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Agronomic performance of experimental super sweet corn hybrids

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ABSTRACT

Super sweet is classified as a special type of corn, due to the presence of genes which promote sugar accumulation in grains, significantly reducing starch content in the endosperm. This study aimed to evaluate the agronomic performance of experimental super sweet corn hybrids, carrying the gene *shrunken-2*, in order to identify and select promising genotypes for Southern Brazil. The experiments were carried out in two sowing seasons in 2017/18, in the experimental field of UNICENTRO, Guarapuava-PR, Brazil. Thirty-two experimental hybrids resulting from an 8x4 partial diallel among super sweet corn inbred lines from four distinct populations were evaluated along with two commercial hybrids (BRS Vivi and Tropical Plus) used as checks. Traits of agronomic and commercial interest were evaluated: male flowering (MF), husk covering index (HCI), yield of husked ears (YHE), grain yield (GY), commercial prolificacy (CPR), percentage of commercial ears (PCE), color (COL) and soluble solids (SS) of the grains. We verified significant differences among the experimental hybrids, except for COL. There was no significant effect of sowing season regarding to SS. Genotypes x seasons interaction was significant for YHE, GY, CPR, PCE and COL. There are promising experimental hybrids showing performances superior to commercial super sweet corn hybrids used in Brazil. The experimental hybrids D2-61 x D5-41 and D3-10 x D5-43 were superior to the other experimental genotypes. The experimental hybrid D2-61 x D5-41 shows potential to meet the demands of the current super sweet corn market.

Keywords: *Zea mays* subsp. *Saccharata*, special corn, ear yield, grain yield.

RESUMO

Desempenho agronômico de híbridos experimentais de milho super doce

O milho super doce é classificado como um tipo especial de milho, por possuir genes que promovem o acúmulo de açúcar nos grãos, diminuindo significativamente o teor de amido no endosperma. Este trabalho teve como objetivo avaliar o desempenho agronômico de híbridos experimentais de milho super doce, portadores do gene *shrunken-2* (*sh2*), para a identificação e seleção de híbridos promissores para a região sul do Brasil. O experimento foi realizado em duas épocas de semeadura na safra 2017/18, no campo experimental da UNICENTRO, em Guarapuava-PR, Brasil. Foram avaliados 32 híbridos experimentais resultantes de um dialelo parcial 8x4 entre linhagens de milho super doce, provenientes de quatro populações distintas, juntamente com dois híbridos comerciais (BRS Vivi e Tropical Plus) utilizados como testemunhas. Foram avaliados caracteres de interesse agronômico e comercial: florescimento masculino (FM), índice de empalhamento da espiga (IE), rendimento de espigas despalhadas (RED), rendimento de grãos (RG), prolificidade comercial (PC), porcentagem de espigas comerciais (PEC), coloração (COR) e teor de sólidos solúveis (SS) dos grãos. Houve diferenças significativas entre os híbridos experimentais, exceto para COR. Não houve efeito significativo da época de semeadura para SS e a interação genótipos x épocas foi significativa para os caracteres RED, RG, PC, PEC e COR. Há híbridos experimentais promissores, competitivos com híbridos comerciais utilizados no Brasil para a produção de milho super doce. Os híbridos experimentais D2-61 x D5-41 e D3-10 x D5-43 foram superiores ao demais genótipos experimentais. O híbrido experimental D2-61 x D5-41 tem potencial de atendimento às exigências do mercado atual de milho super doce.

Palavras-chave: *Zea mays* subsp. *Saccharata*, milho especial, produtividade de espigas, rendimento de grãos.

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Sweet and super sweet corn are classified as special corns, since they present in recessive homozygosis, at least one of the genes which block part of the conversion of sugar into starch, giving the sweet character to the grain (Ferreira, 2011). The resulting phenotypes, from the genotypes with these genes, differ in the proportion of starch and type of sugar present in the endosperm. The standard sweet corn contains the *sugary* gene, which does not allow conversion of phyto-glycogen or water-soluble polysaccharides into starch, resulting in an increase of simple sugar concentration and a decrease in starch content in endosperm. The super sweet corn has *brittle, shrunken-2* or *sugar extender* gene, which accumulate high sugar contents in grains, showing low contents of total carbohydrates

(Tracy, 2001).

In Brazil, sweet corn is cultivated in approximately 36 thousand hectares, 90% of this cultivated area in the state of Goiás (Luz *et al*., 2014), showing potential to become a great producer of super sweet corn. However, the crop is relatively little exploited, due to small consumption and lack of hybrids adapted for the market (Teixeira *et al*., 2013).

Evaluation and selection of experimental hybrids of super sweet corn adapted to the South Region of Brazil is important, in order to spread and expand its cultivation throughout the national territory. The aim of this study was to evaluate the agronomic performance of the experimental hybrids of super sweet corn, in order to identify and select promising hybrids for Guarapuava region, PR.

MATERIAL AND METHODS

The experiments were carried out in the experimental field of Universidade Estadual do Centro Oeste, in Guarapuava-PR, in two sowing seasons: October 14 and November 15, 2017.

Thirty two experimental hybrids were obtained from crosses among super sweet corn inbred lines, carrying the *shrunken-2* (*sh2*) gene, from four populations, in an 8x4 partial diallel scheme. Eight inbred lines from D2, D3 and D4 populations were used as pollen receptors, and four inbred lines of population D5 were used as pollen donor. The 32 experimental hybrids were evaluated along with two commercial super sweet hybrids (BRS Vivi and Tropical Plus) used as checks.

The experimental design was in randomized blocks with three replications. Each plot consisted of one 5-m row, spacing 0.80 m between rows, whose final stand corresponded to 62,500 plants/ha. Ear harvest was performed when the grains reached the milky stage, showing humidity between 73 and 78%, according to Luz *et al.* (2014).

The following traits were evaluated: 1) male flowering (MF), calculated from the sowing date up to pollen release by the anthers of the middle third of the tassel in 50% of the plants in the plot, expressed in °C day (degrees-day), using the daily thermal sum required to reach the MF, taking into account the base temperature, 10°C (Renato *et al*., 2013); 2) husk covering index (HCI): percentage of husk mass in relation to the total mass of the ear, according to Teixeira *et al*. (2001); 3) yield of husked ears (YHE): mass of all husked ears, in kg ha^{-1}; 4) percentage of commercial ears (PCE): considering as commercial the husked ears larger than 15 cm and 3 cm in diameter; 5) grain yield (GY): grain mass of commercial ears, cut close to the cob, in kg ha^{-1}; 6) commercial prolificity (CPR): average number of commercial ears per plant; 7) grain color (COL): using a scoring scale, in which 1= beige, 2= light yellow, 3= yellow, 4= dark yellow and 5= orange (Albuquerque *et al*., 2008); 8) total soluble solid content (SS): using samples of grains of the central region of six ears per plot, expressed in ºBrix, obtained with the aid of a digital refractometer.

YHE and GY data were submitted to ideal stand correction using the covariance method (Schmildt *et al*., 2001). Lilliefors test was applied and after verifying the normality of data ($p<0.05$), we performed joint analysis of variance, decomposing the effects of genotypes on the experimental hybrids (EH), commercial hybrids (CH) and contrast EH *vs* CH, for the evaluated characteristics, as well as the respective interactions with sowing seasons. When significant, the means were grouped by Scott Knott test at 5% probability, using GENES software (Cruz, 2013).

RESULTS AND DISCUSSION

Analysis of variance showed significant effect ($p<0.01$) of experimental hybrids for the evaluated traits, except for COL, which shows variability among the evaluated genotypes, making the selection possible for breeding programs. Significant differences among commercial hybrids for MF, HCI, SS, PCE and CPR were verified (Table 1).

The contrast between experimental and commercial hybrids (EH *vs* CH) was significant ($p<0.01$) for MF, HCI, YHE, CPR, PCE and SS. For MF, HCI, YHE and CPR, the average of experimental hybrids was higher than the average of commercial hybrids and the opposite results were observed for PCE and SS.

The sowing seasons (environments) influenced the performance of evaluated traits, except for soluble solid content (SS). There was lower rainfall between the 16th and 19th week and higher average temperature in the experiment carried out in the second season (data not shown), factors which contributed to differences in genotypes performance.

The interaction between experimental hybrids and sowing seasons was significant ($p<0.01$) for YHE, GY, CPR, PCE and COL, so that these variables were discussed separately in each season; unlike MF, HCI and SS whose means grouping test was presented together.

We observed differences between the two commercial hybrids (checks) for MF, YHE and GYC in the first sowing season and for CPR and PCE in the second sowing season (Tables 1 and 2). In relation to MF, the average of commercial hybrids was lower than the average of experimental hybrids (Table 1), showing greater precocity. We also observed values of MF between 932 and 1,051ºC day, within the range suitable for breeding programs, considering days after sowing (Pereira Filho & Cruz, 2002). Evaluations based on °C day measurements are more appropriate for predicting the cycle of each genotype in different geographic locations. Thus, two groups were formed showing favorable MF means (lower values), and the check hybrid Tropical Plus was grouped with other 15 experimental hybrids (Table 1).

The husks shall cover the entire tip of the ear, without exceeding the total of 12 layers, since values above these ones can negatively correlate with commercial yield (Pereira Filho *et al*., 2016). As the ears of this experiment were harvested in phenological stage R3, no genotype showed insufficient husk covering at the tip of the ear, considering the husk covering index (HCI) described by Teixeira *et al*. (2001).

For HCI, commercial hybrids average (19.87%) was lower than that of experimental hybrids (24.63%). Hybrids BRS Vivi and Tropical Plus were classified in the group of lower means, along with 11 experimental hybrids, and other hybrids showed favorable HCI values (Table 1).

For YHE, the genotypes showed superior performance in the first sowing season (18.24 t ha^{-1}) comparing with the second season (16.61 t ha^{-1}) and the average of experimental hybrids was higher than the average of commercial hybrids in both sowing seasons (Table 1).

Table 1. Means of male flowering (MF, °C day), husk covering index (HCI, %), yield of husked ears (YHE, t ha^{-1}) and grain yield (GY, t ha^{-1}) of 32 super sweet corn experimental hybrids (EH) and two commercial hybrids (CH), evaluated in two sowing seasons in 2017/18, in Guarapuava-PR. Guarapuava, Corteva Agriscience, 2019.

Genotype	MF	HCI	YHE		GY	
			1st season	2nd season	1st season	2nd season
D2-07 x D5-09	991 b	24.49 a	16.20 bA	13.41 dA	7.16 aA	2.98 dB
D2-07 x D5-41	986 b	18.80 b	21.44 aA	18.48 bA	6.45 aA	8.03 aA
D2-07 x D5-42	1.037 a	25.29 a	19.22 aA	15.70 cA	6.22 aA	5.24 bA
D2-07 x D5-43	1.004 a	25.31 a	19.62 aA	18.00 bA	5.84 aA	6.09 bA
D2-61 x D5-09	952 b	28.13 a	17.04 bA	15.60 cA	4.56 bA	4.34 cA
D2-61 x D5-41	985 b	25.89 a	19.91 aA	22.28 aA	6.29 aA	7.29 aA
D2-61 x D5-42	984 b	27.95 a	18.04 aA	19.88 bA	4.33 bB	6.39 bA
D2-61 x D5-43	960 b	27.09 a	17.81 aA	17.52 bA	5.28 aA	5.03 bA
D2-68 x D5-09	989 b	26.66 a	16.09 bA	15.65 cA	4.62 bA	5.00 bA
D2-68 x D5-41	997 b	22.51 b	20.29 aA	21.35 aA	6.04 aA	7.19 aA
D2-68 x D5-42	1.051 a	27.29 a	16.21 bA	15.65 cA	4.14 bA	4.78 cA
D2-68 x D5-43	1.024 a	26.33 a	15.11 bA	15.72 cA	4.05 bA	5.52 bA
D3-08 x D5-09	1.025 a	23.06 b	19.51 aA	15.58 cB	6.26 aA	4.96 bA
D3-08 x D5-41	1.019 a	24.20 a	21.32 aA	16.24 cB	6.00 aA	4.49 cA
D3-08 x D5-42	1.040 a	22.08 b	21.81 aA	18.34 bA	7.09 aA	6.03 bA
D3-08 x D5-43	1.009 a	24.89 a	18.42 aA	16.74 cA	5.79 aA	4.06 cB
D3-10 x D5-09	987 b	24.19 a	18.84 aA	15.29 cA	6.26 aA	4.62 cA
D3-10 x D5-41	968 b	27.12 a	20.88 aA	18.12 bA	5.18 aA	5.16 bA
D3-10 x D5-42	1.025 a	27.42 a	21.15 aA	22.01 aA	5.99 aA	7.00 aA
D3-10 x D5-43	993 b	27.25 a	22.54 aA	23.90 aA	6.44 aA	8.13 aA
D4-13 x D5-09	1.020 a	23.73 b	18.13 aA	12.29 dB	5.78 aA	3.28 dB
D4-13 x D5-41	984 b	22.70 b	23.05 aA	19.32 bA	6.75 aA	5.77 bA
D4-13 x D5-42	1.026 a	25.17 a	18.89 aA	17.83 bA	5.59 aA	4.12 cA
D4-13 x D5-43	1.009 a	19.99 b	16.30 bA	16.23 cA	5.62 aA	5.51 bA
D4-18 x D5-09	1.019 a	21.75 b	16.95 bA	13.95 cA	4.58 bA	2.60 dB
D4-18 x D5-41	1.015 a	22.04 b	19.43 aA	19.65 bA	6.11 aA	6.32 bA
D4-18 x D5-42	1.036 a	21.64 b	16.02 bA	21.10 aA	5.73 aA	5.79 bA
D4-18 x D5-43	1.005 a	25.40 a	18.96 aA	16.14 cA	5.65 aA	4.39 cA
D4-25 x D5-09	956 b	24.37 a	13.30 bA	10.01 dA	3.99 bA	2.06 dB
D4-25 x D5-41	988 b	22.42 b	16.28 bA	14.74 cA	3.74 bA	2.36 dA
D4-25 x D5-42	1.028 a	27.36 a	15.47 bA	11.01 dB	4.09 bA	1.69 dB
D4-25 x D5-43	995 b	25.65 a	12.31 bA	13.30 dA	2.49 bA	2.93 dA
BRS Vivi	1.031 a	21.47 b	19.06 aA	11.05 dB	7.06 aA	4.07 cB
Tropical Plus	932 b	18.27 b	14.61 bA	12.60 dA	5.00 bA	4.35 cA
General average	1.002	24.35	18.24 A	16.61 B	5.47 A	4.93 B
EH average	1.003 a	24.63 a	18.33 a	16.91 a	5.44	4.97
CH average	982 b	19.87 b	16.84 b	11.82 b	6.03	4.21
CV (%)	2.87	13.27	12.90	13.34	19.76	19.90

Means followed by the same letter, uppercase in the line and lowercase in the column, belong to the same group by Scott Knott test, 5% probability.

In the first sowing season, 20 experimental hybrids and the check BRS Vivi composed the group of highest means of YHE. In the second sowing season, four groups were formed for YHE, and the experimental hybrids D3-10 x D5-43 (23.9 t ha^{-1}), D2-61 x D5-41 (22.2 t ha^{-1}), D3-10 x D5-42 (22.0 t ha^{-1}), D2-68 x D5-41 (21.3 t ha^{-1}) and D4-18 x D5-42 (21.10 t ha^{-1}) were superior compared to the other genotypes, including the check hybrids (Table 1). Some studies related on selection of super sweet corn genotypes reported experimental hybrids with husked ear productivity value of up to 24.38 t ha^{-1} (Luz *et al*., 2014) and 25.72 t ha^{-1} (Xavier *et al*., 2019).

The experimental hybrids D3-08 x D5-09, D3-08 x D5-41, D4-13 x D5-09 and D4-25 x D5-42 and the hybrid BRS Vivi contributed to the significance of the genotypes x sowing seasons interaction for YHE and most of genotypes showed higher means in the first sowing season (Table 1).

For grain yield (GY), no difference among the averages of experimental and commercial hybrids was noticed, and the performance was superior in the first season comparing to the second (5.47 t ha^{-1} and 4.93 t ha^{-1}, respectively) (Table 1). Xavier *et al*. (2019) reported averages of grain yield of 4.54 t ha^{-1} and 4.69 t ha^{-1} in two consecutive seasons evaluating dialel hybrids of super sweet corn, reaching the best hybrid 7.40 t ha^{-1}. Super sweet corn hybrids with high grain yield are fundamental for industrial processing (Barbieri *et al*., 2005).

In the first sowing season, two groups were formed for GY, and 22 experimental hybrids and the hybrid BRS Vivi performed better than the others. In the second sowing season, four groups were formed. The experimental hybrids D2-07 x D5-41, D2-61 x D5-41, D2-68 x D5-41, D3-10 x D5-42 and D3-10 x D5-43 were grouped with the highest means (Table 1).

For soluble solid contents (SS), we point out that some studies evaluated physicochemical parameters of sweet corn cultivars with values between 16 and 17 °Brix (Perfeito *et al*., 2017) with average of 15.49 °Brix (Mamede *et al*., 2014). The general average in this study was 16.04 ºBrix and 13 experimental hybrids did not differ significantly from the commercial hybrids. The averages of checks and experimental hybrids were 17.73 and 15.93 °Brix, respectively (Table 2).

Prolificacy is a trait which generally is not prioritized in corn breeding programs (Elias *et al*., 2010), which reduces the tolerance of the crop to adverse conditions. Nevertheless, some data show that the average of one ear per plant (prolificacy = 1) maximizes the production of green ears and the gross profit margin of sweet corn (Williams, 2014).

In relation to prolificacy of commercial ears (CPR), we observed significant difference between the sowing seasons, being superior in the first season, when the average of experimental hybrids was superior to the commercial hybrids (0.92 and 0.79, respectively) (Table 2). Thus, we verified superiority of the experimental genotypes in relation to number of commercial ears, showing greater economic viability for producers and industry.

For CPR, in the first season, three groups were formed, and the commercial hybrids were classified in the group of lower means. The experimental hybrids D2-07 x D5-41, D3-08 x D5-41, D3-10 x D5-41 and D4-13 x D5-41 formed the group of superior means, of 1.09, 1.13, 1.09 and 1.23 commercial ears per plant, respectively, differing significantly from the others (Table 2). These values are in accordance with other evaluations of super sweet corn production in different population densities, with values ranging from 1.03 to 1.25, considering stand similar to the one used in this study (Souza *et al*., 2013).

In the second season, CPR showed an average of 0.66 ears per plant, being this trait influenced by sowing season. We observed four groups, in which the experimental hybrids D2-07 x D5-41, D2-61 x D5-41 and D3-10 x D5-43 were statistically superior to others, showing averages of 0.91, 0.98 and 1.05 commercial ears per plants, respectively. In relation to genotypes x seasons interaction, nine experimental hybrids, along with the commercial hybrid Tropical Plus, showed no inversion of behavior (Table 2).

Percentage of commercial ears is an important attribute to be considered, since genotypes with high PCE levels are considered desired, since the commercialization can be done based on this trait, as ears inferior to the standard required concerning length and diameter are discarded (Albuquerque *et al.*, 2008).

The percentage of commercial ears (PCE) was statistically superior in the first sowing season. Significance of the contrast between averages of commercial and experimental hybrids was only observed in the second season, when the commercial genotypes showed statistically higher averages (Table 2).

In relation to PCE in the first sowing season, 22 experimental hybrids along with two commercial hybrids were grouped in higher-means group. In the second sowing season, five experimental hybrids along with the check Tropical Plus showed superior means, which ranged from 72.39% to 83.03% (Table 2). These values corroborate other studies, in which the performance of genotypes of common green corn and super sweet corn were evaluated for *in natura* consumption (Albuquerque *et al*., 2008; Grigulo *et al*., 2011).

Grain color (COL) is one of the traits which influences the consumer's choice for the product. For industrially processed corn the intense yellow color is preferred. However, for *in natura* consumption, the consumers prefer lighter color grains, from beige to yellow (Cancellier *et al*., 2011). As almost all the super sweet corn produced in Brazil is dedicated for canning industry, more intense colored genotypes are supposed to be selected, thus, higher values on the score scale are desirable.

For grain color (COL), there were no significant differences among the evaluated hybrids. Therefore, we assumed that the experimental hybrids present the color pattern compatible with the commercial hybrids currently available on the market. Genotypes x seasons interaction was significant for COL, yet, 22 genotypes did not contribute for the interaction (Table 2), showing stability in the two sowing seasons.

Considering the results of the evaluations of MF, HCI, YHE and GY, simultaneously, in both sowing seasons (Table 1), we selected the experimental hybrids D2-61 x D5-41, D2-68 x D5-41 and D3-10 x D5-43, as they showed to be superior to the others, including the commercial hybrids BRS Vivi and Tropical Plus, which were used as checks.

The experimental hybrid D2-61 x

Table 2. Means of male flowering (MF, °C day), husk covering index (HCI, %), yield of husked ears (YHE, kg ha^{-1}) and grain yield (RG, kg ha^{-1}) of 32 super sweet corn experimental hybrids (EH) and two commercial hybrids (CH), evaluated in two agricultural harvest seasons 2017/18. Guarapuava, Corteva Agriscience, 2019.

Genotype	SS	CPR		PCE		COL	
		1st season	2nd season	1st season	2nd season	1st season	2nd season
D2-07 x D5-09	15.83 b	0.85 cA	0.53 cB	82.29 aA	44.99 cB	4.50 A	4.50 A
D2-07 x D5-41	15.50 b	1.09 aA	0.91 aB	88.37 aA	80.59 aA	4.67 A	4.83 A
D2-07 x D5-42	17.45 a	0.92 bA	0.65 bB	82.77 aA	65.25 bB	4.17 A	4.50 A
D2-07 x D5-43	14.75 b	0.93 bA	0.73 bB	84.77 aA	69.68 bB	3.33 B	4.83 A
D2-61 x D5-09	16.28 a	0.79 cA	0.66 bA	69.81 bA	61.08 bA	3.67 B	4.83 A
D2-61 x D5-41	16.47 a	1.01 bA	0.98 aA	82.15 aA	79.43 aA	4.33 A	4.33 A
D2-61 x D5-42	17.38 a	0.90 cA	0.70 bB	81.34 aA	53.30 cB	4.00 A	4.67 A
D2-61 x D5-43	17.22 a	0.88 cA	0.76 bA	78.29 aA	59.97 bB	3.83 A	4.33 A
D2-68 x D5-09	15.53 b	0.69 cA	0.65 bA	77.36 aA	69.59 bA	4.67 A	4.83 A
D2-68 x D5-41	17.02 a	0.96 bA	0.81 bA	78.55 aA	67.04 bA	4.50 A	4.67 A
D2-68 x D5-42	17.03 a	0.79 cA	0.62 bB	72.60 bA	67.12 bA	4.00 A	4.50 A
D2-68 x D5-43	15.25 b	0.75 cA	0.72 bA	79.28 aA	75.40 aA	3.50 B	4.50 A
D3-08 x D5-09	14.47 b	0.97 bA	0.79 bB	84.97 aA	69.78 bB	4.33 A	4.83 A
D3-08 x D5-41	15.28 b	1.13 aA	0.58 cB	82.33 aA	49.08 cB	4.17 A	4.50 A
D3-08 x D5-42	16.97 a	0.97 bA	0.66 bB	69.83 bA	57.74 cA	4.67 A	4.50 A
D3-08 x D5-43	17.02 a	0.96 bA	0.75 bB	77.08 aA	49.47 cB	4.50 A	4.50 A
D3-10 x D5-09	14.93 b	0.92 bA	0.68 bB	77.93 aA	57.64 cB	4.33 A	4.50 A
D3-10 x D5-41	15.02 b	1.09 aA	0.69 bB	75.45 bA	53.86 cB	3.67 B	4.50 A
D3-10 x D5-42	17.12 a	0.99 bA	0.73 bB	75.08 bA	55.87 cB	4.17 B	5.00 A
D3-10 x D5-43	15.62 b	1.04 bA	1.05 aA	82.34 aA	74.84 aA	4.33 A	4.67 A
D4-13 x D5-09	15.78 b	0.89 cA	0.45 cB	81.77 aA	52.62 cB	4.00 A	4.67 A
D4-13 x D5-41	15.02 b	1.23 aA	0.72 bB	83.83 aA	51.44 cB	3.33 B	4.50 A
D4-13 x D5-42	15.57 b	0.88 cA	0.53 cB	69.79 bA	42.78 dB	3.50 B	4.67 A
D4-13 x D5-43	15.23 b	0.86 cA	0.71 bA	89.39 aA	72.39 aB	3.67 B	5.00 A
D4-18 x D5-09	15.97 b	0.82 cA	0.35 dB	68.62 bA	33.76 dB	4.83 A	5.00 A
D4-18 x D5-41	14.25 b	1.01 bA	0.78 bB	79.83 aA	58.95 cB	4.67 A	5.00 A
D4-18 x D5-42	16.95 a	0.88 cA	0.72 bA	88.21 aA	55.54 cB	4.83 A	5.00 A
D4-18 x D5-43	15.30 b	0.97 bA	0.58 cB	81.09 aA	52.63 cB	4.50 A	4.67 A
D4-25 x D5-09	15.20 b	0.74 cA	0.45 cB	74.81 bA	45.95 cB	4.17 B	5.00 A
D4-25 x D5-41	16.48 a	0.93 bA	0.39 dB	71.84 bA	29.87 dB	4.17 B	5.00 A
D4-25 x D5-42	17.03 a	0.76 cA	0.32 dB	66.27 bA	32.18 dB	4.50 A	5.00 A
D4-25 x D5-43	14.83 b	0.80 cA	0.67 bA	84.77 aA	62.23 bB	4.00 A	4.50 A
BRS vivi	17.00 a	0.74 cA	0.47 cB	78.34 aA	70.42 bA	3.67 B	4.83 A
Tropical Plus	18.45 a	0.83 cA	0.75 bA	86.70 aA	83.03 aA	4.67 A	4.33 A
General average	16.04	0.91 A	0.66 B	79.05 A	58.99 B	4.14 B	4.69 A
EH average	15.93 b	0.92 a	0.67	78.84	57.88 b	4.14	4.70
CH average	17.73 a	0.79 b	0.61	82.52	76.72 a	4.17	4.58
CV (%)	8.94	12.06	12.47	10.29	12.52	13.18	7.08

Means followed by the same letter, uppercase in the line and lowercase in the column, belong to the same group by Scott Knott test, 5% probability.

D5-41 was classified in the group of superior genotypes for all the evaluated traits, surpassing or not differing from the commercial checks BRS Vivi and Tropical Plus in both sowing seasons (Tables 1 and 2). Hybrid D3-10 x D5-43 showed performance inferior to checks only for SS, with value of 15.62ºBrix (Table 2), which is above the minimum limit required by the market. These experimental hybrids are promising, with performances equal or superior to the commercial hybrids of super sweet corn widely used in Brazil. The experimental hybrid D2-61 x D5-41 has the potential to meet the current market demands of super sweet corn.

REFERENCES

ALBUQUERQUE, CJB; PINHO, RG; SILVA, R. 2008. Desempenho de híbridos experimentais e comerciais de milho para produção de milho verde. *Bioscience Journal* 24: 69-76.

BARBIERI, VHB; LUZ, JMQ; BRITO, CH; DUARTE, JM; GOMES, LS; SANTANA, DG. 2005. Produtividade e rendimento industrial de híbridos de milho doce em função de espaçamentos e populações de plantas. *Horticultura Brasileira*. 23: 826-830.

CANCELLIER, LL; AFFÉRRI, FS; CRUZ, OS; PELUZIO, JM; MELO, AV. 2011. Desempenho de populações de milho para produção de grãos e consumo *in natura* no Estado de Tocantins. *Revista Ciência Agronômica* 42: 542-553.

CRUZ, CD. 2013. GENES - a software package for analysis in experimental statistics and quantitative genetics. *Acta Scientiarum. Agronomy*. 35: 271-276.

ELIAS, HT; VOGT, GA; VIEIRA, LC; PINHO, RG; NASPOLINI, V; COVER, C. 2010. Melhoramento genético do milho. In: FILHO, JAW.; ELIAS, HT (org). *A cultura do milho em Santa Catarina*. Florianópolis: Epagri. p. 414-480.

FERREIRA, AC. 2011. *Condicionamento fisiológico, fitorreguladores e qualidade de sementes de milho-doce*. Jaboticabal: UNESP. 60p. (M.Sc. Dissertation).

GRIGULO, ASM; AZEVEDO, VH; KRAUSE, W; AZEVEDO, PH. 2011. Avaliação do desempenho de genótipos de milho para consumo *in natura* em Tangará da Serra, MT, Brasil. *Bioscience Journal* 27: 603-608.

LUZ, JMQ; CAMILO, JS; BARBIERI, VHB; RANGEL, RM; OLIVEIRA, RC. 2014. Produtividade de genótipos de milho doce e milho verde em função de intervalos de colheita. *Revista Ceres* 32: 163-167.

MAMEDE, NGMA; CHITARRA, BA; FONSECA, JOM; SOARES, GA; PEREIRA FILHO, AI. 2014. Qualidade do milho doce minimamente processado conservado sob diferentes atmosferas. *Engenharia na Agricultura* 22: 520-534.

PEREIRA FILHO, IA; CRUZ, J. 2002. Cultivares de milho para o consumo verde. *Embrapa Milho e Sorgo*, 2000, p. 1-7.

PEREIRA FILHO, IA; CRUZ, JC; BORGHI, E. 2016. Cultivares de milho-doce. *O cultivo do milho doce*, p.55-60.

PERFEITO, DGA; LOPES, MCM; SALOMÃO, LC; SOUZA, MLC; BENETT, CGS; LIMA, BP. 2017. Caracterização pós-colheita de milho doce submetido ao parcelamento de fertirrigação nitrogenada. *Brazilian Journal of Food Technology* 20: 1-7.

RENATO, NS; SILVA, JBL; SEDIYAMA, GC; PEREIRA, EG. 2013. Influência dos métodos para cálculo de graus-dia em condições de aumento de temperatura para as culturas de milho e feijão. *Revista Brasileira de Meteorologia* 28: 382-388. https://doi.org/10.1590/S0102-77862013000400004

SCHMILDT, ER; ROBERTO, P; PEREIRA, G. 2001. Avaliação de métodos de correção do estande. *Pesquisa Agropecuária Brasileira* 36: 1011-1018.

SOUZA, RS; VIDIGAL FILHO, PS; SCAPIM, CA; MARQUES, OJ; QUEIROZ, DC; OKUMURA, RS; JOSÉ, JV; TAVORE, RV. 2013. Elementos de produção de milho doce em diferentes densidades populacionais. *Comunicata Scientiae* 4: 285-292.

TEIXEIRA, FF; MIRANDA, RA; PAES, MCD; SOUZA, SM; GAMA, EEG. 2013. Melhoramento do milho doce. *Embrapa Milho e Sorgo*, p.34.

TEIXEIRA, FF; SOUZA, IRP; GAMA, EEGE; PACHECO, CAP; PARENTONI, SN; SANTOS, MXD; MEIRELLES, WF. 2001. Avaliação da capacidade de combinação entre linhagens de milho doce. *Ciencias e Agrotecnologia* 25: 483-488.

TRACY, WF. 2001. Sweet corn. In: *Specialty corn*. Boca Raton: CRC press, p.155-198.

WILLIAMS, MM. 2014. Few crop traits accurately predict variables important to productivity of processing sweet corn. *Field Crops Research* 157 n. 20.

XAVIER, LFS; PESTANA, JK; SEKIYA, A; KRAUSE, MD; MOREIRA, RMP; FERREIRA, JM. 2019. Partial diallel and potential of super sweet corn inbred lines bt2 to obtain hybrids. *Horticultura Brasileira* 37: 278-284. http://dx.doi.org/10.1590/S0102-053620190305