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Agronomic characteristics of different corn cultivars for silage production in the agreste of Pernambuco State[1]

André Luis Alves Neves[2], Rafael Dantas dos Santos[3], Ítalo Reneu Rosas de Albuquerque[7], Luiz Gustavo Ribeiro Pereira[4*], José Nildo Tabosa[5], José Avelino dos Santos Rodrigues[6], Rui da Silva Verneque[4*] e Anselmo Luis Alves Neves[8]

[1]Trabalho financiado pelo CNPq/CTAgro nº 555708/2009-8 e Banco do Nordeste do Brasil nº 7539
[2]Núcleo Nordeste da Embrapa Gado de Leite, Aracaju, Sergipe, andre.neves@embrapa.br
[3]Embrapa Semiárido, Petrolina, Pernambuco
[4]Embrapa Gado de Leite, Juiz de Fora, Minas Gerais, Bolsista de produtividade do CNPq
[5]Instituto Agronômico de Pernambuco, Recife, Pernambuco
[6]Embrapa Milho e Sorgo, Sete Lagoas, Minas Gerais
[7]Universidade Federal da Bahia, Salvador, Bahia
[8]Engenheiro Agrônomo autônomo, Bom Jesus da Lapa, Bahia, Brasil

Abstract: – In this study, we evaluated agronomic traits and yields of five corn genotypes (BRS 1055, BRS 3035, BRS 2022, SÃO JOSÉ, and BRS CAIMBÉ). The experiment was set up in a randomized block design with five treatments and five replications. SÃO JOSÉ was prominent for PH, EIH, and PBP, with mean values of 2.05 m, 1.15 m, and 7.62%, respectively. BRS 3035, BRS 2022, and BRS CAIMBÉ attained the highest PDM (9.68, 9.66, and 8.62 t/ha, respectively). BRS 2022, BRS 3035, and BRS CAIMBÉ were the best for agronomic characteristics for silage production in the region of the Borborema Plateau, a semi-arid zone of Pernambuco State.

Keywords: forage, nutrition, ruminant, semiarid

Características agronômicas de diferentes cultivares de sorgo para a produção de silagem no agreste pernambucano

Resumo: Foram avaliadas as características agronômicas e as produtividades cinco genótipos de milho (BRS 1055, BRS 3035, BRS 2022, SÃO JOSÉ, BRS CAIMBÉ). Foi utilizado o delineamento experimental em blocos ao acaso, com cinco tratamentos e cinco repetições. O genótipo SÃO JOSÉ destacou-se em relação à altura de planta, de inserção de espigas e porcentagem de plantas quebradas, apresentando média de 2,05m, 1,15m m e 7,62%, respectivamente. Os genótipos BRS 3035, BRS 2022 e BRS CAIMBÉ obtiveram as maiores produções de matéria seca (9,68, 9,66 e 8,62 t/ha, respectivamente). Os genótipos BRS 2022, BRS 3035 e BRS CAIMBÉ destacaram-se quanto às características agronômicas para produção de silagem na região do Planalto da Borborema, sertão de Pernambuco.

Palavras–chave: forragem, nutrição, ruminante, semiárido

Introduction

The selection of corn genotypes for silage production aims to attain an economically viable product with a high grain/green matter (GM) ratio, which, when combined with suitable management of fertilization and harvest period, will produce larger yields of dry matter (DM) and grains, and result in a silage with higher nutritional value, which is more digestible and has a lower fiber content (MELO et al., 1999).

This study evaluated agronomic characteristics and yields of the cultivars BRS 1055, BRS 3035, BRS 2022, SÃO JOSÉ, and BRS CAIMBÉ, and focused on the production of silage in the agreste of Pernambuco State.

Material and Methods

The experiment was conducted from May to August 2011 at the Experimental Station of the Agronomic Institute of Pernambuco State (IPA), in São Bento do Una, Pernambuco State, Borborema Plateau. The area has an annual average rainfall of 655 mm; a semiarid megathermal climate; and soils predominantly of sandy loam textural class, known as "psament".

The investigation used a randomized block design with five treatments (BRS 1055, BRS 3035, BRS 2022, SÃO JOSÉ and BRS CAIMBÉ) and five replications. Each treatment comprised approximately 12 plants/m, which was attained after thinning at 20 days after emergence.

Fertilization was performed according to soil analysis. At sowing fertilization, we used 150 kg/ha ammonium sulfate + 450 kg/ha triple superphosphate + 100 kg/ha potassium chloride. Two-side dressing fertilizations were applied, the first on the 30th day, and the second on the 60th day after plant emergence, with the dose equivalent to 150 kg/ha ammonium sulfate.

Agronomic evaluations were performed when the plants exhibited grains in the middle of the cob at the dough/hard stage.

Variables were tested to check data normality, and later subjected to an analysis of variance, and means were compared using Tukey's test at the 5% level. All procedures were performed using R (R Development Core Team, 2011).

Results and Discussion

Significant differences ($p < 0.05$) were detected for PH, EIH and PBP (Table 1).

Table 1. Agronomic traits of the corn varieties

Varieties	NE[1]	PH (m)[2]	EIH (m)[3]	Plants/ha	PBP(%)[4]	PGM (t/ha)[5]	PDM(t/ha)[6]
BRS 1055	1.2	2.00b	0.74b	61428	6.52a	25.0b	6.12b
BRS 3035	1.28	2.05b	0.74b	61714	1.34b	35.86a	9.68a
BRS2022	1.2	1.97b	0.67b	62000	0.94b	40.28a	9.66a
SÃO JOSÉ	1.2	2.37a	1.15a	59714	7.62a	25.6b	6.12b
BRS CAIMBÉ	1.28	1.86b	0.73b	61143	1.92b	34.3ab	8.62ab
Mean	1.23	2.05	0.81	61200	3.66	32.2	8.04
CV (%)	16.15	7.33	15.47	6.24	45.81	15.51	20.43

Mean values followed by different letters in the same column are significantly different ($p < 0.05$) by Tukey's test. [1]NE – number of ears/plant; [2]PH – plant height; [3]EIH – ear insertion height; [4]PBP – percentage of broken plants; [5]PGM – production of green matter; [6]PDM – production of dry matter.

The HP of SÃO JOSÉ was 2.37 m, which was superior to that of other varieties ($p < 0.05$) at a mean HP of 2.05 m.

EIH was significantly different ($p < 0.05$), with SÃO JOSÉ having the highest value (1.15 m). The mean EIH among all cultivars was 0.81 m.

With regards to the percentage of broken plants (PBP), which had a significant difference ($p < 0.05$), SÃO JOSÉ and BRS 1055 had higher values at 7.62% and 6.52%, respectively. These high PBPs for SÃO JOSÉ and BRS 1055 are most likely associated with higher PHs and EIHs combined with wind speed.

The values of PGM and PDM/ha, which showed a significant difference among varieties ($p < 0.05$), are listed in Table 1. BRS 3035 and BRS 2022 were superior to BRS 1055 and SÃO JOSÉ with respect to production of GM (PGM) and dry matter (PDM) and similar to that of BRS CAIMBÉ.

Only the percentage of ears in GM was significantly different ($p < 0.05$) (Table 2), with BRS 1055 and BRS CAIMBÉ exhibiting the highest percentages (43% and 43.6%, respectively), but similar to that of BRS 3035 and BRS 2022. This value was lower in SÃO JOSÉ, at 35% of ear in GM, but equal to BRS 3035 and BRS 2022.

Table 2. Percentage participation of ear, stem, and leaf in the corn varieties

Cultivars	Ear		Stem		Leaf	
	%GM	%DM	%GM	%DM	%GM	%DM
BRS 1055	43.0a	42.2	36.6	37.2	20.4	20.6
BRS 3035	41.6ab	38.4	39.8	39.4	18.6	22.2
BRS 2022	41.8ab	36.8	40.8	43.4	17.4	19.8
SÃO JOSÉ	35.0b	34.0	44.4	42.4	20.6	23.6
BRS CAIMBÉ	43.6a	39.2	38.8	40.8	17.6	20.0
Mean	41.0	38.12	40.08	40.64	18.92	21.24
CV (%)	9.66	14.43	10.46	13.94	9.20	13.47

Mean values followed by different letters in the same column are significantly different ($p < 0.05$) by Tukey's test. GM – green matter; DM – dry matter.

The percentages of ear in GM and stem and leaf in GM and DM were not different among varieties ($p > 0.05$), which affirmed that these materials presented similar phenological characteristics.

Analysis of the proportionality relationship among ear, stem, and leaf is very important because it indicates the potential of these genotypes to provide soluble carbohydrates in adequate amounts for optimal fermentation and, consequently, the production of high-quality silages with high productivity (SANTOS et al., 2010).

Conclusions
BRS 2022, BRS 3035, and BRS CAIMBÉ excelled in agronomic characteristics for silage production in the Borborema Plateau, a semi-arid zone of Pernambuco State.

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