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Evaluation of Inbred Lines of Baby Corn Through Line × Tester Method

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Abstract: Eight S_3 baby corn lines of KH101 were evaluated following line (8) × tester (3) method by determining general combining ability (GCA) and specific combining ability (SCA). Highly significant genotypic differences were observed indicated wide range of variability present among the genotypes. Variance due to SCA was larger than GCA variance for all the characters indicating the preponderance of non-additive gene action in the expression of various traits. Among the parents none were found as good general combiners for baby corn yield. None of 24 cross combinations showed significant SCA effects for yield per plant. Considering cob length, cob diameter, cob per plant, total fodder weight and yield per plant the crosses KH-101/S_3-44×VS/S_3-24 and KH-101/S_3-44×VS/S_3-25 were selected as promising baby corn hybrids.

Keywords: Evaluation, Inbred, Baby Corn, Line × Tester, SCA, GCA

1. Introduction

Baby corn are young and unfertilized corn ears with 2-3 cm emerged silks. Baby corn can be eaten raw and included in the diet in manifold ways, e.g., in salad, chutney, pakora, soup, preserves and so on. Baby corn, popular in many Asian cuisines, has become a staple in salad bars across the United States. Most of the baby corn sold in the US and in Europe is imported from Thailand, Taiwan and Indonesia. It is an extremely easy crop to produce and is grown just like any other corn crop. It is not produced locally because hand labor is required for harvesting and processing, market prices are unknown, and consumers are unfamiliar with it as a fresh crop. However, locally produced fresh baby corn has several advantages over imported baby corn. It is superior in both taste and texture to processed baby corn and it can easily be grown organically. There has been a large increase in demand for organic foods. This may be the time for small farmers to test the market for baby corn locally. Markets may include organic sales through farmers' markets, restaurants, local grocery stores and health food stores ([1]. Despite manifold uses of baby corn, very little information on breeding strategies followed for improvement in baby corn [2]. Due to the limited number of studies on baby corn, no high-yielding cultivars were developed for the market. Currently some early-maturing corn cultivars, originally destined for grain production, are used for baby corn production [3]. Breeders obtain abundant information from line × tester analysis by Kempthorne [4], which is often used in breeding programs of different crops, due to its efficiency in selecting parents for crosses resulting in hybrids with desirable phenotypes. This analysis provides estimates of general (GCA) and specific (SCA) combining ability as well as information about the predominance of genes with additive and non-additive effects in the trait control [5]. The aim of this study was to evaluate the combining ability of baby corn lines and hybrids with favorable traits for the production of baby corn in lines derived from commercial hybrid.

2. Materials and Methods

Seeds were sown following Randomized Complete Block Design (RCBD) with two replications at Bangladesh Agricultural Research Institute, Joydebpur during rabi, 2014-15. Spacing was maintained at 60 cm × 20 cm. Two border rows were used at each end of the replication to minimize the border effect. Fertilizer were applied @ 250, 55, 110, 40, 5 and 1.5 Kg/ha of N, P, K, S, Zn and B, respectively. All the recommended packages of practice were followed and the observations were recorded on ten randomly selected plants for quantitative characters viz. days to 50% tasselling, days to 50% silking, plant height (cm), upper cob height (cm), lower cob height (cm), weight of per cob with husk (g), weight of per cob without husk (g), cob length (cm), cob diameter (cm), number of cob per plant, fodder yield per plant (g), days to 1st cob harvest, interval between 1st and last cob harvest and cob yield per plant (g). Estimates of combining ability and their variance were made as suggested by Kempthorne [4].

3. Results and Discussions

3.1. Analysis of Variance

The analysis of variance revealed significant differences among the crosses for yield and other traits indicating sufficient genetic variability present among the hybrids. The analysis of variance also revealed significant differences in the variance due to lines, testers, and line × tester for yield and some yield contributing traits (Table 1). Significant differences were observed among the lines for weight of per cob with husk, cob length (cm), cob diameter (cm), number of cob per plant, days to 1st cob harvest and yield per plant (g). Noteworthy difference was also exist among testers for weight of per cob with husk, weight of per cob without husk, days to 50% silking, number of cob per plant, total fodder weight per plant (g) and cob yield per plant (g). Significant variances were also observed in interactions of line × testers for weight of per cob with husk, weight of per cob without husk, number of cob per plant, total fodder weight per plant (g) and cob yield per plant (g) indicating that there were wide range of variability among lines, testers and their interactions for the traits under study.

Higher estimation of dominance variance as compared to additive variance for all the characters indicates the predominant role of non-additive type of gene action play in the inheritance which suggests the scope of improvement of these characters through heterosis breeding. Similar finding were reported by Ceyhan *et al.* [6], Kanagarasu *et al.* [7] and Motamedi *et al.* [8] and Ahmed *et al.* [9] in corn for different characters. Involvement of non-additive gene action for the characters in present investigation is also in consonance with the findings of Suneetha *et al.* [10] for days to 50% tasselling and silking, Dhasarathan *et al.* [11] for days to 50% tasseling, plant height, number of baby corns per plant, baby corn length, baby corn weight, Anantha [12] and Selvarani [13] for days to tasseling, Geetha and Jayaraman [14], Anantha [12] and Prakash and Ganguli [15] for plant height, Rodrigues and Da Silva [16] for baby corn length, Mahto and Ganguly [17] for grain yield.

Table 1. *Mean squares and estimation of variance for different characters of baby corn.*

Source	df	DT	DS	PH (cm)	UCH (cm)	LCH (cm)	WPCH (g)	WPCWH (g)
Replications	1	91.4	98.4**	806	88.4	283	25.8	8.24
Treatments	34	38.6**	45.0**	1672**	943**	559**	218	8.69
Parents	10	23.2	12.3**	501*	311**	97.5**	443**	20.6**
Parents vs Crosses	1	891**	1105**	4657**	21245**	11955	130**	20.7**
Crosses	23	8.26	13.1	228	335	264**	123**	2.99
Lines	7	6.94	10.5	132	61.2*	132	230**	3.27
Testers	2	26.4	65.0	1416	3315*	1753**	97.3**	0.67**
Lines ×Testers	14	6.32	7.02	107*	46.4	117	73.6**	3.18**
Error	34	6.78	8.06	87.9	56.2	30.5	44.3	3.25
Estimation of component of variance								
б^{2}g (Line)	-	0.103	0.583	4.08	2.46	2.463	26.1	0.016
б^{2}g (Tester)	-	1.254	3.625	81.7	204	102	1.48	-0.157
б^{2}gca	-	0.067	0.211	4.18	9.96	5.06	1.72	-0.007
б^{2}sca	-	-0.229	-0.520	9.58	-4.85	43.43	14.6	-0.037
б^{2}gca /б^{2}sca	-	-0.292	-0.405	0.43	-2.05	0.117	0.118	0.176

DT=Days to 50% tasseling, DS= Days to 50% silking, PH=plant height, UCH=Upper cob height, LCH=Lower cob height, WPCH = Weight of per cob with husk, WHPCW= Weight of per cob without husk

Table 1. *Cont'd.*

Source	df	CL (cm)	CD (cm)	NCPP	FYPP (g)	DFCH	IFLCH	CYPP (g)
Replications	1	1.04	0.024	0.103	403	88.4	84.9	61.62**
Treatments	34	1.26**	0.132	0.362	125608**	75.1	26.2**	76.95**
Parents	10	2.23*	0.285	0.307	31708	33.0*	9.2	150.45**
Parents vs Crosses	1	1.92	0.397	0.248	3175113**	1833*	345**	116.49**
Crosses	23	0.814*	0.054	0.390	33846*	17.0*	19.8*	43.27**
Lines	7	0.723**	0.059*	0.680*	19033	19.1*	31.0	45.83**
Testers	2	2.13	0.188*	0.007*	129752**	47.7	25.4	8.67**
Lines x Testers	14	0.673	0.032*	0.300*	27552**	11.6*	13.4	46.94**
Error	34	0.455	0.081	0.149	13890	7.6	18.7	57.13**

Source	df	CL (cm)	CD (cm)	NCPP	FYPP (g)	DFCH	IFLCH	CYPP (g)
Estimation of component of variance								
б^2 g (Line)	-	0.008	0.004	0.063	-1419.747	1.259	2.948	-0.185
б^2 g (Tester)	-	0.091	0.010	-0.018	6387.515	2.260	0.751	-2.391
б^2 gca	-	0.005	0.001	0.003	217.374	0.188	0.222	-0.126
б^2 sca	-	0.109	-0.024	0.075	6831.070	2.001	-2.662	-5.093
б^2 gca /б^2 sca	-	0.045	-0.031	0.041	0.032	0.094	-0.083	.0247

CL= cob length, CD= cob diameter, NCPP= Number of cob per plant, FYPP= Fodder yield per plant, DFCH= Days to first cob harvest, IFLCH=Interval between first and last cob harvest, CYPP=Cob yield per Plant

3.2. Proportional Contribution of Lines, Testers and Their Interactions

The proportional contribution of lines was higher than testers and their interactions for weight of per cob with husk, number of cob per plant, interval between first and last cob harvest indicating their predominant maternal influence (Table 2). Testers exhibited less contribution to weight of per cob with husk, weight of per cob without husk, number of cob per plant, interval between first and last cob harvest and cob yield per plant. Motamedi *et al.*, [8] found less influence of testers for kernel yield. The relative contribution of line × tester interaction was more important for days to 50% tasseling, cob length, con diameter, fodder yield per plant, days to first cob harvest and cob yield per plant. The higher contribution of interactions of the line × tester than lines and testers, indicating higher estimates of variances due to non-additive genetic effects and the importance of specific combining ability.

Table 2. *Proportional contribution (%) of lines, testers and their interactions to total variance in baby corn.*

Source	DT	DS	PH (cm)	UCH (cm)	LCH (cm)	WPCH (g)	WPCH (g)
Line	25.6	24.4	17.5	5.6	15.2	56.8	33.3
Tester	27.8	43.1	53.9	86.0	57.7	6.9	2.0
Line× Tester	46.6	32.5	28.5	8.4	27.1	36.3	64.7

Table 2. *Cont'd.*

Source	CL (cm)	CD (cm)	NCPP	FYPP (g)	DFCP	IFLCH	CYPP (g)
Line	27.0	33.1	53.0	17.1	34.2	47.8	32.23
Tester	22.7	30.3	0.1	33.3	24.4	11.2	1.74
Line ×Tester	50.3	36.6	46.8	49.5	41.4	41.1	66.03

Abbreviations are given in Table 1

3.3. General Combining Ability (GCA) Effects

General combining ability is one of the main criteria of rapid genetic assaying of test genotypes under Line × Tester analysis. Selection of parents with good general combining ability is a prime requisite for any successful breeding program especially for heterosis breeding. The general combining ability effects and *per se* performance of parents (lines and testers) are presented in Table 3.

The GCA effects showed that line KH-101/S_3-32 exhibited significant negative GCA effects for interval between 1st and last cob harvest could be utilized for evolving earliness but it expressed highly significant negative GCA effects for number cob per plant. Only the line KH-101/S_3-1 expressed highly significant positive GCA effects for number of cob per plant. KH-101/S_3-44 expressed highly significant positive GCA effects for weight of per cob with husk. Dhasarathan *et al.* [11] and Rodrigues and Da Silva [16] also observed significant positive number of baby corns per plant. None of the parents showed significant positive GCA effects for cob diameter, which is supported by Rodrigues and Da Silva [16] and opposed by Dhasarathan *et al.* [11].

None of the parent showed significant positive GCA effects for cob yield per plant which is differing from the result of Dhasarathan *et al.* [11] and Rodrigues and Da Silva [16]. It might due to using different genotypes. The tester VS/S_3-24 had positive significant effect on fodder yield per plant. The pollen parent VS/S_3-2 showed significant negative GCA for days to 50% tasseling, days to 50% silking and days to 1st cob harvest, identified as early material. As GCA is generally associated with additive gene action in inheritance of characters, the lines and testers with high GCA may be utilized in hybridization program to improve a particular trait through transgressive segregation.

3.4. Specific Combining Ability (SCA) Effects

The Specific combining ability effects and mean of the crosses for cob yield and other qualitative characters are presented in Table 4. Positive SCA effect is expected for yield components. The crosses KH-101/S_3-44×VS/S_3-24, KH-101/S_3-44×VS/S_3-25, KH-101/S_3-32×VS/S_3-24 expressed highly significant positive SCA effects for number of cob per plant. The cross KH-101/ S_3-3×VS/S_3-2 recorded significant positive SCA for fodder yield per plant. The cross KH-101/S3-1×VS/S3-2 exhibited significant negative plant height. These results were in harmony with the findings of Dhasarathan *et al.* [11] and Ahmed *et al.* [9] who reported significant positive SCA effects for cob yield per plant and significant negative SCA effects for plant height.

Table 3. *General combining ability effect of parents and their mean performance.*

Parents	**DT**		**DS**		**PH (cm)**		**UCH (cm)**	
Testers	**GCA**	**Mean**	**GCA**	**Mean**	**GCA**	**Mean**	**GCA**	**Mean**
VS/S_3- 2	-1.48*	92.5	-2.15**	97	10.27**	139.0	-0.22	4.25
VS/S_3-24	0.83	94	1.85*	98	-2.08	111.7	0.18	7.49
VS/S_3-25	0.65	91	0.29	96	-8.18**	116.5	0.05	5.72
SE (gi)	0.65		0.71		2.34		0.45	
SE (gi-gj)	0.92		1.00		3.32		0.64	
Lines								
KH-101/S_3-1	-0.04	90.5	-1.06	95.0	1.06	97.3	-1.02	32.6
KH-101/S_3-3	-1.71	83.0	-1.73	90.0	5.10	107.0	2.01	37.5
KH-101/S_3-14	-0.38	94.5	0.10	98.5	0.66	86.8	1.41	40.3
KH-101/S_3-28	-0.04	90.0	0.44	97.0	-0.44	127.0	-0.03	60.7
KH-101/S_3-32	1.63	90.0	0.94	97.0	-5.10	91.2	-3.76	37.3
KH-101/S_3-33	-1.04	87.5	-1.56	94.5	-8.14	102.0	-5.26	42.5
KH-101/S_3-39	0.63	87.0	0.94	93.5	5.66	120.0	3.81	54.4
KH-101/S_3-44	0.96	87.0	1.94	93.5	1.20	121.0	2.84	52.5
SE	1.06		1.16		3.83		3.06	
SE (gi-gj)	1.50		1.64		5.41		4.33	

Abbreviations are given in Table 1

Table 3. *Cont'd.*

Parents	**LEH. (cm)**		**WPCH (g)**		**WPCWH (g)**	
Testers	GCA	Mean	GCA	Mean	GCA	Mean
VS/S_3-2	10.88**	34.4	-2.41	31.70	-0.22	4.25
VS/S_3-24	-0.89	25.7	2.52	62.65	0.18	7.49
VS/S_3-25	-9.99**	18.6	-0.12	48.39	0.05	5.72
SE (gi)	1.38		1.66		0.45	
SE (gi-gj)	1.95		2.35		0.64	
Lines						
KH-101/S_3-1	-9.03**	13.2	-2.55	26.2	-0.25	5.5
KH-101/S_3-3	1.10	13.7	-6.29*	45.9	-1.18	9.2
KH-101/S_3-14	2.00	17.7	1.46	34.6	-0.30	5.6
KH-101/S_3-28	1.80	31.7	-2.64	55.0	0.01	9.7
KH-101/S_3-32	3.60	17.8	-2.15	40.9	0.36	6.5
KH-101/S_3-33	-5.60*	18.1	-3.83	33.4	-0.34	7.4
KH-101/S_3-39	2.27	24.8	2.23	71.1	1.39	10.7
KH-101/S_3-44	3.84	25.0	13.77**	63.8	0.31	15.6
SE	2.26		2.72		0.74	
SE (gi-gj)	3.19		3.84		1.04	

Abbreviations are given in Table 1

Table 3. *Cont'd.*

Parents	**CL (cm)**		**CD (cm)**		**NCPP**		**FYPP. (g)**	
Testers	**GCA**	**Mean**	**GCA**	**Mean**	**GCA**	**Mean**	**GCA**	**Mean**
VS/S_3- 2	-0.37*	5.10	-0.12	0.49	0.00	3.6	15.1	594.45
VS/S_3-24	0.36*	6.81	0.09	1.56	0.02	3.5	81.5**	463.97
VS/S_3 -25	0.01	6.63	0.03	0.85	-0.02	3.6	-96.6**	354.47
SE (gi)	0.17		0.07		0.10		29.4	
SE (gi-gj)	0.24		0.10		0.14		41.6	
Lines								
KH-101/S_3-1	-0.48	4.8	0.13	0.6	0.54**	2.6	-98.1*	134
KH-101/S_3-3	0.14	7.1	0.00	1.2	-0.07	3.2	-14.6	215
KH-101/S_3-14	-0.02	6.3	-0.15	0.7	0.00	3.0	24.2	337
KH-101/S_3-28	-0.25	7.6	-0.03	1.2	-0.13	3.3	33.2	389
KH-101/S_3-32	0.09	6.3	-0.01	1.4	-0.63**	2.7	66.0	234
KH-101/S_3-33	-0.23	7.0	-0.09	1.6	0.07	2.8	-60.7	272
KH-101/S_3-39	0.68*	8.1	0.01	1.3	0.27	3.3	-1.4	319
KH-101/S_3-44	0.07	7.9	0.14	1.3	-0.03	2.6	51.3	382
SE (gi)	0.28		0.12		0.16		48.1	
SE (gi-gj)	0.39		0.16		0.22		68.0	

Abbreviations are given in table 1

Table 3. *Cont'd.*

Parents	DFCH		IFLCH		CYPP (g)	
Testers	**GCA**	**Mean**	**GCA**	**Mean**	**GCA**	**Mean**
VS/S_3- 2	-1.97**	94.8	1.33	12.2	-0.83	20.8
VS/S_3- 24	1.27	98.9	-1.18	11.1	0.56	21.1
VS/S_3- 25	0.70	93.8	-0.15	11.0	0.26	23.5
SE (gi)	0.69		1.08		1.88	
SE (gi-gj)	0.97		1.53		2.67	
Lines						
KH-101/S_3-1	-0.19	99.1	0.29	9.4	2.14	24.8
KH-101/S_3-3	-1.25	88.1	1.04	15.7	-3.20	22.5
KH-101/S_3-14	-0.65	102	0.67	7.5	-0.99	23.2
KH-101/S_3-28	-0.62	98.3	1.67	9.2	-0.69	20.9
KH-101/S_3-32	2.65*	99.3	-5.19**	10.2	-2.66	29.4
KH-101/S_3-33	-2.89*	92.3	2.10	12.7	-0.26	14.3
KH-101/S_3-39	1.18	92.5	-0.66	10.2	5.48	25.2
KH-101/S_3-44	1.78	95.5	0.08	10.2	0.18	48.6
SE (gi)	1.12		1.76		3.08	
SE (gi-gj)	1.59		2.50		4.36	

Abbreviations are given in Table 1

Table 4. *Specific combining ability effect and their mean performance.*

Crosses	DT		DS		PH		UCH.(cm)	
	SCA	**Mean**	**SCA**	**Mean**	**SCA**	**Mean**	**SCA**	**Mean**
KH-101/S_3-1×VS/S_3-2	-1.52	79.0	-1.19	82.5	-13.88*	163	-0.39	91
KH-101/ S_3-1×VS/S_3-24	-1.33	81.5	-1.19	86.5	9.09	174	0.00	88
KH-101/ S_3-1×VS/S_3-25	2.85	85.5	2.38	88.5	4.79	164	0.39	80
KH-101/ S_3-3×VS/S_3-2	-0.85	78.0	-0.52	82.5	-0.11	181	1.46	106
KH-101/ S_3-3×VS/S_3-24	-0.67	80.5	-0.52	86.5	2.35	171	-1.75	89
KH-101/ S_3-3×VS/S_3-25	1.52	82.5	1.04	86.5	-2.25	161	0.30	73
KH-101/S_3-14×VS/S_3-2	-0.69	79.5	-0.85	84.0	-2.28	175	-0.35	105
KH-101/S_3-14×VS/S_3-24	-0.50	82.0	-0.85	88.0	0.59	165	0.48	81
KH-101/S_3-14×VS/S_3-25	1.19	83.5	1.71	89.0	1.69	160	-0.13	80
KH-101/S_3-28×VS/S_3-2	-0.02	80.5	-0.19	85.0	5.52	181	-0.76	104
KH-101/S_3-28×VS/S_3-24	-0.33	82.5	-1.19	88.0	-3.31	160	0.90	84
KH-101/S_3-28×VS/S_3-25	0.35	83.0	1.38	89.0	-2.21	155	-0.14	74
KH-101/S_3-32×VS/S_3-2	1.81	84.0	1.31	87.0	9.49	181	-0.43	104
KH-101/S_3-32×VS/S_3-24	1.00	85.5	1.31	91.0	-4.15	155	1.28	80
KH-101/S_3-32×VS/S_3-25	-2.81	81.5	-2.63	85.5	-5.35	147	-0.85	67
KH-101/S_3-33×VS/S_3-2	-1.02	78.5	-1.69	81.5	-7.08	161	-0.24	96
KH-101/S_3-33×VS/S_3-24	1.17	83.0	1.31	88.5	2.89	159	0.39	79
KH-101/S_3-33×VS/S_3-25	-0.15	81.5	0.38	86.0	4.19	154	-0.16	71
KH-101/S_3-39×VS/S_3-2	2.31	83.5	2.31	88.0	10.23	192	0.37	112
KH-101/S_3-39×VS/S_3-24	-0.50	83.0	0.31	90.0	-6.21	163	0.99	87
KH-101/S_3-39×VS/S_3-25	-1.81	81.5	-2.63	85.5	-4.01	159	-1.36	74
KH-101/S_3-44×VS/S_3-2	-0.02	81.5	0.81	87.5	-1.91	175	0.34	107
KH-101/S_3-44×VS/S_3-24	1.17	85.0	0.81	91.5	-1.25	164	-2.28	86
KH-101/S_3-44×VS/S_3- 25	-1.15	82.5	-1.63	87.5	3.15	162	1.95	78
SE $_{(sij)}$	1.84		2.01		6.63		1.28	
S.E. $_{(sij-skl)}$	2.60		2.84		9.38		1.80	

Abbreviations are given in Table 1

Table 4. *Cont'd.*

Crosses	LCH (cm)		WCPH (g)		WPCWH (g)	
	SCA	**Mean**	**SCA**	**Mean**	**SCA**	**Mean**
KH-101/S_3-1×VS/S_3-2	-17.5**	34.3	0.35	45.0	-1.52	79.0
KH-101/S_3-1×VS/S_3-24	7.49	47.6	1.80	51.4	-1.33	81.5
KH-101/S_3-1×VS/S_3-25	10.09*	41.1	-2.15	44.8	2.85	85.5
KH-101/S_3-3×VS/S_3-2	1.88	63.9	10.83*	51.8	-0.85	78.0
KH-101/S_3-3×VS/S_3-24	2.16	52.4	-13.46*	32.4	-0.67	80.5
KH-101/S_3-3×VS/S_3-25	-4.04	37.1	2.62	45.9	1.52	82.5
KH-101/S_3-14×VS/S_3-2	-2.92	60.0	-3.47	45.2	-0.69	79.5
KH-101/S_3-14×VS/S_3-24	-0.14	51.0	5.19	58.8	-0.50	82.0
KH-101/S_3-14×VS/S_3-25	3.06	45.1	-1.72	49.3	1.19	83.5
KH-101/S_3-28×VS/S_3-2	0.08	62.8	-1.77	42.8	-0.02	80.5

Crosses	LCH (cm)		WCPH (g)		WPCWH (g)	
	SCA	Mean	SCA	Mean	SCA	Mean
KH-101/S_3-28×VS/S_3-24	-4.64	46.3	-1.20	48.3	-0.33	82.5
KH-101/S_3-28×VS/S_3-25	4.56	46.4	2.97	49.9	0.35	83.0
KH-101/S_3-32×VS/S_3-2	7.28	71.8	-5.85	39.2	1.81	84.0
KH-101/S_3-32×VS/S_3-24	-3.14	49.6	7.43	57.4	1.00	85.5
KH-101/S_3-32×VS/S_3-25	-4.14	39.5	-1.57	45.8	-2.81	81.5
KH-101/S_3-33×VS/S_3-2	-1.72	53.6	1.67	45.1	-1.02	78.5
KH-101/S_3-33×VS/S_3-24	1.36	44.9	1.21	49.5	1.17	83.0
KH-101/S_3-33×VS/S_3-25	0.36	34.8	-2.88	42.8	-0.15	81.5
KH-101/S_3-39×VS/S_3-2	8.42*	71.6	-3.51	46.0	2.31	83.5
KH-101/S_3-39×VS/S_3-24	0.49	51.9	-1.15	53.2	-0.50	83
KH-101/S_3-39×VS/S_3-25	-8.91*	33.4	4.65	56.4	-1.81	81.5
KH-101/S_3-44×VS/S_3-2	4.55	69.3	1.75	62.8	-0.02	81.5
KH-101/S_3-44×VS/S_3-24	-3.57	49.4	0.17	66.1	1.17	85
KH-101/S_3-44×VS/S_3-25	-0.97	42.9	-1.92	61.4	-1.15	82.5
SE $_{(sij)}$	3.91		4.71		1.84	
S.E. $_{(sij-skl)}$	5.52		6.66		2.60	

Abbreviations are given in table 1

Table 4. *Cont'd.*

Crosses	CL (cm)		CD (cm)		NCPP		FYPP. (g)	
	SCA	Mean	SCA	Mean	SCA	Mean	SCA	Mean
KH-101/S_3-1×VS/S_3-2	0.21	6.42	-0.08	0.88	0.72	4.5	-161	551
KH-101/S_3-1×VS/S_3-24	-0.31	6.63	0.05	1.21	-0.27	3.5	114	893
KH-101/S_3-1×VS/S_3-25	0.09	6.67	0.03	1.13	-0.45	3.3	46.4	646
KH-101/S_3-3×VS/S3-2	0.46	7.28	0.02	0.85	0.33	3.5	193*	988
KH-101/S_3-3×VS/S_3-24	-0.18	7.37	-0.13	0.91	-0.19**	3.0	-81.4	780
KH-101/S_3-3×VS/S_3-25	-0.28	6.92	0.10	1.08	-0.14**	3.0	-111	572
KH-101/S_3-14×VS/S_3-2	0.24	6.90	0.04	0.71	0.16	3.4	-199*	635
KH-101/S_3-14×VS/S_3-24	0.12	7.52	-0.14	0.75	-0.05	3.2	34.3	935
KH-101/S_3-14×VS/S_3-25	-0.36	6.68	0.10	0.93	-0.11**	3.1	164	887
KH-101/S_3-28×VS/S_3-2	-0.16	6.28	-0.03	0.76	0.00	3.1	22.3	865
KH-101/S_3-28×VS/S_3-24	0.09	7.25	-0.04	0.96	0.28	3.4	-17.3	892
KH-101/S_3-28×VS/S_3-25	0.06	6.88	0.07	1.01	-0.28	2.8	-5.0	726
KH-101/S_3-32×VS/S_3-2	0.22	6.99	-0.06	0.75	-0.30	2.3	54.8	931
KH-101/S_3-32×VS/S_3-24	0.01	7.51	0.11	1.13	0.08**	2.7	-5.5	937
KH-101/S_3-32×VS/S_3-25	-0.23	6.92	-0.05	0.91	0.22	2.8	-49.3	715
KH-101/S_3-33×VS/S_3-2	0.18	6.63	0.05	0.78	-0.10*	3.2	-44.1	705
KH-101/S_3-33×VS/S_3-24	-0.39	6.79	-0.06	0.88	-0.12*	3.2	31.6	847
KH-101/S_3-33×VS/S_3-25	0.21	7.04	0.01	0.89	0.22	3.5	12.5	650
KH-101/S_3-39×VS/S_3-2	0.35	7.72	0.15	0.99	-0.20**	3.3	88.7	897
KH-101/S_3-39×VS/S_3-24	0.01	8.10	-0.05	1.00	-0.12*	3.4	-22.7	852
KH-101/S_3-39×VS/S_3-25	-0.36	7.38	-0.10	0.89	0.32	3.8	-66.0	631
KH-101/S_3-44×VS/S_3-2	-1.50	5.25	-0.09	0.88	-0.60	2.6	45.4	907
KH-101/S_3-44×VS/S_3-24	0.64	8.13	0.25	1.42	0.38**	3.6	53.7	874
KH-101/S_3-44×VS/S_3- 25	0.86	7.99	-0.16	0.95	0.22**	3.4	8.3	758
SE $_{(sij)}$	0.48		0.20		0.27		83.34	
S.E. $_{(sij-skl)}$	0.67		0.28		0.39		117.85	

Abbreviations are given in Table 1

Table 4. *Cont'd.*

Crosses	DFCH		IFLCH		CYPP (g)	
	SCA	Mean	SCA	Mean	SCA	Mean
KH-101/S_3-1×VS/S_3-2	-0.80	81.9	2.61	19.9	3.33	26.8
KH-101/S_3-1×VS/S_3-24	-2.84	83.1	1.16	15.9	-1.87	23.0
KH-101/S_3-1×VS/S_3-25	3.64	89.0	-3.77	12.0	-1.47	23.1
KH-101/S_3-3×VS/S_3-2	1.57	83.2	-0.89	17.1	8.08	26.2
KH-101/S_3-3×VS/S_3-24	-1.67	83.2	0.06	15.6	-6.76	12.76
KH-101/S_3-3×VS/S_3-25	0.10	84.4	0.83	17.4	-1.32	17.9
KH-101/S_3-14×VS/S_3-2	-1.23	81.0	-1.38	16.3	-0.23	20.1
KH-101/S_3-14×VS/S_3-24	-0.17	85.3	1.83	17.0	1.87	23.6
KH-101/S_3-14×VS/S_3-25	1.40	86.3	-0.45	15.7	-1.63	19.8
KH-101/S_3-28×VS/S_3-2	-0.07	82.2	1.68	20.3	-2.53	18.1
KH-101/S_3-28×VS/S_3-24	-2.00	83.5	-0.78	15.3	5.47	27.5

Crosses	DFCH		IFLCH		CYPP (g)	
	SCA	Mean	SCA	Mean	SCA	Mean
KH-101/S_3-28×VS/S_3-25	2.07	87.0	-0.90	16.3	-2.93	18.8
KH-101/S_3-32×VS/S_3-2	0.67	86.2	-3.16	8.60	-3.67	15.0
KH-101/S_3-32×VS/S_3-24	3.13	91.9	0.34	9.60	2.33	22.4
KH-101/S_3-32×VS/S_3-25	-3.80	84.4	2.82	13.1	1.33	21.1
KH-101/S_3-33×VS/S_3-2	-1.00	79.0	-0.43	18.6	-1.87	19.2
KH-101/S_3-33×VS/S_3-24	1.26	84.5	2.95	19.5	0.03	22.5
KH-101/S_3-33×VS/S_3-25	-0.26	82.4	-2.53	15.1	1.83	24.0
KH-101/S_3-39×VS/S_3-2	1.83	85.9	0.81	17.1	-0.20	26.6
KH-101/S_3-39×VS/S_3-24	0.90	88.2	-3.49	10.3	3.80	32.0
KH-101/S_3-39×VS/S_3-25	-2.73	84.0	2.68	17.5	-3.60	24.3
KH-101/S_3-44×VS/S_3-2	-0.97	83.7	0.77	17.8	-2.91	18.6
KH-101/S_3-44×VS/S_3-24	1.40	89.3	-2.08	12.5	8.88	28.02
KH-101/S_3-44×VS/S_3-25	-0.43	86.9	1.31	16.9	7.79	30.4
SE $_{(sij)}$	1.95		3.05		5.34	
S.E. $_{(sij-skl)}$	2.75		4.32		7.56	

Abbreviations are given in Table 1

4. Conclusion

Considering the above result the parent KH-101/S_3-1, KH-101/S_3-44 identified as a good general combiner for number of cob per plant and weight of per cob with husk respectively. Furthermore, considering days to tasseling, silking, plant height, lower ear height, upper ear height, number of cob per plant and cob yield per plant, based on mean performance and SCA effects the two crosses namely KH-101/S_3-44×VS/S_3-24, KH-101/S_3-44×VS/S_3-25 were selected as promising hybrid, could be used in future breeding program to develop high yielding baby corn hybrids with desirable qualities.

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