing and in seedbed preparation are important sources of contamination after having been used in stubble fields. Therefore, tractors, plows, harrows, and land levelers are carefully washed before they enter land which is in a fallow cycle. These measures, together with the inspection and rouging which are done during the growing season, help to insure that foundation seed is genetically pure and free of mechanical mixtures and noxious weed seeds.

1986 Activities

Of the 2913 cwt. of foundation seed rice sold in March 1986, the varieties and quantities were as follows: Lemont, 1305 cwt.; Newbonnet, 420 cwt.; Mars, 761 cwt.; and Tebonnet, 427 cwt. An additional 495 cwt. of Lemont and 142 cwt. of Newbonnet were downgraded to registered class and sold on bids.

The Rice Research Station's foundation seed rice crop in 1986 consisted of 30.82 acres of Tebonnet, 26.44 acres of Lemont, 18.06 acres of Mars, and 5.20 acres of the experimental variety 8502213, subsequently named Mercury.

Breeder seed was grown in 1896 as follows: Tebonnet, .75 acre; Lemont, .40 acre; Mercury, .50 acre; and Mars, .50 acre.

Headrows of Tebonnet and Lemont were also grown in 1986.

EFFECT OF TWO PLANTING DATES ON BLACKBIRD DAMAGE TO SPROUTING RICE[1/]

(A Preliminary Report)

E.A. Wilson, E.A. LeBoeuf[2/], and D.J. LeBlanc[2/]

INTRODUCTION

Sprouting rice suffers locally serious losses from blackbird (Icteridae) depredations, and monetary loss to an individual farmer can be substantial. Cultural control of bird depredation is potentially the most cost-effective form of preventing damage to newly-planted rice. Based on changes in blackbird population structure and feeding patterns, planting rice after April 15 has been recommended as a way of reducing blackbird damage to sprouting rice. However, variation in the degree of bird-caused damage to sprouting rice associated with different planting dates has not been documented. This study was conducted to determine the effect of two planting periods on blackbird damage to sprouting rice.

MATERIALS AND METHODS

Five experimental units (E U) were established in areas of traditionally high blackbird use. Three E U's were located in close proximity to the coastal marsh of Vermilion Parish, Louisiana. Two E U's were located near the Miller's Lake blackbird roost in Evangeline Parish, Louisiana. Each E U consisted of two 5- to 9-acre fields separated by a rice field levee. Within E U's, fields were randomly selected to be planted either early (March 15) or late (April 15). Cooperating growers were asked to plant the fields as close as possible to the target dates.[3/]

Fields were aerially seeded with 125 to 140 lb of seed per acre. Rice was grown using normal cultural practices, as determined by the cooperating grower. Growers were instructed to take no measures to protect fields from depredating birds.

To determine sprout loss 50 paired sample points, each consisting of two 2-ft^2 plots, were established within each field. Within each pair one plot was protected from bird damage with a wire screen exclosure, and the other plot was unprotected. Each field was divided into two strata of equal width. Five

1/ This research was supported in part by funds provided by rice producers through the Louisiana Rice Research Board and by the U.S. Department of Agriculture.
2/ Wildlife Biologists, U.S. Department of Agriculture/APHIS/Animal Damage Control, Crowley, Louisiana.
3/ Appreciation is expressed to farmers Steven Plaisance, Ludring Plaisance, Wiley Hargrave, Steve Benson, and Mitch Benson for their cooperation in this experiment.

transects were randomly located within each stratum. Paired sample points were systematically placed along these transects as described by Otis et al. (1983). Protected plots were located on the transect; unprotected plots were placed 6 ft away on a randomly selected bearing from the transect. Exclosures, which were determined not to affect the distribution of aerially-seeded rice, were placed in each field immediately before or after seeding. Seedlings were counted in all protected and unprotected plots when rice reached a height of approximately 3 inches and was beyond the stage of vulnerability to bird damage. Appropriate formulas were applied to these counts to determine estimates of total and percent sprout loss in each field.

To determine the relative bird use of early- and late-planted fields, bird counts were made on each field during the bird-vulnerable period. Each count consisted of a 30-minute census conducted from the field edge between sunrise and 1000 h. During each census, birds were recorded by number and species for each minute of observation.

RESULTS AND DISCUSSION

Percent sprout loss in early-planted fields averaged 98.0, compared with 3.8 for late-planted fields. Estimates of total sprout loss averaged 17.8 times greater in early-planted fields than in late-planted fields (Table 1).

Blackbird use of early-planted fields ranged from 130 to 968 birds per minute of observation (Table 2). Bird activity was extremely high in E U's 1, 2, 4, and 5 and resulted in rapid destruction of sprouting rice. Flocks of 1000 to 5000 blackbirds were commonly observed, and little undamaged rice remained 3 to 4 days following field drainage. Blackbird activity in E U 3 appeared to be lower than in the other early-planted fields. However, rice was destroyed within 8 to 10 days following field drainage.

Blackbird use of late-planted fields ranged from 2 to 9 birds per minute (Table 2). Solitary birds and small groups of 10 to 30 individuals were observed primarily along brushy borders of fields. Sprouting rice damage, where it was observed, appeared to be confined to field edges. Stand reductions were not high enough to necessitate replanting of any of the late-planted fields.

Red-winged Blackbirds (*Agelaius phoeniceus*) were responsible for almost all rice depredations; redwings made up over 98% of all target birds observed on test fields. Boat-tailed Grackles (*Quiscalus major*) damaged rice in one early-planted field.

We attribute the greatly reduced bird damage in late-planted fields to a combination of factors affecting blackbird numbers and feeding behavior. The departure of northern migrants, a decline in the number of roosting birds, the dispersal of birds over nesting territories, a shift in dietary preference from grain to insects, and increased food availability are factors which may be responsible for the decreased bird use of late-planted fields.

LITERATURE CITED

1. Otis, D.L., N.R. Holler, P.W. Lefebvre, and D.F. Mott. 1983. Estimating bird damage to sprouting rice. pp. 76-89 *in* Kaukeinen, D.E., Ed. Vertebrate Pest Control and Management Materials: Fourth Symposium. ASTM STP 817. American Society for Testing and Materials.

Table 1. Blackbird damage to sprouting rice in fields planted early (March 10-14) and late (April 15-17). Vermilion and Evangeline parishes, Louisiana. 1986.

Experimental unit	Planting period	Expected number of sprouts	Estimated number of sprouts lost	Percent sprout loss
1	Early	4,887,000	4,708,000	96.3
2	Early	4,743,000	4,485,000	94.6
3	Early	4,610,000	4,577,000	99.3
4	Early	5,604,000	5,595,000	99.8
5	Early	4,772,000	4,772,000	100.0
			$\bar{x}$ = 4,827,400	$\bar{x}$ = 98.0
1	Late	4,440,000	214,000	4.8
2	Late	11,093,000	-373,000	-3.4
3	Late	10,096,000	959,000	9.5
4	Late	6,044,000	- 67,000	-1.1
5	Late	6,930,000	624,000	9.0
			$\bar{x}$ = 271,400	$\bar{x}$ = 3.8

Table 2. Blackbird use of rice fields planted early (March 10-14) and late (April 15-17). Vermilion and Evangeline parishes, Louisiana. 1986.

Experimental unit	Planting period	Number of observation periods	Birds per minute of observation	Range (daily means)
1	Early	3	968	1 - 2700
2	Early	5	532	75 - 983
3	Early	6	130	19 - 248
4	Early	5	311	10 - 833
5	Early	5	399	33 - 977
			$\bar{x}$ = 468	
1	Late	4	2	0 - 3
2	Late	4	4	2 - 4
3	Late	4	2	1 - 4
4	Late	5	4	2 - 7
5	Late	5	9	2 - 21
			$\bar{x}$ = 4	

FEASIBILITY OF BAITING BLACKBIRDS AT SPRING ROOSTS FOR REDUCING DAMAGE TO SPROUTING RICE[1/]

(A Preliminary Report)

E.A. Wilson, J.F. Glahn[2/], B.U. Constantine[3/], and E.A. LeBoeuf[3/]

INTRODUCTION

Spring roosting populations of blackbirds are responsible for locally severe damage to sprouting rice, and much of this damage appears to be associated with proximity to blackbird roosts. Lethal reduction of blackbird roosting numbers may provide an alternative to existing methods of reducing bird depredations on rice. Potentially effective methods of lethal reduction include spraying roosts with contact toxicants or baiting birds with toxic baits at sites near the roost. The aquatic location of most blackbird roosts in Louisiana makes the registration of a contact toxicant unlikely. The purpose of this study was to examine the feasibility of baiting birds at sites near spring roosts and to determine blackbird preference for selected grain bait carriers.

MATERIALS AND METHODS

This study was conducted during the first half of March 1986. This period was chosen because in theory (a) baiting should be most successful prior to the initiation of rice planting, and (b) baiting during this period should attract primarily those birds responsible for rice depredations. Four 5-acre fields (two pastures and two plowed fields) located 0.1 to 1.0 mile east and southeast of the Miller's Lake blackbird roost, Evangeline Parish, Louisiana, were selected as test sites[4/]. Approximately 65% of each field was baited with a 50/50 mixture of cracked corn and dehulled brown rice at a rate of 50 lb/A. Bait was applied in 13-ft swaths spaced 7 ft apart using a Spyker #93 broadcaster pulled by a Suzuki 230 4-wheel ATV. Three dense particle swaths of cracked corn, each 6 to 12 inches wide and equally spaced in the field perpendicular to the broadcast swaths, were established as additional visual attractants to both pasture sites.

To assess bait removal and bait preference by birds, 50 1-ft^2 plots were established in each field. Plots were placed along broadcast bait swaths and

---

1/ This research was supported in part by funds provided by rice producers through the Louisiana Rice Research Board and by the U.S. Department of Agriculture.

2/ Research Biologist, U.S. Department of Agriculture/APHIS/Animal Damage Control Research, Bowling Green, Kentucky.

3/ Wildlife Biologists, U.S. Department of Agriculture/APHIS/Animal Damage Control, Crowley, Louisiana.

4/ Appreciation is expressed to farmer Clifton Fruge for his cooperation in this experiment.

spaced at systematic intervals proportional to total swath length. The 25 odd numbered plots (consumption plots) contained broadcast particles of cracked corn and dehulled brown rice. Five particles each of cracked corn, dehulled brown rice, rough rice, and sunflower meats were placed in the other 25 even numbered plots (preference plots) after the removal of broadcast bait. To determine bait consumption by small mammals and insects, 10 additional 1-ft^2 plots containing broadcast bait were established adjacent to every fifth assessment plot and covered with a 2 ft^2 1 x 2 inch mesh wire bird exclosure. In all plots, bait particles were counted at plot establishment and at 2-day intervals thereafter until bait was consumed.

Blackbird numbers and species composition at the Miller's Lake roost were estimated weekly. To determine bird use of baited fields, bird counts were made on each test field beginning the day of baiting and continuing for 5 days or until bait was consumed. Each count consisted of a 60-minute census conducted from the field edge immediately before sunset as birds returned to the roost. During each observation period, birds landing on test sites and birds passing over fields were recorded by number and species for each minute of observation. To determine potential exposure of baits to nontarget birds, a census route was established around the perimeter of each baited test field. Each route was walked two times 1 to 2 hours after sunrise, and during each census all birds observed or heard were recorded by number and species.

RESULTS AND DISCUSSION

Heavy bird use of Field 1 resulted in 100% bait removal within 2 days following baiting (Tables 1 and 2). Bird use of Field 2 was light for 4 days following baiting, but increased substantially by the fifth day, and 72% of the bait was removed from consumption plots. No bird use was recorded on Fields 3 and 4 immediately after baiting. Heavy rains partially flooded these fields the morning of March 12. This appeared to make both sites more attractive to birds. At bait removal assessment, 100% of bait was estimated to have been removed from both fields, but at least part of the bait was obliterated by rain. Red-winged Blackbirds (Agelaius phoeniceus) were the primary species observed on all four fields. Brown-headed Cowbirds (Molothrus ater) were observed in substantial numbers on Field 1.

Removal of bait from preference plots was almost total in three of the four test fields (Table 2). There appeared to be some difference in percent reduction among bait types in Field 2, but overall, no preference was detected among the bait carriers tested.

Based on removal of bait from exclosures, small mammals and insects could be responsible for removing 46 to 63% of the bait from the two pasture sites (Table 2). Fire ants were observed physically removing bait. Because heavy rains flooded exclosures in both plowed fields, bait removal by small mammals and insects could not be accurately assessed.

Twenty-five species of nontarget birds were recorded on or in the vicinity of test fields (Table 3). More nontarget species foraged at pasture sites than plowed fields. Song Sparrows and Common Crows were the two most abundant nontarget species observed on bait sites. Cardinals and Mourning Doves were the only other two granivorous birds seen foraging on baited fields, but their numbers were minimal.

Because of the small number and positioning of test sites, less than 1% of roosting birds returning on flightlines passed over and were subsequently attracted to baited fields. However, between 25 and 71% of birds passing over the sites landed on them within 0 to 5 days after baiting. Blackbirds were readily decoyed out of flightlines by the first birds to land on baited fields. From 72 to 100% of the bait was consumed within 48 hours after birds began using baited fields. Assuming that the number of birds landing on baited fields is proportional to the number passing over the fields, then it should be possible to bait larger numbers of birds by establishing more baited fields and positioning them under major flightlines. The primary conclusion from this study is that spring roosting populations of blackbirds can be attracted to bait sites near roosts and once attracted will readily accept grain baits.

Table 1. Bird observation data from 4, 5-acre test fields baited with a 50/50 mixture of cracked corn and dehulled brown rice near Miller's Lake, Evangeline Parish, Louisiana. March 1986.

			Observations by date			
Field/type	Treatment date	Observation date(s)	Birds passing over field	Birds landing	Primary species landing	Time on site (min)
1/Pasture	3/3	3/3	40,000	10,000	Cowbirds	12
		3/4	23,000	10,000	Redwings	41
2/Pasture	3/4	3/4-7	18-100,000	0-750	Cowbirds	5
		3/8	9,600	3,000	Redwings	22
3/Plowed	3/10	3/10-11	4,550-5,800	0	----	0
		3/12	10,400	4,050	Redwings	45
		3/13	----	750	Redwings	--
4/Plowed	3/11	3/11	8,500	0	----	0
		3/12	2,100	1,500	Redwings	40
		3/13	8,000	200	Redwings	--

Table 2. Field description, bait application, and bait removal at four test fields near Miller's Lake, Evangeline Parish, Louisiana. March 1986.

				Bait removal plots % reduction by type			Bait preference plots % reduction by type				Bird exclosure plots % reduction by type		
Field/type	Field sizes (acres)	Bait swath (acres)	Bait applied (lb)	Cracked corn	Brown rice	Total	Cracked corn	Brown rice	Rough rice	Sunflower meats	Cracked corn	Brown rice	Total
1/Pasture	5	3.3	163[1/]	100	100	100	100	100	100	100	52	72	63
2/Pasture	5	3.0	170[1/]	63	74	72	37	58	57	79	31	60	46
3/Plowed	5	3.5	200[2/]	100	100	100	100	99	99	97	54	71	64
4/Plowed	5	3.5	200[2/]	100	100	100	99	100	100	91	79	86	83

1/ Another 150 lb of cracked corn added in dense particle swaths but consumption not assessed.

2/ Some bait obliterated by partial flooding of fields during heavy rain.

Table 3. List of nontarget birds seen or heard in vicinity of Miller's Lake test sites, Evangeline Parish, Louisiana. March 1986.

Common name	Scientific name
1. Great Blue Heron	(*Ardea herodias*)
2. Cattle Egret	(*Bubulcus ibis*)
3. Snow Goose	(*Chen caerulescens*)
4. Turkey Vulture	(*Cathartes aura*)
5. Northern Harrier	(*Circus cyaneus*)
6. Red-tailed Hawk	(*Buteo jamaicensis*)
7. American Kestrel	(*Falco sparverius*)
8. Common Moorhen	(*Gallinula chloropus*)
9. American Coot	(*Fulica americana*)
10. Killdeer	(*Charadrius vociferus*)
11. Common Snipe	(*Gallinago gallinago*)
12. Mourning Dove	(*Zenaida macroura*)
13. Barred Owl	(*Strix varia*)
14. Blue Jay	(*Cyanocitta cristata*)
15. American Crow	(*Corvus brachyrhynchos*)
16. House Wren	(*Troglodytes aedon*)
17. American Robin	(*Turdus migratorius*)
18. Blue-gray Gnatcatcher	(*Polioptila caerulea*)
19. Northern Mockingbird	(*Mimus polyglottos*)
20. Northern Cardinal	(*Cardinalus cardinalus*)
21. Savannah Sparrow	(*Passerculus sandwichensis*)
22. Song Sparrow	(*Melospiza melodia*)
23. Dark-eyed Junco	(*Junco hyemalis*)
24. Eastern Meadowlark	(*Sturnella magna*)
25. House Sparrow	(*Passer domesticus*)

PLANT PHYSIOLOGY

PLANT GROWTH REGULATOR EFFECTS ON RICE

R.T. Dunand, J.B. Baker, M.W. Brunson, R.R. Dilly,
G.A. Meche, and J.W. Shrefler

INTRODUCTION

Plant growth regulators (PGRs) can have a tremendous effect on crop production because of their ability to alter plant growth and development. Therefore, determination of modifications to plant growth and development which would improve rice production and identification of PGRs which cause those effects are necessary. At present, research in this area has shown modification of internode elongation can be beneficial, and PGRs have been identified which can modify internode elongation. To date, research has shown PGRs can reduce plant stature by limiting internode elongation. In varieties susceptible to lodging because of tall stature, reductions in plant height by PGRs have been accomplished and have resulted in a greater tolerance of tall varieties to lodging. In addition, studies on modifying internode elongation in rice have shown that PGRs can limit exsertion of the panicle. Studies of this particular response to properly timed applications of PGRs have shown that seed production in red rice can be prevented. In that respect PGRs offers the first control measure for established red rice in commercial rice production. Another area of interest relating to PGRs involves rice biomass production for forage for crawfish. Along with nitrogen fertility, PGRs that promote vegetative growth and elongation are being studied to determine their effects on biomass production and persistence under a winter flood. In an effort to address the objectives of stature reduction, red rice seed elimination and enhanced biomass production, PGRs were tested for their effects on rice growth and development.

Experiment: Stature Reduction in Rice with Mefluidide

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Tebonnet/100 lb/A

Planting Date: May 7, 1986

Row Spacing: 7 in

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on May 7
120-0-0 as urea (45%) on June 2

Plot Size: 8.75 x 23 ft

Treated Area: 8.75 x 23 ft

Treatments:
Application times: June 10 (Tebonnet at mid-tiller)
June 20(Tebonnet at panicle initiation)
June 27 (Tebonnet at panicle differentiation)
Application rates: 0.0625, 0.125, and 0.25 lb ai/A

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 24 hours following application

Herbicide(s): 3 lb/A propanil (Stampede) on May 29
4 lb/A molinate (Ordram) on June 19

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on June 13

Fungicide(s): None

Emergence: May 12

Water Management: Flushed on May 12; Permanent flood on June 6

Harvest Date: Aug 29

Harvested Plot Area: 8.75 x 23 ft

Experimental Design: Randomized complete block with four replications, factorial treatment arrangement

Comments: Mefluidide reduced plant height. Mefluidide applied at mid tiller reduced plant height from 52 in in the untreated control to 49 and 48 in for the 0.0625 and 0.125 lb/A rates, respectively. Mefluidide applied at panicle initiation had similar effects. Panicle initiation treatments reduced plant height from 52 in in the untreated check to 47 and 48 in for the 0.0625 and 0.125 lb/A rates, respectively. Mefluidide applied at panicle differentiation reduced plant height more than mefluidide applied at either of the earlier times of application. Plant heights were 53, 46, and 46 in for plants receiving 0, 0.0625 and 0.125 lb/A mefluidide, respectively, at panicle differentiation.

Grain yield was also reduced by mefluidide. Grain yields from the untreated checks averaged between 6600 and 6700 lb/A. All mefluidide treatments yielded signficantly lower than their respective untreated checks, and mefluidide applied at panicle differentiation resulted in significantly lower grain yields than mefluidide applied at mid tiller and panicle initiation. There were no significant differences in grain yield between the 0.0625 and 0.125 lb/A rates of mefluidide applied at mid tiller and panicle initiation. Grain yields ranged from 5800 to 6200 lb/A. Mefluidide (0.0625 lb/A) applied at panicle differentiation produced significantly lower grain yield than mefluidide applied at mid tiller and panicle initiation, and mefluidide (0.0125 lb/A) applied at panicle differentiation produced significantly lower grain yield than mefluidide (0.0625 lb/A) applied at panicle differentiation.

In contrast, mefluidide increased grain moisture. Grain moisture in the untreated checks ranged from 16.4 to 16.9%. For the 0.0625 lb/A mefluidide rate grain moisture ranged from 17.8 to 18.6% with no significant differences between times of application. Grain moisture was significantly different between times of application for mefluidide applied at the 0.125 lb/A rate. Grain moistures were 18.9, 17.9, and 21.7% for the mid tiller, panicle initiation and panicle differentiation times of application, respectively.

Effect of mefluidide on agronomic factors associated with Tebonnet rice production. Rice Research Station, Crowley, LA. 1986.

Mefluidide application			Grain	
Time (growth stage)	Rate (lb/A)	Plant height (in)	Yield (lb/A)	Moisture (%)
Mid tiller	0	52 a[1]	6610 a	16.4 a
	0.0625	49 b	6200 b	17.8 b
	0.125	48 c	6010 bc	18.9 c
Panicle initiation	0	52 a	6660 a	16.4 a
	0.0625	47 cd	5860 c	18.3 bc
	0.125	48 cd	6100 bc	17.9 b
Panicle differentiation	0	53 a	6600 a	16.9 a
	0.0625	46 d	4700 d	18.6 bc
	0.125	46 d	4350 e	21.7 d

[1] Differences within columns determined by the Duncan's multiple range test ($P<0.05$).

Experiment: Stature Reduction in Rice with XE-1019

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Tebonnet/100 lb/A

Planting Date: May 7, 1986

Row Spacing: 7 in

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on May 7
90-0-0 as urea (45%) on June 2

Plot Size: 4 x 20 ft

Treated Area: 4 x 15 ft

Treatments:
Application times: June 10 (Tebonnet at mid-tiller)
June 23 (Tebonnet at panicle initiation)
Application rates: 0.015 and 0.03 lb/A, XE-1019

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 24 hours following application

Herbicide(s): 3 lb/A propanil (Stampede) on May 29

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on June 13

Fungicide(s): None

Emergence: May 11

Water Management: Flushed on May 12; Permanent flood on June 6

Harvest Date: Sept 2

Harvested Plot Area: center 2.33 x 15 ft

Experimental Design: Randomized complete block with four replications, factorial treatment arrangement

Comments: Plant stature and grain yield were affected by XE-1019 while grain moisture was unaffected. Plant height was affected by rate of application. Plant height was decreased significantly from 51 inches in the untreated control to 46 inches by 0.015 lb ai/A. An additional reduction in plant height to 43 inches resulted from application of 0.03 lb ai/A. Grain yield was affected by time and rate of application. Application of XE-1019 at panicle initiation reduced grain yields about 200 lb/A compared to application at mid-tiller. Incremental decreases of 200 lb/A also resulted with increases in rate. Grain yields were 6700, 6500 and 6300 lb/A for the untreated control and 0.015 and 0.03 lb ai/A rates, respectively. No lodging occurred. The results indicate the potential to reduce lodging in rice with XE-1019 exists. Whether the benefits accrued from the prevention of lodging would be more than the direct grain yield reduction caused by XE-1019 is unknown.

Effect of XE-1019 on stature and grain production of Tebonnet. Rice Research Station, Crowley, LA. 1986.

Application time	Application rate (lb ai/A)	Plant height (in)	Grain Moisture (%)	Grain Yield (lb/A)
		A. Time x Rate		
Mid-tiller	0	51	16.6	6780
	0.015	47	16.2	6610
	0.03	44	16.6	6410
Panicle initiation	0	51	16.7	6620
	0.015	45	16.4	6340
	0.03	43	16.2	6170
		B. Time		
Mid-tiller		47	16.5	6600 a[1/]
Pancile initiation		46	16.4	6400 b
		C. Rate		
	0	51 a	16.7	6700 a
	0.015	46 b	16.4	6500 ab
	0.03	43 c	16.3	6300 b

[1/] Differences within columns determined by the Duncan's multiple range test ($P<0.05$).

Experiment: Mefluidide and Red Rice Seedhead Suppression - Time and Rate of Application Study

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Labelle/200 lb/A

Planting Date: Apr 4, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Apr 2
90-0-0 as urea (45%) on Apr 18

Plot Size: 5 x 30 ft

Treated Area: 5 x 30 ft

Treatments:
Application times: June 12 Labelle at mid boot, (MB)
June 17 (Labelle at first heading, (FH)
June 24 Labelle at 100% headed (HD), 100%
July 1 Labelle at milk stage, (MS)
Application rates: 0.125, 0.25, and 0.5 lb/A, mefluidide (Embark)

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 6 hours following application

Herbicide(s): 3 lb/A propanil (Stampede) on Apr 18

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on May 9

Fungicide(s): None

Emergence: Apr 8

Water Management: Flooded for seeding on Apr 3; Drained on Apr 7; Permanent flood on Apr 21

Harvest Date: July 29

Harvested Plot Area: center 4 x 25 ft

Experimental Design: Randomized complete block with three replications, factorial treatment arrangement

Comments: Red rice panicle suppression was greatest for the mid boot, first heading and 100% headed times of application. The most effective rates of mefluidide were 0.25 and 0.5 lb/A. In some instances complete red rice panicle suppression was achieved.

Grain yield was affected by some mefluidide treatments. Primarily mefluidide applied at the first heading and 100% headed stages of growth decreased grain yield. This was due not only to the suppression of red rice seed production but also to a direct effect on Labelle. There were significantly higher levels of empty Labelle florets for the first heading and 100% headed application times. It is during these stages of Labelle growth that heading is occurring and pollination or grain filling are undoubtedly sensitive to the presence of mefluidide.

Grain moisture was decreased due to mefluidide application. In the instances in which red rice suppression was highest, grain moisture was most dramatically affected. Since red rice is later maturing than Labelle, red rice moisture content is high when Labelle reaches harvest moisture (18-21%). Consequently, reductions in red rice seed due to mefluidide resulted in lower harvested grain moistures.

Lodging was lowest when red rice suppression was highest. Red rice has long stems and tall stature. Both plant characters influence lodging in rice in general. When red rice populations are high the contribution of red rice to lodging can be significant. The seedhead suppressant activity of mefluidide on red rice decreases stem development which can decrease the contribution red rice makes to lodging.

Grade and milling, factors which determine rice market value, were positively influenced by mefluidide. Grade, based on red rice content alone, was improved from grade 6 to 1 with increasing mefluidide rate for the mid boot timing. For the other timings grade was improved from sample grade to grades 4, 3 and 5 for the first heading, 100% headed and milk stage timings, respectively. Sample grade is the lowest grade possible and 1 is the highest grade possible. Milling yield is divided into two categories, total and whole milling yields. Total milling yield is the percentage of the grain remaining after shelling, hull (lemma and palea) removal and milling, bran removal. Whole milling yield is the percentage of the grain which completes the milling process with the majority of its endosperm intact. Commmercial rice has been selected for its ability to withstand the milling process but red rice has not. Consequently, red rice has a greater tendency to break during processing and be lost resulting in less of the original sample finishing the process and causing low milling yields.

In this experiment, total and whole milling yields were influenced similarly by mefluidide time and rate of application. Total milling yield was increased from the upper 50's in the untreated checks to the mid and upper 60's and 70 with mefluidide applications. Similarly, whole milling yield was increased from the low and upper 40's in the untreated checks to as high as the lower 60's. With mefluidide total and whole milling yields were highest from mefluidide application during mid boot, intermediate for applications during late boot and lowest for applications during 100% headed and milk stage.

The results for grade and milling reflect considerable differences in price. In this experiment, price support was increased from less than \$4.22 to over \$8.00 for the application of mefluidide at the various times of application.

Mefluidide had a very positive affect on rice production where red rice was the primary problem. The only negative affect was injury to the commercial variety with the first heading and 100% headed applications. In general the difference in maturity of the very early season commercial variety and red rice allowed mefluidide applications at the mid boot, late boot and 100% headed stages of growth of the commercial variety to selectively inhibit red rice reproductive growth. Immediate tangible benefits to a rice farmer due to improvements in productivity inferred from these results would be higher direct prices, lower drying costs and more efficient harvest. Long term benefits would be less red rice seed returned to the soil and lower red rice infestations in future rice production.

Effect of time and rate of application of mefluidide on red rice panicle suppression and agronomic factors associated with commercial rice production. Rice Research Station, Crowley, LA. 1986.

Application time (Labelle growth stage)	Mefluidide rate (lb/A)	Red rice panicle suppression (%)	Grain Yield (lb/A)	Grain Moisture[2] (%)	Lodging (%)	Empty florets (%)	Grade	Milling Total (%)	Milling Whole (%)	Price ($/cwt)
Mid boot	0	0	3014	18.9 (>23.0) a	80 ab	0 d	6 ab	59 e	48 ef	5.02
	0.125	60	2208	14.4 (>23.0) cd	10 d	0 cd	5 cd	66 bc	60 abc	6.76
	0.25	100	2111	13.6 (22.5) d	0 d	0 d	2 e	68 ab	63 ab	8.09
	0.5	100	1783	12.4 (19.2) d	0 d	0 d	1 e	70 a	64 a	8.26
First heading	0	0	1912	18.7 (>23.0) a	80 ab	0 d	SG[3] a	56 f	42 hi	3.92
	0.125	50	2068	14.5 (>23.0) cd	20 cd	0 cd	5 cd	66 bc	55 cd	6.39
	0.25	90	1487	12.7 (21.8) d	0 d	20 bcd	4 cd	67 ab	56 cd	6.91
	0.5	100	1292	12.7 (21.6) d	0 d	80 a	4 d	66 bc	51 de	6.49
100% headed	0	0	1981	18.2 (>23.0) a	90 a	0 d	SG a	56 f	42 ghi	3.92
	0.125	40	1756	17.4 (>23.0) ab	60 b	30 b	6 ab	58 ef	39 i	4.30
	0.25	80	1822	15.0 (>23.0) bcd	20 cd	20 bcd	5 cd	64 cd	46 efgh	5.62
	0.5	100	1379	13.2 (22.3) d	0 d	20 bc	3 d	64 cd	43 fghi	6.10
Milk stage	0	0	2206	17.2 (>23.0) abc	80 ab	0 d	SG ab	59 e	47 efg	4.44
	0.125	10	2250	17.7 (>23.0) ab	90 a	0 d	6 ab	59 ef	47 efg	4.94
	0.25	60	2287	17.8 (>23.0) ab	80 ab	0 d	SG ab	63 d	53 d	5.09
	0.5	30	2595	14.4 (>23.0) cd	30 c	0 d	5 bc	66 bc	59 bc	6.69
Mid boot		60 a[1]	2279 a	14.8	20	0	4	66	59	
Late boot		60 a	1690 b	14.7	20	30	5	64	51	
First heading		50 a	1735 b	16.0	40	20	5	60	42	
Milk stage		20 b	2334 a	16.8	70	0	6	62	52	
	0	0 c	2278	18.3	85	0	SG	58	45	
	0.125	40 b	2070	16.0	40	10	6	62	50	
	0.25	80 a	1927	14.8	30	10	4	65	54	
	0.5	80 a	1762	13.2	10	20	3	67	54	

1/ Differences within columns determined by the Duncan's multiple range test (P<.05).

2/ Grain moisture was determined one week after harvest since harvest moistures (in parentheses) were off scale at harvest.

3/ Sample grade.

Experiment: Amidochlor and Red Rice Seedhead Suppression - Time and Rate of Application Study

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Labelle/200 lb/A

Planting Date: Apr 11, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Apr 8
90-0-0 as urea (45%) on Apr 8

Plot Size: 5 x 30 ft

Treated Area: 5 x 15 ft

Treatments:
- Application times: June 23 Labelle at late boot (LB)
  June 30 Labelle at 100% headed, 100% (HD)
  July 7 Labelle at milk stage (MS)
- Application rates: 0.75, 1.5, and 3.0 lb/A amidochlor (Limit)

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No significant rainfall for 24 hours after application

Herbicide(s): None

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on May 9

Fungicide(s): None

Emergence: Apr 16

Water Management: Flooded for seeding on Apr 9; Drained on Apr 14; Permanent flood on Apr 17

Harvest Date: July 31

Harvested Plot Area: center 3 x 13 ft

Experimental Design: Randomized complete block with three replications, factorial treatment arrangement

Comments: Grain yield and moisture were lower on the average for the late boot application and for the three rates of amidochlor. Yield reduction for the late boot application was due not only to the suppression of red rice but also to the suppression of Labelle. At the 3 lb/A rate of amidochlor 80% of Labelle stems had panicles suppressed to some degree. Rate effects on grain yield were due primarily to the suppression of red rice. Grain yields were low in general due to the high red rice population (2-5 plants/ft^2). Grain moisture was identically affected by time and rate of application of amidochlor. Red rice was later maturing than Labelle and high in moisture at Labelle maturity. Consequently, amidochlor treatments which suppressed red rice resulted in less red rice seed in the harvested grain and lower grain moisture.

Lodging and dockage were decreased by amidochlor. Lodging was lower for the late boot and 100% headed times of application compared to the milk stage time of application and for all rates of amidochlor compared to the untreated checks. Dockage was decreased for all rates of amidochlor and the late boot and full head times of application. For the milk stage time of application dockage was decreased significantly with the 3 lb/A rate of amidochlor only. Red rice has lengthy stems and tall stature. Both plant characters influence lodging and dockage in rice in general. When red rice populations are high the contribution of red rice to lodging and dockage can be significant. The seedhead suppressant activity of amidochlor on red rice decreases stem development which can decrease the contribution red rice makes to lodging and dockage.

Grade and milling, factors which determine rice market value, were positively influenced by amidochlor. Grade, based on red rice content alone, was improved from sample grade (SG) in the untreated check to 2 for the 1.5 and 3.0 lb/A rates of amidochlor and the late boot time of application, and improved from sample grade in the untreated check to 3 for the 1.5 and 3.0 lb/A rates of amidochlor and the 100% headed time of application. Sample grade is the lowest grade possible and 1 is the highest grade possible. Amidochlor had no affect on grade for the milk stage time of application. Milling yield is divided into two categories, total and whole milling yields. Total milling yield is the percentage of the grain remaining after shelling, hull (lemma and palea) removal and milling, bran removal. Whole milling yield is the percentage of the grain which completes the milling process with the majority of its endosperm intact. Commercial rice has been selected for its ability to withstand the milling process but red rice has not. Consequently, red rice has a greater tendency to break during processing and be lost resulting in less of the original sample finishing the process and causing low milling yields.

In this experiment, total and whole milling yields were influenced similarly by amidochlor time and rate of application. Total milling yield was increased from the mid and upper 50's in the untreated checks to the mid 60's and 70 for the late boot and full head times of application and to the low and mid 60's for the milk stage time of application. Whole milling yield was increased from the low and mid 40's to the low and upper 60's for the late boot and full head times of application and to the mid 50's for the milk stage time of application. The improvement in milling yields for the milk stage application indicated a decrease in red rice in the harvested sample due to amidochlor application. But there was no affect on grade as previously mentioned. Red rice was high in the yield samples ranging from approximately 30 to 40%. The application of amidochlor under these conditions of high red rice could have decreased red rice content to near 15% for the milk stage application. This would have resulted in no improvement in grade but the resultant 15 to 25% decrease in red rice content could have affected milling yields.

The results for grade and milling reflect considerable differences in price. In this experiment, government price support was increased from less than $4.37 to over $7.00 for the application of amidochlor at the late boot and 100% headed times of application.

Amidochlor had a very positive affect on rice production where red rice was the primary problem. The only negative affect was injury to the commercial variety with the late boot applications. In general the difference in maturity of the very early season commercial variety and red rice allowed amidochlor applications at the 100% headed stage of growth of the commercial variety to selectively inhibit red rice reproductive growth. Immediate tangible benefits to a rice farmer due to improvements in productivity inferred from these results would be higher direct prices, lower drying costs, more efficient harvest and cleaner grain samples. Long term benefits would be less red rice seed returned to the soil and lower red rice infestations in future rice production.

Effect of time and rate of application of amidochlor for red rice suppression on agronomic factors associated with commercial rice production. Rice Research Station, Crowley, LA. 1986.

Application time (Labelle growth stage)	Amidochlor rate (lb/A)	Grain yield (lb/A)	Harvest moisture (%)	Lodging (%)	Labelle injury (%)	Dockage (g)	Grade	Milling Total (%)	Milling Whole (%)	Price ($/cwt)
Late boot	0	3633	>23.0	80	0 d	242 a	SG[2] a	56 d	43 c	<4.30
	0.75	2727	22.1	0	20 c	134 c	3 b	67 b	64 a	7.81
	1.5	2531	20.2	0	50 b	84 d	2 b	69 ab	66 a	8.36
	3.0	2034	20.3	0	80 a	69 d	2 b	70 a	69 a	>8.48
100% heading	0	3249	>23.0	60	0 d	213 ab	SG a	57 d	44 c	<4.37
	0.75	3242	20.1	0	0 d	87 d	5 a	67 b	63 a	7.04
	1.5	3102	19.8	0	0 d	70 d	3 b	68 ab	64 a	7.86
	3.0	3044	20.0	0	0 d	72 d	3 b	68 ab	64 a	7.86
Milk stage	0	3288	>23.0	80	0 d	213 ab	SG a	58 d	44 c	<4.37
	0.75	2972	>23.0	30	0 d	171 bc	SG a	63 c	54 b	5.17
	1.5	2652	>23.0	40	0 d	176 bc	SG a	64 c	54 b	5.22
	3.0	3227	>23.0	30	0 d	165 c	SG a	65 c	56 b	5.41
Late boot		2731 b[1]	21.5 b	20 b	40	132	4	66	60	
100% heading		3159 a	20.7 b	20 b	0	110	4	65	59	
Milk stage		3035 ab	>23.0 a	40 a	0	181	SG	62	52	
	0	3390 a	>23.0 a	70 a	0	223	SG	57	44	
	0.75	2980 b	21.6 b	10 b	10	131	5	66	60	
	1.5	2762 b	21.0 b	10 b	20	110	4	67	61	
	3.0	2769 b	21.0 b	10 b	30	102	4	68	62	

1/ Differences within columns determined by the Duncan's multple range test (P<.05).
2/ Sample grade.

Experiment: UBI-1444 and Red Rice Seedhead Suppression - Time and Rate of Application Study

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Labelle/200 lb/A

Planting Date: Apr 11, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Apr 8
90-0-0 as urea (45%) on Apr 8

Plot Size: 5 x 30 ft

Treated Area: 5 x 30 ft

Treatments:
Application times: July 2, Labelle at milk stage (MS)
July 9, Labelle at dough stage (DS)
July 16, Labelle at physiological maturity (PM)
Application rates: 0.5, 1.0, and 2.0 lb/A UBI-1444

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 6 hours following application

Herbicide(s): None

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on May 9

Fungicide(s): None

Emergence: Apr 16

Water Management: Flooded for seeding on Apr 9; Drained on Apr 14; Permanent flood on Apr 17

Harvest Date: Aug 7

Harvested Plot Area: center 4 x 25 ft

Experimental Design: Randomized complete block with three replications, factorial treatment arrangement

Comments: Suppression of red rice panicles occurred with the milk and dough stage applications. Results were most consistent at the 2 lb/A rate with red rice panicle suppression at 100%. The same results were found with the dough stage and 1 lb/A treatment and were expected but did not occur with the milk stage and 1 lb/A treatment. Field observations indicated no differences between the 1 and 2 lb/A rates for the milk stage application. Four red rice plants were sampled from each plot for the seedhead suppression evaluation. All stems (main and tiller) from each plant were evaluated for suppressed panicles. No explanation can be given at this time for the difference in the field observations and the data collected for the 1 lb/A rate and the milk stage time of application.

Plants with suppressed panicles are shorter than normal, and panicles which are suppressed and do not exsert the boot have limited pollination and seed production. The direct effect of these two activities of a seedhead suppressant such as UBI-1444 on agronomic factors associated with commercial rice production is reflected in the lodging and grain production results.

Lodging was reduced as a direct result of UBI-1444 shortening the red rice. Red rice heading was noted after the milk and dough stage applications. Although no direct measurements of plant height were taken, red rice was noticeably shorter in the milk and dough stage treatments compared with the other treatments.

Grain production was significantly affected by time and rate of application of UBI-1444. Of all grain production variables studied, grain yield was least affected. Equivalent yields occurred in all treatments except the 0.5 lb/A rate at physiological maturity, which was higher than any other treatment. The higher yield with that treatment can not be explained. Grain yields in general were low due to red rice competition. There were 3 to 5 red rice plants/ft^2 which is a high red rice infestation. Grain moisture in several treatments was lower than in the control. This is explained by the lack of red rice seed in those particular treatments. Red rice is later maturing than Labelle and high in moisture when Labelle is at harvest moisture. Consequently, Labelle samples containing a lot of red rice have a higher moisture content than Labelle samples containing little or no red rice. In addition, the presence of red rice seed in a commercial rice sample can affect grade and milling, the primary factors determining rice sale price. The 2 lb/A rate of UBI-1444 applied at the milk stage, dough stage and physiological maturity resulted in significantly better grades of rice and milling values. This resulted in higher rice price estimates.

From these experimental results, it is clear that UBI-1444 can reduce the negative impact of red rice on commercial rice production. In commercial rice production where a very early season variety matures before red rice, UBI-1444 can be applied after active grain filling has begun in the commercial variety yet while red rice has not begun active seed formation and selectively limit red rice seed production with minimal impact on the commercial variety.

The effects of UBI-14444 on red rice suppression and agronomic factors associated with commercial rice production. Rice Research Station, Crowley, LA. 1986.

				Grain					
							Milling		Unit
Labelle growth stage[1/]	UBI-14444 (lb/A)	Red rice suppression[2/] (%)	Lodging[3/] (%)	Yield[4/] (lb/A)	Moisture (%)	Grade[5/]	Total (%)	Whole (%)	price ($/cwt)
-	0	0 a[6]	90 a	1909 b	20.7 a	SG a	68 ab	56 cd	5.56 d
Milk stage	0.5	0 a	80 a	1816 b	21.1 a	5 b	68 ab	58 bcd	6.71 c
	1.0	33 b	10 c	1951 b	17.2 d	4 cd	69 ab	63 a	7.54 ab
	2.0	100 c	0 c	1742 b	16.7 d	2 e	70 a	62 ab	8.11 a
Dough stage	0.5	36 b	80 a	2378 b	19.8 abc	SG a	67 b	57 cd	5.59 d
	1.0	100 c	80 a	1758 b	21.0 a	4 bc	68 ab	58 bcd	7.11 bc
	2.0	100 c	40 b	2217 b	17.7 cd	2 e	69 ab	60 abc	7.91 a
Physiological maturity	0.5	11 ab	70 a	3131 a	18.2 bcd	6 a	67 b	57 cd	6.09 d
	1.0	22 ab	80 a	1865 b	20.5 ab	4 bc	64 c	56 d	6.76 c
	2.0	28 b	90 a	1714 b	19.8 abc	3 de	69 ab	61 ab	7.69 ab

1/ Milk stage = 100% headed + 1 week; dough stage = 100% headed + 2 weeks; physiological maturity = 100% headed + 3 weeks.

2/ Percentage of red rice stems with panicles totally suppressed.

3/ Percentage of plot area with fallen plants.

4/ Adjusted to 12% moisture.

5/ SG = sample grade.

6/ Differences within columns determined by the Duncan's multiple range test (P<.05).

Experiment: Preplant Herbicide and Seedhead Suppressant Combinations for Red Rice Control

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Labelle/200 lb/A

Planting Date: Apr 30, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 ($N-P_2O_5-K_2O-ZnSO_4$) as 8-24-24-1.2 Zn and 90-0-0 as urea (45%) on Apr 28

Plot Size: 7 x 50 ft

Treated Area: 7 x 50 ft

Treatments:

Preplant herbicides: 3 lb/A thiobencarb (Bolero) PPS on Apr 28
4 lb/A molinate (Ordram) PPI on Apr 28

Seedhead Suppressants: 0.25 lb/A mefluidide (Embark) on July 7
1.50 lb/A amidochlor (Limit) on July 14

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: 0.02 in within 24 hours following Embark application

Herbicide(s): See Treatments

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on June 13

Fungicide(s): None

Emergence: May 2

Water Management: Flooded for seeding on Apr 29; Drained on Apr 30; Permanent flood on May 2

Harvest Date: Aug 26

Harvested Plot Area: center 1 sq. ft. for stand and center 1 sq. meter for panicle density and grain yield

Experimental Design: Randomized complete block four replications, split plot (whole plot = preplant herbicide, subplot = seedhead suppressant)

Comments: Red rice stand and Labelle grain yield were affected by preplant herbicides only. Red rice stands were 6, 3 and 2 plants/ft^2 in the untreated control, Ordram and Bolero, respectively. Labelle grain yields were 97, 288, and 444 g/m^2 for the same treatments, respectively. Bolero provides better control of rice weeds in general compared to Ordram which may explain the yield differences. No weed control ratings were taken and no differences between weed control were noticeable.

Red rice panicle density was affected by both preplant herbicide and seedhead suppressant. Molinate and thiobencarb reduced panicle density below control levels in the absence of seedhead suppressant. There was no difference between panicle densities with molinate or thiobencarb. Panicle density reduction due to preplant herbicide resulted from red rice stand reduction. In general, the effect of seedhead suppressant on red rice panicle density was independent of preplant herbicide. There was no difference in panicle density with mefluidide and amidochlor regardless of preplant herbicide. Amidochlor reduced red rice panicle density below levels obtained with molinate alone but not below levels obtained with thiobencarb alone. Panicle densities obtained with mefluidide were no different from panicle densities obtained with preplant herbicides alone. Additivie effects of preplant herbicide and seedhead suppressant were not observed statistically except with molinate and amidochlor. Although numercially there were trends toward interactive effects the data was highly variable (c.v. = 90%) explaining the lack of statistical support.

Effects of seedhead suppressants and preplant herbicides on red rice and Labelle. Rice Research Station, Crowley, LA. 1986.

		Red rice		Labelle	
Seedhead suppressant	Preplant herbicide	Stand (plants/ft^2)	Panicle density (panicles/m^2)	Stand (plants/ft^2)	Yield (g/m^2)
-	-	4	78 a[1/]	26	106
	molinate	2	32 bc	20	309
	thiobencarb	3	23 cd	22	420
mefluidide	-	6	14 cd	23	147
	molinate	5	8 cd	30	279
	thiobencarb	2	7 cd	24	454
amidochlor	-	8	2 d	15	39
	molinate	2	2 d	23	277
	thiobencarb	1	<1 d	19	456
-		3	44	23	278
mefluidide		4	10	26	294
amidochlor		3	1	19	258
	-	6 a	31	22	97 c
	molinate	3 b	14	24	288 b
	thiobencarb	2 b	10	22	444 a

1/ Difference within columns determined by the Duncan's multiple rante test (P=0.05).

Experiment: Fenoxyprop-ethyl and Red Rice Control - Time of Application Study

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Labelle/200 lb/A

Planting Date: Apr 4, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Apr 2
90-0-0 as urea (45%) on May 9

Plot Size: 5 x 30 ft

Treated Area: 5 x 30 ft

Treatments: Application time:
May 6, Labelle at first tiller (FT)
May 23, Labelle at late tiller (LT)
June 5, Labelle at panicle differentiation (PD)
June 12, Labelle at late boot (LB)
Application rate: 0.15 lb/A fenoxyprop-ethyl (Whip)

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 24 hours following application

Herbicide(s): 3 lb/A propanil (Stampede) on Apr 18

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on May 9

Fungicide(s): None

Emergence: Apr 9

Water Managementnt: Flooded for seeding on Apr 3; Drained on Apr 7; Permanent flood on May 12

Harvest Date: Aug 19

Harvested Plot Area: 5 x 30 ft

Experimental Design: Randomized complete block with three replications, factorial treatment arrangement

Comments: Red rice stand and panicle density were unaffected by applications of fenoxyprop-ethyl. Red rice height was significantly lower when fenoxyprop-ethyl was applied at panicle differentiation and late boot. Labelle grain yield was highest with the panicle differentiation and late boot treatments. Labelle stand was increased by the late boot application and plant height was shortest for the late boot application.

Fenoxyprop-ethyl exhibited no herbicide activity on red rice under the experimental conditions imposed. Increased Labelle yields and stands in response to certain timings are encouraging as well as the reduction in red rice height.

Effect of time of application of fenoxyprop-ethyl on red rice and commercial rice. Rice Research Station, Crowley, LA. 1986.

	Labelle			Red rice			
					Panicle production		
	Grain yield (lb/A)	Stand (plants/ ft^2)	Height (cm)	Stand (plants/ ft^2)	(panicles/ ft^2)	(panicles/ plant)	Height (cm)
Application time							
CK	2785 a[1/]	16 a	118 b	17 a	13 a	0.7 a	140 c
Early tiller	2665 a	15 a	131 c	13 a	12 a	0.9 ab	142 c
Late tiller	2732 a	22 b	114 b	15 a	17 a	1.1 b	131 bc
Panicle differentiation	3540 b	12 a	110 ab	20 a	20 a	1.0 ab	126 b
Early boot	3260 b	17 a	104 a	19 a	18 a	1.0 ab	120 a

1/ Differences within columns determined by the Duncan's multiple range test (P< 05).

Experiment: Fenoxyprop-ethyl and Red Rice Control - Seeding Rate Study

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Labelle/see Treatments

Planting Date: Apr 4, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Apr 2
90-0-0 as urea (45%) on May 9

Plot Size: 5 x 30 ft

Treated Area: 5 x 30 ft

Treatments:
- Application time: May 23, Labelle at late tiller (LT)
- Application rate: 0.15 lb/A fenoxyprop-ethyl (Whip)
- Seeding rates: 50, 100, and 200 lb/A

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 24 hours following application

Herbicide(s): 3 lb/A propanil (Stampede) on Apr 18

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on May 9

Fungicide(s): None

Emergence: Apr 9

Water Management: Flooded for seeding on Apr 3; Drained on Apr 7; Permanent flood on May 12

Harvest Date: Aug 19

Harvested Plot Area: 5 x 30 ft

Experimental Design: Randomized complete block with three replications

Comments: The combination of fenoxyprop-ethyl applied at late tiller of Labelle and Labelle seeding rate of 200 lb/A reduced red rice stand and panicle density. Red rice tillering (plant basis) and plant height were unaffected. Labelle stand increased with increasing seeding rate. Labelle grain yield and plant height were unaffected. Cultivar stand and fenoxyprop-ethyl have the potential to reduce red rice infestations.

Effect of seeding rate and fenoxyprop-ethyl on red rice and commercial rice. Rice Research Station, Crowley, LA. 1986.

	Labelle			Red rice			
	Grain yield (lb/A)	Stand (plants/ ft^2)	Height (cm)	Stand (plants/ ft^2)	Panicle production (panicles/ ft^2)	Panicle production (panicles/ plant)	Height (cm)
Seeding rate (lb/A)							
50	2667	10 a[1/]	109	20 b	22 b	1	125
100	3072	12 ab	111	14 ab	17 ab	1	132
200	2705	24 b	118	12 a	12 a	1	125

1/ Differences within columns determined by the Duncan's multiple range test (P<.05).

Experiment: Fenoxyprop-ethyl and Red Rice Control - Rice Variety Study

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: See treatments/200 lb/A

Planting Date: Apr 4, 1986

Row Spacing: Broadcast (water-seeded)

Fertilizer: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Apr 2
90-0-0 as urea (45%) on May 9

Plot Size: 5 x 30 ft

Treated Area: 5 x 30 ft

Treatments:
Application time: May 23 (varieties at late tiller)
Application rate: 0.15 lb/A fenoxyprop-ethyl
Varieties: Lemont, Newbonnet, and Tebonnet

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: No rainfall within 24 hours following application

Herbicide(s): 3 lb/A propanil (Stampede) on Apr 18

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on May 9

Fungicide(s): None

Emergence: Apr 9

Water Management: Flooded for seeding on Apr 3; Drained on Apr 7; Permanent flood on May 12

Harvest Date: Aug 19

Harvested Plot Area: 5 x 30 ft

Experimental Design: Randomized complete block with three replications

Comments: Of the three cultivars studied, Lemont treated with fenoxyprop-ethyl at late tiller had a higher grain yield than Tebonnet or Newbonnet treated similarly. Cultivar stand, red rice stand, and red rice panicle production were unaffected. Lemont can be more productive than Tebonnet or Newbonnet when each is treated with fenoxyprop-ethyl at late tiller and when each is growing in an area heavily infested with red rice.

Effect of variety and fenoxyprop-ethyl on red rice and commercial rice. Rice Research Station, Crowley, LA. 1986.

	Labelle			Red rice			
					Panicle production		
	Grain yield (lb/A)	Stand (plants/ ft^2)	Height (cm)	Stand (plants/ ft^2)	(panicles/ ft^2)	(panicles/ plant)	Height (cm)
Variety							
Tebonnet	2988 a[1/]	23	-	12	14	1	-
Lemont	4231 b	23	-	12	13	1	-
Newbonnet	3494 ab	17	-	15	17	1	-

[1/] Differences within columns determined by the Duncan's multiple range test ($P < .05$).

Experiment: Plant Growth Regulators, Soil Fertility and Rice Biomass in Crawfish Production

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/none

Variety/Seeding Rate: Mars/100 lb/A

Planting Date: Aug 28, 86

Row Spacing: 7 in

Fertilizer: See Treatments

Plot Size: 8.75 x 23 ft

Treated Area: center 5 x 23 ft

Treatments:
Sampling dates: Oct 21, Dec 4, Jan 16, Mar 3
Soil fertility: 24-72-72-3.6 (N-P_2O_5-K_2O-$ZnSO_4$) as 8-24-24-1.2 Zn on Aug 28; 0, 24, and 48 lb N/A as urea (45%) on Oct 1
Plant Growth Regulators: 0.5 lb/A mefluidide (Embark) on Oct 15
6.4 lb/A gibberellin (Pro-Gib) on Oct 15

Sprayer: CO_2-driven, hand-held, 32 psi, 15 GPA, 80015 nozzles

Pertinent Rainfall: 0.02 in within 24 hours following Embark application

Herbicide(s): 4 lb/A propanil (Stampede) on Sept 30

Insecticide(s): None

Fungicide(s): None

Emergence: Sept 4

Permanent Flood: Oct 24, 8-10 in flood depth

Harvest Date: None

Harvested Plot Area: None

Experimental Design: Randomized complete block with three replications, split plot (whole plot = harvest date, subplot = nitrogen, mefluidide, and gibberellin rates), factorial arrangement of subplots

Comments: Time after flooding had the greatest effect on rice biomass (Table 1). Rice biomass peaked six weeks after flood up and remained high until twelve weeks after flood up. Shortly thereafter cold weather killed the plant above the water line and biomass decreased to about the same level which was present at flood up. Of the inputs relating to soil fertility and plant growth regulation, only soil nitrogen fertility had an effect. At the 12th week following flood up rice biomass was lower at the 48 lb N/A rate than at the 72 lb N/A rate yet there was no difference in rice biomass between the 24 and 72 lb N/A rates. This decrease is unexplained.

Although the plant growth regulators had no effect on rice biomass, rice growth and development was affected. Six weeks following flood up mefluidide increased stem number and decreased panicle exsertion while plant height was affected by a combination of nitrogen fertility, mefluidide and gibberellin (Table 2). The number of stems from mefluidide treated plots average 114 per sample compared with 77 for plots not receiving mefluidide. The proliferation of stems in the mefluidide treated plots was the result of suppressed reproductive development. Mefluidide prevented panicle exsertion which resulted in an average of 4 panicles per sample in plots receiving mefluidide compared with 28 panicles per sample in plots receiving no mefluidide. The ability of mefluidide to increase biomass by increasing stem number was probably offset by the decrease in biomass associated with mefluidide-suppressed stem elongation.

Table 1. Response of rice biomass to nitrogen fertility and plant growth regulators over time in a simulated crawfish production system. Rice Research Station, Crowley, LA. 1986.

	Nitrogen Effects		Mefluidide Effects		Gibberellin Effects	
Time after flooding (weeks)	Nitrogen rate (lb/A)	Dry weight (g)	Mefluidide rate (lb/A)	Dry weight (g)	Gibberellin rate (lb/A)	Dry weight (g)
0	24	61 a[1/][2/]	0	66 a	0	63 a
	48	64 a	0.5	62 a	6.4	65 a
	72	67 a				
6	24	166 de	0	168 c	0	175 c
	48	161 de	0.5	165 c	6.4	158 c
	72	172 e				
12	24	128 cd	0	123 b	0	119 b
	48	104 bc	0.5	126 b	6.4	130 b
	72	142 d				
18	24	80 ab	0	80 a	0	81 a
	48	86 ab	0.5	80 a	6.4	79 a
	72	75 a				

1/ Data collected from 3 linear row feet per plot.

2/ Differences within columns determine by the Duncan's multiple range test (P=0.05).

Table 2. Response of rice to nitrogen fertility and plant growth regulators six weeks following flood up in a simulated crawfish production system. Rice Research Station, Crowley, LA. 1986.

Nitrogen rate (lb/A)	Mefluidide rate (lb/A)	Gibberellin rate (lb/A)	Dry weight (g)	Stem count (no)	Panicle count (no)
24	0	0	207[1/]	85	39
		6.4	165	70	27
	0.5	0	166	110	6
		6.4	127	86	4
48	0	0	138	87	19
		6.4	160	65	35
	0.5	0	164	114	3
		6.4	183	124	6
72	0	0	201	84	34
		6.4	138	71	15
	0.5	0	174	142	2
		6.4	174	111	6
Mefluidide main effects:					
	0		168	77 a[2/]	28 a
	0.5		165	114 b	4 b

[1/] Data collected from 3 linear row feet per plot.

[2/] Differences within columns determined by the Duncan's multiple range test (P=0.05).

SUMMARY

Plant growth regulators reduced plant height, limited red rice seed production and stimulated rice vegetative development for crawfish forage.

In studies with plant growth regulators for stature reduction, plant height was reduced 3 to 8 inches by mefluidide and XE1019. In addition grain yields were decreased as much as 2200 lb/A by mefluidide and 400 lb/A by XE1019. Grain moisture was increased up to 5% by mefluidide and unaffected by XE-1019.

Red rice seed production was reduced by limiting panicle exsertion with amidochlor, mefluidide and UBI-1444. Complete red rice seedhead suppression was obtained with 1.5 lb/A amidochlor applied at 100% heading, 0.25 lb/A mefluidide applied at mid boot and 2.0 lb/A UBI-1444 applied at milk stage of the commercial variety. Grain yields were decreased proportionate to reduced red rice seed production. In addition, grain moisture decreased 6%, grade was raised from sample grade to No. 2 , and milling yield improved up to 10% as the result of reductions in grain red rice content. Lodging decreased as much as 80% because of reductions in red rice height associated with seedhead suppression. Injury to commercial rice occurred when amidochlor was applied before heading and when mefluidide was applied during flowering. Molinate and thiobencarb (preplant herbicides for red rice control) in combination with amidochlor and mefluidide applied for red rice seedhead suppression reduced red rice populations by 80% and prevented red rice seed production in red rice plants which escaped preplant herbicide control. In areas heavily infested with red rice, fenoxyprop-ethyl applied at panicle differentiation and early boot of commercial rice increased grain yield without reducing red rice stand. Red rice growth was affected by panicle differentiation and early boot fenoxyprop-ethyl applications because plant height was reduced significantly compared to the untreated control and earlier application times. Red rice stands were lowered by the combination of fenoxyprop-ethyl applied at late tiller of the commercial rice and 100 and 200 lb/A commercial rice seeding rates compared to lower seeding rates. Lemont was more competitive with red rice than Tebonnet or Newbonnet when fenoxyprop-ethyl was applied at late tiller of all three cultivars.

Rice biomass was highest 6 to 12 weeks after flood up and was not increased by mefluidide or gibberellin. Mefluidide increased stem number by 50% but associated biomass increases were offset by reduced stem elongation associated with mefluidide-arrested reproductive development. Mefluidide decreased panicle exsertion by 90%.

CONCLUSIONS

Plant growth regulators can alter plant growth to reduce plant height and increase vegetative development in commercial rice and minimize red rice seed production. Modifications in stem development by plant growth regulators are responsible.

Plant growth regulators applied during vegetative stages of growth reduce internode elongation during the early stages of stem development reducing plant height. The plant growth regulators mefluidide and XE-1019 reduce plant stature providing the potential to minimize lodging.

Plant growth regulators applied during the early stages of reproductive development reduce internode elongation associated with panicle exsertion. Panicle suppression reduces seed production since rice does not pollinate well unless the panicle is fully exserted. The differential in maturities between very early season commercial varieties and red rice can be used in conjunction with plant growth regulators for seedhead suppression to minimize weed seed production. Mefluidide applied at the late boot stage of Labelle, amidochlor applied after heading of Labelle and UBI-1444 applied after milk stage of Labelle can effectively limit the production of red rice seed without affecting grain production of Labelle.

Fenoxyprop-ethyl applied during panicle differentiation and booting of very early season commercial varieties can minimized red rice competition. Also fenoxyprop-ethyl in combination with high commercial rice seeding rates and certain cultivars like Lemont can provide an advantage in red rice infested areas.

Endogenous hormone changes resulting from incomplete panicle development caused by seedhead suppressants releases dormant buds located at nodes along stems resulting in secondary stem development and increased vegetative development. The potential to increase rice biomass in a crawfish production system through increased stem production with plant growth regulators exists.

CULTURAL PRACTICES FOR RED RICE SUPPRESSION

R.T. Dunand, R.R. Dilly, and G.A. Meche

INTRODUCTION

Red rice (Oryza sativa L.) is a noxious weed in commercial rice production. The presence of red rice seed in a sample of harvested grain affects grade and milling yield. Both grade and milling yield are primary factors in the determination of the value of rice. Consequently, red rice can affect the price of rice significantly.

The development of cost effective practices to minimize red rice while maximizing commercial rice production are essential. The use of cultural practices to control red rice offers a solution. Cultural practices involve the use of facilities already available to the farmer, and do not require the additional costs associated with the purchase of equipment, chemicals, etc.

The sensitivity of rice to environmental factors during germination is established. Temperature and oxygen are important during germination. Also after emergence the growth and development of rice is affected by plant population. In the field, temperature and oxygen during germination are affected by date of planting and management of irrigation water, and plant population is affected by rate of seeding. Consequently, the effects of such cultural practices as date of planting, management of irrigation water and rate of seeding of commercial rice on red and commercial rice were studied.

Experiment: Cultural Management and Red Rice Control

Location: Rice Research Station, South Unit

Soil Type/Test Results: Crowley silt loam/NA

Variety/Seeding Rate: Mars/see Treatments

Planting Date: see Treatments

Row Spacing: Broadcast (water-seeded)

Fertilizer:
- March planting: 24-72-72-3.6 ($N-P_2O_5-K_2O-ZnSO_4$) as 8-24-24-1.2 Zn and 90-0-0 as urea (45%) on Mar 13, 1986
- April planting: same as March planting on Apr 13

Plot Size: 5 x 10 ft

Treated Area: 5 x 10 ft

Treatment(s):
- Planting Dates: Mar 15 and Apr 15
- Seeding Rates: 135 and 202 lb/A
- Water Management (drainage after seeding):
  - None - remained flooded following seeding
  - Brief - drained following seeding and reflooded 3 days later
  - Prolonged - drained after emergence and reflooded at the 3- to 4-leaf stage

Sprayer: NA

Rainfall: NA

Herbicide(s): None

Insecticide(s): 0.5 lb/A carbofuran (Furadan) on Apr 20 (March planting) and on May 14 (April planting)

Fungicide(s): None

Emergence: Mar 22 (March planting) and Apr 19 (April planting)

Permanent Flood: March planting - ND on Apr 19; BD on Mar 21; PD on Mar 15
April planting - ND on May 11; BD on Apr 17; PD on Apr 15

Harvest Date: March planting on July 23 and April planting on Aug 12

Harvested Plot Area: center 2 ft^2

Experimental Design: Randomized complete block with four replications, split plot with factorial arrangement of subplots (whole plot = planting date, sub-plots = seeding rate and water management combinations)

Comments: Planting date, seeding rate, and water management impacted Mars stand, panicle density, and grain yield (Table 1). Stands of Mars were highest when there was no drainage (ND) after water-seeding. Intermediate Mars stands occurred when there was brief drainage (BD), and lowest Mars stands resulted when drainage was prolonged until the 3- to 4-leaf stage (PD). Mars panicle density was higher for the 202 lb/A seeding rate compared with the 135 lb/A seeding rate. Also, Mars panicle density was highest with ND and lowest with PD regardless of planting date. There was no difference in panicle density with ND and BD for the March planting while for the April planting panicle density with BD was intermediate between the ND and PD water managements. The effects of planting date and water management on Mars grain yield were identical to their effects on panicle density, indicating grain yield and panicle density were closely related.

Red rice stand, panicle density, pedicle density, and seed yield were affected by planting date and water management (Table 2). Red rice stand was lowest when there was no or brief drainage after water-seeding Mars, indicating a flooded or water-logged soil can reduce red rice infestations. Red rice panicle density, pedicle density, and seed yield were identically affected by planting date and water management, indicating a close relationship between panicle number and size and seed production. Red rice panicle density, pedicle density, and seed yield were lowest with ND and highest with PD regardless of planting date. For the March planting date, the effect of BD on red rice panicle development was identical to ND, and for the April planting date, the effect of BD on red rice panicle development was intermediate between ND and PD.

In general, planting in the middle of March or allowing no drainage following water-seeding reduces the impact of red rice on commercial rice production. In addition the productivity of Mars is enhanced by the same conditions relating to planting date and water management which have a negative effect on red rice.

Table 1. Effect of planting date, seeding rate, and water management on 'Mars'. Rice Research Station, Crowley, LA. 1986.

Planting date	Seeding rate (lb/A)	Water management	Stand (plants/ft^2)	Panicle density (panicles/ft^2)	Grain yield (g/ft^2)	Grain density (grains/ft^2)
		A. Planting date x seeding rate x water management				
March 15	135	ND	18	30	61	2518
		BD	14	34	68	2693
		PD	1	2	1	52
	202	ND	24	38	65	2748
		BD	13	26	63	2578
		PD	1	3	3	136
April 15	135	ND	16	26	52	2220
		BD	13	16	11	528
		PD	4	3	2	70
	202	ND	25	33	55	2425
		BD	18	24	34	1486
		PD	4	5	6	268
		B. Planting date x water management				
March 15		ND	20	34 c	63 c	2633 c
		BD	14	31 c	66 c	2635 c
		PD	1	2 a	2 a	94 a
April 15		ND	20	29 c	54 c	2323 c
		BD	15	20 b	22 b	1004 b
		PD	4	4 a	4 a	169 a
		C. Seeding rate				
	135		11	18 a	32	1347
	202		14	22 b	38	1606
		D. Water management				
		ND	20 c[1/]	32	58	2478
		BD	14 b	26	44	1820
		PD	2 a	3	3	132

[1/] Differences within columns determined by the Duncan's multiple range test (P=0.05).

Table 2. Effect of planting date, seeding rate, and water management on red rice (*Oryza sativa* L.). Rice Research Station, Crowley, LA. 1986.

Planting date	Seeding rate (lb/A)	Water manage-ment	Plant density (plants/ ft^2)	Panicle density (panicles/ ft^2)	Pedicle density (pedicles/ ft^2)	Grain yield (g/ft^2)	Grain density (grains/ ft^2)
		A. Planting date x seeding rate x water management					
March 15	135	ND	2	6	592	13	494
		BD	1	5	510	11	428
		PD	15	36	2616	52	2201
	202	ND	1	3	281	5	222
		BD	2	5	481	10	391
		PD	15	40	2752	51	2139
April 15	135	ND	2	8	668	14	536
		BD	8	19	1519	27	1104
		PD	18	25	1518	16	677
	202	ND	3	4	498	10	399
		BD	4	6	573	11	457
		PD	15	25	1524	12	600
		B. Planting date x water management					
March 15		ND	2	5 a[1/]	436 a	9 a	358 a
		BD	2	5 a	495 a	10 a	410 a
		PD	14	38 c	2684 c	52 b	2170 b
April 15		ND	2	6 a	583 a	12 a	467 a
		BD	6	13 b	1046 b	19 a	781 a
		PD	17	25 c	1521 b	14 a	638 a
		C. Water management					
		ND	2 a	5	510	11	413
		BD	4 a	9	771	15	595
		PD	16 b	32	2103	33	1404

[1/] Differences within columns determined by the Duncan's multiple range test (P=0.05).

SUMMARY

Commercial rice grain yield responded positively to reductions in red rice competition. Water-seeding in March followed by no drainage or brief drainage and water-seeding in April followed by no drainage reduced red rice stand. Red rice panicle production and development were also reduced.

CONCLUSIONS

In fields heavily infested with red rice planting date and water management following water-seeding are important factors to consider before planting a rice crop in southwest Louisiana. Selection of a March planting date requires keeping the field flooded all season or draining for a few days after seeding and reflooding for the remainder of the season to minimize red rice competition. Selection of an April planting date requires keeping the field flooded all season.

RICE WEED CONTROL STUDIES[1/]

(A Progress Report)

John B. Baker and James W. Shrefler

INTRODUCTION

As new herbicides which have potential of being useful in controlling weeds in Louisiana rice fields are developed it is necessary that they be tested under the cultural practices likely to be used by Louisiana farmers. Since research in other areas of Louisiana and in other states concentrates on dry-seeded rice, this work concentrates on water-seeded rice. These tests provide information on how new herbicides might be incorporated into the cultural practices and herbicide treatments already being used in Southwest Louisiana.

MATERIALS AND METHODS

With the exception of the alligatorweed control tests, these experiments were conducted at the main unit of the Rice Research Station in a field which is managed to maintain heavy infestation of many of the weeds found in rice fields. The soil type is Crowley silt loam.

Seedbed preparation consisted of discing in late winter, and springtooth harrowing and cultimulching as needed for the final seedbed preparation. All test were water-seeded with presprouted Lemont at a rate equivalent to 125 lbs of dry seed per acre. Following seeding the flood was removed to optimize stand establishment. Prior to establishing the permanent flood 400 lb/A of 20-10-10 fertilizer was applied. The time schedules of events in the tests are presented in Table 1.

In order to delineate the plots the rice and weeds were killed in an 18" wide strip on both sides and ends of the 7' x 50' plots. In test W6-86-3 the alleys were treated preplant with methoxychlor, and in the other tests the alleys were treated postemergence with glyphosate.

[1/]This research supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

Table 1. Schedule of operations. Rice Research Station, Crowley, LA. 1986.

Operation performed	Test number				
	WC-86-1	WC-86-3	WC-86-4	WC-86-5	OST-86-1
	Date of operation				
Seedbed preparation	5-6-86	5-12-86	5-6-86	5-12-86	-
Preplant treatments	5-7-86	5-14-86	-	5-14-86	-
Flood for planting	5-8-86	5-15-86	5-8-86	5-15-86	-
Seeding	5-9-86	5-16-86	5-9-86	5-16-86	4-14-86
Postseeding drainage	5-10-86	5-16-86	5-10-86	5-16-86	4-15-86
Flush irrigation	5-16,22-86	5-23-86	5-16,22-86	5-23-86	-
Fertilization	6-3-86	5-28-86	6-3-86	6-3-86	-
Postemergence treatments					
3 days after seeding	-	-	-	-	4-17-86
6 days after seeding	-	5-22-86	5-15-86	-	-
13 days after seeding	5-22-86	-	5-22-86	-	-
17 days after seeding	-	-	-	-	5-1-86
20 days after seeding	5-29-86	-	5-29-86	-	-
24 days after seeding	-	-	-	-	5-8-86
Permanent flood	6-5-86	5-28-86	6-5-86	6-5-86	4-25-86
Rated	6-4-86	-	6-4-86	6-4-86	5-23-86
Harvested	9-23-86	9-15-86	9-23-86	9-15-86	-

Rice tolerance and weed control ratings were taken prior to flooding using the following scales:

Rice tolerance:

1. - very severe injury with >90% stand reduction
2. - severe injury with 70-90% stand reduction
3. - moderate injury, primarily leaf burning and stunting
4 - slight injury, primarily leaf burning
5. - no injury

Weed control:

1. - <10% control
2. - slight, 10-30% control
3. - moderate, 30-70% control
4. - good, 70-90% control
5. - >90% control

Yield data were collected in tests WC-86-1 and WC-86-4 by combine harvesting the entire 7' x 50' plot, weighing the grain, measuring the moisture content and converting the data to 12% moisture yields. In WC-86-3 and WC-86-5 yield data were collected by hand harvesting a 9 sq ft sample area from each plot, threshing, cleaning and converting to 12% moisture yields.

All tests were randomized complete block design tests with four replicates. The data were subjected to an analysis of variance, and where appropriate, mean comparisons were made using the Duncan's multiple range technique or individual mean comparisons.

Information on chemicals tested is presented in Table 7.

RESULTS AND DISCUSSION

Herbicide comparison test. Treatments and data for this test are presented in Table 2. The tank mixture of propanil and pendimethalin or sequential treatment with propanil and fenoxaprop or triclopyr caused more rice injury than other treatments. Satisfactory junglerice control was obtained with all treatments except the preplant surface (PPS) thiobencarb. Thiobencarb PPS was also found to be weak on signalgrass, sesbania, dayflower, texasweed, and yellow nutsedge, but it gave excellent control of amazon sprangletop. The low weed control ratings with the late postemergence treatment with BAS-514 were due to the short time interval between treatment and rating performance. BAS-514 acts slowly and by late season the control of junglerice was satisfactory. Dayflower was not satisfactorily controlled by molinate, molinate/propanil, propanil/propanil, propanil/fenoxaprop, and propanil/trichlopyr. Only fenoxaprop+triclopyr gave satisfactory control of texasweed. Only preplant incorporated (PPI) molinate or molinate PPI/propanil gave satisfactory control of yellow nutsedge. Amazon sprangletop was controlled satisfactorily by all treatments except the BAS-514 treatments. The reduced yield in the treatments with the tank mixture of fenoxaprop and bromoxynil is probably due to a delayed rice injury since other treatments having essentially the same ratings did not show this yield reduction. Only the yield of the untreated check was lower.

Table 2. Water-seeded Herbicide Comparison Test.[1] Rice Research Station, Crowley, La. 1986.

Herbicide	Rate (lb ai/A)	Time of[2] treatment	Rice[3] tolerance	Weed control[4] EC	BP	SE	CC	CP	CE	LP	Yield[5] (100 lb/A)
molinate	4	PPI	4.0	5.0	4.5	4.0	5.0	2.0	4.0	5.0	47.5abc
molinate/propanil	4/3	PPI/Po	4.0	5.0	4.5	5.0	4.0	1.0	4.5	5.0	49.5ab
thiobencarb	4	PPS	4.75	3.75	3.5	3.0	2.0	1.0	2.0	5.0	46.1abcd
thiobencarb/ propanil	4/3	PPS/Po	4.5	4.0	4.0	5.0	2.0	1.0	2.25	5.0	51.1a
propanil	3	Po	4.5	4.0	4.0	5.0	1.0	1.0	1.0	5.0	46.7abc
propanil+ thiobencarb	3+3	Po	4.5	4.75	4.25	5.0	2.0	1.0	1.25	5.0	48.2abc
propanil+ pendimethalin	3+1	Po	3.25	4.75	4.75	5.0	2.0	2.0	2.0	5.0	43.3 cd
propanil/propanil	3/3	Po/PF	5.0	4.75	4.5	5.0	4.0	1.0	2.0	5.0	50.0a
propanil/ fenoxaprop	3/.15	Po/PF	3.75	5.0	5.0	5.0	4.0	2.0	2.0	5.0	44.2 bcd
propanil/ triclopyr	3/.375	Po/PF	3.5	4.75	4.25	5.0	4.0	2.0	2.0	5.0	46.1abcd
fenoxaprop+ triclopyr	.15+.375	PF	3.0	5.0	5.0	5.0	3.0	4.0	2.0	5.0	42.7 cd
fenoxaprop+ bromoxynil	.15+.75	PF	4.0	5.0	5.0	5.0	2.0	3.5	1.0	5.0	41.1 d
BAS-514	.25	Po	4.75	5.0	5.0	5.0	2.0	1.0	1.25	2.0	48.2abc
BAS-514	.50	Po	4.5	5.0	5.0	5.0	2.0	3.5	1.0	1.0	49.0ab
BAS-514	.25	PF	4.75	3.5	4.0	4.0	1.0	2.0	1.0	1.0	45.7abcd
BAS-514	.50	PF	4.25	3.5	3.0	5.0	1.0	1.0	1.0	1.0	50.9a
untreated	-	-	5.0	1.0	1.0	3.0	1.0	1.0	1.0	1.0	31.4 e

1/ See experiment number WC-86-1 in Table 1 for details of experiment.
2/ PPI: preplant incorporated treatments applied 5/7/86.
PPS: preplant surface treatments applied 5/7/86.
Po: postemergence treatment applied 5/22/86.
PF: postemergence treatment applied 5/29/86.
3/ See Materials and Methods for rating scale.
4/ See Materials and Methods for rating scale. See Table 6 for weed identification.
5/ Yield means followed by the same letter are not significantly different at the .05 probability level.

BAS-514 time of treatment test. Treatments and data for this test are presented in Table 3. The BAS-514 treatments applied 6 days after seeding (DAS) caused slightly more rice injury, but the rice apparently recovered. This injury was demonstrated by an apparent loss of geotropism with the young seedling failing to stand up straight. This also occurred to a leser degree with the later times of treatment. Weed control performance of BAS-514 was essentially the same at the various times of treatment with the exception of amazon sprangletop which was not controlled adequately at the 13 and 20 DAS treatment times. The poor rating for control of junglerice and signalgrass by the 20 DAS treatments were due to the slow action of the herbicide and the short time interval between application and rating of performance. The decline in sprangletop control with later treatments is probably responsible for the apparent, but nonsignificant, decline in yield at the later treatment times.

Combination of BAS-514 with propanil gave slightly better control of junglerice, signalgrass and sesbania than propanil alone and much better control of sprangletop than BAS-514 alone. This combination also gave slightly better control of rice flatsedge than BAS-514 alone. Improved sprangletop control by the combination is probably the reason for the improved yield.

The sequential combination of BAS-514 and sethoxydim provided better control of junglerice, signalgrass and sesbania than sethoxydim alone and better control of sprangletop than BAS-514 alone. The lack of adequate weed control is probably the cause of the low yield in the sethoxydim treatment.

Preplant BAS-514 test. Treatments and data for this test are presented in Table 4. BAS-514 was evaluated in water-seeded rice as a preplant incorporated treatment alone and in combination with molinate and as a preplant surface treatment alone and in combination with thiobencarb. Treatments receiving molinate showed considerable rice injury, but the plants recovered and yielded well. Although PPI BAS-514 alone was quite effective on junglerice, signalgrass, sesbania and texasweed, the combination of BAS-514 and molinate PPI give excellent control of all weeds rated.

Performance of preplant surface applied BAS-514 was the same as preplant incorporated. When mixed with thiobencarb there was improved control of dayflower over BAS-514 alone, and there was improved control of signalgrass, sesbania, and texasweed over thiobencarb alone.

The improved yield of the combinations over the molinate and thiobencarb was probably the result of the improved control of sesbania.

Thiobencarb rate and BAS-514 combination test. Treatments and data for this test are presented in Table 5. This test differed from the previous three tests in three major ways. 1.) The length of the postseeding drainage period was 12 days whereas it was 20-27 days in the other tests. 2.) The entire test was oversprayed with acifluorfen to control sesbania. 3.) The 18" alleys between plots were treated with a preplant surface application of methoxychlor whereas in the other test they were treated postemergence with glyphosate. It was obvious early in the season that there was a reduction in rice stands which may have been due to the adverse effect of early flooding on stand establishment

Table 3. BAS-514 Time of Treatment Test.[1/] Rice Research Station, Crowley, LA. 1986.

Herbicide	Rate (lb ai/A)	Time of[2/] treatment	Rice[3/] tolerance	Weed control[4/]							Yield[5/] (100 lb/A)
				EC	BP	SE	CC	CE	CI	LP	
BAS-514	.25	6DAS	3.25	5.0	5.0	4.75	3.5	1.25	3.75	4.5	44.1 ab
BAS-514	.375	6DAS	3.0	5.0	5.0	5.0	3.0	2.0	4.0	4.0	44.7 ab
BAS-514	.25	13DAS	4.0	5.0	5.0	5.0	2.75	1.0	2.5	3.0	43.0 ab
BAS-514	.375	13DAS	4.75	5.0	5.0	5.0	3.5	1.25	3.25	3.0	41.5 b
BAS-514	.25	20DAS	4.5	2.5	3.5	4.0	2.5	1.25	2.75	1.75	41.1 b
BAS-514	.375	20DAS	4.5	3.25	4.5	4.5	3.25	1.0	1.67	2.5	41.5 b
BAS-514 + propanil	.25 + 3.0	13DAS	3.75	5.0	5.0	5.0	3.5	1.75	4.0	5.0	48.1 a
BAS-514 + propanil	.375 + 3.0	13DAS	3.5	5.0	5.0	5.0	3.25	1.0	3.5	5.0	47.5 a
Propanil	3.0	13DAS	4.5	4.5	4.25	4.5	3.0	1.75	3.5	5.0	45.1 ab
BAS-514 / sethoxydim	.25 / .1	13/27DAS	4.0	5.0	5.0	5.0	3.0	1.5	2.75	4.75	44.2 ab
BAS-514 / sethoxydim	.375 / .1	13/27DAS	4.0	5.0	5.0	5.0	2.75	1.25	3.0	5.0	46.7 a
Sethoxydim	.1	27DAS	4.0	3.75	4.25	3.0	2.5	1.0	2.0	5.0	34.3 c
untreated	-	-	4.75	1.0	1.0	1.0	1.0	1.0	1.0	1.0	25.4 d

1/ See experiment number WC-86-4 in Table 1 for details of experiment.
2/ DAS - days after water seeding.
3/ See Materials and Methods for rating scale.
4/ See Materials and Methods for rating scale. See Table 6 for weed identification.
5/ Yield means followed by the same letter are not significantly different at the .05 probability level.

Table 4. Preplant BAS-514 Test.[1] Rice Research Station, Crowley, La. 1986.

Herbicide	Rate (lb ai/A)	Time of[2] treatment	Rice[3] tolerance	Weed Control[4]						Yield[5] (100 lb/A)
				EC	BP	SE	CP	CC	CE	
BAS-514	.25	PPI	5.0	5.0	5.0	5.0	3.5	2.5	1.0	50.0 a
BAS-514	.375	PPI	5.0	5.0	5.0	5.0	5.0	2.75	1.25	53.0 a
BAS-514 + molinate	.25 + 4	PPI	2.5	5.0	5.0	5.0	4.5	4.75	5.0	44.9 a
BAS-514 + molinate	.375 + 4	PPI	2.5	5.0	5.0	5.0	4.5	5.0	4.5	50.5 a
molinate	4	PPI	2.75	5.0	5.0	3.5	3.5	5.0	5.0	38.3 ab
BAS-514	.25	PPS	5.0	5.0	5.0	5.0	3.25	2.0	1.25	49.3 a
BAS-514	.375	PPS	4.5	5.0	5.0	5.0	3.75	2.0	1.0	50.9 a
BAS-514 + thiobencarb	.25 + 4	PPS	4.25	5.0	5.0	5.0	3.75	4.25	1.25	47.2 a
BAS-514 + thiobencarb	.375 + 4	PPS	3.75	5.0	5.0	5.0	3.75	3.75	1.25	46.9 a
thiobencarb	4	PPS	4.5	4.5	1.75	3.0	2.0	4.25	1.0	35.5 ab
untreated	-	-	5.0	1.0	1.0	1.0	1.0	1.0	1.0	25.8 b

1/ See experiment number WC-86-5 in Table 1 for details of experiment.
2/ PPI - preplant incorporated. PPS - preplant surface treatment.
3/ See Materials and Methods for rating scale.
4/ See Materials and Methods for rating scale. See Table 6 for weed identification.
5/ Yield means followed by the same letter are not significantly different at the .05 probability level.

Table 5. Thiobencarb rate and BAS-514 combination test.[1/]
Rice Research Station, Crowley, La. 1986.

Herbicide[2/]	Rate (lb ai/A)	Time of[3/] treatment	Yield[4/] (100 lb/A)
thiobencarb	2	PPS	35.5
thiobencarb	4	PPS	31.7
thiobencarb	6	PPS	29.7
thiobencarb	8	PPS	30.0
thiobencarb + BAS-514	4 + .375	PPS	32.5
thiobencarb / BAS-514	4 / .375	PPS / 6DAS	23.3
BAS-514	.375	PPS	36.1
BAS-514	.375	6DAS	29.5
molinate	4	PPI	34.4
untreated	-	-	32.3

1/ See experiment number WC-86-3 in Table 1 for details of experiment.
2/ All plots oversprayed with .125 lb ai/A acifluorfen at midseason.
3/ PPS - preplant surface application. DAS - days after seeding.
PPI - preplant incorporated.
4/ See text for discussion of mean comparisons.

or to movement of the methoxychlor from the treated alleys. There was no significant effect on yield of the rate of thiobencarb from 0 to 8 lb ai/A. The use of BAS-514 as a PPS treatment, alone or in combination with thiobencarb, did not significantly alter yield when compared with the untreated or thiobencarb treated respectively. On the other hand the probability that the mean yield of the 6 DAS treatment with BAS-514 following thiobencarb PPS was not different from the PPS combination was only .045, and the probability that the mean yield of the 6 DAS BAS-514 treatment following PPS thiobencarb was not different from the treatment with PPS thiobencarb alone was only .064. It appears that the combination of the preplant surface treatment with thiobencarb followed by a early postemergence treatment with BAS-514 coupled with a short postseeding drainage period may result in excessive rice injury.

Alligatorweed control tests. Two small tests were conducted on the Flying J Ranch in Vermilion parish with the cooperation of Mr. Connie Simon. The rice was water-seeded with presprouted Lemont. Metsulfuron methyl was tested as a postflood postemergence treatment at rates of 1, 2, and 3 oz ai/A. In each 7 ft by 25 ft plot an area which contained alligatorweed was encompassed with an aluminum cylinder to prevent the postemergence spray from being diluted by movement away from the treated area. Observations taken two weeks after treatment indicated that all rates tested stopped the growth of alligatorweed, but at that time the plants were still green. Further observations were not made since the field was treated with 2,4-D.

In an adjacent field which had been water-seeded with presprouted Lemont, 7 ft by 25 ft plots were established in an area heavily infested with alligatorweed. BAS-514 and SC-0735 were applied three days after the field had been seeded and drained. The rates tested were: BAS-514 at 4, 6, and 8 oz ai/A and SC-0735 at 0.5, 1 and 2 oz ai/A. The field was reflooded six days after seeding. Postflood applications of fluoxypyr at rates of 2, 4, and 8 oz ai/A and trichlopyr at 6 oz ai/A were made 14 days after seeding. BAS-514 gave 70 - 90% alligatorweed control, but there was serious stand reduction when used at this early time of application followed by early flooding. SC-0735 failed to show any activity at the rates tested. Fluoxypyr gave 70 - 90% control with good to excellent crop tolerance. Triclopyr, which was the standard treatment in this test, did not give the level of control that it has provided in previous years, giving only 10 - 30% control.

In summary, metsulfuron methyl and fluoxypyr look very promising and warrant further testing. BAS-514 may perform better if applied at a later time or if the flood is delayed.

Table 6. Weeds rated in herbicide test conducted at the Rice Research Station, Crowley, LA. 1986.

Abbreviation used in tables	Common name	Scientific name
AP	alligatorweed	Alternanthera philoxeroides
BP	broadleaf signalgrass	Brachiaria platyphylla
CC	dayflower	Commelina communis
CE	yellow nutsedge	Cyperus exculentus
CI	rice flatsedge	Cyperus iria
CP	texasweed	Caperonia palustris
EC	junglerice	Echinochloa colona
LP	Amazon sprangletop	Leptochloa panicoides
SE	hemp sesbania	Sesbania exaltata

Table 7. Continued.

Name or code no. used in report	Formulation	Chemical nature of active ingredient	Manufacturer
SC-0735	75WP	not released at this time	Stauffer
sethoxydim	1.5EC	2-[1-(ethoxyimino)butyl]-5-[2-(ethylthio) propyl]-3-hydroxy-2-cyclohexen-1-one	BASF
thiobencarb	8EC	S-[4-chlorophenyl)methyl]diethylcarbamothioate	Chevron
triclopyr	3EC	[(3,5,6-trichloro-2-pyridinyl)oxy] acetic acid	Dow

Table 7. Herbicides tested in studies at the Rice Research Station, Crowley, LA. 1986.

Name or code no. used in report	Formulation	Chemical nature of active ingredient	Manufacturer
acifluorfen-sodium	2S	5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoic acid, sodium salt	Rohm & Haas
BAS-514	50WP	3,7-dichloro-8-quinolinecarboxylic acid	BASF
bromoxynil	2EC	3,5-dibromo-4-hydroxybenzonitrile	Rhone-Poulenc
fenoxaprop	1EC	(±)-2-[4-[(6-chloro-2-benzoxazolyl)oxy] phenoxy]propanoic acid	Hoechst-Roussel
fluroxypyr	1.67EC	4-amino-3,5-dichloro-6-fluoro-2-pyridyl-oxyacetic acid	Dow
glyphosate	3S	N-(phosphonomethyl)glycine	Monsanto
metolachlor	8EC	2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide	CIBA-Geigy
metsulfuron	10WP	2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2yl) amino]carbonly]amino]sulfonyl]benzoic acid	DuPont
molinate	8EC	S-ethyl hexahydro-1H-azepine-1-carbothioate	Stauffer
pendimethalin	4F	N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine	American Cyanamid
propanil	4EC	N-(3,4-dichlorophenyl)propanamide	Rohm & Haas

(Continued)

Chemical Control of Red Rice in Rice [1/]

(A Preliminary Report)

John B. Baker and James W. Shrefler

INTRODUCTION

The thrust of these investigations is the development of procedures which can be used by rice producers to control red rice. This research encompasses activities ranging from initial screening of herbicides, in search of compounds which will selectively kill red rice with minimal damage to the seeded rice variety, to integration of such compounds into the cultural program used in rice production. In 1986, weather conditions prevented execution of all experiments planned. All of the experiments were conducted in water-seeded rice.

MATERIALS AND METHODS

Test site. The test site for these experiments was a field at the South Unit of the Rice Research Station. This field had been overseeded in 1985 with red rice from a source near Kinder, Louisiana and allowed to mature in a crop of soybeans. The seed produced by this crop were worked into the soil in the fall to assure a suitable red rice infestation for these studies. The soil at this site is a Midland silty clay loam.

Planting procedure. All tests were water-seeded with presprouted Lemont rice at a rate equivalent to 125 lb/A of dry seed. The fields which had been disc plowed in the previous fall were chisel plowed and land leveled in early spring and retilled with a field cultivator as needed to prevent excessive weed growth. Just prior to seeding, the final seedbed was prepared, leeves were built, and the field to be seeded was flooded. This was done as quickly as possible, but normally flooding was accomplished 2-3 days after seedbed preparation. Bags of seed to be presprouted were placed in a canal for 24 hours, placed on a rack to drain for an additional 24 hours, and sown into the flooded test plots the same day the plots were flooded or the following day. In one test, the time interval between the initial flood and seeding was a variable in the experiment. Generally, the plots were drained within 24 hours of seeding and reflooded 5 days later. In one experiment the length of this postseeding drainage period was a variable. In most experiments, just prior to applying the permanent flood, 400 lb/A of 20-10-10 was applied. Where length of the postseeding drainage period was a variable, all plots were fertilized after the final set of plots had been flooded.

[1/] This research was supported in part by funds provided by Louisiana rice farmers through the Rice Research Board.

Herbicide application. All of the herbicides evaluated in these studies were preplant treatments. The preplant incorporated treatments were applied as sprays and incorporated as quickly as possible with a front-tine garden rototiller. Preplant surface treatments were applied as sprays or as granular treatments as soon after seedbed preparation as possible. Sprays were applied in a volume of 15 GPA with a four-nozzel boom equipped with 80015 flat fan tips, spraying at a pressure of 32 psi and a ground speed of 2.5 mph. Granular formulations were applied by weighing out the amount needed for each plot and applying it to the area as uniformly as possible using a centrifugal spreader. In some cases additional blank granules were mixed with the formulated material to provide bulk so that a better distribution could be achieved. Information on treatments for each experiment is presented in the tables.

Data collection and analysis. In the length of drainage experiment two 2 sq. ft. enclosures were placed in each plot to protect two sample areas from predation. One of these areas served for determination of stand density of the seeded variety and red rice. The plants in this area were pulled from the flooded plots at 4-5 weeks, taken to the laboratory where they could be examined to separate red rice from Lemont, and counted. The second area served to provide harvest data. All plants were harvested and taken to the laboratory where the panicles of red rice and Lemont were separated and counted.

In other experiments random sample areas were hand harvested, and panicle counts made. In the thiobencarb rate study, all of the Lemont panicles from the sample area were bulked, threshed, cleaned and weighed for yield determination.

Schedule of events and other details of the various experiments are presented in Table 1.

RESULTS AND DISCUSSION

Thiobencarb rate study. Treatments and data for this test are presented in Table 2. All rates of thiobencarb effected a significant reduction in the red rice panicle density (RPD) compared to the untreated check. There was no significant difference between the rates of thiobencarb as determined by a multiple range test or by trend analysis. Molinate, which was included for comparison, gave outstanding red rice control with RPD significantly lower than the untreated check and the low rate of thiobencarb.

Lemont panicle density (LPD) in the thiobencarb treated plots was not significantly different from the untreated check or the molinate check, although the molinate check had a significantly higher LPD than the untreated check. Lemont yield in the thiobencarb treated plots was significantly higher than in the untreated check but significantly lower than the molinate treated. This significant increase in yield in molinate treated plots is probably a reflection of larger panicle size as well as a higher panicle density.

Length of drainage study. Treatments and data for this test are presented in Table 3. In this study the effects of two herbicides and various lengths of the postseeding drainage period (PDP) were examined. In the case of red rice stand density (RSD) it was found that both thiobencarb and molinate treated plots were significantly lower than the untreated check but not significantly different from each other. The length of the PDP had no significant effect on the performance of the herbicides, but in the untreated plots there was a significant linear increase in RSD as the length of the PDP increased. The herbicide treated plots also had a significantly lower RPD than the untreated, but they were not significantly different from each other. There was no significant effect of the length of the PDP on RPD.

Lemont stand density (LSD) was not affected by the herbicide treatments, but there was a significant linear increase in LSD as the length of the PDP increased. Lemont panicle density (LPD), on the other hand, was influenced by the herbicide treatments, with the molinate treated plots having a higher LPD than the thiobencarb treated or the untreated and the thiobencarb treated being higher than the untreated. There was no significant effect of the length of the PDP on LPD. Lemont yield reflected the panicle stand density with molinate treated plots yielding significantly higher than thiobencarb which were significantly higher than the untreated. Length of the PDP had no significant effect on Lemont yield.

Effect of time of treatment and time of preseeding flood on red rice and Lemont. Treatments and panicle density data are presented in Table 4. When the length of the interval between herbicide application and preplant flooding (HT) was zero, there was a significant linear increase in RPD as the length of the interval between seedbed preparation and preplant flooding (FT) was increased. When HT was three days, there was no significant effect of FT. There was no significant effect of HT on RPD.

The effects on LPD were the reverse of the effects on RPD. When the herbicide was applied the same day as the flood (HT=0) there was a significant linear decrease in LPD as the length of FT was increased. The effects of the length of HT on LPD were not significant.

Herbicide screening for red rice control in water-seeded rice. Treatments and data are presented in Table 5. The test was a strip-plot design with basal treatments of PPS thiobencarb, PPI molinate, or no herbicide overlaid with various experimental herbicides. No significant interactions were found. The basal treatments had no significant effect on LPD, but molinate and thiobencarb plots had significantly lower RPD than the untreated. The experimental herbicides had no significant effects on RPD, but tridiphan treated plots had a significantly lower LPD. The apparent selective action of tridiphan on Lemont vs red rice is the result of the inherently superior ability of red rice to tiller heavily in thin stand densities, which masked the stand thinning which occurred in red rice as well as Lemont.

Table 1. Schedule of operations.

Operation performed	Test number			
	RRC-86-4	RRC-86-5	RRC-86-6	RRC-86-8
	Date of operation			
Seedbed preparation	4-28-86	4-28-86	4-28-86	5-6-86
Preplant treatments	4-29-86	4-29-86	4-29-86	5-9,5-12,5-15-86
Flood for planting	4-30-86	4-30-86	4-30-86	5-9,5-12,5-15-86
Seeding	5-1-86	5-1-86	5-1-86	5-16-86
Postseeding drainage	5-3-86	5-3-86	5-3-86	5-16-86
Fertilization	5-22-86	5-6-86	5-6-86	5-22-86
Permanent flood	5-6,5-9,5-12-86	5-6-86	5-6-86	5-23-86
Harvested	8-28-86	9-2-86	9-3-86	9-16-86

Table 2. Effect of rate of thiobencarb on red rice and Lemont.[1/]

Herbicide[2/]	Rate (lb ai/A)	Panicles/sq yd[3/] Red rice	Lemont	Lemont Yield[3/] (100 lb/A)
thiobencarb	2	115.5 b	291.0ab	43.7 b
thiobencarb	4	72.3ab	285.8ab	43.9 b
thiobencarb	6	52.8ab	283.5ab	43.1 b
thiobencarb	8	79.0ab	275.3ab	41.8 b
molinate	4	0.5a	330.5a	54.9a
untreated	-	237.8 c	256.3 b	30.0 c

1/ See experiment number RRC-86-5 in Table 1 for details of experiment.
2/ Thiobencarb applied to the surface of the prepared seedbed. Molinate applied preplant incorporated.
3/ Means within a column followed by the same letter are not significantly different at .05 probability level.

Table 4. Effect of length of interval between seedbed preparation or herbicide application and preseeding flood on red rice and Lemont panicle density.[1/]

Length of interval between herbicide application and preseeding flood	Length of interval between seedbed preparation and preseeding flood (days)		
	0	3	6
days	- - - - panicles per 2 sq ft - - - -		
	- - - - - - - - - Red rice - - - - - - - - -		
0	42.25	93.75	102.50
3		75.50	143.00
6			139.25
untreated	82.25	131.75	168.25
	- - - - - - - - - Lemont - - - - - - - - -		
0	36.75	29.00	21.00
3		25.00	15.75
6			11.75
untreated	17.25	7.0	16.00

1/ See experiment number RRC-86-8 Table 1 for schedule of events. See text for discussion of significance of results.

Table 3. Effect of length of postseeding drainage period and herbicides on red rice and Lemont.[1/]

Herbicide[2/]	Length of postseeding drainage	Red rice: Stand density	Red rice: Panicle density	Lemont: Stand density	Lemont: Panicle density	Lemont: Yield
	(days)	-----plants or panicles per 2 sq ft			-----	cwt/A
thiobencarb	0	2.75	3.25	33.75	38.5	35.5
thiobencarb	3	1.50	12.00	36.75	52.25	42.5
thiobencarb	6	5.00	11.50	53.50	57.00	41.9
thiobencarb	9	6.25	33.25	55.25	54.25	37.0
molinate	0	0.75	0.75	36.75	62.50	53.1
molinate	3	1.25	6.00	47.25	59.5	52.7
molinate	6	1.25	3.25	50.67	60.25	47.3
molinate	9	5.75	3.75	61.00	56.25	47.6
untreated	0	9.00	65.75	40.50	39.25	25.6
untreated	3	15.25	82.25	40.25	39.25	17.0
untreated	6	27.50	79.50	53.00	41.50	15.7
untreated	9	26.25	83.00	55.50	47.50	18.9

1/ See experiment number RRC-86-4 in Table 1 for schedule of events and the text for discussion of statistical significance.

2/ Thiobencarb applied at the rate of 4 lb ai/A as a preplant surface spray. Molinate applied at the rate of 4 lb ai/A as a preplant incorporated spray.

Table 5. Screening of supplemental preplant treatments for red rice control in water-seeded rice.1/

Supplemental 2/ treatment	Rate	Basal treatment 2/ molinate	thiobencarb	untreated	average
	lb ai/A	- - - - - panicles per 2 sq ft 3/			- - - - - -
			- - - Lemont - - -		
SC-0500(1G)	.125	66.7	66.3	44.3	59.1a
SC-0500	.25	54.3	48.0	37.3	46.6ab
SC-0500	.5	57.0	71.0	45.3	57.8a
SC-0735(1G)	.0625	65.0	63.3	39.7	56.0a
SC-0735	.125	58.0	54.0	41.5	51.6ab
SC-0735	.25	58.0	53.7	42.0	51.2ab
BAS-514(50WP)	.1875	74.3	57.0	45.0	58.8a
BAS-514	.375	69.7	52.7	48.3	56.9a
BAS-514	.75	72.7	60.3	35.3	56.1a
tridiphan(4EC)	.5	36.3	42.0	38.3	38.9 b
tridiphan	1.0	22.5	14.3	17.7	17.6 c
tridiphan	1.5	7.7	16.3	14.0	12.7 c
untreated	-	55.3	56.7	27.3	46.4ab
average	-	54.4	50.4	36.5	
			- - - Red rice - - -		
SC-0500	.125	0.0	27.0	68.7	31.9
SC-0500	.25	0.3	5.3	58.7	21.4
SC-0500	.5	0.0	16.7	35.0	17.2
SC-0735	.0625	0.0	4.3	67.0	23.8
SC-0735	.125	0.0	4.3	37.5	12.6
SC-0735	.25	0.0	8.3	29.3	12.6
BAS-514	.1875	0.0	8.3	51.7	20.0
BAS-514	.375	0.0	18.7	45.0	21.2
BAS-514	.75	0.7	1.7	67.0	23.1
tridiphan	.5	7.0	34.3	27.7	23.0
tridiphan	1.0	0.0	39.0	13.0	19.5
tridiphan	1.5	0.0	7.7	28.7	12.1
untreated	-	0.0	18.3	45.0	21.2
average	-	0.6a	14.9a	44.3 b	

1/ See experiment number RRC-86-6 in Table 1 for schedule of events.

2/ Means in a row or column followed by the same letter are not significantly different at the .05 probability level.

3/ All treatments preplant surface treatments except molinate which was preplant incorporated. The basal treatments of thiobencarb and molinate were applied at the rate of 4 lb ai/A.

RICE INSECT CONTROL STUDIES

RICE WATER WEEVIL CONTROL: TF3721 SEED TREATMENT

J. F. Robinson, C. M. Smith, G. B. Trahan, and R. M. Michot

Location: Rice Research Station, Crowley, LA

Soil: Crowley silt loam

Variety: Mars

Seeding Rate: 117 lb/A

Seeding Depth: 1.5 in

Planting Method: Drill seeded, June 17, 1986

Plot Size (ft): Planted: 20 x 4.67 (7 rows on 8-in spacings)
Harvested: 2.67 x 18 = 48 sq ft (4 center rows)

Fertilization: 60-60-60, June 17
120-0-0, July 7 (before flood)

Water Management: Flushed, June 19
Permanent flood, July 8
Drained for harvest, Sept 30

Herbicides: Propanil 4 lb ai/A, July 1
Bolero 4 lb ai/A, July 7

Application Equipment: Propanil applied with a CO_2 hand boom 15 gpa @ 30 psi
Bolero applied by casoron spreader
Granular insecticide applied with a shaker jar
PPI trts. incorporated about 1-in deep with hand rake

Experimental Design: Randomized complete block with 3 replications

Harvested: Oct 20 with Kubota small plot combine

Comments: TF3721 applied as a seed treatment, 0.2 lb ai/cwt, gave acceptable rice water weevil control. Although the analyses of variance for plant height and yield were not significant, there is a trend towards reduced plant height and yield as seed treatment rate increases. This trend may indicate a phytotoxic response and should be looked at in future tests.

Table 1. Rice water weevil control with TF3721 applied as seed treatment and PP-993 applied preplant incorporated. Rice Research Station, Crowley, LA. 1986.

Treatment	Rate (lb ai/A)	App.	RWW immatures per core	Percent control	Plant height (cm)	Yield (lb/A)
TF3721	0.05	ST	14.7 ab	31.3	111.9	4804.3
TF3721	0.14	ST	8.6 bcd	59.8	106.6	4633.6
TF3721	0.23	ST	3.3 e	84.6	109.1	4072.7
PP-993	0.04	PPI	20.0 a	6.5	106.1	4356.4
PP-993	0.12	PPI	12.1 bc	43.5	110.3	4773.1
PP-993	0.20	PPI	7.7 cde	64.0	110.8	4672.9
Amaze	2.00	PPI	21.3 a	0.0	110.3	4549.7
Carbofuran	0.50	PoF	4.8 de	77.6	116.1	4896.4
Check			21.4 a	----	111.1	4885.3

ST = seed treatment; PPI = preplant incorporated; Percent control = ((# ck - # trt)/# ck) x 100; ANOVA not significant for height and yield.

RICE WATER WEEVIL CONTROL: SC-0567

J. F. Robinson, C. M. Smith, G. B. Trahan, and R. M. Michot

Location: Rice Research Station, Crowley, LA

Spoil: Crowley silt loam

Variety: Mars

Seeding Rate: 120 lb/A

Seeding Depth: 1.5 in

Planting Method: Drill seeded, May 16, 1986

Plot Size (ft): Planted: 20.5 x 4 (7 rows on 7-in spacings)
Harvested: 2.33 x 20.5 = 47.83 sq ft (4 center rows)

Fertilization: 30-60-60, May 16
120-0-0, June 6 (before flood)

Water Management: Flushed, May 22
Permanent flood, June 6
Drained for harvest, Aug 22

Herbicides: Propanil 4 lb ai/A, May 29

Application Equipment: Propanil applied with a CO_2 hand boom 15 gpa @ 30 psi
Granular insecticide applied with a shaker jar
PPI trts. incorporated about 1-in deep with hand rake

Experimental Design: Randomized complete block with 3 replications

Harvested: Sept 12 with a Kubota small plot combine

Comments: SC-0567 gave good rice water weevil control when applied at a rate of 2.0 lb ai/A either as a PPI or PeF treatment. The PPI treatments interacted with propanil and burned the rice plants. The PeF and PoF applications did not interact with propanil.

Table 1. Rice water weevil control with different application timings and rates of SC-0567. Rice Research Station, Crowley, LA. 1986.

Treatment	Number RWW immatures per core	Percent control	Phyto rating	Yield (lb/A)
SC-0567 1.0 PPI	7.3 ef	69.9	2.0	6174 ab
2.0 PPI	3.3 f	86.3	2.3	6148 ab
1.0 PeF	8.6 ef	64.8	1.0	6468 a
2.0 PeF	2.2 f	90.9	1.0	6534 a
1.0 PoF	23.2 ab	4.6	1.0	5734 b
2.0 PoF	29.3 a	----	1.0	5795 b
Amaze 2.0 PPI	21.0 bc	13.7	1.7	5710 b
Furadan 0.5 PeF	10.1 de	58.4	1.3	6324 ab
Furadan 0.5 PoF	15.1 dc	37.9	1.0	6449 a
Check	24.3 ab	----	1.0	5966 ab

*** PPI = preplant incorporated applied May 16, 1986; PeF = preflood applied June 6; PoF = postflood applied June 13; core sample = 3 5/8 in (dia) x 3 in (depth); Percent control = ((# ck - # trt)/ #ck) x 100; Duncan's range test p = 0.05; phytotoxicity rating 1-7 range 1 = no burn 7 = severe burn with dead plants; yield corrected to 12% moisture.

RICE WATER WEEVIL CONTROL: ALSYSTIN, BAYTHROID, UC-84572 AND DIMILIN

J. F. Robinson, C. M. Smith, G. B. Trahan, and R. M. Michot

Location: Rice Research Station, Crowley, LA

Soil: Crowley silt loam

Variety: Mars

Seeding Rate: 120 lb/A

Seeding Depth: 1.5 in

Planting Method: Drill seeded, May 16, 1986

Plot Size (ft): Planted: 20 x 4 (7 rows on 7-in spacings)
Harvested: 2.33 x 15 = 35 sq ft (4 center rows)

Fertilization: 30-60-60, May 12
120-0-0, June 9 (before flood)

Water Management: Plots individually leveed to prevent mixing
Flushed, May 23
Permanent Flood, June 10
Drained for harvest, Aug 21

Herbicides: Propanil 4 lb ai/A, June 4

Application Equipment: Propanil and insecticide spray treatments applied with a CO_2 hand boom calibrated to 15 gpa @ 30 psi
Granular insecticide applied with a shaker jar

Harvested: Sept 10-11, hand harvested

Experimental Design: Randomized complete block with 3 replications

Comments: The insect growth regulators Alsystin, UC-84572, and Dimilin all gave good rice water weevil control. The timing study with Alsystin indicated that a single application of 0.28 lb ai/A applied as late as 9 days PoF would give effective control. Applications made 13 and 15 days PoF were less effective.

Table 1. Rice water weevil control with Alsystin, Baythroid, UC-84572, and Dimilin. Rice Research Station, Crowley, LA. 1986.

			7/08/86			7/16/86			7/24/86			
Insecticide	Rate	Days PoF	L/C	DMRT	%C	L/C	DMRT	%C	L/C	DMRT	%C	Yield (lb/A)
Alsystin	0.28	3	1.6	ij	91.7	2.4	de	81.0	3.6	bcd	48.6	4751
Alsystin	0.28	6	4.7	efghi	75.6	3.8	cd	69.8	5.9	bc	15.7	4842
Alsystin	0.28	9	2.1	hij	89.1	3.4	cd	73.0	1.8	cd	74.3	4843
Alsystin	0.28	13	8.8	bcde	54.4	5.1	bcd	59.5	3.0	bcd	57.1	4577
Alsystin	0.28	15	12.0	abc	37.8	7.6	abc	39.7	4.8	bcd	31.4	4663
Alsystin	0.14											
	+oil	6	5.0	efghi	74.1	5.9	bcd	53.2	6.6	ab	5.7	4533
Alsystin	0.40	6	2.1	hij	89.1	2.4	de	81.0	2.0	cd	71.4	4705
Baythroid	0.0446	6	6.9	bcdef	64.2	9.4	ab	25.4	7.0	ab	----	4339
UC-84572 F	0.05											
	+x-77	6	11.9	abcd	38.3	6.4	bcd	49.2	4.4	bcd	37.1	4715
UC-84572 F	0.05	6	13.3	ab	31.1	6.3	bcd	50.0	3.6	bcd	48.6	4616
UC-84572 F	0.10	6	6.3	cdefg	67.4	3.0	de	76.2	1.7	cd	75.7	4964
UC-84572 EC	0.10	6	8.3	bcde	57.0	3.3	cde	73.8	2.7	bcd	61.4	4823
UC-84572 F	0.15	6	2.7	fghij	86.0	3.1	cde	75.4	1.2	d	82.9	4418
UC-84572 F	0.25	6	6.1	defgh	68.4	3.1	de	75.4	1.2	d	82.9	4834
Dimilin	1 oz	3+9	3.2	fghij	83.4	3.8	cd	69.8	4.9	bcd	30.0	4878
Dimilin	2 oz	3+9	0.7	j	96.4	2.7	de	78.6	3.9	bcd	44.3	4809
Dimilin	4 oz	3+9	0.2	j	99.0	0.6	e	95.2	1.3	d	81.4	4590
Dimilin	4 oz	3	1.9	ij	90.2	3.3	cde	73.8	4.0	bcd	42.9	4983
Furadan	0.50	6	15.8	a	18.1	11.9	a	5.6	12.2	a	----	4424
Check			19.3	a	----	12.6	a	----	7.0	ab	----	4544

PoF = post-flood; plots flooded June 10, 1986; L/C = number of rice water weevil immatures per core; 3, 3 5/8 in (dia) x 3 in (depth) core samples were taken from each plot on each sampling date; %C = percent control ((# ck - # trt)/# ck)*100.

RICE WATER WEEVIL CONTROL: PP-993

J. F. Robinson, C. M. Smith, G. B. Trahan, and R. M. Michot

Location: Rice Research Station, Crowley, LA

Soil: Crowley silt loam

Variety: Mars

Seeding Rating: 120 lb/A

Seeding Depth: 1.5 in

Planting Method: Drill seeded, April 30, 1986

Plot Size (ft): Planted: 16.5 x 4 (7 rows on 7-in spacings)
Harvested: 2.58 x 16.5 = 42.63 sq ft (4 center rows)

Fertilization: 30-60-60, April 30
120-0-0, May 29

Water Management: Flushed, May 1
Permanent flood, May 30
Drained for harvest, Aug 11

Herbicides: Propanil 4 lb ai/A, May 12 and May 29
Bolero 4 lb ai/A, May 29

Application Equipment: Propanil applied with a CO_2 hand boom 15 gpa @ psi
Bolero applied by casoron spreader
Granular insecticide applied with a shaker jar
PPI trts. incorporated about 1 in deep with hand rake

Experimental Design: Randomized complete block with 4 replications

Harvested: Aug 25 with a Kubota small plot combine

Comments: PP-993 applied preplant incorporated at a rate of 0.25 lb ai/A gave good rice water weevil control.

Table 1. Rice water weevil control with PP-993 applied preplant incorporated. Rice Research Station, Crowley, LA. 1986.

Treatment	Rate (lb ai/A)	App.	RWW immatures per core	Percent control	Plant height (cm)	Yield (lb/A)
PP-993	0.075	PPI	6.1 b	71.0	108.3 ab	5478.5
PP-993	0.10	PPI	6.2 b	70.5	110.8 a	5971.9
PP-993	0.125	PPI	5.9 b	71.9	106.3 ab	5940.9
PP-993	0.25	PPI	2.2 bc	89.5	106.2 ab	6569.0
Amaze	2.00	PPI	18.6 a	11.4	103.4 b	6063.4
Carbofuran	0.50	PoF	1.2 c	94.3	102.9 b	6249.2
Check			21.0 a	----	104.0 b	6070.8

PPI = preplant incorporated; core sample = 3 5/8 in (dia) x 3 in (depth); Percent Control = ((# ck - # trt)/ #ck) x 100.

RICE WATER WEEVIL CONTROL: PREPLANT INCORPORATED CARBOFURAN

J. F. Robinson, C. M. Smith, G. B. Trahan, and R. M. Michot

Location: Rice Research Station, Crowley, LA

Soil: Crowley silt loam

Variety: Lemont

Seeding Rate: 140 lb/A

Seeding Depth: surface

Planting Method: Water seeded, May 5, 1986, pre-sprouted seed

Plot Size (ft): Planted: 18.5 x 4 (7 rows on 7-in spacings)
Harvested: 2.58 x 16.5 = 42.63 sq ft (4 center rows)

Fertilization: 120-60-60, April 30

Water Management: Flooded, May 1; Drained, May 7
Flooded, May 9; Drained for harvest, Aug 11

Herbicides: Bolero 4 lb ai/A, May 1, surface applied spray

Application Equipment: Bolero applied with a CO_2 hand boom 15 gpa @ 30 psi
Granular insecticide applied with a shaker jar
PPI trts. incorporated about 1-in deep with hand rake

Experimental Design: Randomized complete block design with 4 replications

Harvested: Aug 26 with a Kubota small plot combine

Comments: Carbofuran applied PPI at the rate of 1.0 lb ai/A gave good rice water weevil control. Rice water weevil control increased and rice yields decreased as Carbofuran PPI rate increased. These data indicate a possible phytotoxic interaction between Carbofuran applied PPI, at rates above 0.5 lb ai/A, and preflood surface application of Bolero.

Table 1. Rice water weevil control in a water-seeded system with a preflood surface application of Bolero as the herbicide and Carbofuran applied preplant incorporated. Rice Research Station, Crowley, LA. 1986.

Treatment	June 2 L/C	June 11 L/C	June 20 L/C	Plant height (cm)	Yield (lb/A)
Carbofuran 0.25 PPI	0.5 bc	3.0 b	7.1 b	80.6	6651.7 a
0.50 PPI	0.5 bc	1.0 bc	4.4 bc	81.8	6340.5 ab
0.75 PPI	0.5 bc	0.5 bc	4.1 bc	81.8	5765.8 bc
1.00 PPI	0.3 c	0.0 c	2.7 c	80.6	5432.4 c
0.50 PoF	3.3 ab	12.3 a	3.6 bc	80.3	6324.2 ab
Check	4.3 a	16.8 a	12.2 a	80.3	5578.2 c

PPI = preplant incorporated; PoF = postflood; L/C = number of rice water weevil immatures per 3 5/8 in (dia) x 3 in (depth) core sample; plots flooded May 1; seeded May 5 with pre-sprouted seed; plots drained May 7; plots re-flooded May 9; Carbofuran PoF applied June 13.

EVALUATION OF TISSUE CULTURE LINES FOR RICE WATER WEEVIL RESISTANCE

J.F. Robinson, T.P. Croughan, G.B. Trahan, R.M. Michot, and M.M. Pizzalotto

One hundred and sixty-six rice lines regenerated from tissue culture were evaluated in a preliminary one rep field test for rice water weevil resistance. Plants were grown in the greenhouse, 50 seed/pot, and each pot was transplanted as a unit into the field on June 9, 1986. Rice water weevil immature counts were taken on July 17, 1986 and plant height measurements were taken at maturity. These data are summarized in Table 1. Lines with counts lower than the variety mean will be tested in a replicated test in 1987.

Table 1. Number of rice water weevil immatures and plant height for 166 rice lines regenerated from tissue culture. Rice Research Station, Crowley, LA. 1986.

		All lines				Selected lines				
Variety	Variable	No.	Min.	Max.	Mean	No.	Percent	Min.	Max.	Mean
Lebonnet	Height	22	42	91	71.8	--	----	60	91	73.8
	L/C	22	2	37	14.7	12	45.5	2	13	8.0
Lemont	Height	80	50	80	63.2	--	----	50	80	64.0
	L/C	80	1	42	13.1	50	62.5	1	13	8.6
Mars	Height	8	62	88	75.0	--	----	76	88	80.0
	L/C	8	14	40	25.5	3	37.5	14	20	17.3
Starbonnet	Height	37	64	103	82.1	--	----	64	103	81.9
	L/C	37	5	52	25.3	22	59.5	5	25	16.3
Saturn	Height	19	56	83	72.7	--	----	62	83	74.9
	L/C	19	9	64	26.0	12	63.1	9	25	15.9

Height in cm; L/C = rice water weevil immatures per 3 5/8 in (dia.) x 3 in (depth) core sample; selected lines = lines with counts lower than variety mean.

INVESTIGATIONS OF RESISTANCE IN RICE, *ORYZA SATIVA* L., TO THE RICE WATER WEEVIL *LISSORHOPTRUS ORYZOPHILUS* KUSCHEL

(A Preliminary Report)

C. A. Cook, C. M. Smith, J. F. Robinson, G. B. Trahan

The purpose of this study was to identify the mechanisms of resistance to the rice water weevil, *Lissorhoptrus oryzophilus* Kuschel, five cultivars of rice, *Oryza sativa* L., previously shown to be resistant. Specifically, each accession was evaluated for non-preference to feeding and oviposition and for tolerance in field studies.

In the oviposition test, one plant of each cultivar was placed in a PVC pipe barrier and infested at a rate of two pairs of weevils/plant. Five replications were sampled at the end of 5 days, the remaining five replications were sampled 10 days after infestation. Females deposited an average of 25 eggs/plant in stems of the susceptible check cultivars, and showed the greatest preference for PI321294 (41 eggs/plant). PI321264 was the least preferred with an average of 8.2 eggs/plant.

A tolerance study was arranged in a split plot design with four replications. The test was repeated twice during the season. In the first test, there were no statistical differences in the rough rice yields between the treated and untreated plots. However, PI283682, PI319513, and PI321278 consistently had equivalent rough rice yields among the two treatments, which may indicate some degree of tolerance to larval root feeding. PI283682 has a higher root volume than PI319513 or PI321278 and sustained weevil feeding pressure with minimal root damage.

Table 1. Rough rice yields in plots treated with carbofuran and in untreated plots of selected rice cultivars. Rice Research Station, Crowley, LA. 1986.

PI	Treated (g)	Untreated (g)
283682	506.6	591.8
319513	1157.0	1062.2
321278	859.7	752.2
Starbonnet	1065.2	950.9
Saturn	1194.6	1077.8
321264C	764.7	641.5
321264A	1145.0	988.2
321294	711.8	503.1
Labelle	805.6	1102.6

RICE STALK BORER PHEROMONE TRAP TYPE STUDIES

(A Preliminary Report)

P. Caballero, C. M. Smith, J. F. Robinson, G. B. Trahan, R. M. Michot, and C. A. Cook

The rice stalk borer (RSB), Chilo plejadellus Zinken, occurs in rice fields in the southeastern United States. In general, C. plejadellus damage has not been economically significant for the past several years, but it has recently been reported as infesting large parts of the rice producing areas of Arkansas and Mississippi. Insecticidal control is not practical since insecticide efficiency is uncertain and infestations are irregular. The objectives of this study were to compare the efficiency of three different RSB pheromone monitoring traps and to compare seasonal abundance of RSB moths at two north Louisiana sites and one south Louisiana site by using one of these trap types.

Synthetic RSB pheromone (Shin-Etsu Company, Tokyo, Japan, Cat. No. 76870) was combined with an equal amount of the anti-oxidant 2,6-di-tert-butyl-p-cresol (BHT) and dissolved in HPLC grade heptane to obtain the desired 3.0 mg concentration. Two hundred µl of the pheromone solution was dispensed onto each septa, Cat. No. 2-7131-10, obtained from Bittner Co., Norcross, Georgia, supplied by Fisher Scientific. One septa was placed in each pheromone trap and replaced with a fresh septa weekly.

In the first experiment, three trap types were compared: the Phercon No. 3302-0 trap (sticky trap) obtained from Trece, Inc., Salinas, California; the International Pheromone Systems trap (bucket trap) obtained from Great Lakes IPM, Vestaburg, Michigan; and a standard fluorescent black light trap attached to a walk-in cage. The Phercon and IPS traps were replicated at three sites on the Louisiana Rice Research Station in Crowley. Each was suspended 3 ft above the ground on steel conduit tubes. The light trap is located permanently on the northeast corner of the Research Station. The weekly trap catches (Figure 1) indicated that the bucket traps were about two times more effective as the light trap and about 2.5 times more effective than the sticky traps in attracting RSB male moths.

The second experiment compared the catches of sticky traps containing septa with 3 mg of RSB pheromone at Lake Providence (three traps) and Crowley (three traps). Fresh septa were placed in traps on a weekly basis. The weekly trap catches for each of these locations (Table 1) indicated that traps at the Lake Providence site had consistently higher trap catches. The second peak catches of the season appeared about 1 to 2 weeks later at Lake Providence than at Crowley.

Table 1. *Chilo plejadellus* Zinken catches using Phercon sticky traps. Lake Providence and Crowley, LA. 1986.

Date	Number of moths trapped	
	Lake Providence	Crowley
4/18	--	2
5/3	--	1
6/25-7/1	2	--
7/2-7/8	12	1
7/9-7/15	12	1
7/16-7/22	107	1
7/23-7/29	1	6
7/30-8/5	11	2
8/6-8/11	20	3
8/12-8/18	6	5
8/19-8/25	6	18
8/26-9/1	295	5
9/9-9/15	16	--
9/16-9/22	0	--

EVALUATION OF UNIFORM REGIONAL RICE NURSERY

(A Preliminary Report)

C. M. Smith, J. F. Robinson, and C. A. Cook

The rice stalk borer, *Chilo plejadellus* Zinken, has been noticed recently to be infesting large portions of the rice producing areas of Arkansas and Mississippi. The result of rice stalk borer larval feeding is the production of empty white seedheads. In this study, we evaluated the 1986 Regional Uniform Rice Nursery for larval feeding damage by the rice stalk borer.

The number of whiteheads in each variety were counted in the plants in each of the three replications in the nursery. The variety with the greatest number of whiteheads was NWRX/BLMT (PI8203085) (27.0%), while the least infested variety was 9881/331581/L201 (PI8403163) (1.3% whiteheads).

The differences in incidence of whiteheads among varieties fit a normal distribution, but the overall intensity of the infestation was not severe enough to cause consistent differences among the material evaluated.

EVALUATION OF *ORYZA* SPECIES FOR FALL ARMYWORM RESISTANCE

(A Preliminary Report)

C. M. Smith, E. M. Nowick, M. A. Riley, C. A. Cook, B. H. Lye

The fall armyworm (FAW), *Spodoptera frugiperda* (J. E. Smith), is a sporadic pest of rice, *Oryza sativa* L., in the United States. Feeding by the larvae causes defoliation, reduced plant and panicle density, and reduced rice yields (Pantoja, et al. 1986). We evaluated FAW feeding resistance in 34 wild *Oryza* spp. using the known susceptible rice variety 'Mars' for comparison. If any were found resistant, these species might be used in breeding studies to develop resistant commercial varieties.

A laboratory preference test was conducted using leaves from field-grown plants of each of the 34 species and 'Mars.' Plastic 9 cm quartered petri dishes lined with moist No. 1 filter paper were used to hold leaves and insects. Two-leaf sections, 4 cm long, from each species were placed in one quadrant of five different petri dishes (replications). The 'Mars' control was included in each petri dish. One-third instar FAW larva taken directly from artificial diet was placed in quadrant two and another in quadrant four of each dish. Lids were placed on the dishes, and the dishes were placed in black plastic bags (to simulate darkness) for 18 hours at 25°C.

Larvae were then removed and the percent feeding by FAW was calculated for each 4-cm leaf piece as percent feeding on the control variety minus the percent feeding on treatment species. The species were then ranked from greatest positive difference (most resistant) to greatest negative difference (least resistant). Test results (Table 1) revealed that leaves of *O. breviligulata* w843 were the least preferred and that leaves of *O. perennis* w1185 were the most preferred by FAW larvae. *O. nivara* a103834 and *O. paraguayensis* were more preferred or about equal to 'Mars' in preference respectively by FAW larvae. On the basis of FAW feeding preference alone, a number of *Oryza* species may offer potential for incorporation into commercial rice varieties.

LITERATURE CITED

Pantoja, A., C. M. Smith, and J. F. Robinson. 1986. Effects of the fall armyworm (Lepidoptera: Noctuidae) on rice yields. J. Econ. Entomol. 79: 1324-1329.

Table 1. Feeding preference of *Spodoptera frugiperda* (J. E. Smith) between *Oryza* spp. and the susceptible *Oryza sativa* variety, 'Mars.'

Oryza species	Mean difference (Mars-Oryza species)
O. breviliqulata w843	40.78
O. perennis w1185	28.79
O. brevuliqulata pi223065	20.05
O. perennis pi346362	18.73
O. rufipogon al03817	18.43
O. rufipogon al03823	17.70
O. nivara al03419	17.33
O. latifolia al00960	16.20
O. rufipogon al03315	15.95
unknown al03818	15.75
O. officinalis al01073	14.68
O. austaliensis pi239667	14.43
O. glaberrima al02710	14.10
O. nivara al01524	13.78
O. barthii al04070	13.35
O. glaberrima al02554	13.33
O. grandiglumis al01405	12.13
O. nivara al01148	11.98
O. alta al00161	11.90
O. perennis al00687	11.35
O. perennis pi346368	11.25
O. punctata pi254570	11.05
O. minuta pi125257	10.75
unknown al01443	10.65
O. latifolia pi269727	10.63
O. nivara al01466	10.00
O. glaberrima al01800	9.03
O. alta w0018	8.93
unknown al03793	8.63
O. glumaepatula al00968	4.83
O. perennis pi346369	3.70
O. glaberrima al02213	0.30
O. paraguayensis	-0.10
O. nivara al03834	-2.48

THE ISOLATION OF ALLELOCHEMICALS FROM RICE, *ORYZA SATIVA* L., THAT AFFECT FALL ARMYWORM, *SPODOPTERA FRUGIPERDA* (J.E. Smith)

(A Preliminary Report)

H. P. Hernandez, C. M. Smith, N. H. Fischer

Fall armyworm (FAW), *Spodoptera frugiperda,* is an occasional insect pest of rice in the United States. Pantoja et al. (1986) found rice PI346833 to be moderately resistant. This study is being conducted to determine the compounds that may be responsible for the resistance of PI346833, using Mars as a susceptible check. Growth inhibition bioassays were performed to monitor the isolation and purification of possible active compounds from various rice extracts.

Previously, we found that the petroleum ether (PE) and dichloromethane (DCM) extracts of tillers from mature plants of both PI346833 and Mars were active. These extracts caused very high mortality, ranging from 90 to 100%. The methanol (MeOH) extract also lowered the larval weight by 26 to 35% and larval life was longer compared with the control.

Since the extracts from mature rice tillers showed no differences in activity, extracts from 4-leaf stage seedlings were bioassayed. In these experiments, six fractions from each of the PE and DCM extracts of PI346833 and Mars were bioassayed.

The PE extracts from PI346833 contained four moderately active fractions (1, 2, 4, and 6) which caused 57, 54, 46, and 39% mortality[1], respectively. One DCM fraction (1) had caused slight mortality (31%). In these active fractions, the mortality occurred in the adult or prepupal stages (Table 1).

Of all the PE and DCM fractions from Mars seedlings, only DCM fraction 3 was active, and caused 31% mortality (Table 2). All the PE fractions are inactive.

It is apparent that the PE extract of PI346833 seedling contains allelochemicals that adversely affect FAW development. These active constituents may be absent or in low concentration in the Mars seedlings. Identification and bioassay of individual compounds in the PE extract fractions are currently in progress.

---

[1]Percent mortality rates were corrected using Abbott's formula.

Table 1. Development and survival of fall armyworm *Spodoptera frugiperda* (J.E. Smith) reared on diet supplemented with fractions of petroleum ether (PE) and dichloromethane (DCM) extracts from PI346833 seedlings.

Fractions	Mean weight (mg) 11-day Larvae	Pupae	Mean life (days) Larvae	Pupae	Mortality[1/]
					-----%-----
PE-1	175	208	16	9	57
PE-2	341	213	16	9	54
PE-3	245	210	16	9	8
PE-4	359	204	15	9	46
PE-5	385	219	14	9	0
PE-6	309	224	15	8	39
DCM-1	336	227	15	9	31
DCM-2	206	215	16	8	5
DCM-3	332	213	15	9	0
DCM-4	328	217	15	9	0
DCM-5	195	216	16	9	0
DCM-6	313	202	15	9	11
Control	364	202	14	8	0

[1/] Percent mortality is corrected using Abbott's formula. Control had 13% mortality.

Table 2. Development and survival of fall armyworm *Spodoptera frugiperda* (J.E. Smith) reared on diet supplemented with fractions of petroleum ether (PE) and dichloromethane (DCM) extracts from Mars seedlings.

Fractions	Mean weight (mg) 8-day Larvae	Pupae	Mean life (days) Larvae	Pupae	Mortality[1/]
					-----%----
PE-1	48	222	16	10	0
PE-2	46	225	16	11	0
PE-3	48	220	16	10	0
PE-4	36	222	18	10	0
PE-5	53	227	17	10	0
PE-6	48	229	16	10	0
DCM-1	46	224	16	11	0
DCM-2	57	224	16	10	0
DCM-3	26	218	17	11	31
DCM-4	52	224	16	11	0
DCM-5	71	231	15	10	0
DCM-6	27	227	18	11	0
Control	56	233	16	10	0

[1/] Percent mortality is corrected using Abbott's formula. Control had 13% mortality.

DISEASE CONTROL STUDIES

DEVELOPMENT OF DISEASE RESISTANT RICE GERMPLASM[1/]

(A Progress Report)

D.E. Groth, C.A. Hollier, M. Frey, and J. Nugent

INTRODUCTION

Disease damage to rice can greatly impair productivity, and in some instances, totally destroy a crop. Fortunately, the United States does not have any of the destructive viral and bacterial diseases that are present in other rice growing areas of the world. However, fungal diseases are prevalent and can be very destructive to Louisiana rice crops. The more important rice diseases in Louisiana include sheath blight caused by *Rhizoctonia solani* Kuhn, blast caused by *Pyricularia oryzae* Cav., water molds caused by *Pythium* and *Achlya* spp., brown spot caused by *Bipolaris oryzae* B. deHann, stem rot caused by *Sclerotium oryzae* Cutt., narrow brown spot caused by *Cercospora oryzae* Miyake, and kernel smut caused by *Neovossia horrida* (Bref.) Sacc. & Syd.

The objectives of this project were 1) to identify and estimate severity of the diseases occurring in the rice producing regions of Louisiana, 2) to introduce new germplasm for the breeding for disease resistance in the rice improvement program at the L.S.U. Rice Research Station, and 3) screen lines for disease resistance.

MATERIALS AND METHODS

1986 Rice Disease Survey. The disease survey of commercial rice fields was conducted in the summer of 1986. Fields with maturing rice were selected at random. Ten sampling sites were inspected in each field by walking a number of paces through the field and stopping at random locations. Disease severities and/or incidence were recorded for each disease. Sheath blight, brown spot, leaf smut *(Entyloma oryzae)*, and narrow brown spot were rated on 0 to 9 scales where 0 indicated no infection and 9 a severe infection. Blast was estimated by the percent of heads infected, where 0 = none and 9 = 90% or more. The variety of rice was determined for each field whenever possible.

RESULTS AND DISCUSSION

1986 Rice Disease Survey. The most common diseases found in Louisiana rice fields were water molds, sheath blight, blast, brown spot, leaf smut, and narrow brown leaf spot. Incidents of kernel smut and sheath rot were also reported in the state but did not appear in any of the fields sampled.

1/ This research is supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

In 1986, sheath blight was the most severe disease on rice in Louisiana (Table 1). Sheath blight was 1.4 times greater on long-grain varieties in the southwest region than on the long-grain varieties in the northeast and 2.5 times greater than on medium-grain varieties. Blast was very severe on the variety Newbonnet in 1986 in the northeast. Brown spot, leaf smut, and narrow brown leaf spot were also common in 1986. Overall, disease pressure was about the same in 1986 as in 1985.

Table 1. Disease survey of commercial long- and medium-grain rice fields in the southwest and northeast rice growing parishes of Louisiana in 1986 at plant maturity.

Variety	Sheath blight[a]	Brown spot[a]	Leaf smut[a]	Narrow brown[a]	Blast[c]
			Southwest Region		
Long-grains					
Lemont (15)[d]	5.0	2.4	2.9	2.8	0.2
Newbonnet (1)	2.9	1.9	4.1	0.2	0.0
Tebonnet (11)	3.5	2.2	2.6	2.0	0.1
Unknown (5)	3.6	3.4	1.9	1.5	0.1
Average:	4.2	2.5	2.7	2.2	0.2
Range:	(1.0-7.5)	(0.3-6.5)	(.2-7.0)	(0-6.0)	(0-0.3)
Medium-grains					
Mars (10)	1.7	0.6	1.1	0.6	0.1
Range:	(0.2-3.4)	(0-3.1)	(0.4-2.7)	(0-2.5)	(0-0.3)
			Northeast Region		
Long-grains					
Lemont (18)	3.3	1.6	0.6	0.9	0.0
Newbonnet (2)	1.0	1.7	1.2	1.0	7.1
Average:	3.1	1.6	0.7	0.9	0.7
Range:	(0.2-6.7)	(0.4-2.5)	(0-2.3)	(0-2.5)	(0-7.4)

[a] Plants rated on a 0 to 9 scale, 0 = no symptoms, 9 = severe infection.

[b] Number of plants showing symptoms in 1 ft^2.

[c] Rated 0 = no infection, 9 = 90 to 100% infected.

[d] Number of fields sampled of each variety.

MATERIALS AND METHODS

Variety Trial. A variety trial was planted at the Rice Research Station in Crowley, LA to evaluate the response of common commercial varieties to diseases in the field. Tested were the long-grain varieties 'Lemont', 'Labelle', 'Lebonnet', 'Newbonnet', 'Bond', 'Tebonnet', 'TORO-2', 'Skybonnet', 'Leah', 'Della', 'Gulfmont', 'Rexmont', and 'L202'.

and the medium-grain varieties 'Saturn', 'Pecos', and 'Mars'. Fertilizer was preplant incorporated at a rate of 60-60-60 lb/A N-P_2O_5-K_2O 1 to 2 inches deep using a small grain drill. Each variety was drill seeded at 100 lb/A on April 30, 1984 and flushed to promote germination. Plots consisted of 7 rows 16 ft long spaced 7 inches apart. The experiment was arranged in a randomized complete block design with four replications. Propanil was applied at 4 lb/A to control weeds. A permanent flood was established as soon as seedlings had emerged 2 to 4 inches, carbofuran was applied to control rice water weevils, and plots were topdressed with 100 lb/A N as Ammonium sulfate before flooding. All plots were inoculated with a moist, autoclaved rice grain:rice hull (1:2) medium culture of Rhizoctonia solani (isolate LR-172) at the green ring growth stage at the rate of 100 ml of inoculum per plot. Plots were rated for disease severities at maturity. The center four rows (35 ft^2) were harvested with a small plot combine. Sample weight and moisture content were determined and grain yields were calculated at 12% moisture for each variety.

RESULTS AND DISCUSSION

Varity Trial. The results of the variety trial are reported in Table 2. Foliar disease reactions were very similar to those found in commercial rice fields. Sheath blight severity was also similar to that in commercial fields.

Table 2. Rice variety trial disease ratings and yields in 1986 at the Rice Research Station, Crowley, LA.

Variety	Sheath blight	Brown spot	Narrow brown	Leaf smut	Leaf Scorch	Yield lb/A
Saturn	3.8	0.0	3.8	3.5	2.5	5944
Mars	2.8	0.0	1.3	4.5	0.0	5844
Pecos	3.3	0.3	2.5	4.0	1.3	5729
TORO-2	4.8	0.0	0.0	2.5	0.3	5662
Labelle	5.8	0.3	3.3	4.5	0.0	4172
Tebonnet	5.0	0.8	3.3	3.3	1.5	5174
Gulfmont	6.8	0.5	3.8	2.5	1.3	5139
Leah	5.5	0.5	1.5	2.5	1.8	5777
Lemont	6.0	0.5	1.5	2.3	2.8	5755
Lebonnet	5.5	0.5	3.3	4.3	2.5	6063
Skybonnet	6.3	0.3	2.3	4.3	1.3	5340
Newbonnet	4.8	1.0	3.3	3.0	1.3	5278
L202	5.0	0.5	0.0	2.8	0.0	4660
CB801	5.0	0.5	0.0	0.3	0.3	4532
Della	4.0	0.3	1.8	4.0	1.8	5744

MATERIALS AND METHODS

1985 URN Disease Nurseries. The disease nursery was planted on June 12, 1986. Four grams of seed of each entry were drill seeded into each of three 4-ft rows. Row spacing was 10 inches with 3 ft between tiers of rows. On June 27, Propanil was applied at 4 lb/A to control weeds. On July 7, the nursery was fertilized at a 100-50-50 (N, P_2O_5, K_2O) lb/A rate and a permanent flood of 4 to 6 inches in depth was established.

All plots in the sheath blight nursery were inoculated with a rice seed: rice hull:fungus inoculum at a rate of 50 ml/2 row plot on August 8. Inoculum was prepared by inoculating a moist, autoclaved (1 hr at 15 lb pressure on 2 consecutive days) rice grain:rice hull medium (1:2) in 2-liter flasks with plugs from a 5-day old PDA culture of Rhizoctonia solani (isolate LR-172). The inoculum was incubated at 28°C for 14 days. After incubation, the inoculum was removed from the flasks, broken into small pieces, mixed with fresh rice hull mixture (1:1), allowed to incubate for 24 hours, and spread over the plot rows while still moist.

The number of days from seeding to 50% heading for each entry was recorded when about half of the panicles in a plot had emerged from the boot. Approximately 35 days after heading, each entry was rated for sheath blight, brown spot, narrow brown spot, and leaf smut infection severity on a 0 to 9 scale previously reported.

RESULTS AND DISCUSSION

1985 URN Disease Nursery. In the Uniform Rice Nursery, 23 lines, entries 5, 11, 25, 33, 97, 98, 106, 118, 157, 189, 192, 214, 267, 345, 530, 602, 621, 637, 655, 657, 659, 661, and 668 showed a resistant (3 or less) reaction to sheath blight. Three entries exhibited multiple disease resistance to sheath blight, brown spot (0-3), narrow brown leaf spot (0-1), and leaf smut (0-1). These were entries 192, 345, 661.

In the sheath blight nursery, disease pressure was high in severity, and any late-maturing entries were exposed to dry weather conditions during sheath blight development and their resistant reaction may have been due to these conditions. For the foliage diseases, brown leaf spot and leaf smut disease pressure were light and narrow brown spot pressure was high in 1986.

The 3-year ratings (1984-86) and averages for the commercial varieties are listed in Table 3 with corresponding disease rating.

MATERIALS AND METHODS

Plant Introductions. Rice germplasm is introduced through quarantine under USDA, PPQ Departmental Permit No. 59055 using the following precautionary methods. The rice seeds are selected from an apparently disease-free and pest-free source plant, securely packaged to prevent loss in transit and mailed to the Plant Germplasm Quarantine Center at Beltsville, Maryland using a green and yellow permit label. Only the minimum amount of seed needed for research purposes may be introduced and other materials are denied entry. A phytosanitary certificate issued by the plant protection service of the exporting country should accompany the seed and no fungicidal or insecticidal compounds are to be applied to the seed. At the quarantine center the seeds are visually inspected for the presence of any pests and then subject to hot water treatment at 56°C for 15 min to kill any pathogens in and on the seed. The seeds are dried and sent to the Rice Research Station in Crowley, Louisiana.

In the laboratory, under aseptic conditions, the hulls are removed and the seeds are surface sterilized in 1% NaHO (20% bleach) for 1 to 2 hours. Seeds are then germinated using standard seed health testing methods. This involves placing the surface sterilized seed on plates of potato dextrose agar (PDA, Difco), sealing the plates with parafilm and incubating them under cool-white fluorescence lamps for 7 to 10 days at room temperature (20°C $\pm$ 2). This allows the seeds to germinate and any fungal or bacterial pathogens to grow out from the seed onto the agar and be detected. Individual uncontaminated, normal seedlings are potted in soil in the greenhouse. Hulls, contaminated seedlings, agar plates and any other plant materials not used are sterilized by autoclaving (1 hr at 15 lb pressure).

In the greenhouse, the rice plants are fertilized, treated with carbofuran, and a permanent flood is established. Plants are inspected periodically for any evidence of disease. Any diseased plants are immediately rouged and destroyed by incineration. In addition, the plants and greenhouse are sprayed weekly with pesticides to control potential insect vectors. Seeds produced on the quarantined mother plants are heat treated for 24 hrs at 50°C and, after visual inspection, released. All vegetative parts of the mother plants are destroyed by incineration and the water in the greenhouse bench is treated by adding chlorine bleach.

The plant introductions from 1985 were planted on April 8, 1986. Three grams of seed of each entry were drill seeded into a 3-ft row. Row spacing was 10 inches with 3 ft between tiers of rows with one row of variety Lemont between two rows of introductions. On May 9, Propanil was applied at 4 lb/A to control weeds. On May 12, the nursery was fertilized at a 100-50-50 (N, P_2O_5, K_2O) lb/A rate and a permanent flood of 4 to 6 inches in depth was established.

All plots in the nursery were inoculated with a rice seed: rice hull:fungus inoculum at a rate of 50 ml/2 row plot on June 2. Inoculum was prepared by inoculating a moist, autoclaved (1 hr at 15 lb pressure on 2 consecutive days) rice grain:rice hull medium (1:2), in 2 liter flasks, with plugs from a 5-day old PDA culture. The inoculum was incubated at 28°C for 14 days with daily shaking. After incubation, the inoculum was removed from the flasks, broken into small pieces, mixed with moist rice hulls (1:1) and spread over the plot rows while still moist.

The number of days from seeding to 50% heading for each entry was recorded when about half of the panicles in a plot had emerged from the boot. Approximately 35 days after heading, each entry was rated for sheath blight infection severity on a 0 to 9 scale previously reported. Grain type and plant height were recorded for each entry. Disease reactions to naturally occurring brown spot, leaf smut, and narrow brown leaf spot were made for each line using 0 to 9 scales. Plant height and grain type were recorded for each entry.

RESULTS AND DISCUSSION

1986 Plant Introductions. Approximately 25 new rice lines were introduced through plant quarantine in 1986 (Table 4) from Japan. Seed of each line will be increased in 1987 and be deposited in the National Small-grains Collection at Beltsville, Maryland where it will be made available some time in 1988. In addition, all lines will be screened for various characteristics, including disease resistance, insect resistance, and other agronomic traits.

The results of the germplasm evaluations are presented in Table 5. Numerous lines showed good resistance to sheath blight, leaf smut, brown spot, and narrow brown spot. Abundant variation was also present in the introduced lines in terms of plant height, heading date, and grain type. Further evaluations will be conducted.

Table 3. Reaction of various varieties to sheath blight (SB), brown spot (BS), leaf smut (LS), and narrow brown leaf smut (NB) in disease nurseries at the Rice Research Station, Crowley, LA, in 1984, 1985, and 1986.

	SB[1/]					BS[1/]					LS[1/]					NB[1/]				
	84	85	86	Ave	Rating[2/]	84	85	86	Ave	Rating[2/]	84	85	86	Ave	Rating[2/]	84	85	86	Ave	Rating[2/]
VELG[3/]																				
Labelle	7	8	7	7.3	VS	3	2	3	2.6	MS	5	3	2	3.3	MS	3	7	6	5.3	S
Tebonnet	6	7	7	6.6	S	3	3	4	3.3	MS	3	4	1	2.6	MR	3	4	6	4.3	S
Skybonnet	7	9	7	7.6	S-VS	2	3	2	2.3	MR-MS	3	5	0	2.6	MR	3	3	8	4.6	S
Bond	6	8	6	6.6	S-VS	2	1	4	2.3	MR-MS	4	2	1	2.3	MR	3	4	4	3.6	MS
Gulfmont	9	8	9	8.6	VS	0	0	2	0.6	R	4	7	1	4.0	MS	0	4	9	4.3	S
ELG																				
Leah	5	5	5	5.0	MS	3	0	3	2.0	MR	1	5	3	3.0	MS	3	4	6	4.3	S
Lemont	8	7	8	7.6	VS	4	3	3	3.3	MS-S	2	6	1	3.0	MS	3	4	7	4.6	S
Lebonnet	8	9	7	8.0	VS	4	0	3	2.3	MR	4	7	1	4.0	MS	3	5	6	4.6	S
Bellmont	8	9	8	8.3	VS	2	3	3	2.6	MS	5	5	5	5.0	S	5	4	6	5.0	S
MLG																				
Bellevue	6	4	6	5.3	MS	3	0	3	2.0	MR	4	8	5	5.6	S	1	5	3	3.0	MS
Newbonnet	6	8	6	6.6	MS-S	0	0	0	0	R	2	5	1	2.6	MR	3	1	8	3.0	MS
Starbonnet	4	5	6	5.0	MS	4	0	3	2.3	MR	4	6	1	3.6	MS	3	2	3	2.6	MS
EMG																				
Mars	4	5	3	4.0	MS	4	0	2	2.0	MR	1	6	1	2.6	MR	1	4	2	2.3	MR
Saturn	5	7	7	6.3	MS-S	3	2	4	3.0	MS	5	4	5	4.6	MS	6	2	4	4.0	S
Pecos	4	4	2	3.3	MR	3	2	2	2.3	MR	4	5	0	3.0	MS	0	0	1	0.3	R
Brazos	6	5	5	5.3	MS	3	0	3	2.0	MR	3	4	0	2.6	MR	0	0	0	0.0	R
Mercury		6	2	5.0	MS		2	3	2.5	MS		7	2	4.5	MS		0	3	1.5	R
Special																				
Toro-2	7	6	5	6.0	MS-S	3	0	4	2.3	MR	1	6	2	3.0	MR	1	3	4	2.6	MS
Newrex	9	7	7	7.6	S-VS	4	3	5	4.0	MS-S	6	6	3	5.0	MS	0	0	3	1.0	R
Short																				
Norti	4	4	4	4.0	MS	3	0	5	2.6	MS	0	5	0	2.6	MR	0	3	3	2.0	MR

1/ Diseases rated on 0 - 9 scale where 0 = immune and 9 = a very severe reaction.

2/ R = resistant, MR = moderately resistant, MS = moderantly susceptible, S = susceptible, and VS = very susceptible.

3/ VELG = very early long grain, ELG = early long grain, MLG = midseason long grain, EMG = early medium grain, special and short grain varieties.

Table 4. Plant introductions at the Rice Research Station, Crowley, LA. 1986.

Introduction number	Source	Source identification number[a]	Variety, cross or genus species[b]
DG860404	Japan		Akihikari
405	Japan		Akinishiki
406	Japan		Akiyutaka
407	Japan		Aoisora
408	Japan		Chiyonishiki
409	Japan		Fukuhikari
410	Japan		Hatsushimo
411	Japan		Hounenwase
412	Japan		Hourei
413	Japan		Kiyonishiki
414	Japan		Kochihibiki
415	Japan		Koganemasari
416	Japan		Koshihikari
417	Japan		Minaminishiki
418	Japan		Natsuhikari
419	Japan		Nipponbave
420	Japan		Nishihomare
421	Japan		Oozora
422	Japan		Reihou
423	Japan		Reimei (Induced mutant)
424	Japan		Sachiminori
425	Japan		Sasanishiki
426	Japan		Todorokiwase
427	Japan		Toyamanishiki
428	Japan		Toyonishiki

a/ Identification number given to rice line by originating institute.

b/ Specific name, genus species, or cross identification given to line by originating institute.

LITERATURE CITED

1. Groth, D.E. 1985. Plant introductions. Ann. Prog. Rpt., Rice Res. Stn., La. Agri. Exp. Stn., L.S.U. Agricultural Center, 77:234-242.

2. Groth, D.E. and M.C. Rush. 1985. Rice assessemnt keys. Ann. Prog. Rpt., Rice Res. Stn., La. Agri. Exp. Stn., L.S.U. Agricultural Center, 77:150-157.

3. International Seed Testing Association. 1966. International rules for seed testing. Proc. Int. Seed Test. Assoc. 31:1-152.

Table 5. Agronomic and disease resistance traits of 1985 plant introductions tested in 1986 at the Rice Research Station, Crowley, LA.

Introduction Number	Name or cross	P.I. No.	Height in cm.	Days to heading	Grain type	Sheath blight	Brown spot	Narrow brown	Leaf smut
DG840017	Zao Hua Aiu	PI505358			M	-	-	-	-
DG840019	Wan Xian (9Hao)#9	59			M	-	-	-	-
DG850261	19971 4440//Bg90-2K8	60			L	-	-	-	-
62	Unknown	61	161	117	M	1	6	0	0
63	Shuan Nong 422	62	166	100	M	1	3	0	0
65	Luo ham gu	63	132	90	M	2	2	0	0
67	Shuang Xu gu	64	150	100	M	1	2	0	0
70	La Cheag 11	65	85	96	M	4	3	1	0
71	Quer Zi	66	153	103	M	3	5	0	0
72	IR18348-36-3-3	67	100	112	L	2	4	3	3
73	IR18350-229-3	68	96	106	L	2	5	2	3
74	IR24632-34-2	69	100	120	L	2	4	0	1
75	IR25588-7-3-1	70	98	120	L	2	4	0	1
76	IR25621-135-1-1	71	86	93	L	5	6	1	0
77	IR25840-83-3-2	72	98	103	L	6	8	1	2
78	IR28128-45-3-3-2	73	101	90	L	7	4	0	0
79	IR28238-109-1-3-2-2	74	---	142	L	3	3	1	1
80	IR28239-94-2-3-6-2	75	99	90	L	4	3	1	3
81	IR29670-15-2-3	76	100	90	L	5	4	0	1
82	IR29692-9-1-3-2	77	80	96	L	2	3	0	1
83	IR29692-14-1-1-2	78	95	93	L	2	3	0	0
84	IR29692-65-2-3-3	79	101	93	L	6	3	0	0
85	IR29692-94-2-1-3	80	97	93	L	2	3	1	0
86	IR29708-23-1-2-2	81	90	93	L	2	4	0	0
87	IR29708-41-2-2-3	82	96	90	L	3	4	0	0
88	IR29708-113-3-2-3	83	87	90	L	2	2	0	0
89	IR29725-3-1-3-2	84	95	93	L	3	4	0	1
90	IR29725-22-3-3-3	85	85	93	L	2	4	0	0
91	IR31779-112-1-2-2-3	86	75	86	L	6	4	0	0
92	IR31802-48-2-2	87	92	90	L	3	4	0	1
93	IR31837-11-2-2-1-2	88	90	93	L	1	3	0	0
94	IR31851-63-1-2-3-2	89	75	??	L	1	?	0	0

Continued.

Table 5. Continued.

Introduction Number	Name or cross	P.I. No.	Height in cm.	Days to heading	Grain type	Sheath blight	Brown spot	Narrow brown	Leaf smut
95	IR31864-64-2-3-3-3	PI505390	28	112	L	1	8	0	2
96	IR32333-61-2-3-2	91	100	90	L	3	3	0	0
98	IR32358-122-2-1-2	92	102	110	L	3	7	0	2
99	IR32429-47-3-3-2-2	93	90	90	L	5	2	0	1
DG850300	IR32429-115-3-2-1	94	89	93	L	3	3	0	1
1	IR34631-6-1-3	95	108	107	L	2	6	1	2
2	IR34631-113-1-2	96	105	107	L	2	5	0	1
4	IR34681-27-3-3-3	97	106	107	L	3	4	0	1
5	IR35300-56-2-2-1	98	122	117	L	3	2	0	1
6	IR35311-96-3-2-1	99	102	96	L	3	1	0	0
7	IR39368-57-3-2	PI505400	113	120	L	3	5	0	0
8	IR21820-154-3-2-2-3	401	113	117	L	2	5	1	2
9	IR21848-65-3-2-2	402	114	---	---	-	-	-	-
DG850310	IR28153-10-3-1-3	403	112	114	L	3	5	0	2
11	IR28183-2-2-1-1	404	---	138	L	3	5	0	1
12	IR28222-23-1-3-3-2	405	101	133	L	3	4	0	1
13	IR29706-11-1-3-3	406	108	124	---	3	4	0	0
14	IR31916-17-2-1-2	407	105	117	L	2	5	0	0
15	IR35353-94-2-1-3	408	105	120	L	2	5	0	0

COMMERCIAL RICE FUNGICIDE TRIAL[1/]

D.E. Groth

Location: Rice Research Station, Crowley, LA

Soil Type: Crowley silt loam

Varietv/Seed Rate: Lemont, 100 lb/A

Planting Method/Date: Drill seeded - Mar 26, 1986

Fertilization: 100-50-50, Mar 26; 60-0-0, May 12; 40-0-0, June 19

Second Crop: 60-0-0

Plot Size: 4 x 16 ft

Emergence Date: Apr 8

Water Management: Flushed Mar 31, Apr 8, Apr 18, Apr 25, May 1; Permanent flood Apr 14, Drained July 20, Ratoon flood Aug 8

Herbicides: 4 qt/A propanil, Apr 29

Insecticides: 20 lb/A Furadan, May 15; Seven XLR 1.3 qt/A, July 21

Fungicides: Various fungicides, rates and timing -- See Table 1.

Application Equipment: CO_2 backpack sprayer, 1102 tips, 20 gal/A

Harvest: Aug 6; second crop Oct 11

Experimental Design: Randomized block design with four replications

Disease Ratings: Sheath blight severity (0-9 scale) July 17, Aug 1, Nov 10; Infestation levels (0-100%) Aug 1; Brown spot leaf smut and narrow brown leaf spot (0-9 scales) Aug 1

Results: First crop results Table 1. Second crop results Table 2.

Comments: Sheath blight severity was high, other diseases were low. Fungicides were applied to 1st crop only; effects on 2nd crop were residual.

[1/] This research is supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

Table 1. Residual effects of foliar fungicides on second crop rice. Rice Research Station, Crowley, LA. 1986.

Treatment number	Fungicide treatment	Timing	Rate formulated	Sheath blight (7/17/86)[1]	Sheath blight (8/1/86)[1]	Sheath blight Infestation[2]	Brown spot[1]	Leaf smut[1]	Nr. Br. spot[1]	Yield (lb/Ac)	Change[3]
1	Uninoculated check	---	---	1.0**	0.8**	8**	1.8	2.5	2.8	7845	1479**
2	Inoculated check	---	---	7.0	7.5	88	2.0	2.8	2.5	6366	-
3	Benlate 50WP	B + H	1 lb	5.0**	5.5**	68**	0.5**	1.8	0.8**	6987	621
4	"	B + H	2 lb	4.5**	4.5**	63**	0.3**	1.0**	0.5**	7413	1047**
5	"	PI + B	1 lb	5.0**	5.5**	60**	0.5**	1.3**	1.8	7315	949**
6	"	B	1 lb	5.3**	5.8**	70*	1.5	2.3	1.5*	7013	647*
7	"	H	1 lb	5.5**	5.8**	70*	0.3**	2.3	1.0**	6739	373
8	"	H	1½ lb	5.0**	5.5**	73*	0.5**	1.3**	0.8**	6827	461
9	"	H	2 lb	5.8*	5.3**	68*	0.5**	1.8	0.5**	6886	520
10	Benlate 50WP + CS7	B + H	1 lb	4.5**	5.0**	53**	0.3**	1.0**	0.5**	7249	883**
11	Folatec 3.8 FL	PI + B	12 fl oz	4.8**	6.3*	69**	1.3	2.5	1.5*	6844	478
12	Folatec	B + H	12 fl oz	5.5**	6.3*	75	0.8*	2.0	2.0	6788	422
13	Rovral 50WP	B + H	1 lb	5.0**	4.3**	53**	0.3**	1.5*	2.5	7009	643*
14	"	B + H	2 lb	3.5**	4.0**	48**	0.5**	2.0	2.0	7496	1130**
15	"	PI + B	1 lb	3.8**	4.5**	43**	0.8*	1.3**	1.8	7552	1186**
16	"	B	1 lb	5.0**	5.5**	65**	0.5**	1.8	2.0	6825	459
17	"	H	1 lb	5.5**	5.3**	74	0.3**	2.3	2.0	6860	494
18	"	H	1½ lb	5.8*	5.8**	63**	0.3**	2.0	1.5*	7033	667*
19	"	H	2 lb	5.5**	5.5**	71*	0.8*	2.3	2.3	6795	429
20	Rovral 50WP + CS7	B + H	1 lb	4.8**	4.5**	64**	0.5**	1.8	1.0**	7426	1060**
21	Rovral/Benlate	B/H	1 lb/1 lb	4.3**	4.8**	53**	0.8*	1.0**	0.8**	7015	649*
22	Rovral Flo	B + H	0.5 lb Ai/Ac	5.3**	5.3**	73*	0.3**	2.3	1.8	7057	691*
23	Tilt 3.6 EC	PI + B	6 fl oz	4.0**	4.8**	58**	1.0*	0.5**	0.8**	7805	1439**
24	"	PI + B	8 fl oz	4.0**	4.5**	50**	1.3	0.5**	0.8**	7695	1329**
25	"	B	6 fl oz	5.8*	5.0**	61**	0.3**	0.8**	1.3*	7089	733*
26	"	B	8 fl oz	5.3**	4.3**	55**	0.0**	1.0**	1.5*	7431	1065**
27	"	B	10 fl oz	4.0**	4.5**	45**	0.5**	0.0**	1.0**	7318	952**
28	Tilt/Benlate	B/H	8 fl oz/1 lb	3.8**	4.8**	51**	0.8*	0.5**	0.3**	7225	859**
29	Tilt + CS7	PI + B	6 fl oz	4.3**	4.5**	35**	0.5**	0.3**	1.3*	7328	962**
30	SN84364 50WP	PI + B	0.5 lb	2.5**	3.8**	35**	1.0*	1.3**	1.5*	7538	1162**
31	"	PI + B	0.7 lb	2.5**	2.8**	16**	0.3**	0.5**	1.5*	7717	1351**
32	"	PI + B	1.0 lb	2.3**	3.0**	16**	1.0*	1.0**	2.3	7665	1299**
33	SN84364 50WP + CS7	PI + B	0.7 lb	2.0**	3.5**	25**	1.0*	1.3*	1.8	7755	1389**
34	SN/Benlate	B/H	0.7 lb/1 lb	3.5**	4.0**	35**	0.3**	1.8	0.8**	7524	1158**
35	NTN19701 75WP	B + H	0.33 lb	3.5**	3.3**	23**	0.5**	1.8	1.3*	7830	1464**
36	NTN19701	B + H	0.70 lb	2.8**	2.8**	27**	1.3	2.0	2.3	7836	1470**
37	NTN/Benlate	B/H	0.7 lb/1 lb	3.0**	3.5**	28**	0.8*	1.8	1.0**	7696	1330**
38	NTN19701	PI + B	0.7 lb	2.5**	2.5**	18**	1.0*	1.5*	2.3	7609	1243**
LSD (0.05)				1.1	1.0	15	1.0	1.1	1.0	538	
LSD (0.01)				1.4	1.3	19	1.4	1.5	1.3	710	

[1] Rated using 0-9 scale (0 = no disease). [2] Rated on 0-100% infected tillers. [3] Change from inoculated check.
* = significant at 5% level from check; ** = significant at 1% level from check.

Table 2. Residual effect of fungicidal sprays on yield and disease control in Lemont rice. Rice Research Stn., Crowely, LA. 1986.

Treatment number	Fungicide treatment	Timing	Rate formulated	2nd Crop Stand 1/	Stand change 2/	Yield lb/A	Change 3/	SB	Total yield change 5/
1	Uninoculated check	---	---	11.5	5.2*	1854	621**	(-)2.0*	2100
2	Inoculated check	---	---	6.3	---	1233	---	3.5	----
3	Benlate 50WP	B + H	1 lb	6.0	-0.3	1754	521*	4.8*	1142
4	"	B + H	2 lb	6.5	0.2	1861	628**	4.8*	1675
5	"	PI + B	1 lb	7.8	1.5	2176	943**	5.5**	1892
6	"	B	1 lb	9.3	3.0	1548	316	5.0*	963
7	"	H	1 lb	7.5	1.2	1536	304	5.0*	677
8	"	H	1½ lb	8.5	2.2	1323	90	5.5**	551
9	"	H	2 lb	6.8	0.5	1559	326	5.0*	864
10	Benlate 50WP + CS7	B + H	1 lb	10.0	3.7	2086	853**	5.0*	1736
11	Folatec 3.8 FL	PI + B	12 fl oz	10.8	4.5	1644	411	4.8*	889
12	Folatec	B + H	12 fl oz	8.3	2.0	1263	30	5.0*	452
13	Rovral 50WP	B + H	1 lb	9.3	3.0	1432	200	4.0	843
14	"	B + H	2 lb	8.5	2.2	1794	472*	4.8*	1602
15	"	PI + B	1 lb	5.8	-0.5	1609	377	4.0	1563
16	"	B	1 lb	5.5	-0.8	1520	288	4.8*	747
17	"	H	1 lb	8.5	2.2	1386	153	3.8	647
18	"	H	1½ lb	4.8	-1.5	1156	-77	4.3	590
19	"	H	2 lb	7.3	1.0	1376	143	4.8*	572
20	Rovral 50WP + CS7	B + H	1 lb	10.8	4.5	1971	738**	4.3	1798
21	Rovral/Benlate	B/H	1 lb/1 lb	8.0	1.7	1438	205	4.8*	854
22	Rovral Flo	B + H	0.5 lb Ai/Ac	6.0	-0.3	1432	199	4.8*	890
23	Tilt 3.6 EC	PI + B	6 fl oz	11.3	5.0*	1897	665**	4.5	2104
24	"	PI + B	8 fl oz	10.5	4.2	1862	629**	5.3**	1958
25	"	B	6 fl oz	8.3	2.0	1636	403	4.5	1136
26	"	B	8 fl oz	7.5	1.2	1904	671**	4.0	1736
27	"	B	10 fl oz	12.3	6.0*	1685	452*	4.5	1404
28	Tilt/Benlate	B/H	8 fl oz/1 lb	9.5	3.2	1581	349	5.8**	1208
29	Tilt + CS7	PI + B	6 fl oz	12.5	6.2*	2025	792**	5.0*	1754
30	SN84364 50WP	PI + B	0.5 lb	11.5	5.2*	1643	410	4.8*	1572
31	"	PI + B	0.7 lb	9.3	3.0	1928	696**	4.5	2047
32	"	PI + B	1.0 lb	13.0	6.7**	1948	715**	4.0	2014
33	SN84364 50WP + CS7	PI + B	0.7 lb	7.8	1.5	1683	450*	4.5	1839
34	SN/Benlate	B/H	0.7 lb/1 lb	11.0	4.7	1878	645**	4.3	1803
35	NTN19701 75WP	B + H	0.33 lb	8.3	2.0	1718	485*	4.5	1945
36	NTN19701	B + H	0.70 lb	12.8	6.5**	1694	462*	4.0	1932
37	NTN/Benlate	B/H	0.7 lb/1 lb	13.5	7.2**	1934	701**	5.0*	2031
38	NTN19701	PI + B	0.7 lb	8.8	2.5	1897	665**	5.3**	1908
LSD (0.05)				4.9		450		1.3	
LSD (0.01)				6.4		593		1.7	

1/ Stand = Number of plants per foot of row. 2/ Change in stand density from inoculated unsprayed check.
3/ Change in yield in lb/A from inoculated check. 4/ Sheath blight rating in second crop based on a 0-9 scale.
5/ Total yield change in 1st and 2nd crop from inoculated check.

WHEAT FUNGICIDE TRIAL

D.E. Groth

Location: Rice Research Station, Crowley, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: McNair 1003, 50 lb/A

Planting Method/Date: Drill seeded, Nov 15, 1985

Fertilization: 25 lb N/A preplant, 75 lb N stage 5, Feb 25

Plot Size: 4 x 20 ft

Herbicide: None

Insecticide: None

Fungicide: Various rates, timings, and kinds (See Table 1)

Application Equipment: CO_2 backpack sprayer, 1102 tips, 20 gal/A, 30 lb/in^2 pressure

Harvest: May 20, 1986

Experimental Design: Randomized complete block design with four replications

Disease Ratings: Leaf rust (0-100%)

Comments: Leaf rust was very severe late in the season.

Table 1. Results of the wheat foliar fungicide test. Rice Research Station, Crowley, LA. 1986.

Fungicides	Rate formulated	Formulation	Timing	Percent rust	Yield (bu/A)	1000 grain wt (g)
Control	---	---	---	82.5	44.0	34.85
Diathane M-45	2 lb	80WP	9 + 10.3	50.0	44.3	35.75
Diathane M-45 +CS-7	1 lb + 1 pt	80WP	9 + 10.3	48.0	44.6	36.15
Manzate 200	0.4 gal	---	9 + 10.3	50.0	44.3	34.52
Diathane M-45 + Bayleton	2 lb + 2 oz	80WP + 50WP	9 + 10.3	19.0	49.6	38.40
Diathane M-45 + Benlate	2 lb + 8 oz	80WP + 50WP	9 + 10.3	60.0	45.2	35.53
Bayleton	8 oz fl	1.8EC	9 + 10.3	4.0	48.2	37.78
Bayleton	3.6 oz	50WP	9 + 10.3	5.0	44.3	36.82
Bayleton	4.0 oz	50WP	9 + 10.3	5.0	44.3	37.21
HWG1608	12 oz	1.2Ec	9 + 10.3	0.0	46.7	36.79
Tilt	4 oz	3.6EC	9	33.0	46.4	35.77
Rovral	1 lb	50WP	9 + 10.3	69.0	39.5	35.02

FUNGICIDAL CONTROL OF FOLIAR AND STEM DISEASES[1/]

(A Progress Report)

M.C. Rush, G.D. Lindberg, and D.E. Groth

INTRODUCTION

Field testing of foliar applications of fungicides for the control of diseases caused by fungi was initiated in 1972. Theoretically, the fungal diseases occurring on rice in Louisiana can be controlled by foliar applications of fungicides. The diseases which are economically significant include blast (*Pyricularia oryzae*), brown spot (*Bipolaris oryzae*), sheath blight (*Rhizoctonia solani*), stem rot (*Sclerotium oryzae*), narrow brown leaf spot (*Cercospora oryzae*), and leaf smut (*Entyloma oryzae*). These diseases are endemic in the Louisiana rice area becoming epidemic periodically. Certain of our presently grown commercial varieties are very susceptible to these diseases. Ultimately, control of these diseases will be by an integrated disease management system using a combination of pesticides, disease resistance, cultural practices, biological control, and legislative - regulatory procedures. It is important that effective fungicides are found, developed, and made available to Louisiana rice growers for use in disease management programs.

MATERIALS AND METHODS

A test was conducted at the L.S.U. Rice Research Station, Crowley, LA, during the 1986 season, to screen fungicides for their efficacy in controlling foliar and stem diseases on Lemont rice. The tests were conducted on Crowley silt loam soil with a pH of 6.0. Plots were 20 ft, 7-row, drill strips with 7-inch row spacings and 14-inch alleys. Each treatment was repeated five times in a randomized complete block design. The plots in this test were inoculated with *Rhizoctonia solani* and infections by the target fungi were from this inoculation or from natural sources of inoculum. Six hundred lb/A of 20-10-10 fertilizer was applied by a drill application to the test area at planting. Plots were planted May 4, and 4 lb/A of propanil was applied over the test area before applying the permanent flood. Fungicide applications were made at the green ring (June 23), boot (July 10), and heading (July 25) stages of growth. Fungicides were applied in 20 gal/A of water with a back-pack type CO_2 sprayer. The treatments were as indicated in Table 1.

[1/] Mention of trade names of the fungicides or other chemicals described in this report are for identification purposes only and does not imply endorsement by the Louisiana Agricultural Experiment Station, Louisiana State University.

Table 1. Effect of fungicidal sprays on yield and disease control in Lemont rice inoculated with Rhizoctonia solani the cause of Sheath blight. Rice Research Station, Crowley, LA 1986.

Treatment	Timing[a]	Rate (fl oz, lb, or pt/A formulated)	Mean yield (lb/A)[b]	Change from unsprayed (lb/A)[b]	Mean % tillers infected at maturity	Mean % tillers dead at maturity
Uninoculated, unsprayed	-	-	5017	417	13.6*	0.0*
Inoculated control	-	-	4600	-	67.4	39.0
Benlate 50 WP	B,H	1.0 lb	5179	579	59.2	2.0*
Benlate 50 WP	B,H	2.0 lb	5411*[c]	811	27.8*	0.5*
Mon-5862	B,H	1.7 pt	5132	532	28.8*	0.7*
Mon-13111	B,H	5.3 pt	4672	72	14.0*	0.5*
Mon-13111	B,H	2.6 pt	4990	390	20.6*	0.0*
Mon-13111	B,H	1.3 pt	4816	216	27.2*	1.2*
Rovral	B,H	1.0 lb	5318*	718	44.0*	7.5*
Rovral	B,H	2.0 lb	4822	222	29.0*	1.2*
Tilt 3.6E	GR,B	6.0 fl oz	5126	526	63.2	12.0*
Tilt 3.6E	GR,B	8.0 fl oz	5328*	728	39.0*	3.4*
Tilt 3.6E and	GR	8.0 fl oz	5038	438	47.4*	5.9*
Benlate 50 WP	B	1.0 lb				
Chloroneb	B,H	2.0 lb	4928	328	80.6	25.0*
RH 7592 + COC	GR,B	4 pt + 24 ml/gal	4970	370	39.6*	3.5*
RH 7592 + COC	GR,B	2 pt + 24 ml/gal	5254*	654	56.8	6.5*
RH 7592 + COC	B,H	4 pt + 24 ml/gal	5051	451	40.6*	1.0*
RH 7592 + COC	B,H	2 pt + 24 ml/gal	5112	512	48.8*	0.5*
RH 7592 + COC and	B	4 pt + 24 ml/gal	5217	617	35.0*	1.2*
Benlate 50 WP	H	1.0 lb				
SN 84364 50 WP	GR,B	0.5 lb	4679	79	52.4	3.5*
SN 84364 50 WP	GR,B	0.7 lb	4898	298	31.8*	4.2*
SN 84364 50 WP + COC	GR,B	1.0 lb + 24 ml/gal	5128	528	29.4*	1.0*
SN 84364 50 WP + COC	GR,B	0.7 lb + 24 ml/gal	5118	518	32.0*	3.0*
SN 84364 20 Sc	GR,B	0.9 pt	5118	518	46.2*	3.0*
SN 84364 50 WP (360 302F)	GR,B	0.7 lb	4904	304	43.2*	4.5*
SDS-45037	GR,B	2.5 pt	5208	608	25.2*	0.7*

Table 1. Cont.

Treatment	Timing[a]	Rate (fl oz, lb, or pt/A formulated)	Mean yield (lb/A)[b]	Change from unsprayed (lb/A)[b]	Mean % tillers infected at maturity	Mean % tillers dead at maturity
SDS-45037	GR,B	3.75 pt	5336*[c]	736	19.4*	0.0*
SDS-45037	B,H	3.75 pt	5316*	716	18.8*	0.7*
EF-705	B,H	1.0 pt	5170	570	73.8	25.5*
EF-705	B,H	1.5 pt	5029	429	74.8	24.0*
EF-705	B,H	2.0 pt	5390*	790	79.4	29.0*
PP-523	GR,B	1.76 pt	4997	397	51.6	8.0*
PP-523	GR,B	3.52 pt	5214	614	24.2*	1.0*
PP-523	GR,B	5.36 pt	5495*	895	31.8*	0.5*
PP-523	GR,H	3.52 pt	4784	184	27.8*	0.5*
Rovral + Benlate 50 WP	B,H	1.0 lb + 0.5 lb	5539*	939	16.8*	0.5*
Rovral + Benlate 50 WP	B,H	1.0 lb + 1.0 lb	5321*	721	16.2*	0.0*
NTN 19701	B,H	0.35 lb	5538*	938	21.2*	0.0*
NTN 19701 and	B	0.35 lb	5562*	962	22.8*	0.0*
Benlate 50 WP	H	1.0 lb				
HWG 1608 1.2 EC	B,H	0.75 pt	5055	455	62.6	8.5*
NTN 19701 + HWG 1608	B,H	0.35 lb + 0.75 pt	4728	128	16.6*	0.0*
Rovral (3357)	B,H	1.0 pt	5262*	662	35.4*	2.0*
A1055	B,H	1.34 pt	5239	639	29.8*	0.5*
A1055	B,H	2.0 pt	5227	627	25.4*	0.0*
A1055 and	B	2.0 pt	5456*	856	24.2*	0.0*
Benlate 50 WP	H	1.0 lb				
A1055	B,H	2.7 pt	5156	556	32.4*	1.5*
$LSD_{0.05}$			640.0		17.0	9.7

[a] Sprays were applied at the indicated rate in 20 gallons water per acre at green ring (GR), boot (B), and heading (H).

[b] To convert lb/A to kg/ha, multiply by 1.12.

[c] Means followed by an asterisk were significantly different from the inoculated control at the 5% level.

Plots were evaluated for sheath blight, brown spot, narrow-brown spot, and leaf smut incidence 2 days before harvest. The plots were harvested with a small-plot combine on September 7. Rough rice weights were corrected to 12% moisture.

RESULTS AND DISCUSSION

The effects of foliar sprays on yield and control of sheath blight are shown in Table 1. The uninoculated healthy rice had a 417 lb/A yield advantage over the inoculated, unsprayed plots. Fourteen fungicide treatments gave significant increases in yield over the inoculated control. The treatments having significant yield increases had significant decreases in disease. The NTN 19701 at boot stage and Benlate 50 WP at the heading stage treatment was outstanding, giving a 962 lb/A yield increase over the inoculated control. The NTN 19701, PP-523 (ICI), A1055 (Uniroyal), and Benlate 50 WP at 2 lb/A at boot and heading all gave yield increases of more than 800 lb/A. Most of the fungicide treatments significantly reduced sheath blight damage.

Control of narrow brown spot and brown spot by fungicidal sprays is shown in Table 2. Benlate 50 WP, Tilt 3.6E, RH-7592 (Rohm & Haas), PP-525, HWG1608 (Mobay), and A1055 gave significant control of narrow brown spot. All of these fungicides except for the Benlate 50 WP also gave significant control of brown spot.

Table 2. Effect of fungicidal sprays on Sheath blight (*Rhizoctonia solani*), narrow brown spot (*Cercospora oryzae*), and brown spot (*Bipolaris oryzae*) control on Lemont rice. Rice Research Station, Crowley, LA 1986.

Treatment	Timing[a]	Rate (fl oz, lb, or pt/A formulated)	Sheath blight Ratings[b]	Narrow brown spot Ratings[b]	Brown spot Ratings[b]
Uninoculated, unsprayed	-	-	1.4*[c]	4.8	4.4
Inoculated control	-	-	7.2	4.8	4.0
Benlate 50 WP	B,H	1.0 lb	4.2*	0.2*	3.6
Benlate 50 WP	B,H	2.0 lb	2.8*	0.2*	3.2
Mon-5862	B,H	1.7 pt	3.0*	4.8	3.4
Mon-13111	B,H	5.3 pt	2.4*	4.8	4.0
Mon-13111	B,H	2.6 pt	2.6*	3.8	4.4
Mon-13111	B,H	1.3 pt	3.4*	5.4	4.2
Rovral	B,H	1.0 lb	4.0*	5.6	4.4
Rovral	B,H	2.0 lb	3.2*	4.4	2.2*
Tilt 3.6E	GR,B	6.0 fl oz	5.4*	1.2*	2.8*
Tilt 3.6E	GR,B	8.0 fl oz	3.8*	0.2*	2.4*
Tilt 3.6E and	GR	8.0 fl oz	5.0*	1.2*	3.4
Benlate 50 WP	B	1.0 lb			
Chloroneb	B,H	2.0 lb	6.6	4.8	4.8
RH 7592 + COC	GR,B	4 pt + 24 ml/gal	4.0*	0.0*	2.2*
RH 7592 + COC	GR,B	2 pt + 24 ml/gal	4.8*	0.0*	2.4*
RH 7592 + COC	B,H	4 pt + 24 ml/gal	2.8*	0.0*	1.4*
RH 7592 + COC	B,H	2 pt + 24 ml/gal	3.4*	0.0*	1.2*
RH 7592 + COC and	B	4 pt + 24 ml/gal	3.4*	0.0*	2.8*
Benlate 50 WP	H	1.0 lb			
SN 84364 50 WP	GR,B	0.5 lb	4.6*	4.4	3.8
SN 84364 50 WP	GR,B	0.7 lb	3.8*	4.2	3.8
SN 84364 50 WP + COC	GR,B	1.0 lb + 24 ml/gal	3.0*	4.2	3.8
SN 84364 50 WP + COC	GR,B	0.7 lb + 24 ml/gal	4.2*	4.6	3.6
SN 84364 20 Sc	GR,B	0.9 pt	4.2*	4.8	3.6
SN 84364 50 WP (360 302F)	GR,B	0.7 lb	4.4*	5.2	4.2
SDS-45037	GR,B	2.5 pt	2.8*	5.0	3.6

Table 2. Cont.

Treatment	Timing[a]	Rate (fl oz, lb, or pt/A formulated)	Sheath blight Ratings[b]	Narrow brown spot Ratings[b]	Brown spot Ratings[b]
SDS-45037	GR,B	3.75 pt	2.2*[c]	4.4	4.0
SDS-45037	B,H	3.75 pt	2.6*	4.4	3.6
EF-705	B,H	1.0 pt	6.6	4.2	4.0
EF-705	B,H	1.5 pt	6.6	4.4	3.8
EF-705	B,H	2.0 pt	6.8	3.4*	3.6
PP-523	GR,B	1.76 pt	5.0*	0.8*	4.0
PP-523	GR,B	3.52 pt	2.8*	0.4*	1.8*
PP-523	GR,B	5.36 pt	3.0*	0.0*	1.8*
PP-523	GR,H	3.52 pt	2.6*	0.0*	1.4*
Rovral + Benlate 50 WP	B,H	1.0 lb + 0.5 lb	2.6*	0.4*	1.8*
Rovral + Benlate 50 WP	B,H	1.0 lb + 1.0 lb	1.6*	0.0*	1.2*
NTN 19701	B,H	0.35 lb	3.8*	5.2	3.6
NTN 19701 and	B	0.35 lb	2.6*	2.0*	3.2
Benlate 50 WP	H	1.0 lb			
HWG 1608 1.2 EC	B,H	0.75 pt	5.0*	1.0*	2.2*
NTN 19701 + HWG 1608	B,H	0.35 lb + 0.75 pt	2.0*	0.4*	1.6*
Rovral (3357)	B,H	1.0 pt	3.2*	4.6	3.6
A1055	B,H	1.34 pt	2.8*	1.8*	2.6*
A1055	B,H	2.0 pt	2.0*	2.0*	2.4*
A1055 and	B	2.0 pt	2.4*	0.0*	2.2*
Benlate 50 WP	H	1.0 lb			
A1055	B,H	2.7 pt	3.4*	0.4*	2.4*
$LSD_{0.05}$			1.3	1.2	1.0

[a] Sprays were applied at the indicated rate in 20 gallons water per acre at green ring (GR), boot (B), and heading (H).

[b] Ratings based in a scale of 0 = no disease to 9 = severe disease.

[c] Means followed by an asterisk were significantly different from the inoculated control at the 5% level

CHEMICAL CONTROL OF RICE SEEDLING DISEASES - 1986[1/][2/]

(A Progress Report)

M.C. Rush

INTRODUCTION

Seed-rot and damping-off diseases are common in the Southern rice area causing stand reduction and irregularities in water-planted and, to a lesser extent, drill-planted rice. Losses are incurred directly through the costs of replanting and indirectly through the inefficient use of space and light in irregular stands, and by increased competition with weeds. Rice seed germination and growth of seedlings are often poor under the weather conditions normally encountered in March and early April. Considerable damage to water-planted seed is encountered under these cool weather conditions regardless of the seed treatment fungicide used. The fungi causing seed rotting and water-mold in water-seeded rice include species of *Achlya, Pythium,* and *Fusarium.* Drill-seeded rice can be injured by several seedborne fungi including *Bipolaris oryzae, Curvularia lunata, Fusarium roseum,* and *Fusarium moniliforme.*

Theoretically, seed and seedling diseases of rice can be economically controlled by seed treatment fungicides. For this reason, a cooperative program to develop more effective fungicidal seed treatments is conducted at experiment stations in Arkansas, Louisiana, Mississippi, and Texas. Fungicides or formulations of fungicides are field screened in experimental tests at each station. Those formulations performing well in the experimental test are advanced to the cooperative tests in subsequent years.

MATERIALS AND METHODS

A single lot of Lemont rice seed was treated in February and the first week in March 1986 with fungicides at the rates listed in Table 1. The formulated fungicides were placed into water (8 ml/1 lb seed) in glass jars, stirred with a magnetic stirrer bar until in suspension, and the suspended material was used to coat the inside of each jar. Weighed seed samples were poured into the coated jars, shaken by hand for 1 to 2 minutes, and placed onto a jar mill to revolve for 15 minutes. Treated seed were stored in heavy manila seed envelopes until planted.

1/ Mention of trade names of the seed-protectant fungicides described in this paper is for identification purposes only and does not imply endorsement by the Louisiana Agricultural Experiment Station, Louisiana State University.

2/ This research supported in part by funds provided by rice producers through the Louisiana Rice Research Board.

Table 1. Fungicides used in the 1986 plantings of the Cooperative seed-protectant fungicide tests.

Fungicide or Combination	Rate (oz or fl. oz/cwt formulated)	Manufacturer or supplier
Untreated seeds (Lemont)	---	---
A1055	6.0	Uniroyal
A1055 + Captan 400-D	4.0 + 2.0	"
A1055 + Apron Fl.	4.0 + 1.0	"
Apron Fl + Nu-Flow D	0.5 + 2.2	Gustafson
Captan 400-D	3.0	"
Captan 65 Sprills	2.5	Stauffer
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	Wilbur-Ellis
Champion Seed Dressing (Copper hydroxide)	4.0	Agtrol
Dithane M-45 Fl.	4.0	Rohm & Haas
Imazalil + Vitavax + Thiram	5.5	Wilbur-Ellis
Manzate 200 Fl.	4.0	Dupont
Nu-Flow Difolaten 4 Fl.	4.0	Wilbur-Ellis
Nusan 30 EC (TCMTB) + Nu-Flow D (chloroneb)	1.5 + 2.2	" "
SN 84364 50 WP + Apron Fl.	4.0 + 1.0	Nor-Am
SN 84364 50 WP + Apron Fl.	4.0 + 0.5	"
SN 84364 50 WP + Captan 400-D	4.5 + 2.0	" "
Vitavax 200-FF	4.0	Gustafson
Vitavax-PCNB Fl. + Apron Fl.	2.0 + 0.5	"
Vitavax-PCNB Fl. + Captan 400-D	2.0 + 2.0	" "

Four pounds of seed were treated with each fungicide. Treated seed samples were divided into 1-lb lots and used in the regional seed-protectant-fungicides tests. Seed lots were treated by M.C. Rush. Tests were planted at the Texas A & M University Agricultural Research and Extension Center, Beaumont, Texas; the Rice Experiment Station, Stuttgart, Arkansas; the Delta Branch Experiment Station, Stoneville, Mississippi; and the Rice Research Station, Crowley, Louisiana.

Simulated water- and drill-seeded methods were used to plant treated seed at the Rice Research Station. Water-seeded tests consisted of 12 treatments with six replications of 200 presoaked seeds per plot. Seed were soaked in five volumes of tap water for 24 to 30 hours before planting. Plots consisted of cylinders 2 feet in diameter made of 1/8 inch mesh hardware cloth. After planting, each cylinder was covered with 1/2 inch mesh hardware cloth to keep out birds and rats. The cylinders were arranged in a completely randomized block design, 2 feet apart within blocks, with a 6-foot alley between blocks. The treated seeds were planted in 4 to 6 inches of water.

Two individually leveed plot areas were water planted at each planting date using identical procedures. In one plot area, the water was removed after 3 days and the plots were flushed as needed. In the other plot area, the flood was maintained continuously at 2 to 4 inches until 3 days before the stands were counted.

Drill-planted plots consisted of single 10-foot rows with 200 seed per row. Plots were replicated five times in a randomized complete block design in each test. Rows were spaced 10 inches apart within blocks with 6-foot alleys between blocks. Seeds were planted with a drop-seeder.

Fifty-nine fungicide treatments were evaluated in the experimental screening test. These treatments are listed in Table 2. Fifty seeds per plot were used in the water- and drill-seeding systems. Other practices were the same as those used in the advanced tests.

Plots were flushed with water as needed to provide optimum conditions for growth. Stand counts were made when seedlings within a test were at the 3-leaf stage (4 to 6 inches tall). Plots were sprayed with propanil (4 lb ai/A) after stand counts were made, flooded, and observed for injury from fungicide-herbicide interaction. The soil was a Crowley silt loam pH 6.0.

RESULTS AND DISCUSSION

Seeds treated with 19 fungicides and fungicide combinations were compared with untreated seeds for stand production in the advanced (cooperative) tests. In the drill-seeded planting systems, the Dithane M-45Fl treatment was the only treatment giving a significant stand increase (Table 3). In the water-seeded, drained, and flushed test, none of the fungicidal treatments gave a significant stand increase (Table 4). In the water-seeded, continuous flood test, the Apron Fl + Nu-Flow D, Manzate 200 Fl, and SN84364 + Apron treatments gave significant stand increases (Table 5).

Table 2. Experimental fungicides used in the 1986 experimental seed-protectant fungicides tests at the Rice Research Station, Crowley, LA.

Fungicide or combination	Rate (oz or fl oz/cwt formulated)	Manufacturer or supplier
Untreated	---	---
A1055	4.0	Uniroyal
A1055	6.0	"
A1055	8.0	"
A1055	10.0	"
A1055 + Apron Fl.	4.0 + 1.0	"
AGTROL Zinc Starter	4.0	Agtrol
AGTROL Zinc Starter	8.0	"
AGTROL Zinc Starter	6.0	"
Aliette 80WP	1.0	Rhone-Poulenc
Aliette 80WP	2.0	"
Aliette 80WP	4.0	"
Aliette 80WP	6.0	"
Aliette 80WP	8.0	"
Apron Fl + Nu-Flow D	0.5 + 2.2	Gustafson
Captan 400-D	3.0	"
Captan 65 Sprills	2.5	Stauffer
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	"
Champion SD	4.0	Agtrol
Champion SD	6.0	"
Champion SD + Zinc Starter	4.0 + 4.0	"
Champion SD + Zinc Starter	6.0 + 4.0	"
Difolatan 4 Fl.	4.0	Chevron
Dithane M-45 Fl.	4.0	Rohm & Haas
GUS ER 11	3.0	Gustafson
GUS FA 16	2.0	"
GUS FA 16	4.0	"
GUS FK 15	3.0	"
GUS FR 11	3.0	"
Imazalil + Vitavax + Thiram	5.5	Wilbur-Ellis
Imazalil + Vitavax + Thiram	3.5	"
Imazalil + Vitavax + Thiram	8.0	"
Manzate 200 Fl.	4.0	Dupont
Nu-Flow D	2.2	Wilbur-Ellis
Nu-Flow D	4.0	"
Nu-Flow D + Aliette	2.2 + 2.0	"
Nu-Flow D + Aliette	2.2 + 4.0	"
Nu-Flow D + Aliette	4.0 + 4.0	"
Nusan 30 EC	1.5	"
Nusan 30 EC	3.0	"
Nusan 30 EC + Nu-Flow D	1.5 + 2.2	"

Table 2. Continued.

Fungicide or combination	Rate (oz or fl oz/cwt formulated)	Manufacturer or supplier
SN 84364 50WP	3.0	Nor-Am
SN 84364 50WP	4.5	"
SN 84364 50WP	6.0	"
SN 84364 50WP	8.0	"
SN 84364 50WP + Apron Fl.	5.0 + 0.5	"
SN 84364 50WP + Apron Fl.	4.0 + 1.0	"
SN 84364 50WP + Apron Fl.	4.0 + 0.5	"
SN 84364 50WP + Apron Fl.	3.0 + 1.0	"
SN 84364 50WP + Captan 400-D	4.5 + 3.0	"
SN 84364 50WP + Captan 400-D	3.0 + 3.0	"
Vitavax 200-FF	4.0	Gustafson
Vitavax 200-FF + Aliette	4.0 + 4.0	"
Vitavax 200-FF + Apron Fl.	2.0 + 0.5	"
Vitavax 200-FF + Apron Fl.	2.0 + 1.0	"
Vitavax PCNB FL + Captan 400-D	2.0 + 2.0	"
Vitavax PCNB FL	4.0	"
Vitavax PCNB FL	6.0	"
Vitavax PCNB FL + ANCHOR Fl.	2.0 + 0.5	"
Vitavax PCNB FL + Apron Fl.	2.0 + 0.5	"

Table 3. Louisiana planting of the Cooperative seed-protectant fungicide test (drill-seeded April 14, stand counts on May 26, 1986). Rice Research Station, Crowley, LA.

Treatment	Rate (oz or fl. oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Untreated seeds (Lemont)		84	113	107	114	104	104.4
Captan 400-D	3.0	113	93	75	113	151	109.0
Vitavax 200-FF	4.0	107	101	107	136	125	115.2
Vitavax-PCNB Fl. + Apron Fl.	2.0 + 0.5	112	141	90	105	118	113.2
Vitavax-PCNB Fl. + Captan 400-D	2.0 + 2.0	107	148	125	103	133	123.2
SN 84364 50 WP + Captan 400-D	4.5 + 2.0	140	98	111	68	124	108.2
Nusan 30 EC (TCMTB) + Nu-Flow D (chloroneb)	1.5 + 2.2	103	134	92	69	120	103.6
Apron Fl + Nu-Flow D	0.5 + 2.2	110	124	112	113	114	114.6
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	119	98	133	96	112	111.6
Nu-Flow Difolaten 4 Fl.	4.0	123	149	112	128	96	121.6
Imazalil + Vitavax + Thiram	5.5	88	144	129	123	122	121.2
Dithane M-45 Fl.	4.0	140	123	120	138	140	132.2*
A 1055	6.0	102	102	117	127	94	108.4
A 1055 + Captan 400-D	4.0 + 2.0	105	112	112	127	124	116.0
Manzate 200 Fl.	4.0	126	135	96	126	123	121.2
Champion Seed Dressing (Copper hydroxide)	4.0	130	144	116	108	121	123.8
SN 84364 50 WP + Apron Fl.	4.0 + 0.5	69	142	113	132	119	115.0
SN 84364 50 WP + Apron Fl.	4.0 + 1.0	120	112	108	126	98	112.8
A 1055 + Apron Fl.	4.0 + 1.0	103	109	121	123	91	109.4
Captan 65 Sprills	2.5	96	106	107	125	125	111.8
$LSD_{.05}$							22.1

[a] Mean number of plants from 200 seeds per plot. Means followed by an asterisk were significantly different from the mean for untreated seed at the 5% level.

Table 4. Louisiana planting of the Cooperative seed-protectant fungicide test (water-seeded on April 14, drained in 3 days, and flushed as needed; stand counts on May 26, 1986). Rice Research Station, Crowley, LA.

Treatment	Rate (oz or fl. oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Untreated seeds (Lemont)		21	103	59	66	55	60.8
Captan 400-D	3.0	76	32	45	52	78	56.6
Vitavax 200-FF	4.0	62	56	63	94	56	66.2
Vitavax-PCNB Fl. + Apron Fl.	2.0 + 0.5	51	46	85	94	85	72.2
Vitavax-PCNB Fl. + Captan 400-D	2.0 + 2.0	54	70	97	56	67	68.8
SN 84364 50 WP + Captan 400-D	4.5 + 2.0	59	64	61	53	70	61.4
Nusan 30 EC (TCMTB) + Nu-Flow D (chloroneb)	1.5 + 2.2	51	42	76	63	78	62.0
Apron Fl + Nu-Flow D	0.5 + 2.2	51	78	94	85	94	80.4
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	65	63	76	102	59	73.0
Nu-Flow Difolaten 4 Fl.	4.0	24	34	28	64	50	40.0
Imazalil + Vitavax + Thiram	5.5	52	93	48	89	68	70.0
Dithane M-45 Fl.	4.0	45	74	77	61	87	68.8
A 1055	6.0	71	21	115	50	87	68.8
A 1055 + Captan 400-D	4.0 + 2.0	44	77	54	62	41	55.6
Manzate 200 Fl.	4.0	64	51	79	81	78	70.6
Champion Seed Dressing (Copper hydroxide)	4.0	55	63	51	64	60	58.6
SN 84364 50 WP + Apron Fl.	4.0 + 0.5	37	67	58	83	86	66.2
SN 84364 50 WP + Apron Fl.	4.0 + 1.0	22	95	55	87	93	70.4
A 1055 + Apron Fl.	4.0 + 1.0	68	86	39	87	101	76.2
Captan 65 Sprills	2.5	92	87	62	53	41	67.0
$LSD_{.05}$							NS

[a] Mean number of plants from 200 seeds per plot. Means followed by an asterisk were significantly different from the mean for untreated seed at the 5% level.

Table 5. Louisiana planting of the Cooperative seed-protectant fungicide test (water-seeded on April 14, continuous-flood, stand counts on May 26, 1986). Rice Research Station, Crowley, LA.

Treatment	Rate (oz or fl. oz/cwt formulated)	Reps (Stand Count) I	II	III	IV	V	$\bar{X}$[a]
Untreated seeds (Lemont)		61	40	60	51	44	51.2
Captan 400-D	3.0	77	59	51	50	85	64.4
Vitavax 200-FF	4.0	83	52	59	72	63	65.8*
Vitavax-PCNB Fl. + Apron Fl.	2.0 + 0.5	92	72	41	48	48	60.2
Vitavax-PCNB Fl. + Captan 400-D	2.0 + 2.0	52	37	48	60	35	46.4
SN 84364 50 WP + Captan 400-D	4.5 + 2.0	43	58	39	51	38	45.8
Nusan 30 EC (TCMTB) + Nu-Flow D (chloroneb)	1.5 + 2.2	55	39	67	50	61	54.4
Apron Fl. + Nu-Flow D	0.5 + 2.2	82	64	74	61	63	68.8*
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	54	42	54	53	41	48.8
Nu-Flow Difolaten 4 Fl.	4.0	52	38	36	30	38	38.8
Imazalil + Vitavax + Thiram	5.5	60	76	65	42	59	60.4
Dithane M-45 Fl.	4.0	63	60	53	71	57	60.8
A 1055	6.0	47	62	46	48	43	49.2
A 1055 + Captan 400-D	4.0 + 2.0	51	43	56	56	30	47.2
Manzate 200 Fl.	4.0	51	72	61	73	71	65.6*
Champion Seed Dressing (Copper hydroxide)	4.0	54	60	61	43	54	54.4
SN 84364 50 WP + Apron Fl.	4.0 + 0.5	49	61	60	52	47	53.8
SN 84364 50 WP + Apron Fl.	4.0 + 1.0	71	66	57	43	94	66.2*
A 1055 + Apron Fl.	4.0 + 1.0	79	40	72	44	57	58.4
Captan 65 Sprills	2.5	62	42	51	45	36	47.2
$LSD_{.05}$							14.2

[a] Mean number of plants from 200 seeds per plot. Means followed by an asterisk were significantly different from the mean for untreated seed at the 5% level.

In the experimental seed-treatment fungicide tests, seeds treated with 59 fungicides or fungicide combinations were compared with untreated seed for stand production. In the drill-seeded test, the Champion 5D and Vitavax 200-FF + Aliette treatments gave significant stand increases (Table 6). None of the treatments in the water-seeded, drained, and flushed plantings gave significant stand increases (Table 7). Several treatments in the water-seeded, continuous flood planting gave significant stand increases (Table 8). Mean stands were very low in this test. In general, the warm weather at planting was not favorable for disease development.

Table 6. Stand establishment by Lemont seeds treated with experimental fungicides and drill-seeded at the Rice Research Station, Crowley, LA. (planted April 14, stand counts on May 26, 1986).

Treatment	Rate (oz or fl oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Untreated		22	21	24	25	27	23.8
Captan 400-D	3.0	21	30	32	12	17	22.4
Vitavax 200-FF	4.0	35	22	19	32	15	24.6
Vitavax 200-FF + Apron Fl.	2.0 + 0.5	32	31	32	26	21	28.4
Vitavax 200-FF + Apron Fl.	2.0 + 1.0	29	33	26	36	21	29.0
Vitavax PCNB FL + Captan 400-D	2.0 + 2.0	20	21	24	31	27	24.6
Vitavax PCNB FL	4.0	18	23	22	30	13	21.2
Vitavax PCNB FL	6.0	15	29	19	29	10	20.4
GUS FK 15	3.0	24	30	21	33	13	24.2
GUS FR 11	3.0	21	25	12	22	22	20.4
GUS ER 11	3.0	24	19	9	24	9	17.0
Vitavax PCNB FL + ANCHOR Fl.	2.0 + 0.5	31	25	29	31	21	27.4
GUS FA 16	2.0	31	29	33	33	18	28.8
GUS FA 16	4.0	34	26	7	21	30	23.6
Champion SD	4.0	28	28	26	24	11	23.4
Champion SD	6.0	36	31	25	38	28	31.6*
Champion SD + Zinc Starter	4.0 + 4.0	31	17	8	31	28	23.0
Champion SD + Zinc Starter	6.0 + 4.0	22	23	22	28	23	23.6
Imazalil + Vitavax + Thiram	5.5	31	34	33	26	25	29.8
Imazalil + Vitavax + Thiram	3.5	30	29	15	30	22	25.2
Imazalil + Vitavax + Thiram	8.0	27	26	33	37	20	28.6
AGTROL Zinc Starter	4.0	34	39	23	30	16	28.4
AGTROL Zinc Starter	8.0	31	13	14	23	11	18.4
A1055	4.0	27	29	31	17	8	22.4
A1055	6.0	29	30	19	26	13	23.4
A1055	8.0	24	34	24	30	30	28.4
A1055	10.0	28	30	29	24	28	27.8
SN 84364 50WP + Apron Fl.	4.0 + 0.5	29	18	13	35	18	22.6
SN 84364 50WP + Captan 400-D	4.5 + 3.0	36	22	26	27	19	26.0
SN 84364 50WP + Captan 400-D	3.0 + 3.0	32	31	26	32	10	26.2
SN 84364 50WP	3.0	37	28	21	18	16	24.0
SN 84364 50WP	4.5	29	24	25	30	16	24.8
SN 84364 50WP	6.0	30	16	17	22	12	19.4
SN 84364 50WP	8.0	29	34	17	21	26	25.4
Zinc Starter	6.0	30	22	11	20	20	20.6
SN 84364 50WP + Apron Fl.	5.0 + 0.5	21	34	28	30	32	29.0
SN 84364 50WP + Apron Fl.	3.0 + 1.0	27	24	30	24	17	24.4
Vitavax PCNB FL + Apron Fl.	2.0 + 0.5	27	25	27	31	39	29.8
Dithane M-45 Fl.	4.0	21	23	37	25	12	23.6
Manzate 200 Fl.	4.0	26	17	22	27	31	24.6

Table 6. continued

Treatment	Rate (oz or fl oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Aliette 80WP	1.0	30	23	24	26	23	25.2
Aliette 80WP	2.0	24	17	29	22	25	23.4
Aliette 80WP	4.0	28	28	22	36	15	25.8
Aliette 80WP	6.0	31	30	16	21	32	26.0
Aliette 80WP	8.0	32	25	32	29	15	26.6
SN 84364 50WP + Apron Fl.	4.0 + 1.0	35	31	30	29	25	30.0
A1055 + Apron Fl.	4.0 + 1.0	34	23	24	22	11	22.8
Captan 65 Sprills	2.5	34	21	27	26	24	26.4
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	34	20	14	32	10	22.0
Difolatan 4 Fl.	4.0	31	34	26	33	14	27.6
Apron Fl + Nu-Flow D	0.5 + 2.2	30	28	24	28	13	24.6
Nusan 30 EC + Nu-Flow D	1.5 + 2.2	33	24	22	26	25	26.0
Nusan 30 EC	1.5	33	30	18	25	10	23.2
Nu-Flow D	2.2	30	25	11	25	10	20.2
Nu-Flow D	4.0	31	21	23	25	21	24.2
Nusan 30 EC	3.0	33	31	19	27	23	26.6
Nu-Flow D + Aliette	2.2 + 2.0	34	25	17	25	16	23.4
Nu-Flow D + Aliette	2.2 + 4.0	30	26	15	24	20	23.0
Nu-Flow D + Aliette	4.0 + 4.0	29	26	30	28	17	26.0
Vitavax 200-FF + Aliette	4.0 + 4.0	34	43	31	36	17	32.2*
$LSD_{.05}$							7.2

[a] Mean number of plants from 50 seeds per plot. Means followed by an asterisk were significantly different from the mean for untreated seed at the 5% level.

Table 7. Stand establishment by Lemont seeds treated with experimental fungicides and water-seeded, drained after 3 days, and flushed as needed at the Rice Research Station, Crowley, LA (planted April 14, stand counts on May 26, 1986).

Treatment	Rate (oz or fl oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Untreated		25	17	20	19	15	19.2
Captan 400-D	3.0	14	32	17	12	28	20.6
Vitavax 200-FF	4.0	22	27	16	21	24	22.0
Vitavax 200-FF + Apron Fl.	2.0 + 0.5	18	12	20	24	16	18.0
Vitavax 200-FF + Apron Fl.	2.0 + 1.0	14	30	16	28	15	20.6
Vitavax PCNB FL + Captan 400-D	2.0 + 2.0	18	19	21	20	18	19.2
Vitavax PCNB FL	4.0	8	18	23	16	30	19.0
Vitavax PCNB FL	6.0	14	22	16	13	17	16.4
GUS FK 15	3.0	14	13	20	13	16	15.2
GUS FR 11	3.0	13	10	14	14	17	13.6
GUS ER 11	3.0	5	5	8	8	16	8.4
Vitavax PCNB FL + ANCHOR Fl.	2.0 + 0.5	11	20	24	10	14	15.8
GUS FA 16	2.0	6	28	24	21	4	16.6
GUS FA 16	4.0	15	19	22	19	17	18.4
Champion SD	4.0	20	23	15	32	17	21.4
Champion SD	6.0	16	27	21	22	25	22.2
Champion SD + Zinc Starter	4.0 + 4.0	26	23	19	22	21	22.2
Champion SD + Zinc Starter	6.0 + 4.0	20	25	23	19	15	20.4
Imazalil + Vitavax + Thiram	5.5	17	22	19	32	16	21.2
Imazalil + Vitavax + Thiram	3.5	11	24	19	26	23	20.6
Imazalil + Vitavax + Thiram	8.0	6	15	18	17	20	15.2
AGTROL Zinc Starter	4.0	6	21	17	17	16	15.4
AGTROL Zinc Starter	8.0	19	30	19	19	15	20.4
A1055	4.0	15	27	11	23	24	20.0
A1055	6.0	16	13	18	22	17	17.2
A1055	8.0	11	18	14	20	15	15.6
A1055	10.0	7	13	18	20	16	14.8
SN 84364 50WP + Apron Fl.	4.0 + 0.5	14	16	17	29	15	18.2
SN 84364 50WP + Captan 400-D	4.5 + 3.0	3	23	21	17	18	16.4
SN 84364 50WP + Captan 400-D	3.0 + 3.0	6	17	18	21	22	16.8
SN 84364 50WP	3.0	13	10	12	23	20	15.6
SN 84364 50WP	4.5	10	25	22	13	18	17.6
SN 84364 50WP	6.0	11	12	16	23	22	16.8
SN 84364 50WP	8.0	10	19	21	16	20	17.2
Zinc Starter	6.0	26	22	19	17	22	21.2
SN 84364 50WP + Apron Fl.	5.0 + 0.5	13	18	22	17	19	17.8
SN 84364 50WP + Apron Fl.	3.0 + 1.0	14	22	28	14	13	18.2
Vitavax PCNB FL + Apron Fl.	2.0 + 0.5	23	17	25	20	15	20.0
Dithane M-45 Fl.	4.0	23	23	15	14	22	19.4
Manzate 200 Fl.	4.0	13	26	17	21	22	19.8

Table 7. continued

Treatment	Rate (oz or fl oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\bar{X}$[a]
Aliette 80WP	1.0	14	18	24	16	24	19.2
Aliette 80WP	2.0	21	14	15	11	5	13.2
Aliette 80WP	4.0	21	18	15	17	18	17.8
Aliette 80WP	6.0	28	22	17	25	20	22.4
Aliette 80WP	8.0	20	19	20	21	14	18.8
SN 84364 50WP + Apron Fl.	4.0 + 1.0	21	17	29	12	28	21.4
A1055 + Apron Fl.	4.0 + 1.0	21	22	17	26	23	21.8
Captan 65 Sprills	2.5	20	15	15	28	14	18.4
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	9	23	23	14	25	18.8
Difolatan 4 Fl.	4.0	19	11	15	21	20	17.2
Apron Fl + Nu-Flow D	0.5 + 2.2	16	19	15	21	18	17.8
Nusan 30 EC + Nu-Flow D	1.5 + 2.2	17	19	26	20	18	20.0
Nusan 30 EC	1.5	25	11	13	14	13	15.2
Nu-Flow D	2.2	25	15	18	12	19	17.8
Nu-Flow D	4.0	19	7	19	8	18	14.2
Nusan 30 EC	3.0	26	22	9	22	16	19.0
Nu-Flow D + Aliette	2.2 + 2.0	25	10	14	17	9	15.0
Nu-Flow D + Aliette	2.2 + 4.0	17	10	22	13	2	12.8
Nu-Flow D + Aliette	4.0 + 4.0	14	19	16	24	18	18.2
Vitavax 200-FF + Aliette	4.0 + 4.0	20	31	34	18	15	23.6
$LSD_{.05}$							NS

[a] Mean number of plants from 50 seeds per plot.

Table 8. Stand establishment by Lemont seeds treated with experimental fungicides and water seeded, in a continuous flood, at the Rice Research Station, Crowley, LA (planted April 14, stand counts on May 26, 1986).

Treatment	Rate (oz or fl oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Untreated		13	8	10	8	11	10.0
Captan 400-D	3.0	12	11	17	10	14	12.8
Vitavax 200-FF	4.0	16	18	15	16	13	15.6*
Vitavax 200-FF + Apron Fl.	2.0 + 0.5	17	17	15	16	13	15.6*
Vitavax 200-FF + Apron Fl.	2.0 + 1.0	12	14	16	13	24	15.8*
Vitavax PCNB FL + Captan 400-D	2.0 + 2.0	20	9	16	17	16	15.6*
Vitavax PCNB FL	4.0	13	12	14	14	15	13.6
Vitavax PCNB FL	6.0	11	10	10	15	7	10.6
GUS FK 15	3.0	10	13	10	13	16	12.4
GUS FR 11	3.0	7	10	10	10	9	9.2
GUS ER 11	3.0	10	5	6	11	5	7.4
Vitavax PCNB FL + ANCHOR Fl.	2.0 + 0.5	14	10	5	10	12	10.2
GUS FA 16	2.0	18	12	15	10	12	13.4
GUS FA 16	4.0	14	14	12	15	10	13.0
Champion SD	4.0	16	16	16	13	8	13.8
Champion SD	6.0	16	13	21	11	17	15.6*
Champion SD + Zinc Starter	4.0 + 4.0	10	16	11	16	18	14.2
Champion SD + Zinc Starter	6.0 + 4.0	8	14	15	15	9	12.2
Imazalil + Vitavax + Thiram	5.5	5	12	16	5	18	11.2
Imazalil + Vitavax + Thiram	3.5	13	8	7	20	8	11.2
Imazalil + Vitavax + Thiram	8.0	15	17	13	19	8	14.4*
AGTROL Zinc Starter	4.0	12	15	14	13	14	13.6
AGTROL Zinc Starter	8.0	10	10	10	20	7	11.4
A1055	4.0	13	13	22	12	22	16.4*
A1055	6.0	9	9	15	13	12	11.6
A1055	8.0	4	11	6	8	11	8.0
A1055	10.0	8	11	10	12	13	10.8
SN 84364 50WP + Apron Fl.	4.0 + 0.5	11	17	13	8	11	12.0
SN 84364 50WP + Captan 400-D	4.5 + 3.0	6	9	9	7	9	8.0
SN 84364 50WP + Captan 400-D	3.0 + 3.0	8	17	7	12	10	10.8
SN 84364 50WP	3.0	15	9	14	11	10	11.8
SN 84364 50WP	4.5	14	7	6	7	13	9.4
SN 84364 50WP	6.0	17	5	11	8	9	10.0
SN 84364 50WP	8.0	15	8	9	6	10	9.6
Zinc Starter	6.0	7	14	11	10	20	12.4
SN 84364 50WP + Apron Fl.	5.0 + 0.5	13	15	15	11	15	13.8
SN 84364 50WP + Apron Fl.	3.0 + 1.0	14	19	12	14	14	14.6*
Vitavax PCNB FL + Apron Fl.	2.0 + 0.5	20	16	12	11	15	14.8*
Dithane M-45 Fl.	4.0	18	23	18	23	19	20.2*
Manzate 200 Fl.	4.0	16	21	12	23	16	17.6*

Table 8. continued

Treatment	Rate (oz or fl oz/cwt formulated)	Reps (Stand Counts) I	II	III	IV	V	$\overline{X}$[a]
Aliette 80WP	1.0	13	9	9	14	4	9.8
Aliette 80WP	2.0	11	10	15	16	7	11.8
Aliette 80WP	4.0	11	13	0	14	12	10.0
Aliette 80WP	6.0	11	12	11	13	14	12.2
Aliette 80WP	8.0	10	12	6	12	14	10.8
SN 84364 50WP + Apron Fl.	4.0 + 1.0	12	19	15	10	16	14.4*
A1055 + Apron Fl.	4.0 + 1.0	11	13	13	14	11	12.4
Captan 65 Sprills	2.5	18	15	9	18	9	13.8
Captan 65 Sprills + Nu-Flow D	2.5 + 2.2	8	11	10	13	15	11.4
Difolatan 4 Fl.	4.0	8	6	12	4	8	7.6
Apron Fl + Nu-Flow D	0.5 + 2.2	18	18	12	9	11	13.6
Nusan 30 EC + Nu-Flow D	1.5 + 2.2	12	10	12	13	13	12.0
Nusan 30 EC	1.5	12	11	13	10	8	10.8
Nu-Flow D	2.2	7	7	10	9	14	9.4
Nu-Flow D	4.0	13	14	7	9	14	11.4
Nusan 30 EC	3.0	10	13	9	9	16	11.4
Nu-Flow D + Aliette	2.2 + 2.0	3	16	7	15	10	10.2
Nu-Flow D + Aliette	2.2 + 4.0	15	15	16	7	15	13.6
Nu-Flow D + Aliette	4.0 + 4.0	3	13	11	12	15	10.8
Vitavax 200-FF + Aliette	4.0 + 4.0	10	23	18	14	17	16.4*
$LSD_{.05}$							4.4

[a] Mean number of plants from 50 seeds per plot. Means followed by an asterisk were significantly different from the mean for untreated seed at the 5% level.

CHEMICAL CONTROL OF BLAST IN LOUISIANA

(A Progress Report)

G. D. Lindberg and M. C. Rush

INTRODUCTION

Chemical control of rice blast is one part of a broader program of chemical control of foliar diseases of rice. Coordination of all chemical control studies in rice provides us with a better knowledge of the full capabilities of all the materials that are used.

MATERIALS AND METHODS

The blast susceptible California rice variety M-201 was planted April 24, 1986. The plots measured 4 x 20 ft with seven drill rows on a 7-in spacing. All the fertilizer was applied at the rate of 100/50/50 per acre. The chemicals were applied with a 2-nozzle (8002) boom at the rate of 20 gal/A at 40 psi. Single rates were used with an application at booting, July 2 and one at heading, July 11.

RESULTS AND DISCUSSION

Severe blast development occured in the M-201 rice in 1986. All of the chemical treatments resulted in significantly fewer rotten-neck panicles than the untreated control. Some materials, however, were far superior to others in the control of rotten-neck. Benlate and the 2-lb rate of Kasumin reduced rotten-neck almost 50%, and one treatment of Beam reduced rotten-neck about 63%.

Rough rice yields significantly higher than the untreated controls occurred in the rice treated with Benlate, the Monsanto material, manganese oxide, Kasumin, HWG 1608, and Beam. We have no certain explanation for the better performance of the lower rate of Beam, 2.5 lb/A, than the higher rate, 3.3 lb/A.

Table 1. Rough rice yields and rotten-neck data from M-201 rice sprayed with chemicals for the control of blast.

Treatment[1/]	Rate lb or pt/A	Mean rotten-neck	Mean yield lb/A
Untreated		48	1480
Benlate 50 WP	1.0 lb	26	2081
Monsanto 5862	1.33 pt	33	1868
MnO_2 (Tech.)	1.0 lb	39	1906
Tilt 3.6 EC	0.5 pt	34	1693
SN 84364 50 WP	1.0 lb	38	1570
SDS 45037 40 Fl	3.75 pt	36	1746
EF 705 2% L	1.0 pt	33	1783
EF 705 2% L	1.5 pt	35	1977
EF 705 2% L	2.0 pt	27	2391
PP 523 0.05 Sc	3.5 pt	37	1567
MnO_2 (Tech.)	2.0 lb	39	1801
NTN 19701	0.35 lb	38	1734
NTN 19701 (booting)	0.35 lb	36	1518
Benlate (heading)	1.0 lb		
HWG 1608 1.2 EC	0.75 lb	34	1892
Beam 75 WP	0.25 lb	18	2766
Beam 75 WP	0.33 lb	29	2087
$LSD_{0.05}$		4	313

1/ An application at booting and one at heading.

WEED CONTROL RESEARCH

INTRODUCTION

Southwest Louisiana has an abundance of weed species, some not commonly found in other areas of the state. Our climatic conditions are favorable to prolific weed growth and subsequent competition with crop species. For both soybeans and grain sorghum, the majority of the acreage is drill- or broadcast-planted. Consequently, producers are limited to using preemergence or postemergence over-the-top herbicide treatments. The more economical weed control options such as cultivation or band application of herbicides, which could be used in a wide row system, are not available in a solid-seeded system.

This progress report summarizes weed control studies conducted in soybeans, grain sorghum, and rice (off-station only) during the 1986 growing season. Results of herbicide efficacy and crop tolerance studies, as well as residual activity of herbicide treatments on crops planted the following year, are presented. Much of the research data is preliminary since evaluation of many of the herbicides is limited. Data presented in this report should not be considered as an endorsement or recommendation of any herbicide. Registration by the Environmental Protection Agency is required before any herbicide can be legally used.

Herbicides and adjuvants evaluated in 1986 are shown in Table 1. Selected weed areas on the Rice Research Station and at several off-station sites have been managed to encourage uniform weed populations. Weed species evaluated for control are presented in Table 2. Specific information on location, soil type, variety, row spacing, treatment date, sprayer type, etc., for all experiments are individually presented followed by a table of results. Miscellaneous abbreviations used in describing each experiment are shown in Table 3. Weed control and crop injury ratings for all experiments are based on a scale of 0-100%, where 0 equals no control or crop injury and 100 equals complete control or crop injury. Where appropriate, crop yields were obtained and adjusted to 13% moisture.

Table 1. Herbicides and adjuvants evaluated in soybeans, grain sorghum, and rice at the Rice Research Station, Crowley, LA, and at several off-station sites. 1986.

Trade name	Common name	Chemical name	Manufacturer
Ag 98	nonionic surfactant		Rohm & Haas
Agridex	Crop oil concentrate		Helena
Arsenal	imazapyr	2-[4,5-dihydro-4-methyl-4-(1-methyl ethyl)-5-oxo-1*H* imidazol-2-yl]-3-pyridine carboxylic acid	American Cyanamid
Assure	quizalofop	ethyl 2-[4-(6-chloro-2-quinoxalynyloxy)phenoxy] propionate	Dupont
Atrazine	atrazine	2-chloro-4-(ethylamino)-6-(isopropylamino)-s-triazine	Ciba Geigy, Shell, others
Basagran	bentazon	3-isopropyl-1*H*-2,1,3-benzothiadiazin-4(3*H*)-one 2,2-dioxide	BASF
BAS 514	quinclorac	3,7-dichloro-8-quinoline-carboxylic acid	BASF
BAS 517	cycloxydim	2-[1-(ethoxyimino)-butyl]-3-hydroxy-5-(2H-tetrahydrothiopyran-3-yl)2-cyclohexene-1-one	BASF
Benazolin	benazolin-ethyl	ethyl 4-chloro-2-oxobenzo-thiazolin-3-ylacetate	Nor-Am
Blazer	acifluorfen	5-(-2-chloro-4-(trifluoromethyl)-phenoxy)-2-nitrobenzoic acid	Rohm & Haas
Bolero	thiobencarb	S(4-chlorophenyl-methyl) diethyl-carbamothioate	Chevron
Buctril	bromoxynil	3,5-dibromo-4-hydroxybenzonitrile	Rhone Poulenc
Butyrac	2,4-DB	4-(2,4-dichlorophenozy)butyric acid	Union Carbide

Continued.

Table 1. Continued.

Trade name	Common name	Chemical name	Manufacturer
Canopy	metribuzin + chlorimuron		Dupont
Cinch	cinmethylin	7-oxabicyclo[2.2.1]heptane,1-methyl-4-(1-methyethyl)-2-[2-methylphenyl)-methoxy]-,exo-	Shell
Classic (DPX F6025)	chlorimuron	Ethyl 2-[[[[(4-chloro-6-methoxypyrimidin-2-yl) amino] carbonyl]amino]sulfonyl]benzoate	Dupont
Cobra	lactofen	1'-(Carboethoxy) ethyl 5-[2-chloro-4-(trifluoromethyl) phenoxy]-2-nitrobenzoate	PPG
Command	dimethazone	2-(2-chlorophenyl)methyl-4,4-dimethyl-3-isoxazolidinone	FMC
	2,4-D	(2,4-dichlorophenoxy)acetic acid	Several
Dual	metolachlor	2-chloro-N-(2-ethyl-6-methyl-phenyl)-N-(2-methoxy-1-methylethyl)acetamide	Ciba Geigy
Dyanap	napthalam + dinoseb	N-1-naphthylphthalamic acid + 2-sec-butyl-4,6-dinitrophenol	Uniroyal
Embark	mefluidide	N-(2,4-dimethyl-5-((trifluoro-methyl)sulfonyl)amino)phenyl) acetamide	3M
Fusilade	fluazifop	(±)-butyl 2-[4-[(5-(trifluoro methyl)-2-pyridinyl)oxy]phenoxy] propanoate	ICI
Fusilade 2000	fluazifop-P-butyl	active isomer of above	ICI
Garlon	triclopyr	((3,5,6-trichloro-2-pyridinyl) oxy)acetic acid	Dow
Gemini	linuron + chlorimuron	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea + Ethyl 2-[[[[(4-chloro-6-methoxypyrimidin-2-yl) amino] carbonyl]amino]sulfonyl]benzoate	Dupont

Continued.

Table 1. Continued.

Trade name	Common name	Chemical name	Manufacturer
Harmony	DPX-M6316		Dupont
Hoelon	diclofop	methyl 2(4(2,4-dichlorophenoxy) phenoxy)propanate	Hoechst-Roussel Agri-Vet
Ignite	glufosinate (proposed)	ammonium (3-amino-3-carboxyproply)-methylphosphinate	Hoechst-Roussell Agri-Vet
Laddock	atrazine + bentazon	2-chloro-4-(ethylamino)-6-(isopropylamino)-s-triazine + 3-isopropyl-1*H*-2,1,3,-benzothiadiazin-4(3*H*)-one 2,2-dioxide	BASF
Lasso MT	alachlor	2-chloro-2',6'-diethyl-N-(methoxymethyl) acetanilide	Monsanto
Lexone	metribuzin	4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5 (4H)-one	Dupont
Londax	DPX-F5384		Dupont
Lorox	linuron	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea	Dupont
Ordram	molinate	S-ethyl hexahydro-1H-azepine -1-carbothioate	Stauffer
Paraquat	paraquat	1,1'-dimethyl-4,4'-bipyridinium ion	Chevron
Poast	sethoxydim	2-(1-(ethoxyamino)-butyl)-5-(2-(ethylthio)-propyl)-3-hydroxy-2-cyclohexene-1-one	BASF
Prowl	pendimethalin	n-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine	American Cyanamid
Pursuit	imazamethabenz	5-ethyl-2-(4-isopropyl-4-methyl -5-oxo-2-imidazolin	American Cyanamid

Continued.

Table 1. Continued.

Trade name	Common name	Chemical name	Manufacturer
RE-39571		5,6-dideoxy-1,2-O-(1-methylethyl-dene)-3-O-(2-methylphenyl methyl)-2-D-glucofuranose	Chevron
Roundup	glyphosate	N-(phosphonomethyl)glycine	Monsanto
Sencor	metribuzin	4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5(4H)-one	Mobay
Select	cloproxydim	(E,E)-(+/-)-Z-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one	Chevron
Scepter	imazaquin	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-quinoline-carboxylic acid	American Cyanamid
Stam	propanil	3',4'-dichloropropionanilide	Rohm & Haas
Tackle	acifluorfen	5-(-2-chloro-4-(trifluoromethyl)-phenoxy)-2-nitrobenzoic acid	Rhone Poulenc
Tandem	tridiphane	2-(3,5-dichlorophenyl)-2-(2,2,2-trichloroethyl)oxirane	Dow
Treflan	trifluralin	a,a,a-trifluoro-2,6-dinitro,N,N-dipropyl-p-toluidine	Elanco
Turbo	metolachlor + metribuzin	2-chloro-N-(2-ethyl-6-methyl-phenyl)-N-(2-methoxy-1-methylethyl)acetamide + 4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5(4H)-one	Mobay
Verdict	haloxyfop	methyl 2-(4-((3-chloro-5-(trifluoromethyl)-2-pyridinyl)oxy)phenoxy)propanoate	Dow
Whip	fenoxaprop	ethyl 2-(4-(6-chloro-2-benzoxazolyloxy)-phenoxy)propanasate	Hoechst-Roussel Agri-Vet

Table 2. Abbreviations of weed species evaluated in weed control studies conducted at the Rice Research Station, Crowley, LA, and at several off-station sites. 1986.

Abbreviation	Common name	WSSA abbreviation	Scientific name
AS	annual sedge	---	Cyperus sp.
BG	bermudagrass	CYNDA	Cynodon dactylon (L.) Pers.
BSG	broadleaf signalgrass	BRAPP	Brachiaria platyphylla (Griseb.) Nash
BYG	barnyardgrass	ECHCG	Echinochloa crus-galli (L.) Beauv.
CB	cocklebur	XANST	Xanthium strumarium L.
EC	eclipta	ECLAL	Eclipta prostrata L.
HS	hemp sesbanica	SEBEX	Sesbania exaltata (Raf.) Rydb. ex A.W. Hill
IG	itchgrass	ROOEX	Rottboellia exaltata L.f.
JR	junglerice	ECHCO	Echinochloa colonum (L.) Link
JV	indian jointvetch	AESIN	Aeschynomene indica L.
MW	mexicanweed	CNPCA	Caperonia castaniifolia (L.) St. Hil.
PLMG	palmleaf morningglory	IPOWR	Ipomoea wrightii Gray
PMG	pitted morningglory	IPOLA	Ipomoea lacunosa L.
RR	red rice	ORYSA	Oryza sativa L.
RW	redweed	MEOCO	Melochia corchorifolia L.
SP	sicklepod	CASOB	Cassia obtusifolia L.
WP	wild poinsettia	EPHHL	Euphorbia heterophylla L.

Table 3. Miscellaneous abbreviations used in weed control studies conducted at the Rice Research Station, Crowley, LA, and at several off-station sites. 1986.

CV	Coefficient of variation
DF	Dry flowable
DP	Delayed preemergence
EC	Emulsifiable concentrate
EP	Early postemergence
GPA	Gallons per acre
lb ai/A	Pounds active ingredient per acre on a broadcast basis
L	Liquid
LP	Late postemergence
LSD	Least significant difference
PES	Preemergence surface applied
PPI	Preplant soil incorporated
psi	Pounds per square inch pressure
RCB	Randomized complete block experimental design
VEP	Very early postemergence
WP	Wettable powder
/	Indicates sequential application
(+)	Indicates a tank mix

SOYBEAN WEED CONTROL RESEARCH

J.L. Griffin, R.J. Habetz, and R.P. Regan

Experiment: Soybean tolerance to pre- and postemergence herbicides

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Centennial, 50 lb/A

Planting Date: June 16, 1986

Row Spacing: 32 in

Fertilizer: 0-80-80 banded at planting

Plot Size: 3 rows x 30 ft (treat two rows)

Treated: June 16 (PES); July 9 (EP)

Weed Size: None present

Crop Size: V3 (6-8 in)

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi (PES); CO_2 backpack - 20 GPA, 8002 nozzles, 32 psi (EP)

Rated: July 23

Rainfall: 1st week after planting - 1.20 in; 2nd week - 2.70 in; 3rd week - 1.80 in; 4th week - 0.55 in

Harvested: Nov 22

Experimental Design: Randomized complete block, 4 replications

Comments: Application of preemergence and postemergence herbicides at labeled rates resulted in minimal soybean injury (Table 4). Phytotoxicity manifested as both stand reduction and stunting, however, was noted for Sencor (35%) and Canopy (24%) applied at 0.75 lb/A (double rate). Mature plant height was significantly lower than the untreated control for all preemergence treatments except Command and Lorox but similar to the control for the postemergence treatments. Where both Sencor and Canopy were applied at double rates, plant height was significantly reduced compared to the labeled rate. Lower pod height for soybeans treated with Sencor at 0.38 and 0.75 lb/A, Scepter at 0.13 lb/A, and Canopy and Gemini at 0.75 lb/A was significantly less than the untreated control. Soybean yields (data not presented) were less than 7.5 bu/A for all treatments due to extremely dry conditions.

Table 4. Soybean tolerance to preemergence and postemergence over-the-top herbicides. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Phytotoxicity 7/23	Mature plant ht	Mature pod ht
	(lb ai/A)		(%)	-----(in)------	
Sencor (75% DF)	0.38	PES	9	21.5	2.5
	0.75	PES	35	16.5	1.8
Scepter (1.5 EC)	0.13	PES	13	21.3	2.3
	0.25	PES	18	20.0	3.0
Canopy (75% DF)	0.38	PES	6	21.0	2.8
	0.75	PES	24	18.0	2.3
Scepter/Scepter	0.13/0.13	PES/EP	15	20.3	2.8
	0.13/0.25	PES/EP	18	19.0	2.8
Canopy/Classic	0.38/0.008	PES/EP	3	22.5	3.3
(25% DF)	0.38/0.016	PES/EP	9	21.0	3.0
Command (6 EC)	0.75	PES	1	24.3	3.3
	1.50	PES	1	23.5	2.8
Lorox (4 L)	0.75	PES	0	21.8	3.3
Gemini (60% WP)	0.75	PES	11	20.5	2.5
Basagran (4 EC) + Blazer (2 EC)	0.50 + 0.25	EP	3	24.3	3.5
Blazer	0.50	EP	1	25.8	3.3
Cobra (2 EC)	0.20	EP	4	23.0	3.3
2,4-DB (2 EC)	0.03	EP	0	24.8	3.3
	0.06	EP	4	23.5	3.0
Check	----	--	0	24.3	3.3
LSD (0.05)			9	2.6	0.6
CV (%)			74.1	8.4	15.5

[1/] Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments except 2,4-DB.

Experiment: Red rice postemergence test

Location: Rice Research Station, South Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 12, 1986

Row Spacing: Broadcast

Fertilizer: none

Plot Size: 10 x 25 ft (treat inside 5 ft)

Treated: July 8

Weed Size: RR 2-8 in (most at 4 in); AS 2-3 in; EC 1-2 in

Crop Size: V4

Sprayer: CO_2 backpack - 20 GPA, 11002 nozzles, 32 psi

Rated: July 23, Sept 3

Experimental Design: Randomized complete block, 4 replications

Comments: Late season red rice control was at least 85% for all treatments except Verdict at 0.13 lb/A, Classic at 0.008 lb/A, and Embark + Basagran at 0.13 + 0.75 lb/A (Table 5). Annual sedge control was excellent for Pursuit, Scepter, and Embark + Basagran. Only Scepter and Embark + Basagran controlled eclipta.

Table 5. Postemergence over-the-top control of red rice (RR), annual sedge (AS), and eclipta (EC) in soybeans. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control				
			7/23		9/3		
			RR	AS	RR	AS	EC
	(lb ai/A)		(%)				
Poast (1.5 EC)	0.38	EP	93	0	94	0	0
Fusilade 2000 (1 EC)	0.19	EP	95	0	93	0	0
Verdict (2 EC)	0.13	EP	81	0	81	0	0
	0.19	EP	85	0	90	0	0
DPX Y6202-31 (0.8 EC)	0.05	EP	95	0	91	0	0
	0.06	EP	95	0	94	0	0
Pursuit (1.95 EC)	0.06	EP	89	94	91	95	0
	0.13	EP	94	95	95	95	0
Scepter (1.5 EC)	0.13	EP	90	95	89	95	98
	0.19	EP	86	95	89	95	99
Classic (25% DF)	0.008	EP	29	0	85	0	0
Embark (2 EC) + Basagran (4 EC)	0.13 + 0.75	EP	75	99	81	95	96
BAS 517 (1.67 EC)	0.10	EP	90	0	94	0	0
	0.15	EP	95	0	90	0	0
	0.20	EP	94	0	94	0	0
Select (2 EC)	0.06	EP	90	0	91	0	0
	0.13	EP	95	0	94	0	0
LSD (0.05)			7	1	5	1	2
CV (%)			5.5	3.0	3.6	1	6.3

[1/] Agridex crop oil concentrate at 1 qt/A added to all treatments except Pursuit, Scepter, Classic, and Embark + Basagran which had 0.25% (v/v) Ag 98 nonionic surfactant added.

Experiment: Red rice seedhead suppression test

Location: Rice Research Station, South Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Crop not planted

Fertilizer: none

Plot Size: 10 x 25 ft (treat inside 5 ft)

Treated: Aug 15, 1986

Weed Size: RR 24-30 in, most at boot stage (approx. 1% headed)

Sprayer: CO_2 backpack - 20 GPA, 11002 nozzles, 32 psi

Rated: Sept 3

Experimental Design: Randomized complete block, 4 replications

Comments: This study was conducted to determine if presently available grass herbicides could be used economically to suppress seedhead production in red rice. Seedhead emergence in red rice treated with Scepter, Poast, and Fusilade 2000 at recommended rates averaged 3, 9, and 10%, respectively, compared with the untreated check with 88% emergence (Table 6). Seedhead emergence where Scepter was applied at one quarter and Fusilade 2000 was applied at one-half labeled rates was no more than 15%.

Table 6. Seedhead suppression of red rice (RR) in soybeans using postemergence over-the-top herbicides. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	RR seedhead emergence
	(lb ai/A)	---------(%)---------
Scepter (1.5 EC)	0.02	28
	0.03	15
	0.06	9
	0.13	3
Poast (1.5 EC)	0.05	66
	0.10	45
	0.19	28
	0.38	9
Fusilade 2000 (1 EC)	0.03	40
	0.06	29
	0.13	13
	0.25	10
Check	----	88
LSD (0.05)		22
CV (%)		52.0

[1/] Ag 98 nonionic surfactant at 0.25% (v/v) added to Scepter treatments and Agridex crop oil concentrate at 1 qt/A added to Poast and Fusilade 2000 treatments.

Experiment: Itchgrass preplant incorporated-preemergence test

Location: Habetz Farm, Crowley, LA

Soil Type: Acadia silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 17, 1986

Row Spacing: 30 in

Fertilizer: none

Plot Size: 10 x 25 ft (treat inside 5 ft)

Treated: June 17

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 23, Aug 8

Rainfall: 1st week after planting - 0.28 in; 2nd week - 3.0 in; 3rd week - 1.9 in

Experimental Design: Randomized complete block, 4 replications

Comments: Herbicides were incorporated two passes with a vibrashank and the seedbed was somewhat rough. On the second rating, itchgrass control was at least 85% for Treflan at 1.5 and 2.0 lb/A and Command at 1.25 lb/A (Table 7). Itchgrass control was substantially higher, regardless of the rate, where Command was surface applied compared with preplant incorporated.

Table 7. Itchgrass control using preplant incorporated and preemergence surface applied herbicide treatments. Habetz Farm, Crowley, LA. 1986.

Treatment	Rate of application	Application time	Itchgrass control 7/23	8/8
	(lb ai/A)		--------(%)--------	
Prowl (4 EC)	1.0	PPI	69	61
	1.5	PPI	83	71
	2.0	PPI	85	83
Treflan (4 EC)	1.0	PPI	85	81
	1.5	PPI	90	86
	2.0	PPI	93	91
Select (2 EC)	0.13	PPI	28	28
	0.25	PPI	31	23
Command (6 EC)	1.0	PPI	63	51
	1.25	PPI	50	55
	1.0	PES	89	80
	1.25	PES	93	88
Check	---	---	0	0
LSD (0.05)			16	23
CV (%)			16.8	26.6

Experiment: Itchgrass postemergence test

Location: Habetz Farm, Crowley, LA

Soil Type: Acadia silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 17, 1986

Row Spacing: 30 in

Fertilizer: none

Plot Size: 4 rows x 25 ft (treat inside two)

Treated: July 24

Weed Size: IG ≤10 in (most at 6-8)

Crop Size: V4

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: Aug 8, Oct 31

Experimental Design: Randomized complete block, 3 replications

Comments: Scepter at 0.13 lb/A was applied PES over the entire experimental area. On the late rating date, itchgrass control was at least 90% for all treatments except Poast, BAS 517, and Select (Table 8). BAS 517 at 0.15 lb/A provided itchgrass control similar to that of Poast at 0.25 lb/A (approximately 75%).

Table 8. Postemergence over-the-top control of itchgrass in soybeans. Habetz Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Itchgrass control	
			8/8	10/31
	(lb ai/A)		-------(%)-------	
Fusilade 2000 (1 EC)	0.13	EP	87	92
	0.19	EP	93	90
Poast (1.5 EC)	0.25	EP	85	75
	0.38	EP	82	70
BAS 517 (1.67 EC)	0.10	EP	77	53
	0.15	EP	87	77
	0.20	EP	92	88
Verdict (2 EC)	0.13	EP	87	95
	0.19	EP	92	95
Assure (0.8 EC)	0.09	EP	93	93
	0.13	EP	93	92
DPX Y6202-31 (0.8 EC)	0.05	EP	90	93
	0.06	EP	92	92
Select (2 EC)	0.06	EP	70	65
	0.13	EP	87	82
Hoelon (3 EC)	1.00	EP	68	90
Scepter (1.5 EC)	0.13	EP	0	0
LSD (0.05)			12	17
CV (%)			9.2	12.6

1/ Agridex crop oil concentrate at 1 qt/A added to all treatments except Hoelon and Scepter which had 0.25% (v/v) Ag 98 nonionic surfactant added.

Experiment: Verdict tank mix test

Location: Habetz Farm, Crowley, LA

Soil Type: Acadia silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 17, 1986

Row Spacing: 30 in

Fertilizer: none

Plot Size: 4 rows x 25 ft (treat inside two)

Treated: July 24

Weed Size: IG ≤10 in (most at 6-8); BSG 12-24 in (some heading); MW and PMG 4 in

Crop Size: V4

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: Aug 8, Oct 31

Experimental Design: Randomized complete block, 3 replications

Comments: Scepter at 0.13 lb/A was applied PES over the entire experimental area. Itchgrass control with Verdict at individual rates was similar regardless of whether applied alone or tank mixed with Blazer or Cobra (Table 9). Tank mixes with Cobra provided somewhat higher control of mexicanweed than that of Blazer but pitted morningglory control was similar for the Cobra and Blazer tank mixes.

Table 9. Postemergence over-the-top control of itchgrass (IG), broadleaf signalgrass (BSG), mexicanweed (MW), and pitted morningglory (PMG) in soybeans. Habetz Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 8/8 IG	BSG	MW	PMG	10/31 IG
	(lb ai/A)		(%)				
Verdict (2 EC)	0.13	EP	90	83	0	0	90
	0.19	EP	93	87	0	0	93
Verdict + Blazer (2 EC)	0.13 + 0.38	EP	88	77	80	97	82
	0.19 + 0.38	EP	90	78	83	93	90
	0.25 + 0.38	EP	93	82	85	98	90
Verdict + Cobra (2 EC)	0.13 + 0.20	EP	90	83	87	97	85
	0.19 + 0.20	EP	95	90	95	98	75
	0.25 + 0.20	EP	97	90	90	100	88
Check	---		0	0	0	0	0
LSD (0.05)			7	4	9	5	15
CV (%)			5.3	3.1	9.3	4.1	10.9

1/ Agridex crop oil concentrate at 1 qt/A added to all herbicide treatments.

Experiment: Hoelon-Whip itchgrass test

Location: Habetz Farm, Crowley, LA

Soil Type: Acadia silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 17, 1986

Row Spacing: 30 in

Fertilizer: none

Plot Size: 4 rows x 25 ft (treat two rows)

Treated: Aug 22

Weed Size: IG 12-24 in (most at 20 in and some headed); BSG 8-12 in (seed present)

Crop Size: R3 (24 in)

Sprayer: CO_2 backpack - 20 GPA, 11002 nozzles, 32 psi

Rated: Sept 9, Oct 31

Experimental Design: Randomized complete block, 3 replications

Comments: Itchgrass control with Hoelon at 0.63, 0.75, and 1.00 was similar and no difference was noted between adjuvants (nonionic surfactant or crop oil concentrate) (Table 10). Itchgrass control was lower where Hoelon was tank mixed with Whip or where Whip was applied alone compared with Hoelon alone.

Table 10. Itchgrass (IG) and broadleaf signalgrass (BSG) control in soybeans using postemergence over-the-top herbicides. Habetz Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Weed control		
		9/9		10/31
		IG	BSG	IG
	(lb ai/A)	(%)		
Hoelon (3 EC) + Ag 98	0.63	67	0	90
Hoelon + Agridex	0.63	67	13	93
Hoelon + Ag 98	0.75	78	7	93
Hoelon + Agridex	0.75	58	13	88
Hoelon + Ag 98	1.00	87	3	95
Hoelon + Whip (1 EC) + Ag 98	0.5 + 0.1	68	27	80
Whip + Agridex	0.15	23	30	57
Check	----	0	0	0
LSD (0.05)		21	19	13
CV (%)		21.1	90.9	9.6

[1/] Ag 98 nonionic surfactant added at 0.25% (v/v) and Agridex crop oil concentrate added at 1 qt/A.

Experiment: General broadleaf preemergence and pre-/postemergence sequential test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: May 5, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat 2 rows)

Treated: May 5 (PES); June 2 (EP)

Weed Size: PMG cotyledonary - 2 leaf

Crop Size: V4

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 4, June 24

Rainfall: 1st week after planting - 0.00 in; 2nd week - 1.55 in; 3rd week - 3.75 in; 4th week - 0.40 in

Experimental Design: Randomized complete block, 4 replications

Comments: Late season broadleaf signalgrass control was similar for Scepter and Canopy applied alone or tank mixed with Dual (Table 11). Pursuit provided pitted morningglory control comparable to Scepter. In general, pitted morningglory control was at least 80% for all treatments.

Table 11. Broadleaf signalgrass (BSG) and pitted morningglory (PMG) control in soybeans using preemergence and pre-/postemergence over-the-top sequential herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 6/4 BSG	Weed control 6/4 PMG	Weed control 6/24 BSG	Weed control 6/24 PMG
	(lb ai/A)		(%)			
Dual (8 EC) + Sencor (75% DF)	2.0 + 0.38	PES	96	85	95	85
Turbo (8 EC)	2.0	PES	94	85	93	84
Turbo + Scepter (1.5 EC)	2.0 + 0.09	PES	98	83	95	83
Scepter	0.13	PES	90	83	86	81
Scepter	0.19	PES	90	84	83	84
Lasso MT (4 L) + Scepter	2.5 + 0.13	PES	85	79	76	80
Prowl (4 EC) + Scepter	1.0 + 0.13	PES	93	85	91	83
Dual + Scepter	2.0 + 0.13	PES	88	80	90	79
Dual + Scepter/Scepter	2.0 + 0.13/0.13	PES/EP	85	76	81	81
Pursuit (1.95 EC)	0.06	PES	94	81	91	83
Pursuit	0.13	PES	93	75	75	73
Dual + Pursuit/Pursuit	2.0 + 0.06/0.06	PES/EP	95	76	91	83
Canopy (75% DF)	0.25	PES	90	84	86	85
Canopy	0.38	PES	90	83	85	80
Dual + Canopy	2.0 + 0.38	PES	94	86	91	81
Dual + Canopy/Classic (25% DF)	2.0 + 0.38/0.008	PES/EP	91	89	94	90
Command (6 EC)	0.75	PES	96	80	95	83
Command	1.0	PES	90	81	84	83
Command + Scepter	0.75 + 0.09	PES	100	85	71	63
LSD (0.05)			11	10	27	18
CV (%)			8.6	9.0	21.6	15.3

[1/] Ag 98 nonionic surfactant added at 0.25% (v/v) to all postemergence treatments.

Experiment: General broadleaf pre-/postemergence sequential test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: May 5, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat 2 rows)

Treated: May 5 (PES); June 2 (EP)

Weed Size: PMG cotyledonary - 2 leaf, CB cotyledonary - 4 leaf

Crop Size: V4

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 4, June 24

Rainfall: 1st week after planting - 0.00 in; 2nd week - 1.55 in; 3rd week - 3.75 in; 4th week - 0.40 in

Experimental Design: Randomized complete block, 4 replications

Comments: Late season broadleaf signalgrass and pitted morningglory control was excellent and generally similar for the herbicide treatments (Table 12). Command and Dual PES followed by postemergence herbicides provided similar control to that of preemergence tank mixes followed by postemergence treatments.

Table 12. Broadleaf signalgrass (BSG), pitted morningglory (PMG), and cocklebur (CB) control in soybeans using preemergence/postemergence over-the-top sequential herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 6/4 BSG	6/4 PMG	6/4 CB	6/24 BSG	6/24 PMG	6/24 CB
	(lb ai/A)		(%)					
Dual (8 EC) + Scepter (1.5 EC)/Scepter	2.0 + 0.13/0.13	PES/EP	95	86	80	96	90	89
Dual + Scepter/ Classic (25% DF)	2.0 + 0.13/0.008	PES/EP	94	85	78	95	89	74
Dual + Scepter/ Cobra (2 EC)	2.0 + 0.13/0.15	PES/EP	95	95	95	90	94	88
Dual + Scepter/ Blazer (2 EC)	2.0 + 0.13/0.38	PES/EP	95	91	89	95	93	83
Dual + Scepter/ Tackle (2 EC)	2.0 + 0.13/0.38	PES/EP	96	90	89	95	95	85
Dual + Canopy (75% DF)/Classic	2.0 + 0.38/0.008	PES/EP	98	94	73	96	96	90
Dual + Canopy/ Scepter	2.0 + 0.38/0.13	PES/EP	95	93	91	98	100	100
Dual + Canopy/ Cobra	2.0 + 0.38/0.15	PES/EP	98	96	96	98	94	92
Dual + Canopy/Blazer	2.0 + 0.38/0.38	PES/EP	96	93	94	98	95	86
Dual + Canopy/Tackle	2.0 + 0.38/0.38	PES/EP	95	93	91	95	98	90
Command/Scepter	1.0/0.13	PES/EP	100	83	83	100	93	96
Command/Classic	1.0/0.008	PES/EP	100	86	85	100	96	93
Command/Cobra	1.0/0.15	PES/EP	100	95	95	100	94	95
Command/Blazer	1.0/0.38	PES/EP	100	93	94	75	94	83
Command/Tackle	1.0/0.38	PES/EP	100	93	96	100	98	88
Dual/Scepter	2.0/0.13	PES/EP	96	70	74	96	90	90
	2.0/0.19	PES/EP	95	70	73	98	94	99
Dual/Classic	2.0/0.008	PES/EP	95	70	76	90	89	88
	2.0/0.016	PES/EP	95	68	71	89	95	71
LSD (0.05)			2	8	16	NS	5	NS
CV (%)			1.5	6.5	12.8	12.4	4.0	14.7

[1/] Ag 98 nonionic surfactant added at 0.25% (v/v) to all postemergence treatments.

Experiment: General broadleaf postemergence test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: May 5, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat 2 rows)

Treated: May 20 (VEP); May 29 (EP); June 2 (EP)

Weed Size: MG & CB cotyledonary - 1 leaf at VEP; MG & CB 2-3 leaf at EP; MG & CB 3-4 leaf at LP

Crop Size: V2 at VEP-EP; V4 at EP

Sprayer: CO_2 backpack 20 GPA, 8002 nozzles, 32 psi (VEP & EP); Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi (EP - June 2)

Rated: June 4, June 24

Rainfall: 1st week after planting - 0.00 in; 2nd week - 1.55 in; 3rd week - 3.75 in; 4th week - 0.40 in.

Experimental Design: Randomized complete block, 3 replications

Comments: Broadleaf signalgrass control in late season was excellent for Pursuit and Pursuit + Arsenal but poor for the other treatments (Table 13). Cocklebur control was at least 86% for all treatments except Classic. Soybean injury was minimal for all treatments except Benazolin (16%).

Table 13. Broadleaf signalgrass (BSG), pitted morningglory (PMG), and cocklebur (CB) control and soybean (SB) injury using postemergence over-the-top herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control/phytotoxicity						
			6/4				6/24		
			BSG	PMG	CB	SB	BSG	CB	SB
	(lb ai/A)		(%)						
Scepter (1.5 EC) + Dyanap (3 EC)	0.09 + 1.5	EP	20	81	87	13	43	89	5
Scepter	0.13	EP	7	8	6	4	50	91	4
Scepter + Cobra (2 EC)	0.06 + 0.15	EP	50	73	81	15	30	91	2
Scepter + Blazer (2 EC)	0.06 + 0.38	EP	20	73	69	20	57	95	0
Cobra	0.15	EP	33	87	84	25	27	95	2
Basagran (4 EC) + Blazer/Basagran + Blazer	0.19 + 0.06/ 0.19 + 0.06	VEP/EP	72	93	92	0	3	95	0
Pursuit (1.95 EC)	0.06	EP	7	7	10	2	85	93	2
	0.09	EP	5	7	13	5	95	95	0
Pursuit + Arsenal	0.06 + 0.003	EP	3	3	7	8	95	89	5
	0.09 + 0.003	EP	3	7	10	7	95	97	2
Benazolin (4.18 EC) + Varaquat	0.38 + 1% V/V	EP	0	0	6	3	3	93	8
Benazolin + Agridex	0.38 + 1% V/V	EP	0	8	26	20	15	86	16
Classic	0.008	EP	3	7	7	2	13	63	3
LSD (0.05)			15	14	13	12	4	NS	29
CV (%)			48.2	21.8	17.9	90.4	17.3	18.7	64.8

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all treatments except Benazolin.

Experiment: Wild poinsettia preemergence tank mix test

Location: J. Heinen Farm, Crowley, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: Apr 30, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: Apr 30 (PES)

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: May 31, June 23

Rainfall: 1st week after planting - 0.55 in; 2nd week - 0.0 in; 3rd week - 1.8 in; 4th week - 3.3 in; 5th week - 1.8 in

Experimental Design: Randomized complete block, 3 replications

Comments: In general, broadleaf signalgrass control was excellent for all treatments (Table 14). Wild poinsettia control late season was at least 92% for tank mixes with Command but was somewhat lower for the Dual + Scepter + Sencor tank mixes.

Table 14. Wild poinsettia (WP), pitted morningglory (PMG), and broadleaf signalgrass (BSG) control using preemergence herbicide tank mixes. J. Heinen Farm, Crowley, LA. 1986.

Treatment	Rate of application	Application time	Weed control 5/31 WP	5/31 PMG	5/31 BSG	6/23 WP
	(lb ai/A)		(%)			
Command (6 EC) +	0.75 + 0.13	PES	95	90	99	95
Sencor (75% DF)	0.75 + 0.25	PES	95	95	90	95
	1.0 + 0.25	PES	100	100	99	95
Command + Canopy	0.75 + 0.13	PES	93	88	99	93
(75% DF)	0.75 + 0.25	PES	97	83	91	93
	1.0 + 0.25	PES	95	88	92	97
Dual (8 EC) +	1.5 + 0.09 + 0.13	PES	80	68	93	80
Scepter (1.5 EC)	1.5 + 0.09 + 0.25	PES	82	83	97	85
+ Sencor	1.5 + 0.13 + 0.25	PES	82	85	89	85
Command + Scepter	0.75 + 0.09	PES	95	88	100	92
	0.75 + 0.13	PES	95	90	97	95
	1.0 + 0.13	PES	95	93	98	93
LSD (0.05)			6	12	NS	22
CV (%)			4.0	8.6	21.0	15.8

Experiment: Wild poinsettia preemergence and pre-/postemergence sequential test #1

Location: J. Heinen Farm, Crowley, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: May 30, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: Apr 30 (PES); May 21 (EP)

Weed Size: WP cotyledonary - 3 leaf (2-3 in); BSG 2-4 leaf

Crop Size: V2-V3

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 4

Rainfall: 1st week after planting - 0.55 in; 2nd week - 0.0 in; 3rd week - 1.8 in; 4th week - 3.3 in; 5th week - 1.8 in

Experimental Design: Randomized complete block, 4 replications

Comments: Broadleaf signalgrass and wild poinsettia control were similar for Scepter and Canopy applied alone or tank mixed with Dual or Lasso MT (Table 15). Wild poinsettia control was increased at the higher rates of both Canopy and Scepter. The Scepter and the Canopy/Classic sequential treatments provided wild poinsettia control similar to that of the higher preemergence rates of Scepter or Canopy alone. Pursuit provided similar weed control to that of Scepter. Excellent broadleaf signalgrass and wild poinsettia control was obtained with Command at 0.75 lb/A.

Table 15. Broadleaf signalgrass (BSG) and wild poinsettia (WP) control in soybeans using preemergence and postemergence over-the-top herbicides. J. Heinen Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 6/4 BSG	Weed control 6/4 WP
	(lb ai/A)		----(%)-----	
Dual (8 EC) + Scepter (1.5 EC)	2.0 + 0.13	PES	88	80
Dual + Canopy (75% DF)	2.0 + 0.38	PES	91	79
Lasso MT (4 L) + Scepter	2.5 + 0.13	PES	89	81
Lasso MT + Canopy	2.5 + 0.38	PES	90	83
Sencor (75% DF)	0.38	PES	79	50
Canopy	0.25	PES	79	63
	0.38	PES	83	79
Canopy/Classic (25% DF)	0.38/0.008	PES/EP	83	81
Scepter	0.13	PES	76	76
	0.25	PES	86	88
Scepter/Scepter	0.13/0.13	PES/EP	95	89
Pursuit (1.63 EC)	0.06	PES	82	75
	0.13	PES	63	84
Pursuit/Pursuit	0.06/0.06	PES/EP	92	83
Command (6 EC)	0.75	PES	95	93
	1.0	PES	100	96
	1.25	PES	100	99
Prowl (4 EC) + Scepter	1.0 + 0.13	PES	45	79
LSD (0.05)			24	8
CV (%)			20.1	6.8

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Wild poinsettia preemergence and pre-/postemergence sequential test #2

Location: J. Heinen Farm, Crowley, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: May 30, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: Apr 30 (PES); May 21 (EP)

Weed Size: WP cotyledonary - 3 leaf (2-3 in); BSG 2-4 leaf

Crop Size: V2-V3

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 4, June 23

Rainfall: 1st week after planting - 0.55 in; 2nd week - 0.0 in; 3rd week - 1.8 in; 4th week - 3.3 in; 5th week - 1.8 in

Experimental Design: Randomized complete block, 4 replications

Comments: Late season broadleaf signalgrass and wild poinsettia control was similar for all treatments, averaging 91 and 89%, respectively (Table 16).

Table 16. Broadleaf signalgrass (BSG) and wild poinsettia (WP) control in soybeans using preemergence and postemergence over-the-top herbicides. J. Heinen Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 6/4 BSG	Weed control 6/4 WP	Weed control 6/23 BSG	Weed control 6/23 WP
	(lb ai/A)		(%)			
Dual (8 EC) + Scepter (1.5 EC)	2.0 + 0.13	PES	95	80	93	87
Dual + Scepter/ Scepter	2.0 + 0.13/0.13	PES/EP	95	91	97	97
Dual + Scepter/ Classic (25% DF)	2.0 + 0.13/0.008	PES/EP	92	88	88	93
Dual + Scepter/ Cobra (2 EC)	2.0 + 0.13/0.15	PES/EP	92	95	92	95
Dual + Scepter/ Blazer (2 EC)	2.0 + 0.13/0.38	PES/EP	95	93	92	93
Dual + Canopy (75% DF)	2.0 + 0.38	PES	92	80	92	73
Dual + Canopy/ Classic	2.0 + 0.38/0.008	PES/EP	92	93	93	92
Dual + Canopy/ Scepter	2.0 + 0.38/0.13	PES/EP	95	87	98	93
Dual + Canopy/ Cobra	2.0 + 0.38/0.15	PES/EP	92	92	90	95
Dual + Canopy/ Blazer	2.0 + 0.38/0.38	PES/EP	95	85	95	83
Command (6 EC)/ Scepter	0.75/0.13	PES/EP	100	95	95	96
Command/Classic	0.75/0.008	PES/EP	98	90	93	93
Command/Blazer	0.75/0.38	PES/EP	98	63	65	63
LSD (0.05)			6	NS	NS	NS
CV (%)			3.4	19.3	17.6	19.1

[1/] Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Wild poinsettia postemergence rate-timing test

Location: J. Heinen Farm, Crowley, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 60 lb/A

Planting Date: Apr 30, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: May 20 (EP); May 29 (LP)

Weed Size: WP 3-4 leaf (2-4 in) at EP; WP 8-10 leaf (4-6 in) and new flush 3 leaf (2 in) at LP

Crop Size: V2 at EP; V4-V5 at LP

Sprayer: CO_2 backpack - 20 GPA, 10002 nozzles, 32 psi

Rated: June 4, June 23

Experimental Design: Randomized complete block, 3 replications

Comments: On the late rating date wild poinsettia control was similar when applied early or late postemergence (Table 17). Classic provided higher wild poinsettia control late postemergence than early and late postemergence control was similar to that of Scepter. Blazer provided control similar to that of Scepter.

Table 17. Postemergence over-the-top control of wild poinsettia as influenced by herbicide rate and timing of application. J. Heinen Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 6/4	Weed control 6/23
	(lb ai/A)		------(%)------	
Scepter (1.5 EC)	0.13	EP	78	80
	0.19	EP	88	92
Classic (25% DF)	0.008	EP	73	47
	0.012	EP	72	53
Blazer (2 EC)	0.38	EP	87	77
	0.50	EP	88	85
Scepter	0.13	LP	78	83
	0.19	LP	78	92
Classic	0.008	LP	80	88
	0.012	LP	80	82
Blazer	0.38	LP	83	78
	0.50	LP	85	73
Check	----	--	0	--
LSD (0.05)			8	16
CV (%)			6.6	12.9

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all treatments.

Experiment: Sicklepod and redweed preemergence and pre-/postemergence sequential test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 50 lb/A

Planting Date: May 23, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: May 23 (PES); June 17 (EP)

Weed Size: SP 1-2 leaf (2 in); RW 3-4 leaf (1-2 in); BSG 2-3 leaf

Crop Size: V4 (7-8 in)

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 23, July 23

Rainfall: 1st week after planting - 5.10 in

Experimental Design: Randomized complete block, 4 replications

Comments: Early season stunting of soybeans was more severe with Canopy than Scepter. Plants, however, recovered and showed no evidence of injury at maturity. Redweed control was poor with Scepter (Table 18). Tank mixes of Scepter with Lasso MT, Dual, and Prowl enhanced redweed activity but control was still less than 80%. Canopy alone provided good to excellent redweed control comparable to Dual + Sencor or Turbo. Late season sicklepod control for Scepter and Canopy was similar (60-70%) and tank mixes with Lasso MT, Dual, or Prowl did not enhance activity. Sequential applications of Scepter/Scepter and Canopy/Classic provided higher control compared with a single preemergence application. Turbo provided sicklepod control similar to that of Dual + Sencor. Sicklepod control with Command was poor.

Table 18. Broadleaf signalgrass (BSG), sicklepod (SP), and redweed (RW) control in soybeans using preemergence and pre-/postemergence over-the-top sequential herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 6/23 BSG	Weed control 6/23 SP	Weed control 6/23 RW	Weed control 7/23 SP
	(lb ai/A)		(%)			
Dual (8 EC) + Sencor (75% DF)	2.0 + 0.38	PES	98	88	91	83
Turbo (8 EC)	2.0	PES	95	83	90	78
Turbo + Scepter (1.5 EC)	2.0 + 0.09	PES	94	86	89	79
Scepter	0.13	PES	84	80	51	60
	0.19	PES	90	86	50	69
Lasso MT (4 L) + Scepter	2.5 + 0.13	PES	90	84	78	70
Prowl (4 EC) + Scepter	1.0 + 0.13	PES	89	79	71	61
Dual + Scepter	2.0 + 0.13	PES	95	81	79	61
Dual + Scepter/Scepter	2.0 + 0.13/0.13	PES/EP	95	94	91	88
Pursuit (1.95 EC)	0.06	PES	94	70	66	30
	0.13	PES	96	80	89	58
Dual + Pursuit/Pursuit	2.0 + 0.06/0.06	PES/EP	96	91	95	84
Canopy (75% DF)	0.25	PES	78	83	89	59
	0.38	PES	83	83	93	74
Dual + Canopy	2.0 + 0.38	PES	98	91	96	83
Dual + Canopy/ Classic (25% DF)	2.0 + 0.38/0.008	PES/EP	98	95	98	94
Command (6 EC)	0.75	PES	96	69	86	40
	1.0	PES	96	74	88	58
Command + Scepter	0.75 + 0.09	PES	95	79	65	41
LSD (0.05)			5	5	20	26
CV (%)			3.4	4.1	17.4	27.8

[1/] Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Sicklepod and redweed pre-/postemergence sequential test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 50 lb/A

Planting Date: May 23, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: May 23 (PES); June 17 (EP)

Weed Size: SP 1-2 leaf (2 in); RW 3-4 leaf (1-2 in); BSG 2-3 leaf

Crop Size: V4 (7-8 in)

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: July 23

Rainfall: 1st week after planting - 5.10 in

Experimental Design: Randomized complete block, 4 replications

Comments: At the time the postemergence treatments were applied sicklepod height was greater where preemergence tank mixes were applied compared with application of only a preemergence grass herbicide. Sicklepod control was at least 90% only where Classic followed Dual + Scepter or Dual + Canopy, or where Scepter followed Dual + Canopy (Table 19). Where only Dual was applied preemergence, sicklepod control was highest following postemergence treatment with Classic. Sicklepod control was greatly enhanced when Cobra or Blazer followed Dual + Scepter or Canopy compared with Dual alone.

Table 19. Sicklepod (SP) control in soybeans using pre-/postemergence over-the-top sequential herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 7/23
	(lb ai/A)		-----(%)----
Dual (8 EC) + Scepter (1.5 EC)/Scepter	2.0 + 0.13/0.13	PES/EP	81
Dual + Scepter/Classic (25% DF)	2.0 + 0.13/0.008	PES/EP	91
Dual + Scepter/ Cobra (2 EC)	2.0 + 0.13/0.15	PES/EP	69
Dual + Scepter/ Blazer (2 EC)	2.0 + 0.13/0.38	PES/EP	74
Dual + Canopy (75% DF)/ Classic	2.0 + 0.38/0.008	PES/EP	94
Dual + Canopy/Scepter	2.0 + 0.38/0.13	PES/EP	90
Dual + Canopy/Cobra	2.0 + 0.38/0.15	PES/EP	81
Dual + Canopy/Blazer	2.0 + 0.38/0.38	PES/EP	83
Dual/Scepter	2.0/0.13	PES/EP	70
	2.0/0.19	PES/EP	71
Dual/Classic	2.0/0.008	PES/EP	84
	2.0/0.012	PES/EP	88
Dual/Cobra	2.0/0.20	PES/EP	45
Dual/Blazer	2.0/0.50	PES/EP	33
Dual/Tackle	2.0/0.50	PES/EP	40
LSD (0.05)			13
CV (%)			12.4

[1/] Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Jointvetch preemergence and pre-/postemergence sequential test

Location: Rice Research Station, South Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 13, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: June 13 (PES); July 2 (EP)

Weed Size: BYG 2-5 in, JV 1-7 leaf (1-5 in) but most at 1 leaf

Crop Size: V3

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi (PES);
CO_2 backpack - 20 GPA, 10002, 32 psi (EP)

Rated: July 15, Aug 11

Rainfall: 1st week after planting - 0.60 in; 2nd week - 2.5 in;
3rd week - 3.95 in; 4th week - 0.90 in

Experimental Design: Randomized complete block, 4 replications

Comments: On the late rating date, broadleaf signalgrass control was at least 88% for all treatments except Lasso MT + Canopy (Table 20). Jointvetch control preemergence was far superior with Canopy than with Scepter (89 vs 47%). Postemergence application of Scepter following Scepter preemergence provided only 70% jointvetch control. Application of Classic following Canopy did not enhance jointvetch activity compared with only Canopy preemergence. Where only a preemergence grass herbicide was applied, postemergence application of Classic provided 74% jointvetch control compared with postemergence applications of Scepter and Blazer, which gave 61 and 51% control, respectively.

Table 20. Barnyardgrass (BYG) and jointvetch (JV) control in soybeans using preemergence and pre-/postemergence over-the-top sequential herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 7/15 BYG	Weed control 7/15 JV	Weed control 8/11 BYG	Weed control 8/11 JV
	(lb ai/A)		(%)			
Prowl (4 EC) + Scepter (1.5 EC)	1.5 + 0.13	PES	96	76	94	38
Dual (8 EC) + Scepter	2.0 + 0.13	PES	99	75	94	54
Lasso MT (4 L) + Scepter	3.0 + 0.13	PES	96	80	94	50
Prowl + Canopy (75% DF)	1.5 + 0.38	PES	95	94	91	89
Dual + Canopy	2.0 + 0.38	PES	96	94	94	86
Lasso MT + Canopy	3.0 + 0.38	PES	84	96	78	91
Dual + Scepter/Scepter	2.0 + 0.13/0.13	PES/EP	100	90	96	70
Dual + Canopy/ Classic (25% DF)	2.0 + 0.38/0.008	PES/EP	96	95	94	93
Dual/Scepter	2.0/0.13	PES/EP	99	85	98	61
Dual/Classic	2.0/0.008	PES/EP	96	89	93	74
Dual/Blazer (2 EC)	2.0/0.50	PES/EP	88	81	88	51
Check	---	---	0	0	0	0
LSD (0.05)			5	7	6	12
CV (%)			3.6	5.9	5.0	13.0

[1/] Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Mexicanweed preemergence and pre-/postemergence sequential test

Location: T. Faulk Farm, Crowley, LA

Soil Type: Midland silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 18, 1986

Row Spacing: 30 in

Fertilizer: None

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: June 18 (PES); July 14 (EP)

Weed Size: MW ≤2 in stunted/abnormal (Scepter treated); MW 4 in (Canopy treated)

Crop Size: V3-V4

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: July 15, Aug 11

Rainfall: 1st week after planting - 0.20 in; 2nd week - 3.20 in; 3rd week - 4.75 in

Experimental Design: Randomized complete block, 3 replications

Comments: Broadleaf signalgrass control early season was excellent for all treatments (Table 21). Soybean stand loss and stunting due to excessive rain, however, substaintially reduced late season grass control for most treatments. Late season mexicanweed ratings were 80% or more for only Turbo + Scepter and Dual + Scepter followed by Scepter. Mexicanweed control was less than 30% for Dual + Sencor and Command.

Table 21. Broadleaf signalgrass (BSG) and mexicanweed (MW) control in soybeans using preemergence and pre-/postemergence over-the-top sequential herbicide treatments. T. Faulk Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 7/15 BSG	Weed control 7/15 MW	Weed control 8/11 BSG	Weed control 8/11 MW
	(lb ai/A)		(%)	(%)	(%)	(%)
Dual (8 EC) + Sencor (75% DF)	2.0 + 0.38	PES	97	40	87	30
Turbo (8 EC)	2.0	PES	100	77	87	57
Turbo + Scepter (1.5 EC)	2.0 + 0.09	PES	100	93	83	80
Scepter	0.13	PES	97	93	67	75
	0.19	PES	95	95	67	75
Lasso MT (4 L) + Scepter	2.5 + 0.13	PES	98	93	70	70
Prowl (4 EC) + Scepter	1.0 + 0.13	PES	97	92	70	72
Dual + Scepter	2.0 + 0.13	PES	98	95	85	73
Dual + Scepter/Scepter	2.0 + .13/0.13	PES/EP	100	95	95	90
Pursuit (1.95 EC)	0.06	PES	95	75	70	47
Pursuit	0.13	PES	97	88	78	73
Dual + Pursuit/Pursuit	2.0 + 0.06/0.06	PES/EP	98	78	95	70
Canopy (75% DF)	0.25	PES	97	87	67	67
	0.38	PES	95	90	68	67
Dual + Canopy	2.0 + 0.38	PES	97	83	82	60
Dual + Canopy/ Classic (25% DF)	2.0 + 0.38/0.008	PES/EP	98	87	85	78
Command (6 EC)	0.75	PES	100	33	93	20
	1.0	PES	100	37	88	23
Command + Scepter	0.75 + 0.09	PES	100	90	95	60
LSD (0.05)			5	8	18	20
CV (%)			2.8	6.3	13.3	19.3

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Mexicanweed pre-/postemergence sequential test

Location: T. Faulk Farm, Crowley, LA

Soil Type: Midland silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 18, 1986

Row Spacing: 30 in

Fertilizer: None

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: June 18 (PES); July 14 (EP)

Weed Size: MW 5 leaf (4-6 in) - Dual treated; MW ≤2 in - Scepter treated; MW 4 in - Canopy treated

Crop Size: V3-V4

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: July 15, Aug 11

Rainfall: 1st week after planting - 0.20 in; 2nd week - 3.20 in; 3rd week - 4.75 in

Experimental Design: Randomized complete block, 3 replications

Comments: Broadleaf signalgrass control late season was good to excellent for all treatments (Table 22). Where Scepter was applied postemergence, signalgrass control was at least 95% indicating the postemergence grass activity of Scepter. Late season mexicanweed control was at least 83% where Scepter was applied postemergence following Dual + Scepter or Canopy and was higher than where Classic was applied postemergence following the same treatments. Where only Dual was applied preemergence, mexicanweed control with Scepter postemergence was at least 80% and significantly higher than Classic, Cobra, Blazer, or Tackle.

Table 22. Mexicanweed (MW) and broadleaf signalgrass (BSG) control in soybeans using preemergence and postemergence over-the-top sequential herbicide treatments. T. Faulk Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 7/23 MW	Weed control 8/11 BSG	Weed control 8/11 MW
	(lb ai/A)		-------(%)-------		
Dual (8 EC) + Scepter (1.5 EC)/Scepter	2.0 + 0.13/0.13	PES/EP	88	97	88
Dual + Scepter/ Classic (25% DF)	2.0 + 0.13/0.008	PES/EP	90	88	75
Dual + Scepter/ Cobra (2 EC)	2.0 + 0.13/0.15	PES/EP	90	85	78
Dual + Scepter/ Blazer (2 EC)	2.0 + 0.13/0.38	PES/EP	90	88	75
Dual + Canopy (75% DF)/ Classic	2.0 + 0.38/0.008	PES/EP	88	85	73
Dual + Canopy/Scepter	2.0 + 0.38/0.13	PES/EP	85	95	83
Dual + Canopy/Cobra	2.0 + 0.38/0.15	PES/EP	88	83	77
Dual + Canopy/Blazer	2.0 + 0.38/0.38	PES/EP	93	73	75
Dual/Scepter	2.0/0.13	PES/EP	78	95	80
Dual/Scepter	2.0/0.19	PES/EP	77	95	88
Dual/Classic	2.0/0.12	PES/EP	80	82	70
Dual/Cobra	2.0/0.20	PES/EP	85	82	67
Dual/Blazer	2.0/0.50	PES/EP	83	83	67
Dual/Tackle	2.0/0.50	PES/EP	85	82	62
LSD (0.05)			9	11	10
CV (%)			6.4	7.6	7.8

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Mexicanweed postemergence rate-timing test

Location: T. Faulk Farm, Crowley, LA

Soil Type: Midland silt loam

Variety/Seeding Rate: Hartz 7126, 60 lb/A

Planting Date: June 18, 1986

Row Spacing: 30 in

Fertilizer: None

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: July 11 (EP); July 15 (LP)

Weed Size: BSG 2-4 in, MW 4 leaf (3 in), a few at 7 leaf (6 in) at EP; BSG 5-6 in, MW 4-6 in, most at 5-6 leaf (5 in) at LP

Crop Size: V3 at EP; V4 at LP

Sprayer: CO_2 backpack - 20 GPA, 8002 nozzles, 32 psi

Rated: July 23, Aug 11

Experimental Design: Randomized complete block, 4 replications

Comments: Broadleaf signalgrass control was at least 83% where Scepter was applied either early or late postemergence but was less than 50% for Classic and Blazer (Table 23). Late season mexicanweed control was the same and at least 82% for individual rates of Scepter regardless of application time. Poor mexicanweed control (less than 65%) was obtained with Classic and Blazer applied both early and late postemergence.

Table 23. Postemergence over-the-top control of mexicanweed (MW) and broadleaf signalgrass (BSG) as influenced by herbicide rate and timing of application. T. Faulk Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control 7/23 MW	Weed control 8/11 BSG	Weed control 8/11 MW
	(lb ai/A)		-------(%)	-------	
Scepter (1.5 EC)	0.13	EP	77	88	82
	0.19	EP	70	95	87
Classic (25% DF)	0.008	EP	70	37	33
	0.012	EP	68	33	37
Blazer (2 EC)	0.38	EP	80	33	43
	0.50	EP	77	47	65
Scepter	0.13	LP	80	85	82
	0.19	LP	70	83	87
Classic	0.008	LP	75	37	50
	0.012	LP	73	33	53
Blazer	0.38	LP	80	30	37
	0.50	LP	83	40	37
Check	----	--	0	0	0
LSD (0.05)			15	21	21
CV (%)			12.5	24.8	23.1

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all treatments.

Experiment: Broadleaf signalgrass and redweed preemergence and pre-/postemergence sequential test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Wilstar 550, 50 lb/A

Planting Date: May 23, 1986

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 3 rows x 25 ft (treat two rows)

Treated: May 23 (PES); June 17 (EP)

Weed Size: BSG 2-3 leaf (1 in), RW 1 in

Crop Size: V4 (7-8 in)

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi

Rated: June 23

Experimental Design: Randomized complete block, 4 replications

Comments: Broadleaf signalgrass control was enhanced when Scepter and Canopy were tank mixed with the grass herbicides (Table 24). Prowl or Dual tank mixed with Scepter provided higher signalgrass control compared with the Lasso MT + Scepter tank mix. Redweed control was 55% for Scepter at 0.13 lb/A but 95% for Canopy at 0.25 lb/A. Tank mixes of Scepter with Dual, Prowl, and Lasso MT provided approximately 80% redweed control, comparable to the Dual + Sencor and Turbo treatments. Soybean injury was minimal for all treatments.

Table 24. Broadleaf signalgrass (BSG) and redweed (RW) control, and soybean (SB) phytotoxicity using preemergence and pre-/postemergence over-the-top sequential herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Weed control/ phytotoxicity 6/23 BSG	RW	SB
	(lb ai/A)		-------(%)-------		
Dual (8 EC) + Sencor (75% DF)	2.0 + 0.38	PES	95	88	0
Turbo (8 EC)	2.0	PES	96	84	0
Turbo + Scepter (1.5 EC)	2.0 + 0.09	PES	95	91	5
Scepter	0.13	PES	81	55	8
	0.19	PES	85	64	13
Lasso MT (4 L) + Scepter	2.5 + 0.13	PES	88	73	8
Prowl (4 EC) + Scepter	1.0 + 0.13	PES	94	78	5
Dual + Scepter	2.0 + 0.13	PES	94	80	9
Dual + Scepter/Scepter	2.0 + 0.13/0.13	PES/EP	98	95	10
Pursuit (1.95 EC)	0.06	PES	94	73	0
	0.13	PES	96	85	3
Dual + Pursuit/Pursuit	2.0 + 0.06/0.06	PES/EP	99	98	18
Canopy (75% DF)	0.25	PES	80	95	15
	0.38	PES	85	95	14
Dual + Canopy	2.0 + 0.38	PES	94	94	16
Dual + Canopy/ Classic (25% DF)	2.0 + 0.38/0.008	PES/EP	95	99	18
Command (6 EC)	0.75	PES	98	93	0
	1.0	PES	98	79	0
Command + Scepter	0.75 + 0.09	PES	96	73	3
LSD (0.05)			5	19	5
CV (%)			3.8	16.2	49.9

1/ Ag 98 nonionic surfactant at 0.25% (v/v) added to all postemergence treatments.

Experiment: Rice and grain sorghum recrop test

Location: Rice Research Station, South Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Mars rice, 120 lb/A and R1090 Grain sorghum, 10 lb/A

Planting Date: Apr 16, 1986

Row Spacing: 7 in

Fertilizer: None

Plot Size: 10 x 50 ft

Treated: June 7

Sprayer: Tractor compressed air - 22 GPA, 8003 nozzles, 25 psi

Rated: July 29, 1985 (weed control); May 24, 1986 (phytotoxicity)

Experimental Design: Randomized complete block, 3 replications

Comments: In 1985 herbicides at labeled and double rates were incorporated and Centennial soybeans were planted. Weed control ratings were made in 1985 and residual phytotoxicity of the herbicide treatments was measured on rice and grain sorghum planted in 1986. In 1985, soybean injury was excessive (at least 30%) at double rates of all herbicides except Lasso MT, Command, Pursuit, and Canopy (Table 25). In general, increasing herbicide rates did not increase barnyardgrass control. Hemp sesbania control, however, was increased at double rates of Prowl, Lasso MT, and Command. Rice injury following Pursuit at 0.13 and 0.25 lb/A was 17 and 50%, respectively, but was minimal for the other treatments. Grain sorghum injury was 25% or more only where atrazine at 2.0 and 4.0 lb/A and Pursuit at 0.25 lb/A were applied the previous year.

Table 25. Soybean (SB) phytotoxicity, and barnyardgrass (BYG) and hemp sesbania (HS) control using preemergence herbicides and their residual activity on rice and grain sorghum planted the following year. Rice Research Station, Crowley, LA. 1985-1986.

Treatment	Rate of application	Phytotoxicity/ weed control 7/29/85 SB	BYG	HS	Phytotoxicity 5/24/86 Rice	Grain sorghum
	(lb ai/A)	(%)				
Prowl (4 EC)	1.5	10	97	25	0	0
	3.0	60	98	70	0	13
Treflan (4 EC)	1.5	13	97	43	0	0
	3.0	30	98	55	0	3
Lasso MT (4 L)	3.5	7	83	55	0	0
	7.0	3	93	85	0	3
Dual (8 EC)	2.5	2	97	70	0	7
	5.0	40	98	73	0	23
Atrazine (4 L)	2.0	97	83	100	7	27
	4.0	100	97	100	7	43
Command (6 EC)	1.5	2	98	59	0	7
	3.0	2	100	95	0	7
Pursuit (1.95 EC)	0.13	13	90	25	17	20
	0.25	17	97	33	50	60
Scepter (1.5 EC	0.25	30	88	82	0	0
	0.50	72	95	92	0	3
Cinch (7 EC)	1.50	58	97	10	0	0
RE-39571 (3 EC)	1.50	72	25	69	0	5
Canopy (75% DF)	0.38	23	82	95	0	7
	0.76	27	98	98	0	7
F6025 (25% DF)	0.06	30	27	80	0	12
	0.13	27	58	65	0	13
Check	----	27	10	7	0	0
LSD (0.05)		35	20	29	15	25
CV (%)		64.1	14.6	26.9	253.3	132.5

GRAIN SORGHUM WEED CONTROL RESEARCH

J.L. Griffin, R.J. Habetz, and R.P. Regan

Experiment: Grain sorghum weed control test

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: R1090 grain sorghum, 8 lb/A

Planting Date: Apr 24, 1986

Row Spacing: 30 in

Fertilizer: 30-60-60 broadcast and incorporated prior to planting; 88-0-0 on May 19

Plot Size: 3 rows x 25 ft (treat 2 rows)

Treated: Apr 24 (PES), 12 May (EP), May 21 (LP)

Weed Size: PMG cotyledonary - 2 leaf (1-3 in), CB 1-3 leaf (1-3 in), BYG 2-3 leaf (1-2 in) at EP, PMG 2-3 leaf, CB 3-4 leaf, BYG 6-7 leaf at LP

Crop Size: 4-5 leaf (3-4 in) at EP; 5-6 in at LP

Sprayer: Tractor compressed air - 20 GPA, 8003 nozzles, 26 psi (PES); CO_2 backpack - 20 GPA, 8002 nozzles, 32 psi (EP/LP)

Rainfall: 1st week after planting - 0.22 in; 2nd week - 0.54 in; 3rd week - 0.00 in; 4th week - 1.40 in

Experimental Design: Randomized complete block, 4 replications

Comments: Barnyardgrass control was at least 90% for all treatments except atrazine, 2,4-D, and Laddock (Table 26). The Tandem-atrazine tank mix applied early postemergence compared with atrazine alone significantly increased barnyardgrass and bermudagrass control without affecting broadleaf weed control or grain sorghum injury. Lasso MT followed by Buctril and Lasso MT + Harmony provided lower control of pitted morningglory than the other treatments. Cocklebur control was poor where Harmony was used. BAS 514 provided excellent morningglory control but control of cocklebur was significantly increased when tank mixed with atrazine or 2,4-D. Grain sorghum injury was 20% or less for all treatments except Lasso + Harmony, Tandem + atrazine, Tandem + atrazine followed by atrazine, BAS 514, and BAS 514 + 2,4-D.

Table 26. Barnyardgrass (BYG), bermudagrass (BG), pitted morningglory (PMG), and cocklebur (CB) control, and grain sorghum (GS) injury using preemergence and postemergence over-the-top herbicide treatments. Rice Research Station, Crowley, LA. 1986.

Treatment	Rate of application	Application time	Weed control/phytotoxicity 5/30				
			BYG	BG	PMG	CB	GS
	(lb ai/A)		(%)				
Lasso MT (4 L) + Atrazine (4 L)	2.0 + 1.2	PES	93	81	100	99	11
Dual (8 EC) + Atrazine	1.5 + 1.2	PES	95	89	100	97	10
Lasso MT/Atrazine[1/]	2.0/1.5	PES/EP	98	89	99	94	8
Lasso MT/Buctril (2 EC)	2.0/0.25	PES/EP	94	56	79	82	9
Lasso MT/Buctril[1/] + Atrazine	2.0/0.25 + 0.50	PES/EP	95	82	96	94	10
Lasso MT/Harmony (75% DF)	2.0/0.008	PES/LP	94	35	80	55	24
	2.0/0.016	PES/LP	91	77	89	69	25
Prowl (4 EC) + Atrazine[1/]	1.0 + 1.2	EP	93	79	100	84	15
Tandem (4 EC) + Atrazine[1/]	0.50 + 1.25	EP	96	90	100	100	24
	0.75 + 1.25	EP	95	93	100	97	21
Tandem + Atrazine/ Atrazine[1/]	0.50 + 1.0/1.0	EP/LP	95	95	100	100	34
	0.75 + 1.0/1.0	EP/LP	95	95	100	97	39
BAS 514 (50% WP)[1/]	0.50	LP	95	53	95	74	21
	1.0	LP	95	28	95	80	21
BAS 514 + Atrazine[1/]	1.0 + 1.0	LP	94	58	100	100	16
BAS 514 + 2,4-D[1/] (3.8 EC)	1.0 + 1.0	LP	95	45	100	100	21
Atrazine[1/]	1.0	LP	75	66	100	100	20
2,4-D[1/]	1.0	LP	23	5	100	100	18
Laddock (3.32 EC)[1/]	0.50	LP	38	15	99	44	15
LSD (0.05)			12	20	8	24	16
CV (%)			10.2	21.1	5.6	19.1	58.0

[1/] Agridex COC added at 1 qt/A.

OFF-STATION RICE WEED CONTROL RESEARCH

J.L. Griffin, R.J. Habetz, and R.P. Regan

Experiment: Water-seeded rice weed control test

Location: Errol Lounsberry Farm, Lake Arthur, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: Lemont, 120 lb/A

Planting Date: Mar 26, 1986

Row Spacing: Broadcast pre-sprouted seed

Fertilizer: 60-60-60 ($N-P_2O_5-K_2O$) on Mar 25; 100-0-0 on May 7

Plot Size: 7 x 25 ft

Treated: Mar 25 (PPI & PES); Apr 22 (EP); May 3 (LP)

Crop Size: 4 leaf at EP; 2-4 tillers (6 in) at LP

Sprayer: CO_2 backpack - 10 GPA, 8001 nozzles, 28 psi

Rated: May 7

Experimental Design: Randomized complete block, 4 replications

Comments: Due to herbicide movement from an adjacent area, weed control ratings could not be made. Rice phytotoxicity, however, was quite severe (approximately 40%) for Ordram preplant incorporated followed by Stam early postemergence and BAS 514 at 0.50 lb/A preplant surface (Table 27). In contrast, injury where BAS 514 was applied early postemergence was minimal. At maturity, rice injury associated with the herbicide treatments was not apparent.

Table 27. Phytotoxicity of several herbicides on water-seeded rice. E. Lounsberry Farm, Lake Arthur, LA. 1986.

Treatment	Rate of application	Application time	Phytotoxicity 5/7
	(lb ai/A)		-----(%)-----
Ordram (8 EC)	3.0	PPI	18
Ordram/Stam (4 EC)	3.0/3.0	PPI/EP	38
Bolero (8 EC)	4.0	PPS	1
Bolero/Stam	4.0/3.0	PPS/EP	8
BAS 514 (50% WP)	0.25	PPS	14
	0.50	PPS	40
	0.25	EP	1
	0.50	EP	1
Prowl (4 EC) + Stam	1.0 + 3.0	EP	5
Stam	3.0	EP	4
Stam/Stam	3.0/3.0	EP/LP	10
Stam + Bolero	3.0 + 3.0	EP	11
Stam/Whip (1 EC)	3.0/0.15	EP/LP	4
Stam/Garlon (3 EC)	3.0/0.38	EP/LP	5
Whip + Garlon	0.15 + 0.38	LP	4
Check	----	----	0
LSD (0.05)			5
CV (%)			33.1

Experiment: Dry-seeded rice weed control test

Location: Will Bollich Farm, Cheneyville, LA

Soil Type: Moreland clay

Variety/Seeding Rate: Lemont, 100 lb/A

Planting Date: Apr 9, 1986

Row Spacing: Broadcast on dry seedbed and flushed

Fertilizer: 45-0-0 ($N-P_2O_5-K_2O$) at planting; 100-0-0 at permanent flood

Plot Size: 10 x 25 ft (treat inside 6 ft)

Treated: Apr 9 (PPI); Apr 16 (DP); May 6 (EP); May 16 (LP)

Weed Size: AG 2-3 leaf (4 in), PLMG cotyledonary - 2 leaf (2 in) at EP; BYG 4-5 leaf, PLMG 3-4 leaf (4-5 in) at LP

Crop Size: 3-4 leaf (4 in) at EP; 4-5 leaf (4-6 in) at LP

Sprayer: CO_2 backpack - 10 GPA, 8001 nozzles, 28 psi

Rated: May 16, June 6, Aug 20

Experimental Design: Randomized complete block, 4 replications

Comments: On the final rating date, rice injury was 11% or less for all treatments except Stam early postemergence followed by Whip late postemergence (28%) and Whip + Garlon late postemergence (21%) (Table 28). Injury was manifested as stand reduction and stunting. Barnyardgrass control was excellent for all treatments. Palmleaf morningglory control was at least 90% for all treatments except Ordram preplant incorporated (42%) and Bolero delayed preemergence (79%).

Table 28. Barnyardgrass (BYG) and palmleaf morningglory (PLMG) control, and phytotoxicity of several herbicides on dry-seeded rice. W. Bollich Farm. Cheneyville, LA. 1986.

Treatment	Rate of application	Application time	Weed control/ phytotoxicity 5/16 Rice	6/6 Rice	6/6 BYG	6/6 PLMG	8/20 Rice
	(lb ai/A)		(%)				
Ordram (8 EC)	4.0	PPI	3	15	90	42	5
Ordram/Stam (4 EC)	4.0/3.0	PPI/EP	11	30	95	96	11
Bolero (8 EC)	4.0	DP	4	6	91	79	3
Bolero/Stam	4.0/3.0	DP/EP	6	10	100	100	1
BAS 514 (50% WP)	0.25	DP	0	6	100	100	0
	0.50	DP	6	8	100	99	9
	0.25	EP	1	23	100	99	4
	0.50	EP	1	1	100	100	0
Prowl (4 EC) + Stam	1.0 + 3.0	EP	16	21	100	98	9
Stam	3.0	EP	6	10	98	99	3
Stam/Stam	3.0/3.0	EP/LP	6	15	100	100	0
Stam + Bolero	3.0/3.0	EP	23	34	100	100	3
Stam/Whip (1 EC)	3.0/0.15	EP/LP	5	66	100	100	28
Stam/Garlon (3 EC)	3.0/0.38	EP/LP	5	24	100	99	10
Whip + Garlon	0.15 + 0.38	LP	1	48	100	100	21
Check	---	--	0	0	0	0	0
LSD (0.05)			5	19	7	13	10
CV (%)			58.0	67.8	5.2	10.0	110.9

Experiment: Poast/Whip rate-timing test on rice

Location: B. Leonards Farm, Crowley, LA

Soil Type: Crowley silt loam

Variety/Seeding Rate: Lemont, 120 lb/A

Planting Date: Mar 24, 1986

Row Spacing: Water-seeded broadcast

Plot Size: 10 x 25 ft (treat inside 6 ft)

Treated: Apr 18 (EP); May 12 (LP)

Weed Size: BYG 2-3 leaf (1-2 in) at EP; BYG ≥12 in (some at boot) at LP

Crop Size: 2-3 leaf (3-4 in) at EP; 9-10 leaf at LP

Sprayer: CO_2 backpack - 10 GPA, 8001 nozzles, 28 psi

Rated: May 31

Experimental Design: Randomized complete block, 4 replications

Comments: Rice injury, manifested as stand reduction and stunting, was less severe where herbicides were applied late postemergence compared with early postemergence (Table 29). Both Poast and Whip applied early postemergence caused similar phytotoxicity. Late postemergence applications at the high rates were more injurious with Poast than Whip. An acceptable injury level of 20% or less was noted only for Poast at 0.05 lb/A applied early and late postemergence, and for Whip at 0.08 applied late postemergence. Barnyardgrass control regardless of herbicide rate or time of application was excellent.

Table 29. Phytotoxicity of Poast and Whip on rice as influenced by rate and timing of application. B. Leonards Farm, Crowley, LA. 1986.

Treatment[1/]	Rate of application	Application time	Phytotoxicity 5/31
	(lb ai/A)		-----(%)-----
Poast (1.5 EC)	0.05	EP	18
	0.10	EP	55
	0.20	EP	90
	0.05	LP	10
	0.10	LP	26
	0.20	LP	54
Whip (1.0 EC)	0.08	EP	26
	0.15	EP	58
	0.30	EP	85
	0.08	LP	11
	0.15	LP	25
	0.30	LP	26
Check	----	--	0
LSD (0.05)			16
CV (%)			30.2

1/ Agridex COC at 1 qt/A added to the Poast treatments.

COVER CROP BURNDOWN HERBICIDE RESEARCH

J.L. Griffin, R.J. Habetz, and R.P. Regan

Experiment: Cover crop burndown test for grain sorghum

Location: Rice Research Station, North Unit

Soil Type: Acadia silt loam

Variety/Seeding Rate: 'Woogenellup' sub clover, 23 lb/A; 'Tibbee' crimson clover, 28 lb/A; hairy vetch, 58 lb/A; R1090 grain sorghum, 9 lb/A

Planting Date: Nov 15, 1985 (Legume cover crops); April 23, 1986 (grain sorghum)

Row Spacing: 10 in (cover crops); 30 in (sorghum)

Fertilizer: 0-60-60 banded in Fall when cover crops were planted

Plot Size: 7.5 x 35 ft (treat inside 6 ft)

Treated: Apr 3, 1986 (burndown); entire area received Bicep at 3.0 lb/A on Apr 23

Sprayer: Tractor compressed air - 6 GPA, 80067 nozzles, 24 psi; 22 GPA, 8003 nozzles, 22 psi; 40 GPA, 8006 nozzles, 22 psi

Rated: Apr 18 (cover crop control)

Experimental Design: Randomized complete block, 3 replications

Comments: When burndown herbicides were applied, sub clover and vetch were at the vegetative growth stage and crimson clover was at early bloom. Dry matter yield for sub clover, vetch, and crimson clover averaged 1815, 2360, and 3812 lb/A, respectively. Ignite at both rates provided excellent control of sub clover, crimson clover, and vetch (Table 30). Crimson clover control with paraquat at both rates was excellent but 1.0 lb/A was needed for vetch control. Poor control was noted for sub clover treated with Paraquat and for all cover crops treated with Roundup. Grain sorghum stands were poor following all herbicide treatments, primarily due to dry conditions and severe stink bug pressure.

Table 30. Influence of burndown herbicide treatments on sub clover (SC), crimson clover (CC), and vetch (V). Rice Research Station, Crowley, LA. 1986.

Treatment	Rate of application	Spray volume	Cover crop control 4/18 SC	CC	V
	(lb ai/A)	(gal/A)	-----------	(%)	----------
Paraquat (2 EC)[1/]	0.5	22	37	95	82
	1.0	22	78	100	97
	0.5	40	45	98	80
	1.0	40	78	100	97
Roundup (4 EC)	1.5	6	43	23	37
	2.5	6	53	33	47
Ignite (1.67 EC)	0.75	6	92	95	98
	1.5	6	100	98	100
LSD (0.05)			23	12	11
CV (%)			20.4	8.5	8.0

[1/] X-77 nonionic surfactant was added at 1/2 pt/100 gallons water.

Experiment: Cover crop burndown test for soybeans

Location: Rice Research Station, North Unit

Soil Type: Acadia silt loam

Variety/Seeding Rate: 'Woogenellup' sub clover, 23 lb/A; 'Tibbee' crimson clover, 28 lb/A; hairy vetch, 58 lb/A; Wilstar 550 soybeans, 60 lb/A

Planting Date: Nov 15, 1985 (Legume cover crops); May 20, 1986 (soybeans)

Row Spacing: 10 in (Legume cover crops); 30 in (soybeans)

Fertilizer: 0-60-60 banded in Fall when cover crops were planted

Plot Size: 7.5 x 35 ft (treat inside 6 ft)

Treated: May 7, 1986 (burndown); entire area received Dual at 2.0 lb/A + Lexone at 0.25 lb/A PES on May 23 and Poast at 0.38 lb/A on June 23

Sprayer: Tractor compressed air - 6 GPA, 80067 nozzles, 24 psi; 22 GPA, 8003 nozzles, 22 psi; 40 GPA, 8006 nozzles, 22 psi

Rated: May 24 (cover crop control); May 31 (% soybean stand)

Experimental Design: Randomized complete block, 3 replications

Comments: When burndown herbicides were applied, sub clover was at mid-bloom and crimson clover and vetch were at late bloom to early seed set. Dry matter yield for sub clover, crimson clover, and vetch averaged 6545, 3924, and 3525 lb/A. Crimson clover control was not rated since natural senescense occurred following herbicide application. Both Paraquat and Ignite provided 100% control of both sub clover and vetch; Roundup provided approximately 90% control (Table 31). With the exception of the Roundup burndown in the crimson clover, soybean stands in the cover crop residues were similar when seeded no-till following the burndown treatments or in a prepared seedbed.

Table 31. Influence of burndown herbicide treatments on sub clover (SC), crimson clover (CC), and vetch (V) and their subsequent effects on soybean stand and yield. Rice Research Station, Crowley, LA. 1986.

Treatment	Rate of application	Spray volume	Cover crop control 5/24 SC	Cover crop control 5/24 V	Soybean stand rating 5/31 SC	Soybean stand rating 5/31 CC	Soybean stand rating 5/31 V	Soybean yield SC	Soybean yield CC	Soybean yield V
	(lb ai/A)	(gal/A)	(%)					(bu/A)		
Conventional seedbed	---	--	---	---	80	93	87	31.6	39.6	34.2
Paraquat (2 EC)[1/]	0.5	22	100	100	72	87	90	31.8	37.9	34.1
	1.0	22	100	100	85	93	92	30.4	33.6	33.0
	0.5	40	100	100	80	88	92	30.6	37.2	32.8
	1.0	40	100	100	82	90	93	32.4	39.0	32.5
Roundup (4 EC)	1.5	6	88	88	65	80	90	30.2	36.8	37.4
	2.5	6	90	88	65	83	92	33.1	38.3	33.9
Ignite (1.67 EC)	0.75	6	100	100	82	90	95	38.1	36.4	33.9
	1.5	6	100	100	83	88	95	33.4	38.5	34.5
LSD (0.05)			4	4	NS	6	NS	NS	NS	NS
CV (%)			2.5	2.6	16.4	4.0	6.3	11.2	7.2	7.1

[1/] X-77 nonionic surfactant was added at 1/2 pt/100 gallons water.

CONCLUSIONS

Scepter premergence at 0.13 lb/A provided good control (70-90%) of broadleaf signalgrass (BSG), barnyardgrass (BYG), mexicanweed (MW), wild poinsettia (WP), pitted morningglory (PMG), and cocklebur (CB); fair control (50-70%) of red rice (RR), sicklepod (SP), hemp sesbania (HS), and jointvetch (JV); and poor control (less than 50%) of redweed (RW) and itchgrass (IG) in soybeans. Canopy at 0.25 lb/A preemergence provided good BSG, BYG, CB, PMG, RW, HS, and JV control; fair control of RR, WP, MW, and SP; and poor control of IG. In general, tank mixes of grass herbicides with Scepter or Canopy did not enhance annual grass activity over that of Scepter or Canopy alone. Sequential applications of Scepter preemergence followed by Scepter postemergence and Canopy preemergence followed by Classic postemergence were required for consistent SP control. Weed control with Pursuit at 0.06 lb/A was similar to that of Scepter with the exception that Pursuit was stronger postemergence on grasses but weaker on eclipta (EC). Unlike Scepter, recrop injury on rice was noted with Pursuit. Command at 0.75 - 1.00 lb/A preemergence provided consistently excellent control (90-100%) of BYG, BSG, and WP and good control of IG. Preplant incorporation of Command dramatically decreased IG activity compared with a preemergence surface application. Command provided good control of PMG and RW but poor control of SP and MW. Weed control with Turbo at 2.0 lb/A was comparable to that of Dual at 2.0 lb/A + Sencor at 0.38 lb/A.

Postemergence control of PMG, SP, and JV in soybeans was higher with Classic at 0.008 lb/A than Scepter at 0.13 lb/A. Scepter, however, provided better control of BSG, BYG, RR, WP, MW, annual sedge (AS), and EC. Tackle at 0.38 lb/A and Cobra at 0.15 lb/A provided similar broadleaf control to that of Blazer at 0.38 lb/A. Cocklebur control and soybean phytotoxicity, however, were somewhat higher for Cobra compared with Blazer or Tackle. Postemergence grass herbicides, Poast at 0.38 lb/A, Fusilade 2000 and Verdict at 0.19 lb/A, DPX Y6202-31 at 0.05 lb/A, BAS 517 at 0.10 lb/A, and Select at 0.06 lb/A, showed excellent red rice activity. Itchgrass control was at least 90% with Fusilade 2000 and Verdict at 0.13 lb/A, Assure at 0.09 lb/A, DPX Y6202-31 at 0.05 lb/A, and Hoelon at 0.63 lb/A.

In grain sorghum, postemergence application of Tandem at 0.50 lb/A + atrazine at 1.25 lb/A increased grass control over atrazine alone. BAS 514 applied postemergence at 0.50 lb/A provided excellent annual grass and morningglory control but was weak on CB.

In rice, BAS 514 showed promise for BYG control but appeared weak on sprangletop, aquatic weeds, yellow nutsedge, and JV. In water-seeded culture, BAS 514 at 0.50 lb/A was somewhat injurious when applied preplant surface just ahead of initial flood-up but did not injure rice when applied postemergence. In dry-seeded culture, BAS 514 at the same rate showed little rice injury when applied delayed preemergence or early postemergence. The Stam at 3.0 lb/A early postemergence-Whip at 0.15 lb/A late postemergence and the Whip at 0.15 lb/A + Garlon at 0.38 lb/A late postemergence treatments were somewhat injurious to dry-seeded rice. Both Poast and Whip at rates as low as 0.10 and 0.15 lb/A, respectively, injured rice (stand reduction and stunting) when applied at the 9-10 leaf growth stage.

In the cover crop studies, Ignite at 0.75 lb/A, unlike Roundup at 1.5 lb/A, provided excellent burndown of subterranean clover, crimson clover, and vetch in no till systems.

A successful weed control program in any crop is vital to obtaining maximum yields. In most cases, herbicides serve as the basic weed control measure. Use of sound agronomic practices in conjunction with herbicide use should encourage more rapid stand establishment thereby enhancing competition from the crop and reducing weed interference. Producers should be aware that it is both easier and less expensive to control weeds at early developmental stages. In addition, poor early season weed control may not be correctable later in the season. Since weeds are generally most competitive the first four weeks after planting, early weed control measures should minimize their adverse effect on crop yield.

ROTATIONAL CROPS RESEARCH

INTRODUCTION

Soybeans [*Glycine max* (L.) Merr.] are a major agronomic crop in Louisiana. Southwest Louisiana, where soybeans are grown primarily as a rotational crop with rice, is one of the major soybean producing areas in the state. Some of the soybean acreage is double cropped with wheat (*Triticum aestivum* L.). In recent years, grain sorghum [*Sorghum bicolor* (L.) Moench] acreage has increased. In the southwest area, grain sorghum may serve as an alternate crop to soybeans and may fit well into a rotation system with rice. Soybean, grain sorghum, and wheat varieties differ in their adaptability to soil types and climatic conditions. Consequently, variety trials are conducted at locations throughout the state to aid producers in selecting varieties best adapted to their area. Research is conducted at the Rice Research Station each year to compare performance of newly released and established soybean, grain sorghum, and wheat varieties and to determine the impact of integrating these alternate crops in rotation systems with rice.

SOYBEAN VARIETY TEST

J.L. Griffin, B.G. Harville, W. Hall, R.J. Habetz, and R.P. Regan

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Seeding Rate: 10 seed/row ft

Planting Date: Apr 25, 1986 (Group IV); May 22 (Group V & VII); June 16 (Group VI & VIII)

Row Spacing: 32 in

Fertilizer: 0-80-80 banded at planting

Plot Size: 4 rows x 30 ft

Treated: 2.0 lb/A Dual or 2.5 lb/A Lasso MT applied broadcast after planting

Rainfall: Group VI and VIII varieties were replanted on June 16 due to excessive rainfall following the May 22 planting

Harvested: At maturity for each variety

Experimental Design: Randomized complete block, 4 replications

Comments: In general, soybean yields were the lowest observed over the last 5 years (Table 1). The extremely low yields of the Group VI and VIII varieties were directly related to the late planting date and droughty conditions that occurred during flowering and pod fill. The Group IV variety, Ring Around 451, which yielded 35.5 bu/A in 1986 and which has been tested for 2 years, shows promise for early planting and harvest. Seed quality, however, will determine its adaptability to south Louisiana conditions. Comparing 3-year average yields, only five varieties, all Group V, produced more than 35.0 bu/A; Asgrow 5980, Deltapine 105, Hartz 5370, Coker 485, and Terra-Vig 505. Three-year average yields of the Group VI, VII, and VIII varieties were highest for Centennial (24.2 bu/A), Wright (26.8 bu/A), and Coker 368 (21.1 bu/A), respectively.

Table 1. Performance of commercial soybean varieties grown on Crowley silt loam soil at the Rice Research Station, Crowley, LA. 1986.

Maturity group and variety	Yield 1986	Yield 3-year average (1984-86)	Plant height at maturity	Date matured	Height of lower pod above ground	Average lodging[1/]
	--------(bu/A)--------		----(in)----		----(in)----	
Group IV (very early)						
Ring Around 451	35.5	----	40	9/5	5	1.0
Ring Around 480	27.9	----	35	9/2	5	1.0
LSD (0.05)	9.7					
CV (%)	17.6					
Group V (early)						
Asgrow 5980	27.9	36.4	31	9/17	3	1.0
Pioneer 9581	27.6	----	23	9/15	3	1.0
Deltapine 105	26.3	38.6	24	9/24	2	1.0
Pioneer 9561	25.3	34.6	24	9/7	3	1.0
Deltapine 675	24.7	----	24	9/24	3	1.0
Deltapine 345	24.7	33.6	29	9/26	3	1.0
FFR561	24.6	34.6	19	9/17	2	1.0
Hartz 5370	24.5	35.2	26	9/26	3	1.0
Coker 485	23.4	35.1	25	9/30	3	1.0
Yield King 577	23.4	----	24	9/17	3	1.0
Narow	23.2	----	18	9/15	2	1.0
Terra-Vig 505	23.1	35.5	28	9/24	3	1.0
AX5005	22.9	----	28	9/17	4	1.0
Terra-Vig 515	22.2	32.7	26	9/30	3	1.0
Hartz 5171	21.5	32.5	24	9/30	3	1.0
Hartz 5252	21.5	----	25	9/15	3	1.0
Yield King 503	21.4	33.7	31	9/22	3	1.0
Pioneer 9571	21.4	32.1	23	9/15	3	1.0
Wilstar 550	21.2	34.8	23	9/17	2	1.0
Yield King 593	20.7	32.9	29	9/30	3	1.0

Continued.

Table 1. Continued.

Maturity group and variety	Yield 1986	Yield 3-year average (1984-86)	Plant height at maturity	Date matured	Height of lower pod above ground	Average lodging[1/]
	--------(bu/A)--------		----(in)----		----(in)----	
Group V (early) (continued)						
GI 575	20.5	----	35	10/31	4	1.0
Asgrow 5474	20.4	33.5	22	9/17	2	1.0
S 5919	20.3	----	26	9/14	3	1.0
Terra-Vig 553	19.3	33.6	23	9/23	3	1.0
Hartz 5164	18.6	----	21	9/30	2	1.0
AX5095	17.8	----	32	10/10	4	1.0
Forrest	16.4	30.1	20	9/30	2	1.0
Buckshot 500	14.5	----	33	10/6	4	1.0
LSD (0.05)	7.0					
CV (%)	22.3					
Group VI (med. early)						
Davis	11.7	22.4	22	10/15	3	1.0
GI 651	11.6	----	25	10/16	3	1.0
Funk 3305	11.4	----	23	10/20	4	1.0
Spartan	10.2	23.4	26	10/30	4	1.0
Ring Around 606	9.7	23.5	24	10/15	4	1.0
AX5506	8.9	----	24	10/30	3	1.0
ESX 677	8.7	----	25	11/17	3	1.0
Centennial	8.7	24.2	26	10/28	3	1.0
Yield King 613	8.7	21.8	24	10/12	4	1.0
Tracy M	8.6	22.8	23	10/29	3	1.0
Sanalona	8.6	----	22	10/30	3	1.0
AX5556	8.5	----	24	10/30	4	1.0
Coker 686	8.3	----	23	11/11	2	1.0
FFR 668	8.2	----	20	11/6	3	1.0
AX5566	8.2	----	25	10/30	4	1.0

Continued.

Table 1. Continued.

Maturity group and variety	Yield 1986	Yield 3-year average (1984-86)	Plant height at maturity	Date matured	Height of lower pod above ground	Average lodging[1/]
	--------(bu/A)--------		----(in)----		----(in)----	
Group VI (med. early) (continued)						
Asgrow 6785	8.1	----	22	10/21	4	1.0
Banner	8.1	----	19	10/16	3	1.0
S 69-54	8.0	22.3	24	11/11	3	1.0
Sampson	8.0	----	24	11/11	3	1.0
Yield King 696	8.0	----	25	10/29	4	1.0
Sanders 611	8.0	----	19	11/9	2	1.0
Buckshot 603	7.6	----	21	11/30	3	1.0
Victory	7.6	----	22	11/9	3	1.0
Ring Around 680	7.4	23.9	29	11/18	4	1.0
GI 653	7.4	----	24	11/8	4	1.0
Deltapine 566	7.3	21.6	24	11/11	4	1.0
Deltapine 506	7.1	22.3	26	11/17	3	1.0
Buckshot 601	7.0	----	21	11/11	3	1.0
Pioneer 9691	6.9	----	22	11/16	3	1.0
AX5516	6.8	----	22	10/30	3	1.0
ESX 607	6.7	----	22	10/30	3	1.0
GI 652	6.7	----	20	10/15	4	1.0
Buckshot 602	6.7	----	21	10/21	3	1.0
Leflore	6.9	----	21	10/30	3	1.0
Terra-Vig 616	6.4	----	23	11/7	3	1.0
Hartz 6383 R	6.4	17.8	21	11/15	3	1.0
GI 654	6.4	----	24	11/11	4	1.0
S 69-96	6.3	19.1	23	11/6	3	1.0
AX5006	6.2	----	21	10/10	4	1.0
Asgrow 6242	6.1	----	21	10/30	3	1.0
X 6385	6.0	----	22	11/10	3	1.0

Continued.

Table 1. Continued.

Maturity group and variety	Yield 1986	Yield 3-year average (1984-86)	Plant height at maturity	Date matured	Height of lower pod above ground	Average lodging[1/]
	--------(bu/A)--------		----(in)----		----(in)----	
Group VI (med. early) (continued)						
Hartz 6130	5.7	----	23	10/30	4	1.0
Asgrow 6520	5.5	22.3	15	11/6	2	1.0
LSD (0.05)	2.3					
CV (%)	21.4					
Group VII (med. late)						
Asgrow 7372	25.2	----	32	10/28	4	1.0
Coker 627	24.8	----	41	10/19	5	1.0
Wright	24.5	26.8	38	11/17	4	1.0
Asgrow 7986	23.8	----	41	11/26	4	1.0
Hartz 7126	22.7	26.5	42	11/10	4	1.0
TI 700	22.4	----	34	10/31	4	1.0
Coker 82-191	22.3	----	34	11/8	3	1.0
Pioneer 9791	22.3	----	36	11/22	3	1.0
Ransom	22.2	26.3	36	11/15	4	1.0
Deltapine 417	20.9	23.8	41	11/22	4	1.0
GI 707	20.4	----	38	11/27	3	1.0
Coker 82-606	20.3	----	39	11/26	4	1.0
S 72-60	20.3	24.9	37	10/31	4	1.0
Yield King 757	20.1	----	42	11/22	4	1.0
Deltapine 497	19.2	25.4	40	11/29	3	1.0
Yield King 707	18.9	----	42	11/19	4	1.0
Funk Exp. 1409	17.8	----	36	11/22	3	1.0
Starr	17.4	----	37	11/17	4	1.0
TI 707	17.2	----	42	11/22	4	1.0
FFR 771	16.1	----	43	11/18	5	1.0

Continued.

Table 1. Continued.

Maturity group and variety	Yield 1986	Yield 3-year average (1984-86)	Plant height at maturity	Date matured	Height of lower pod above ground	Average lodging[1/]
	--------(bu/A)--------		----(in)----		----(in)----	
Group VII (med. late) (continued)						
Terra-Vig 708	15.5	23.6	31	11/10	3	1.0
Hartz 7110	15.0	----	35	11/11	3	1.0
Terra-Vig 717	14.7	----	31	11/8	3	1.0
LSD (0.05)	4.9					
CV (%)	17.0					
Group VIII (late)						
Coker 82-645	10.0	----	26	11/17	3	1.0
Hartz 8112	9.2	20.3	25	11/17	4	1.0
Coker 488	9.2	----	26	11/15	3	1.0
Coker 368	7.7	21.1	24	11/11	3	1.0
Terra-Vig 808	6.4	17.3	19	11/14	2	1.0
LSD (0.05)	2.3					
CV (%)	17.9					

[1/] 1 = no lodging

GRAIN SORGHUM VARIETY TEST

J.L. Griffin, M.S. Kang, W. Hall, R.J. Habetz, and R.P. Regan

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: 8 lb/A

Planting Date: Apr 25, 1986

Row Spacing: 32 in

Fertilizer: 40-80-80 banded at planting; 88-0-0 on June 6

Plot Size: 4 rows x 30 ft

Treated: 1.5 lb/A atazine applied broadcast after planting

Rainfall: 0.55 in received on May 2

Harvested: Aug 20

Experimental Design: 9 x 9 balanced lattice, 3 replications

Comments: Grain sorghum yields in 1986 were lower than those observed in 1985 (Table 1). Variability in yield was somewhat high partly due to severe early season stink bug pressure. Even though methyl parathion was applied at 0.25 lb/A, thinned stands and small heads were observed partially accounting for the depressed yields. In general, a 4000 lb/A yield is considered good, and in 1986, yield of all varieties was less than that level. Only one variety, Topaz, produced a 2-year average yield in excess of 4000 lb/A. Incidence of head blight and sheath blight also affected yields in 1986.

Table 1. Performance of commercial grain sorghum varieties grown on a Crowley silt loam at the Rice Research Station, Crowley, LA. 1985-1986.

Company or brand	Hybrid	Yield 1986	Yield 1985	Yield Two year avg.	Plant ht.	Head blight rating[1/]	Sheath blight rating[1/]
		------(lb/A)-----			-(in)-		
Asgrow	Topaz	3670	4411	4041	56	2.8	6
Funk's	G-1711	3237	4649	3943	59	4.3	4
Pioneer	8300	3285	4571	3928	59	3.2	4
Northrup King	Savanna 5	3698	4154	3926	71	1.9	3
Rohm & Haas	Coker 7675	3697	4131	3914	56	3.7	4
Cargill	PAG 6670	2968	4807	3888	59	3.9	5
Terra	HT126DR	3278	4434	3856	57	3.9	5
Triumph Seed	Two 80-D	2831	4799	3815	55	4.3	4
Hyperformer	1330DR	3301	4237	3769	64	3.5	4
Pioneer	8333	3051	4465	3758	54	3.5	5
Seed Tec	701G	3316	4196	3756	59	4.5	5
Pioneer	8222	2807	4694	3751	50	3.4	6
Cargill	Paymaster 1091	2661	4840	3751	58	3.7	5
Asgrow	GS712	3035	4425	3730	59	4.7	5
Dekalb-Pfizer	DK-64	3108	4348	3728	58	3.3	6
Asgrow	Opal	2285	5102	3694	50	2.9	4
Taylor-Evans	T-E Dinero	2596	4747	3672	52	4.2	5
Hyperformer	1225DR	3256	4051	3654	57	4.0	4
Northrup King	2665	2772	4499	3636	52	5.2	4
Northrup King	2660	3103	4114	3609	52	3.5	5
Dekalb-Pfizer	M565	2655	4510	3583	55	4.5	7
Cargill	Paymaster DR1125	2701	4388	3545	53	4.4	7
Stauffer	S9750	2768	4319	3544	59	4.0	6
Funk's	G522DR	2712	4375	3544	53	4.5	6
George Warner	W-876DR	2863	4195	3529	57	4.2	5
George Warner	W-839DR	3001	4056	3529	56	3.3	6
McCurdy	Chaparral	2640	4403	3522	52	4.7	7
Triumph Seed	Two 70-D	2740	4298	3519	53	4.0	7
Terral-Norris	Sunbelt 444	2310	4627	3469	54	4.4	5
Cargill	PAG 4462	2308	4596	3452	53	4.2	6
Stauffer	530GS	2661	4079	3370	51	4.0	5
Cargill	Paymaster 1022	2040	4681	3361	51	5.0	7
McCurdy	M745	2361	4315	3338	55	3.4	4
McCurdy	M57YG	2518	4154	3336	59	3.8	5
Cargill	Paymaster R1090	1981	4620	3301	53	3.8	7
Taylor-Evans	T-E 4-75	2170	4297	3234	56	4.4	6
George Warner	W-851DR	2126	3564	2845	51	4.7	6
Funk's	G-1602	1754	3888	2821	50	5.7	5
Triumph Seed	Two 68-D	3567	-	-	59	3.7	5
Agratech	GK712G	3368	-	-	49	3.7	5
Alexandria Seed	AX2000	3354	-	-	52	3.7	5

Continued.

Table 1. Continued.

Company or brand	Hybrid	Yield 1986	Yield 1985	Yield Two year avg.	Plant ht.	Head blight rating[1/]	Sheath blight rating[1/]
		------(lb/A)		-----	-(in)-		
Cargill	PAG 662	3262	-	-	61	3.4	5
Dekalb-Pfizer	DK-50	3217	-	-	58	3.7	5
Agratech	GK 802G	3188	-	-	53	3.5	6
Taylor-Evans	T-E 4-77	3141	-	-	57	4.5	6
McCurdy	M747	3100	-	-	51	4.9	5
Hyperformer	HB-980C55	3058	-	-	55	3.8	5
Cargill	Paymaster 1096Y	3037	-	-	61	2.0	5
Stauffer	S9740Y	3004	-	-	60	1.3	5
Funk's	RA 787	3000	-	-	55	4.2	4
Alexandria Seed	AX2210	2966	-	-	56	3.2	6
Cargill	PAG X31262	2939	-	-	63	3.3	4
Alexandria Seed	AX2205	2896	-	-	52	3.8	7
Funk's	RA 808	2884	-	-	56	3.3	4
Dekalb-Pfizer	DK-49	2805	-	-	57	3.7	6
Asgrow	H8206	2802	-	-	54	3.7	6
Frontier	F-524	2743	-	-	61	4.2	5
Cargill	Paymaster R109A	2740	-	-	51	4.0	6
Seed Tec	3502	2715	-	-	61	1.3	4
Triumph Seed	TRX 3185	2699	-	-	52	3.5	6
Rohm & Haas	Coker 7737	2561	-	-	54	4.5	4
George Warner	W-744DR	2553	-	-	55	2.7	5
Alexandria Seed	AX2222	2546	-	-	58	3.9	5
Northrup King	2779	2544	-	-	54	4.9	8
Alexandria Seed	AX2207	2508	-	-	59	3.7	5
Frontier	F-457D	2434	-	-	53	4.7	4
Alexandria Seed	AX2200	2421	-	-	53	3.5	7
Pioneer	8226	2413	-	-	52	3.9	7
Funk's	G-522A	2391	-	-	51	3.4	7
Northrup King	2244	2376	-	-	55	4.3	7
Seed Tec	686	2363	-	-	49	4.2	7
Stauffer	S9525	2185	-	-	54	4.7	7
Cargill	61	2135	-	-	48	4.5	7
Seed Tec	692G	2108	-	-	54	5.5	6
Triumph Seed	TR 60-G	1953	-	-	49	4.0	5
Hyperformer	Honcho	1704	-	-	49	5.2	7
LSD (0.05)		1224	700				
CV (%)		27.4	9.9				

[1/] Rated on scale 0-9 with 1 = no disease and 9 = 100% infection.

WHEAT VARIETY TEST

J.L. Griffin, S.A. Harrison, R.J. Habetz, and R.P. Regan

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Seeding Rate: 90 lb/A

Planting Date: Nov 15, 1985

Row Spacing: 7 in

Fertilizer: 23-92-92 broadcast and incorporated prior to planting; 75-0-0 on Feb 14

Plot Size: 4 x 40 ft

Harvested: May 16

Experimental Design: Randomized complete block, 4 replications

Comments: Grain yields for the 1985-86 growing season (Table 1) were lower than those observed in previous years. Dry weather in spring and the presence of stem rust and bacteria (probably *Pseudomonas* sp.) contributed to the reduced yields. Average yield of the 24 entries was 47.7 bu/A. Florida 302 produced the highest yield with 70.8 bu/A. Leaf rust pressure was about normal and averaged 12 and 20%, respectively, at milk and dough stages. Stem rust overwintered in the area and increased very rapidly in the spring. The average stem rust occurrence was 53%. Florida 302 had a 3-year average yield of 76.6 bu/A (Table 2). The average 3-year mean yield of 14 varieties was 65.0 bu/A. Recommended varieties for the southwest Louisiana area are: Coker 762, Coker 797, Coker 983, Florida 302, Hunter, McNair 1003, Rosen, Southern Belle, and Terral 812. McNair 1003, Hunter, and Southern Belle are particularly susceptible to leaf rust and should be monitored for fungicide need.

Table 1. Performance of wheat varieties grown on a Crowley silt loam soil at the Rice Research Station, Crowley, LA. 1985-86.

Entry	Yield[1/] (bu/A)	Test wt.[1/] (lb/bu)	Plant height (in)	Heading date	Leaf rust[2/] (%)	Leaf rust2[2/] (%)	Stem rust[2/] (%)	Bacteria[3/]
Florida 302	70.8	58.6	38	3/26	0	2	2	7
HW 3022	59.9	57.7	38	4/1	11	1	30	8
Coker 93-23	59.8	58.0	30	3/20	4	20	75	7
Coker 983	58.3	59.6	30	3/23	18	23	42	8
Hunter	57.7	60.1	27	3/17	28	17	50	8
Terral 812	56.5	57.6	34	3/20	4	20	70	8
Southern Belle	56.0	58.1	34	3/29	4	29	40	9
Rosen	53.6	56.6	32	3/26	22	26	62	9
Coker 916	52.2	57.5	34	3/29	8	29	95	4
HW 3015	49.4	58.2	36	3/29	6	29	55	9
Pioneer 2551	49.1	53.3	34	4/10	11	10	5	9
Coker 762	48.4	57.7	31	3/29	4	29	75	9
McNair 1003	48.0	55.8	35	3/26	48	26	40	9
Coker 68-15	47.6	59.1	36	4/3	8	3	15	9
Coker 797	47.1	58.9	30	3/14	1	14	60	9
HW 3023	45.8	57.6	34	3/28	4	28	100	8
Terral 817	45.3	59.2	38	3/23	2	23	12	8
Magnum	44.4	59.0	37	3/31	4	31	30	6
Coker 747	43.6	57.9	33	4/4	18	4	52	9
Nelson	42.4	57.6	37	4/2	1	2	75	9
Florida 301	38.6	58.0	36	3/14	8	14	5	8
GA 1123	35.5	57.5	42	3/31	30	31	58	9
Saluda	34.3	57.2	35	4/6	22	6	95	8
HW 3021	27.8	56.9	38	3/29	35	29	95	7
Mean	47.7	57.9	34.3	3/27	11.8	20.0	53.3	7.8
LSD (0.05)	14.4	--	3.0	--	20.4	--	38.1	2.5
CV (%)	21.4	--	4.3	--	84.3	--	34.6	15.6

1/ Adjusted to 13% moisture.
2/ Modified Cobbs scale. Rated at milk and dough stages for leaf rust, and dough stage for stem rust.
3/ Rated on a scale of 1-9; 1 = light, 9 = severe. Probably *Pseudomonas* sp.

Table 2. Performance of wheat varieties grown on a Crowley silt loam soil over three years at the Rice Research Station, Crowley LA. 1984-1986.

Entry	Yield[1]				Leaf rust[2]				Septoria[3]			
	1984	1985	1986	Mean	1984	1985	1986	Mean	1984	1985	1986	Mean
	----------(bu/A)---------				-----(% of leaf area)----				-------(rating)-------			
Florida 302	79.0	80.0	70.8	76.6	TR	TR	00	01	3	5	7	5
Terral 812	77.3	77.9	56.5	70.5	10	10	04	08	5	6	8	6
Coker 983	76.5	72.2	58.3	70.2	TR	25	18	15	7	7	8	7
Hunter	80.2	72.5	57.8	68.9	12	06	28	15	6	8	8	7
Coker 797	74.5	82.6	47.1	68.1	TR	TR	01	02	7	8	9	8
Rosen	75.1	72.3	53.6	67.0	07	06	22	12	6	8	9	8
McNair 1003	72.4	76.1	48.0	65.5	60	23	48	44	5	8	9	7
Coker 762	80.9	66.5	48.4	65.3	00	TR	04	02	5	7	9	7
Southern Belle	72.7	66.6	56.0	65.1	15	04	04	08	6	6	9	7
Terral 817	65.6	80.0	45.3	63.6	17	TR	02	07	7	7	8	7
Coker 916	56.3	73.9	52.2	60.8	TR	03	08	04	6	8	4	6
Florida 301	69.5	72.2	38.6	60.0	00	TR	08	03	7	8	8	8
Coker 747	61.2	63.6	43.6	56.1	07	TR	18	09	5	6	9	7
Nelson	59.2	55.5	42.9	52.4	00	04	01	02	6	8	9	8
Mean				65.0				09				7
LSD (0.05)				11.0								
CV (%)				10.5								
Omega 78	64.6	65.4	----	65.0	TR	04	--	03	7	8	-	8
HW 3022	----	67.5	59.9	63.7	--	04	11	08	-	5	8	6
HW 3015	----	76.8	49.4	63.1	--	20	06	13	-	8	9	8
Magnum	----	61.7	44.4	53.0	--	11	04	08	-	7	6	6
Saluda	----	55.5	34.3	44.9	--	TR	22	12	-	7	8	8
HW 3021	----	60.9	27.8	44.4	--	40	35	38	-	8	7	8
Mean				55.7				14				7

[1] Adjust to 13% moisture.

[2] Modified Cobbs scale.

[3] Rated on a scale of 1-9; 1 = light, 9 = severe.

WHEAT FERTILIZATION TEST

J.L. Griffin, D.E. Groth, R.J. Habetz, and R.P. Regan

Location: Rice Research Station, North Unit

Soil type: Crowley silt loam

Variety/seeding rate: Coker 762, 90 lb/A

Planting date: Nov 15, 1985

Row spacing: 7 in

Fertilizer: 25-100-100 banded at planting; 25, 38, 50, 63, 75, 100, 125 lb N/A as ammonium sulfate applied on Jan 28, 1986 (growth stage 4, Feeke's scale) and/or Feb 25 (growth stage 6, Feeke's scale)

Plot size: 4 x 25 ft

Harvested: May 16

Experimental design: Randomized complete block design, 4 replications

Comments: This study was conducted to determine the effect of nitrogen timing and rate on yield and disease incidence in wheat. At planting 25 lb N/A was applied across all treatments. Nitrogen rates of 25, 50, 75, 100, and 125 lb/A were applied at growth stage 4 (when leaf sheaths lengthened) on Jan 28, at growth stage 6 (when first node on stem was visible) on Feb 25, or at stage 4 and 6 (one half of N at each stage). In addition, a Dithane treatment applied twice at 2 lb/A on Mar 17 at stage 10 (boot stage) and on Mar 27 was included. Where N was topdressed at 75 lb/A or less, wheat yields were higher when applied at stage 6 than at stage 4 (Table 1). Yields were comparable for 75 lb N/A or less applied at stage 6 and for 38 lb N/A or less applied at stage 4 and 6. Wheat yields were similar regardless of application time for N topdressed at 100 and 125 lb/A. Yields, however, where N was topdressed at 100 and 125 lb/A at stage 6 or split at 4 and 6 were not significantly different from 75 lb N/A applied similarly. At 125 lb N/A topdressed application of Dithane did not significantly increase yield over the untreated control at the same N rate. Mature plant height was not greatly affected by N rate or timing. Rust was most prevalent where N was applied early but comparable for the late or split application. The higher rust incidence is partly responsible for the lower yields observed at the recommended rate (75 lb N/A topdressed) for the early N application.

Table 1. Response of Coker 762 wheat to N rate and timing treatments. Rice Research Station, Crowley, LA. 1985-1986.

At planting	Feekes 4	Feekes 6	Total	Yield (bu/A)	Mature plant height (in)
25	0	0	25	26.6	21.3
25	0	25	50	39.9	25.0
25	0	50	75	46.4	26.5
25	0	75	100	45.0	26.0
25	0	100	125	42.6	24.6
25	0	125	150	46.4	24.8
25	0	125	150 2/	48.7	25.0
25	25	0	50	29.0	23.6
25	50	0	75	28.6	25.5
25	75	0	100	36.1	27.6
25	100	0	125	44.6	28.8
25	125	0	150	52.9	29.3
25	12	12	50	34.4	25.8
25	25	25	75	46.9	26.3
25	38	38	100	47.3	27.8
25	50	50	125	48.3	26.8
25	63	63	150	52.7	27.0
LSD (0.05)				8.7	1.6
CV (%)				14.4	4.3

1/ N applied as ammonium sulfate.

2/ Dithane at 2 lb/A applied twice.

INFLUENCE OF CROPPING SYSTEMS ON LONG-TERM SOYBEAN PRODUCTION

J.L. Griffin, R.J. Habetz, and R.P. Regan

Location: Rice Research Station, North Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Centennial, 50 lb/A

Planting Date: June 9, 1986 (stale seedbed)

Row Spacing: 30 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 0.2 acre

Treated: 2.0 lb/A Dual + 0.25 lb/A Lexone

Rainfall: Soybeans were replanted on June 9 due to excessive rainfall following the first planting on May 23

Harvested: Nov 20

Experimental Design: Randomized complete block, 3 replications

Comments: This study was initiated in 1982 to compare changes in crop yield, soil fertility, and insect, disease, and weed pressure associated with five cropping systems: 1) continuous soybeans; 2) continuous soybeans double cropped with wheat; 3) continuous soybeans with vetch as a winter crop; 4) a 1-year grain sorghum/2-year soybean rotation; and 5) a 1-year fallow/2-year soybean rotation. The cropping sequences for each year are shown in Table 1. Initial soil fertility levels for the experimental area in 1982 were pH = 5.8, organic matter = 1.08%, phosphorus = 45 ppm, and potassium = 102 ppm. Soil samples taken in 1985 indicated that soil organic matter levels had increased for all cropping systems since initiation of the study. Organic matter tended to be highest for the soybean-wheat, soybean-vetch, and grain sorghum-soybean systems, averaging 1.8%. Soybean yields over 5 years were similar for continuous soybean, soybean-vetch, grain sorghum-soybean, and fallow-soybean cropping systems ranging from approximately 40 bu/A in 1982 and 1983 to approximately 20 bu/A in 1984, 1985, and 1986 (Table 2). The lower yields in 1984 and 1985 were due in part to inclement weather around harvest time. In 1986, extremely dry conditions occurred in combination with "green bean" problems. Soybean yields over 4 years averaged 2.5 bu/A lower where soybeans followed wheat as compared with continuous soybeans. Wheat yields have been as high as 63 bu/A and grain sorghum as high as 5818 lb/A, indicating their potential for the southwest Louisiana area.

Disease and insect pressure have been similar regardless of the cropping system. Weed pressure, especially from mexican weed [Caperonia castaniifolia (L.) St. Hil.], and drought stress were more severe in soybeans following wheat as compared with the other cropping systems.

Table 1. Cropping systems evaluated at the Rice Research Station, Crowley, LA. 1982-1987.

Cropping system	1982	1983	1984	1985	1986	1987
1	S	S	S	S	S	S
2	S-W	S-W	S-W	S-W	S-W	S-W
3	S-V	S-V	S-V	S-V	S-V	S-V
4	GS	S	S	GS	S	S
5	F	S	S	F	S	S

S = soybeans, GS = grain sorghum, W = wheat, V = vetch, F = fallow.

Table 2. Crop yields for the soybean cropping systems study. Rice Research Station, Crowley, LA. 1982-1986.

	Yield (bu/A)							
Cropping systems	Fall 1982	Spring 1983	Fall 1983	Spring 1984	Fall 1984	Spring 1985	Fall 1985	Fall 1986
Continuous soybeans	42.2	--	42.1	--	20.6	--	19.4	18.6
Soybeans/wheat	39.4	35.0	40.0	63.0	20.8	53.7	14.3	21.9
Soybeans/vetch	43.1	--	43.1	--	20.1	--	17.7	20.9
Grain sorghum - soybeans	3648 lb/A	--	45.1	--	19.6	--	5818 lb/A	22.3
Fallow plow - soybeans	--	--	46.3	--	20.4	--	--	22.3
LSD (0.05)	NS	--	3.1	--	NS	--	NS	NS

AN INTEGRATED APPROACH TO RED RICE CONTROL

J.L. Griffin, J.B. Baker, R.T. Dunand, and R.P. Regan

Location: Rice Research Station, South Unit

Soil Type: Crowley silt loam

Variety/Seeding Rate: Centennial, 70 lb/A

Planting Date: June 10, 1986

Row Spacing: 7 in

Fertilizer: 0-60-60 broadcast and incorporated prior to planting

Plot Size: 2.5 acres per treatment

Treated: Dual 2.0 lb/A + Lexone 0.38 lb/A preemergence; Embark 0.12 lb/A + Basagran 0.75 lb/A postemergence over-the-top

Harvested: Oct 21

Comments: The effectiveness of combining cultural and chemical practices for red rice control in soybean/rice rotation systems (2-year/1-year and 1-year/1-year - soybean/rice) was continued in 1986. The high level of control in soybeans consisted of shallow-incorporated Dual and Sencor followed by postemergence application of Embark and Basagran. The low level of control consisted of only a surface-applied preemergence treatment. In previous years, the high level of control in rice consisted of water seeding, Ordram, and pinpoint flood water management. The low level consisted of water seeding and delayed flood water management. The crop sequences and yields by year are shown in Table 1. Red rice seed counts in the soil were made each year just prior to planting the crop. In 1983, seed counts were extremely high but decreased dramatically the second year. In the 2:1 rotation where soybeans were grown in 1984, red rice seed production, determined by red rice panicles present in the mature crop, did not occur. In the 1:1 rotation where rice was grown in 1984, significant red rice seed production occurred and was more severe under the low level of control as compared with the high. In 1985 and 1986, regardless of the rotation system or red rice control level, red rice seed was not detected in the soil prior to planting. In 1986, soybean yields were similar and averaged 23.9 bu/A. Red rice control was excellent and similar for the high and low control levels, indicating that neither herbicide incorporation nor application of postemergence treatments were beneficial. Based on previous years results, following two years of soybeans where red rice was not allowed to reseed, use of Ordram and proper water management produced 1-2 grade rice. Even though rice yields were similar each year, grade tended to be higher under the Ordram - pinpoint flood treatment as compared with the no Ordram - delayed flood treatment.

Table 1. Comparison of crop yields for two rotation systems and two levels of red rice control at the Rice Research Station, Crowley, LA. 1983-1986.

Rotation system	Control level	1983 Crop[1/]	1983 Yield[2/]	1984 Crop	1984 Yield	1985 Crop	1985 Yield	1986 Crop	1986 Yield
2:1	high	SB	37.0	SB	21.7	R	6183	SB	24.7
2:1	low	SB	37.0	SB	20.2	R	6037	SB	23.5
1:1	high	SB	37.0	R	5916	SB	15.0	SB	24.8
1:1	low	SB	37.0	R	6195	SB	15.0	SB	22.7

1/ SB = soybean, R = rice.

2/ Soybean yield in bu/A and rice yield in lb/A.

ESTABLISHMENT METHODS FOR GRAIN SORGHUM IN DOUBLE CROPPED CRAWFISH PONDS

M.W. Brunson and J.L. Griffin

INTRODUCTION

Four methods of establishing grain sorghum (Sorghum bicolor) in crawfish ponds following crawfish harvest season were evaluated. Planting methods included 1) mud seeding, where seed were broadcast into the pond immediately following crawfish pond drawdown, 2) early conventional tillage, where ponds were drawn down on April 15, allowed to dry, and grain sorghum planted into a prepared seedbed, 3) late conventional tillage, where crawfish harvest was extended through May 15, ponds were drained, dried, and a seedbed was prepared, and 4) late no-till, where ponds were drained May 15, allowed to dry, and the sorghum was planted no-till. The study was conducted in replicate 0.20 A ponds, and the experimental design was a randomized complete block with four replications.

In the early conventional till (ECT) ponds, a seedbed was prepared on April 29, 1986 and grain sorghum (Paymaster R1090) was planted in 30-inch rows at the rate of 8 lb/A. Fertilizer, 60-60-60 (N-P_2O_5-K_2O) was incorporated preplant, and a Lasso/Atrazine premix (3.5 qt/A) was surface applied after planting. An additional 40 lb/A of nitrogen in the form of ammonium sulfate (21-0-0) was applied 7 weeks after planting.

Mud seeded ponds were drained May 15 and grain sorghum was broadcast directly into the mud at the rate of 10 lb/A. Severe soil crusting occurred and seedling establishment was poor. In an effort to soften the soil and provide moisture, the ponds were briefly flushed 2 days after planting. Flushing proved to be of little benefit, since many of the seeds floated and were either lost through the drain or concentrated around the edges of the field and in the cracks in the soil. This treatment was subsequently abandoned, and the late no-till (LNT) treatment was implemented in these ponds.

The late conventional till (LCT) and the LNT ponds received the same fertilizer and herbicide treatments as ECT ponds, with the exceptions that in LNT ponds fertilizer was not incorporated and 1 pt/A paraquat was tank mixed with the Lasso/Atrazine premix to kill sprouted sorghum plants left from the unsuccessful mud planting. LCT ponds were no-till planted. Both late planted treatments were planted on June 13, 1986.

Two weeks after seeding stand counts were taken to estimate plant density in all plots. Grain was harvested from ECT ponds on August 25, and production was determined by quantifying yield from two 625 ft^2 combine harvested samples in each pond. The LNT and LCT ponds were combine harvested on October 5 and grain production was determined in a similar manner.

All ponds were flooded to a depth of 10 to 12 inches for crawfish production on November 1, 1986. Just prior to flooding, biomass in all ponds were determined by removing at ground level all vegetation within a 25 ft^2 area in each pond. These samples were then separated into straw/stubble and green ratoon components, dried in a forced air drier at 150°F, and dry matter was determined (Table 1). The study is in progress, and crawfish are being harvested from all ponds.

Table 1. Stand counts and yield components of grain sorghum planted in double cropped crawfish ponds. Rice Research Station, Crowley, LA. 1986.

		Yield (lb/A)			
Treatment	Stand counts (plants/m row)	Grain 1/	Total biomass 2/	Ratoon 2/	Straw 2/
Early conv. till	16.8	4478 a	4926 a	2844 a	2082 a
Late no-till	16.5	3502 b	3171 b	1064 b	2107 a
Late conv. till	16.5	2164 c	3161 b	1083 b	2079 a
lsd	-NS-	-515-	395	-285-	-NS-
C.V., %	10.6	8.8	6.1	9.9	10.7
$\bar{x}$	16.6	3381	3753	1664	2089

1/ Adjusted to 13% moisture.
2/ Measured at floodup on Nov. 1, 1986.

COMPARISON OF SEVEN TERRESTRIAL VEGETATIVE TYPES FOR CRAWFISH FORAGE

(A Final Report)

M.W. Brunson

INTRODUCTION

Seven terrestrial vegetative types were drill seeded on 8-in row spacings with a seven row Kincaid cone-planter on July 20, 1985 and on July 22, 1986. A Crowley silt loam soil (Typic Albaqualf) typical of that found in the area was used. Plot size was 5 x 30 ft, and the study was arranged in a randomized complete block design with four replications. Seeding rates were: browntop (*Panicum ramosum*), japanese (*Echinochloa crusgalli* var. *frumentacea*), proso (*Panicum miliaceum*), and pearl (*Pennisetum typhoides*) millets - 30 lb/A; grain sorghum (*Sorghum bicolor*) - 10 lb/A; sorghum sudangrass (*S. bicolor*) - 23 lb/A. Natural vegetation was allowed to volunteer in the check plots. All plots were fertilized at the rate of 40 lb/A nitrogen in the form of 21-0-0 ($N-P_2O_5-K_2O$) as a top dressing after plant emergence.

Stand quality 2 and 5 weeks post-seeding, days to 50% heading, plant senescence at October flood-up time, and biomass at fall flood-up were determined for each vegetative type. Stand quality was rated on a scale 1-9 where 1 = no stand and 9 = ideal stand. Days to 50% heading was determined by visual inspection. Plant senescence was rated on the following scale: 0 = no stem or leaf senescence, 1 = 1 to 10%, 2 = 11 to 20% . . . 9 = 81% or more leaf and stem tissue senesced. Biomass present at the time of crawfish pond flood-up (October 15) was determined by mechanically harvesting all vegetation at ground level within a randomly selected 25 ft^2 area using a Kincaid sickle-bar forage harvester. Vegetative samples were dried in a forced air drier at 150°F until a constant weight was attained, and dry matter biomass was determined.

Data were combined over years and subjected to analysis of variance techniques. The Fisher Protected LSD (least significant difference) test was used to separate mean treatment differences.

RESULTS

The year x treatment interaction was not significant ($P>0.05$) for any of the parameters measured, and consequently analyses were restricted to two-year treatment means. Stand qualities, as indicated by 2- and 5-week ratings, were excellent for all plant types except the volunteer weeds (Table 1). Weed stand density did improve between 2- and 5-weeks post-seeding but remained significantly ($P<0.05$) lower than for any other vegetative type. Days to 50% heading ranged from 54 for weeds (primarily *Cyperus* spp.) to 72 for browntop millet.

Dry matter biomass at fall flood-up ranged from 2448 lb/A for browntop millet to 5028 lb/A for the sorghum sudangrass (Table 2). The sudangrass produced significantly ($P<0.05$) greater biomass than the other six types, producing 28% more biomass than pearl millet (3935 lb/A). Grain sorghum biomass (3668 lb/A) exceeded the remaining four plant types by at least 399 lb/A, and was significantly greater than browntop (2448 lb/A) and proso (2868 lb/A) millets.

Senescence ratings at flood-up ranged from 1.5 for sorghum sudangrass to 9.5 for proso millet (Table 2). Flood-up senescence of proso millet was significantly ($P<0.05$) higher than the other six plant types. However, senescence ratings for japanese and browntop millets ranked a close second and third, with 8.6 and 8.1, respectively. Pearl millet and grain sorghum had senescence ratings of less than 5.0 but were significantly greater than the sorghum sudangrass (Table 2).

Table 1. Stand quality ratings and days to 50% heading for seven terrestrial vegetative types planted in crawfish ponds. Rice Research Station, Crowley, LA. 1985-86.

Vegetative type	Stand rating[1/] 2 Wk post-seeding 1985	1986	Mean	5 Wk post-seeding 1985	1986	Mean	Days to 50% head 1985	1986	Mean
Browntop millet	8.7	8.5	8.6	9.0	8.8	8.9	71	73	72
Japanese millet	8.5	8.3	8.4	9.0	9.0	9.0	71	71	71
Proso millet	9.0	8.8	8.9	9.0	9.0	9.0	58	56	57
Pearl millet	8.8	8.8	8.8	9.0	9.0	9.0	70	72	71
Grain sorghum	8.5	8.5	8.5	9.0	9.0	9.0	62	62	62
Sorghum sudangrass	8.8	9.0	8.9	9.0	9.0	9.0	70	70	70
Weeds	6.0	6.0	6.0	8.0	7.0	7.5	53	56	54
Mean			8.3			8.8			6.0
CV%			7.7			4.6			11.4
lsd (0.05)			0.65			0.41			0.7

1/ Based on scale 1 to 9, where 1 = no stand and 9 = ideal stand.

Table 2. Dry matter biomass and senescence ratings of seven terrestrial vegetative types at the time of crawfish pond flood-up. Rice Research Station, Crowley, LA. 1985-86.

Vegetative type	Dry matter biomass (lb/A) 1985	1986	Mean	Senescence rating[1/] 1985	1986	Mean
Browntop millet	2558	2337	2448	7.8	8.5	8.1
Japanese millet	3407	3130	3269	8.5	8.8	8.6
Proso millet	2864	2870	2868	9.8	9.3	9.5
Pearl millet	4037	3832	3935	4.8	4.3	4.5
Grain sorghum	3530	3806	3668	4.8	4.0	4.4
Sorghum sudangrass	4673	5386	5030	1.5	1.5	1.5
Weeds	2911	3143	3027	4.8	6.3	5.5
Mean			3463			6.0
CV%			18.0			11.4
lsd (0.05)			709			0.7

1/ Based on scale 0 to 9, where 0 = no stem or leaf senescence, 1 = 1 to 10% . . . 9 = 81% or more stem or leaf senescence.

FORAGE CROPS TISSUE CULTURE RESEARCH

BERMUDAGRASS IMPROVEMENT THROUGH TISSUE CULTURE

(A Progress Report)

INTRODUCTION

Bermudagrass is an important forage grass in Louisiana. Many existing varieties are more productive than common bermudagrass; however, improvement is needed in the nutritional quality as well as the level of resistance to disease and insect pests. The objective of this project is to develop a tissue culture system for bermudagrass in order to utilize biotechnology for crop improvement. Additionally, systems are being developed to screen for disease and insect resistance with cell cultures. The fall armyworm (FAW), Spodoptera frugiperda (J.E. Smith), and the leaf spot disease, Helminthosporium cynodontis, are two major problems in bermudagrass fields. Both can severly weaken the plant and result in substantial stand loss.

EXPERIMENT 1. CALLUS INDUCTION AND PLANT REGENERATION.

S.S. Croughan and K.M. Hebert

Stolon tissue was surface sterilized, cut to expose the node, and placed on an agar solidified nutrient medium. Callus which formed was transferred to regeneration media and monitored for signs of plantlet formation. Media was modified as needed to optimize the response of each variety.

All varieties and strains of bermudagrass tested have formed callus. These include: Alicia, Brazos, Coastal, Grazer, Hardie, Oklan, OSU LCB W-26, OSU 71x6-7, Tifton 44, Tifton 78, and Tifton 292. Of these lines, Grazer forms callus most readily and OSU 71x6-7 the least. The type of callus formed also varies with variety. For example, Grazer callus is much more uniform in appearance, less dense, lighter colored and more succulent (Table 1) than callus from other material.

Table 1. Percent dry weight [(dry weight/fresh weight) x 100] of callus after 14 days growth on callus maintenance medium.

Bermudagrass	Dry weight (%)
Coastal	9.45 a
OSU 71x6-7	10.05 a
Tifton 292	9.79 a
Grazer	7.55 b

Means followed by the same letter are not significantly different (P>0.05).

The varieties and strains of bermudagrass callus which have been tested for regeneration ability include Grazer, Coastal, OSU LCB W-26, Brazos, OSU 71x6-7, and Tifton 292. Early stages of regeneration have been observed in all; however, plants have only been obtained from three, Grazer, Brazos and OSU LCB W-26. Different media complexes are currently being tested for increasing the rates of regeneration. Many meristemoids have been observed however they have not developed any further.

The plants which have been regenerated are being vegetatively propagated. These plants will be established in the field at three locations in 1987 for further evaluation.

EXPERIMENT 2. SCREENING FOR RESISTANCE TO *Helminthosporium cynodontis.*

M.D. Richardson, S.S. Croughan, and D.E. Groth

Variants of *Helminthosporium cynodontis* were isolated in 1985 and screened for toxin production. Suspension cultures of each variant were initiated in potato dextrose broth. The suspensions were grown for 7 days on a shaker (100 rpm), then filtered through glass wool and Whatman No. 1 paper. The filtrate was placed into 60 x 15 mm petri dishes and three leaf sections were floated in each dish. After 24 hours, the leaf sections were observed for disease symptoms. From this screening, two variants produced the best disease symptoms and were selected for further study.

These two variants were next screened for optimal toxin production. Suspension cultures were grown on a shaker for 1, 3, 5, 7, 10, and 14 days. On each day of harvest, the cultures were filtered as described above. A dilution series was made of the filtrate, placed in petri dishes, and leaf sections floated on the filtrate for 24 hours. Data is presented in Table 2. A minimum of 7 days of growth was determined to be necessary to obtain optimal toxin production.

Table 2. Amount of toxin produced as a function of time in culture of *H. cynodontis.* Leaf sections were floated on filtrate for 24 hours before being screened for symptoms.

% Toxin concentration (vol./vol.)	Age of culture (days)					
	1	3	5	7	10	14
100.0	0	+	+	+	+	+
50.0	0	+	+	+	+	+
25.0	0	0	+	+	+	+
12.5	0	0	0	+	+	+
6.3	0	0	0	0	0	0
3.2	0	0	0	0	0	0
0	0	0	0	0	0	0

0 = no symptoms, + = symptoms present.

The filtrate was next tested on whole plants to verify that the toxin isolated produced the same symptoms observed in the field. Filtrate was sprayed on whole plants while the control plants were sprayed with water. Symptoms were observed within 12 days on the plants sprayed with the filtrate.

Seven varieties of bermudagrass were next screened for susceptibility to the disease. Fungus suspensions were grown and filtered as described above. A dilution series of the filtrate was also used to determine if different levels of sensitivity existed among the varieties. Data is shown in Table 3. Oklan and Tifton 78 were the most resistant and Hardie was the most susceptible.

Table 3. Susceptibility of bermudagrass varieties to H. cynodontis toxin.

Variety	% Toxin concentration (vol./vol.)						
	100.0	50.0	25.0	12.5	6.3	3.2	0.0
Grazer	+	+	+	0	0	0	0
Coastal	+	+	+	0	0	0	0
Brazos	+	+	+	0	0	0	0
Oklan	+	+	0	0	0	0	0
Hardie	+	+	+	+	+	0	0
Tifton 44	+	+	+	0	0	0	0
Tifton 78	+	+	0	0	0	0	0

0 = no symptoms; + = symptoms present.

Cell cultures from the same seven varieties were screened for susceptibility to the toxin. Callus was initiated as described above in Experiment 1. The toxin was autoclaved and found to be heat stable. Callus growth medium was prepared without toxin and with toxin diluted to 25%. One gram of callus tissue was placed on each petri dish and observed over time. Weights were measured every 7 days for 6 weeks and the tissue transferred to fresh medium every second transfer. Very little difference was observed in the callus, and no weight differences were noted between callus grown on medium with or without toxin.

Disease symptoms in the field appear to be correlated with the K status of the plant. The callus is grown in a medium which is high in K, which may explain why no response to the toxin was observed. Callus was transferred to a medium with a low level of K, with and without the toxin as before. There was a decrease in weight and necrotic areas observed in the cultures in which the toxin was present and the level of K was low. It appears then that there is an interaction between the toxin and the K status of the callus. Research is continuing to evaluate this interaction further before screening of callus cultures for toxin susceptibility continues.

EXPERIMENT 3. SCREENING FOR RESISTANCE TO FALL ARMYWORM (FAW), Spodoptera frugiperda (J.E. Smith).

S.S. Croughan and S.S. Quisenberry

In order to obtain asepetic larvae, egg masses from FAW were sterilized with sodium hypochlorite, rinsed with sterile water, and placed on petri dishes containing nutrient medium to monitor contamination. After 3 days, one neonate larva was added to a cup containing a standard, artificial rearing diet (pinto bean) and monitored daily to determine if the sterilization procedure effected larval development. Aseptic and undamaged larvae were obtained using concentrations of 0.53 to 1.31% sodium hypochlorite for four minutes. At higher concentrations, the egg loss from masses was large during the sterilization period and larvae mortality and deformity high. At lower concentrations of sodium hypochlorite, contamination was high.

Callus was initiated as described above under Experiment 1. Two grams of callus was placed into Magenta vessels (3 x 3 x 4 inches) containing callus maintenance medium. Three aseptic FAW larvae were placed in each vessel (n = 18 vessels per variety or strain of bermudagrass). After 5 days, all larvae but one were removed per vessel. Larvae were aseptically weighed 11 and 14 days after infestation (Table 4).

There was low survival of the FAW larva when grown on the Grazer callus. The callus had a higher moisture content (see data under Experiment 1 description above). The lack of development of the larvae fed Grazer callus was probably attributable to excessive water content of the callus. Many larvae did not progress past the first instar, and appeared to drown. Larvae fed callus from Tifton 292 had the least weight gain while larvae fed Coastal callus weighed the most.

Table 4. Eleven- and 14-day weights of fall armyworm larvae feeding on bermudagrass callus.

	Weight (mg)	
Bermudagrass	11 day	14 day
Coastal	39.4 a	46.7 a
OSU 71 x 6-7	28.1 b	39.7 a
Tifton 292	10.3 c	15.9 b
Grazer	3.8 c	12.0 b

Means followed by the same letter are not significantly different (P>0.05).

Information from leaf screening experiments (Jamjanya and Quisenberry, 1987) has shown that OSU 71 x 6-7 is more resistant than Tifton 292 and Coastal. Grazer is susceptible to the FAW.

The preliminary results with callus screening could delineate differences among the varieties; however, the specific resistance rating was not directly comparable to results observed in leaf feeding studies. In both the leaf and callus feeding experiments, OSU 71 x 6-7 was rated more resistant than Coastal. Grazer appeared to be the most resistant variety according to the callus feeding, while being rated the most susceptible variety using leaf feeding. The excess water content of the Grazer callus could account for this difference. Further research is continuing to optimize the callus-FAW system and to standardize the nutritional status of the callus tissue.

ALFALFA IMPROVEMENT THROUGH TISSUE CULTURE

(A Progress Report)

S.S. Croughan

Alfalfa is a high quality forage legume that is only grown on 15,000 acres in Louisiana. A variety is needed which is better adapted to the southeastern United States. The objective of this project is to use tissue culture techniques to develop plants with improved traits which can be used as a source of germplasm for varietal improvement.

As previously described (Croughan, 1985 Annual Report), alfalfa seeds are surface sterilized, germinated aseptically, and the cotyledons placed on callus induction media. Once callus is formed, it is transferred to regeneration media. Plants which form are placed in a wick culture for root development, and then transferred to 4-inch pots in the greenhouse.

The plants which survive the initial period in the greenhouse are transferred to 1-gallon pots and inoculated with powdered *Rhizobium meliloti* (Pelinoc). The plants are maintained in the greenhouse and clipped to 4 inches periodically. At appropriate times during the year, the plants are transplanted to the field.

Early stages of regeneration were observed in all the varieties tested. Many plants were obtained from most of the varieties. No plantlets were obtained, however, from the varieties Arc, Pioneer 532, or Kanza. In some varieties, for example Florida 77 and Vanguard, some of the embryoids which formed did not develop completely into plants. Some regenerated plants were highly mutated and did not develop normally. A few were lost due to contamination. Two media sequences were used for all varieties (see Croughan, 1985 Annual Report). For some varieties, for example Defender and Raidor, the 'S' sequence produced the most regenerated plants, while for other varieties such as Southern Special the 'A' sequence was best. The variety Apollo produced about the same number of plants on both media sequences.

A significant number of the plants which regenerated did not survive potting and transfer to the greenhouse (Table 1). Several soil types and acclimation procedures were tested to reduce the loss at this stage. To increase survival, the plants from the wicks were throughly rinsed with distilled water, long thin shoots trimmed, and the plants put under cheesecloth for a week to acclimate to the greenhouse conditions. A mixture of vermiculite and potting soil was the best potting mix.

The majority of the regenerated plants were planted in the field in the fall of 1986. The rest will be transplanted to the field in the spring of 1987. The soil was tested (P: 5 ppm, K: 113 ppm, Ca: 1500 ppm, Mg: 595 ppm, pH = 5.5) and 3 tons per acre of lime were incorporated. The plants were transplanted to the field November 8, 1986, spaced 5 feet apart, and grouped by variety. Check plants were randomly placed within each variety group. A teaspoon of powdered Rhizobium meliloti was added to the soil around each plant at the time of planting. Evaluations will begin in Spring of 1987.

Varieties which have not successfully regenerated plants are continuing to be manipulated in the laboratory. Media is being modified and different explant sources tested to obtain regenerated plants. Ovaries and petioles have been tried as alternative explant sources. The nitrogen amount and form plays a major role in regeneration in alfalfa. Different sources of nitrogen are being evaluated for increases in regeneration rates as well as the overall hardiness of the regenerated plants. Work is focused on obtaining high rates of regeneration and survival of plants from the varieties recommended for Louisiana: Apollo, Arc, Cimarron, Florida 77, Southern Special, and Vanguard.

Table 1. Plants regenerated from alfalfa callus grown on two media sequences ('A' and 'S')*.

	# Plants surviving								
	Wick			Greenhouse			Field**		
Variety	A	S	Total	A	S	Total	A	S	Total
Apollo	68	72	140	23	46	69	6(3)	6(5)	12(8)
Arc	0	0	0	0	0	0	0	0	0
Cal West 475	1	18	19	0	11	11	0	3	3
Cal West 481	1	27	28	1	23	24	0	8(3)	8(3)
Cimarron	8	45	53	5	39	44	3	9(2)	12(2)
Classic	138	26	164	119	18	137	39(14)	6(2)	45(16)
Defender	0	35	35	0	21	21	0	8(2)	8(2)
Florida 77	2	1	3	0	1	1	0	0	0
Hi Phy	4	95	99	4	76	80	2	33(5)	35(5)
Kanza	0	0	0	0	0	0	0	0	0
Pioneer 521	71	93	164	30	64	94	3	20(5)	23(5)
Pioneer 532	0	0	0	0	0	0	0	0	0
Raidor	0	67	67	0	55	55	0	21(4)	21(4)
Shenandoah	3	0	3	2	0	2	0(1)	0	0(1)
Southern Special	116	22	138	96	17	113	32(6)	4(2)	36(8)
Vancor	0	1	1	0	1	1	0	0	0
Vanguard	0	2	2	0	1	1	0	0	0
WL 318	0	68	68	0	61	61	0	30(1)	30(1)
Total	412	572	984	280	434	714	85(24)	148(31)	233(55)

* Planted fall 1986, number in () to be planted spring 1987.
** A = Blaydes media sequence
S = Schenk and Hildebrandt media sequence
(see Croughan, 1985 Annual Report for complete media composition).

INFLUENCE OF FEEDLOT SURFACE AND SHADE ON PERFORMANCE OF STEERS FED HIGH FORAGE DIETS

T.W. White and F.G. Hembry

INTRODUCTION

Gains by steers grazing summer forages have not been effected by shade at the Rice Research Station. Gains on pasture was significantly lower than when green chopped forage was fed in shaded concrete pens. Likewise, steers fed on 80% hay ration gained more rapidly in shaded concrete pens than when fed in dirt lots with shade. This experiment was designed to study the influence of feedlot conditions and shade on performance of steers fed green chopped forage and a 80% hay ration.

MATERIALS AND METHODS

In each of two years seventy-two Hereford x Angus crossed steers averaging 488 lb were blocked by weight into nine groups. One steer from each weight group was randomly assigned to each of eight treatments. The eight treatments were grazing, green chopped forage fed in partially covered concrete pens or dirt lot with shade, 80% hay ration fed in partially covered concrete pens, concrete pen with no shade, dirt pen with shade near the feeder, dirt pen with shade removed from the feeder and dirt pen without shade. The 80% hay ration also contained 4% corn, 3% cottonseed meal, 10% molasses, 2% urea, .5% trace mineral salt, .5% dicalcium phosphate and vitamin A. This ration had been shown previously to provide performance similar to summer pasture. The grazed grass, green chopped forage and hay was predominately dallisgrass. The grass was fertilized with 50-100-100 (N-P_2O_5-K_2O) in the spring and 150 pounds of nitrogen per acre in three applications throughout the summer. The 80% hay ration and green chopped forage was fed free-choice with the green chop cut and fed each morning. A mixture of trace mineral salt and dicalcium phosphate was provided for the pasture and green chopped forage treatments. Shade was provided in the dirt lots by a 18 x 22 ft. shed.

These experiments were initiated in late April or early May and terminated after 112 days. All weights were taken after a 16-hr shrink without feed or water.

RESULTS AND DISCUSSION

The influence of feedlot surface and shade on average daily gain of steers consuming high forage diets is shown in table 1. Steers on pasture gained faster ($P<.05$) than those on other treatments. These steers gained well throughout the grazing period and more than in previous years on this pasture. This may be partially explained by the fact that dallisgrass almost completely took over these pastures from high concentrations of Coastal bermudagrass in

Table 1. Influence of feedlot surface and shade on performance of steers consuming high forage diets. Rice Research Station, Crowley, LA. 1985 and 1986.

Treatment	Average daily gain, lb	Dry matter intake, lb
Graze	1.10[d]	----
Green chop-concrete pen[a]	.70[f]	14.5
Green chop-dirt lot with shade	.23[g]	15.2
80% hay ration-concrete pens[a]	.92[e]	17.0
80% hay ration-concrete pen-no shade	.57[f]	15.7
80% hay ration-dirt lot with shade[b]	.65[f]	16.4
80% hay ration-dirt lot-with shade[c]	.70[f]	16.5
80% hay ration-dirt lot-no shade	.36[g]	15.1

[a] Partially covered concrete pens.
[b] Shade near self-feeder.
[c] Shade removed from self-feeder.
[defg] Means in the same column bearing different superscripts differ ($P<.05$).

previous years and dallisgrass has shown promise for this area in other experiments. Steers fed green chopped forage in partially covered concrete pens did not gain as well as steers on pasture possibly due to less selectivity but did gain faster ($P<.05$) than those fed in a dirt lot with shade even though the latter consumed more forage. Some difference was expected between these two treatments but the magnitude of the difference was surprising, particularly when intake is considered. The dirt lot was occasionally muddy but not to an extent that would explain the difference in gains.

Intake of the 80% hay ration did not vary greatly among treatments, however, gains were influenced by treatments. Gains were similar when steers were fed on dirt with shade near and removed from the feeder and greater ($P<.05$) than with no shade in dirt lots. When steers were fed in a dirt lot with no shade daily gains were lowest ($P<.05$).

SUMMARY

Seventy-two Hereford x Angus crossed steers were blocked by weight and assigned to eight treatments during a 112-day experiment in each of two years to investigate the influence of feedlot surface and shade on performance of steers consuming high forage diets. The treatments were grazing, green chopped forage fed in partially covered concrete pens or dirt lots with shade, 80% hay ration fed in partially covered concrete pens, concrete pen with no shade, dirt pen with shade near the feeder, dirt pen with shade removed from feeder and dirt lot without shade. The forage was predominately dallisgrass. Steers fed green chopped forage in partially covered concrete pens gained ($P<.05$) more than those in the dirt lot even though the latter consumed more dry matter and both groups gained less ($P<.05$) than those that grazed. Steers fed 80% hay ration on concrete or dirt gained less ($P<.05$) than those fed in partially covered concrete pens. Shade did not appear to consistently influence performance, but shade and concrete in combination improved gains.

INFLUENCE OF FISH MEAL LEVEL AND GRAIN TYPE IN DIETS FOR FINISHING STEERS

(A Preliminary Report)

T.W. White, L.S. Sticker and F.G. Hembry

INTRODUCTION

Dietary protein entering the rumen is degraded and utilized by the microorganisms or escapes into the abomasum and lower gastrointestinal tract where it is degraded to amino acids that are absorbed. Some proteins are degraded less than others in the rumen and therefore may be of greater nutritional value. Fish meal is a high protein product of south Louisiana that has received only limited attention as a ruminant protein source in the United States but should have rumen by-pass qualities since heat is used in the oil extraction process.

Rice has not been thoroughly investigated as a feed grain because of its demand as a human food source. Recent rice surpluses have created an interest in feeding rice to beef cattle. Limited research at this station suggests that milled rice is equal to corn for finishing steers. This experiment was conducted to compare milled rice and corn with five levels of fish meal for finishing steers.

MATERIALS AND METHODS

One-hundred Hereford x Angus crossed steers averaging 561 lb were implanted with 36 mg Zeranol and blocked by weight into 10 groups. One steer from each weight group was randomly assigned to each of 10 treatments. A 2 x 5 factorial design was used to compare milled rice and corn with five levels of fish meal. The ration contained 20% ground grass hay, 10% molasses, 1% dicalcium phosphate, .5% trace mineralized salt, .5% urea, 330 I.U. vitamin A per pound of feed, 63 to 64% ground grain and 0, .95, 1.90, 2.85 or 3.80% fish meal. Soybean meal was added to provide 11% crude protein rations.

The steers were denied feed and water for 18 hr prior to weighing initially and at 28-day intervals. Steers were slaughtered after 150 days. Carcass characteristics were evaluated by USDA graders and longissimus muscle area and fat thickness were measured on the cut surface at the 12th rib 48 hr after slaughter.

RESULTS AND DISCUSSION

The results of feeding five levels of fish meal and two grains are shown in table 1. Fish meal did not consistently influence gains. Average daily gains were highest ($P<.05$) when rations contained 3.80% fish meal, however gains were lower ($P<.05$) with 2.85 than 1.90% fish meal. Carcass weight and marbling score followed this same general trend. Fish meal level did not influence quality grade, fat thickness or longissimus area.

Table 1. Performance of steers fed five levels of fishmeal with milled rice and corn. Rice Research Station, Crowley, LA. 1986.

	Percent fish meal					Grain	
	0	.95	1.90	2.85	3.80	Milled rice	Corn
No. steers	20	20	20	20	20	50	50
Initial wt, lb	561	651	652	560	561	561	561
Days on feed	150	150	150	150	150	150	150
Feed intake, lb	22.6	22.6	23.2	22.9	24.4	21.4	24.8
Daily gain, lb	2.30^{bc}	2.28^{bc}	2.44^{b}	2.23^{c}	2.72^{a}	2.28^{e}	2.51^{d}
Carcass wt, lb	529^{b}	522^{b}	540^{ab}	519^{b}	564^{a}	519^{e}	551^{d}
Marbling score^{f}	8.2^{c}	8.8^{bc}	9.3^{b}	8.8^{bc}	10.7^{a}	8.4^{e}	10.0^{d}
Quality grade^{g}	10.2	10.6	10.8	10.6	11.6	10.1^{e}	11.4^{d}
Fat thickness, in	.30	.30	.35	.30	.35	.35	.30
Longissimus muscle area, sq in	10.1	9.9	10.2	9.9	10.1	10.0	10.0

^{abc} Means of the fish meal levels on the same line that do not have a common superscript letter differ ($P<.05$).

^{de} Means of the grain type on the same line that do not have a common superscript letter differ ($P<.05$). There were interactions ($P<.05$) for grain type and fish meal level on gains and carcass weight.

^{f} Slight = 8; slight plus = 9; small minus = 10.

^{g} Good = 10; good plus = 11.

Including milled rice in the ration resulted in lower ($P<.05$) gains, carcass weight, marbling score and quality grade in comparison to corn. There was an interaction ($P<.05$) for grain type and fish meal level on gains and carcass weight. This may have been due to a higher feed intake of the corn ration with 3.80% fish meal.

SUMMARY

A 2 x 5 factorial design was used to compare milled rice and corn with five levels of fish meal in 20% roughage rations. Fish meal was included in the rations at 0, .95, 1.90, 2.85 or 3.80% with soybean meal used to balance the ration to 11% crude protein. One-hundred Hereford x Angus crossed steers were blocked by weight and randomly assigned to 10 treatments. Average daily gain, carcass weight and marbling scores were higher ($P<.05$) at the 3.80% fish meal level than at the 2.85% level, which tended to be lower then at the 1.90% level. Gains, carcass weight, marbling scores and quality grades were higher ($P<.05$) when corn was fed than when rice was fed. There was an interaction ($P<.05$) for grain type and fish meal level on gains and carcass weight that may have been the result of varied feed intake.

INTERNATIONAL RICE TRAINING PROGRAM

(A Progress Report)

Maurice F. Miller

INTRODUCTION

The Louisiana State University Rice Research Station has cooperated for a number of years with the Foreign Training Division of the International Agricultural Development Service by providing informative training programs for international leaders.

Data regarding the classification of visitors according to countries are presented in Table 1. A total of 140 participants representing 22 countries received training at the Rice Research Station in 1986. The number of participants increased from 76 in 1985 to 140 in 1986. Brazil, for three consecutive years, provided the largest number of visitors.

Table 1. Number of participants trained according to country. Rice Research Station, Crowley, LA. 1986.

Country	Number of participants
Argentina	8
Brazil	31
Cameroon	1
China (People's Republic)	5
Colombia	3
Costa Rica	15
Dominican Republic	2
Ecuador	14
El Salvador	10
Germany (West)	3
Guatemala	11
Guinea - Bissau	1
Honduras	12
India	1
Iraq	4
Ivory Coast	4
Japan	3
Panama	5
Sri Lanka	2
Tamil Nadu	1
Thailand	2
Zaire	1
TOTAL	139

Table 2 presents information regarding the number of participants according to sponsoring organizations. The majority were sponsored by the USAID.

Subject matter interest of the participants varied from general rice production practices to specific interests concerning plant breeding, genetics, processing and marketing of rice, control of rice diseases, insects, and weeds. There were also interests in biotechnology, hydrology, fertilization, beef cattle research, and the rotation of rice and crawfish.

Table 2. Number of visitors according to sponsoring organizations. Rice Research Station, Crowley, LA. 1986.

Sponsoring organization	Number sponsored
AAI	1
AID/ROCAP	3
AID/USDA	1
CAGG	5
CBEA	1
Cyanamid	23
FAO	1
IIE	6
IRGA	1
LSU International Program	28
Private	23
Rice Council	1
Stauffer Chemical Company	1
USAA	1
USAID	38
USIA	5
US State Department	1
TOTAL	140

ECONOMICS OF ENTERPRISE SELECTION AND WHOLE FARM DECISION MAKING IN THE LOUISIANA RICE GROWING AREAS [1/]

Thomas P. Zacharias, Brian E. McManus and Kathryn A. Broussard [2/]

Enterprise budget projections for 1987 were developed for rice, soybeans, milo, corn, wheat, wheat-soybean double crop, and a rice-crawfish double cropping systems. Previously, enterprise budget projections were only reported for rice, soybean, and milo enterprises in the Southwest Louisiana rice area. A summary of the enterprise budgeting analysis for Southwest Louisiana is presented in Table 1. Budgeting results for rice production in Northeast Louisiana are shown in Table 2. Owner-operator and tenant-operator situations were budgeted for each enterprise with the exception of the rice-crawfish double cropping system. Other than rice, all enterprises were valued at the government loan support price or at a projected market price. The rice enterprise was valued at the loan rate price plus the deficiency payment. Under these assumptions, sufficient revenue was available to cover direct expenditures for all but the owner-operator row planted soybean and the tenant-operator soybean enterprises. Direct expenditures were defined to be seed, fuel, fertilizer, labor, chemicals, maintenance on equipment, and interest on operating capital. Recovery of total expenditures varied by commodity and land tenure. Total expenditures include direct expenditures plus the annualized cost of replacing capital assets. All tenant situations for all enterprises except rice (both drill and water-seeded) exhibited negative returns in relation to total expenditures. The corn and soybean enterprises were the only owner-operator situations that did not generate sufficient revenues to cover total expenditures. The rice, wheat-soybean double crop, and the rice-crawfish enterprises yielded the greatest return in relation to total expenditures of all enterprise combinations considered in the analysis.

Detailed enterprise budgets and supporting data were published in Department of Agricultural Economics Research Reports, Numbers 665 and 666, January 1987.

Service enterprise budgets were prepared for several alternative rice irrigation systems in southwest Louisiana. Cost estimates were developed for diesel, electric, and natural gas power systems. Deep well and surface water sources for each of the above power systems were evaluated. Per acre inch direct irrigation costs for a deep well water source were estimated to be approximately \$1.47, \$2.57, and \$1.54 for diesel, electric, and natural gas systems, respectively. Total per acre inch irrigation costs for a deep well

---

[1/]Research supported in part by funds provided by Louisiana rice producers through the Louisiana Rice Research Board.

[2/]Assistant Professor and Research Associates, respectively, Department of Agricultural Economics and Agribusiness, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge, LA.

water source were estimated to be approximately \$2.65, \$3.54, and \$2.70 for diesel, electric, and natural gas systems, respectively. Per acre inch direct irrigation costs for a surface irrigation water source were estimated to be approximately \$0.66, \$0.96, and \$0.67 for diesel, electric, and natural gas systems, respectively. Total per acre inch irrigation costs for a surface irrigation water source were estimated to be approximately \$1.32, \$1.50, and \$1.31 for diesel, electric, and natural gas systems, respectively. Detailed results of the irrigation cost analysis are reported in Department of Agricultural Economics Research Report, Number 666, January 1987.

Table 1. A Summary of Projected Costs and Returns per Acre For Rice, Soybeans, Corn, Milo, Wheat, Wheat-Soybean Double-Crop, and Rice-Crawfish Double Crop Enterprises, Southwest Louisiana, 1987. [a]

Crop Description [b]	Yield Per Acre	Unit	Total Income	Direct Expenses	Returns	Fixed Expenses	Total Expenses	Returns
			---------------------- Dollars Per Acre ----------------------					
Rice Enterprises:								
Water Plant, Owner [c]	41.45	cwt.	483.31	276.95	206.36	84.14	361.09	122.22
Water Plant, Tenant [d]	24.87	cwt.	289.98	176.64	113.34	43.36	220.00	69.98
Drill Plant, Owner [c]	43.66	cwt.	509.08	257.34	251.74	84.99	342.33	166.75
Drill Plant, Tenant [d]	26.20	cwt.	305.49	160.28	145.21	44.21	204.49	101.00
Second Cutting [c]	9.64	cwt.	112.40	62.31	50.09	28.63	90.95	21.46
Soybean Enterprises:								
6-Row, Owner [c]	24.50	bu.	116.86	117.16	-0.30	32.68	149.84	-32.98
6-Row, Tenant [d]	19.60	bu.	93.49	115.61	-22.12	32.68	148.29	-54.80
Drill Plant, Owner [c]	27.00	bu.	128.79	121.35	7.44	30.45	151.80	-23.01
Drill Plant, Tenant [d]	21.60	bu.	103.03	119.57	-16.54	30.45	150.02	-46.99
Corn Enterprises								
6-Row, Owner [c]	100.00	bu.	182.00	148.42	33.58	36.76	185.18	-3.18
6-Row, Tenant [d]	80.00	bu.	145.60	144.82	0.78	36.76	181.58	-35.98
Milo Enterprises:								
Drill Plant, Owner [c]	44.43	cwt.	138.18	86.51	51.67	26.26	112.77	25.41
Drill Plant, Tenant [d]	35.54	cwt.	110.54	86.51	24.03	26.26	112.77	-2.23

(Continued)

Table 1. (Continued)

Crop Description b/	Yield Per Acre	Unit	Total Income	Direct Expenses	Returns	Fixed Expenses	Total Expenses	Returns
			---------- Dollars Per Acre ----------					
Wheat Enterprises								
Drill Plant, Owner c/	45.00	bu.	102.60	70.39	32.21	23.32	93.71	8.89
Drill Plant, Tenant d/	36.00	bu.	82.08	70.39	11.69	23.32	93.71	-11.63
Wheat-Soybean Double Crop								
Wheat-Soybean, Owner c/	45+25	bu.	221.85	149.68	72.17	41.18	190.86	30.99
Wheat-Soybean, Tenant d/	36+20	bu.	177.48	150.62	26.86	41.18	191.80	-14.32
Rice-Crawfish Double Crop e/								
Rice-Crawfish, Owner c/	4,050+800	lbs.	687.02	463.26	223.76	188.24	651.50	35.52

a/ Crop prices used were $11.66 per hundredweight for rice, $4.77 per bushel for soybeans, $3.11 per hundredweight for milo, $2.28 per bushel for wheat, and $1.82 per bushel for corn.

b/ Rental arrangements for rice were 1/5 crop share for land and 1/5 crop share for water with both landlord and waterlord paying 1/5 of fertilizer and chemicals and the waterlord paying for all the irrigation fuel. Rental arrangements for soybeans, milo, and wheat were 1/5 crop share for land with no cost sharing on part of the landlord.

c/ Land costs are not included.

d/ Includes land rent based on representative crop-sharing arrangements for the area.

e/ Rice was valued at the loan rate of $6.84 per hundredweight. Average monthly prices for live crawfish were $.70, $.50, and $.40 for January, February, and March, respectively.

Table 2. A Summary of Projected Costs and Returns per Acre For Rice Production, Mississippi Delta and Ouachita Areas, Louisiana, 1987. a/

Crop Description b/	Yield Per Acre	Unit	Total Income	Total Direct Expenses	Returns Above Direct Expenses	Total Fixed Expenses	Total Specified Expenses c/	Returns Above Specified Expenses d/
			---------------------- Dollars Per Acre					----------------------
Rice Enterprises:								
Rice, Water Plant, Owner	48.60	cwt.	566.68	239.75	326.93	72.35	312.10	254.58
Rice, Water Plant, Tenant d/	29.16	cwt.	340.01	195.83	144.18	43.08	238.91	101.10
Rice, Drill Plant, Owner	48.60	cwt.	566.68	229.66	337.02	75.43	305.09	261.59
Rice, Drill Plant, Tenant d/	29.16	cwt.	340.01	186.13	153.88	46.16	232.29	107.72

a/ Crop price used for rice was $11.66 per cwt.

b/ Rental arrangements for rice were 1/5 cropshare for land and 1/5 cropshare for water with no cost sharing on the part of the landlord.

c/ Includes land rent based on representative crop-sharing arrangements for the area. Land costs are not included.

d/ Farm overhead expenses are not included in total specified expenses.

STATION PERSONNEL

Joseph A. Musick - Resident Director
Associate Professor

Carol L. Bastian
Secretary

Virginia F. Fontenot[1]
Secretary

Patti S. Gabel
Typist Clerk III

Darlene M. Toups
Word Processor Operator II

Kathryn A. Broussard
Research Associate

Teresa H. Malbrough
Custodian I

Patrick K. Bollich[2] - Rice Fertilization
Assistant Professor

William J. Leonards, Jr.
Research Associate

Ora J. Primeaux
Research Farm Spec. II

Sharon M. Rawls
Research Associate

Douglas M. Walker
Research Associate

Martin W. Brunson - Fisheries
Assistant Professor

Steven M. Simon
Ag Lab Assistant

Charles R. Weirich
Research Associate[3]

1/ Retired 12/31/86
2/ Appointed 01/20/86
3/ Resigned 07/15/86

Suzan S. Croughan - - - - - - - - - - - - - - - - - Forage Crops Tissue Culture
Assistant Professor

Karen M. Hebert[4/]
Research Associate

Timothy P. Croughan - Rice Tissue Culture
Associate Professor

Mona M. Pizzolatto
Research Associate

Dannell B. Trumps
Lab Tech Asst-Agribu

Richard T. Dunand - Rice Physiology
Associate Professor

Raymond R. Dilly, Jr.
Research Associate

Gregory A. Meche
Research Associate

Wayne C. Faulk - Farm Manager
Instructor

Brian D. Broussard
Research Farm Supervisor II

Jeffery L. Jackson
Research Farm Specialist II

Timothy C. Miller
Ag Lab Assistant

Randal K. Morgan
Ag Lab Assistant

Ronald J. Pellerin
Ag Lab Assistant

Ovrilien J. Primeaux
Farm Research Supervisor I

Oday Sonnier
Research Farm Specialist II

Andrus Stutes
Research Farm Specialist II

Kenneth J. Trahan
Ag Lab Assistant

4/ Appointed 01/13/86

James L. Griffin - Soybean Research
Associate Professor

Robert J. Habetz
Research Associate

Ronald P. Regan
Research Associate

Donald E. Groth - Plant Pathology
Assistant Professor

Marty J. Frey
Research Associate

Joseph Nugent
Farmer I

Kent S. McKenzie - Rice Breeding
Associate Professor

Honey L. Clayton[5/]
Farmer I

Keith Collins[6/][7/]
Research Associate

Andre P. Fabacher[8/]
Research Associate

Robert J. Guidry[9/]
Lab Tech Asst-Agribu

Farman Jodari
Instructor

Rosemary Pollingue[10/]
Ag Lab Assistant

M. Fred Miller - Rice Processing
Assistant Professor

5/ Resigned 05/23/86
6/ Appointed 01/01/86
7/ Transferred to Northeast Research Stn. 09/15/86
8/ Appointed 11/10/86
9/ Appointed 10/13/86
10/ Resigned 04/30/86

Elaine M. Nowick - Rice Genetics
Assistant Professor

Herman L. Hoffpauir
Ag Lab Assistant

Donnie R. Stutes - Shop
Farm Research Supervisor II

James J. Borne
Maintenance Repairman II

Melvin Lawrence
Maintenance Repairman II

Sidney J. Dugar
Laborer - Farming

John F. Robinson - Rice Insects
Research Entomologist (USDA)

Robert J. Michot
Research Associate

George B. Trahan
Agricultural Research Technician (USDA)

Ralph N. Webster
Agricultural Research Technician (USDA)

Lawrence M. White, III - Foundation Seed Rice
Research Associate

T. Wayne White - Animal Science
Professor

Gerardo R. Romero
Research Associate

B. Keith Guillory
Farm Research Supervisor I

E. Allen Wilson - Bird Control in Rice
Research Associate

Cooperating personnel responsible for research projects at the Rice Station include the following campus staff.

John B. Baker--------------------------Weed Control
Plant Pathology & Crop
Physiology Department
Louisiana State University

Gerard T. Berggren, Jr.----------------Soybean Diseases
Plant Pathology & Crop
Physiology Department
Louisiana State University

Marc A. Cohn---------------------------Red Rice Control
Plant Pathology & Crop
Physiology Department
Louisiana State University

Seth M. Dabney-------------------------Rice Research
Agronomy Department
Louisiana State University

Marcus M. Eichhorn, Jr.----------------Forage Crops
Hill Farm Research Station

Steve A. Harrison----------------------Wheat Research
Agronomy Department
Louisiana State University

Bob G. Harville------------------------Wheat Research
Agronomy Department
Louisiana State University

F. Glen Hembry-------------------------Beef Cattle
Animal Science Department
Louisiana State University

Bert J. Hoff---------------------------Rice Genetics
Agronomy Department
Louisiana State University

Seth J. Johnson------------------------Insect Control
Entomology Department
Louisiana State University

Lynn M. Kitchen------------------------Weed Control
Plant Pathology & Crop
Physiology Department
Louisiana State University

Kenneth L. Koonce----------------------Experimental Statistics
Experimental Statistics Department
Louisiana State University

George D. Lindberg---------------------Rice Diseases
Plant Pathology & Crop
Physiology Department
Louisiana State University

Sharron S. Quisenberry-----------------Forage Insect Control
Entomology Department
Louisiana State University

Milton C. Rush-------------------------Rice Diseases
Plant Pathology & Crop
Physiology Department
Louisiana State University

Joseph E. Sedberry, Jr.----------------Soil Chemistry
Agronomy Department (Minor Elements)
Louisiana State University

C. Michael Smith-----------------------Rice Insects
Entomology Department
Louisiana State University

Thomas P. Zacharias--------------------Economics
Agricultural Economics Department
Louisiana State University

The Rice Station is especially indebted to Mr. H. F. Morris, Jr., Feed and Fertilizer Laboratory, for the chemical analysis of research samples. Dr. Kenneth L. Koonce, Department of Experimental Statistics, and his staff aided in the research program through their help in the planning and statistical analysis of research data.