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COMBINING ABILITY FOR SWEET CORN (*Zea mays saccharata*) INBRED LINES

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ABSTRACT

Sweet corn is a variety of corn with high sugar content used as human food at the milk stage. The information on general combining ability and specific combining ability for sweet corn inbred lines are important for hybrid development. The objectives of this study were to estimate general and specific combining ability effects and identify superior sweet corn hybrids for eating quality and fresh yield. Experimental entries consisted of 38 sweet corn hybrids developed from crossing 19 sweet corn inbred lines with two sweet corn testers in a line×tester mating design. These hybrids were evaluated at two plant dates; early at 22^nd^ of April and delayed 6^th^ of August in two separate experiments at Sakha Research Station 2018 season. Data recorded on days to 50% silking, plant height, sweetness, fresh yield with and without husk, ear length, No. of rows/ear and No. of kernels /row. Combined analysis of variance showed that the means of early planting increased significantly than delayed planting date for all studied traits. The non-additive gene effects were more important than additive gene effects for sweetness, fresh yield with and without husk, ear length, and No. of kernels /row. While the additive gene effects were predominant in the expression of days to 50% silking, plant height and No. of rows/ear. The best inbred lines for general combing ability effects were Sk307, Sk316, Sk318 and Sk319 for most traits. The sweet corn hybrid Sk307×Sk321 was superior for sweetness, fresh yield with and without husk and No. of rows/ear.

Key words**: *Sweet corn, Line×tester, Combing ability, Sweetness*.**

INTRODUCTION

Among the various types of specialty corn, sweet corn (*Zea mays* L. *saccharata*) is used as human food at the milk stage when the kernel is soft succulent and sweet or in processed food, whereas the straw can be used for silage after harvest. It is of most popular vegetable crops in the USA and Canada, but its consumption has been increasing all over the world, as a source of sugar, fiber minerals and certain vitamins (Lertrat and Pulam 2007). In Egypt sweet corn has attracted very little attention as a crop. So research on this crop is poor and sparse, however the sweet corn can be spread instead of common corn, which is eaten grilled in the milk stage, when it has high yield and quality with the methods of freezing, marketing and some industries. For these goals the maize research program is acting now. One of the goals of sweet corn breeding procedures is to produce sweet corn with a high sugar concentration in the endosperm.

Meilgaard *et al* (1991) showed that a common method for quantifying attributes of food that are accepted to affect consumer acceptance involves trained taste panels using descriptive sensory profiling. Geise (1953) reported that the early work on sweet corn quality was conducted using triangle taste tests to determine the smallest increment of several variable quality factor of sweet corn that could be detected by panelists. Kernel sugar concentration as a quality factors was not studied in the early research. Section of hybrids during the first stage is based on relatively highly hereditary properties, such as ear and kernel appearance, ear and kernel size and if sources allow taste. In order to estimate sugar content, tenderness and succulence of grain, a certain equipment is necessary. Since these analyses are expensive and lengthy, they are usually performed at the last stage of the testing program, but yield and its components are determined over all stages of studies (Tracy 1994).

The sweetness is the major component of flavor and is affected by the amount of sugar and starch in the endosperm (Dickert and Tracy 2001). The sweetness is determined not only by genetics, but also by the way the respective varieties are managed and harvested. Wann *et al* (1971) stated that the primary components of fresh sweet corn associated with consumer preference are kernel texture, flavor (sweetness and aroma). Reyes *et al* (1982) found that sensory perception of sweetness was more closely related to sucrose concentration than with levels of either fructose or glucose. Generally many papers have been published in which quality has been defined and scored using different attributes such as: color, texture and flavor (Garwood *et al* 1976), hedonic quality and sweetness (Evensen and Boyer 1986), sweetness firmness, moistness, flavor and overall quality (Geeson *et al* 1991), sweetness, starchiness, crispness and tenderness (Azanza *et al* 1994). The main goals of this study were to estimate of general and specific combining ability effects and identify superior sweet corn hybrids for eating quality and fresh yield.

MATERIALS AND METHODS

Experimental entries consisted of 38 sweet corn hybrid developed in line × tester mating design (Kempthorne 1957), where 19 sweet corn inbred lines derived from five sweet corn populations crossed with two inbred line testers (Sk320 and Sk321) in 2017 season. Experimental entries were planted in two planting dates (early date on 22nd of April and delayed date on 6th of August) in two separate experiments at Sakha Research Station in 2018 season. The experimental design was a randomized complete blocks design with three replications at each planting date. Plot consisted of 1 row of 4m length with 0.8m width and 25cm between hills, resulting in a population density of 50000 plants/ha. The hybrids were managed using standard production practices recommended for maize.

Data were collected on traits: number of days to 50% silking, plant height (cm), sweetness one from eating quality traits measured on three self pollinated ears in each plot. These ears were harvested after 18 days for early planting and 23 days for delayed planting date after days to 50% silking and immediately sampled raw and rated for sweetness by an experienced taste-testing panels. Rating for sweetness was based on a 1-6 scale (1=bland or subpart sweetness and 6= very sweet or highly desirable sweetness), fresh ears weight with and without husk per plot converted to fresh yield with husk and without husk ton/hectare (t/ha), dehusked ear length (cm), number of rows per ear and number of kernels per row. Data on fresh yield with and without husk, ear length, number of rows and kernels per row were recorded at fresh harvest stage that is 18 to 23 days after 50% silking for early and delayed planting date, respectively.

The combined analysis of variance for all studied traits across the two planting dates was done as outlined by Snedecor and Cochran (1967). The line × tester analysis of variance was performed, when the differences between 38 F_1 hybrids were significant according to Kempthorne (1957), to estimate general (GCA) and specific (SCA) combining ability effects.

RESULTS AND DISCUSSION

The results in Table (1) showed that the mean squares due to planting date (D) were highly significant for all studied traits, except for sweetness, indicating overall differences between early and delayed planting. The highest mean for all studied traits occurred at early planting (22nd April), while 6th August planting gave the lowest values for all studied traits (Table 2). These results suggest that the environmental conditions at early planting were suitable than delayed planting for sweet corn production at Sakha location. Farsiani *et al* (2011) and Khan *et al* (2011) found that sweet corn was significantly affected by planting date and decrease in days to silking with delayed of planting from March to July.

Table 1. Analysis of variance for sweet corn hybrids for eight traits combined across two planting dates.

SOV	df	Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)	Fresh yield without husk (t/ha)	Ear length (cm)	No. of rows/ear	No. of kernels/row
Planting date (D)	1	3373.372**	384663.267**	0.157	5625.445**	2118.957**	187.752**	31.688**	1241.333**
Rep/D	4	72.017	7291.714	0.627	102.188	35.156	6.455	1.280	28.570
Hybrid(H)	37	85.094**	991.695**	3.006**	155.422**	49.969**	19.881**	17.440**	85.871**
H×D	37	4.345	265.465**	0.869	26.034*	9.503**	1.674*	1.346	14.954*
Error	148	3.422	116.025	0.811	16.321	4.733	1.100	1.438	9.371

***, ** Significant at 0.05 and 0.01 levels of probability, respectively.**

Table 2. Means of planting date across 38 F_1 hybrids for eight traits.

Planting date	Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)	Fresh yield without husk (t/ha)	Ear length (cm)	No. of rows/ear	No. of kernels /row
22nd April	69.05	246.59	4.78	23.53	13.52	20.03	16.84	42.92
6th August	61.35	164.44	4.72	13.60	7.42	18.21	16.09	38.25
LSD 0.05	2.20	22.16	0.21	2.62	1.54	0.66	0.29	1.39

Mosa (2012) found that the best planting date for grain yield was 15th may than 15th June at Sakha location in Egypt.

Regarding to Table 1, the mean squares due to sweet corn hybrids were highly significant for all studied traits, indicating highly differences among studied sweet corn hybrids for all studied traits; hence, selection is possible to identify the most desirable hybridsThe mean performance of 38 sweet corn F_1 hybrids for eight studied traits across two planting date is presented in Table (3). The best hybrids were (Sk306 × Sk320), (Sk317 × Sk320), (Sk318 × Sk320) and (Sk319 × Sk320) for earliness, (Sk314 × Sk320) and (Sk315 × Sk320) for short plant (towards lodging resistance), (Sk318 × Sk321) and (Sk319 × Sk321) for tall plant (can be used as silage), (Sk303 × Sk321), (Sk307 × Sk320), (Sk307 × Sk321), (Sk309 × Sk320), (Sk311 × Sk320), (Sk312 × Sk320), (Sk314 × Sk320), (Sk315 × Sk320) and (Sk315 × Sk321) for sweetness (towards increased sugar percentage), (Sk303 × Sk321), (Sk304 × Sk321), (Sk307 × Sk321), (Sk316 × Sk321) and (Sk319 × Sk321) for high fresh yield with husk (t/ha), (Sk304 × Sk321), (Sk307 × Sk321), (Sk308 × Sk320) and (Sk319 × Sk320) for high fresh

Table 3. Mean performance of 38 sweet corn F_1 hybrids for eight traits across two planting dates.

Hybrid	Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)	Fresh yield without husk (t/ha)	Ear length (cm)	No. of rows/ear	No. of kernels /row
Sk301×Sk320	65.17	203.17	4.00	19.84	10.41	21.00	13.17	43.67
Sk301×Sk321	68.00	211.67	5.33	22.56	10.07	19.70	15.67	42.50
Sk302×Sk320	64.50	201.50	4.17	16.98	9.96	20.30	14.50	42.00
Sk302×Sk321	67.00	229.17	4.67	20.48	9.88	19.23	16.00	41.00
Sk303×Sk320	62.33	210.83	5.00	21.58	12.94	20.10	14.33	40.00
Sk303×Sk321	68.17	214.33	5.50	24.54	12.38	19.43	17.17	41.00
Sk304×Sk320	61.33	198.50	4.83	15.08	9.92	18.57	16.33	41.50
Sk304×Sk321	67.17	211.33	4.83	28.37	15.86	18.83	20.33	39.33
Sk305×Sk320	62.33	187.33	5.00	17.16	11.14	18.67	16.83	42.00
Sk305×Sk321	66.33	194.67	5.33	18.94	10.68	17.80	19.33	39.00
Sk306×Sk320	60.83	195.17	5.17	17.76	11.51	18.70	16.00	40.83
Sk306×Sk321	67.17	204.67	4.17	13.35	7.75	18.87	17.00	40.83
Sk307×Sk320	62.17	207.17	5.50	18.29	11.24	18.53	15.83	41.67
Sk307×Sk321	65.83	219.50	5.50	24.49	13.36	19.00	19.67	43.00
Sk308×Sk320	61.33	206.17	5.33	22.36	13.68	19.50	16.17	41.00
Sk308×Sk321	64.00	217.00	5.00	1.72	0.94	17.07	20.17	35.50
Sk309×Sk320	65.00	200.00	5.67	17.87	10.60	19.33	15.83	42.00
Sk309×Sk321	73.17	208.00	4.83	12.41	6.38	15.73	18.00	33.67
Sk310×Sk320	63.33	201.83	5.00	20.17	11.40	19.77	15.17	41.50
Sk310×Sk321	73.17	191.17	4.67	12.19	6.65	14.40	16.50	33.17
Sk311×Sk320	63.17	205.50	5.50	20.95	11.87	20.30	14.83	44.67
Sk311×Sk321	72.83	207.50	5.00	13.85	6.22	15.43	16.00	32.00
Sk312×Sk320	66.83	208.00	5.83	19.87	11.12	20.33	16.33	43.67
Sk312×Sk321	74.50	192.50	4.33	11.09	5.75	14.50	16.33	27.00
Sk313×Sk320	65.00	207.00	4.67	20.98	12.90	18.67	15.83	42.83
Sk313×Sk321	67.83	208.17	4.67	18.37	9.24	16.85	18.50	38.17
Sk314×Sk320	65.17	181.50	5.50	14.06	9.06	18.33	16.67	40.67
Sk314×Sk321	67.50	196.50	5.00	9.70	5.61	20.77	19.33	44.00
Sk315×Sk320	62.67	167.00	5.50	21.20	13.18	20.90	15.83	42.33
Sk315×Sk321	64.17	194.33	5.50	16.71	8.63	19.43	17.33	39.00
Sk316×Sk320	61.83	204.83	3.50	18.30	11.82	21.45	15.50	42.83
Sk316×Sk321	66.00	221.00	4.33	24.66	13.08	20.88	17.00	43.00
Sk317×Sk320	59.33	201.17	3.33	18.45	11.41	21.23	14.33	40.83
Sk317×Sk321	65.33	220.17	4.17	20.25	10.77	20.50	15.50	42.33
Sk318×Sk320	58.33	210.33	3.50	21.55	13.00	21.23	14.17	45.67
Sk318×Sk321	64.83	229.83	3.50	23.49	12.01	20.57	16.67	43.50
Sk319×Sk320	60.67	211.67	3.67	19.77	13.35	20.43	14.33	41.67
Sk319×Sk321	63.50	229.67	3.67	26.40	12.44	20.47	17.33	43.00
LSD 0.05	2.09	12.18	1.01	4.57	2.46	1.21	1.35	3.46

yield without husk (t/ha), (Sk301 × Sk320), (Sk316 × Sk320), (Sk317 × Sk320) and (Sk318 × Sk320) for maximum ear length, (Sk304 × Sk321), (Sk307 × Sk321) and (Sk308 × Sk321) for increased number of rows/ear and (Sk311 × Sk320), (Sk314 × Sk321) and (Sk318 × Sk320) for the increased number of kernels/row. From above results, the hybrid (Sk307×Sk321) showed high values for sweetness, fresh yield with and without husk and number of rows/ear.

The mean squares due to the interaction of H×D were significant for plant height, fresh yield with and without husk, ear length and number of kernels/row, indicating that the hybrids tested behaved differently from one planting date to another for these traits.

The best hybrids under the two planting dates are presented in Table (4). The high plant height was desirable because after harvest the straw can be used as silage, consequently the hybrids (Sk302×Sk321), (Sk318×Sk321) and (Sk319×Sk321) were stable under early and delayed planting dates. For fresh yield with and without husk, the best hybrids were (Sk301×Sk321), (Sk303×Sk321), (Sk304×Sk321) and (Sk308×Sk320) at early planting date for two traits, while (Sk304×Sk321), (Sk307×Sk321), (Sk318×Sk321) and (Sk319×Sk321) at delayed planting date for fresh yield with husk and (Sk303×Sk320), (Sk307×Sk321), (Sk316×Sk320) and (Sk318×Sk320) at delayed planting for fresh yield without husk. The best hybrid under early and delayed planting dates (Sk317×Sk321) for ear length and (Sk301×Sk320) for number of kernels/row.

Table 4. The best hybrids under two planting dates for five traits.

Plant height (cm)		Fresh yield with husk (t/ha)		Fresh yield without husk (t/ha)		Ear length (cm)		No. of kernels/row	
22nd April	6th August	22nd April	6th August	22nd April	6th August	22nd April	6th August	22nd April	6th August
Sk302×Sk321	Sk302×Sk321	Sk301×Sk321	Sk304×Sk321	Sk301×Sk321	Sk303×Sk320	Sk315×Sk320	Sk301×Sk320	Sk301×Sk320	Sk301×Sk320
Sk317×Sk321	Sk308×Sk321	Sk303×Sk321	Sk307×Sk321	Sk303×Sk321	Sk307×Sk321	Sk316×Sk321	Sk314×Sk321	Sk311×Sk320	Sk314×Sk321
Sk318×Sk321	Sk318×Sk321	Sk304×Sk321	Sk318×Sk321	Sk304×Sk321	Sk316×Sk320	Sk317×Sk320	Sk316×Sk320	Sk313×Sk320	Sk316×Sk320
Sk319×Sk321	Sk319×Sk321	Sk308×Sk320	Sk319×Sk321	Sk308×Sk320	Sk318×Sk320	Sk318×Sk320	Sk317×Sk320	Sk316×Sk321	Sk318×Sk320

Line × tester analysis of variance for 38 sweet corn hybrids for eight traits is presented in Table (5). The mean squares due to lines (L), testers (T) and their interaction (L×T) were significant or highly significant for all studied traits, except T for sweetness and fresh yield with husk, meaning that the inbred lines differed from each other as well as testers and the inbred lines performed differently in their respective crosses depending on the type of tester used for these traits. Mean squares due to the interaction of L×D was significant or highly significantly for fresh yield without husk and plant height, respectively, while the mean squares due to T×D interaction was highly significant for sweetness, ear length and number of kernels/row, meanwhile that the mean squares due to L×T×D interaction was significant or highly significant for plant height, fresh yield with and without husk, meaning that L, T and L×T interaction were affected by change in planting date for these traits.

Table 5. Line × tester analysis of variance for 38 sweet corn F_1 hybrids for eight traits across two planting dates.

SOV	df	Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)	Fresh yield without husk (t/ha)	Ear length (cm)	No. of rows/ear	No. of kernels /row
Lines (L)	18	75.920**	1346.776**	4.773**	144.334**	41.441**	20.466**	16.909**	63.356**
Testers (T)	1	1430.004**	5850.987**	0.070	54.782	288.990**	122.760**	276.320**	574.754**
L×T	18	19.551**	366.654**	1.404*	172.101**	45.220**	13.582**	3.589**	81.227**
L×D	18	4.123	319.045**	0.825	24.277	8.417*	1.381	1.791	12.694
T×D	1	2.741	6.671	6.331**	0.649	2.091	11.633**	1.268	76.422**
L×T×D	18	4.657	226.261*	0.611	29.203*	11.001**	1.416	0.906	13.801
Error	148	3.422	116.025	0.811	16.321	4.733	1.101	1.438	9.371
K^2GCA/K^2SCA	-	4.461	1.322	0.333	0.052	0.374	0.532	6.571	0.413

***, ** Significant at 0.05 and 0.01 levels of probability, respectively.**

Regarding to Table (5), the ratio between K^2GCA (additive gene effects) and K^2SCA (non-additive gene effects) showed that additive gene effects were of greatest importantce than non-additive gene effects in the inheritance of days to 50% silking, plant height and No. of rows/ear traits, while the reverse was true for sweetness, fresh yield with and without husk, ear length and No. of kernels/row (non-additive gene effects > additive gene effects). Has (2007), Zhao YuanZeng *et al* (2002), Bordallo *et al* (2005) and Sadaiah *et al* (2013) observed predominance of non-additive gene effects than additive gene effects for sugar content. Srdic *et al* (2011) found that the non-additive gene effects were predominant in the expression for fresh ear yield. Elayaraja *et al* (2014) revealed that both additive and non-additive variances are important in manifestation of most of the traits under study. The non-additive was higher than additive variance for ear weight with and without husk, ear length, number of rows/ear, No. of kernels/row and plant height traits, while additive was higher than non-additive variance for days to 50% silking trait. Has and Has (2009) found that the non-additive gene effects were more important than additive gene effects for eating quality. Asghar and Mehdi (1999) found that broad-sense heritability for grain yield/plant and sweetness were 38 and 36%, respectively. Shantha Kumara *et al* (2013) reported that the non-additive gene effects were predominant for green cob yield and quality traits. Worrajinda *et al* (2013) found that SCA variance was higher than GCA variance for ear weight, indicating the predominance of non-additive gene effects.

Estimates of general combining ability effects for 19 sweet corn inbred lines across two planting dates are presented in Table (6). The desirable inbred lines for general combining ability effects were: (Sk306, Sk307, Sk308, Sk315, Sk316, Sk317, Sk318 and Sk319) for earliness, (Sk305, Sk310, Sk314 and Sk315) for short plant, (Sk302, Sk303, Sk307, Sk316, Sk318 and Sk319) for tall plant, (Sk303, Sk307 and Sk315) for sweetness, (Sk303, Sk304, Sk307, Sk316, Sk318 and Sk319) for high fresh yield with and without husk, (Sk301, Sk302, Sk303, Sk315, Sk316, Sk317, Sk318 and Sk319) for ear length, (Sk304, Sk305, Sk307, Sk308, Sk313 and Sk314) for No. of rows/ear, (Sk301, Sk307, Sk314, Sk316, Sk318 and Sk319) for No. of kernels/ row. In general, the best inbred lines for GCA effects were Sk307, Sk316, Sk318 and Sk319 for most studied traits. These sweet corn inbred lines could be utilized in maize improvement programs for improvement of these traits of interest as these inbred lines have high potential to transfer desirable traits to their hybrid progenies.

Table 6. General combining ability effects for 19 sweet corn inbred line for eight traits across two planting dates.

Inbred line	Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)	Fresh yield without husk (t/ha)	Ear length (cm)	No. of rows/ear	No. of kernels /row
Sk301	1.377*	1.895	-0.088	2.625*	-0.235	1.223*	-2.053*	2.496*
Sk302	0.544	9.811*	-0.338	0.159	-0.562	0.640*	-1.219*	0.912
Sk303	0.044	7.061*	0.509*	4.487*	2.179*	0.640*	-0.719*	-0.088
Sk304	-0.956	-0.605	0.079	3.150*	2.410*	-0.427	1.864*	-0.171
Sk305	-0.873	-14.522*	0.412	-0.524	0.431	-0.893*	1.614*	-0.088
Sk306	-1.206*	-5.605	-0.088	-3.015*	-0.851	-0.343	0.031	0.246
Sk307	-1.206*	7.811*	0.746*	2.814*	1.823*	-0.360	1.281*	1.746*
Sk308	-2.540*	6.061	0.412	-6.531*	-3.171*	-0.843*	1.697*	-2.338*
Sk309	3.877*	-1.522	0.496	-3.434*	-1.989*	-1.593*	0.447	-2.754*
Sk310	3.044*	-9.022*	0.079	-2.394*	-1.451*	-2.043*	-0.636	-3.254*
Sk311	2.794*	0.978	0.496	-1.172	-1.436*	-1.260*	-1.053*	-2.254*
Sk312	5.461*	-5.272	0.329	-3.091*	-2.048*	-1.710*	-0.136	-5.254*
Sk313	1.211*	2.061	-0.088	1.102	0.593	-1.368*	0.697*	-0.088
Sk314	1.127*	-16.522*	0.496	-6.695*	-3.147*	0.423	1.531*	1.746*
Sk315	-1.790*	-24.855*	0.746*	0.379	0.428	1.040*	0.114	0.079
Sk316	-1.290*	7.395*	-0.838*	2.906*	1.972*	2.040*	0.219	2.329*
Sk317	-2.873*	5.145	-1.004*	0.779	0.611	1.740*	-1.553*	0.996
Sk318	-3.623*	14.561*	-1.254*	3.945*	2.026*	1.773*	-1.053*	3.996*
Sk319	-3.123*	15.145*	-1.088*	4.509*	2.414*	1.323*	-0.636	1.746*
LSD g_{ij}0.05	1.046	6.094	0.509	2.285	1.230	0.609	0.678	1.732

***, ** Significant at 0.05 and 0.01 levels of probability, respectively.**

The results in Table (7), showed that the best combiner tester was Sk320 for earliness, short plant, fresh yield without husk, ear length and No. of kernels/ row and Sk321 for tall plant and No. of rows/ear.

Table 7. General combining ability effects for two sweet corn testers for eight traits across two planting dates.

Tester	Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)	Fresh yield without husk (t/ha)	Ear length (cm)	No. of rows/ear	No. of kernels /row
Sk320	-2.504*	-5.066*	0.018	0.490	1.126*	0.734*	-1.101*	1.588*
Sk321	2.504*	5.066*	-0.018	-0.490	-1.126*	-0.734*	1.101*	-1.588*
LSD g_i 0.05	0.339	1.977	0.165	0.741	0.399	0.197	0.220	0.561

The best sweet corn hybrids in specific combining ability effects for eight traits across two planting dates are presented in Table (8). The desirable hybrids were, Sk312×Sk320 for earliness, sweetness, fresh yield with husk, ear length, No. of rows/ear and No. of kernels/ row, Sk307×Sk321 for fresh yield with and without husk, No. of rows/ear and No. of kernels/ row, Sk304×Sk321 for fresh yield with and without husk, ear length and No. of rows/ear, Sk309×Sk320 for earliness, ear length and No. of kernels/ row, Sk310×Sk320 for earliness, fresh yield with husk and ear length, Sk311×Sk320 for earliness, fresh yield without husk and No. of kernels/ row, Sk306×Sk320 for sweetness and No. of rows/ear and Sk316×Sk321 for sweetness and fresh yield without husk, Sk315×Sk320 for earliness and tall plant, Sk308×Sk320 for fresh yield with and without husk and Sk314×Sk321 for earliness and No. of kernels/ row.

Table 8. The best sweet corn hybrids in specific combing ability effects for eight traits across two planting dates.

Days to 50% silking	Plant height (cm)	Sweetness	Fresh yield with husk (t/ha)
Sk309×Sk320	Sk302×Sk320	Sk301×Sk321	Sk304×Sk321
Sk310×Sk320	Sk310×Sk321	Sk306×Sk320	Sk307×Sk321
Sk311×Sk320	Sk312×Sk321	Sk312×Sk320	Sk308×Sk320
Sk312×Sk320	Sk313×Sk321	Sk316×Sk321	Sk310×Sk320
Sk315×Sk320	Sk315×Sk320	Sk317×Sk321	Sk312×Sk320
Fresh yield without husk (t/ha)	**Ear length (cm)**	**No. of rows/ear**	**No. of kernels /row**
Sk304×Sk321	Sk304×Sk321	Sk304×Sk321	Sk307×Sk321
Sk307×Sk321	Sk309×Sk320	Sk306×Sk320	Sk309×Sk320
Sk308×Sk320	Sk310×Sk320	Sk307×Sk321	Sk311×Sk320
Sk311×Sk320	Sk312×Sk320	Sk308×Sk321	Sk312×Sk320
Sk316×Sk321	Sk314×Sk321	Sk312×Sk320	Sk314×Sk321

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القدرة على الإئتلاف لسلالات مرباة داخلياً من الذرة الحلوة

(*Zea mays saccharata*)

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تحتوى الذرة الحلوة على نسبة عالية من السكر. معرفة القدرة العامة والخاصة على الإئتلاف لسلالات مرباة داخلياً من الذرة الحلوة تساعد على إستنباط هجن جديدة. لذلك تهدف هذه الدراسة الى تقدير تأثيرات القدرة العامة والخاصة على الإئتلاف والتعرف على هجن الذرة الحلوة المتفوقة فى جودة الأكل والمحصول الطازج. تشتمل هذه التجربة على ٣٨ هجين من الذرة الحلوة الناتجة من التهجين بين ١٩ سلالة من الذرة الحلوة واثنين من الكشافات بنظام التزاوج السلالة فى الكشاف. تم تقييم الهجن الناتجة فى ميعادين زراعة (مبكر فى ٢٢ إبريل ومتأخر فى ٦ أغسطس) فى تجربتين مستقلتين فى محطة بحوث سخا موسم ٢٠١٨. أخذت النتائج لصفات تاريخ ظهور حرائر ٥٠% من النباتات وإرتفاع النبات وتذوق الحلاوة والمحصول الطازج بالأغلفة و بدون أغلفة وطول الكوز وعدد الصفوف بالكوز وعدد الحبوب بالصف. أظهر التحليل المشترك أن متوسطات جميع الصفات عند الزراعة المبكرة أعلى من متوسطات الصفات عند الزراعة المتأخرة. تبين ان تأثيرات التباين الوراثى غير المضيف هى المتحكمة فى وراثة صفات تذوق الحلاوة والمحصول الطازج بالغلاف والمحصول الطازج بدون غلاف وطول الكوز وعدد الحبوب بالصف بينما تأثيرات التباين الوراثى المضيف هى المتحكمة فى وراثة صفات تاريخ ظهور حرائر ٥٠% من النباتات وإرتفاع النبات وعدد الصفوف بالكوز. أفضل السلالات فى تأثيرات القدرة العامة على الائتلاف هى سلالات سخا ٣٠٧ وسخا ٣١٦ و سخا ٣١٨ وسخا ٣١٩ لمعظم الصفات تحت الدراسة. كذلك تفوق الهجين سخا ٣٠٧×سخا٣٢١ فى صفات حلاوة الاكل والمحصول الطازج سواء بالأغلفة اوبدون أغلفة وعدد الصفوف بالكوز.

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