TESTCROSSES FOR SELECTION OF SWEET CORN INBRED LINES

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INTRODUCTION

Sweet corn is a special type of corn, with high nutritional value. The presence of a gene(s) that alters starch biosynthesis, causing accumulation of soluble polysaccharides in the endosperm, increases its sweetness. This property characterizes this type of corn in comparison with common corn.

Brazil is one of the major producers of corn in the world, having a great potential for increasing the production of sweet corn.

Currently, there are 46 varieties of sweet corn in Brazil, but only two of these are planted. There is a demand for new cultivars adapted to tropical conditions with high yields and superior grain quality. Additionally there is insufficient information about evaluations and how to obtain new varieties for the Brazilian conditions.

GOAL

The main goal of this project is investigating different testers for selection of sweet corn inbred lines aimed at obtaining superior hybrids.

MATERIAL AND METHODS

- ✓ Two populations with tropical germoplasm.
- ✓ One is the tester of the other.
- ✓ Three levels of selection (and inbreeding) underlying the testers.
- ✓ Testers were obtained from a mixture of selected lines of the previous generation.
- ✓ Testcrosses were evaluated in randomized complete blocks with three replications in two sowing seasons.
- ✓ The following traits were considered for selecting the testcrosses and choosing the best tester:
  - ✓ grain yield
  - ✓ ear commercial quality
  - ✓Data on plant height, days to flowering, ear length and diameter were also considered but results not shown here.

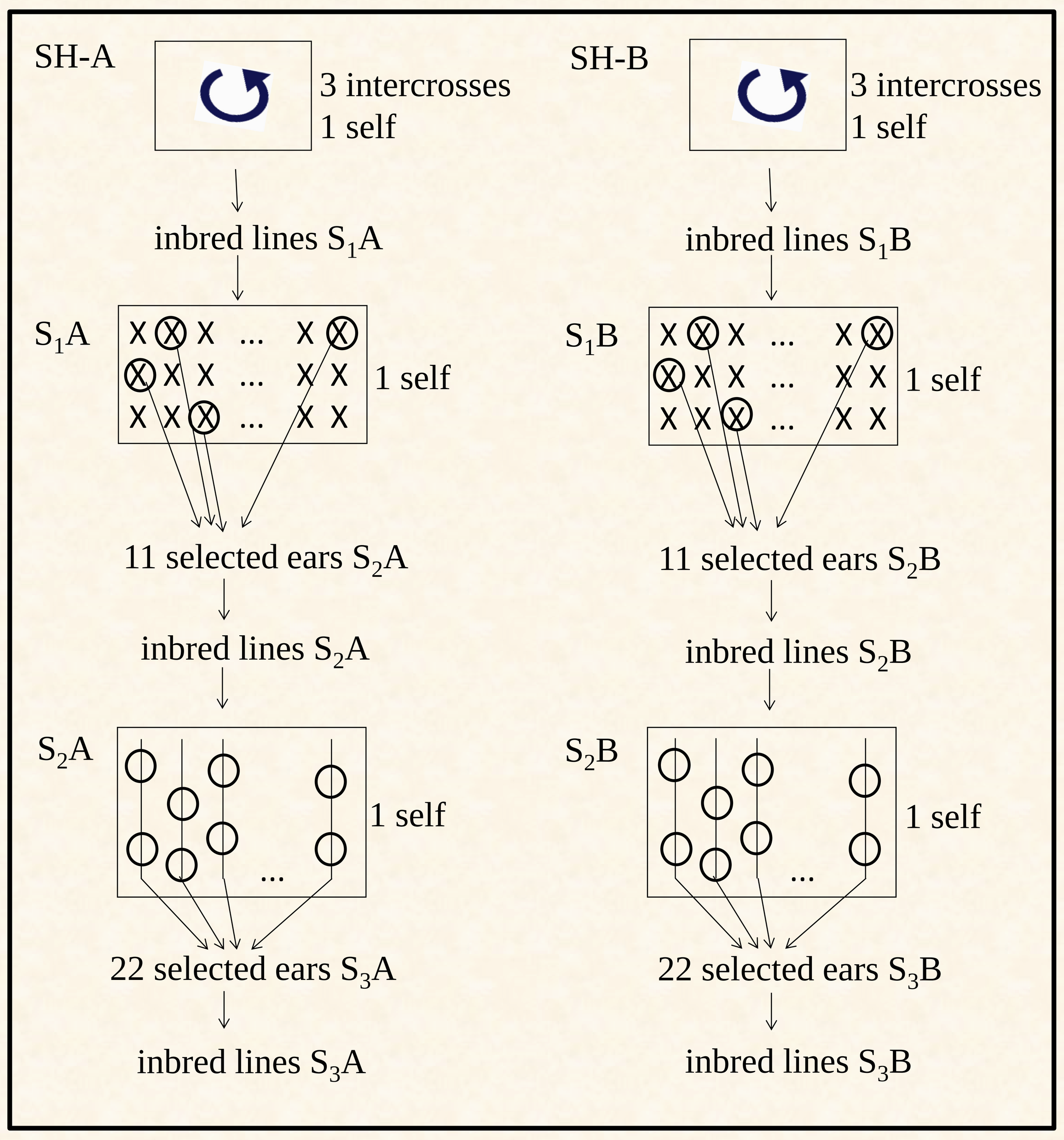

Figure 1. Scheme of obtaining and selecting the inbred lines of populations "A" and "B".

Trial 1:
- 11 S_2A x S_1B
- 11 S_2A x S_2B

Trial 2:
- 11 S_2B x S_1A
- 11 S_2B x S_2A

Trial 3:
- 22 S_3A x S_1B
- 22 S_3A x S_2B
- 22 S_3A x S_3B

Trial 4:
- 22 S_3B x S_1A
- 22 S_3B x S_2A
- 22 S_3B x S_3A

Figure 2. Scheme of obtaining the testcrosses.

RESULTS AND DISCUSSION

Table 1. Testcrosses and control means.

		Traits	$\overline{T}_1$	$\overline{T}_2$	p-values	T_1^+	T_2^+	C^+	$\overline{C}$	$\overline{TP}$
Trial 1	Seasons 1 and 2	Ear commercial quality	12.15	12.77	0.4642	14.63a	15.63a	18.27a	12.94	18.27
		Grain yield (kg/plot)	1.94	2.09	0.2328	2.48a	2.65a	3.17a	2.20	3.17
Trial 2	Seasons 1 and 2	Ear commercial quality	12.66	12.19	0.6153	15.90a	17.67a	20.75a	15.39	20.75
		Grain yield (kg/plot)	2.02	1.98	0.7150	2.46	2.66a	3.24a	2.22	3.24

		Traits	$\overline{T}_1$	$\overline{T}_2$	$\overline{T}_3$	p-values	T_1^+	T_2^+	T_3^+	C^+	$\overline{C}$	$\overline{TP}$
Trial 3	Seasons 1 and 2	Ear commercial quality	13.79	13.46	14.08	0.5780	18.13a	17.90a	18.37a	19.83a	14.43	19.83
		Grain yield (kg/plot)	2.31	2.37	2.47	0.3106	3.00a	3.34a	2.98a	3.22a	2.33	3.22
Trial 4	Seasons 1 and 2	Ear commercial quality	13.09	12.93	14.56	0.0111	16.81a	18.03a	18.52a	17.00a	11.34	13.57
		Grain yield (kg/plot)	2.26	2.23	2.45	0.0304	2.88a	2.82a	3.05a	2.80a	1.95	2.58

$\overline{T}_1$, $\overline{T}_2$, $\overline{T}_3$: mean of testcrosses stemming from tester S_1, S_2, S_3, respectively; p-values: refer to testers sources of variance from ANOVA; T_1^+, T_2^+, T_3^+ : mean of the best testcross stemming from tester S_1, S_2, S_3, respectively; C^+, $\overline{C}$, $\overline{TP}$: mean of the best control, the controls and Tropical Plus control, respectively. Means followed by the same letter do not differ from the Tropical Plus control (Dunnett's test, 5%).

Table 2. Estimates of genetic variances among testcrosses.

Traits	Seasons 1 and 2									
	Trial 1		Trial 2		Trial 3			Trial 4		
	σ^2_{L/T_1}	σ^2_{L/T_2}	σ^2_{L/T_1}	σ^2_{L/T_2}	σ^2_{L/T_1}	σ^2_{L/T_2}	σ^2_{L/T_3}	σ^2_{L/T_1}	σ^2_{L/T_2}	σ^2_{L/T_3}
Ear commercial quality	$0.950^{*(1)}$	0.734^{*}	2.155^{**}	1.053^{*}	1.744^{**}	2.595^{**}	3.444^{**}	2.769^{**}	2.267^{**}	2.240^{**}
	$100^{(2)}$	$77^{(3)}$	100	49	100	149	$198^{(4)}$	100	82	81
Grain yield (kg/plot)	0.006^{**}	0.002^{**}	$<0.001^{ns}$	0.002^{ns}	0.005^{**}	0.007^{**}	0.008^{**}	0.003^{**}	0.008^{**}	0.001^{ns}
	100	34	100	1055	100	137	176	100	278	32

(1) Significance of the variance components obtained by the F test in the analysis of variance.
(2) Variance component of testcrosses stemming from the tester S_1 is considered as 100% .
(3) Percentage of variance component of testcrosses stemming from tester S_2, in relation to generation S_1.
(4) Percentage of variance component of testcrosses stemming from tester S_3, in relation to generation S_2.

CONCLUSIONS

We concluded that the tester stemming from more selected inbred lines was as efficient as testers derived from less selected lines. We also verified that the level of selection and inbreeding underlying the constitution of a tester did not affect the genetic variance among testcrosses of evaluated lines.

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CAPES