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'Cocodrie' - A Summary of Research and Management Recommendations

Cocodrie (RU9502008) is a high yielding, long grain rice variety developed and released by the Louisiana State University Agricultural Experiment Station in 1998. Cocodrie is a semi-dwarf variety with excellent grain and head rice yield potential. Cocodrie originated from the cross Cypress//L-202/Tebonnet made in 1990. Cocodrie has typical U.S. long grain cooking qualities, an apparent starch amylose content of 22.1% and an intermediate gelatinization temperature (70 to 75°C).

Cocodrie was entered into the Arkansas foundation seed program during 1999 at the Rice Research & Extension Center (RREC), located near Stuttgart, AR and foundation seed was made available to Arkansas seed growers in 2000. In 1999, Cocodrie was seeded on about 0.1, 6.5, 1.0% of the Arkansas, Louisiana, and Texas rice acreage, respectively. In 2000, Cocodrie was seeded on about 16% of the Arkansas rice acreage. *Research on rice management and yield performance 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 for Cocodrie and other popular mid-south rice varieties from the Uniform Regional Rice Nursery (URRN) and Arkansas Rice Performance Trials (ARPT) show that Cocodrie has excellent yield potential in all mid-south rice growing states (Tables 1 - 3). The head rice yield potential of Cocodrie has been similar to Cypress in most of these tests.

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Date of seeding studies conducted at the RREC from 1998 to 2000 suggest that Cocodrie yield potential is stable across a wide range of seeding dates (Table 5). Yield data from the Missouri ARPT location also indicates Cocodrie 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. Cocodrie has consistently produced higher yields than Cypress in most yield trials throughout the mid-south.

The number of days required to reach 50% heading varies with seeding date and management. Some studies have suggested that Cocodrie heads about five days before Cypress,. However, date of planting studies show that Cocodrie heads about 2 days earlier than Drew and Cypress. Cocodrie is supported by the Arkansas DD50 program. Based on 30-year weather norms and current DD50 thresholds Cocodrie requires approximately 49 (1100 DD50 units) and 81 (2100 DD50 units) days to reach ½ inch internode elongation (IE) and 50% heading, respectively (based on Stuttgart weather data and emergence date of May 1). Cocodrie requires a relatively short time to reach ½ inch IE compared to other varieties. In contrast, the time between ½ inch IE and 50% heading is longer. About 32 days occur between ½ inch IE and 50% heading. The short vegetative growth stage is important since management practices like draining and drying for straighthead prevention and herbicide application must be performed very quickly. Equally important is the long period from internode elongation to heading in relation to sheath blight management. Differences in crop management and environment may result in a different rate of plant development than that predicted by the DD50 program.

The grain weight and seed dimensions of Cocodrie are similar to those of Cypress (Table 6). Based on seed weight, 90 lb/A is required to obtain 40 seed/ft² or 23 seed per 7 inch drill row foot. Straw strength, plant height and leaf color are similar to that of Cypress. Although seedling vigor tests have not been performed, visual observations in variety studies suggest that Cocodrie has good seedling vigor for a semi-dwarf and is comparable to Cypress. Use of fungicide and/or gibberillic acid seed treatments are advised when seeding at reduced rates, early seed dates, poor seedbed conditions, no-till seedbeds, and on clay soils.

Results from a 1999 survey of Cocodrie 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 Cocodrie in future years.

Seeding rate studies were conducted at the RREC with Cocodrie and Wells during 2000. Data shows that both varieties produce excellent yields at uniform stand densities ranging from 3 to 30 seedlings per row ft (approx. 5 to 50 seedlings per sq ft) (Table 8). In this study, nitrogen fertilizer rate was the same for all seeding rates.

FERTILIZATION

The recommended nitrogen (N) rate for Cocodrie grown on silt and sandy loam soils following soybean in rotation is **150 lb N/A** (Table 9). This recommendation is for N applied in a 2 or 3-way split application where 90 lb N/A is applied pre-flood and

followed by 60 lb N/A at midseason. The midseason N can be applied as a single application. The total and pre-flood N rate should be increased by 30 lb N/A for rice grown on clay soils. Cocodrie has good straw strength, thus the pre-flood N rate should be increased by another 30 lb N/A (120 and 150 lb N/A pre-flood for silt loam and clay soils, respectively) for use of the “Optimum Preflood Method (OPM) (formerly single pre-flood, SPF). Growers should be aware that Cocodrie reaches midseason (green ring and ½ inch IE) about 5 to 7 days faster than most other varieties. Thus, the plant size of Cocodrie at midseason may be somewhat smaller compared to other varieties. Use of the “Optimum Preflood Method” is highly encouraged for this variety.

Use of the plant area board is different for Cocodrie compared to other varieties. First measurements should be made at ½ inch internode elongation instead of green ring. This change was made to accommodate the short vegetative growth interval of Cocodrie. Plant area measurements in nitrogen rate trials showed that differences in plant area among pre-flood N rates was best evaluated at ½ inch IE. Apparently pre-flood N was still being taken up at the beginning of internode elongation. Because midseason plant area measurement is recommended at ½ inch IE instead of BIE, N applications made earlier than ½ inch IE may result in erroneous plant area measurements. Therefore, if the plant area method is used to assess Cocodrie midseason N needs delay application until ½ inch IE.

<u>Midseason Plant Area, cm²</u>	<u>Midseason N Rate, lb N/A</u>
> 750	0
650-750	30
550-650	60
< 550	90

Limited data is available to suggest how Cocodrie 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

Cocodrie 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, Cocodrie and most other current varieties are not included in the “*WHIP 360 Herbicide can be applied only to the following varieties.*” statement on recent Whip labels.

Based on peck damage taken from the ARPT, Cocodrie is more susceptible to rice stink bug damage than Cypress or Drew (Table 2). Cocodrie is rated **very susceptible** to kernel smut (Table 10). Varieties rated as very susceptible to kernel smut may require a preventative application of Tilt fungicide to reduce/prevent yield and quality losses from kernel smut. Cocodrie is rated as **susceptible** to false smut. Straighthead trials show that Cocodrie is **very susceptible** to this disorder and should not be planted in fields with severe straighthead history and should be drained and dried for prevention in fields with any history of straighthead. Cocodrie suffered approximately 90% yield reduction to straighthead in studies conducted during 1999 and 2000 at the RREC. In comparison, Jefferson, Wells, Drew, and Cypress yield

losses to straighthead were 17, 28, 42, and 45%, respectively. Cocodrie is classified as **very susceptible** to sheath blight. Fungicide applications may be warranted when sheath blight incidence (% positive spots) reaches 50% between 7-14 days after ½ inch IE. Cocodrie is very susceptible to some races of blast with an overall rating of **moderately susceptible**.

Field observations made during the 2000 growing season suggest that Cocodrie may be more susceptible to blast than Cypress and that caution should be exercised when selecting fields for this variety.

ADDITIONAL INFORMATION SOURCES

- Univ. of Arkansas Cooperative Extension Service Web www.aragriculture.org
 S Rice Information Sheet No. 141
 S Rice Information Sheet No. 143
 S Rice Information Sheet No. 145
University of Arkansas Agricultural Publications <http://www.uark.edu/depts/agripub/Publications/>
 S B.R. Wells Rice Research Studies 1998 & 1999
Louisiana State University <http://www.agctr.lsu.edu/wwwac/rice/RiceHome.html>

Table 1. Grain yield and milling data collected from the 1997-1999 Arkansas Rice Performance Trials (ARPT) and Uniform Regional Rice Nursery (URN - Arkansas, Louisiana, Mississippi, and Texas) for Cocodrie and selected other varieties.

Variety	Grain Yield (bushels/Acre)					Milling Yield (%HR-TR) ¹				
	AR	LA	MS	TX	Avg.	AR	LA	MS	TX	Avg.
Cocodrie	173	209	167	163	178	61-71	60-69	52-67	55-67	57-68
Wells	184	200	173	186	186	62-73	58-70	44-69	52-67	54-70
Jefferson	151	168	153	155	157	57-71	61-72	52-66	54-67	56-69
Drew	164	196	159	156	169	62-71	62-70	54-69	55-66	58-69
Cypress	165	183	148	154	163	64-71	65-70	60-69	58-68	61-69

1 Milling yield is expressed as percent head rice (HR) and total rice (TR).

Table 2. General agronomic characteristics of Cocodrie 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
Cocodrie	82	38	2	1.95	0.116	156	66-73	23.5
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
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 stinkbug 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 Cocodrie and selected other varieties from the ARPT located at the Missouri Rice Research Station, near Glennonville, MO during 1998 and 1999.

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

Table 4. Yield Performance of Cocodrie and selected other varieties in date of seeding studies conducted during 1998 and 1999 at the RREC.

Variety	1998 Seed Date ¹				1999 Seed Date ²					2000 Seed Date ²				
	April 6	May 11	June 11	1998 Avg.	April 13	May 10	May 27	June 10	1999 Avg	March 31	April 19	May 16	June 13	2000 Avg.
	Bushels/A @ 12% moisture													
Cocodrie	142	139	123	135	198	182	172	146	175	186	205	150	135	168
Wells	137	158	138	144	190	182	164	157	173	183	193	153	124	164
Drew	133	158	132	141	181	164	151	152	162	183	163	149	124	153
Jefferson	115	135	109	120	180	160	147	130	154	--	--	--	--	--
Priscilla	128	146	95	123	185	179	165	141	168	184	166	172	122	161

1 100 lbs N/A applied as a single pre-flood application.

2 130 lbs N/A applied as a single pre-flood application.

Table 5. Kernel dimensions of Cocodrie¹ and Cypress².

Kernel Class	Length, mm	Width, mm	Thickness, mm	Length/Width Ratio
Cocodrie-Rough	9.33	2.52	1.94	3.70
Cocodrie-Brown	7.14	2.20	1.77	3.25
Cocodrie-Milled	7.10	2.17	1.74	3.27
Cypress-Rough	9.27	2.47	2.01	3.76
Cypress-Brown	7.27	2.27	1.81	3.20
Cypress-Milled	7.00	2.20	1.71	3.18

1 Cocodrie kernel dimensions taken from Linscombe et al., 2000. Crop Science 40(1): 294.

2 Dimensions of other common varieties listed in CES Rice Information Sheet No. 147.

Table 6. Results of 1999 seed grower survey for Cocodrie.

Responses Returned	17		
Acres Represented	1996		
Average Grain Yield @ 12% moisture	164.3 bushel/Acre (12% moisture)		
Yield Range, bu/A	134 - 199		
Avg. Head Rice % (8 of 17 responses)	60		
Avg. Total Rice % (8 of 17 responses)	69		
Avg. Seed Rate (range)	92 lb/A (60 - 135 lb/A)		
Seedling Vigor	Excellent - 7	Good - 9	Avg -1
Threshing at Harvest	Easy - 11	Avg - 5	Hard - 1
Lodging	1 of 17 (< 1%)		
Average N Rate lb/A	189 (140 - 218 lb N/A)		
Blast Found; 1 of 17 (foliar only)	Sheath Blight Rating; Moderate-Severe		
False Smut Found; 6 of 17	Kernel Smut Found; 5 of 17		
Fungicide Applied; 11 of 17			

Table 7. Influence of seeding rate on Cocodrie and Wells grain yield and milling quality during 2000 at the Rice Research Extension Center near Stuttgart, AR.

Seed Rate ¹	Cocodrie			Wells		
	Stand Density ²	Grain Yield	Milling Yield	Stand Density	Grain Yield	Milling Yield
	per row ft	bu/A	% HR-TR	per row ft	bu/A	% HR-TR
8	5	185	54 - 66	4	171	47 - 68
15	13	194	56 - 67	11	171	45 - 68
23	15	190	56 - 67	16	180	50 - 69
31	19	188	56 - 66	21	181	47 - 68
39	25	186	57 - 68	27	175	50 - 69
Average	15.5	187	57 - 67	15.6	175	48 - 69

1 Seeding rates were approximately 30, 60, 90, 120, and 150 lbs/A and correspond to 13, 26, 40, 53, and 60 seed per sq ft, respectively.

2 Rows spacings were 7 inches.

Table 8. Cocodrie grain yield response to nitrogen fertilizer rate and method of application from variety x 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 /A	SPF ²	2-WS ³	SPF	2-WS	SPF	2-WS	SPF	2-WS
	bushels per Acre							
0		106		75	80	66	80	89
60	142	117	166	149	128	126	127	147
90	160	135	180	154	146	137	149	159
120	178	143	177	168	153	143	190	172
150	176	153	182	183	160	151	206	157
180	172	171	170	186	173	164	197	206

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 rating¹ for Cocodrie and selected other long grain varieties for common diseases.

Variety	Sheath Blight	Blast	Straighthead	Kernel Smut	False Smut
Cocodrie	VS	MS	VS	VS	S
LaGrue	MS	S	MS	VS	S
Wells	MS	S	MS	MR	S
Drew	MS	R	MS	MS	S
Cypress	VS	MR	MS	VS	S

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