

PUBLICATIONS

1993

**Forage Research
in Texas,
1993**

Bluestem Variety Trial in Southeast Texas

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Summary

Five old-world bluestem plant introductions (PI's) selected from preliminary evaluations and eight varieties were compared for adaptability to poorly drained clay soils, early growth, total yield, and crude protein concentration at the Angleton Research Station in southeast Texas. 'Gordo', PI302040, 'PMT587', 'Pretoria 90', and PI300793 were the most productive the first year; yields exceeded 8,000 lb/acre. The second year, 'Kleberg', PI215342, and Gordo were the most productive at 11,000 lb/acre. By mid-summer of the third year, 'Caucasian', 'WW Ironmaster', 'WW Spar', and PI380755 stands were eliminated. Only Kleberg, PI215342, and Gordo maintained greater than a 90% stand. Crude protein concentration differed significantly at the first harvest, which was due in part to stage of maturity. Protein differences at later harvests were small. Kleberg and PI215342 had higher early production than did Gordo.

Introduction

Old-world bluestems are part of a complex of species belonging to the genera *Bothriochloa*, *Capillipedium*, and *Dichanthium*. Adapted to the southern Great Plains, they respond to management and have satisfactory forage quality (Dabo et al. 1988). They can tolerate stress and are particularly useful for the reclamation of depleted, fine-textured sloping soils. Old-world bluestems, however, perform poorly on sandy and saline soils. Good stands can be obtained with good management practices (Dalrymple 1990). Gordo bluestem (*Dichanthium aristatum*) is grown on clay soils from Victoria east to the Brazos River (Evers and Gabrysch 1993a). In April 1988, 417 PI's and four varieties of old-world bluestem were planted at the Angleton Research Station (Evers 1993). Entries were scored for early forage production and growth on the poorly drained clay soils for 2 years. Seed was collected from the best PI's. These were compared with six bluestem varieties for forage yield and crude protein concentration.

Keywords: old-world bluestems / southeast Texas.

Procedure

Seed of all entries were planted in peat cups in March 1990 and grown in the greenhouse because of limited seed of the PI's. Test site was a Lake Charles clay, which was sprayed with Eptam (EPTC) at 3.5 lb/acre and incorporated on 24 May 1990 for weed control. Entries were transplanted 30 May to 1 June 1990. Plots were 6 by 15 ft consisting of four rows 1.5 ft apart with 1 ft between plants within a row. Experimental design was a randomized complete block with four replications. Only two replications of Gordo and PI302040 and one plot of 'Pretoria', 'Medio', PI283191, and PI380755 were transplanted because of insufficient plants. Data are reported on these entries but were not included in statistical analysis.

Plots were harvested on 8 Aug. and 1 Oct. 1990 and 4 June, 31 July, and 30 Sept. 1991. Stands were rated on 14 July 1992. Fertilization during the study is reported in Table 1. At each harvest, a sample of the harvested forage from each plot was dried to determine dry matter percentage and was analyzed for crude protein by the Kjeldahl procedure.

Results and Discussion

Kleberg and PMT 587 bluestems were the most productive replicated varieties in 1991 (Table 2). Gordo and PI30240 were replicated only twice but were the most productive entries overall with more than 11,000 lb/acre in total yield. The stand of PI380755 was lost by autumn of 1990. Early production of Gordo, the bluestem variety grown in the area, was

Table 1. Fertilizer applications to bluestem study at Angleton, Texas, 1990 and 1991.

Date	N	P ₂ O ₅	K ₂ O
 lb/acre		
24 May 1990	48	60	0
16 Aug. 1990	50	0	0
2 May 1991	48	60	0
4 June 1991	50	0	0
31 July 1991	50	0	0

poor, so it was one of the selection criteria in the earlier study (Evers 1993). Differences in early growth could not be evaluated in 1991 because the plants were not placed in the field until 1 June. WW Ironmaster, selected for alkaline soils, had very poor summer production, which may have been due to the low soil pH (6.2) of the test site. Protein concentration ranged from 6.23 to 9.08 on 8 August and 4.35 to 7.36 on 1 October (Table 3). The significantly higher protein concentration of WW Ironmaster at the first harvest was due to a more immature forage because of slower growth. There was no significant difference

in protein concentration among replicated varieties at the second harvest.

Kleberg, PI215342, and PMT 587 had substantially higher forage production than did Gordo at the first harvest in 1991 (Table 4). By the second harvest, WW Ironmaster and WW Spar stands were lost and 'Caucasian' produced only half of what the other varieties did. Caucasian stands were gone by the third harvest. Yields of Kleberg, Gordo, and PI215342 exceeded 11,000 lb/acre. Protein concentration of PI 300793 was significantly higher than that of the other entries at first harvest (Table 5). This was probably due to slower growth because PI300793 had the

Table 2. First-year production of bluestem varieties at Angleton, Texas, 1990.

Cultivar	8 Aug.	1 Oct.	Total
.....dry matter lb/acre			
PMT 587	4430 a*	4749 a	9178 a
PI300793	3543 bc	4723 ab	8266 ab
PI215342	3566 bc	4246 bc	7812 bc
Kleberg	3574 bc	3921 c	7495 bc
WW Spar	4063 ab	3080 d	7143 bc
Caucasian	3146 c	2454 e	5600 d
WW Ironmaster	1702 d	3169 d	4871 d
Gordo	5295	6207	11502
PI302040	5607	5418	11025
Pretoria 90	3597	5352	8949
PI283191	3316	4650	7966
Medio	4873	2829	7702
PI380755	3456	NR†	3456

*Values within a column followed by the same letter are not significantly different, 0.05 level, Waller-Duncan multiple range test.

†NR - no regrowth.

Table 3. First-year crude protein analysis of bluestem varieties at Angleton, Texas, 1990.

Cultivar	8 Aug.	1 Oct.
Kleberg	7.53 bc*	5.82 a
PI215342	7.06 c	5.55 a
PMT 587	7.89 b	6.73 a
PI 300793	7.30 bc	6.10 a
Caucasian	6.84 c	6.45 a
WW Ironmaster	9.08 a	6.67 a
WW Spar	7.29 bc	6.05 a
Gordo	6.96	4.35
PI302040	6.45	5.14
Pretoria 90	6.23	6.68
PI283191	7.06	7.36
Medio	6.48	6.24
PI380755	8.78	NR†

*Values within a column followed by the same letter are not significantly different, 0.05 level, Waller-Duncan multiple range test.

†NR - no regrowth.

Table 4. Second-year production of bluestem varieties at Angleton, Texas, 1991.

Cultivar	4 June	31 July	30 Sept.	Total
.....dry matter lb/acre				
Kleberg	3094 a*	3086 a	4952 ab	11432 a
PI215342	3142 a	3328 a	4762 a-c	11232 ab
Gordo	2437	3464	5192	11093
PMT 587	3149 a	3040 a	3716 c	9904 bc
PI300793	2000 c	3338 a	4068 bc	9406 c
Caucasian	2854 ab	1830 b	NR	4684 d
WW Ironmaster	2925 ab	NR†	NR	2925 e
WW Spar	2721 ab	NR	NR	2721 e

*Values within a column followed by the same letter are not significantly different, 0.05 level, Waller-Duncan multiple range test.

†NR - no regrowth.

Table 5. Second-year crude protein analysis of bluestem varieties at Angleton, Texas, 1991.

Cultivar	4 June	31 July	30 Sept.
%		
Kleberg	5.93 d*	4.74 bc	4.18 b
PI215342	5.86 d	4.45 c	3.41 c
Gordo	6.08	4.27	4.24
PMT 587	6.98 b	6.06 a	5.92 a
PI300793	9.14 a	5.19 b	4.08 b
Caucasian	7.40 b	5.82 a	NR
WW Ironmaster	6.91 bc	NR†	NR
WW Spar	7.11 b	NR	NR

*Values within a column followed by the same letter are not significantly different, 0.05 level, Waller-Duncan multiple range test.

† NR - no regrowth.

lowest production (Table 4). Protein levels observed in this study agree with those reported in an earlier study of Gordo bluestem (Evers and Gabrysch 1993b).

High rainfall kept soils at the test site saturated most of the time from autumn 1991 to early summer 1992. Total rainfall from November 1991 to June 1992 totaled 52.4 in. The level, poorly drained clay soils contributed to the loss of stands of most entries. Only Kleberg, Gordo, and PI215342 maintained greater than a 90% stand by July 1992, while stands of PI300793 and PMT 587 had been reduced to 30 and 15%, respectively. It was decided to terminate the study at that time.

Kleberg and PI215342 were equal to Gordo for total yield but did have higher early production. Excessive rainfall during the study eliminated germplasm not adapted to poorly drained clay soils. These three entries should be compared for seed production and ease of establishment to identify the most profitable old-world bluestem for southeast Texas.

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