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Study The Line xTester Hybridization, [I] Flowering And Yield in squash (*Cucurbita pepo* L.)

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ABSTRACT

A field experiment was carried at the vegetable research field of horticulture. Landscape design, college of agriculture and forestry, Mosul university, an inbred line from local marketable for seed, and using tow line as a tester, inbreds were tested for GCA, SCA, H^2 in (b.s, ns.) by using line x tester method. Inbreds were planting in spring 2018 using hybridization. An anthesis crossing between inbreds and tester was done. At the end of the growing season, the seeds were a collection. For all hybridization, at the growing season, the spring 2019 varietal trial for crosses and parents was conducted using RCBD design with three replications to evaluate crosses and parents and estimate some genetic parameters vias. : Number of the first node for first female flower, number of days for first male and female flower, number of male and female flowers fro plant, number of fruits for marketable yield for the twist harvesting, number of fruits per plant for marketable, length and diameter (cm) of marketable fruits and fruit weight (gm). The result indicated statistical analysis revealed highly significant mean square increases for all traits for parents and the crosses. While line 6 and tester 2 were superior in high value for GCA and SCA for L2 XT2, L4XT1, and L5XT2 for the number of female flowers per plant. The $H^2_{(b.s.)}$, $H^2_{(n.s.)}$ were more than 50% for most important traits. The inbred dominant gene action was lower than the additive, but it was closed to additive variation for the tester.

Keywords: *Squash, Line x tester, Yield, Heritability, GS combine ability, Genetic parameters.*

INTRODUCTION

Summer squash (*Cucurbita pepo* L.) is one of the common necessaries from the Cucurbit plants, flowed the Cucurbitceae family. It is a cross-pollinated plant, and its diploid chromosomal number is (2n=40). Summer squash is planted for its fruits. Cucurbits play a significant role in human nutrition, especially in tropical countries where their consumption is high. Cucurbit crops constitute a major portion of vegetables and are grown in different regions of grown, in Iraq it planting at tow growing season summer and autumn season. The mating design (Line x Tester) suggested by [1] has been extensively used to estimate GCA and SCA variances and their effects. It is also used in understanding the nature of gene action involved in the expression of economically important quantitative traits. Improvement of crop traits, mainly the characteristics of yield and the extension of Genetic Variability, is the goal of many breeding projects. It can be realized, e.g., by using appropriate forms of parental crosses schemes. If we have a large number of inbred lines (genotypes), experiments are carried out with hybrids obtained by crossing a line × tester (testers). Analyzed the expression of characteristics (usually yield) in F1 hybrids, we can assess the value of breeding lines. [2] reported superior heterosis for total fruit number and precocious fruit number in crosses between inbred lines derived from a summer squash (*C. pepo*) population. They also concluded that inbreeding and crossing methods could be a useful tool in increasing the population means for yield traits through hybrid or synthetic variety production. The problem connected with the identification of best testers was studied by [3]. They used the site regression model to analyze a diallel mating database and identify the ideal tester. The biplot of the first two principal components of the site regression model displays the GCA of lines or testers and SCA of the line x testers interaction. An important question is selecting testers (tester), which should diversify in the maximum degree analyzed trait (yield) in hybrids for the other characters. [4] recorded in their study, the tester Whitaker is a good combiner for yield as shown by its significant positive GCA estimate, while Eskandarany showed a significant negative GCA estimate. The contribution of lines to total variance is 20.3%, 40.4% for testers, and 39.3% for Lx T. none of the lines or testers showed significant GCA or SCA for plant size. Nevertheless, the contribution to the total variance of lines, testers, and Lx T is 63.2%, 4.7%, and 32.1%; respectively, heterosis was superior for total fruit number but low. Breeding strategies based on hybrids' selection require an expected level of heterosis and the specific combining ability. Inbreeding high-yielding varieties of crop plants, the breeders often face the problem of selecting parents and crosses. Combining ability analysis is one of the powerful tools available to estimate the combining ability effects and aids in selecting the desirable parents and crosses to exploit heterosis. Line x tester analysis provides information about general combining ability (GCA) and specific combining ability (SCA) effects of parents and helps estimate various types of gene actions [5]. [6] in their paper, they present a model for obtaining ranking testers. This may be an important diagnostic tool in breeding selection to obtained new hybrids with significant transgressive effects. An example of the results of field experiments was of spring rape. In this experiment, general combining ability (GCA) effects were evaluated in the F1 generation. The results indicate different (depending on the used testers and analyzed traits) evaluate the inbred line's GCA effects. This approach is new to breeding and may be useful to the effective selection of the best testers. Breeders must have information about testers used in different plant breeding methods (in open-pollinated species but also self-pollinated crops). The line x testers analysis method estimates favorable parents and crosses and their general (GCA) and specific (SCA) combining abilities. In earlier studies, [7] used GCA and SCA terms to designate the line's average performance, tester, and hybrid combinations. The obtained results revealed that the mean squares of genotypes and its components, GCA and SCA, were highly significant for all studied traits, indicating that additive and non-additive genetic variance contributed to the inherited traits.

Both GCA and SCA genetic variances were highly significant for all studied traits, indicating the importance of additive and non-additive gene action.

The parental, Zucchino Nova Verde di Milano was seemed to be the best combiner for the number of leaves plant-1 and No. of male flowers plant-1. At the same time, Arab Marrow was the best combiner for stem length, leaf area (cm2), and the number of female flowers plant-1. The above parents' crosses were promising because they showed highly significant estimates of SCA effects [8]. Commercial deployment of summer squash hybrids increases due to the obtained heterosis for yield and other traits [9,10; 11; 13; 14; and 15]. [16] indicated in their field study with 12 x 3 Line x Tester analysis in cucumber and snap melon revealed highly significant estimates for general combining ability and specific combining ability for all the traits, thereby indicating the importance of both additive and non-additive genetic variance in the inheritance of these traits. The genotyped L3 and L2 were found to be the most promising per se for most of the trait, whereas the cross combination L3 x T3, L2 x T2 involving good x good general combiner parents was found with good, desirable SCA effects. The cross combination L7 x T1 was found with the best SCA effect for TSS. The inclusion of F1 combinations with high SCA and parents with good GCA in multiple crosses, Line x Tester mating, could be a worthwhile approach to improve yield and quality traits further. [17] recorded in their study that fifteen and ten crosses had highly significant heterosis values over the mid-parents and the better parents, respectively, for the number of fruits/plant. Concerning heterosis over the checks hybrids, four and two crosses showed significant and highly significant heterosis values over hybrid Azad and Tabark. Still, only one cross (P7xP10) showed highly significant positive values over the checks cultivars Adronto and Marselia. Meanwhile, all crosses showed insignificant heterosis values over the mid-parents and the better parent concerning yield /plant trait. Heterosis over the checks hybrids, three, zero, once, and once crosses gave significant or highly significant positive values of heterosis over Aziad, Adronto, Marselia, and Tabark, respectively. Two lines and two testers gave significant or highly significant positive GCA effects on the number of fruits/plant traits. Three lines also showed significant or highly significant positive values of GCA effects on yield /plant traits. Therefore, these lines considered good combiners for yield traits. In concern of SCA effects, three crosses out of twenty ones gave significant or highly significant positive values for total yield plant trait. [18] investigated the hybridization on the pumpkin (*Cucurbita moschata*) and cleared the narrow-sense heritability estimates were 29.36 and 38.81% for fruit weight and fruit shape index, respectively. [19] indicated that both additive and non-additive genetic genes were positive for all studied yield and yield component traits except additive genetic variance for fruit diameter weight of fruit flesh thickness and seed weight. In addition, the estimates of heritability in the broad sense were larger in magnitudes than their corresponding values in the narrow sense. Heritability ranged from 99.224 to 99.762% for fruit length and fruit diameter for the combined data in a broad sense. Simultaneously, the highest h2 n% was 57.196% for the fruit shape index trait's combined data. The parent P1, P2, and P3 could be recommended as good combiners for average fruit weight, vitamin C, number of fruits per plant, and total yield per plant, whereas the P5 and P6 as promising parents for plant height, leaf area, number of leaves per plant, days to anthesis of female flowers, number of a node of the female flower and total soluble solids [20]

This study's objectives are to assess the combining ability, determine the nature and magnitude of gene actions, and estimate the GCA, SCA, and genetic parameters for flowering and fruit yield-related traits in a line × tester mating design in summer squash (*Cucurbita pepo* L.)

MATERIALS AND METHODS

This experiment was carried out during spring season 2018 at the field vegetable experiments, department of horticulture and landscape design, college of agriculture and forestry, Mosul University to Study the line x tester hybridization in squash (*Cucurbita pepo* L.). The experiment materials consisted of 6 genotypes and two varieties as the squash plant's tester (table 1).

Table 1. List of squash genotypes used in the experiment.

No.	Genotype		Source
L1	Line	Nadi F1	Royal Sluis seeds company, Holland
L2		Opalin	Argeto , Semze Tohumlari , Turkey
L3		Shahbaa	Syria, Alpepo , 69896
L4		Kabak Sakiz	Yazir Mah , Selcuklu , Konya , Turkey
L5		Muzaffer F1	Argeto , Semze Tohumlari , Turkey
L6		Asma F1	Clause seeds company, France.
T(1)7	Tester	Local (Mulla Ahmad)	Mosul market, Nineveh, IRAQ
T(2)8		Khatoon F1	Hollar seeds company

The seeds of the genotypes were sowing on 11/ 3/ 2018 in rows of 1.5 m length and 75 cm with an approximate plant to plant distance of 30 (5 plant per plot), then make a cross between them. The parents' seed and the hybrids were planting on 12/3/2019 online on distant 2 m for the line and 30 cm between the plant within the line under drip irrigation. Inbreds were planting in spring 2018 using hybridization. An anthesis crossing between inbreds and tester was done, at the end of the growing season, the seeds were a collection, for all hybridization, at growing season spring 2019 varietal trial for crosses and parents were conducted by using RCBD design with three replications for each genotype possesses 20 plots to evaluate crosses and parents and to estimate some genetic parameters. Using randomized complete block design (RCBD) with three replicates, all other necessary cultural such as fertilizing, weeding, and cultivation were applied to all plots uniformly [21]. The data were recorded for the traits. Vias: Number of the first node for first female flower, number of days for first male and female flower, number of male and female flowers fro plant, number of fruits for marketable yield for the twist harvesting, number of fruits per plant for marketable, length and diameter (cm) of marketable fruits and fruit weight (gm). All the agronomic data were recorded and subjected to analysis using the SAS statistical software [22]. Estimation of combining ability was done following method 1 of model 1 (fixed effect) of [23]. The mean squares for GCA and SCA were tested against the error variances of respective characters derived from ANOVA reduced to mean level. All the genetic parameters were estimated according to [24].

Table 2. ANOVA analysis, mean square for the genotypes' traits (Line x tester) in squash plant.

SOV.	d.f.	Mean square									
		No. of days for first male flower	No. of days for the first female flower	No. of nod for the first female flower	No. of male flowering /plant	No. of female flowering /plant	No. of marketable fruits for the twist harvesting	No. of market able fruits/plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)
Block	2	5.55	3.95	0.276	1.0667	1.550	0.005	0.397	0.231	0.065	26.600
Genetic group	19	113.280**	69.014**	3.960**	35.596**	29.979**	0.261**	11.397**	1.963**	1.770**	134.494**
parents	7	127.423**	96.262**	5.296**	73.143**	38.191**	0.378**	11.620**	3.612**	3.026**	237.064**
SS parents vs crosses	1	334.469**	260.100**	0.051 n.s	9.344**	42.711**	0.462**	13.689**	0.484 n.s	1.067**	462.853**
crosses	11	84.172**	34.303**	3.465**	14.088**	23.596**	0.151**	11.047**	1.048**	1.034**	39.371**
Lines	5	131.044**	30.533**	1.629**	7.694**	17.378**	0.089**	5.529**	1.351**	0.866**	35.177**
Testers	1	186.778**	81.000**	25.671**	90.250**	113.778**	1.000**	87.734**	3.484**	1.563**	183.603**
LinesxTesters	5	16.778**	28.733**	0.859**	5.250**	11.778**	0.043**	1.228n.s	0.258n.s	1.095**	14.718**
Error	38	1.638	1.090	0.124	1.330**	2.55	0.014	0.548	0.357	0.042	5.528

RESULT AND DISCUSSIONS

Table (2). showed The mean squares for all studied traits, Variability among genotypes was highly significant (P ≤ 0.01) for all the ten traits, indicating the presence of genetic differences among the concerned genotypes. Significant differences were observed among the parents and parents vs. crosses except for the number of nods for the first female flower and fruit length for parents vs. crosses. At the same time, Variability among testers was significant for all characters except the main stem length number of marketable fruits per plant and fruit length (cm). Significant differences were observed among line and tester for all traits under the study. In contrast, the lines x tester were significant in most traits excepted for the number of marketable fruits per plant and fruit length. These results are in line with those reported by [25, for muskmelon; 26 for Cucumis melo; 2; 4; 8;12; 28 for squash; 27, for melon, and 16 for cucumber].

Table (3) indicated the estimated the general combine ability (GCA) for parents and tester for the characters for pepo, showed that L6 found to be good general combiners for all traits with positive highly significant values for GCA effect, while the L4 was good general combines for several days for male flowers, and fruit diameter with significant positive values. On the other hand, the tester (T1 and T2) founded the higher general combine ability for all traits under the study, indicating that both additive and non-additive genetic variance tended to interact with the environments. Therefore, selecting these traits would not be effective in a single environment, but more environments would be required. The performance of parents was an indication of their GCA effects for all the above traits. The positive GCA indicates that these parents contribute to improving these characteristics and transfer them to the added effect of genes on the yield to their crosses towards increasing the yield so that they can be used as parents in crossbreeding programs to improve the efficiency and increase of the yield components by electing plants superior to the characteristics of the yield components, and that the values of the general high GCA of parents indicate their large contribution in transferring this characteristic to hybrids because of the high contrast added to it. This result was reported earlier similar results by [8 ; 16; 20 ; 28 ; 30 ; 31; 33 and 34] **.**

Table(4) shows the specific combine ability (SCA) values for the hybridization resulting from the hybridization by line x tester system for the traits.

It was studied, as it is clear that the private coalition capacity was positive and positive in the desired direction for the number of days to the first flower's appearance. Note where it was positive for ten hybrids and negative for the hybridization of L6 x t1 and L6 x t2 where the hybrids had L1xt1, L1xt2, L2 xt1, L, l4 xt2, as for The number of days for the appearance of the first female flower was significantly positive for eight crosses. The hybrids had L1xt2, L2xt1, L, l4xt1, L4xtt2, l5x2 had negative morale for hybrids L3xt2, L6xt1, L6xt2. This is an important attribute of the number of fruits and yields when increasing the contract percentage for these flowers. It also appears from the table that the special combine ability was positive for the rest of the traits represented by the number of male and female flowers for each plant where hybrids L1x t1, L3x, t2, L4xt2 gave the highest especially combine ability for flowering notes, and hybrids L2xt2, L4xt1, L5xt2 the

Table 3. General combine ability for (GCA) for parent (gi) for the traits.

Parent	**No. of days for first male flower**	**No. of days for the first female flower**	**No. of nod for the first female flower**	**No. of male flowering /plant**	**No. of female flowering /plant**	**No. of marketable fruits for the twist harvesting**	**No. of marketable fruits/plant**	**Fruit length(cm)**	**Fruit diameter (cm)**	**Fruit weight (gm)**
L1	0.509	-1.741	0.109	-1.398	-2.435	0.008	-1.545	-1.505	-0.244	-11.159
L2	- 4.713	-4.185	-0.091	-2.287	-1.546	-0.181	-1.045	-0.682	-0.267	-11.770
L3	-3.713	-5.074	-0.169	-0.509	-0.991	-0.058	-0.601	-0.771	-0.367	-9.170
L4	1.509	-1.185	-0.646	-1.509	0.120	-0.203	-0.390	-0.938	0.256	-7.437
L5	-5.713	-3.963	-0.757	-0.843	0.123	-0.058	-1.101	-0.671	-0.289	-11.137
L6	12.120	16.148	1.554	6.546	4.731	0.492	4.682	4.567	0.911	50.674
S.E. (gi) line	0.369	0.301	0.103	0.332	0.461	0.035	0.214	0.172	0.059	0.679
T1	17.954	17.314	2.693	9.491	4.676	0.358	1.605	5.062	1.489	52.519

T2	13.398	14.314	1.004	6.324	8.231	0.692	4.727	4.440	1.072	48.001
S.E. (gi) tester	0.286	0.233	0.080	0.258	0.357	0.027	0.165	0.134	0.046	0.526

Table 4. Specific combine ability for (SCA) for hybrids (sij) for the traits.

Hybrids	No. of days for first male flower	No. of days for the first female flower	No. of nod for the first female flower	No. of male flowering /plant	No. of female flowering /plant	No. of marketable fruits for the twist harvesting	No. of marketable fruits/plant	Fruit length(cm)	Fruit diameter (cm)	Fruit weight (gm)
L1x t1	4.824	2.574	0.685	2.620	0.657	0.208	0.506	0.494	0.200	8.948
L1 x t2	4.380	5.241	0.474	0.565	0.435	0.108	0.151	0.816	0.250	10.131
L2x t1	3.046	3.019	0.852	1.176	-0.231	0.064	1.040	1.238	-0.011	10.826
L2 x t2	0.935	2.351	0.107	1.009	2.213	0.064	0.118	0.894	0.439	7.643
L3x t1	4.046	5.241	0.396	1.398	0.877	0.208	0.129	1.060	-0.244	10.493
L3 x t2	0.935	-0.759	0.485	2.565	1.657	0.042	1.473	0.982	0.572	10.576
L4x t1	5.824	3.352	0.441	0.065	3.435	0.019	0.984	0.860	1.300	12.026
L4 x t2	4.380	5.019	-0.037	2.898	0.213	0.086	0.829	1.016	-0.350	10.776
L5x t1	1.046	-0.204	0.185	1.731	0.102	0.175	0.929	1.360	0.111	6.793
L5 x t2	1.935	5.796	0.107	1.898	3.546	0.075	0.173	0.782	0.294	12.309
L6x t1	-18.787	-13.981	-2.559	-6.991	-4.843	-0.675	-3.588	-5.012	-1.356	-49.085
L6 x t2	-12.565	-17.648	-1.137	-8.824	-8.065	-0.375	-2.744	-4.499	-1.206	-51.435
S.E (sij)	0.640	0.522	0.178	0.577	0.798	0.060	0.370	0.299	0.103	1.176

The highest number of female flowers was 2.213, 3.435, and 3.546, respectively. The combined specific ability was highly positive for hybridization L1xt1 (0.208), L2xt2 (0.208), for the number of fruits for the twist harvesting for the marketing per plant. The plant had positive morale for hybrids L1xt1, L2xt1, L3xt2, L3xt2, L4xt1, L4xt2, and negative morale was for hybrids L6 xt1, L6xt2, and the special combine ability was positive for the length of the fruit for the ten hybrids and negative for two hybrids L6xt1 for L6Xt2 for L2xT1, lxx1, l5xt1, as for the fruit weight adjective, the special sage ability was positive for ten strikes, and negative for hybridization was L6xt1, L6xt2**.** In general, any hybrid's high impact is due to the high value of this hybrid's performance and its superiority due to the non-additional effects of genes [34]. The ability of a specific combination, SGA, measures the effects of the non-host gene. When it is high in some crosses, it means high compatibility between the parents' characteristics. Many researchers indicate That the GCA and SCA in summer squash genotypes were significant positive values in yield components (4; 5; 6; 8;12; 14; 15; 22; and 19].

Table (5) showed The genetic parameters in genotypes (line x tester) for summer squash traits. The presented results appeared that both additive (δ2A) and non-additive genetic variances including dominance (δ2D) were positive for all studied yield and yield component traits except δ2A for numbers of days for first female flower (-9.809), fruit diameter (- 0.820 cm), and (δ2D) for fruit length (- 0.033), the (δ2g)was higher positive in the number of days for first male flower (25.715), followed fruit(8.086), and the number of marketable fruits per plant. The table also indicated that the $H^2_{(b.s.)}$ was more than 50% for most traits under the study except in fruit length, which was 20%. On the other hand, the $H^2_{(n.s.)}$ was more than 60% for the traits number of days for first male flower (75%), number of nod for first female flower (74%), number of marketable fruits for twist harvesting (61%) and number of marketable fruits per plant (86%). In contrast, the $H^2_{(b.s.)}$ was negatived for the number of days for the first female flower and fruit diameter. The genetic advance was higher in all traits except in the number of days for the first female flower and fruit diameter, which was negative. This indicated that these variances play a role in the genetic expression of yield and yield component traits.

In addition, although the magnitudes of additive genetic variance, which was larger, the dominance genetic variance for traits. It could suggest that additive genetic variance predominated in the inheritance of these traits. At the same time, the dominance genetic variance was larger than the additive genetic variance for traits. The results also illustrated the importance of reciprocal variances, which were smaller than additive genetic variances for most traits. Thus the cytoplasmic genetic factors also contributed to the genetic expression of yield and yield component traits. Such a result means that both additive and non-additive gene effects seemed to have approximately equal importance on the inheritance of two traits. These results are according with the results obtained by [2; 14; 12; 19; 20 ; 31; 32; 33 and 34]. On the other hand, the H^2b was estimated with higher values than double, or more, of H^2n values for the rest studied traits. These results indicated the greater importance of the non-additive gene effect, compared with the additive gene effects, on the inheritance of these traits and, consequently, on their general performances.

Table (6) shows the percentage of the contribution of each of the strains, the tester, and the interference between the strains and the tester, where it appears from the table that the contribution of the heterogeneity of the strains of the total variation was high for most of the traits except for the trait of the fruit diameter was low 38.096. Simultaneously, for the traits, it was also high, except for the trait. The diameter of the fruit was 13.743. It is clear from the same table that the ratio of the contribution of interference between strains and tester to the total heterogeneity was high for the characteristics of the number of days for the first female flower (38,074) and the number of female flowers per plant (22,688), the diameter of the fruit (48,162). It was recorded by [35] in wheat.

Table 5. The genetic parameters in the genotypes (Line x tester) for summer squash.

Genetic parameters	No. of days for first male flower	No. of days for the first female flower	No. of nod for the first female flower	No. of male flowering /plant	No. of female flowering /plant	No. of marketable fruits for the twist harvesting	No. of marketable fruits/plant	Fruit length(cm)	Fruit diameter (cm)	Fruit weight (gm)
σ^2 A	20.668	-9.809	1.097	2.501	0.799	0.039	4.855	0.168	-0.820	5.023
σ^2 D	5.047	9.214	0.244	1.307	3.076	0.009	0.227	-0.033	1.404	3.063
σ^2 T (σ^2G)	25.715	-0.595	1.341	3.808	3.875	0.048	5.082	0.135	0.584	8.086
σ^2 E	1.638	1.090	0.127	1.330	2.550	0.014	0.548	0.357	0.042	5.528
σ^2 P	27.353	0.496	1.468	5.137	6.425	0.063	5.630	0.491	0.626	13.614
$\bar{\alpha}$	0.699	#NUM!	0.667	1.022	2.775	0.697	0.306	#NUM!	#NUM!	1.104
$H^2_{(b.s.)}$	0.940	-1.199	0.913	0.741	0.603	0.769	0.903	0.274	0.933	0.594
$H^2_{(n.s.)}$	0.756	-19.788	0.747	0.487	0.124	0.618	0.862	0.341	-1.311	0.369
EGA	6.916	-24.381	1.584	1.931	0.551	0.271	3.581	0.418	-1.815	2.382
EGA(%)	11.996	-41.534	23.933	6.771	2.484	14.938	31.663	2.462	-59.912	1.333

Table 6. The value is a percentage for the line and tester's contribution and interaction between them in total Variability.

Genotypes	No. of days for first male flower	No. of days for the first female flower	No. of nod for the first female flower	No. of male flowering /plant	No. of female flowering /plant	No. of marketable fruits for the twist harvesting	No. of market able fruits/plant	Fruit length(cm)	Fruit diameter (cm)	Fruit weight (gm)
Lines	70.767	40.459	21.373	24.825	33.476	26.761	22.751	58.589	38.096	40.613
Tester	20.172	21.466	67.357	58.236	43.836	60.362	72.197	30.229	13.743	42.395
Line x tester	9.060	38.074	11.271	16.939	22.688	12.877	5.051	11.182	48.162	16.992

CONCLUSIONS

Conclusion

We conclude that Anova analysis indicated all genotypes were significant for all traits, importance of general (GCA) and specific (SCA) combining abilities. GCA was larger than their corresponding estimates of SCA for yield and yield component traits at both F1 and F1r hybrids. These results indicated that the two parents L6, T2, the both H^2b.s, H^2n.s were more than 50% for some important traits under the study.

Suggestion

Based on research to improved the flowering growth and increased the yield in pepo by using line x tester, it can be suggested that the line x tester hybridizing is best for improved the h2 n.s .and value as a percentage for contribution for line and test was best for several female flowers per plant and fruit weight.

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