

# 2005 RUTGERS Turfgrass Proceedings



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# **2005 RUTGERS TURFGRASS PROCEEDINGS**

**of the**

**New Jersey Turfgrass Expo  
December 6-8, 2005  
Trump Taj Mahal  
Atlantic City, New Jersey**

The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, Cook College, Rutgers, The State University of New Jersey in cooperation with the New Jersey Turfgrass Association. The purpose of this document is to provide a forum for the dissemination of information and the exchange of ideas and knowledge. The proceedings provide turfgrass managers, research scientists, extension specialists, and industry personnel with opportunities to communicate with co-workers. Through this forum, these professionals also reach a more general audience, which includes the public.

This publication includes lecture notes of papers presented at the 2005 New Jersey Turfgrass Expo. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

Special thanks are given to those who have submitted papers for this proceedings, to the New Jersey Turfgrass Association for financial assistance, and to Barbara Fitzgerald and Marlene Karasik for administrative and secretarial support.

Dr. Ann Brooks Gould, Editor  
Dr. Bruce B. Clarke, Coordinator

# MORPHOLOGICAL CHARACTERISTICS OF KENTUCKY BLUEGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY

Robert R. Shortell, William A. Meyer, and Stacy A. Bonos<sup>1</sup>

Kentucky bluegrass (*Poa pratensis* L.) is a popular turfgrass species with a wide range of genetic diversity. This diversity results in many distinct cultivars that can fill a large number of environmental niches. However, this diversity often makes choosing the right cultivar for any particular niche quite challenging. Therefore, classification of cultivars based on agronomic and morphological traits will help to simplify the choice of proper cultivars for your environment. This will result in well adapted, long-lived, perennial turfgrass systems and will drastically reduce the overall environmental inputs. The purpose of this study was to evaluate Kentucky bluegrass genotypes for differences in morphology based on the protocols put forth by the Plant Variety Protection Office of the US Department of Agriculture.

## PROCEDURES

A spaced-plant nursery of Kentucky bluegrass was established in the spring of 2003 at the Rutgers University Plant Biology and Pathology Research and Extension Farm in Adelphia, NJ. One-hundred and seventy-three Kentucky bluegrass cultivars and selections (including all entries of the 2000 National Turfgrass Evaluation Program [NTEP]) were planted in a randomized complete block design with three replications. Plants were maintained in the spaced-plant nursery and mowed at a height of 8 inches twice per year, once after maturity and once before the onset of winter. The field received 1 lb N/1000 ft<sup>2</sup> (10-10-10) in early spring to assist green-up. Morphological and agronomic characteristics measured included heading date, flowering date, mature plant height, plant spread, panicle length, and flag leaf height, length, and width. Measurements were taken on spaced-plants during 2004 and 2005 and are presented in order of the NTEP entry number (Table 1).

## RESULTS

### Heading and Flowering Date

Kentucky bluegrass cultivars and selections exhibit a wide range of heading and flowering dates. Heading and flowering dates are important to plant breeders attempting to hybridize this species because to share genetic information the plants must flower at the same time. Some cultivars such as Kenblue, Wellington, and Armadillo flower in early May, whereas others such as Midnight, Impact, and Rambo do not flower until early June. Attempting to combine these cultivars would require environmental manipulations aimed to force early maturity in the later cultivars.

### Plant Width

In this study, two measurements were used to quantify plant width. In the first, the distance between the two longest extending rhizomes in opposite directions was measured. In the second, the longest extending rhizomes perpendicular to the plane of the first assessment were measured. Some cultivars, such as Mercury and Skye and selections BH00-6002 and DLF-76-9034, exhibit aggressive lateral spread in the spaced-plant setting, often growing right into neighboring plants. Other cultivars, such as North Star, Limousine, and Julius, and selections Ba 84-140 and Pp H 7929, form dense patches that do not spread laterally as quickly.

### Panicle Length

Panicles are the structures that house turfgrass flowers. Panicle length is a measurement taken from the base of the panicle to the tip of the panicle. Although panicles are infrequently observed in the

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mowed turf setting, they are distinct and help to illustrate the variability within the Kentucky bluegrass genus. Cultivars Appalachian and Avalanche have long panicles, whereas the panicles of North Star and Yvette are typically shorter.

### **Flag Leaf Height, Width, and Length**

Flag leaf characteristics are also variable within the genus. Flag leaf height is a measurement taken from the crown of the plant to the flag leaf and is often correlated with the height of the plant. Flag leaf width and length are measurements of the widest and longest parts of the flag leaf, respectively. These measurements are useful when quantifying the texture of the cultivar. North Star and Cheetah are fine textured, but Blue Ridge and Raven are coarser.

### **SUMMARY**

Since Kentucky bluegrass is such a diverse genus, it is important to know how these cultivars and selections grow relative to each other. These data will help to best match cultivars for the perfect blends to ensure the longevity of the turfgrass stand, and

this is the first, and most important, step to reducing environmental inputs commonly associated with ornamental horticulture. Through interpretation of these data the turfgrass professional will be prepared to best select turfgrass cultivars for their particular niche, resulting in sustainable, high-quality turfgrass management.

### **ACKNOWLEDGMENTS**

New Jersey Agricultural Experiment Station Publication No. E-12180-28-06. This work was conducted as part of NJAES Project No. 12180, supported by the New Jersey Agricultural Experiment Station, State, and Hatch Act Funds, Rutgers Center for Turfgrass Science, other grants, and gifts. Additional support was received from the United States Golf Association – Golf Course Superintendents Association of America Research Fund, the National Turfgrass Evaluation Program, and the New Jersey Turfgrass Association. The authors would also like to thank the staff of the Rutgers University Plant Biology and Pathology Research and Extension Farm at Adelphia, NJ for field maintenance and help with data collection.

Table 1. Morphological characterization of Kentucky bluegrass cultivars and selections planted in a spaced-plant nursery established in the spring of 2003 at Adelphia, NJ. (Includes all entries of the 2000 National Kentucky Bluegrass Medium-High Maintenance Test - NTEP.)

	Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf	
				Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>
1	Midnight	22-May	1-Jun	54.5	45.8	40.1	6.6	24.1	0.32	3.8
2	Baron	18-May	28-May	81.2	67.6	43.9	7.3	23.5	0.32	3.6
3	Lily	16-May	23-May	78.2	66.9	51.4	6.7	29.0	0.31	3.0
4	Limerick	16-May	27-May	57.6	48.4	53.8	8.9	33.2	0.32	5.1
5	Bodacious	16-May	23-May	50.4	43.0	40.3	6.9	18.1	0.36	3.6
6	Bedazzled	20-May	27-May	87.0	75.2	49.3	8.8	26.1	0.34	4.3
7	Boomerang	16-May	25-May	63.5	53.5	40.6	7.0	19.5	0.34	3.4
8	Eagleton	14-May	27-May	88.7	75.5	64.4	9.6	32.9	0.29	3.3
9	HV 140	14-May	21-May	85.2	72.8	45.8	6.9	23.1	0.31	3.3
10	Cheetah	17-May	24-May	74.2	65.1	46.3	7.2	25.0	0.24	3.0
11	Yvette	16-May	25-May	57.4	44.6	37.7	5.6	20.5	0.30	2.7
12	Pp H 7929	17-May	26-May	46.7	38.6	43.5	7.3	21.8	0.32	3.1
13	Ulysses	17-May	25-May	76.2	64.3	48.8	7.5	27.1	0.33	3.4
14	Pp H 7907	18-May	25-May	67.1	54.8	43.3	7.4	22.8	0.35	3.4
15	Monte Carlo	21-May	29-May	91.1	78.4	42.8	7.6	20.5	0.33	3.5
16	Royale	17-May	24-May	88.0	72.5	48.5	7.9	26.3	0.27	2.5
17	Shamrock	14-May	20-May	86.3	72.4	52.7	7.5	26.0	0.31	2.7
18	Wellington	9-May	20-May	81.3	65.6	65.1	7.4	39.0	0.29	3.2
19	Wildwood	21-May	27-May	67.3	52.7	42.0	7.3	25.8	0.29	2.8
20	Hallmark	29-May	26-May	81.6	73.3	47.1	7.9	26.3	0.29	3.4
21	Lakeshore	16-May	22-May	94.7	82.5	53.5	7.7	27.9	0.32	2.6
22	Glenmont	20-May	28-May	86.2	72.5	44.4	7.9	23.9	0.27	3.2
23	Coventry	16-May	22-May	82.1	71.4	50.2	6.6	26.4	0.35	2.9
24	Avalanche	14-May	24-May	87.4	76.4	67.2	10.4	38.0	0.29	3.9
25	PST-B5-125	20-May	25-May	58.6	47.1	40.6	7.4	23.0	0.30	2.7

(Continued)

Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf		
			Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>	
26	PST-604	15-May	27-May	91.9	78.6	49.2	8.5	32.0	0.29	3.7
27	PST-108-79	20-May	25-May	76.5	61.1	44.5	6.3	24.9	0.36	3.8
28	Voyager II	19-May	29-May	93.3	78.1	48.5	8.0	26.0	0.30	4.1
29	PST-161	17-May	27-May	105.7	88.2	54.4	10.4	28.8	0.38	4.8
30	Bluemax	18-May	27-May	91.9	77.3	44.2	7.0	20.8	0.28	2.9
31	Brilliant	20-May	28-May	78.3	66.8	48.2	8.1	27.0	0.31	4.2
32	PST-222	19-May	27-May	90.3	75.4	44.9	8.5	23.4	0.36	4.4
33	Midnight II	26-May	29-May	59.2	47.7	40.1	6.8	26.2	0.31	3.7
34	PST - York Harbor 4	18-May	26-May	63.1	52.5	46.1	7.5	25.7	0.29	2.7
35	Blacksburg II	19-May	25-May	89.0	74.5	55.9	8.8	33.1	0.31	3.3
36	Mallard	18-May	27-May	97.8	82.8	47.7	8.6	25.8	0.34	3.7
37	Blue Ridge	20-May	29-May	100.1	85.9	45.2	7.3	23.0	0.36	3.3
38	Apollo	20-May	29-May	85.3	75.2	48.0	8.0	25.7	0.27	3.9
39	Delight	17-May	25-May	82.2	71.2	44.1	7.1	24.3	0.29	2.5
40	HV 238	25-May	27-May	93.5	77.0	49.5	9.6	28.3	0.36	4.3
41	Mercury	15-May	26-May	100.5	85.5	56.4	9.7	31.3	0.31	3.8
42	Arrow	16-May	25-May	99.8	80.8	57.6	9.0	32.6	0.33	3.9
43	Moonshine	13-May	24-May	96.8	86.6	53.7	8.4	28.4	0.32	3.0
44	Dynamo	19-May	29-May	80.8	69.2	47.9	7.7	24.8	0.27	4.2
45	B5-43	18-May	23-May	84.4	69.5	50.4	6.6	25.9	0.31	2.9
46	B5-45	16-May	23-May	83.7	71.4	52.8	7.0	28.7	0.30	2.9
47	Blue-tastic	20-May	27-May	81.1	67.1	43.1	7.2	22.1	0.29	3.1
48	Markham	20-May	28-May	86.1	70.7	46.7	7.7	25.8	0.27	4.0
49	Casablanca	21-May	28-May	82.5	69.6	64.7	7.9	26.0	0.29	4.0
50	B5-144	17-May	23-May	78.8	65.5	49.1	6.7	25.4	0.34	3.2

(Continued)

Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf	
			Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>
51	PST-B4-246	20-May	69.4	56.3	43.2	7.7	25.7	0.31	3.1
52	PST-H6-150	22-May	82.8	70.6	49.5	7.9	26.8	0.28	3.8
53	Alpine	14-May	68.5	54.6	41.4	6.6	21.7	0.25	2.6
54	Pick 453	15-May	81.2	65.7	53.6	9.0	31.8	0.40	2.9
55	Rampart	11-May	74.3	58.4	51.8	8.4	28.8	0.41	2.7
56	Limousine	16-May	49.6	39.0	38.3	5.4	19.7	0.28	2.5
57	Quantum Leap	26-May	59.9	48.7	38.0	7.0	24.0	0.29	4.0
58	Envicta	21-May	83.7	71.5	50.8	7.5	27.3	0.34	3.4
59	Goldrush	18-May	83.6	69.7	44.1	6.8	23.8	0.30	3.1
60	Misty	19-May	71.3	59.8	50.3	8.0	29.2	0.30	3.4
61	Ascot	17-May	81.8	68.7	44.7	7.7	24.7	0.31	3.0
62	BHOO-6002	19-May	111.4	100.3	57.9	7.8	39.8	0.30	3.7
63	Fairfax	15-May	83.5	69.8	52.1	6.7	28.0	0.34	2.9
64	Abbey	19-May	83.3	70.0	46.7	7.4	25.6	0.33	3.3
65	BHOO-6003	18-May	83.9	72.3	48.3	7.7	33.5	0.37	5.0
66	Baronette	19-May	103.8	89.4	57.1	8.3	32.4	0.33	2.8
67	Raven	21-May	80.9	69.1	46.2	7.2	26.9	0.36	3.4
68	Ba 83-113	17-May	78.9	67.6	56.7	9.4	29.9	0.35	3.4
69	Marquis	20-May	90.1	77.1	42.4	7.2	26.0	0.38	3.3
70	Ba 84-140	16-May	42.8	33.5	35.6	5.2	16.4	0.32	2.4
71	Ba 82-288	18-May	93.7	80.3	52.0	8.2	27.0	0.30	3.1
72	Chateau	17-May	83.8	70.9	52.4	7.1	26.8	0.34	3.2
73	BAOO-6001	16-May	79.5	68.2	48.4	8.4	26.1	0.27	3.5
74	CVB 20631	21-May	51.1	38.9	28.7	5.9	15.1	0.26	3.0
75	Chelsea	17-May	60.2	51.3	51.5	8.1	29.2	0.29	3.4

(Continued)

Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf	
			Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>
76	A97-1409	18-May	89.7	72.6	48.8	9.4	27.1	0.34	4.0
77	Katie	20-May	90.5	74.1	46.9	8.6	27.2	0.39	4.8
78	Julius	18-May	50.1	38.9	36.0	5.3	19.4	0.32	2.5
79	Allure	17-May	92.0	69.3	51.7	6.5	25.9	0.33	2.8
80	Valor	21-May	80.7	71.0	49.5	7.8	26.5	0.29	3.7
81	H92-558	13-May	78.1	62.2	51.9	9.4	31.0	0.40	3.2
82	Julia	16-May	87.3	72.3	57.9	8.0	34.7	0.31	3.3
83	Brooklawn	13-May	90.8	81.1	53.6	8.0	28.9	0.31	2.9
84	Boutique	15-May	95.2	78.9	49.7	7.7	26.0	0.35	3.2
85	Blue Sapphire	10-May	81.5	67.1	51.1	9.3	29.3	0.33	3.7
86	NA-K992	15-May	78.6	69.1	65.7	7.5	39.6	0.28	2.9
87	Showcase	20-May	88.7	76.6	49.4	7.9	27.1	0.27	3.8
88	Arcadia	25-May	64.2	53.2	46.4	7.5	29.8	0.30	4.0
89	Kingfisher	16-May	83.1	66.8	49.8	8.6	31.6	0.31	3.5
90	SRX 26351	17-May	79.7	68.6	42.6	7.1	22.8	0.24	2.9
91	SRX 27921	18-May	56.7	44.2	40.3	6.7	19.0	0.32	2.7
92	Sonoma	17-May	91.9	77.8	51.6	8.3	26.8	0.30	3.3
93	Bordeaux	17-May	83.4	66.6	54.8	8.9	31.3	0.30	4.2
94	Cabernet	17-May	95.6	85.1	48.3	8.9	27.8	0.31	3.5
95	Champagne	13-May	102.8	84.2	62.0	9.3	35.4	0.34	4.0
96	Durham	19-May	91.0	80.2	53.5	8.1	28.4	0.31	3.1
97	Skye	18-May	113.9	99.4	56.2	8.3	32.7	0.28	4.0
98	Jewel	10-May	88.9	74.1	59.9	8.5	30.5	0.32	4.8
99	Unknown	25-May	57.1	49.7	42.3	7.2	27.1	0.30	3.7
100	Blue Knight	16-May	66.6	57.1	44.7	5.8	24.4	0.26	2.2

(Continued)



Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf	
			Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>
101	DLF-76-9032	21-May	74.6	61.9	41.1	7.0	22.5	0.30	3.2
102	DLF-76-9034	13-May	119.9	103.0	69.1	10.4	39.5	0.34	4.3
103	DLF-76-9036	19-May	81.9	66.7	45.6	7.2	23.3	0.34	3.5
104	DLF-76-9038	20-May	76.1	64.2	49.5	7.4	27.4	0.26	3.6
105	SI A96-386	21-May	82.6	70.3	42.1	7.2	21.8	0.29	2.8
106	SRX 2114	20-May	68.4	59.5	47.2	7.9	26.6	0.29	3.2
107	SR 2284	17-May	74.6	63.3	51.3	8.9	26.6	0.35	3.6
108	Diva	17-May	89.1	77.8	54.4	8.5	29.5	0.29	3.3
109	SRX QG245	15-May	72.3	60.6	64.4	7.7	34.6	0.26	2.5
110	99AN-53	16-May	96.7	86.5	71.8	8.2	43.6	0.27	3.5
111	Mongoose	13-May	94.6	80.0	61.2	8.0	32.3	0.31	3.0
112	Jefferson	15-May	92.0	76.0	68.1	9.4	37.5	0.26	3.7
113	A98-407	17-May	75.3	65.7	45.8	7.7	24.3	0.34	3.3
114	A98-1028	13-May	103.5	85.5	55.1	8.0	28.7	0.32	2.7
115	A98-183	10-May	92.1	76.3	62.6	10.0	39.5	0.32	3.6
116	Champlain	22-May	91.4	76.8	49.6	9.4	25.9	0.31	4.5
117	Goldstar	13-May	98.0	83.4	60.0	9.9	35.3	0.34	4.2
118	Royce	20-May	84.1	74.8	48.2	7.7	26.9	0.27	3.9
119	Appalachian	9-May	86.7	71.5	60.2	12.0	32.9	0.37	5.5
120	A98-365	17-May	115.2	97.8	50.3	7.7	26.0	0.28	3.5
121	Kenblue	3-May	102.1	83.1	71.5	9.2	41.1	0.29	4.7
122	Princeton P-105	19-May	89.9	78.3	54.6	10.1	28.7	0.32	4.9
123	Impact	23-May	57.2	50.4	40.4	6.7	25.6	0.30	3.6
124	Total Eclipse	23-May	64.5	53.1	42.4	6.8	26.3	0.27	3.6
125	Odyssey	22-May	64.3	56.0	42.3	7.4	27.7	0.27	3.6

(Continued)

Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf		
			Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>	
126	Chicago II	21-May	1-Jun	68.2	57.9	37.4	6.1	20.7	0.32	2.5
127	NuGlade	22-May	1-Jun	57.7	46.7	39.9	7.1	24.2	0.30	3.8
128	Perfection	23-May	1-Jun	60.0	51.8	47.0	7.3	28.8	0.29	4.0
129	Tsunami	22-May	1-Jun	66.0	56.5	41.9	7.1	26.4	0.30	3.9
130	Ginney	22-May	1-Jun	63.6	54.8	41.2	7.0	25.0	0.30	3.8
131	Courtyard	22-May	30-May	61.0	52.2	43.3	7.2	27.3	0.31	3.9
132	Alexa	22-May	1-Jun	66.7	56.8	44.7	7.0	27.2	0.28	3.7
133	J-2885	21-May	1-Jun	59.2	51.4	41.8	7.2	26.6	0.31	4.0
134	Blue Velvet	22-May	1-Jun	69.0	57.9	46.0	7.2	26.0	0.28	3.9
135	Everest	22-May	1-Jun	62.3	53.7	41.2	6.5	24.1	0.29	3.8
136	Awesome	23-May	1-Jun	67.2	55.8	42.1	6.8	26.6	0.28	3.4
137	Excursion	22-May	1-Jun	63.3	53.6	42.6	7.1	27.5	0.29	3.7
138	Freedom III	22-May	1-Jun	67.1	56.9	45.4	7.1	28.4	0.31	3.8
139	EverGlade	22-May	1-Jun	65.5	54.4	41.6	6.8	27.7	0.28	3.2
140	Nu Destiny	23-May	1-Jun	61.2	50.1	41.9	6.7	25.5	0.30	3.5
141	Barrister	22-May	1-Jun	58.8	50.1	42.0	7.2	26.9	0.30	3.8
142	Beyond	21-May	1-Jun	64.7	52.9	45.8	6.9	27.0	0.31	3.7
143	Rugby II	22-May	1-Jun	55.7	48.1	39.9	7.1	25.4	0.31	3.7
144	Award	23-May	1-Jun	58.9	50.0	43.7	6.9	26.2	0.30	3.7
145	Rambo	24-May	1-Jun	60.7	52.9	44.3	6.7	27.5	0.28	3.7
146	Freedom II	22-May	30-May	82.7	63.2	39.5	6.3	23.0	0.28	2.7
147	Liberator	22-May	1-Jun	61.6	50.8	45.3	7.3	29.6	0.31	3.9
148	Armadillo	6-May	18-May	89.8	79.3	74.4	8.9	42.7	0.28	3.5
149	Moonshadow	19-May	29-May	90.1	71.3	45.7	8.0	24.2	0.31	4.0
150	Langara	13-May	24-May	85.1	75.0	49.8	8.1	27.3	0.31	3.3

(Continued)

Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Plant			Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf	
			Spread 1 <sup>3</sup>	Spread 2 <sup>4</sup>	Height <sup>5</sup>			Width <sup>8</sup>	Length <sup>9</sup>
151	A96-739	13-May	87.6	74.6	57.9	9.6	32.0	0.36	4.5
152	PST-H5-35	15-May	77.5	62.8	46.6	7.1	23.8	0.31	2.3
153	PST-B3-170	17-May	70.2	62.3	45.0	7.1	25.9	0.28	2.8
154	B4-128A	17-May	57.5	45.3	37.5	5.6	18.9	0.33	2.7
155	Bluestone	24-May	64.3	54.5	42.8	6.7	27.1	0.29	3.7
156	Washington	9-May	88.3	75.3	69.0	10.4	40.6	0.28	3.5
157	A96-746	12-May	72.3	60.4	58.4	10.3	35.0	0.35	4.7
158	A97-857	14-May	68.1	58.8	53.3	8.2	32.0	0.28	2.8
159	BAR Pp 0468	19-May	72.6	63.9	46.6	7.7	27.5	0.27	4.0
160	BAR Pp 0471	20-May	78.1	66.0	49.3	8.1	27.4	0.26	4.2
161	BAR Pp 0566	19-May	99.3	85.2	55.8	10.3	33.3	0.37	4.3
162	BAR Pp 0573	16-May	79.9	65.1	55.9	8.8	29.9	0.33	3.9
163	Bartitia	18-May	75.1	62.1	45.0	7.1	25.7	0.31	3.0
164	Baritone	15-May	81.4	66.2	59.3	8.4	36.0	0.32	3.6
165	Bariris	15-May	88.4	75.4	59.1	8.4	35.9	0.34	3.6
166	Barzan	17-May	63.3	54.5	50.9	6.5	33.4	0.23	2.4
167	Baronie	15-May	92.9	78.2	59.8	8.4	32.9	0.35	3.4
168	Unique	19-May	81.0	68.6	48.2	7.8	25.7	0.26	3.9
169	Serene	17-May	86.9	70.7	49.5	6.9	27.5	0.32	2.9
170	Moonlight	19-May	83.7	70.4	43.2	7.6	22.6	0.27	3.2
171	Blackstone	13-May	65.3	55.3	45.4	7.5	22.2	0.30	3.6
172	Rita	19-May	108.5	91.4	54.3	8.4	30.4	0.31	2.9
173	North Star	18-May	54.7	44.1	34.1	4.9	16.8	0.24	3.0

(Continued)

Table 1 (continued).

Cultivar or Selection	Heading Date <sup>1</sup>	Flowering Date <sup>2</sup>	Spread 1 <sup>3</sup>	Plant Spread 2 <sup>4</sup>	Height <sup>5</sup>	Panicle Length <sup>6</sup> (cm)	Height <sup>7</sup>	Flag Leaf Width <sup>8</sup>	Length <sup>9</sup>
LSD at 5% =	1.5 Days	1.3 Days	7.5	7.2	5.2	0.7	3.0	0.11	0.7

<sup>1</sup>Date when the majority of the plant is sending up panicles

<sup>2</sup>Date when the majority of the plant is in flower and readily releasing pollen

<sup>3</sup>Distance between the longest extending rhizomes

<sup>4</sup>Distance between the longest extending rhizomes perpendicular to the plant spread 1 measurement<sup>3</sup>

<sup>5</sup>Distance from the crown of the plant to the tips of the majority of the panicles

<sup>6</sup>Distance between the tip of the panicle and the bottom bract

<sup>7</sup>Distance from the crown of the plant to the flag leaf

<sup>8</sup>Measure of the widest part of the flag leaf

<sup>9</sup>Distance between the flag leaf ligule and the flag leaf tip