DRY MATTER PRODUCTION AND NUTRITIVE VALUE OF FORAGE OF DIGITARIA ERIANTHA CV. IRENE IN TWO LOCATIONS OF THE CENTRAL SEMI-ARID REGION OF ARGENTINA.

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ABSTRACT

The aim of this experiment was to compare dry matter **(DM)** production rates and nutritive value of a warm-season grass, *Digitaria eriantha* cv. Irene, in two locations of Central Argentina, Santa Rosa **(SR)** and Villa Mercedes **(VM)**. The plants were established in two identical groups of plots, within a randomized block design. **DM** rates were calculated from serial, out of phase clippings, and **in vitro** dry matter digestibility **(IVDMD)** and crude protein **(CP)** content analyzed on subsamples. The study lasted for three consecutive growing seasons. Results showed that **DM** production rates were generally higher ($P<0.05$) in **SR** than in **VM,** but **IVDMD** and **CP** content showed no clear trends between both locations. **DM** production tended to lower from year 1 to 3, related to processes of N depletion from soils **(VM)** and diminishing rainfall **(SR)**. It is concluded that *D.eriantha* is a very promising warm-season grass to Central Argentina. Data of nutritive value obtained in one location can be used in others, but results of **DM** production rates should be taken under the conditions where they will be used.

KEY WORDS

Digitaria eriantha, dry matter production, nutritive value, location

INTRODUCTION

The semi-arid region of Central Argentina comprises about 10 million hectares, including part of several provinces (San Luis, Buenos Aires, La Pampa, Córdoba). Most agricultural systems are based on grazing beef production, where annual crops are important components of available forage. As soils of this region are highly susceptible to erosion, one of the goals of agricultural research is to replace annual crops by perennial pastures. *Digitaria eriaantha*, a warm-season grass introduced from South Africa, has shown very good adaptation to Central Argentina, as a source of abundant and good quality forage for livestock (Frasinelli *et al.,* 1992). Although this region is defined as semi-arid, it includes different soils, air temperatures and rainfall regimes. This heterogeneity would imply differences in dry matter production, seasonal distribution and nutritive value of forage, yielded by the same species in different locations. The objective of this study was to compare the yield, seasonal distribution and nutritive value of forage produced by *Digitaria eriantha* cv. Irene in two locations, representing two different environmental conditions, of the semi-arid region of Central Argentina.

MATERIALS AND METHODS

The study was conducted between 1992 and 1995 on the locations of Santa Rosa (**SR**), Province of La Pampa (Lat. 36½ 46' S; long. 64½ 16' W; 210 m ASL) and Villa Mercedes (**VM**), Province of San Luis (Lat. 33½ 39' S; long. 65½ 22' W; 515 m ASL) on an Entic Haplustol and a Typic Ustipsamen soils, respectively. Seeds of *D. eriantha* cv Irene were sown in pots, and the plants obtained, randomly distributed between the two locations. The individuals were then transplanted to the field in each location, within a randomized block design. The distribution of plots and all field details were identical in both locations. The experiment consisted of five series of plots, with three blocks in each series. Each plot was 3.90 m long by 2.40 m wide, consisting of 4 rows spaced 0.60 m apart; each row had 13 plants, spaced 0.30 m apart. All the plants were transferred to field between 15 and 20 December, 1991. The forage produced by *D.eriantha* was harvested at about 5 cm from ground level, following the serial, out of phase method of Anslow and Green (1967), as modified by Corral and Fenlon (1978). The clippings started in spring, 1992, continuing during the growing season, until the first frosts of fall, 1993.This resulted in a 35 days rotational clipping system. The same procedure was followed in 1993-94 and 1994-95. Total weight of harvested forage was recorded, and a subsample of each was dried at 60½C for 72 h to estimate dry matter yield, ground through a 1 mm screen in a Wiley type mill and processed for crude protein (**CP**) (N x 6.25) (Kjeldahl method) and in vitro dry matter digestibility (**IVDMD**) (Tilley and Terry, 1963). The results were compared between locations and years by analysis of variance, except for **IVDMD** and **CP**, Villa Mercedes, first year, as laboratory analyses were performed on pools of the three replications.

RESULTS AND DISCUSSION

The results of **DM** production rates, for **SR** and **VM**, during the three consecutive years of evaluation, are presented in Table 1. Most monthly rates were higher for **SR** than **VM**. During the first year, all **DM** production rates were higher ($P<0.05$) in **SR** than **VM** except for February ($P>0.05$). For year 2, the values obtained in **SR** were higher ($P<0.05$) until February; from then the trend in **DM** production changed to not significant differences ($P>0.05$) between locations during March, to higher ($P<0.05$) production rates in **VM** tthan in **SR** during April 1994. During year 3, **DM** production rates were similar in both locations, except for November and April, when rates **DM** production were higher ($P<0.05$) in **SR** than in **VM**. When comparisons between years are done, the results show a trend to diminishing forage production rates from year 1 to 3 of evaluation. This is more marked in **SR** than in **VM**, probably related to rainfall, that dropped from 946 mm during the first years of evaluation to 591 mm in the second year and 360 mm in the third year of evaluation (Table 1). For **VM**, the rainfall was similar for the three growing seasons. The trend to lower **DM** production from years 1 to 3 seems to be related to N extraction from the soil. As the N content of the soil of **VM** is lower than that of **SR**, it may be depressing forage production in **VM**. Grunow and Rabie (1985) found no effect of N fertilization on forage production by *Digitaria eriantha* above 100Kg N/ha and unpublished results (Frasinelli and Jouve, 1996) show a great increase of **DM** production rate of ***D.eriantha*** with N fertilization in **VM** and no significant differences in **SR**. The results of **IVDMD** are presented in Table 2. All the values were between 56,9 and 72,8 %. Except for the notably low digestibility of the forage harvested in **VM** in November 1992 (56,9%), probably due to the effect of a late spring frost, all the other values were high for a warm-season grass. Although some differences between locations were significant ($P<0.05$) (Table 2), no clear trends could be detected. Comparisons between years did not show any trend either.Table 3 shows the **CP** content of forage in both locations. The values were always above 6% **CP** on dry matter basis. During the first year of evaluation there was a trend to higher **CP** content in **SR** forage than in **VM**. For the growing season 1993-94 most values were higher in **VM** than in **SR**; the differences were significant ($P<0.05$) in November and February, but the following year of evaluation the comparison between locations showed the opposite, with most values

higher in **SR** than in **VM** (January and February, P<0.05). There was a trend, in both locations, to lower **CP** content of forage during mid-summer, when compared to spring and fall. Comparisons between years of evaluation did not show any clear trend in % **CP**. The two locations of central Argentina in the present experiment have different environmental conditions (soil and rainfall). These differences were expressed by *D.eriantha*, through different rates of production of **DM**. However, the nutritive value (**IVDMD** and **CP**) of the harvested forage could not be clearly related to locations. It can be concluded, therefore, that information about nutritive value, obtained in one location of the region can be used in the other one, but results of dry matter production can be hardly extrapolated.

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Table 1
Dry matter rates of Digitaria eriantha cv Irene (kg DM/ha.day) in Santa Rosa and Villa Mercedes.

Location	Month NOV.	DEC.	JAN.	FEB.	MAR.	APR.	Rainfall (mm) (Set-May)
			1992/93				
Sta. Rosa	45.9a	78.6a	55.3a	33.1ab	46.7a	17.8a	946
Va. Mercedes	20.9cd	42.1b	28.6b	29.8bc	22.7b	7.6b	616
	1993/94						
Sta. Rosa	28.8b	50.4b	51.3a	33.3a	20.7bc	7.4b	591
Va. Mercedes	16.5cd	24.4c	25.9b	25.7c	19.3bc	17.5a	524
	1994/95						
Sta. Rosa	22.6bc	26.0c	23.9b	15.5d	15.8bc	14.9a	360
Va. Mercedes	14.5d	25.8c	23.4b	14.2d	13.0c	5.7b	599
SEM:	7.3	11.7	4.9	4.1	9.0	2.1	

Values within a column followent ly different letter are significantly (P < 0.05)

Table 2
In vitro dry matter digeatibility (%) of *Digitaria eriantha* cv Irene in Santa Rosa and Villa Mercedes.

Location	Month NOV.	DEC.	JAN.	FEB.	MAR.	APR.
		1992/93				
Sta. Rosa	62.3	67.5	64.8	63.3	63.8	66.8
Va. Mercedes	64.4	63.5	61.7	61.2	68.4	62.7
		1993/94				
Sta. Rosa	66.6^{a}	65.3	65.0^{ab}	64.4a	64.9^{b}	65.8^{a}
Va. Mercedes	56.9^{c}	61.0^{b}	64.3^{b}	65.0a	63.1^{b}	64.7^{a}
		1994/95				
Sta. Rosa	61.0^{b}	61.0^{b}	67.1^{a}	65.8a	64.8^{b}	68.3^{a}
Va. Mercedes	64.8^{ab}	66.4^{a}	64.8^{ab}	68.1a	67.0^{a}	72.9^{a}
SEM:	1.8	0.8	0.8	2.6	0.7	5.2

Values within a column followed by a different letter are significantly different (P< 0.05)

Table 3
Crude protein (%) of *Digitaria eriantha* cv Irene in Santa Rosa and Villa Mercedes

Location	Month NOV.	DEC.	JAN.	FEB.	MAR.	APR
		1992/93#				
Sta. Rosa	19.3	12.7	8.5	8.9	11.1	13.2
Va. Mercedes	13.5	7.9	6.1	8.3	6.3	10.1
		1993/94				
Sta. Rosa	12.0b	8.4a	8.1bc	7.9c	8.2a	8.0b
Va. Mercedes	18.3a	8.8a	9.2ab	11.6a	7.4a	9.0ab
		1994/95				
Sta. Rosa	11.2b	11.2a	10.4a	9.3b	8.3a	12.2a
Va. Mercedes	9.1b	8.5a	6.3c	6.5d	9.3a	11.1ab
SEM:	2.9	2.6	0.6	0.2	0.6	1.6

Values within a column followed by a different letter are significantly different (P < 0.05)