Preliminary Studies On Forage Quality From Cultivars of Weeping Lovegrass [Eragrostis Curvula (Schrad.) Nees] Adapted to Marginal Regions of Argentina.

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Introduction

Weeping lovegrass [*Eragrostis curvula* (Schrad.) Nees] is a perennial C4 grass spread over tropical and subtropical regions worldwide. In Argentina, this forage crop covers 800.000 has; however it has potential to colonize marginal production areas due to its low input costs, fast growth and high biomass production in poor soils and semidesertic environments. Comparative studies showed that weeping lovegrass was more productive but with less forage quality than *P. virgatum L.*, *P. colorutum* L. and *T. dregei* during two growing seasons (Stritzler et al., 1996). Further reports indicated that weeping lovegrass and pangolagrass (*D. erianthra)* produced over 80% biomass, and weeping lovegrass produced 22% more biomass than pangolagrass in the growing season during a four-year study. Its biomass production was given by a longer growing season that allowed two extra-cuttings in summer and a higher survival rate during winter (Gargano et al., 2001). However, weeping lovegrass forage quality is low (>7% CP) and limits animal performance. Nowadays, there are no weeping lovegrass breeding programs in our country. Therefore, we decided to evaluate weeping lovegrass quality and yield traits in commercial and newly developed cultivars growing in marginal areas from the south of Argentina, to determine their potential as forage crop to be included in breeding programs or biotechnological projects.

Figure 1. Experimental field location at Asociación de Cooperativas Agronómicas (ACA) - Cabildo, Buenos Aires, Argentina. **A.** Physical map of Argentina and limiting countries **B.** Physical map of Bahia Blanca and limiting counties including the location of the experimental field at Cabildo (39º 36' South, 61º 64' West).

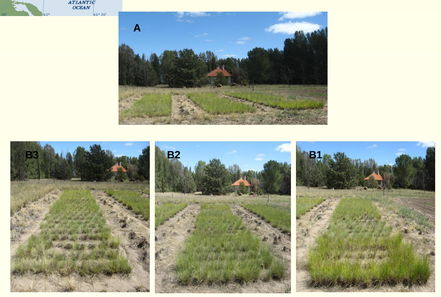

Figure 2. Experimental field at ACA-Cabildo, Buenos Aires, Argentina. **A.** General overview of the experimental design with the three blocks, **B1, B2, B3.** Detailed view of the three blocks (block 1, 2 and three respectively) with the seven tested cultivars in each block.

Materials and Methods

This experiment is located in an experimental field from the ACA –Asociación de Cooperativas Agronómicas- at Cabildo (Buenos Aires, Argentina) (Figure 1). It was done using a completely randomized block design including seven germplasm sources (five cultivars: Tanganyika, Morpa, Don Pablo, Don Juan, Don Eduardo, and two new accessions generated by biotechnological tools: UNST9355 and UNST9446), three blocks (B1, B2, B3) and eight plants per experimental field (Figure 2). The trial was fertilized with 100 kgN.ha^{-1} and watered to reach at least 200mm over the summer. Morphological and forage quality traits including dry weight (DW), dry matter (DM), ashes (A), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), lignin content (LC) and in vitro dry matter digestibility (IVDMD) were registered during two cuttings (November 20th , 2008 and May 6th 2009). Data were analyzed using the GLM procedure and means were compared using the Tukey test (P< 0.05) .

Results

Dry weight production varied between 2-2.3 tn.ha $^{-1}$ and 1-2.3 tn.ha^{-1} in the first and second cutting respectively (Figure 3). No significant differences were observed, among cultivars. However, the highest production was reached by UNST9446, followed by cvs. Don Pablo, Don Juan and Don Eduardo, and finally by cvs. Morpa and Tanganyika.

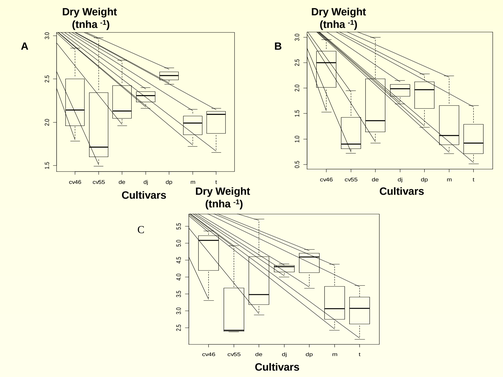

Figure 3. Dry weight from seven cultivars of weeping lovegrass [*E. curvula* (Schrad. Nees] during the growing season 2008-2009. **A.** Boxplots for dry weight at the first cutting (November 20th, 2008) **B.** Boxplots for dry weight at the second cutting (May 6th, 2009) . **C.** Boxplots for total dry weight. No significant differences were observed among cultivars in first, second or total dry weight values (P< 0.05) . cv*46* UNST9446, cv*55* UNST9355, *de* Don Eduardo, *dj* Don Juan, *dp* Don Pablo, *m* Morpa, *t* Tanganiyka.

References

Bajuk M, Antonini CA, Arenas FH, Morábito J, 2004. Weeping lovegrass yield with restricted irrigation in northern Mendoza oasis (Argentina). Rev FCA UNCuyo 36(1): 1-8.

Gargano AO, Adúriz MA, Arelovich HM, Amela MI, 2001. Forage yield and nutritive value of Eragrostis curvula and Digitaria eriantha in central-south semi-arid Argentina. Tropical Grasslands 35: 161–167.

Stritzler NP, Pagella JH, Varinia V, Ferri CM, 1986. Semi-arid warm-season grass yield and nutritive value in Argentina. J Range Management 49:121-125.

Also, no significant differences were observed for other forage quality traits among cultivars (i.e. DW, DM, NDF, LC and IVDMD) in the first cutting. However, CP and ADF showed that cvs. Morpa and Tanganyika had more CP and less ADF, cv. Don Eduardo had the lowest CP and cv. Don Juan had the highest ADF (Table 1).

Cultivars	Dry Weight (g)			Dry Matter (%)			Ashes (%)			Crude Protein (%)		
	Mean	Std Dev		Mean	Std Dev		Mean	Std Dev		Mean	Std Dev	
9446	162,7	39,5	a	93,4	1,5	a	7,4	0,1	bc	6,4	0,6	ab
9355	148,2	57,9	a	93,6	1,6	a	7,3	0,2	bc	6,2	0,6	ab
Don Eduardo	163,6	28,6	a	93,0	0,7	a	8,3	0,1	a	5,6	0,5	b
Don Juan	164,9	8,7	a	93,7	1,4	a	7,0	0,4	bc	6,0	0,3	ab
Don Pablo	182,6	6,7	a	93,9	1,2	a	7,4	0,2	b	6,7	0,3	ab
Morpa	140,6	15,6	a	93,1	1,6	a	6,8	0,1	bc	6,8	0,3	a
Tanganyika	141,5	20,0	a	94,3	1,4	a	6,8	0,1	c	6,8	0,4	a

Cultivars	NDF(%)			ADF (%)			LC (%)			IVDMD (%)		
	Mean	Std Dev		Mean	Std Dev		Mean	Std Dev		Mean	Std Dev	
9446	73,0	0,9	a	36,0	2,0	ab	3,8	0,8	a	57,0	3,0	a
9355	73,4	1,4	a	37,0	2,6	ab	4,3	1,0	a	55,4	3,4	a
Don Eduardo	72,7	0,7	a	37,1	2,1	ab	3,9	0,6	a	57,5	1,5	a
Don Juan	73,2	1,2	a	38,3	1,6	a	4,7	0,7	a	58,0	1,5	a
Don Pablo	72,5	0,6	a	35,3	1,7	ab	3,6	0,7	a	56,3	1,5	a
Morpa	73,3	0,3	a	34,5	1,9	b	3,9	0,7	a	58,2	2,0	a
Tanganyika	73,8	2,3	a	35,1	2,5	b	4,3	0,9	a	53,5	2,7	a

Table 1. Forage quality traits from seven cultivars of weeping lovegrass [*E. curvula* (Schrad. Nees] on November 20th, 2008. *NDF* Neutral Detergent Fiber, *ADF* Acid Detergent Fiber, *.LC* Lignin content, *IVDMD* In Vitro Dry Matter Digestibility . Different letters indicated significant differences among cultivars with the Tukey test (P< 0.05) .

Conclusions

Dry weight production during 2008 showed that weeping lovegrass cultivar growth was limited by cold temperatures in the winter and drought during the summer. However, the UNST9446 produced 4.5 tn.ha^{-1} with 6.4% CP, 3.8% LC and 57.0% IVDMD, and its production did not decrease through the summer. Moreover, the remaining cultivars produced between 34-46% dry weight during summer indicating that minimal management strategies such as fertilization and watering will increase weeping lovegrass production. Therefore, to evaluate yield and performance differences among cultivars it will be effective to apply minimal management strategies during the whole cycle (Bajuk et al., 2004). Also, cvs. Tanganyika and Morpa showed the highest CP and the lowest ADF suggesting that they will have higher digestibility, however there were no significant differences for LC and IVDMD. Forage quality traits will be evaluated for the second cutting and the experiment will be repeated this year.

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