

## AGRONOMIC PERFORMANCE OF FORAGE CORN CULTIVARS IN HIGH AND LOW PHOSPHORUS

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**Abstract**–Silage produced with the entire corn plant (*Zea mays* L.) has been an increasingly widespread alternative as bulky food for ruminants. One of the main care in crop management with a view to silage production is related to fertilization. In tropical soils (such as those in the south of the state of Pará) phosphorus is the most limiting nutrient for agricultural production. Because of the above, the present work aims to know the agronomic performance of forage corn cultivars in high and low phosphorus in the South of the state of Pará. For this, two competition trials of maize cultivars under contracting conditions of phosphorus (P) were carried out: high P (100 kg ha<sup>-1</sup> from P<sub>2</sub>O<sub>5</sub>) and low P (50 kg ha<sup>-1</sup> from P<sub>2</sub>O<sub>5</sub>), using as a source the simple superphosphate (18% from P<sub>2</sub>O<sub>5</sub>). The experimental design was randomized blocks with fourteen treatments and three replications. The treatments were composed of fourteen cultivars, eleven of these were the hybrids: AG1051, AG8088, BM3061, BR2022, BR205, BR206, BRS3046, CR-120, M274, ORION, and PR27D28, and the other three were open pollination populations (PPA): AL BANDEIRANTE, ANHEMBI, and CATIVERDE. The variables evaluated were: height of insertion of the ear (AE) and plant height (AP), total weight per plant (PPT), the weight of the cob with straw (PESP), and weight of the ear without straw (PESP). The medium was compared by the test of groups of Scott and Knott, the 5% of significance, using the program SISVAR. Considering the overall performance of the cultivars, in all traits evaluated in the two trials, the sum of their results points to the cultivar BRS3046 as the most promising for silage production. The high test P, as expected, has been used about the low P.

### INTRODUCTION

With the advance of livestock activity in the form of intensive and semi-intensive breeding, the production of bulky and its conservation became critical points for producers. Silage produced with the entire corn plant (*Zea mays* L.) has been an increasingly widespread alternative as bulky food for ruminants (Resende *et al.*, 2016). Being used as a way to mitigate production costs by increasing animal performance. This is due to the possibility of

reducing the amounts of concentrated food depending on the supply of silage as bulky food (Basi *et al.*, 2011).

Corn is one of the most expressive cereals in Brazil, with a full cultivated field - crop 2020/2021, of 19,495.2 million hectares, with a full production of 108,068.7 million tons (CONAB, 2022). Data to the most recent survey of the Conab, the planted area of corn second crop of Pará grew by 26%. The production was 367.5 thousand tons. Counting the two harvests, the State has planted a field of 230.6

thousand acres (21.2% higher than the previous one) and a production of 974 thousand tons, or 16.7% higher than the crop 2019/2020.

One of the main care in crop management with a view to silage production is related to fertilization (Basi *et al.*, 2011). Orphosphorus (P) is one of the essential macronutrients for plants participating directly in a matrix of processes such as energy generation, nucleic acid synthesis, activation of inactivation/signaling enzymes, and carbon metabolism (Huang *et al.*, 2010), playing a key role in plant development.

Although the requirements of corn in P are in smaller amounts when compared to nitrogen and potassium, the normally recommended doses are high, due to the low efficiency of utilization of this nutrient by the crop (Bastos *et al.*, 2010) resulting from the high adsorption capacity of phosphorus added to the soil, reducing its availability to plants (Corrêa *et al.*, 2008). In tropical soils (such as those in the south of the state of Pará) phosphorus is the most limiting nutrient for agricultural production, because it presents low mobility in the soil, often becoming the factor that restricts plant growth (Bastos *et al.*, 2010).

There are studies on P fertilization, as in genetic divergence (Coelho *et al.*, 2019); efficiency and response to P doses (Bastos *et al.*, 2010; Macielet *et al.*,

2020), cultivation and management systems (Nunes *et al.*, 2011); extraction and export by maize in organic fertilization (Menezes *et al.*, 2018) and several others. However, there are few studies on silage and P fertilization in corn crops in the State of Pará.

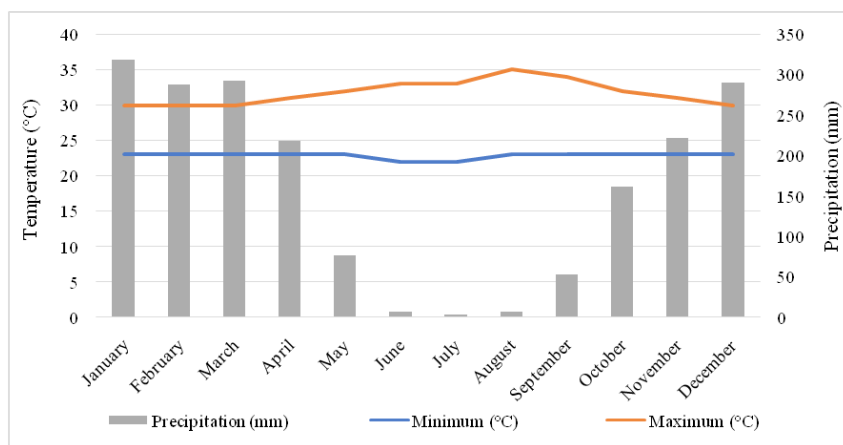
Because of the above, the present work aims to know the agronomic commitment of forage corn cultivars in high and low phosphorus in the South of the state of Pará.

## MATERIALS AND METHODS

Two competition trials of corn cultivars were conducted at Sítio Vitória, Municipality of Santa Maria of Barreiras, Pará State. The climate of the region is classified as the Aw. Being characterized the tropical, having periods of rainfall and drought well defined (Figure 1) according to the classification of Köppen (Dubreuil *et al.*, 2017).

The soil of the experimental field presents very low phosphorus contents (Tabela 1).

The tests were installed under contrasting phosphorus conditions: high P (100 kg ha<sup>-1</sup> of P<sub>2</sub>O<sub>5</sub>) and low P (50 kg ha<sup>-1</sup> of P<sub>2</sub>O<sub>5</sub>), applied in sowing using as a source the simple superphosphate fertilizer (18% of P<sub>2</sub>O<sub>5</sub>). Phosphorus doses were defined according to the need of the corn crop, soil



**Fig. 1.** Precipitation (mm) and temperature (°C) municipality of Santa Maria of Barreiras, Pará State. Source: Clima Tempo (2022).

**Table 1.** Chemical and physical characteristics of the soil from the experimental field to 0–20 cm.

Clay %	pH CaCl <sub>2</sub>	M.O. dagkg <sup>-1</sup>	P mg dm <sup>-3</sup>	K mg dm <sup>-3</sup>	Ca cmol <sub>c</sub> dm <sup>-3</sup>	Mg cmol <sub>c</sub> dm <sup>-3</sup>	Al cmol <sub>c</sub> dm <sup>-3</sup>	CTC cmol <sub>c</sub> dm <sup>-3</sup>
15	4,8	1,7	4,9	43	1,7	0,3	0,20	5,21

M.O: Organic matter.

nutrient content, and taking into account the usual doses of producers (Sousa and Lobato, 2004).

The experimental design used in each assay was randomized blocks with fourteen treatments and three replicates. The treatments were composed of fourteen cultivars, eleven of these were the hybrids: AG1051, AG8088, BM3061, BR2022, BR205, BR206, BRS3046, CR-120, M274, ORION, and PR27D28, and the other three were open pollination populations (PPA): Al Bandeirante, Anhembi, and Cativerde (Table 2).

The experimental plot consisted of four rows of 5.00 m, with a spacing of 0.90 m. In the harvest, the two central rows of each were used, discarding 0.50 m from each end, totaling one field useful of 4 m<sup>2</sup>.

Soil preparation was performed with, grading, and sulking. Sowing and fertilization were carried out manually on 23 December 2011–2021. Thinning was performed after emergence, leaving the spacing of 0.20 m between corn plants, to obtain a population of 55.555 plants ha<sup>-1</sup>.

Nitrogen and potassium fertilization, in cover, were divided into the stages V4 and V8 (four and eight sheets completely open). The dose of 150 kg ha<sup>-1</sup> of N and 90 kg ha<sup>-1</sup> of K<sub>2</sub>O, having as source the urea (43% of N) and potassium chloride (60% of K<sub>2</sub>O).

Cultural treatments, such as phytosanitary control of diseases, pests, and weeds were carried out following the technical recommendations of the crop (Borém *et al.*, 2015).

The harvest was performed when the plants

reached the ideal physiological stage (R5) silage productivity with maximum nutritional efficiency. Whole plants of the useful plot were harvested and the characteristics were measured for Height of ear insertion (AE) and Plant Height (AP) with a metric tape, considering the distance from the ground to the insertion of the first ear and the last open leaf, respectively, total weight per plant (PPT), weight of the cob with straw (PESP) and weight of the ear without straw (PESP) with the use of precision scale (Marafonet *et al.*, 2015).

After tabulation of the data, they were submitted to the normality test. Then, variance analysis was performed for each assay and, after, joint analysis following the criterion of homogeneity of the residual medium squares of the assays.

The medium was compared by the test of groups of Scott and Knott (1974), the 5% of significance, using the program SISVAR (Ferreira, 2014).

## RESULTS AND DISCUSSION

There was a significant effect of the interaction Dose x Cultivate (Table 3) for all variables. According to Perecinand Cargnelutti Filho (2008), the significance of the interaction demonstrates that the factors studied are dependent, that is, the behavior of cultivars for these variables depends on the presence or absence of phosphorus (Maciel *et al.*, 2020).

In invariance analysis (Table 3) the coefficients of variation alternated between 4.63% (PPT) the 11.64% (PESP). These data cause the design to be classified

**Table 2.** Agronomic characteristics of the fourteen maize cultivars used in the experiment.

Trade name	Genetic basis	Transgenics	Cycle	Technological level	Purpose of use
AG 1051	HD	C	SMP	M/A	G/MV/SPI
AG8088	HS	PRO 2	P	A	G/SPI
ALBAND	PPA	C	P	B/M	G/SPI
ANHEMBI	PPA	C	P	B/M	G/SPI
BM3061	HT	C	P	M/A	G/MV/SPI
BR2022	HD	C	P	B/M	G/SPI
BR205	HD	C	P	B/M	G
BR206	HD	C	P	B/M	G/SPI
BRS3046	HT	C	SMP	M/A	G/MV/SPI
CATIVERDE	PPA	C	SMP	M	MV/SPI
CR-120	HD	C	P	M/A	G/SPI
M274	HD	C	P	B/M	G/SPI
ORION	HD	C	SMP	B/M	G
PR27D28	HD	C	SP	B/M	G/SPI

HS: simple hybrid, HD: double hybrid, HT: triple hybrid, PPA: open pollination populations; G: grain, MV: green corn, SPI: whole plant silage; C: conventional; PRO2: technology VT PRO 2<sup>™</sup>; P: precocious; SMP: semi-early; SP: Superprecocoe; A: high; M: medium and B: low. Thedaptado of Pereira Filho andBorghgi (2016), Pereira Filho and Borghi (2020).

as high experimental precision, due to the categorization of the coefficient of variation as low (Pimentel-Gomes, 2009).

The medium of AP (Table 4) ranged from 170 the 243 cm. Both low P dose and high P dose, cultivars were divided into two groups of the medium.

In the test with low content of P, the cultivars AG1051, CATIVERDE, CR-120, and M274 had the highest medium, while the cultivars AG8088, ALBANDEIRANTES, ANHEMBI, BM3061, BR2022, BR205, BR206, BRS046, ORION, and PR27D28 presented the lowest medium. In treatment with a high dose of P cultivars BM3061, BR205 and CATIVERDE showed higher medium and AG1051, AG8088, ALBANDEIRANTES, ANHEMBI, BR2022, BR206, BRS3046, CR-120 M274, ORION, and PR27D28 had the lowest medium.

The cultivars ALBANDEIRANTES, BRS3046,

CATIVERDE, CR-120, M274, ORION, and PR27D28 obtained the highest medium with low and high P content, while in the general medium of the cultivars, three groups of medium were found, where the cultivar CATIVERDE presented the highest medium and the cultivars AG8088, ANHEMBI and PR27D28 composed the group with the lowest medium.

Maciel *et al.* (2020) evaluating maize genotypes under the same fertilization conditions, obtained a medium of AP from 211 cm, with measures that varied from 182 the 240; that is, it obtained a higher medium, but with a lower amplitude of measurements than that found in this study. There are other studies evaluating the behavior of corn in response to different nitrogen and potassium fertilization, such as Silva *et al.* (2019) and Parente *et al.* (2016) where the medium of AP than in this

**Table 3.** Analysis of joint variance of spike height (AE), plant height (AP), Total Weight per Plant (PPT), Weight of the Cob with Straw (PESP), and Weight of the ear without Straw (PESP) of fourteen maize cultivars submitted to high and low P.

Source of variation	Degree of freedom	Middle square				
		AP	AE	PPT	PECP	PESP
Dose	1	10925.76*	6052.01*	708218.68*	118876.19*	52700.19*
Cultivate	13	862.95*	1214.74*	45693.68*	12472.71*	9121.29*
Dose x cultivate	13	243.94*	155.76*	35278.29*	4499.91*	4723.68*
Block (Dose)	4	148.35 <sup>ns</sup>	35.98 <sup>ns</sup>	1952.13 <sup>ns</sup>	869.94 <sup>ns</sup>	494.74 <sup>ns</sup>
CV (%)		6.21	5.55	4.63	8.67	11.64
Medium		206	113	967	389	277

\* Significant and<sup>ns</sup> not significant by the test F to the 5% of significance; CV = Coefficient of Variation.

**Table 4.** Medium plant height (AP) of fourteen maize cultivars submitted in low and high P.

Cultivate	Genetic basis	Baixo P			High P			Medium	
		AP	Letter	Group	AP	Letter	Group	AP	Letter
AG1051	HD	211	a	A	220	b	A	216	b
AG8088	HS	170	b	B	203	b	A	186	c
ALBAND	PPA	195	b	A	210	b	A	203	b
ANHEMBI	PPA	178	b	B	210	b	A	194	c
BM3061	HT	191	b	B	228	a	A	210	b
BR2022	HD	190	b	B	223	b	A	206	b
BR205	HD	190	b	B	243	a	A	217	b
BR206	HD	197	b	B	218	b	A	208	b
BRS3046	HT	197	b	A	208	b	A	202	b
CATIVERDE	PPA	224	a	A	243	a	A	233	a
CR-120	HD	202	a	A	216	b	A	209	b
M274	HD	206	a	A	220	b	A	213	b
ORION	HD	195	b	A	214	b	A	204	b
PR27D28	HD	184	b	A	194	b	A	189	c
Medium		195		B	218		A	206	

Medium followed by the same lowercase letter in the column and uppercase in the row belonging to the same group, by the grouping criterion of Scott & Knott (1974), the 5% of significance. HS: simple hybrid, HD: double hybrid, HT: triple hybrid, PPA: open pollination populations.

study, and consolidating with these data, Oliveira *et al.* (2019) also observed an increase in AE and AP of corn plants with the use of phosphorus.

Almeida (2019) states that the variables plant heights and plant dry matter showed positive and significant responses to the application of  $P_2O_5$  in the sowing groove, that's because the development of the aerial part of the corn is influenced by the amount of phosphorus absorbed (Saldanha *et al.*, 2017). This statement can be found in Table 4.

With the medium of AE (Table 5) ranging from 85 the 147 cm in the general framework, both in the trial with low content of P, as in the high-level test content of P the cultivars were divided into five medium groups for each treatment of P. Standing out with the highest medium for the low dose P to cultivate CATIVERDE, the lowest medium were observed in the cultivars: AG8088, ANHEMBI, and BM3061. In high-dose testing P, the cultivars CATIVERDE and M274 had the highest medium of AE and on the other hand, cultivated ANHEMBI composed the lowest medium group.

The cultivars CATIVERDE, CR-120, and PR27D28 had the highest medium in both trials. In the general medium, composed of seven groups of media, the cultivar CATIVERDE again presented the highest medium alone while the lowest medium of ear height was represented by the cultivar ANHEMBI.

Costa (2020), when evaluating agronomic performance in green corn cultivars in the Cerrado-Amazon Ecotono, observed that in the height of the

ear, the overall medium from 80 cm, ranging from 60 cm (AG 8088) the 106 cm (AG 1051); differing from this work, where the medium ranged from 85 and 147 cm, both cultivars, AG8088 and AG105, had higher medium with 95 and 128 cm, respectively.

A height of ear insertion high predisposes plants to bedridden (Zoz *et al.*, 2018), and also disfavors the accumulation of carbohydrates in the grains, because the leaves above the ear are more efficient in productivity (Alvim *et al.*, 2011). However, the height of the plant and insertion of the ear affects mechanized crop losses and grain purity (Campos *et al.*, 2010), that is, the "adjective" of higher medium is not synonymous with better medium, a statement that is also valid for the contrary.

All cultivars, except for PR27D28, had a medium of PPT top in high P (Table 6); divided into three groups, the highest mediums in treatment with high content of P, were observed in cultivars BM3061, BR206, and BRS3046 the lowest medium were represented by cultivars AG8088, ALBAND, ANHEMBI, CATIVERDE, ORION, and PR27D28.

The assay with the lowest dose of P was divided into five groups of the medium, the hybrid being PR27D28, the cultivar that obtained the highest medium weight, and cultivars BM3061 and BR205, the ones with the lowest medium. Regarding the general medium, divided into six groups of the medium, cultivar BR206 obtained the highest medium and cultivar BR205 the lowest weight.

Although it is known that several factors, directly

**Table 5.** Medium height of insertion of the ear (AE) of fourteen maize cultivars submitted in low and high P.

Cultivate	Genetic basis	Low P			High p			Medium	
AG1051	HD	120	b	B	135	b	A	128	c
AG8088	HS	85	e	B	105	d	A	95	f
ALBAND	PPA	100	d	B	119	c	A	109	e
ANHEMBI	PPA	81	e	B	92	e	A	86	g
BM3061	HT	90	e	B	133	b	A	111	e
BR2022	HD	100	d	B	121	c	A	111	e
BR205	HD	97	d	B	113	c	A	105	e
BR206	HD	109	c	B	130	b	A	120	d
BRS3046	HT	111	c	B	129	b	A	120	d
CATIVERDE	PPA	138	a	A	147	a	A	143	a
CR-120	HD	103	d	A	113	c	A	108	e
M274	HD	122	b	B	139	a	A	131	b
ORION	HD	101	d	B	122	c	A	112	e
PR27D28	HD	112	c	A	108	d	A	110	e
Medium		105		B	122		A	113	

Medium followed by the same lowercase letter in the column and uppercase in the row belonging to the same group, by the grouping criterion of Scott and Knott (1974), the 5% of significance. HS: simple hybrid, HD: double hybrid, HT: triple hybrid, PPA: open pollination populations.

and indirectly, affect the full weight of the plant, a contrasting positive response of cultivar BM3061 was observed, which ranged from 660 g under P to 1217 g with a high P dose. However, it was also noted, unexpected behavior of the cultivar PR27D28, where it got the highest medium PPT in the trial with low content of P. In this context, it is believed that the cultivar is not so demanding for P and can express its maximum potential, genetically defined, of the characteristic: total weight per plant; for more concrete statements it would be necessary a more detailed study, evaluating the behavior of the cultivar under different doses of P, so that it can affirm which dose of maximum technical efficiency.

Basi *et al.* (2011) in their work evaluating the influence of nitrogen on the quality of silage corn state that the nutritive value of silage is determined not only by the percentage of grains in the full mass, but also by the quality and participation of the structural components of the plant such as stem, leaves, cob, and straws. In this context, the variable: total weight per plant, has importance highlighted, since this is the sum of the whole plant, which directly contributes to productivity.

With a medium ranging from 255 to 518 g, the medium of the PECP (Table 7) obtained two cultivars standing out with higher weights in the general medium: the BRS3061 and CR-120.

In low P content, three groups of media were observed, with cultivars BRS3046, CR-120, and P27D28 representatives of the highest medium,

while BR206 and M274 represented the lowest medium. In the high-dose treatment of P, also divided into three groups, cultivars BM3061, BR2022, BR3046, and CR-120 obtained the highest medium, and the cultivars ALBAND, ANHEMBI, BR205, BR206, ORION, and PR27D28 the lowest medium.

Grigulo *et al.* (2011) evaluating the hybrid AG 1051 in the environmental conditions of Mato Grosso do Sul found a medium weight value of ears with straw of 215 g; this value, lower than that found in this work. Costa (2020), evaluating PECP under the same edaphoclimatic conditions of this experiment, observed a medium of 284 g, which, once again, is lower than that observed in this work.

Both trials (low and high P content) showed only two groups of medium (Table 8), in treatment with a high dose of P, only the cultivated CATIVERDE presented a statistically lower medium than the other ones, already at the low P dose, the highest medium of PESP were composed of cultivars: AG8088, BM3061, BRS3046, CARTIVERDE, and CR-120.

Divided into three groups, the general medium is composed of AG8088, BM3061, BRS3046, and CR-120 in the group of the highest medium; ALBAND, ANHEMBI, and BR2022 in the group with lower medium, the other presented intermediate values, as shown in Table 8.

In Brazil, there is no corn cultivar recommended only for silage production. Currently, the hybrids

**Table 6.** Medium total weight per plant (PPT) of fourteen maize cultivars submitted in low and high P.

Cultivate	Genetic basis	Low P		High P		Medium
AG1051	HD	993	b B	1102	b A	1048 b
AG8088	HS	897	c B	1010	c A	954 d
ALBAND	PPA	782	d B	990	c A	886 d
ANHEMBI	PPA	753	d B	967	c A	860 e
BM3061	HT	660	e B	1217	a A	938 d
BR2022	HD	900	c B	993	c A	947 d
BR205	HD	665	e B	910	c A	788 f
BR206	HD	1045	b B	1205	a A	1125 a
BRS3046	HT	908	c B	1200	a A	1054 b
CATIVERDE	PPA	935	c B	1028	c A	982 c
CR-120	HD	865	c B	1115	b A	990 c
M274	HD	878	c B	1123	b A	1001 c
ORION	HD	857	c B	1002	c A	929 d
PR27D28	HD	1113	a A	962	c B	1038 b
Medium		875	B	1059	A	967

Medium followed by the same lowercase letter in the column and uppercase in the row belonging to the same group, by the grouping criterion of Scott and Knott (1974), the 5% of significance. HS: simple hybrid, HD: double hybrid, HT: triple hybrid, PPA: open pollination populations.

**Table 7.** Ear weight medium with straw (PECP) of fourteen maize cultivars submitted in low and high P.

Cultivate	Genetic basis	Low P			High P			Medium	
AG1051	HD	360	b	B	448	b	A	404	b
AG8088	HS	382	b	B	452	b	A	417	b
ALBAND	PPA	255	d	B	370	c	A	313	d
ANHEMBI	PPA	298	d	B	423	c	A	361	c
BM3061	HT	355	b	B	487	a	A	421	b
BR2022	HD	347	b	B	480	a	A	413	b
BR205	HD	280	d	B	347	c	A	313	d
BR206	HD	335	c	A	380	c	A	358	c
BRS3046	HT	423	a	B	498	a	A	461	a
CATIVERDE	PPA	370	b	A	405	c	A	388	c
CR-120	HD	408	a	B	518	a	A	463	a
M274	HD	330	c	B	435	b	A	383	c
ORION	HD	360	b	A	382	c	A	371	c
PR27D28	HD	422	a	A	353	c	B	388	c
Medium		352		B	427		A	389	

Medium followed by the same lowercase letter in the column and uppercase in the row belonging to the same group, by the grouping criterion of Scott and Knott (1974), the 5% of significance. HS: simple hybrid, HD: double hybrid, HT: triple hybrid, PPA: open pollination populations.

**Table 8.** Medium of the weight of the ear without straw (PESP) of fourteen maize cultivars, submitted in low and high P.

Cultivate	Genetic basis	Low P			High P			Medium	
AG1051	HD	189	b	B	335	B	A	262	b
AG8088	HS	275	a	B	358	A	A	317	a
ALBAND	PPA	213	b	A	255	C	A	234	c
ANHEMBI	PPA	225	b	A	232	C	A	228	c
BM3061	HT	280	a	B	347	A	A	313	a
BR2022	HD	205	b	B	278	C	A	242	c
BR205	HD	195	b	B	318	B	A	257	b
BR206	HD	223	b	A	224	C	A	224	c
BRS3046	HT	320	a	B	383	A	A	352	a
CATIVERDE	PPA	308	a	A	250	C	B	279	b
CR-120	HD	343	a	A	307	B	A	325	a
M274	HD	255	b	B	312	B	A	283	b
ORION	HD	248	b	B	313	B	A	281	b
PR27D28	HD	243	b	B	313	B	A	278	b
Medium		252		B	302		A	277	

Medium followed by the same lowercase letter in the column and uppercase in the row belonging to the same group, by the grouping criterion of Scott and Knott (1974), the 5% of significance. HS: simple hybrid, HD: double hybrid, HT: triple hybrid, PPA: open pollination populations.

with higher grain production are also recommended for silage production because most of their quality is related to grains since plant silage is an energy food, and energy is concentrated in the grains (Miranda *et al.*, 2002). In addition, a crop deployed for silage production can be redirected to grain harvesting due to fluctuations in the prices of animal products and/or the grain itself (Pazianiet *al.*, 2009).

Through the characteristics evaluated throughout the work, the cultivate BRS3046 had a higher overall

performance than the other ones, being preferably recommended for silage production.

Another fundamental characteristic of silage production that this triple hybrid has is the type of toothed grain. Silage cultivars must be indicated based on the digestibility of starch and fibers, utilization, and voluntary consumption by animals (Miranda *et al.*, 2002). Recent research results indicate that toothed grains are better used by the animal than hard-type grains (Santos, 2015).

### Conflict of Interest

There is no conflict of interest between the authors. all authors contributed directly to the article.

### CONCLUSION

1. The cultivate CATIVERDE presented higher plant heights and ear insertion in both treatments (low and high doses of phosphorus).
2. The cultivar BR206 obtained the highest medium total weight of the whole plant.
3. The cultivars BRS3046 and CR-120 showed better ear weights with straw and without straw.
4. Considering the overall performance of the cultivars, in all traits evaluated in the two trials, the sum of its results points to cultivar BRS3046 as the most promising for silage production.
5. Treatment with a high dose of P was higher than the low dose of P.

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