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›Wells‹ - A Summary of Research and Management Recommendations

Wells (RU9601053) is a high yielding, long grain rice variety developed and released by the University of Arkansas Agricultural Experiment Station in February 1999. Wells is a short statured variety with excellent grain yield potential and average head rice yield. Wells originated from the cross ›Newbonnet‹/3/‹Lebonnet‹/CI9902//‹Labelle‹ which was first made in 1989 . Wells was named in honor of the late Dr. Bobby Wells. Wells like ›Drew‹ will be protected under the 1994 Plant Variety Protection Act. The University of Arkansas is also seeking a utility patent for Wells.

Foundation seed was produced in 1998 at the Rice Research & Extension Center (RREC), located near Stuttgart, AR. In 1999, 550 cwt of Foundation seed were distributed to seed growers for production. Registered seed will be available in 2000. Based on general estimates of seed production, about 70,000 acres of Wells could be planted in 2000.

Research on rice variety development and management in Arkansas is made possible by rice grower check-off funds administered by the Arkansas Rice Research and Promotion Board.

AGRONOMIC TRAITS AND YIELD COMPARISONS

Yield comparisons from the Uniform Regional Rice Nursery (URRN) and Arkansas Rice Performance Trials (ARPT) show that Wells has excellent yield potential in all mid-south rice growing states (Tables 1 - 3). Head rice yields of Wells have been slightly better than ›LaGrue‹ in most of these tests but below that of ›Cypress‹ and Drew. Due to average head rice yield, moderate resistance to kernel smut, and a tendency for higher total rice yield than other varieties, Wells should be an excellent variety for parboiling.

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Harvest grain moisture does effect the head rice yield of Wells. Data collected in "time of harvest studies" conducted at the RREC in 1999 suggest that as grain moisture declines the head rice yield of Wells also declines (Table 4) . For obtaining good head rice yield, grain moisture at harvest is very critical. This is especially true for very early planting dates when rice heads during July and matures in early August when grain moisture can decline rapidly. For optimum head rice yield Wells should be harvested when grain moisture is 16 to 22%.

Date of seeding studies conducted at the RREC during 1998 and 1999 suggest that Wells' yield potential is stable across a wide range of seeding dates (Table 5). Wells produced the highest yield of conventional long grain varieties included in these studies when planted during early June in central Arkansas. Wells is blast susceptible and since blast may be more severe on late planted rice, disease susceptibility should be considered in variety selection decisions for late-planted rice. Yield data from the Missouri ARPT location also indicates Wells has good yield stability for late May and early June seeding dates in NE Arkansas (Table 3). Seeding dates for the Missouri ARPT in 1998 and 1999 were June 2 and May 28, respectively.

The number of days required to reach 50% heading varies with seeding date, weather and management. In date of planting studies, Wells headed about 2 days later than "Cocodrie" and 2 days earlier than Drew. Wells is supported by the Arkansas DD50 program. Based on 30-year weather norms and current DD50 thresholds Wells requires approximately 56 (1300 DD50 units) and 82 days (2100 DD50 units) to reach 2 inch internode elongation (IE) and 50% heading, respectively (based on Stuttgart weather data and emergence date of May 1). The number of DD50 units required to reach 2 inch IE is comparable to that of Drew and Cypress. About 26 days occur between 2 inch IE and 50% heading for Wells. Differences in crop management and environment may result in a different rate of plant development than predicted by the DD50 program.

The grain weight and seed dimensions of Wells are similar to those of LaGrue (Table 6). Based on seed weight, 96 lb/A is required to obtain 40 seed/ft^2 or 23 seed per 7 inch drill row foot. Straw strength is also similar to or slightly better than LaGrue. Wells is about 3 to 4 inches shorter than LaGrue and Drew and the leaf color is darker green. Although seedling vigor tests have not been performed, visual observations in variety studies suggest that Wells has better seedling vigor than all commonly grown varieties. Others have also noted that Wells has an excellent root system and tillering ability and thus, should perform well at low stand densities. Use of fungicide and/or gibberellic acid seed treatments are advised when seeding at reduced rates, early seeding dates, poor seedbed conditions, no-till seedbeds, and on clay soils. Results from a 1999 survey of Wells seed growers supports research observations on seedling vigor and yield potential at low seeding rate/stand density (Table 7). Of the 18 responses returned, 17 growers indicated they would plant Wells in future years.

FERTILIZATION

The recommended nitrogen (N) rate for Wells grown on silt and sandy loam soils following soybean in rotation is ***150 lb N/A*** (Table 8). This recommendation is for N applied in a 2 or 3-way split application where 90 lb N/A is applied preflood and followed by 60 lb N/A at midseason. The midseason N can be applied as a single application. The total and preflood N rate should be increased

by 30 lb N/A for rice grown on clay soils. Wells has good straw strength, thus the preflood N rate should be increased by another 30 lb N/A (120 and 150 lb N/A preflood for silt loam and clay soils, respectively) for use of the AOptimum Preflood Method@ (OPM) (formerly single preflood, SPF).

Thresholds (listed below) for the plant area board are tentatively set like those for semi-dwarf varieties for the 2000 growing season. Plant area thresholds may change with additional research so check with your local county Extension office for updated recommendations.

Midseason Plant Area, cm^2	**Midseason N Rate, lb N/A**
> 750	0
650-750	30
550-650	60
< 550	90

Limited data is available to suggest how Wells will perform on high pH and salt affected soils in relation to other varieties. Follow University of Arkansas soil test recommendations for phosphorus, potassium and zinc fertilizer rate recommendations.

PEST MANAGEMENT

Wells has not shown sensitivity to registered herbicides when applied at the labeled rates and times. Always read the pesticide label to ensure that specific varieties are not excluded and/or included for each herbicide. For example, Wells and most other current varieties are not included in the A*WHIP 360 Herbicide can be applied only to the following varieties:*@ statement on recent Whip labels.

Based on peck damage taken from the ARPT, Wells is slightly more susceptible to rice stink bug damage when compared to Drew and LaGrue (Table 2). Wells is rated as ***moderately resistant*** to kernel smut which is the best rating of current recommended varieties (Table 9). Disease trials conducted during 1999 show that Wells is one of the most susceptible conventional long grain varieties to false smut and is therefore rated as ***susceptible***. Straighthead trials show that Wells suffered approximately 28% yield reductions to straighthead during 1999. In comparison, ›Jefferson=, Drew, Cypress, and Cocodrie yield losses to straighthead were 17, 42, 45, and 94%, respectively. Wells is rated as ***moderately susceptible*** to sheath blight. Fungicide applications may be warranted when sheath blight incidence (% positive stops) reaches 50% 7 to 14 days after 2 inch IE.

Wells is very susceptible to common races of blast with an overall rating as ***susceptible***. Blast susceptibility of Wells is comparable to that of LaGrue. The predominate two blast races currently found in Arkansas are IC-17 and IB-49. Growers are encouraged to carefully select fields intended for growing Wells due to its susceptibility to blast. The most critical factor in managing potential blast problems on Wells or LaGrue is ability to keep the field flooded at a 4 inch depth until time to drain for harvest.

ADDITIONAL INFORMATION SOURCES

University of Arkansas Cooperative Extension Service Web www.uaex.edu

- Rice Information Sheet No. 141
- Rice Information Sheet No. 143

University of Arkansas Agricultural Publications
http://www.uark.edu/depts/agripub/Publications/

- B.R. Wells Rice Research Studies 1998 & 1999

Table 1. Grain yield and milling data collected from the 1996-1998 Uniform Regional Rice Nursery (URRN - Arkansas, Louisiana, Mississippi, and Texas) for Wells and selected other varieties.

Variety	**Grain Yield (bushels/Acre)[1]**					**Milling Yield (%HR-TR)[2]**				
	AR	**LA**	**MS**	**TX**	**Avg.**	**AR**	**LA**	**MS[3]**	**TX**	**Avg.**
Wells	185	205	170	203	191	65-74	58-70	54-71	52-67	58-70
LaGrue	172	214	177	183	186	61-71	63-67	60-70	43-63	54-68
Drew	154	198	163	172	172	65-72	62-69	60-70	56-66	61-69
Cypress	160	189	156	174	170	65-71	64-70	61-70	58-67	62-69

1 Grain Yield is reported at 12% moisture
2 Milling yield is expressed as percent head rice (HR) and total rice (TR).
3 Milling data from Mississippi is a two year average for 1997 and 1998.

Table 2. General agronomic characteristics of Wells and selected varieties as determined in the Arkansas Rice Performance Trials 1997 - 1999.

Variety	50% Heading	Plant Height	Straw Strength	Kernel Damage[1]		Grain Yield	Milling Yield	Seed Weight (rough)
				Pecky	Smut			
	days	in	rating	%		bu/A	HR-TR	mg
Wells	86	41	3	1.55	0.035	164	60-74	25.1
LaGrue	86	44	3	0.98	0.144	168	63-72	25.1
Cocodrie	82	38	2	1.95	0.116	156	66-73	22.0
Cypress	87	37	2	1.41	0.127	146	67-73	23.7
Drew	88	45	4	1.15	0.042	159	63-71	21.7

1 Kernel damage from stink bug damage (pecky) and kernel smut are the average of 1998 and 1999 data for Cocodrie. All other varieties are the three year average for 1997-1999.

Table 3. Performance of Wells and selected other varieties from the ARPT located at the Missouri Rice Research Station, near Glennonville, MO during 1998 and 1999.

Variety	50% Heading		Avg. Plant Height	Grain Yield		
	1998	1999		1998	1999	Avg
	days		in	bu/A		
Wells	85	72	33	103	153	128
LaGrue	87	72	34	70	158	114
Cocodrie	84	71	29	139	190	165
Cypress	89	78	29	123	141	132
Kaybonnet	89	75	34	88	165	127
Drew	88	77	34	103	129	116

Table 4. Effect of harvest moisture on Wells head rice and total rice yield from two planting dates at the RREC.

Harvest Time[1]	April 13 Planting Date			Harvest Time[1]	May 10 Planting date		
days	Moisture	%HR	% TR	days	Moisture	%HR	% TR
33	20.6	52	71	33	27.7	60	69
37	19.6	48	71	37	21.1	60	71
38	19.0	47	71	38	22.1	59	71
42	17.7	44	71	42	21.8	60	71
43	14.1	40	71	43	15.3	59	72
47	13.7	39	70	47	12.1	53	72

1 Time of harvest is days after 50% heading. Data are means of the check plots (no sodium chlorate applied) from sodium chlorate studies

Table 5. Yield Performance of Wells and selected other varieties in date of seeding studies conducted during 1998 and 1999 at the RREC.

Variety	Yield, 1998 Seed Date				Yield, 1999 Seed Date				
	April 6	May 11	June 11	1998 Avg.	April 13	May 10	May 27	June 10	1999 Avg
	bu/A[1]								
Wells	137	158	138	144	190	182	164	157	173
Cocodrie	142	139	123	135	198	182	172	146	175
Drew	133	158	132	141	181	164	151	152	162
Jefferson	115	135	109	120	180	160	147	130	154
Priscilla	128	146	95	123	185	179	165	141	168

1 Grain yield adjusted to 12% moisture.

Table 6. Kernel dimensions[1] of Wells and LaGrue.

Kernel Class	Length, mm	Width, mm	Thickness, mm	Length/Width Ratio
Wells-Rough	9.46	2.31	1.80	4.10
Wells-Brown	7.34	2.05	1.63	3.58
Wells-Milled	7.00	1.94	1.51	3.61
LaGrue-Rough	9.36	2.58	1.96	3.63
LaGrue-Brown	7.43	2.21	1.77	3.36
LaGrue-Milled	7.07	2.13	1.70	3.32

1 Dimensions of other common varieties listed in Rice Information Sheet No. 122.

Table 7. Results of 1999 seed grower survey for Wells.

Responses Returned	18		
Acres Represented	665		
Average Grain Yield @ 12% moisture	165.7 bushel/Acre (12% moisture)		
Yield Range, bu/A	143 - 183		
Avg. Head Rice % (6 of 18 responses)	57.3		
Avg. Total Rice % (6 of 18 responses)	70.0		
Avg. Seed Rate (range)	57 lb/A (28 - 113 lb/A)		
Seedling Vigor	**Excellent - 15**	**Good - 3**	**Avg - 0**
Threshing at Harvest	**Easy - 9**	**Avg - 9**	**Hard - 0**
Lodging	1 of 18 (< 1%)		
Average N Rate lb/A	170 (100 - 327 lb N/A)		
Blast Found; 2 of 18 (foliar only)	Sheath Blight Rating; Light-Moderate		
False Smut Found; 4 of 18	Kernel Smut Found; 3 of 18		
Fungicide Applied to Field; 5 of 18			

Table 8. Wells grain yield response to nitrogen fertilizer rate and method of application from variety × nitrogen rate studies conducted in 1998 and 1999. The N rate producing the highest yield is printed in bold type.

N Rate	RREC (DeWitt silt loam)				SEREC (Perry clay)			
	1998[1]		1999		1998[1]		1999	
lb N /Acre	SPF[2]	2-WS[3]	SPF	2-WS	SPF	2-WS	SPF	2-WS
0	70		89		72	74	42	37
60	128	96	154	141	147	118	109	91
90	163	102	**182**	165	170	141	150	124
120	**190**	146	179	178	174	156	165	156
150	193	175	164	**180**	**193**	169	193	183
180	189	**194**	164	170	179	**183**	**200**	**189**

1 Source: B.R. Wells Rice Research Studies 1998, Research Series 468.

2 SPF, a single preflood N application of the listed N rate (OPM, Optimum Preflood Method)

3 2-WS, conventional 2-way split N application where preflood-midseason split for each N rate was applied as 60 (30-30), 90 (45-45), 120 (60-60), 150 (90-60), and 180 (120-60).

Table 9. Disease rating[1] for Wells and selected other long grain varieties for common diseases.

Variety	Sheath Blight	Blast[2,3]					SH[3]	Kernel Smut	False Smut
		IG-1	IH-1	IC-17	IB-49	Mean			
Wells	MS	1	1	7	7	S	MS	MR	S
LaGrue	MS	6	5	5	6	S	MS	VS	S
Drew	MS	1	1	2	1	R	MS	MS	S
Cypress	VS	3	1	2	1	MR	MS	VS	S

1 Letter Ratings; R, resistant,; MR, moderately resistant; MS, moderately susceptible; S, susceptible; VS, very susceptible

2 Numerical rating on a scale of 0 (none) to 9 (highly susceptible)

3 SH, straighthead