EVALUATION OF NATIONAL MAIZE VARIETIES IN ARAGUAÍNA-TO

https://doi.org/10.56238/sevened2024.032-006

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ABSTRACT

The present work was developed with the objective of evaluating maize varieties regarding grain yield in the region of Lavras. A total of forty-two genotypes, including varieties, single, double and triple hybrids were evaluated in a randomized block design, with two replications. The grain yield of the genotypes was evaluated. In order to correct irregularities in the booth, the analysis of covariance was performed, and later the analysis of variance was performed. It was verified that the treatments differed from each other for the evaluated trait, forming two groups of means. The most productive group contains the simple hybrid BRS 1055 and 15 other genotypes.

Keywords: *Zea mays*. Commercial hybrids. Grain yield.

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INTRODUCTION

The corn crop stands out in the Brazilian agrarian scenario as one of the most important. The area destined to agriculture in the country in the year 2011/2012 was approximately 51.68 million hectares, and corn culture represented 30% of it, estimated at 15.45 million hectares (CONAB, 2012). Among the states, Minas Gerais contributes with 1.205 million hectares planted with corn, representing 7.8% of the total cultivated in the country.

The total corn production in Brazil estimated in the 2011/2012 harvest was 65.903 million tons and the national average productivity was 4,265 kg $^{ha-1}$ (CONAB, 2012). In the state of Minas Gerais, the production was 7.5 million tons, with an average productivity of 5,782 kg $^{ha-1}$. It can be observed that the average of this state is 35% higher than the national average. Among the factors that contribute to this higher average, we can highlight the existing edaphoclimatic conditions, the level of technology employed by producers, in addition to the use of cultivars with better performance. Regarding this last factor, it can be seen that the market for corn cultivars is dynamic. Each harvest, new cultivars are made available for commercialization.

For the 2011/2012 harvest, 489 corn cultivars were made available for planting, 316 conventional and 173 transgenic, from various seed producing companies (EMBRAPA, 2012). The dynamics of cultivar renewal was maintained, as seen in previous harvests. Seventy-two new cultivars were added while eighty-one were no longer sold, so there was a reduction in the number when compared to the last harvest (EMBRAPA, 2012). Within this market dynamic, different types of genotypes are available to producers, including single, double and triple hybrids, as well as varieties. Thus, each producer has a range of options for planting, and the choice is influenced by the environmental conditions of cultivation, which are associated with the adaptability of the genotype, the technology used in the conduction of the crop, all of this associated with the financial condition of the same. Therefore, it can be concluded that there is a dynamic of the number and type of cultivars available in the market for planting. This reflects the importance of corn genetic improvement programs, as well as all the research involved until the launch of a cultivar.

Genetic improvement programs aim to obtain cultivars superior to those on the market. In this process of obtaining, several evaluation steps are necessary until commercialization. Among the steps, the evaluation in several places is necessary. With it, important data are obtained, which help breeders from public and private entities in decision-making, as well as technicians and farmers in choosing the cultivars most adapted to their regions.

In view of the above, the present work aimed to evaluate new maize cultivars in the southern region of Minas Gerais.

MATERIAL AND METHODS

The experiment was carried out at the Experimental Farm of the Federal University of Lavras (UFLA) in the 2011/12 summer harvest, in Lavras – MG. The experimental area is located at 21º14' S latitude, longitude of 45º00' W and altitude of 988 m. The climate of the region is Cwa, according to the Köppen classification.

A total of 42 genotypes were evaluated. Among these, we can mention the varieties BRS Gorotuba, AL Avaré, Sol da Manhã, BR 106, BRS 4103, Sintética 1X, BRS Caimbé, the simple hybrid BRS 1055, the double hybrid BRS 2020 and the triple hybrid BRS 3060, which are available for planting.

The experimental design was randomized blocks with two replications, with each plot consisting of two rows of five meters with spacing of 0.60 m between rows and 0.25 m between plants. These dimensions culminated in the stand of approximately 66 thousand plants $^{ha-1}$.

At sowing, 360 kg $^{ha-1}$ of the formula 8 (N): 28 (P2O5): 16 (K2O) were used. Cover fertilization was performed when the plants were at the 4-5 fully expanded leaf stage, and 300 kg $^{ha-1}$ of the formula 30 (N): 00 (P2O5): 20 (K2O) were applied. The other crop treatments were the same as those recommended for the corn crop.

Grain yield was evaluated, which was corrected to 13% of water content, according to Brasil (2009), and expressed in kg $^{ha-1}$.

In order to correct irregularities in the stand, the analysis of covariance was carried out according to Ramalho, Ferreira and Oliveira (2000). The average yields of the plots were adjusted to the ideal stand of 66 thousand plants $^{ha-1}$. After this analysis, the data were submitted to the common analysis of variance. Both analyses were performed using the "GLM" (General Linear Models) procedure of the Sas v 8.0 computer package (SAS INSTITUTE, 2000). The means were grouped using the Scott-Knott test, at 5% probability, using the Sisvar computer package (FERREIRA, 1999).

RESULTS AND DISCUSSION

The result of the analysis of variance for grain yield of the 42 genotypes evaluated is presented in Table 1.

The coefficient of variation (CV) is a measure of experimental accuracy. In this study, the VC value was 10.43% (Table 1), which may indicate precision in the conduct of the test.

Table 1 shows that the source of variation in treatments was significant (P>0.05). This shows that the treatments differ from each other for the grain yield trait. This result was expected, since the genotypes evaluated have different genetic constitutions. As previously mentioned, the treatments evaluated are single, double and triple hybrids, as well as varieties.

By means of the Scott-Knott means test, it was verified that the genotypes were separated into two groups (Table 2). It is observed that the simple hybrid BRS 1055 had higher grain yield, with an average of 13,200.82 kg $^{ha-1}$, although it is in the same group as fifteen other treatments. The triple hybrid BRS 3060 and the variety AL Avaré did not differ for the grain yield trait of the simple hybrid BRS 1055.

It has been observed that single, double and triple hybrids present small differences in grain yield, of approximately 10% (COSTA et al., 2010). Thus, when choosing cultivars for planting, the producer must make a cost-benefit analysis, adopting the most convenient cultivar. It is worth commenting that this analysis is valid since a common question is whether the productive potential of simple hybrids would compensate for the higher cost of their seeds.

The fact that the AL Avaré variety does not differ in grain yield in relation to the simple hybrid BRS 1055 (Table 2), it can bring benefits to small farmers. On properties with low technological level, simple hybrids may not be able to express their grain production potential due to the low amount of inputs used. Thus, the use of varieties could be an alternative. The use of varieties can also be associated with important characteristics such as the possibility of multiplication and reuse of seeds without loss of productive potential (CRUZ et al., 2000) in addition to the low acquisition cost.

Table 1 - Summary of the analysis of variance for grain yield of 42 corn genotypes evaluated in Lavras, MG, in the summer harvest of the 2011/2012 crop year.

FV	GL	QM	Pr > Fc
Repetition	1	5.481.727,10	0.0379
Treatments	41	3.734.352,32	0.0002*
Error	41	1.190.978,37	
Overall average (kg $^{ha-1}$)	10.467,00		
CV(%)	10,43		

* Significant at 5% probability by the F-test

Table 2 - Grain yield results of 42 corn genotypes evaluated in Lavras, MG, in the summer harvest of the 2011/2012 crop year.

Treatments	Productivity (1 kg)	Treatments	Productivity (1 kg)
Sint Super-Precoce 1	7.851,65 a*	Saint 10781	10.277,95 a
BRS Gorutuba	7.867,32 a	Synthetic 1 X	10.329,05 a
MC 20	8.121,00 a	DSS-0402	10.541,60 a
Sint 10783	8.878,97 a	Saint 10723	10.553,82 a
DSS-0404	8.951,55 a	BRS 2020	10.618,87 a
BR 106	8.991,05 a	BRS 3060	10.964,97 b
Sint 10805	9.124,60 a	Synthetic 256 L	10.996,32 b
BRS 4103	9.437,62 a	Sint. Mult. TL	11.091,00 b
Sol da Manhã	9.445,77 a	Saint 10717	11.423,15 b
Sint. Pro Vit A	9.529,95 a	Saint 10699	11.441,17 b
DSS HI 01	9.538,10 a	Saint 10707	11.547,45 b
CMS EAO 2008	9.626,97 a	Saint 10771	11.781,47 b
Bio 4	9.699,55 a	HDS NE 4x3	12.078,82 b
Sint 10731	9.737,32 a	Saint 10795	12.176,95 b
VSL BS 42 C 60	9.754,72 a	AL Alvaré	12.253,60 b
Eldorado	9.757,07 a	2E530	12.334,32 b
DSS HI 02	9.778,55 a	PC 0905	12.344,20 b
Sintético RxS Spod	9.953,32 a	PC 0904	12.393,57 b
BRS Caimbé	9.955,67 a	Saint 10697	12.409,25 b
PC 0402 = IPR 164	10.136,25 a	1I934	12.549,22 b
PC 0903	10.187,35 a	BRS 1055	13.200,82 b

* Averages followed by the same lowercase letter in the column do not differ from each other by Scott Knott's test at the 5% probability level

CONCLUSION

A significant difference was observed between the genotypes evaluated, with the simple hybrid BRS 1055 being the one that presented the highest productivity.

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