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RESEARCH PAPER

Elite general and specific combiners for high sugar content and green ear yield in sweet corn (*Zea mays* L. *saccharata*)

M. VANIPRAVEENA[1], S. C. TALEKAR[2*], RAJASHEKHAR M. KACHAPUR[3] AND S. I. HARLAPUR[3]

[1]Department of Genetics and Plant Breeding, College of Agriculture, Dharwad
[2]All India Coordinated Rice Improvement Project, Agricultural Research Station, Mugad
[3]All India Coordinated Maize Improvement Project, MARS, Dharwad
*E-mail: talekarsc@uasd.in

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Abstract:Forty-two F_1 crosses developed using seven parents crossed in full diallel mating design during *rabi* 2018 were evaluated in randomized complete block design during *kharif* 2019 along with parents and four checks *viz*., Misti, Central Maize VL Sweet corn 1 and Madhuri to estimate GCA effects of parents, SCA effects and reciprocal effects of crosses to identify potential combiners to exploit heterosis. The mean sum of squares due to gca, sca and reciprocal effects were significant for all the thirteen characters. The parents such as SC Sel 1, SC Sel 2, SC Sel 3 and SC Syn were identified as potent general combiners for green ear yield, fodder weight, TSS and for other important yield attributing traits. Therefore, these genotypes could be used to develop base material to improve both yield and quality traits. The cross combinations KH1831 × SC Sel 2, SC Sel 2 × SC Syn, SC Sel 2 × SC Sel 3 and KH1831 × SC Sel 1 were potential with significant sca effects. These crosses can be directlyused in heterosis breeding in sweet corn for yield and quality traits.The presence of reciprocal differences for green ear yield and its components suggested the influence of plasma genes in the expression of these traits.

Key words: Green corn, Green ear yield, Reciprocal effects, Sweet corn

Introduction

Maize (*Zea mays* L. 2n = 20) is the world's third most important cereal crop (1st Wheat, 2nd Rice) serving both food for human and feed for animals. It is a miracle crop cultivated in an area of 193 million hectares in over 170 countries (Anon., 2018). Agriculture in India has been diversifying in favour of more remunerative and high-valued crops due to the change in consumption basket of the economy (Khanam *et al*., 2018). Emphasis is laid in the search of alternative crops as an effective strategy to improve the economic status of farmers to achieve climate-resilient agriculture (Dagla *et al.,* 2014). Sweet corn (*Zea mays* L. *saccharata*, 2n = 20) is one among the various speciality corns with huge economic value in India and the global market. Sweet corn is popular in the United States of America cultivated in almost all states. It is grown in an area of 1.17 million hectares with a world-wide volume of 11.85 million tonnes and a productivity of 9.84 t/ha (Anon., 2018). The presence of genes which alter the endosperm starch synthesis due to spontaneous recessive mutations resulted in a high level of water-soluble polysaccharides (WSP) and reduced starch content thus differentiated sweet corn from other maize types (Dinges *et al.,* 2001, Shadlou *et al.,* 2015).

The total sugar ranges from 14-24 % (Wahba *et al*., 2016) in sweet corn and 2-5% (Sadaiah *et al.,* 2013) in normal grain corn at milky stage. The amount of starch and sugar in the endosperm considerably determine the flavour and sweetness of sweet corn (Tracy, 1994). Due to changes in food consumption pattern of both rural and urban populations, sweet corn has gained commercial significance in India. Therefore there is a scope and need for developing cultivars with high green ear yield and total soluble solids, which can meet the requirement of direct consumption, market demand to ensure farmers protection in changing climatic conditions. To establish a sound breeding programme it is important to have information about the general combining ability of parents to identify superior parents for hybridization and specific combining ability of hybrids to identify superior cross combinations. In sweet corn breeding programme, the assessment of the success of inbred lines as possible hybrid parents in field experiments and diallel crosses is still commonly used (Kashiani *et al.,* 2010, Assuncao *et al.,* 2010 and Shadlou *et al.,* 2015). Keeping in view, the demand for sweet corn in the global market, it is felt important to identify elite parents or good combiners to develop potential hybrids.

Material and methods

Seven sweet corn inbred lines obtained from Winter Nursery Centre, Indian Institute of Maize Research (IIMR), Hyderabad and maintained at All India Coordinated Maize Improvement Project, Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad were used as the genetic material for the study. The seven lines were crossed in 7 × 7 complete diallel fashion during *rabi* 2018-19 and generated 21 direct and 21 reciprocal crosses each. The experiment was performed in randomized complete block design with three replications in which hybrids (direct crosses) along with reciprocals and three controls *viz.,* Misti Central maize VL sweet corn 1, Madhuri and were evaluated during *Kharif* 2019 at 'F' block of MARS, Dharwad (15^0 49' N latitude and 74^0 99' E longitude) located at an altitude of 750m above mean sea level (MSL). Each plot consisted of two 4m rows spaced 0.6m apart resulting in a plot size of 4.8 sq. m. area. Each plot was thinned at 15 days after sowing to maintain a spacing of 0.2m between the plants, resulting in anoptimum plant population at harvest time.

Yield and quality analysis

Five random plants were tagged in each entry and observations were recorded on various traits. At the pre-flowering stage, observations on days to 50 per cent tasseling and days to 50 per cent silking were recorded, when 50 per cent of plants in each entry showed anthesis in the tassel and silk emergence in an ear. At the post-flowering stage, plant height and ear height were recorded in centimeters. Green ear yield was recorded immediately after harvest followed by weighing dehusked ears and expressed in tonnes ha^{-1} (t/ha). Other post-harvest observations like the number of kernel rows, number of kernels per row, ear length (cm) and ear girth (cm) were recorded. After harvesting green ears, green fodder weight (t/ha) was recorded by cutting and weighing plants in each entry. Degree of infection to turcicum leaf blight (TLB) was scored as per 1-9 scale (Anon., 2016). Using a hand refractometer, total soluble solids (TSS) analysis was performed from three selfed ears from each entry and expressed in percentage.

Statistical analysis

Analysis of variance was performed for the mean data generated from 42 F_1 hybrids and seven inbred parental lines, thus total variation was partitioned into GCA, SCA and Reciprocal effects. Griffing's numerical approach (method 1, model 1) was used to estimate GCA, SCA and reciprocal effects using formulas as communicated by Fasahat *et al.,* 2016. $GCA_i = 1/2p\,(Yi.+Y.i) - 1/p^{2Y}..$;$SCA_{ij} = ½\,(Yij+Yji) – 1/2p(Yi.+Y.i+Yj.Yij)+1/p^{2Y}..$; and rij = ½(Yij-Yji)

Results and discussion

Analysis of variance for characters related to yield and quality of green ears (Table 1) indicated significant GCA, SCA and reciprocal effects for all the traits studied. The significance of GCA and SCA effects specified the importance of both additive and non-additive gene action in the expression of these traits, while the significance of reciprocal effects highlighted the presence of extra-chromosomal and maternal effects indicating that the order of parental lines used in the development of crosses significantly affects the traits (Bertagna *et al.,* 2018).

Considering the green ear yield, the inbred line SC Sel 2 followed by SC Sel 3 expressed significant and higher estimates of GCA effects (Table 2), a direct reflection of high intense transmission of desirable genes with additive effects from parents to off springs, which can contribute greatly to realize high hybrid vigour and to derive elite inbred lines useful for sweet corn breeding. Two parents SC Sel 1 and SC Syn stood out for *gca* effects on plant height and ear height, while the parent SC Sel 3 exhibited highest and significant estimates of GCA effects for ear length and ear girth, hence can be used to increase the length and diameter of marketable ears in the new hybrids. The parents SC Sel 1 and SC Sel 2 displayed significant GCA effects for kernel rows per ear and number of kernels per row respectively. The inbred line SC Syn was selected for recording significant *gca* effects for green fodder weight. The TLB disease rating scale ranged from 1-9; since the resistant plants with less disease severity are to be identified, hence it is required to select parents with significantly negative GCA effects. Concerning the two parents, SC Sel 3 and SC Syn were selected due to their ability to transmit resistance.Several earlier workers also reported high *gca* values in desirable direction for TLB (Choudary *et al.,* 2010). Regarding TSS, the most promising lines should be selected based on their positive estimates of GCA effects (Elayraja *et al*., 2014) and in our work, the inbred line SC Sel 1 can be used to improve kernel sugar content.

Currently, sweet corn breeding programs aim at developing hybrids with increased green ear yield along with higher total soluble solids and green fodder weight. Therefore, it is necessary to select the hybrid combinations with higher SCA effects to form base populations. Only one cross KH1831 × SC Sel 2 (2.04) registered significant positive sca effect for green ear yield in direct crosses (Table 3), while the same inbred lines crossed in the reciprocal fashion showed negative SCA effect. Correspondingly, seven crosses that manifestednegative SCA effects in direct crossing method displayed significant positive

Table 1. Analysis of variance for green ear yield and its attributing traits for parents and hybrids in sweet corn

Sources of Variations	GCA	SCA	Reciprocals	Error
Degrees of freedom	6	21	21	96
	Mean sum of squares			
Days to 50 per cent tasseling	21.32**	4.48**	4.95**	1.26
Days to 50 per cent silking	14.42**	2.76**	5.64**	1.18
Plant height (cm)	331.22**	107.48**	194.37**	17.39
Ear height (cm)	107.45**	49.15**	76.98**	0.67
Ear length (cm)	5.39**	1.92**	4.26**	0.65
Ear girth (cm)	0.18**	0.10**	0.10**	0.02
No. of kernels rows per ear	0.96*	0.95**	0.70**	0.33
No. of kernels per row	47.90**	8.43*	27.13**	4.40
Ear weight without husk (t/ha)	4.95**	2.16**	4.27**	0.81
Green fodder weight (t/ha)	6.69**	4.96**	4.40**	0.74
TLB(%)	167.70**	67.10**	100.86**	11.12
TSS(%)	1.24**	0.60**	0.81**	0.15
Green ear yield (t/ha)	12.00**	2.75**	7.23**	1.18

Note: *-Significant at 5% level and **-Significant at 1% level

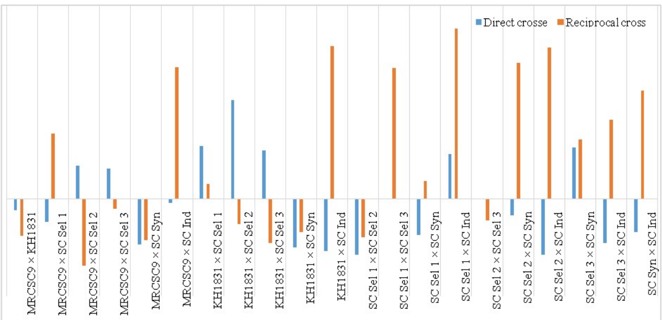

Fig. 1. SCA effects of direct and reciprocal crosses for green ear yield

Table 2. Estimates of general combining ability effects of parents for green ear yield and its attributing traits in sweet corn

Parents	Days to 50 per cent tasseling	Days to 50 per cent silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear girth (cm)	No. of kernel rows per ear	No. of kernels per row	Ear yield without husk (t/ha)	Green fodder weight(t/ha)	TLB (%)	TSS (%)	Green ear yield (t/ha)
MRCSC9	-0.18	-0.37	3.07 **	0.22	-0.12	0.03	0.13	0.27	0.20	0.31	-3.19 **	-0.59 **	0.53
KH1831	-1.51 **	-0.96 **	-1.70	-2.91**	0.58**	-0.07*	-0.05	0.39	0.01	-0.45 *	3.43 **	0.02	0.02
SC Sel 1	-0.04	0.22	4.30 **	1.87 **	0.14	0.04	0.29 *	0.82	0.23	0.39	1.83 *	0.37**	0.14
SC Sel 2	-1.13 **	-0.96**	2.50	1.39 **	0.33	0.01	0.10	1.98 **	0.43	0.33	0.48	0.08	0.80**
SC Sel 3	-0.13	-0.25	-0.87	-2.69**	0.48*	0.11**	0.13	0.94	0.40	0.14	-2.32**	0.01	0.57 *
SC Syn	0.81*	0.34	4.27**	4.41 **	-0.16	0.08 *	-0.10	-0.63	0.01	0.63 **	-4.63 **	-0.04	-0.11
SC Ind	2.19**	1.98**	-9.57**	-2.30**	-1.24 **	-0.22**	-0.51 **	-3.79 **	-1.25**	-1.36**	4.40**	0.15	-1.96**
SEm±	0.27	0.26	1.03	0.20	0.19	0.03	0.14	0.51	0.22	0.21	0.82	0.09	0.26
CD at 5%	0.68	0.65	2.52	0.49	0.48	0.08	0.35	1.27	0.54	0.52	2.01	0.23	0.65
CD at 1%	1.03	0.99	3.82	0.75	0.73	0.13	0.53	1.92	0.82	0.79	3.06	0.35	0.99

Note: *-Significant at 5% level and **-Significant at 1% level

Table 3: Estimates of specific combining ability effects of direct crosses for green ear yield and its attributing traits in sweet corn

Hybrids	Days to 50 per cent tasseling	Days to 50 per cent silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear girth (cm)	No. of kernel rows per ear	No. of kernels per row	Ear yield without husk (t/ha)	Green fodder weight(t/ha)	TLB (%)	TSS (%)	Green ear yield (t/ha)
MRCSC9 × KH1831	0.30	0.90	4.32	3.95 **	-0.63	0.13	-0.27	-2.06	-0.15	0.31	-2.08	0.03	-0.24
MRCSC9 × SC Sel 1	-0.50	0.29	1.41	2.16 **	1.26*	0.13	1.15 **	2.44	-0.46	2.11**	-0.46	-0.24	-0.47
MRCSC9 × SC Sel 2	-0.24	-0.51	0.84	-3.01**	-0.49	0.07	-0.32	2.50	0.86	-0.81	-0.1	0.33	0.68
MRCSC9 × SC Sel 3	1.58 *	0.94	2.53	2.07 **	-1.06*	-0.02	0.19	-1.17	1.19 *	0.68	4.76 *	-0.04	0.62
MRCSC9 × SC Syn	0.30	-0.15	-2.28	-9.53**	-0.61	0.02	-0.01	-1.86	-0.50	-0.26	-0.44	-0.44	-0.95
MRCSC9 × SC Ind	0.75	0.03	-1.03	1.18 *	0.06	-0.07	-0.37	-0.83	-0.32	-0.64	-0.87	0.32	-0.08
KH1831 × SC Sel 1	-0.84	1.76**	-3.40	-4.13 **	0.12	0.15	0.11	3.38 *	0.56	-0.24	2.10	0.64 *	1.09
KH1831 × SC Sel 2	-0.24	0.75	2.59	-0.38	0.70	0.21 *	0.86 *	2.38	1.54*	0.96	4.06*	0.75**	2.04 **
KH1831 × SC Sel 3	-0.07	-0.79	1.01	1.21 *	0.42	0.03	1.16**	-0.90	1.25 *	1.15 *	-0.67	-0.24	1.00
KH1831 × SC Syn	2.13 **	1.76*	11.02 **	2.76 **	-1.57**	0.28 **	-0.48	-2.21	-0.74	0.28	-10.34**	-0.31	-1.01
KH1831 × SC Ind	-2.07 **	-0.53	-10.12 *	3.81 **	-0.22	-0.46**	0.59	-1.67	-1.38 *	-0.36	6.86 **	-0.65*	-1.08
SC Sel 1 × SC Sel 2	0.77	-0.27	0.61	-0.17	-0.12	0.05	0.29	-1.09	-0.48	-2.31 **	3.99	-0.73**	-1.15
SC Sel 1 × SC Sel 3	1.44 *	0.68	3.26	-2.57**	-0.37	0.17	-0.40	0.71	-0.32	0.85	-2.45	-0.76 **	-0.01
SC Sel 1 × SC Syn	-2.17 **	-0.58	-11.35	-2.88**	0.98	-0.28**	0.61	-0.19	-0.66	-2.72**	11.49**	0.36	-0.75
SC Sel 1 × SC Ind	-0.55	-0.22	10.66**	8.02**	0.35	-0.10	-0.64	-0.04	0.93	0.56	-12.36**	0.27	0.93
SC Sel 2 × SC Sel 3	-2.95**	-2.46**	-1.83	-1.93**	1.19 *	-0.27 **	0.22	1.38	-0.52	0.01	0.12	-0.46	-0.01
SC Sel 2 × SC Syn	1.25	1.44 *	10.28**	5.19 **	1.24 *	-0.05	-0.31	0.41	-0.80	1.51**	2.30	-0.04	-0.34
SC Sel 2 × SC Ind	-1.29	-0.53	-6.26 *	4.84**	-0.51	-0.21 *	-0.01	-1.59	-0.82	0.38	8.74**	0.17	-1.16
SC Sel 3 × SC Syn	-1.74 *	-0.60	-0.17	2.45**	0.20	0.12	-0.32	1.67	1.01	0.93	-1.37	-0.06	1.06
SC Sel 3 × SC Ind	1.04	0.41	-10.65	-3.89**	-0.30	0.08	0.08	-0.44	-0.64	-1.32 *	0.02	1.18**	-0.91
SC Syn × SC Ind	0.42	0.49	-4.57	2.82**	-0.91	0.09	0.08	1.02	-0.36	-2.46**	0.67	-0.51 *	-0.69
SEm±	0.69	0.66	2.50	0.50	0.49	0.08	0.35	1.28	0.55	0.52	2.04	0.23	0.66
CD at 5%	1.43	1.39	5.34	1.05	1.03	0.18	0.74	2.68	1.15	1.10	4.27	0.49	1.39
CD at 1%	1.96	1.90	7.29	1.43	1.41	0.25	1.01	3.66	1.57	1.50	5.83	0.68	1.90

Note: *-Significant at 5% level and **-Significant at 1% level

Table 4: Estimates of specific combining ability effects of reciprocal crosses for green ear yield and its attributing traits in sweet corn

Hybrids	Days to 50 per cent tasseling	Days to 50 per cent silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear girth (cm)	No. of kernel rows per ear	No. of kernels per row	Ear yield without husk (t/ha)	Green fodder weight(t/ha)	TLB (%)	TSS (%)	Green ear yield (t/ha)
KH1831 × MRCSC9	2.50 **	1.00	6.93 *	4.00**	-0.33	-0.04	0.11	-0.28	-0.72	0.63	-7.58 **	-0.30	-0.76
SC Sel 1 × MRCSC9	0.16	-1.83 *	6.36*	-2.0**	1.22 *	0.26**	0.77 *	2.44	0.96	2.16**	-7.55 **	0.01	1.35
SC Sel 1 × KH1831	-1.83 *	-0.50	-15.3**	-11.43**	0.12	0.01	0.44	0.27	0.40	-0.75	-7.55 **	-0.15	0.31
SC Sel 2 × MRCSC9	0.66	0.50	-1.4	-3.33**	-1.88**	-0.20 *	-0.44	-4.66**	-1.40*	-0.84	-8.74**	-0.03	-1.38
SC Sel 2 × KH1831	0.33	0.16	-2.76	-0.83	0.10	0.02	0.11	0.66	-0.62	-1.04	0.01	-0.06	-0.52
SC Sel 2 × SC Sel 1	0.16	0.66	7.00 *	-4.50**	-0.96	-0.08	0.33	-3.38 *	-0.76	-1.22*	7.06**	0.82 **	-0.80
SC Sel 3 × MRCSC9	0.50	1.33	5.30	2.33**	-0.46	0.16	-0.11	-0.38	-0.14	-0.71	4.30 *	-0.27	-0.21
SC Sel 3 × KH1831	-0.83	-0.33	3.20	-2.33**	1.04 *	0.09	0.00	1.77	-0.95	-1.02	-5.49 *	-0.36	-0.91
SC Sel 3 × SC Sel 1	-3.16 **	-2.66**	-5.26	-0.66	-0.19	-0.02	0.55	-0.16	2.27**	3.04**	2.12	-0.03	2.70**
SC Sel 3 × SC Sel 2	0.33	0.66	-9.7 **	-2.16**	-1.72**	-0.05	-0.33	-2.55	0.64	-1.64 **	3.34	-0.43	-0.45
SC Syn × MRCSC9	-0.16	0.50	1.83	-0.16	-1.26*	-0.02	-0.11	-2.55	-0.45	0.24	1.09	-0.47	-0.86
SC Syn × KH1831	-1.00	0.16	-4.76	-7.33**	-0.74	-0.07	1.00 *	-1.88	-0.51	-0.89	-2.15	0.03	-0.69
SC Syn × SC Sel 1	0.16	2.33 **	-7.33 **	-5.53**	-0.68	-0.12	-0.22	-0.01	-1.48 *	-1.28 *	7.06 **	1.01**	0.36
SC Syn × SC Sel 2	-2.83 **	-2.50**	-7.90**	-10.06**	0.67	-0.01	0.22	0.99	2.00 **	0.04	-1.09	0.86 **	2.81**
SC Syn × SC Sel 3	-0.83	0.16	-6.26 *	0.76	-0.55	-0.12	-0.11	0.01	1.28 *	0.64	5.39*	1.76**	1.23
SC Ind × MRCSC9	-4.00**	-4.66**	8.23 **	5.83**	1.86 **	0.45**	0.88 *	6.44**	2.43**	0.75	-5.39*	-0.17	2.72**
SC Ind × KH1831	-1.16	-2.16	24.16**	8.33**	3.41**	0.77**	1.22**	7.16**	2.12**	2.69**	-13.32**	1.22**	3.15**
SC Ind × SC Sel 1	-1.83 *	-1.00	8.16 **	8.33**	2.33 **	0.14	0.77 *	5.66**	2.44**	2.01 **	-1.06	-0.42	3.52**
SC Ind × SC Sel 2	0.00	-1.50*	15.10 **	6.00**	1.43**	0.52**	0.77*	6.05**	2.27**	1.96**	-14.38**	0.32	3.12**
SC Ind × SC Sel 3	0.33	-1.16	15.80 **	14.50 **	2.81**	0.27**	0.88 *	6.16**	0.78	1.42 *	-13.65**	-0.06	1.63 *
SC Ind × SC Syn	0.33	-1.16	11.03 **	2.00 **	0.62	0.14	-0.66	4.94 **	1.79 **	1.76**	-5.49 *	-0.63 *	2.23 **
SEm±	0.69	0.66	2.50	0.50	0.49	0.08	0.35	1.28	0.55	0.52	2.04	0.23	0.66
CD at 5%	1.43	1.39	5.34	1.05	1.03	0.18	0.74	2.68	1.15	1.10	4.27	0.49	1.39
CD at 1%	1.96	1.90	7.29	1.43	1.41	0.25	1.01	3.66	1.57	1.50	5.83	0.68	1.90

Note: *-Significant at 5% level and **-Significant at 1% level

SCA effects during their reciprocal mating that ranged from 1.63 (SC Ind × SC Sel 3) to 3.52 (SC Ind × SC Sel 1). Altogether, 14 out 21 crosses exhibited reciprocal differences for green ear yieldsuggesting the influence of plasma genes in the expression of the trait (Table 4, Fig. 1). A similar trend was observed for TSS, TLB, green fodder weight and most of the ear traits indicating the reciprocal differences in the characters highlighting that due consideration should be given while breeding sweet corn for exploitation of heterosis through development of reciprocal crosses. Several workers have reported the presence of reciprocal differences in maize (Zare *et al.*, 2011; Zhang *et al.,* 2016, Barata *et al.,* 2019).

From GCA effects, it is evident that SC Sel 2 and SC Syn with significant GCA effects, and the hybrid combination KH1831 × SC Sel 2 and SC Sel 2 × SC Syn displayed significant *sca* effects for green ear yield and green fodder weight, respectively (Table 3). Since the reciprocal effects were negative (Table 4) for green ear yield and not significant in the positive direction for green fodder weight, explaining the order of parents in the cross combinations affecting the production of green ear yield and green fodder weight. Similar reports of significant reciprocal effects for grain yield were reported by Zare *et al.* (2011). These results specified the necessity of new hypothesis to exploit heterosis considering plasma genes and their interactions with nuclear genes (Zhang *et al.,* 2016, Barata *et al.,*2019). Two genotypes SC Sel 1 and SC Syn were superior for plant height and ear height for*gca* effects. The hybrid combination SC Sel 2 × SC Syn and SC Sel 1 × SC Ind were considered in terms of non-additive gene effects (Table 3). As the reciprocal effects were positive for both the traits of the cross SC Sel 1 × SC Ind the order of parents in hybrid combinations can be maintained, while negative reciprocal effects were observed in the cross SC Sel 2 × SC Syn, the genotype SC Sel 2 should be used as seed parent while SC Syn should be used as pollen parent (Table 4). Verifying the GCA effects of the number of kernel rows, the parent SC Sel 1 was selected and the cross combination MRCSC9 × SC Sel 1 that displayed the highest *sca* effect. As the reciprocal effects were also positive, the order of parents in the cross can be maintained. Regarding TSS, the genotype SC Sel 1 was identified for its GCA effects, thus the cross with highest *sca* effect was KH1831 × SC Sel 1 (Table 3). Since the reciprocal effect (Table 4) was negative for TSS the parent SC Sel 1 should be used as a seed parent thus taking the advantage of extra-nuclear maternal inheritance for developing ears with improved sweetness. Contrary to this, the line either used as seed parent or pollen source is irrelevant according to Ordas *et al.* (2008).

The genotypes KH1831 and SC Sel 2 were superior for days to 50 per cent tasseling, days to 50 per cent silking and ear length. The hybrid combinations SC Sel 2 × SC Sel 3 was found superior for its *sca* effects (Table 3). However, the reciprocal effects (Table 4) was positive for days to 50 per cent silking, days to 50 per cent tasseling, negative for ear length, the genotype SC Sel 3 can be preferred as female parent whereas, the genotype SC Sel 2 can be used as the pollen parent. Regarding TLB the genotype SC Syn is preferred for its gca effects. Thus, the cross KH1831 × SC Syn with lowest SCA effect was selected (Table 3). However, there were no significant differences observed for reciprocal effects for this trait which indicated that the order of parents in the crosses does not affect the production of TLB resistant genotypes.

Conclusion

There hybrids with high SCA effects will be potentially utilized in the department of Sweet corn hybrids commercial cultivation

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