

TECHNICAL NOTES

COFFEEVILLE PLANT MATERIALS CENTER

No. 1

Coffeeville, Mississippi

1990

INITIAL EVALUATION OF BEAKED PANICUM (1984-1988)

Abstract

An assembly of 91 accessions of beaked panicum (*Panicum anceps* Michx.) was evaluated from 1984 through 1988 at the Coffeeville Plant Materials Center (PMC). Comparative evaluations were made for vigor, forage production, seed abundance, and resistance to insects, diseases, and drought. Several accessions performed well in one or more categories, but the three accessions that were rated significantly better ($p = 0.05$) in all four categories were 9002928 (KY-898), 9028349, and 9028510. These three were selected as candidates for advanced evaluation.

Introduction

Beaked panicum is a perennial, warm season bunchgrass which occurs from New Jersey to Kansas and southward to Texas and Florida. It grows on both dry and moist sites in either sunny or shaded locations. It is valuable for forage production, wildlife food, and erosion control. It appears to be well suited for erosion control in bare areas associated with logging operations within forests. Other areas for potential use are mine spoils and other disturbed sites.

Recognizing the potential of beaked panicum for surface mine stabilization and forage production for shallow, droughty hillside pastures low in fertility, the Quicksand (KY) PMC evaluated an assembly from 1968 to 1970 (Quicksand PMC; 1969, 1970). The accession selected at Quicksand for increase and advanced testing was KY-898 (9002928) which was collected in Virginia (Gilbert, 1989). This and other accessions were obtained from Quicksand and included in the initial evaluation at Coffeeville.

Materials and Methods

Most accessions of beaked panicum assembled at the Coffeeville PMC were field collections from its primary service area, and from other plant materials centers. Of the 91 accessions planted, 44 were collected in Arkansas, 21 in Mississippi, 7 in Louisiana, and 1 each in Alabama, Oklahoma, and Tennessee. The PMC at Quicksand, Kentucky, supplied 13, and 3 more were supplied through the National PMC at Beltsville, Maryland.

Because a problem of poor and slow germination of seeds collected earlier, some accessions were subjected to different chemical, temperature, and storage treatments prior to planting. The simplest and only treatment considered necessary to enhance germination was cold stratification (Coffeeville PMC, 1983). This resulted in seeds of some accessions being

conditioned in a damp mixture of 50 percent sand and 50 percent shredded peat moss on January 24, 1984. The seeds were stratified at about 40° F until planted on May 30, 1984.

The test site was a field of Oaklimeter sil, (0-2 percent slope) that had been fertilized with 13-13-13 at a rate of 400 pounds per acre. Rows were 6 meters long and 1 meter apart. Cultivation and hand weeding as necessary were used to control weeds. Evaluations were made periodically from 1984 through 1988 according to standard procedures described in the National Plant Materials Manual (USDA, 1984). Emphasis was placed on factors related to vigor; forage and seed production; and resistance to diseases, insects, and drought. Height and width were measured in centimeters. Other factors were rated on a scale of 1-9 with one having the best appearance.

Results and Discussion

Evaluation data are listed in Table I. Because of the great quantity of data, evaluations were grouped into four categories that were considered important for selection: 1) vigor, 2) forage abundance, 3) seed production, and 4) resistance to diseases, insects, and drought to simplify a statistical comparison. The visual rating (1-9) was subtracted from 10 to assign the highest number to the best. Then a composite score was calculated by an equation that gave higher values to accessions rated best in the individual evaluations.

The score for foliage production (FOLIAGE) was computed by dividing the product of foliage HT, WD, ABN, and UNI by 1000 to reduce the magnitude of the number for statistical simplification.

For overall appearance (VIGOR), only the early season vigor (1) entry was used because most late season vigor (2) values were not recorded.

The score for seed production (SEED) was obtained by the equation $AMT \times FILL \times UNI$ where:

- 1) AMT = Seedhead amount.
- 2) FILL = Seed fill.
- 3) UNI = Seed uniformity.

Reaction to the environmental (RESISTANCE) was the product of disease (DIS), insect (INS), and drought (DRY) tolerance. In this as in other calculations, the product was used to place more emphasis on the best evaluation ratings and make separation more definite.

The composite score data were analyzed using a randomized complete block design using years as replications. Means were separated using the Duncan's Multiple Range test. The foliage score provided the best separation with three accessions showing no significant difference ($p = 0.05$) from each other. The three accessions with the best scores for foliage were:

- 9002928 - Collected in Virginia and selected by the Quicksand PMC.
- 9028349 - Collected in Jefferson County, AR, by Artis Mendenhall.
- 9028510 - Collected in Wayne County, MS, by James Wolfe.

These three also were not significantly different from the highest in the other three groups. Ranking of the best accessions in each group is given in Table II.

Although accession 9028510 ranks higher than the other two at Coffeenville, there is no evidence that it would perform equally well in the area of the Quicksand PMC. The data of Table I show that the northern most ecotypes matured about 2 months earlier than those collected in the south. Additional testing may determine if the performance is affected by geography. Since a market for beaked panicum would probably not be great enough to justify release of more than one cultivar, the accession with the greatest range of adaptation should be considered.

Conclusion

In the initial evaluations of beaked panicum at the Coffeenville PMC, only three accessions ranked among the highest in four categories: 1) foliage production, 2) vigor, 3) seed production, and 4) resistance to diseases, insects, and drought. The species has potential for wide use in the eastern United States, but currently the market would probably not justify the release of more than one cultivar. Therefore, extensive testing is needed to determine which accession would have the widest application.

References

Coffeenville PMC. 1983. Unpublished data.

Gilbert, Charles F. 1989. Personal Correspondence.

Quicksand PMC. 1969. Annual Technical Report.

_____. 1970. Annual Technical Report.

USDA. 1984. National Plant Materials Manual. Title 190.

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
434,164	84	0	7	0	10	25	7	7								2
434,165	84	0	7	0	20	30	5	3								2
434,166	84	0	0													
434,167	84	0	0													
	85	0	0													
	86	0	0													
AVERAGE		0	0													
9,002,928	84	100	2	1	50	70	1	1	110	1	1	1	10/01	1	1	1
	85	100	1		85	170	1	1		2	1	1	08/05	1	1	
	86	100	2	2	65	100	2	1	100	2	4	2	07/27	1	1	2
	87	100	1		65	110	1	1	135	2	1	2	08/15	1	1	1
	88	100	1		60	90	2	1						1	1	1
AVERAGE		100	1	2	65	108	1	1	115	2	2	2	08/17	1	1	1
9,016,955	84	90	4	4	20	20	5	3	80	3	1	2	10/18	1	2	1
	85	100	3		70	150	2	2		2	3	3	07/22	1	1	
	86	100	1	3	70	120	3	3	110	2	1	3	07/17	2	1	3
	87	100	2		65	110	1	2	105	3	1	1	08/15	1	1	1
	88	100	3		60	85	3	3						1	1	3
AVERAGE		98	3	4	57	97	3	3	98	2	2	2	08/18	1	1	2
9,016,956	84	0	0													
9,016,957	84	0	0													
9,021,712	84	100	3	3	35	60	3	1	90	3	1	1	10/04	1	2	1
	85	100	2	2	70	110	1	1		3	1	1	09/20	1	1	
	86	100	2	2	60	90	2	3	115	2	1	3	07/27	3	1	1
	87	100	2		95	110	2	2	125	3	1	2	08/18	1	1	1
	88	100	2		75	100	2	1						1	1	1
AVERAGE		100	2	2	67	94	2	2	110	3	1	2	09/01	1	1	1
9,028,241	84	35	5	5	40	25	5	3	80	5	3	3	11/13	1	1	3
9,028,244	84	70	4	3	45	70	3	3	60	2	1	1	11/08	1	1	4
	85	95	2	3	65	130	2	3		3	1	3	10/07	1	1	
	86	100	2	3	60	100	2	1	80	5	1	1	10/21	1	1	3
	87	100	4		45	85	3	2	75	5	2	4	10/28	1	1	3
	88	95	4		30	40	5	2					11/10	1	1	5
AVERAGE		460	3	3	49	85	3	2	72	4	1	2	10/27	1	1	4

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD HEIGHT	SEED			MATURE DATE	RESISTANCE			
			1	2	HT	WD	ABN	UNI		AMT	FILL	UNI		DIS	INS	DRY	
9,028,246	84	0	0														
9,028,251	84	0	0														
9,028,253	84	90	5	5	25	45	4	5	65	4		3	10/25	1	3	4	
	85	95	2	3	60	140	2	3		2	1	3	08/28	1	1	3	
	86	100	2	4	55	85	3	4	105	5	2	5	08/19	1	1	4	
	87	100	3		50	85	3	3	130	3		5	09/05	1	1	1	
	88	100	5		40	60	4	4						1	1	5	
AVERAGE		97	3	4	46	85	3	4	100	4	2	4	09/11	1	1	3	
9,028,258	84	95	4	4	55	60	2	3	75	5	3	5	10/23	1	1	5	
	85	100	2	3	60	160	2	1		2	1	3	10/07	1	1	2	
	86	100	2	4	70	105	2	1	100	7	4	5	09/19	2	1	4	
	87	100	3		60	95	3	2	90	6	1	3	09/05	1	1	4	
	88	100	5		45	50	4	4						1	1	6	
AVERAGE		99	3	4	59	94	3	2	88	5	2	4	09/29	1	1	4	
9,028,263	84	20	3	2	60	70	1	1	90	2	1	1	10/22	1	1	1	
	85	40	3	3	70	130	3	5		2	3	3	10/07	1	1		
	86	80	3	3	65	90	3	5	90	2	1	3	10/21	2	1	3	
	87	80	4		60	75	4		110	1	1	2	09/25	1	1	3	
	88	85	4		55	65	3	4						1	1	5	
AVERAGE		61	3	3	62	86	3	4	97	2	2	2	10/11	1	1	3	
9,028,271	84	50	5	5	25	25	5	3	70	6	1	4	10/15	1	3	1	
	85	75	3		70	130	3	3		3	1	4	07/22	1	1		
	86	80	2	3	55	90	3	4	90	3	1	4	07/27	2	1	3	
	87	80	2		65	110	3	3	115	5	1	3	09/05	1	1	1	
	88	95	3		60	100	2	2						1	1	1	
AVERAGE		76	3	4	55	91	3	3	92	4	1	4	08/25	1	1	2	
9,028,274	84	100	3	4	55	70	2	3	75	5	3	5	10/05	1	1	4	
	85	100	2		55	130	2	1		3	1	3	08/27	1	1	3	
	86	100	2	3	65	100	2	1	95	4	3	3	08/19	2	1	4	
	87	100	2		65	90	3	2	120	4	5	3	09/05	1	1	4	
	88	100	5		40	50	4	4					11/10	1	1	6	
AVERAGE		100	3	4	56	88	3	2	97	4	3	4	09/19	1	1	4	

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,275	84	80	4	4	25	25	4	5	85	4	1	3	11/01	1	2	1
	85	95	3		70	130	2	3		3	1	2	10/07	1	1	
	86	100	2	2	60	105	2	2	85	5	1	5	08/19	1	1	3
	87	100	2		65	100	3	2	100	3	1		09/05			2
	88	100	4		60	75	4	3						1	1	3
AVERAGE		95	3	3	56	87	3	3	90	4	1	3	09/23	1	1	2
9,028,282	84	90	4	4	25	20	4	4	75	4	1	3	11/01	1	3	1
	85	100	3		65	130	3	2		2	1	1	10/07	1	1	
	86	100	3	3	40	75	3	3	80	3	3	3	09/02	1	1	2
	87	100	3		65	90	3	1	100	1	1		09/05	1	1	3
	88	100	3		65	85	3	1						1	1	2
AVERAGE		98	3	4	52	80	3	2	85	2	2	2	09/27	1	1	2
9,028,284	84	0														
	87	85	1		95	105	2	2	150	3	0		10/13	1	1	2
	88	100	3		75	80	4	4					11/10	1	1	5
AVERAGE		62	2		85	92	3	3	150	3	0		10/27	1	1	3
9,028,290	84	100	4	4	30	25	4	3	70	5	1	3	11/01	1	2	1
	85	100	2	3	65	150	2	1		3	1	3	10/07	2	1	
	86	100	1	2	90	120	1	1	122	4	1	3	09/29	3	1	2
	87	100	2		75	100	2		95	4	1	4	10/13	1	1	3
	88	100	3		65	90	3	1						1	1	2
AVERAGE		100	2	3	65	97	2	2	96	4	1	3	10/13	2	1	2
9,028,313	84	100	4	5	20	20	4	3	70	1	1	2	10/16	1	2	1
	85	100	3	4	60	130	4	5		2	1	1	10/07	1	1	
	86	100	2	3	45	105	3	2		3	4	3	09/02	2	1	2
	87	100	2		60	100	3	2	120	3	3		10/13	1	1	2
	88	100	3		60	95	2	2						1	1	2
AVERAGE		100	3	4	49	90	3	3	95	2	2	2	10/02	1	1	2
9,028,314	84	70	5	5	25	40	5	5	35	6	1	3	10/25	1	3	4
	85	95	2	4	60	140	2	3		4	1	3	09/17	1	1	4
	86	85	2	5	60	105	2	2	95	7	3	5	09/02	2	1	5
	87	85	3		50	105	3	2	120	4	1	4	10/01	1	1	3
	88	90	5		30	60	5	3					11/15	1	1	6
AVERAGE		85	3	5	45	90	3	3	83	5	2	4	10/06	1	2	4

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AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD		VIGOR		FOLIAGE			SEEDHEAD HEIGHT	SEED			MATURE DATE	RESISTANCE		
		PCT	1	2	HT	WD	ABN	UNI		AMT	FILL	UNI		DIS	INS	DRY
9,028,316	84	5	7	7	15	15	7	3	55	8	1	3	11/01	1	3	1
	85	15	5	4	45	110	5	5		3	1	4	09/17	1	1	
	86	20	2	3	50	90	3	3	110	3	1	3	07/27	3	1	2
	87	20	3		60	100	3	3	120	4	1	1	09/05	1	1	2
	88	25	3		40	65	3	3						1	1	3
AVERAGE		17	4	5	42	76	4	3	95	5	1	3	09/10	1	1	1
9,028,332	84	90	3	3	55	45	3	3	70	4	1	3	11/05	1	2	1
	85	100	2	3	75	170	2	2		5	1	3	10/01	2	1	2
	86	100	2	3	65	100	2	2		5	2	3	09/26	5	1	3
	87	20	3		60	100	3	3	120	4	1	1	09/05	1	1	2
	88	100	3		55	95	2	2						1	1	4
AVERAGE		82	3	3	62	102	2	2	95	4	1	2	10/02	2	1	2
9,028,349	84	100	4	3	40	40	3	2		2	1	1	11/01	1	1	1
	85	100	2		85	150	2	1		2	1	1	09/10	2	1	
	86	100	1	1	70	110	1	1	100	2	4	3	09/12	2	1	2
	87	100	1		80	125	1	1	120	2	2	1	10/13	1	1	1
	88	100	2		50	110	1	1						1	1	2
AVERAGE		100	2	2	65	107	2	1	110	2	2	2	10/02	1	1	1
9,028,356	84	100	3	3	40	50	3	3	80	3	1	2	10/10	1	2	3
	85	100	2	3	50	130	1	1		5	1	5	08/12	1	1	
	86	100	2	3	55	100	3	1	115	3	5	2	07/27	3	1	4
	87	100	4		45	85	4	1	105	3	1	1	08/25			4
	88	100	5		30	80	4	1						1	1	4
AVERAGE		100	3	3	44	89	3	1	100	4	2	2	08/26	2	1	4
9,028,361	84	100	4	3	50	70	3	3	105	1	1	1	10/18	1	2	1
	85	100	2		90	130	1	1		1	1	1	08/12	1	1	
	86	100	2	2	60	95	2	2		3	4	2	08/19	2	1	1
	87	100	2		65	100	2	1	125	1	1	1	08/25	1	1	2
	88	100	3		60	95	3	2						1	1	3
AVERAGE		100	3	2	65	98	2	2	115	2	2	1	09/03	1	1	2
9,028,365	84	100	3	1	50	75	1	1	90	2	1	1	11/01	1	1	1
	85	100	2		60	140	1	1		4	1	2	09/17	1	1	
	86	100	2	2	65	100	1	1	95	5	3	3	09/02	2	1	2
	87	100	2		65	105	2	1	110	2	1	1	09/12	1	1	1
	88	100	3		60	100	2	2								2
AVERAGE		100	2	2	60	104	1	1	98	3	2	1	09/23	1	1	2

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AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,369	84	100	1	1	60	70	1	1	85	2		1	10/18	1	1	2
	85	100	2		70	140	1	1		2	1	1	09/17	1	1	
	86	100	2	3	65	85	2	3	95	3	3	5	09/02	2	1	5
	87	100	3		70	90	3	1	95	4	1	1	09/12	1	1	3
	88	100	4		50	70	3	3						1	1	5
AVERAGE		100	2	2	63	91	2	2	92	3	2	2	09/20	1	1	4
9,028,378	84	100	3	1	50	70	2	2	100	2	1	1	10/25	1	1	1
	85	100	1	2	80	140	1	1		3	1	1	09/17	1	1	
	86	100	1	1	65	115	1	1	100	4	3	3	09/02	2	1	1
	87	100	2		75	105	2	1	120	2	1	1	10/13	1	1	1
	88	100	3		70	100	2	3						1	1	2
AVERAGE		100	2	1	68	106	2	2	107	3	2	2	09/29	1	1	1
9,028,383	86	0	0													
9,028,384	84	40	5	6	15	20	7	3	45	6	1	3	11/05	1	3	3
	85	50	3	4	50	130	4	4		6	1	5	09/17	1	1	
	86	90	2	5	50	85	2	3	75	4	3	3	09/02	1	1	6
	87	90	4		50	80	4	2	90	4	1	1	10/13	1	1	5
	88	95	6		30	60	6	1						1	1	7
AVERAGE		73	4	5	39	75	5	3	70	5	2	3	10/02	1	1	5
9,028,387	84	85	5	5	25	35	5	3	60	5	1	4	11/05	1	1	4
	85	95	3	5	50	130	3	3		2	1	3	09/17	1	1	3
	86	100	2	6	55	95	3	4	90	3	3	5	08/19	2	1	7
	87	100	3		50	90	3	3	85	6	3	5	10/13	1	1	6
	88	90	6		30	55	7	2						1	1	7
AVERAGE		94	4	5	42	81	4	3	78	4	2	4	09/29	1	1	5
9,028,391	84	100	3	5	50	70	1	1	55	5	1	5	11/05	1	1	6
	85	100	1	5	60	130				1	1	1	09/17	1	1	2
	86	100	2	6	60	100	2	2	80	6	2	3	08/19			7
	87	100	4		50	80	4	3	80	6	3	4	10/13	1	1	5
	88	100	5		40	50	6	4					11/10	1	1	7
AVERAGE		100	3	5	52	86	3	2	72	4	2	3	10/07	1	1	5
9,028,394	84	100	4	4	35	60	3	1	70	5	1	5	11/14	1	1	4
	85	100	1	3	75	150	1	2		3	1	1	10/14	1	1	
	86	100	1	4	65	105	1	4	90	5	1	3	09/19	1	1	4
	87	100	2		70	105	2	3	95	5	1	4	10/13	1	1	2
	88	100	5		40	60	5	5					11/10	1	1	7
AVERAGE		100	3	4	57	96	2	3	85	4	1	3	10/20	1	1	4

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AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,397	84	100	3	2	50	20	1	1	90	3	1	1	10/18	1	1	3
	85	100	1	2	65	110	3	1		3	1	3	09/17	1	1	
	86	100	1	2	65	100	1	2	110	3	3	1	08/19	3	1	4
	87	100	2		65	90	2	2	125	2	1	1	09/12	1	1	2
	88	100	4		55	70	4	3						1	1	5
AVERAGE		100	2	2	60	78	2	2	108	3	2	2	09/16	1	1	4
9,028,399	84	80	5	4	30	40	4	5	60	4	1	3	10/18	1	2	4
	85	95	3	3	60	140	2	3		5		4	09/17	1	1	
	86	100	1	3	55	105	1	2	95	4	4	3	08/19	2	1	5
	87	100	2		65	105	3	2	100	3	1	3	09/12	1	1	3
	88	100	4		45	70	4	3						1	1	6
AVERAGE		95	3	3	51	92	3	3	85	4	2	3	09/16	1	1	4
9,028,404	84	100	2	1	65	90	1	1	70	1		1	10/18	1	1	4
	85	100	1	3	60	130	3	1		1	2	1	09/17	1	1	
	86	100	1	4	65	80	1	1	100	3	3	1	09/30	1	1	5
	87	100	3		50	80	3	1	90	1	4	2	09/12	1	1	3
	88	100	4		45	65	4	2						1	1	5
AVERAGE		100	2	3	57	86	2	1	87	2	3	1	09/27	1	1	4
9,028,408	84	90	5	4	25	30	5	5	60	5	1	3	10/18	1	2	1
	85	100	2	3	65	140	2	2		1	1	2	09/17	1	1	
	86	100	2	3	45	100	2	1	90	3	2	2	09/02	5	1	3
	87	100	2		55	105	2	1	100	3	1	1	09/25	1	1	2
	88	100	4		55	80	3	2						1	1	4
AVERAGE		98	3	3	49	91	3	2	83	3	1	2	09/23	2	1	2
9,028,415	84	100	4	3	40	60	3	3	70	2	1	1	10/29	1	1	1
	85	100	1	2	70	140	1	1		3	1	1	09/17	1	1	
	86	100	2	2	60	95	1	2	130	4	2	3	09/19	2	1	2
	87	100	2		70	100	2	2	110	3	1	1	09/15	1	1	2
	88	100	3		55	80	3							1	1	4
AVERAGE		100	2	2	59	95	2	2	62	3	1	2	09/27	1	1	2
9,028,416	84	80	5	5	25	30	5	5	80	5	1	3	10/18	1	3	1
	85	90	2	1	75	150	1	1		2	1	2	08/15	1	1	
	86	100	1	2	55	105	1	2		2	3	3	08/10	2	1	3
	87	100	2		55	105	2	2	120	1	1	1	08/10	1	1	1
	88	100	3		50	75	3	2						1	1	2
AVERAGE		94	3	3	52	93	2	2	100	2	2	2	08/28	1	1	1

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,419	84	80	5	5	25	30	5	5	85	5	1	3	10/18	1	2	1
	85	80	2		75	150	2	3		3	1	3	08/27	1	1	
	86	95	2	1	60	105	2	1	120	3	2	3	09/02	1	1	1
	87	95	2		75	115	1	2	120	2	1	1	09/12	1	1	1
	88	100	3		65	85	2	3						1	1	4
AVERAGE		90	3	3	60	97	2	3	65	3	1	2	09/14	1	1	2
9,028,421	84	90	7	5	30	40	5	5	50	6		4	11/05	1	3	1
	85	100	3		50	140	3	3		3	1	2	08/27	1	1	
	86	100	1	1	60	95	1	2	110	3	2	3	09/19	4	1	2
	87	100	1		75	110	1	1	125	3	1	2	08/21	1	1	1
	88	100	1		70	115	1	2						1	1	2
AVERAGE		98	3	3	57	100	2	3	95	4	1	3	09/18	1	1	2
9,028,423	84	0	0													
9,028,424	84	0	0													
9,028,428	84	70	5	5	30	35	5	6	60	4	1	3	11/05	1	3	1
	85	90	3		50	160	3	3		3	1	1	08/27	1	1	
	86	100	2	2	50	100	2	3	100	3		3	09/19	3	1	2
	87	100	2		65	95	2	2	125	3	1	3	09/12	1	1	2
	88	100	3		55	85	2	2						1	1	3
AVERAGE		92	3	4	50	95	3	3	95	3	1	2	09/23	1	1	2
9,028,434	84	50	6	5	30	35	5	5	60	6	1	3	10/25	1	3	1
	85	75	3		50	100	3	3		3	1	1	08/27	1	1	
	86	75	3	3	50	80	3	3	105	4		3	08/19	2	1	3
	87	75	3		55	90	2	2	120	1	1	1	08/21	1	1	3
	88	100	4		45	65	4	4						1	1	5
AVERAGE		75	4	4	46	74	3	3	95	4	1	2	09/08	1	1	3
9,028,439	84	95	4	4	40	40	3	4	105	3	1	2	10/04	1	3	1
	85	100	2		70	140	2	2		3	1	3	08/27	1	1	
	86	100	1	2	70	100	1	2	120	2	1	1	07/27	4	1	1
	87	100	2		60	110	2	1	120	2	1	1	08/15	1	1	3
	88	100	3		50	75	3	2						1	1	3
AVERAGE		99	2	3	58	93	2	2	115	2	1	2	08/26	2	1	2

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,443	84	100	4	3	45	50	3	3	90	3	1	2	10/09	1	2	2
	85	100	2		55	140	3	2		3	1	3	09/05	1	1	
	86	100	2	3	60	80	2	2	110	3	1	2	08/19	2	1	3
	87	100	2		65	100	2	1	115	2	1	1	08/15	1	1	2
	88	100	3		50	65	3	1						1	1	4
AVERAGE		100	3	3	55	87	3	2	105	3	1	2	09/09	1	1	3
9,028,446	84	95	5	4	30	35	4	4	70	4	1	3	11/05	1	1	1
	85	100	3	4	30	120	3	2		3	1	1	10/16	1	1	
	86	100	3	3	35	90	3	1	85	6	2	3	10/21	1	1	2
	87	100	3		45	85	3	2	90	5	3	4	09/12	1	1	2
	88	100	4		30	70	4							1	1	4
AVERAGE		99	4	4	34	80	3	2	82	4	2	3	10/14	1	1	2
9,028,459	84	100	3	3	45	65	1	1	80	2	1	1	10/25	1	2	2
	85	100	3	3	60	130	3	1		3	1	1	08/27	1	1	
	86	100	2	3	55	105	2	1	100	3	2	2	08/15	5	1	3
	87	100	2		65	105	2	1	110	1	1	1	08/15	1	1	3
	88	100	4		45	90	3	3						1	1	4
AVERAGE		100	3	3	54	99	2	1	97	2	1	1	09/05	2	1	3
9,028,460	84	100	4	3	35	55	3	4	50	3	1	1	10/10	1	2	1
	85	100	2	3	70	150	2	1		3	1	1	08/15	1	1	
	86	100	2	3	55	100	2	1	105	3	1	3	08/19	4	1	3
	87	100	2		65	105	2	1	120	2	1	2	08/15	1	1	2
	88	100	4		50	85	4	3						1	1	3
AVERAGE		100	3	3	55	99	3	2	92	3	1	2	08/30	2	1	2
9,028,463	84	95	4	3	35	45	3	5	75	5	1	3	11/05	1	2	2
	85	100	3	4	50	130	4	4		5	1	1	10/07	1	1	
	86	100	3	4	50	85	3	4	85	5	1	5	09/19	2	1	3
	87	100	3		55	90	2	3	100	5	1	3	10/13			3
	88	100	3		50	80	4	2						1	1	3
AVERAGE		99	3	4	48	86	3	4	87	5	1	3	10/11	1	1	3
9,028,466	84	100	1	1	55	70	1	1	55	4	1	5	11/05	1	1	4
	85	100	2		90	150	2	1		3	1	1	10/07	1	1	
	86	100	2	4	75	90	2	1	92	3	3	3	10/21	1	1	1
	87	100	3				3	1	75	1	1	2	10/28	1	1	3
	88	100	4		45	50	4	2						1	1	5
AVERAGE		100	2	2	66	90	2	1	74	3	2	3	10/23	1	1	3

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,468	84	90	4	3	50	60	3	4	75	3	1	3	11/05	1	2	1
	85	95	2		70	140	2	2		2	1	1	09/17	1	1	
	86	100	2	2	60	105	1	2	110	4	1	1	09/19	1	1	2
	87	100	2		65	100	2	1	130	3	1	1	10/13	1	1	1
	88	100	2		60	90	2	3						1	1	3
AVERAGE		97	2	2	61	99	2	2	105	3	1	2	10/06	1	1	2
9,028,471	84	90	4	4	30	45	4	4	80	3	1	3	10/25	1	2	1
	85	100	2		80	140	1	1		1	1	1	08/27	1	1	
	86	100	2	3	55	100	1	2	95	3	2	3	07/27	3	1	3
	87	100	3		55	95	2	1	120	2	1	1	08/28	1	1	2
	88	100	4		50	80	3	2						1	1	4
AVERAGE		98	3	4	54	92	2	2	98	2	1	2	09/03	1	1	2
9,028,476	84	95	4	4	25	35	4	3	45	4		3	11/05	1	2	4
	85	100	3		40	140	3	2		3	1	1	10/28	1	1	
	86	100	2	3	50	95	2	1	105	7	2	3	09/30	1	1	4
	87	100	3		50	80	3	1	80	3	3	3	09/28	1	1	3
	88	100	5		40	70	5	2					11/10	1	1	6
AVERAGE		99	3	4	41	84	3	2	77	4	2	2	10/21	1	1	4
9,028,481	84	100	4	4	40	40	4	4	55	7	3	1	11/01	1	1	4
	85	90	4	4	30	100	4	3		4	1	2	11/04	1	1	
	86	100	3	3	35	70	3	1	100	5	3	3	10/30	1	1	4
	87	100	3		40	75	3	1	41	7	1	1	11/13	1	1	3
	88	100	5		30	55	5	2					11/20	1	1	6
AVERAGE		98	4	4	35	68	4	2	65	6	2	2	11/07	1	1	4
9,028,488	84	80	5	5	20	20	5	3	40	6	1	1	11/05	1	2	1
	85	100	2	3	60	170	2	2		1	1	1	10/07	1	1	
	86	100	2	3	70	115	2	1	85	3	1	1	09/30	2	1	4
	87	100	2		55	95	3	1	85	3	1	2	10/13	1	1	2
	88	100	4		45	80	4	3					11/02	1	1	5
AVERAGE		96	3	4	50	96	3	2	70	3	1	1	10/18	1	1	3
9,028,492	84	0														
	85	90	3	4	40	110	2	3		7	1	1	12/02	1	1	
	86	100	2	5	55	70	3	1	80	9	3	3	11/13	1	1	4
	87	100	4		50	55	4	1	41	7	3	5	11/13	1	1	7
	88	100	6		25	40	6	2					11/20	1	1	6
AVERAGE		78	4	4	42	69	4	2	60	8	2	3	11/20	1	1	6

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD HEIGHT	SEED			MATURE DATE	RESISTANCE			
			1	2	HT	WD	ABN	UNI		AMT	FILL	UNI		DIS	INS	DRY	
9,028,494	84	0															
	87	100	2		85	95	2	2	100	5	3	3	10/31	1	1	5	
	88	100	4		45	70	4	5						1	1	6	
AVERAGE		67	3		65	82	3	4	100	5	3	3	10/31	1	1	6	
9,028,498	84	85	4	4	30	40	5	3	30	5	0	3	11/01	1	2	4	
	85	90	4	4	70	160	3	4		3	1	1	10/07	1	1	3	
	86	100	2	3	90	120	1	2		5	9	3	10/30	1	1	5	
	87	100	3		60	90	3	3	66	4	3	1	11/13	1	1	3	
	88	100	5		40	65	4	3					11/15	1	1	6	
AVERAGE		95	4	4	58	95	3	3	48	4	8	2	11/01	1	1	4	
9,028,506	84	100	3	5	40	45	1	1	55	8	0	3	11/09	1	1	6	
	85	20	7	5	35	90	5	7		6	3	5	08/05	1	1		
	88	80	5		70	55	4	3						1	1	5	
AVERAGE		67	5	5	48	63	3	4	55	7	6	4	09/22	1	1	6	
9,028,510	84	75	3	1	50	65	1	1		1	1	1	10/16	1	1	1	
	85	85	1	2	90	200	1	2		1	1	1	07/22	1	1		
	86	100	1	2	75	120	1	1	120	2	6	2	07/27	2	1	1	
	87	100	1		75	125	1	1	125	1	1	1	08/07	1	1	1	
	88	100	1		70	110	1	1		5				1	1	1	
AVERAGE		98	1	2	72	124	1	1	122	2	2	1	08/14	1	1	1	
9,028,992	84	100	3	1	55	60	3	3	100	1	1	1	10/04	1	1	1	
	85	100	2	2	70	130	2	1		2	1	1	07/22	1	1		
	86	100	2	1	60	90	2	1		1	1	1	07/27	2	1	1	
	87	100	3		85	90	2	1	110	1	1	1	08/18	1	1	2	
	88	100	2		55	85	2	1						1	1	2	
AVERAGE		100	2	1	65	91	2	1	105	1	1	1	08/18	1	1	2	
9,028,993	84	100	3	2	55	75	2	3	90	3	1	1	10/18	1	1	1	
	85	100	1	2	80	130	1	1		3	1	1	08/05	1	1		
	86	100	1	2	60	105	1	1	115	2	1	1	08/19	2	1	1	
	87	100	2		75	100	2	1	110	3	1	1	08/20	1	1	1	
	88	100	2		55	90	3	1						1	1	2	
AVERAGE		100	2	2	65	100	2	1	105	3	1	1	08/31	1	1	1	

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,028,994	84	95	4	4	30	50	3	3	60	3	1	3	10/18	1	2	1
	85	100	1	2	80	130	1	1		3	1	1	08/05	1	1	
	86	100	2	3	55	95	2	2	115	1	1	2	08/19	1	1	1
	87	100			60	100	3	2	110	2	1	1	09/05	1	1	3
	88	100	6		45	85	3							1	1	6
AVERAGE		99	3	3	54	92	2	2	95	2	1	2	09/04	1	1	2
9,028,995	84	90	4	4	30	40	4	3	70	4	1	3	10/18	1	3	1
	85	100	2	3	65	120	1	1		3	1	2	07/22	1	1	
	86	100	1	3	65	110	1	1	110	2	1	1	07/27	1	1	2
	87	100	3		80	100			90	3	1	1	08/20	1	1	4
	88	100	3		50	90	3							1	1	5
AVERAGE		98	3	3	58	92	2	2	90	3	1	2	08/22	1	1	3
9,028,996	84	95	3	3	35	50	3	2	36	3	1	1	11/21	1	1	3
	85	90	4	3	35	140	3	2		2	1	1	11/04	1	1	
	86	100	3	3	40	100	4	3	75	5	1	3	11/13	1	1	3
	87	100	5		40	75	4	3	45	6	1		11/03	1	1	5
	88	100	6		30	60	6	2					11/20	1	1	6
AVERAGE		97	4	3	36	85	4	2	52	4	1	2	11/12	1	1	4
9,028,997	84	5	6	6	15	20	7	3	30	7	1	5	11/08	1	3	1
9,028,998	84	80	4	3	40	60	3	5	90	3	1	3	10/25	1	3	1
	85	95	1	1	90	150	1	1		2	1	2	07/22	1	1	
	86	100	2	1	65	100	2	1	105	5	1	3	09/02	3	1	3
	87	100	2		70	115	1	1	135	2	1	1	09/12	1	1	2
	88	100	3		65	90	3	2						1	1	3
AVERAGE		95	2	2	66	103	2	2	110	3	1	2	09/07	1	1	2
9,029,375	84	95	3	5	40	45	3	3	36	6	1	1	11/08	1	1	5
	85	75	5	4		120	3	5		4	1	1	11/04			3
	86	100	3	5	50	70	3	5	90	8	1	7	09/02	1	1	5
	87	100	5		45	70	4	4		5	1	6	09/05	1	1	5
	88	100	6		30	55	6	5					11/10	1	1	8
AVERAGE		94	4	5	41	72	4	4	63	7	1	4	10/12	1	1	5
9,029,376	84	95	3	3	55	50	3	2	60	1	1	1	10/18	1	1	
	85	100	1	1	80	160	1	1		1	1	1	10/07	3	1	
	86	100	1	2	75	120	1	2	95	3	1	2	08/19	3	1	3
	87	100	2		75	100	2	2	105	3	3		09/15	1	1	4
	88	100	5		55	90	5	3						1	1	5
AVERAGE		99	2	2	68	104	2	2	87	2	2	1	09/22	2	1	4

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD HEIGHT	SEED			MATURE DATE	RESISTANCE			
			1	2	HT	WD	ABN	UNI		AMT	FILL	UNI		DIS	INS	DRY	
9,029,377	84	0	0														
9,029,378	84	100	3	3	45	45	3	1	60	1	1	1	10/30	1	1		
	85	90	4	3	30	140	3	2		3	1	1	11/12	1	1		
	86	95	4	2	40	90	3	3	92	3	1	3	10/21	1	1	1	
	87	90	3		45	90	3	1	85	4	1	3	11/03	1	1	3	
	88	100	4		40	70	4	3						1	1	3	
AVERAGE		95	4	3	40	87	3	2	79	3	1	2	11/01	1	1	2	
9,029,379	84	95	3	2	45	70	1	3	65	1	1	1	10/30	1	1	1	
	85	95	4	3	45	140	3	1		1	1	1	10/07	1	1		
	86	100	4	3	40	80	3	3	100	5	1	5	09/30	1	1	2	
	87	100	4		35	70	4	4	65	3	3	1	10/13	1	1	3	
	88	95	4		30	60	5	4						1	1	3	
AVERAGE		97	4	3	39	84	3	3	77	2	2	2	10/13	1	1	2	
9,029,381	84	75	4	4	30	40	3	5	55	1	1	1	10/18	1	2	1	
	85	95	3	3	50	140	3	3		2	1	1	10/07				
	86	100	3	3	45	75	3	4	55	3	3	3	08/19	2	1	2	
	87	100	4		35	65	4	4	85	3	1	2	09/05	1	1	3	
	88	100	5		40	65	5	2						1	1	5	
AVERAGE		94	4	3	40	77	4	4	65	2	2	2	09/19	1	1	3	
9,029,388	84	100	3	3	35	65	3	3	45	1	1	1	10/30	1	2	1	
	85	100	3	3	70	150	2	2		2	1	1	10/07	1	1		
	86	100	3	4	55	90	3	3	80	4	1	2	09/30	2	1	3	
	87	100	3		80	130	3	2	100	2	1	1	10/13	1	1	4	
	88	100	5		35	70	4	3						1	1	4	
AVERAGE		100	3	3	55	101	3	2	75	2	1	1	10/13	1	1	3	
9,041,736	84	100	1	5	50	60	1	1	85	2	3	1	09/17	1	1	6	
	85	100	1	5	55	120	1	1		5	1	3	07/22	1	1	4	
	86	100	2	5	65	110	2	2	105	3	1	3	07/17	1	1	5	
	87	100	2		60	95	3	2	115	3	1	1	08/07	1	1	3	
	88	100	6		25	65	5	2		6				1	1	6	
AVERAGE		100	2	5	51	90	2	2	102	4	2	2	08/08	1	1	5	
9,041,737	84	95	5	5	25	25	5	3	60	6	1	3	10/01	1	2	1	
	85	90	2	3	50	120	2	3		3	1	2	07/22	1	1		
	86	100	3	3	55	110	2	1	90	3	4	2	07/27	1	1	3	
	87	100	3		45	105	3	3	105	3	1	1	08/28	1	1	2	
	88	100	5		30	65	5	2						1	1	6	
AVERAGE		97	4	4	41	85	3	2	85	4	2	2	08/19	1	1	3	

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
 AT COFFEEILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,041,738	84	75	5	5	25	40	5	5	60	5	1	1	10/01	1	2	1
	85	100	3	2	60	160	3	2		3	1	2	07/22	1	1	
	86	100	1	3	80	110	1	1	105	2	1	2	07/27	2	1	3
	87	100	1		75	105	2	1	120	2	1	2	08/07	1	1	1
	88	100	3		55	95	3	2		4				1	1	4
AVERAGE		95	3	3	59	102	3	2	95	3	1	2	08/14	1	1	2
9,041,739	84	0	0													
9,041,740	84	100	2	3	50	60	3	3	90	3	1	1	10/01	1	1	1
	85	100	1	3	75	190	1	1		3	1	3	07/22	1	1	
	86	100	1	3	75	105	1	1	100	1	1	2	07/27	2	1	3
	87	100	2		65	100	2	1	120	2	1	2	08/07	1	1	2
	88	100	3		50	85	4	2		5				1	1	5
AVERAGE		100	2	3	63	108	2	2	103	3	1	2	08/14	1	1	3
9,041,741	84															
9,041,742	84	100	3	3	40	45	3	3	80	3	2	3	10/05	1	1	1
	85	100	1	2	70	140	1	1		3	1	1	10/07	1	1	
	86	100	2	3	60	100	2	1	105	2	4	2	07/27	1	1	2
	87	100	2		60	95	2	1	125	2	1	2	08/15	1	1	2
	88	100	4		45	75	3	4						1	1	5
AVERAGE		100	2	3	55	91	2	2	103	2	2	2	09/05	1	1	2
9,041,743	84	100	2	2	65	70	2	3	110	3	1	3	10/01	1	1	1
	85	100	1		60	130	1	1		3	1	3	07/22	1	1	
	86	100	2	3	70	85	2	1	100	2	1	2	07/17	1	1	1
	87	100	2		70	105	2	1	125	4	1	1	08/15	1	1	1
	88	100	3		50	80	3	1		5				1	1	3
AVERAGE		100	2	2	63	94	2	1	112	3	1	2	08/13	1	1	2
9,041,744	84	100	1	2	70	70	1	1	95	1	1	1	09/17	1	1	1
	85	100	1	2	70	150	1	1		3	1	1	07/22	1	1	
	86	100	1	3	80	90	2	1	120	2	1	1	07/17	1	1	1
	87	100	2		75	110	2	1	130	3	1	2	08/15	1	1	1
	88	100	3		65	90	3	2								
AVERAGE		100	2	2	72	102	2	1	115	2	1	1	08/10	1	1	1

TABLE I. INITIAL EVALUATIONS OF BEAKED PANICGRASS
AT COFFEEVILLE PMC (1984-1988)

ACCESSION NUMBER	YR RC	STD PCT	VIGOR		FOLIAGE				SEEDHEAD	SEED			MATURE	RESISTANCE		
			1	2	HT	WD	ABN	UNI	HEIGHT	AMT	FILL	UNI	DATE	DIS	INS	DRY
9,041,745	84	100	1	2	55	65	1	1	110	3	1	1	09/24	1	1	1
	85	100	1	2	65	160	1	1		3	1	1	07/22	1	1	
	86	100	1	2	80	115	1	1	120	3	1	1	07/17	2	1	2
	87	100	2		75	115	2	1		2	1	2	08/07	1	1	2
	88	100	2		60	85	3	2		3				1	1	3
AVERAGE		100	2	2	67	108	2	1	115	3	1	1	08/10	1	1	2
9,041,746	84	80	5	5	30	40	5	7	65	4	1	3	10/01	1	3	1
	85	95	2		75	160	2	3		3	1	1	07/22	1	1	
	86	100	1	3	75	85	2	1	120	1	1	3	07/17	1	1	1
	87	100	1		80	110	1	1	140	1	1	1	08/07	1	1	1
	88	100	2		80	90	2	2		2				1	1	2
AVERAGE		95	2	4	68	97	2	3	108	2	1	2	08/11	1	1	1

LEGEND:

- YR RC = Year of Record.
 STD PCT = Percent Stand.
 * VIGOR (1 = May or June, 2 = August or September).
 FOIAGE (HT = height and WD = width) in cm.
 * FOLIAGE (ABN = abundance and UNI = uniformity).
 SEEDHEAD HEIGHT in cm.
 * SEED (AMT = amount, FILL, UNI = uniformity).
 * RESISTANCE (DIS = disease, INS = insects, and DRY = drought).
- * Rating scale:
 1 = Best, 9 = Worst.
 0 = None (Converted to 10 for averaging).