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Combining Ability Estimate of Some Sweet Corn Inbred Lines Using Line × Tester Mating Design Under Two Planting Dates

Cross Mark

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ABSTRACT

Sweet corn breeders use combining ability assessment as a key tool to identify the best inbred lines and hybrids. Using the line × tester mating scheme, ten new inbred lines were crossed with two testers at Sakha Agricultural Research Station in 2022 summer season. The resulting 20 crosses were planted in a randomized complete block design with three replications on two planting dates, 20 April and 20 June at Sakha Agricultural Research Station in 2023 summer season. Combined analysis of variance for eight traits across two planting dates showed highly significant differences between two planting dates for the studied traits. The early planting date on 20 April showed highest values for all studied traits compared with the late one. Additive gene effects were more vital in controlling the inheritance of days to 50% silking, fresh yield with husk, fresh yield without husk, ear length, number of rows/ear and number of kernels/row, while non-additive gene effects were preponderance in the inheritance of plant height and sweetness. The desirable inbred lines for GCA effects were Sk5006/2 and Sk6021/8 for most studied traits. Hybrids Sk5006\2 × Sk5008/1, Sk5005/9 × Sk5008/1 and Sk5006/2 × SC super sweet 110 showed high sweetness and high fresh yield without husk. These hybrids could be used for commercial production, after testing in advanced trials.

Keywords: *Hybrids, GCA, SCA, Tester, Sweet corn, Additive, Non-additive, gene effects.*

INTRODUCTION

Worldwide, sweet corn (*Zea mays saccharata* L.) is grown for human as a fresh or processed food, it is a noteworthy supply of fiber, minerals, and many vitamins (Lertrat and Pulam, 2007 and Sadaiah *et al.,* 2013). Customers like sweet corn because of its distinct flavor, sweetness, and appealing aroma. Sweet corn provides nutritional qualities that are good for your health. The nutritional value of sweet corn kernels is related to the content of water (72.7%) and the total content of solid parts (27.3%), which include hydrocarbons (81%), proteins (13%), lipids (3.5%) and others (2.5%), starch is the dominant hydrocarbon component (Szymanek ,2012). The sweet taste of the corn kernel is results from a recessive mutation that occurs naturally in the genes that control the conservation of sugar to starch in the endosperm of corn kernels (Sujiprihati *et al.*, 2012). It is mutation of field corn at the sugary (su) locus located in the short arm of chromosome 4 (Shin *et al,*. 2006; Sa *et al.,* 2012 and Hossain *et al.,* 2015). The predominant sugar in (su) varieties is sucrose, and fewer amounts of maltose, glucose and fructose (Cobb and Hannah, 1981). In sweet corn, the sugar content is high when in the milk and the early dough stage and by its wrinkled translucent kernel when dry (George, 1999 and Singh and Bahaduar, 2014). Thus, the milk stage is the ideal time to harvest sweet corn this stage usually lasts about a weak .When the corn is ready to be harvested, the farmer may tell by looking at the silks, husks, and kernels. The silks should be brown and starting to dry, which occurs about 3 weeks after the silks first appear. The husks should hold tightly to the ear and the kernels should produce a little milky fluid when pierced (Weichmann, 1987; Wien, 1997 and Salunkhe and Kadam, 1998). The green plants after harvesting sweet green cobs provides nutrition forage for working animals which is an additional plus point of sweet corn (Upadhyay and Singh, 2020). A large planting date window is used to grow sweet corn to provide a consistent supply for a fresh market (Tracy, 2001). Plus, change in the planting date modifies the radiative and the thermal conditions during the growing season due to the normal variation of the weather conditions throughout the year (Cirilo and Andrade, 1994). Quality attributes such flavor, sweetness, creamy texture, appearance, scent, and low starch content are the focus of the sweet corn breeding program. Especially high productivity stands out as the main objective of sweet corn breeding program (Lertrat and Pulam, 2007). When breeding sweet corn, consistency in ear length, size, and shape, as well as optimal kernel row layout and kernel characteristics like breadth, depth, and color, are all carefully considered (Pajic *et al.,* 2010). Estimation of combining ability is important for sweet corn breeders to develop new hybrids by selection of inbred lines and hybridization (Ruswandi *et al.,* 2015). One of the methods to estimate combining ability was the line x tester analysis introduced by Kempthorne (1957). This method is easy and accurate to estimate combining ability effects and to select superior inbred lines and hybrids. Also combining ability analysis can assess the relative importance and modes of gene effects involved in expressing the desired traits (Gaballah *et al.,* 2022). General combining ability (GCA) expresses the additive portion of the total variance and average behavior of inbred lines, whereas Specific combining ability (SCA) expresses the behavior of particular hybrid combinations, with a composition of a non-additive portion of the total variance, arising primarily from dominance and epistatic deviations (Mural, 2012;Aslam *et al.,* 2017 and Haider *et al.,* 2021). The non-additive gene effects were more important than additive gene effects in the inheritance of sweetness,

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fresh yield with husk and fresh yield without husks, ear length, and number of kernels/row. While, the reverse was obtained for days to 50% silking, plant height and number of rows/ear (Mosa *et al.*, 2019). The objectives of this study were, to examine the effect of planting dates on sweet corn hybrids and estimates of combining abilities to determine the superior inbred lines and hybrids.

MATERIALS AND METHODS

This research was conducted at Sakha Research Station. Ten sweet corn new inbred lines, Sk5008/1, Sk5006/2, Sk5004/3, Sk5006/4, Sk5008/5, Sk5006/6, Sk5008/7, Sk6021/8, Sk5005/9 and Sk5005/10 were crossed with two testers, Sk5001/8 and SC super sweet 110 using line × tester mating design in 2022 summer growing season. The resulting 20 sweet corn hybrids were evaluated using a randomized complete block design with three replications on two planting dates 20 April and 20 June in 2023 summer growing season. The plot was one row, four m long, width 0.8 m between rows and 0.25 m between each plant. In every planting date trial, field management practices for maximum maize output were used at the proper time. The traits under investigation were, days to 50% silking, plant height (cm), fresh yield with husks (t/ha), fresh yield without husks (t/ha), sweetness (scale (1-5), 1=light sweetness and 5= great sweetness), ear length (cm), number of rows/ear and number of kernels/row. The harvest was done after three weeks from number of days to 50% appearance of silking. Combined analysis across two planting dates was done outlined by Snedecor and Cochran(1989) after the homogeneity test using computer application of Statistical Analysis System (SAS, 2008). Line × tester analysis was done according to Kempthorne(1957) by AGD-R software (Analysis of Genetic Design in R for Windows) version 5.0 Statistical Software (Rodriguez *et al.,* 2015).

RESULTS AND DISCUSSION

Analysis of variance:

The results in Table 1, showed highly significant variations (p>0.01) between the two planting dates (D), this is due the varying climatic conditions between the two planting dates. Also, hybrids (H) mean squares were highly significant for all studied traits, suggesting that greater diversity among the hybrids. The mean squares of hybrids x planting dates (H × D) interaction was highly significant for sweetness, fresh yield without husk, ear length, number of rows/ear, and number of kernels/row, indicating that hybrids performed differ at the two planting dates for these traits. The significant influence of the hybrids, planting dates and their interaction were also observed in previous researches, (Garcia *et al*., 2009; Ibrahim and Ghada, 2019 and Mosa *et al.*,2019).

Table1. Mean squares of 20 sweet corn hybrids, planting dates and their interaction for eight traits.

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 dates (D)	1	8585.20**	29516.00**	46.90**	196.30**	172.30**	163.30**	91.20**	757.80**
Rep/D	4	14.20	421.90	0.60	7.40	5.20	1.20	1.20	5.80
Hybrids (H)	19	53.30**	1586.90**	1.90**	53.10**	19.20**	14.30**	8.40**	70.70**
H×D	19	3.20	154.10	0.80**	3.60	6.40**	6.70**	1.90**	43.3**
Error	76	4.50	102.60	0.30	3.00	1.90	2.40	0.90	10.5

** Significant at 0.01 levels of probability.

Mean performance:

The early planting date (20 April) had a desirable values for sweetness, fresh yield with husk and fresh yield without husk, ear length, no. of rows/ear and no. of kernels/row however, the opposite was true for days to 50% silking and plant height when the late planting date (20 June) had the desirable values (Table 2).

Table 2. Means of two planting dates across 20 sweet corn 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)	number of rows/ear	number of kernels /row
20 April	72.70	229.60	4.40	15.70	10.40	18.80	17.70	34.60
20 June	55.80	198.30	3.15	13.10	8.90	16.50	16.00	29.60
LSD 0.05	1.90	5.12	0.27	0.87	0.69	0.78	0.47	1.63
LSD 0.01	3.14	8.47	0.45	1.43	1.14	1.29	0.77	2.69

Mean performance of 20 sweet corn hybrids for eight studied traits across two planting dates are presented in Table 3. The desirable hybrids were Sk5006/2 × Sk5001/8, Sk6021/8 × Sk5001/8, Sk5006/6 × SC super sweet 110 and Sk6021/8 × SC super sweet 110 for earliness, Sk5008/5 × Sk5001/8, Sk5008/7 × Sk5001/8, Sk6021/8 × Sk5001/8, Sk5008/5 × SC super sweet 110 and Sk6021/8 × SC super sweet 110 for short plant height, Sk5008/1 × Sk5001/8, Sk5006/2 × Sk5001/8, Sk5006/4 × Sk5001/8, Sk5006/6 × Sk5001/8, Sk5005/10 × Sk5001/8, Sk5008/1 × SC super sweet 110 , Sk5006/2 × SC super sweet 110 and Sk5004/3 × SC super sweet 110 for high sweetness, Sk5006/2 × Sk5001/8, Sk5004/3 × Sk5001/8, Sk6021/8 × Sk5001/8, Sk5005/9 × Sk5001/8, Sk5006/2 × SC super sweet 110 , Sk5006/6 × SC super sweet 110, Sk6021/8 × SC super sweet 110 and Sk5005/9 × SC super sweet 110 for high fresh yield with husk and fresh yield without husk, Sk5004/3 × Sk5001/8, Sk5005/10 × Sk5001/8, Sk5006/6 × SC super sweet 110 and Sk6021/8 × SC super sweet 110 for longest ear, Sk5006/2 × Sk5001/8, Sk5006/4 × Sk5001/8, Sk5006/2 × SC super sweet 110 and Sk5006/4 × SC super sweet 110 for number of rows/ear and Sk5006/2 × Sk5001/8, Sk5006/2 × SC super sweet 110 and Sk6021/8 × SC super sweet 110 for number of kernels/row.

Figure 1, showed eight hybrids Sk5006/2 × Sk5001/8, Sk5006/4 × Sk5001/8, Sk5005/9 × Sk5001/8, Sk5006/2 × SC super sweet 110, Sk5004/3 × SC super sweet 110, Sk5006/4 x SC super sweet 110, Sk5005/9 × SC super sweet 110 and Sk5005/10 × SC super sweet 110 were mixed with a high sweetness output and high fresh yield without husk. These hybrids can be used for commercial production.

Table 3. Mean performance of 20 sweet corn hybrids for eight traits combined 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
Sk 5008/1× Sk 5001/8	1	69.80	211.70	4.16	12.60	7.60	15.90	16.70	26.70
Sk5006/2 × Sk 5001/8	2	61.80	229.70	4.50	17.60	11.40	17.80	18.60	38.10
Sk5004/3 × Sk 5001/8	3	64.30	231.50	3.50	15.90	11.30	19.30	16.40	34.30
Sk5006/4 × Sk 5001/8	4	65.80	220.80	4.33	14.70	10.30	17.50	18.60	31.80
Sk5008/5 × Sk 5001/8	5	69.80	176.00	2.33	8.60	5.80	14.70	16.90	25.00
Sk5006/6 × Sk 5001/8	6	63.80	236.00	4.16	15.50	9.60	18.10	14.90	29.70
Sk5008/7 × Sk 5001/8	7	67.20	195.30	2.66	10.60	7.00	15.70	16.50	26.00
Sk6021/8 × Sk 5001/8	8	59.20	195.00	3.50	21.10	12.30	18.70	17.90	32.20
Sk5005/9 × Sk 5001/8	9	64.70	230.80	3.83	16.40	12.00	18.20	16.50	32.40
Sk5005/10×Sk 5001/8	10	64.50	205.70	4.00	13.80	9.60	19.70	15.70	33.70
Sk 5008/1× SC Super sweet 110	11	65.70	206.00	4.50	11.90	7.80	15.40	17.80	31.10
Sk5006/2× SC Super sweet 110	12	62.20	211.00	4.16	15.40	10.70	16.90	18.10	36.30
Sk5004/3× SC Super sweet 110	13	65.00	218.80	4.16	14.60	10.20	18.80	15.80	34.10
Sk5006/4× SC Super sweet 110	14	62.30	221.80	3.83	12.70	10.00	17.60	18.90	32.40
Sk5008/5× SC Super sweet 110	15	68.00	198.70	3.66	11.70	7.90	16.50	17.00	30.20
Sk5006/6× SC Super sweet 110	16	60.00	228.70	3.66	15.80	10.30	19.10	14.70	35.20
Sk5008/7× SC Super sweet 110	17	65.30	208.00	3.16	11.80	7.60	16.40	16.30	30.00
Sk6021/8× SC Super sweet 110	18	60.70	199.30	3.66	19.20	11.20	20.40	17.30	36.10
Sk5005/9× SC Super sweet 110	19	63.00	237.80	3.83	15.70	10.40	17.30	15.90	33.40
Sk5005/10× SC Super sweet 110	20	62.00	216.00	3.83	12.60	10.30	18.80	16.30	33.40
LSD 0.05		2.40	11.60	0.60	2.00	1.60	1.80	1.10	3.70
LSD 0.01		3.20	15.40	0.80	2.60	2.10	2.40	1.40	4.90

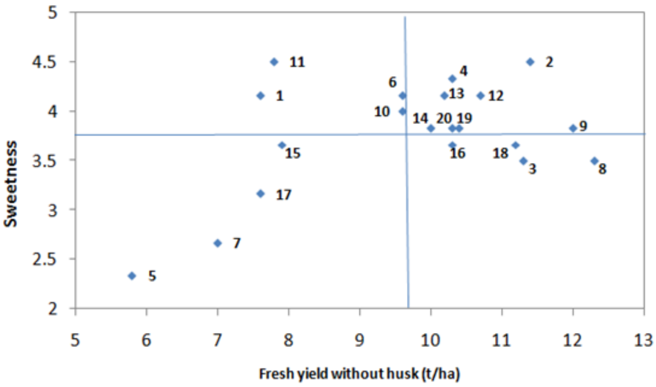

Figure 1. The sweetness versus fresh yield without husk (t/ha) for 20 hybrids combined across two planting dates .

Line × tester analysis:

Mean squares for lines, testers, lines x testers and their interactions with planting dates for eight traits are shown in Table 4. Significant or highly significant differences were found for all traits of inbred lines (L), for days to 50% silking and number of kernels /row of testers (T) and for days to 50% silking, plant height, sweetness, fresh yield with husk, fresh yield without husk and number of kernels/row of (L × T) interaction. Similar results showed significant differences in lines, testers and lines x testers obtained by Ahmed *et al.* (2017), Chouhan *et al.* (2020) and Susanto *et al.* (2021). The mean squares for (L x D) interaction was highly significant for all traits except for days to 50% silking, plant height and fresh yield with husk. While (T×D) interaction was not significant for all traits except for both number of rows/ ear and number of kernels/row. Also mean squares for (L×T×D) interaction was significant or highly significant for sweetness, fresh yield without husk, ear length and number of kernels/row.

Table 4. Line × tester analysis for 20 sweet corn hybrids for eight traits combined across two planting date.

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)	9	91.6**	2868.5**	2.9**	102.7**	36.6**	26.6**	16.8**	111.9**
Testers (T)	1	85.0**	56.0	0.7	8.3	0.1	0.8	0.1	149.1**
L×T	9	11.5**	475.3**	1.0**	8.4**	3.9*	3.5	1.0	20.8*
L×D	9	4.6	156.6	1.0**	2.9	7.2**	8.6**	2.5**	48.8**
T×D	1	3.7	154.1	0.4	7.2	3.0	1.6	7.2**	78.3**
L×T×D	9	1.7	151.7	0.7*	3.9	6.0**	5.3*	0.7	33.8**
Error	76	4.5	102.6	0.3	3.0	1.9	2.4	0.9	10.5
GCA/SCA		2	0.6	0.4	1.6	1.45	1.8	11	1.9

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

The proportion of additive gene effects (GCA) were predominated over non-additive gene effects (SCA) for all studied traits, except for plant height and sweetness, indicating that the additive gene effects were vital in controlling in the inheritance of days to 50% silking, fresh yield with husk and fresh yield without husk, ear length, number of rows/ ear and number of kernels/row. While non-additive gene effects were more predominant in the inheritance of plant height and sweetness. These results were consistent with Elayaraja *et al.* (2014), Chozin and Sudjatmiko (2019), Mosa *et al.* (2019) Susanto *et al.* (2021) and Prai-anun *et al.* (2024).

General combining ability effects of ten inbred lines for eight traits are presented in Table (5). In this study, significant and positive of GCA effects is desirable for all traits except for days to 50% silking and plant height which desirable is significant and negative. Hence the desirable inbred lines for GCA effects were Sk5006/2, Sk5006/6 and Sk6021/8 for earliness, Sk5008/5, Sk5008/7 and Sk6021/8 for short plant height, Sk5008/1, Sk5006/2 and Sk5006/4 for high sweetness, Sk5006/2, Sk5006/6 Sk6021/8 and Sk5005/9 for high fresh yield with husk, Sk5006/2, Sk5004/3, Sk6021/8 and Sk5005/9 for high fresh yield without husk, Sk5004/3, Sk5006/6, Sk6021/8 and Sk5005/10 for ear length, Sk5006/2, Sk5006/4 and Sk6021/8 for number of rows/ear and Sk5006/2, Sk5004/3 and Sk6021/8 for number of kernels/row. From above results the inbred lines, Sk5006/2 and Sk6021/8 were desirable for GCA effects of most studied traits, therefore, it can be used to produce superior hybrids. The desirable tester for GCA effects was SC super sweet 110 for earliness and number of kernels/row.

The GCA effect of sweetness opposite GCA effects of fresh yield without husk for ten inbred lines Figure 2, showed that Sk6021/8 had high GCA effect for fresh yield without husk and low GCA effects for sweetness, while inbred lines Sk5006/2, Sk5004/3, Sk5006/4, Sk5006/6, Sk5005/9 and Sk5005/10 had desirable GCA effect for both sweetness and fresh yield without husk, also inbred line Sk5008/1 had high GCA effect for sweetness and low GCA effects for fresh yield without husk. Meanwhile inbred lines Sk5008/5 and Sk5008/7 had low GCA effect for both sweetness and fresh yield without husk.

Table 5. General combining ability effects of 10 sweet corn inbred lines for eight traits combined 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
Sk 5008/1	1	3.49**	-5.10	0.56**	-2.16**	-1.97**	-1.97**	0.43	-3.18**
Sk5006/2	2	-2.26**	6.40*	0.56**	2.08**	1.40**	-0.28	1.51**	5.05**
Sk5004/3	3	0.41	11.20**	0.06	0.87	1.07**	1.41**	-0.74**	2.07*
Sk5006/4	4	-0.18	7.40*	0.31*	-0.69	0.50	-0.09	1.90**	-0.05
Sk5008/5	5	4.66**	-26.60**	-0.77**	-4.26**	-2.83**	-2.05**	0.13	-4.49**
Sk5006/6	6	-2.34**	18.40**	0.14	1.26*	0.29	0.95*	-2.04**	0.35
Sk5008/7	7	1.99**	-12.30**	-0.86**	-3.19**	-2.33**	-1.62**	-0.44	-4.08**
Sk6021/8		-4.34**	-16.80**	-0.19	5.71**	2.09**	1.91**	0.73**	2.06*
Sk5005/9		-0.43	20.40**	0.06	1.63**	1.51**	0.12	-0.61*	0.79
Sk5005/10		-1.01	-3.10	0.14	-1.24*	0.28	1.62**	-0.87**	1.47
Tester Sk 5001/8		0.84**	-0.68	-0.08	0.26	0.02	-0.08	0.03	-1.11**
Tester SC Super Sweet 110		-0.84**	0.68	0.08	-0.26	-0.02	0.08	-0.03	1.11**
LSD $g_{ij\ line}$	0.05	1.22	5.82	0.31	1.00	0.79	0.890	0.54	1.86
LSD $g_{ij\ line}$	0.01	1.62	7.72	0.42	1.32	1.05	1.181	0.72	2.47
LSD $g_{ij\ tester}$	0.05	0.54	2.60	0.14	0.44	0.35	0.398	0.24	0.83
LSD $g_{ij\ tester}$	0.01	0.72	3.45	0.19	0.59	0.47	0.528	0.32	1.10

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

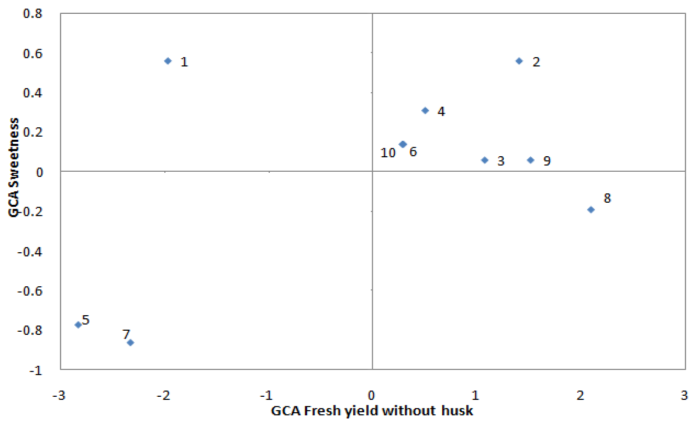

Figure 2. The GCA effects of sweetness opposite GCA effects of fresh yield without husk (t/ha) for ten inbred lines combined across two planting dates .

The preferred hybrids for SCA effects were Sk6021/8 × Sk5001/8 for earliness, Sk5008/5 × Sk5001/8 and Sk5006/2 × SC super sweet 110 for short plant height, Sk5008/5 × SC super sweet 110 for high sweetness and Sk5008/5 × SC super sweet 110 for fresh yield with and without husk Table (6).

Table 6. Specific combining ability effects of 20 sweet corn hybrids for eight traits combined 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
Sk 5008/1× Sk 5001/8	1.24	3.52	-0.09	0.06	-0.14	0.33	-0.56	-1.08
Sk5006/2× Sk 5001/8	-1.01	10.02*	0.24	0.84	0.36	0.56	0.19	2.01
Sk5004/3× Sk 5001/8	-1.17	7.02	-0.26	0.39	0.51	0.38	0.27	1.20
Sk5006/4× Sk 5001/8	0.91	0.18	0.32	0.73	0.16	0.04	-0.16	0.81
Sk5008/5× Sk 5001/8	0.08	-10.65*	-0.59**	-1.83*	-1.10*	-0.83	-0.06	-1.49
Sk5006/6× Sk 5001/8	1.08	4.35	0.33	-0.43	-0.41	-0.42	0.04	-1.62
Sk5008/7× Sk 5001/8	0.08	-5.65	-0.18	-0.86	-0.33	-0.27	0.04	-0.89
Sk6021/8× Sk 5001/8	-1.60*	-1.48	-0.01	0.70	0.51	-0.79	0.28	-0.83
Sk5005/9× Sk 5001/8	-0.01	-2.82	0.08	0.04	0.77	0.50	0.28	0.61
Sk5005/10× Sk 5001/8	0.41	-4.48	0.16	0.36	-0.33	0.50	-0.32	1.26
Sk 5008/1× SC Super sweet 110	-1.24	-3.52	0.09	-0.06	0.14	-0.33	0.56	1.08
Sk5006/2× SC Super sweet t 110	1.01	-10.02*	-0.24	-0.84	-0.36	-0.56	-0.19	-2.01
Sk5004/3× SC Super sweet 110	1.17	-7.02	0.26	-0.39	-0.51	-0.38	-0.28	-1.20
Sk5006/4× SC Super sweet 110	-0.91	-0.18	-0.32	-0.73	-0.16	-0.04	0.16	-0.81
Sk5008/5× SC Super sweet 110	-0.08	10.65*	0.59**	1.83*	1.10*	0.83	0.06	1.49
Sk5006/6× SC Super sweet 110	-1.08	-4.35	-0.33	0.43	0.41	0.42	-0.04	1.62
Sk5008/7× SC Super sweet 110	-0.08	5.65	0.18	0.86	0.33	0.27	-0.04	0.89
Sk6021/8× SC Super sweet 110	1.60*	1.48	0.01	-0.70	-0.51	0.79	-0.27	0.83
Sk5005/9× SC Super sweet 110	0.01	2.82	-0.08	-0.04	-0.77	-0.50	-0.28	-0.61
Sk5005/10× SC Super sweet 110	-0.41	4.48	-0.16	-0.36	0.33	-0.50	0.32	-1.26
LSD S_{ij} 0.05	1.60	8.23	0.44	1.41	1.10	1.259	0.77	2.63
LSD S_{ij} 0.01	2.10	10.92	0.59	1.87	1.49	1.670	1.02	3.49

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

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تقدير القدرة على الإئتلاف لبعض سلالات الذرة السكرية باستخدام النظام التزاوجي السلالة × الكشاف تحت ميعادين للزراعة

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الملخص

تقدير القدرة على الإئتلاف مهمة لمربى الذرة السكرية لانتخاب أفضل السلالات والهجن. تم تهجين 10 سلالات جديدة من الذرة السكرية مع اثنين من الكشافات في محطة البحوث الزراعية بسخا موسم صيف 2022. وتم تقييم ال20 هجين الناتجة في تصميم قطاعات كاملة العشوائية في ثلاث مكررات في ميعادين للزراعة 20 ابريل و 20 يونيو بمحطة البحوث الزراعية بسخا موسم صيف 2023.اظهرالتحليل المشترك بين ميعادين الزراعة لثمانية صفات أن الاختلافات بين ميعادين الزراعة كانت عالية المعنوية لجميع الصفات تحت الدراسة واعطي الميعاد المبكر 20 ابريل أعلى القيم في جميع الصفات بالمقارنة بالميعاد المتاخر. كانت تأثيرات الفعل الوراثي المضيف هى الأكثر تحكما فى وراثة صفات عدد الأيام حتى ظهور حرائر 50% من النباتات والمحصول الطازج بالأغلفة والمحصول الطازج بدون أغلفة وعدد الصفوف في الكوز وعدد الحبوب في الصف بينما تأثيرات الفعل الوراثي غير المضيف كانت هي الأكثر تحكما في وراثة ارتفاع النبات ودرجة الحلاوة. أظهرت السلالات Sk5006/2 وSk6021/ قيم مرغوبة في تأثيرات القدرة العامة على الائتلاف في معظم الصفات كذلك أظهرت الهجن (Sk5006\2 × Sk5008/1) و (Sk5005/9 × Sk5008/1) و (Sk5006/2 × SC super sweet 110) قيم عالية في المحصول الطازج بدون أغلفة ودرجة الحلاوة. هذه الهجن يمكن استخدامها في الانتاج التجاري بعد اجتيازها الاختبارات المتقدمة.