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Evaluation of Selected Inbred Lines of Eggplant (cv. Black Balady.) and Hybrids Among them

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ABSTRACT

This study was carried out at El - Barmoon Farm, Mansoura Horticultural Research Station, Dekahlia Governorate, Egypt during four successive summer seasons of 2010 to 2014. Seeds of the local Balady of eggplant (*Solanum melongena* L.). The lines were selected from four populations (S_0) of local genotypes collected from different four regions of Egypt . The mean squares of the selected lines were highly significant for all studied traits except total soluble solids trait. Furthermore, the superior values between lines mean squares comparing to within plot mean squares indicated the relative magnitude variation between lines than the among the same line. This fact could be used as a primarily indicator for the success of reaching to a logical level of homozigoisty. The mean performance of the selected lines for vegetative traits, yield components and fruit quality traits were recorded the lines L.B.10-2 highly recommended for direct integration or as parental lines for the earliest flowers ,the highest early yield and fruit shape index by the mean of 57.51 day , 1.093 kgs and, 1.908 cm^2, respectively. The coefficient of variance was estimated for some vegetative, yield components and fruit traits after four cycles of selection in ten lines. The line LB.29-1 was a good donor for plant height , number of branches and early yield per plant but with relative small fruit size comparing with the other lines. While, the line LB.17-5 gave highly recommended for fruit shape index and total soluble solids by the mean of 1.252 % and 3.524 %. The magnitude of the genetic variation between lines was the most important part comparing with genetic variation within plants for all studied traits. Obtained broad-sence heritability (H2Bs) values for the studied traits ranged from 3.22 % to 99.7% , suggesting moderate to high values of heritability. The result indicated that the F_1 hybrid L.B.10-2 x L.B.14-1 showed the highest and desirable value for number of branches per plant of the mean of 31.77, number of fruits per plant 23.66, fruit shape index of the mean of 0.103 and total soluble solids , respectively. At the same time, the F_1 hybrid L.B.10-2 x L.B.37-4 exhibited the highest values of hybrid vigor for earliness triat (Early yield per pant) of the mean of 56.47**,** Average fruit weight of the mean of 84.64 and total early of the mean of 33.93, respectively.. While, the F_1 hybrid L.B.10-2 x L.B.22-3 showed the highly heterosis is noticed for the prominent yield attributing characters of -12.24 for earliest flowers. This result indicated that choice of parents is very important. These hybrids can be developed for breeding programme and also can satisfy the local demand eggplant breeding programme should aim to produce new F_1 hybrids.

Keywords: Eggplant , Pure Line, Selection, Heritability, Coefficient of variation and Heterosis.

INTRODUCTION

Selection is an important method for improving characters, especially in the self-pollinated crops. In many countries, selection from the local cultivars and landraces genotypes were used to develop a new lines and cultivars adapted to the consumers and environment conditions . Is an annual and a warm climate crop that has broad sense of diversity in color, shape and size etc. (Sidhu *et al*., 2005; Cerciola *et al*., 2013). Eggplant is an important source of vitamins A and C, minerals, fiber in addition to phytochemicals and antioxidant compounds as flavonoid which have medicinal properties (Gebhardt and Thomas, 2002; Piao *et al*., 2014). Asia, Africa, and the Mediterranean region are considered the main regions of eggplant production worldwide (Mutlu *et al*., 2008). Recently, Eggplant take place the third as most important crop of *Solanaceae* family after potato and tomato. China represents the greatest eggplant producer with17 million tons annually, followed by India with 8 million tons, while Egypt is the third place with 1 million tons per year (FAOSTAT Data 2015). *S. melongena* has been subjected to different breeding programs with diverse objectives depending upon market needs and consumer preference of each production region. Resistance to biotic abiotic stress, resistance to herbicides, yield and its quality such as early maturity, colour, and the capacity for long storage quality are the most important objectives for genetic improvement. On the other hand, improvement of nutritive value as high dry matter, sugars, anthocyanin and total phenol contents, low level of polyphenol oxidase activity and orthodihydroxy phenolic compounds to avoid browning of cut fruits also represent a significant aims for eggplant genetic improvement. Selection and breeding of eggplant has resulted in a large number of eggplant varieties according to meet the consumer demands (Sidhu *et al.*, 2005; Sekara *et al.,* 2007; Cericola *et al*., 2013). Development of any new commercial varieties is highly depending on the genetic variability (Barchi *et al*., 2012; Lebeau *et al*., 2013). Normally development of new Eggplant varieties is based on intra-varietal group crossings or by the incorporation of landraces (Munoz-Falcon *et al*., 2009a). Open pollinated, pure lines and F_1 hybrid represent the principal cultivar form in Eggplant. However modern F_1 hybrids have a narrow genetic base, become the common form that used in the commercial production of eggplants (Maria *et al*., 2015). Simple selection from the local varieties represents an important approach for genetic improvement. Hence, new lines were derived from the landraces by applying different strategies of selection in Eggplant (Karmakar and Bhattacharya, 2000; Naresh-Babu *et al*. 2001). In addition, Chingakham *et al*. (2016) reported that the hybrids derived from local landraces germplasm showed competitive behavior in productivity and other quality traits comparing with the commercial hybrids. These reasons lead eggplant breeders to start from nothing, step by step. Therefore, this investigation was conducted to fulfill the following goals:-

1. To develop new families of eggplant and then homozygous lines with great emphasis for fruit quality through selection program.

2. Utilization of these inbred lines in the production of vigorous F_1 hybrids to obtain high yielding hybrids.
3. Evaluation of hybrids obtained from the hulf diallel mating design to obtain the important genetic parameters, which enable plant breeder to continue the breeding programs for further improvements of inbred lines or the production of superior F_1 hybrids.

MATERIALS AND METHODS

During the summer season of during successive early summer seasons of 2011-2014. Seeds of four populations (S_0) from the local Balady cultivar and genotypes of eggplant (*Solanum melongena* L.) were collected from different four Regions of Egypt, i.e., Helwan district, Alexanderia governorate (West–Delta); Ismailia (East-Delta); Behera (Middle-Delta) and Bany sweef (Upper–Egypt). The collected seeds were bulked and classified into one group long black . In the summer season of 2011, 500 plants from the one group was grown. The best 20 plants were selected and selfed. Seeds of each plant were separately collected to produce the C1 (first cycle) populations. In the second summer season (2012), 50 plants from the progeny of each selected plant were planted. Observations and selection were made between and within the families, in order to, select the best plants with the best fruit characters and selfed again to produce the C2. The planting, observations, selection and selfing were continued during summer seasons of 2013 , in order to obtained seeds of the C3 populations. In the summer seasons of 2014, 30 plants with three replicates (10 plants / plot) of the C3 populations of the 10 selected genotypes were grown with the F_1 hybrid (long black fruit type) and S_0 from each group as control cultivars.

The coefficient of variance (C.V%) was estimated for all selected genotypes as individual plants concerning some characters, i.e., number of days from transplanting to first flower an thesis, plant height, fruit length (at ripening stage) and fruit diameter (at 10 cm -length) to determine the degree of its homogeneity. According to the obtained data, 10 populations were excluded due to their high heterogeneity. The remaining genotypes (C4) were evaluated during the two seasons of 2013 and 2014 with suitable control cultivars and the combined data over the two seasons were calculated. These ten inbred lines named as L.B.6-1- L.B.10-2 – L.B.14-1 – L.B.17-5 – L.B.22-3 - L.B.29-1 - L.B.35-2 - L.B.37-4 - L.B.41-3 - L.B.48-4 .Where, L.B was indicates for long black. The lines L.B.10-2 , L.B.14-1, L.B.22-3 and L.B.41-3 are highly recommended for direct integration or as parental lines for F_1 eggplant improvement. During summer seasons of 2014 these inbred lines were crossed according to half diallel mating design (2 x 2) to obtain 6 F_1 hybrids. In addition, the parental lines were also selfed to produce enough seeds from them. In the growing season of 2015, all ten genotypes which included four parental lines and six F_1 hybrids, were evaluated in a field trial experiment. A randomized complete block design with three replicates was used in this study. In the late two seasons, each plot consisted of two rows, each row was 1.0 m wide and 5.0 m long and the plants were spaced at 50 cm. part (20 plants/plot).Routine cultural practices, similar to those used in eggplant commercial production, were domes as needed.

The experiment was conducted at El-Baramoon Horticulture Research Station, Vegetable Research Dept., nearby Mansoura city, Dakahlia governorate. The following traits were estimated in each derived line; plant height ($PHcm^2$), number of branches (NB/P), leave area (LA cm^2), days to flowering (D.T.F), early yield per plant (EY/P kgs), number of fruits per plant (NF/P), average fruit weight (A.F.W kgs), total yield (Y/P kgs), fruit shape index (SH.I) and total soluble solids (T.S.S) %. Phenotypic and genotypic parameters i.e, mean, coefficient of variation, genotypic variation between and within lines, heritability in broad sense. In order to maximize the genetic gain, selection between and within the lines was applied in attempt to obtain superior families among the selected lines. Then, selection within families was applied among these individuals until reaching the best plants of the best families. Data were statistically analyzed and means were compared based on the L.S.D. test. to compare the mean of a particular line with the grand mean of the lines in the experiment component of variances, genotypic and phenotypic coefficient of variation and broad-sense heritability (H^2Bs) were estimated according to Singh and Chaudhary (1995).

RESULTS AND DISSECTION

Brinjal eggplant represent the most popular and traditional vegetables in Egypt which take place the third, after potato and tomato as the most important crop from s*olanaceae* family. However, its productivity is still relatively low and the most production come from imported F_1 hybrids seeds. Hence, this study focused on maintain and conserve the national genetic resources through integrate the local varieties and landraces into breeding programs as a way for avoiding losses this germplasm and exploitation its genetic potential in production of new lines or hybrids from the current resources.

Between lines and within plot variation :

The analyses of variance and mean squares of vegetative, yield and fruit quality traits in eggplant were obtained and the results are presented in Table 1: It appeared from the Table that the mean squares of the selected lines were highly significant for all studied traits except total soluble solids trait. Furthermore, the superior values between lines mean squares comparing to within plot mean squares indicated the relative magnitude variation between lines than the among the same line. This fact could be used as a primarily indicator for the success of reaching to a logical level of homozigoisty. Similar finding were reported by many authors among them (Elsayed *et al.*, 2016) .

Table 1. Analysis of variances and mean squares for ten lines in addition to check variety subjected to four cycles of selection for vegetative, yield and fruit quality traits in eggplant .

SOV	DF	PH	N.B./P.	L.A cm^2	D.T.F	EY/P	NF/P	A.F.W	Y/P	SH.I	T.S.S%
Replication	2	72.45	3.984	194.73	76.68	0.588	9.409	1180.48	0.801	0.098	1617.6
Lines	10	770.79**	8.076**	1837.24**	781.04**	0.751**	45.76*	12739.7**	1.685**	1.236**	1697.4
Between	20	7.76	0.398	55.43	19.49	0.01	0.329	32.97	0.015	0.022	1643.1
Within plots	132	15.02	0.18	59.92	5.43	0.038	0.041	0.096	0.001	0.001	1638.1

plant height PH in (cm),N.B.P: number of branches, LA : in (cm^2), D.T.F: days to flowering, EY/P: early yield per plant in (kg), NF/P: number of fruits per plant, A.F.W: average fruit weight in (kg), Y/P: total yield, SH.I: fruit shape index and T.S.S%.: total soluble solids %.

The Genotype-mean performances of the selected lines :

The mean performance of the selected lines for vegetative traits, yield components and fruit quality traits were obtained and the means are presented in Table 2 : Significant differences were observed in plant height (PH cm^2) among the different lines compared with the check var. The line L.B.37-4 recorded the highest one with 107.18 cm followed by the line L.B.22-3 with 85.32 cm. while the plant height of check var. did not exceed 96.6 cm. On the other hand, four lines were shorter than the check var. (L.B.41-3, L.B.10-2, L.B.29-1 and L.B.48-4). Close values of plant height were obtained .

Regarding number of breanches per plant (N.B/P), the line L.B.14-1 gave the highest number of breanches per plant comparing with the check var. (Table 2) while the rest ranged between 10 to 12 branches per plant. In general, close values of this trait were observed and no great variability in this trait was observed during the different cycles of selection. In contrast, leave area (LA cm^2), exhibited broad range of variability where ranged from 96.43 cm^2 to 124.5 cm^2. The lines L.B.41-3 and L.B.37-4 showed the most extensive vegetative growth genotypes. Regarding days to flower (D.T.F), also significant differences were observed among the selected lines and relative to check var. The L.B.10-2 line gave the earliest flowers comparing with the other lines and check var. with 62.65 days. In contrast, the line L.B.41-3 was the later one with 83.41 days until flowering, 57.5 days more than L.B.10-2. On the other hand, L.B.10-2 was earlier than the check var. by about five days which represents a desirable market price for early eggplant production.

In respect of the early yield (E.Y/P kgs) which estimated by adding the weight of the first two picked fruits per plant is presented in Table 2. The early yield ranged from 0.303 kg to 1.093 kg per plant. In the same context, the L.B.10-2 line gave the highest early yield but more than check var. (0.627 kg). Whereas, the lines L.B.37-4, L.B.29-1 and L.B.17-5 recorded the largest yield per plant 1.027 kg, 0.843 kg and 0.787 kg/plant, respectively (Table 2) comparing with the check var. regarding number of fruits per plant, the line L.B.14-1 gave more fruits, 14.62 comparing with the check var. and also the rest of evaluated lines but less in total productivity with 1.986 kg / plant. This could be attributed to the relative small size of its fruits, about 100 grams, comparing with the other fruits of evaluated lines. Regarding average fruit weight (A.F.W kgs) which represents the main component of eggplant yield, it ranged from 131.5 gram to 215.9 gram. Six of ten lines exhibited average fruit weight inferior than the check var. while only few lines exceed the check var. value but without significant differences which revealed that during different cycles of selection, the genetic gain of fruit weight was not effective enough or modest to induce a significant value in fruit weight of eggplant. On the other hand, selection could be segregate the inferior genotypes among the original population and increasing or concentrate the favorable alleles and discard the unfavorable genetic factors from the original population.

Table 2. Mean performances of the evaluated breeding lines for vegetative, yield and fruit quality traits in eggplant compared with check variety.

Genotypes		PH	N.B./P.	L.A cm^2	D.T.F	EY/P	NF/P	A.F.W	Y/P	SH.I	T.S.S%
L.B.6-1		103.9	11.91	120.9	64.39	0.763	12.57	161.3	2.028	1.983	4.7
L.B.10-2		90.58	10.7	100.9	57.5	1.093	11.27	197.5	2.226	1.908	5.15
L.B.14-1		105.8	12.36	121.6	62.3	0.517	14.62	135.8	1.986	2.049	4.25
L.B.17-5		100.8	11.43	100.6	72.5	0.787	12.63	204.9	2.567	2.156	4.4
L.B.22-3		85.32	10.32	97.44	69.9	0.713	11.9	215.9	2.571	1.925	3.73
L.B.29-1		93.69	10.88	100.6	59.06	0.843	11.87	186.2	2.214	1.99	4.867
L.B.35-2		100.9	11.48	102.1	67.47	0.776	12.2	171.6	2.095	2.055	4.28
L.B.37-4		107.2	12.33	124.5	63.81	1.027	14.4	131.5	1.894	2.472	4.933
L.B.41-3		88.89	10.41	96.43	83.41	0.303	8.3	165.4	1.375	2.282	3.24
L.B.48-4		95.54	11.81	99.12	68.87	0.58	13.47	136.0	1.832	2.81	4.833
hk vr.		96.6	10.77	95.55	62.65	0.627	10.93	186.8	2.097	2.473	4.467
LSD	5%	7.432	1.683	19.86	11.78	0.268	1.531	15.31	0.332	0.396	108.1
	1%	8.60	1.947	22.98	13.63	0.311	1.771	17.72	0.385	0.458	125.1

plant height PH in (cm),N.B.P: number of branches, LA : in (cm^2), D.T.F: days to flowering, EY/P: early yield per plant in (kg), NF/P: number of fruits per plant, A.F.W: average fruit weight in (kg), Y/P: total yield, SH.I: fruit shape index and T.S.S%.: total soluble solids %.

The same finding was observed for shape index of fruit (SH.I) where no different forms of fruits could be detected during the different cycles of selection. Finally, total soluble solids (T.S.S)%, significant differences were observed between the line L.B.10-2 and the check var. at 5.15 % of probability while no significant differences were detected for the other lines . Under directional selection, the genetic variance decreases due to linkage disequilibrium. Hence, after a few cycles of selection, a limit is reached where there is no further reduction in the genetic variance. In this context, obtaining of genetic parameters, as coefficient of variance, plant phenotypic components are of a great importance of any improvement program.

Components of variance:

The coefficient of variance was estimated and presented in Table 3 : For some vegetative, yield components and fruit traits after four cycles of selection in ten lines in addition to check var. For plant height (PH cm), the coefficient of variance ranged from 3.530 % to 15.68 % along the ten evaluated lines. Seven of ten lines exhibited coefficient of variance less than the original population while the lines L.B.17-5 and L.B.41-3 have the less values of coefficient of variance revealed the homogeneity between their plants. For number of branches per plant (NB/P), there were two contrast cases. Some lines gave coefficient of variance more than the original population while only four lines showed coefficient of variance less than the original population.

In contrast, the evaluated lines remained with low coefficient of variance for leave area trait (LA cm^2) less than 1.00 except the lines L.B.10-2 and L.B.29-1, which gave 1.187 and 1.123%, respectively. Similar finding was reported for days to flowering trait (D.T.F)where the majority of lines exhibited coefficient of variance less than 1.00 except the lines LB.10-2, LB.29-1 and LB.37-4 which gave 2.054 , 1.925 and 1.355, respectively. Whereas variability within plants for each evaluated line was relatively high for early yield per plant (E.Y/P kgs). This fact revealed by the broad range of coefficient of variance that ranged from 22.55% to 60.87% .

For number of fruits per plant (N.F/P), it worth to note that this trait highly depended on the genotype and there was a moderate variation within plants of the same line. Coefficient of variance ranged from 1.237% to 6.074% for L.B.17-5 and L.B.10-2 ,respectively. The lines L.B.14-1, L.B.37-4, L.B.48-4 and L B.6-1 showed lower variation within their plants comparing with the original population . For average fruit weight (A.F.W kg)there was high similarity of fruit weight within the plants of each evaluated line, consequently, low values of Coefficient of variance were observed and reported as less than one for all studied lines with close values to original population check var.

Regarding total yield per plant(Y/P kgs), as it known this trait represent the outcome of different physiological and morphological traits which controlled by multiple genes often with dominant effect . However, inbreeding and the sequent generation of selefing could be affect negatively on yield as a resents of inbreeding depression. The mean performance of the different lines comparing with the original population check var. could be confirm this finding that most of the lines gave inferior yield comparing with the original population. Generally, its coefficient of variance ranged from 2.066% to 6.408 % . For shape fruit index and total soluble solids, coefficient of variance varied from 1.252% to 4.045% for shape index (SH.I) and from 3.524% to 11.98% for total soluble solids (T.S.S %). In this context, low variation was detected with plants for shape form type long black fruits. In respect of total soluble solids, there was high variation relative to original population check var. since few inbred lines showed high similarity with their plants in patrician the lines L.B.17-5 and L.B.41-3 (Table 3).

Table 3. Coefficient of variance (CV%) values for ten lines subjected to four cycles of selection for vegetative, yield and fruit quality traits in eggplant .

Genotypes	PH	N.B./P.	L.A cm^2	D.T.F	EY/P	NF/P	A.F.W	Y/P	SH.I	T.S.S%
L.B.6-1	6.397	5.958	0.538	0.927	39.30	2.489	0.193	2.677	2.248	6.645
L.B.10-2	15.26	9.485	1.187	2.054	47.12	6.074	0.392	6.408	3.711	11.98
L.B.14-1	6.558	5.634	0.979	0.985	56.54	2.097	0.528	2.456	2.455	7.256
L.B.17-5	3.530	3.610	0.420	0.440	22.55	1.237	0.080	2.120	1.252	3.524
L.B.22-3	7.266	6.050	0.712	0.853	41.67	2.606	0.148	2.740	2.054	6.151
L.B.29-1	15.68	11.85	1.123	1.925	60.87	5.161	0.443	5.619	4.045	11.63
L.B.35-2	6.394	6.794	0.584	0.913	38.48	2.542	0.199	2.733	2.905	7.281
L.B.37-4	6.126	5.117	0.497	1.355	27.50	2.158	0.238	2.392	2.945	6.193
L.B.41-3	3.942	4.669	0.590	0.420	53.86	2.892	0.096	2.066	1.350	4.702
L.B.48-4	6.542	5.215	0.641	0.957	42.52	2.297	0.309	2.431	3.590	6.409
hk vr.	0.802	7.616	2.165	1.114	53.57	2.894	0.169	2.001	7.436	7.090

plant height PH in (cm),N.B.P: number of branches, LA : in (cm^2), D.T.F: days to flowering, EY/P: early yield per plant in (kg), NF/P: number of fruits per plant, A.F.W: average fruit weight in (kg), Y/P: total yield, SH.I: fruit shape index and T.S.S%.: total soluble solids %.

Through the early segregating generations, black eggplant could be improved through applying simple selection based on physiological expression of the studied traits where selection could be effective in isolation and identification of promising lines in eggplant. The line L.B.10-2 showed good performance in days to flowering , number of fruits per plant and total yield comparing with the other lines and original population. While, the line L.B.29-1 was a good donor for plant height , number of branches and early yield per plant but with relative small fruit size comparing with the other lines. In current study, the lines L.B.10-2, L.B.14-1, L.B.17-5 and L.B.29-1 are highly recommended for direct integration or as parental lines for F_1 eggplant improvement. These inbred lines could be further to produce superior F_1 hybrids. Similar finding was reported by different authors among them . Simillar results were reported by Rodrigues - Burruezo *et al.* (2008) who evaluated many local genotypes as well as landraces of eggplant and found high coefficient of variation values suggested sufficient genetic variability for a simple breeding method such as pure line selection.

Estimation of physiological and genetic parameters represents a critical point for the viability of the improvement progress which could be orient in strategy decision for selection efficiency. In this context, different parameters were estimated in current study for vegetative traits, yield components and some fruits quality traits in eggplant and presented in Table 4 :

The magnitude of the genetic variation between lines was the most important part comparing with genetic variation within plants for all studied traits. This fact revealed that the high homogeneity that reached by the different cycles of selection in addition to maximizing the additive genetic variance within the same line and minimizing this gene action between the different lines. On the other hand, plant phenotypic variance within plants always remained the lowest part comparing with both genetic variances wither within or between lines. Whereas, the coefficient of heritability in broad sense was great for nine of ten studied traits that revealed the magnitude of genetic factors in the expression of plant phenotypic performance. Estimates of environmental variance (oe2), genetical variance(og2), plant phenotypic variance (op2), genotypic coefficient of variation (G.C.V% $_{\text{within line}}$ and G.C.V% $_{\text{between line}}$), ratio and broad-sense heritability (H2Bs) for the studied traits are listed in Table(4):

Table 4. Genetic and plant phenotypic parameters for vegetative, yield and fruit quality traits evaluated in ten lines resulted from four cycles of selection.

Parameter	PH	N.B./P.	L.A cm^2	D.T.F	EY/P	NF/P	A.F.W	Y/P	SH.I	T.S.S%
$\sigma^2 g$ within line.	50.87	0.512	118.8	50.77	0.049	3.029	847.1	0.111	0.081	3. 623
$\sigma^2 g$ between line.	152.6	1.536	356.4	152.3	0.148	9.087	2541.3	0.334	0.243	10.87
$\sigma^2 Ph$ within line.	15.02	0.175	59.92	5.430	0.038	0.041	0.096	0.001	0.001	1638.1
$\sigma^2 e$	-1.451	0.446	-0.899	2.813	-0.005	0.058	6.575	0.003	0.004	0.999
$H^2 bs$	0.989	0.951	0.971	0.975	0.986	0.993	0.997	0.991	0.982	0.0322
GCV % within line.	7.337	6.328	10.34	10.71	30.43	14.27	16.91	16.04	12.98	24.72
GCV % between line	12.71	10.96	17.90	18.55	52.71	24.72	29.29	27 .77	22 .49	42. 82

plant height PH in (cm),N.B.P: number of branches, LA : in (cm^2), D.T.F: days to flowering, EY/P: early yield per plant in (kg), NF/P: number of fruits per plant, A.F.W: average fruit weight in (kg), Y/P: total yield, SH.I: fruit shape index and T.S.S%.: total soluble solids %.

The variance was varied from trait to another, since the genetic variance (og2$_{\text{within line.}}$ and og2$_{\text{between line.}}$), estimated for the studied traits were ranged from: 0.049% to 847.1% for early yield per plant ; average fruit weight and 0.148 to 2541.1 for same traits ; respectively. In this respect, the remaining traits showed low values of difference between plant phenotypic and genetic variance, indicating that, the large portion of the plant phenotypic variance (op2) was due to the genetic variance (og2) and the observed significant differences among the selected lines are genetically. For genotypic and plant phenotypic coefficient of variations (G.C.V% $_{\text{within line}}$ and G.C.V% $_{\text{between line}}$), estimated for the studied trait were: 6.328 to 30.43 for number of branches and early yield per plant; 10.96; 52.71for the same traits. Obtained broad-sence heritability (H2Bs) values for the studied traits ranged from 0.0322 to 0.997, suggesting moderate to high values of heritability. The highest two value (0.951 and 0.993were obtained from number of branches per plant and number of fruits per plant %, respectively.

Finally, genotypic coefficient of variation between lines was higher more than within plants which reflect the magnitude of the dominant gene action that concentrated between the different lines as a resent of homozigozity case within each evaluated line. This type of gene action always recovers by hybridization between the distanced homogenous lines generating hybrid vigor or heterosis phenomena. Similar resents were obtained by Mohanty and Prusti (2002) and Das *et al.* (2002) who reported high values of genotypic coefficient of variation and heritability for total yield and average fruit weight. In addition they reported that the potential using of simple selection for genetic improvement of eggplant .

Heterosis %

Heterosis breeding is one of the tool in overcoming yield barrier and increasing productivity. So, an investigation was undertaken to exploit heterosis for eggplant crop improvement . The estimates of mid parent (M.P.),the means of F_1 hybrids and heterosis values for all traits in Table 5 : It was The differences between F_1 hybrids were present. Even though , they were smaller in magnitude than the amounts of heterosis. The significant were obtained when the differences between the parents were large **.**

The result indicated that the heterotic crosses L.B.10-2 x L.B.14-1 and L.B.10-2 x L.B.22-3 showed the highest and desirable heterosis for number of branches per plant (N.B/P) of the mean of 31.77, number of fruits per plant (NF/P) 23.66, fruit shape index (SH.I) of the mean of

0.103, total soluble solids (T.S.S %) , respectively. While, the F1 hybrid L.B.10-2 x L.B.22-3 showed the highly value is noticed for the prominent yield attributing characters of -12.24 for earliest flowers. At the same time, the cross L.B.10-2 x L.B.37-4 showed the highest values of hybrid vigor for earliness trait (Early yield per pant) of the mean of 56.47**,** Average fruit weight (A.F.W kgs) of the mean of 84.64 and total early (Y/P kgs)of the mean of 33.93, respectively.

General, the outstanding cross L.B.10-2 x L.B.37-4 were hybrid vigor for more traits. This result indicated that choice of parents is very important These hybrids can be developed for breeding programme and also can satisfy the local demand. Should aim to produce new F1 hybrids. Ramireddy and Reddy (2011) reported simiiller trend results. The heterosis revealed the type of gene action involved and it helps in the selection of suitable breeding methodology and parameters, which are employed for crop improvement programme.

Table 5 . Heterosis relative to mid parent for all traits estimated during the growing season of 2015.

Genotypes		PH	N.B./P.	L.A cm^2	D.T.F	EY/P	NF/P	A.F.W	Y/P	SH.I	T.S.S%
L.B.10-2x L.B.14-1		3.445*	31.77**	0.027	-8.942	6.989**	23.66**	-11.07	-0.423	0.103	0.406
L.B.10-2x L.B.37-4		-20.07	-32.73	-18.95	-6.393	65.47**	-14.49	48.64**	33.93**	-3.081	-0.670
L.B.10-2x L.B.22-3		16.62**	6.841**	23.87**	-12.24	48.24**	0.082	-9.934	-14.30	15.52**	18.25
L.B.14-1x L.B.37-4		-16.30	-12.23	2.921	6.628	-13.95	3.864**	0.498	3.981**	-2.376	-12.06
L.B.14-1x L.B.22-3		24.95**	22.83**	28.94**	-0.455	-21.89	-1.727	-3.560	-18.54	13.93**	2.928
L.B.37-4 x L.B.22-3		-4.207	-11.55	-2.182	1.165	57.74**	1.584**	17.12**	-2.105	1.558**	13.53
LSD	5%	4.744	1.077	12.68	7.519	0.170	0.978	9.779	0.209	0.253	69.04
	1%	6.471	1.469	17.29	10.25	0.232	1.443	13.34	0.028	0.345	94.16

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

REFERENCES

Barchi L, Lanteri S, Portis E, Valè G; Volante A; Pulcini L, Ciriaci T, Acciarri N, Barbierato V, Toppino L, Rotino GL (2012). A RAD tag derived marker based eggplant linkage map and the location of QTLs determining anthocyanin pigmentation. PLoS ONE 7:43740.

Cericola, F., Portis, E., Toppino, L., Barchi, L., Acciarri, N., Ciriaci, T., Sala, T., Rotino, G.L and Lanteri, S. (2013). The population structure and diversity of eggplant from Asia and the Mediterranean basin. PloS one, 8(9), e73702.

Chingakham Premabati Devi, Anilabha D. Munshi, Tusar Kanti Behera‹ Harshwardhan Choudhary & Partha Saha (2016) Characterisation of cultivated breeding lines of eggplant (Solanum melongena L.) and related wild Solanum species from India, The Journal of Horticultural Science and Biotechnology, 91:1, 87-92, DOI: 10.1080/14620316.2015.1110996.

Das, B.; S. N. Mishra; G. S. Sahu and S. K. Dash (2002). Studies on variability and heritability in brinjal. Orissa- Jornal of horticulture. 30: 1, 54-58; 14 ref. (CAB Abstr. 2002/8 - 2003/10).

Elsayed, A.Y.A., Hamdino M.I. Ahmed and Abeer I. A. Shabana Expected genetic gain in radish (Raphanus sativus var. Red Radicula) submitted to different procedures of selection (2016). Egypt. J. Plant Breed. 20 (4): 313-328.

FAOSTAT (2015) http://faostat.fao.org.

Gebhardt SE, Thomas RG (2002) Nutritive value of foods. Home Garden Bulletin (USDA) 72: 80–81.

Karmakar, K. and B. Bhattacharya (2000). Performance of a local brinjal variety (Solanum melongena L.) and its pest management under terai agro-ecological conditions. Environment and Ecology. 18: 2, 344-346.

Lebeau A, Gouy M, Daunay MC, Wicker E, Chiroleu F, Prior P, Frary A, Dintinger J (2013). Genetic mapping of a major dominant gene for resistance to Ralstonia solanacearum in eggplant. Theor Appl Genet 126:143-158.

Maria H., Santiago V., Pietro G., Mariola P., Isabel A., Francisco J.H., Jaime P.(2015) Increasing the Genetic Base of Modern Cultivars of Eggplant of the Semi-Long Black Type BulletinUASVM Horticulture 72(2):281-287.

Mohanty, B. K. and A. M. Prusti (2002). Variability and selection parameters for economic characters in brinjal. Orissa. J. of Hort. 30 (1): 1-4.

Munoz-Falcon JE, Prohens J, Vilanova S, Nuez F (2009a). Diversity in commercial varieties and landraces of black eggplants and implications for broadening the breeders gene pool. Ann Appl Biol 154:453-465.

Mutlu N, Boyaci FH, Göçmen M, Abak K (2008) Development of SRAP, SRAP-RGA, RAPD and SCAR markers linked with a Fusarium wilt resistance gene in eggplant. Theor Appl Genet 117: 1303–1312.

Naresh-Babu; P. Venkataswarlu and R. C. Verma (2001). Performance of selected brinjal lines in Nagaland. Indian J. of Hill-Farming 14 (2): 29-33 (C.A. CAB Abstr. 2001 AN: 20033114827).

Piao Xiang-Min, Jong-Wook Chung, Gi-An Lee, Jung-Ro Lee, Gyu-Taek Cho, Ho-Sun Lee, Kyung-Ho Ma, Jing Guo1, Hong Sig Kim3, Sok-Young Lee (2014).Variation in Antioxidant Activity and Flavonoid Aglycones in Eggplant (Solanum melongena L.) Germplasm. Plant Breed. Biotech. 2 (4):396-403.

Ramireddy Murthy SRK , Lingaiah HB , Naresh P , Reddy Vinaya Kumar P and Kuchi Venkata Satish (2011) heterosis studies for yield and yield attributing characters in brinjal (*Solanum melongena* L.)plant Archives 11(2):649-653.

Rodriguez – Burruezo, A.; J. Prohens and F. Nuez (2008). Performance of hybrids between local varieties of eggplant (*Solanum melongena* L.) and its re lation to the mean of parents and to mor plant heightological and genetic distance among parents. European J. of Hort. Sci. 73(2):76-83.

Singh, R. K.; B. D. Chaudhary (1995). Biometrical methods in quantitative genetic analysis. Kalyani Publishers, New Delhi-110002, India.

Sękara A., S., Cebula and E . Kunicki (2007). Cultivated eggplants-origin, breeding objectives and genetic resources, a review. Folia Hort. Ann. 19 (1):97-114.

SIDHU A.S., BAL S.S., BEHERA T.K., RANI M., (2005). An outlook in hybrid eggplant breeding. J. New Seeds 6 (2/3): 15-29.

Sidhu, A.S.; Bal, S.S.; Behera, T.K.; & Rani, M. (2005). An outlook in hybrid eggplant breeding. Journal of New Seeds, 6(2-3):15-29.

تقييم سلالات منتخبه من الباذنجان البلدي الاسود والهجن بينها

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الاصناف التجارية التى نتجت عن التحسين الوراثى للبازنجان تم اشتقاقها من السلالات المحلية حيث يتميز الصنف البلدى بوجود مدى واسع من التنوع الوراثى متمثلة فى الصفات الثمرية بجانب بعض الخصائص الفسيولوجية و البيوكميائية. لذا كان الهدف من هذه الدراسة تطوير سلالات مبشرة من الباذنجان (تم جمعها عشوائيا من الاسواق فى عام 2010) كنواة لانتاج الهجن المحلية او للاستخدام المباشر كسلالات مفتوحة التلقيح. و تم استخدام الصنف البلدى من الباذنجان الاسود الطويل كاساس للتحسين الوراثى فى هذه الدراسة. وخلال العروة الصيفية للاعوام ما بين 2011 و حتى 2014 تم عزل النباتات ذات الاختلافات المورفولجية بناءا على قوة النمو و شكل الازهار خلال الموسم الاول و تكييس ازهارها فى مرحلة البرعم لضمان حدوث التلقيح الذاتى و تجنب اى خلط. فى المواسم التالية تم تطبيق الانتخاب داخل وبين النباتات المنتخبة الناتجة عن كل دورة انتخاب سابقة حتى الوصول الى الجيل الرابع . تم تقدير الصفات التالية للنباتات المنتخبة : طول النبات ، عدد الافرع ، المساحة الورقية ، عدد الايام حتى الازهار ، المحصول المبكر ،عدد الثمار ، متوسط وزن الثمرة، المحصول الكلى، معامل الشكل الثمرى و نسبة المواد الصلبة الذائبة الكلية. تم تقدير بعض المؤشرات المظهرية و الوراثية بعد اربع دورات من الانتخاب لعشرة سلالات بالاضافة الى العشيرة الاصلية للمقارنة. اظهر تحليل التباين وجود اختلافات معنوية بين تلك السلالات الناتجة فى جميع الصفات المدروسه ما عدا صفة نسبة المواد الصلبه الكليه. اظهرت السلالة L.B.10-2 اداء جيد من حيث الازهار المبكر والمحصول المبكر ومعامل شكل الثمره مقارنة ببقية السلالات. بينما كانت السلالة L.B.14-1 معطى جيد لكل من عدد الافرع و عدد الثمار على النبات ولكن مع تدنى حجم ثمارها. كان التباين الوراثى وخاصة السيادى بين السلالات المنتخبة هو الاهم مقارنة بالتباين الوراثى داخل السلالات نفسها لمعظم الصفات المدروسة. تشير النتائج الى أهمية الانتخاب المبكر معتمداً على الشكل المظهرى فى تحسين الباذنجان لعزل و تحديد السلالات الفائقه منه. وبصفه عامه كانت افضل السلالات هى L.B.10-2, L.B.14-1 - و L.B.22-3 وL.B.37-3.وكذلك اجرى التهجين فى العروة الصيفيه عام 2014 بين السلالات التى اثبتت تفوقها فى الصفات المرغوبه بمقصد الاستفادة من ظاهرة قوة الهجين وتجميع الصفات المرغوبه فى هجين متميز وبناءاً عليه تم عمل برنامج تهجين ادخلت فيه اربع سلالات مميزة فى صفات الجودة المتنوعه بنظام التهجين النصف دوار لانتاج سته هجن فى الجيل الاول الانعزالى مع الاستمرار فى التلقيح الذاتى المستمر لتلك السلالات . وتم تقييم العشرة تراكيب وراثيه والتى تشمل اربع اباء وستة هجن فى تجربه حقلية فى موسم نمو عام 2015 فى مزرعة محطة بحوث البساتين بالبرامون بمحافظة الدقهليه . واثبتت النتائج تفوق الهجين : L.B.14-1 x L.B.10-2 فى معظم الصفات محل الدراسه بينما تفوق الهجين : L.B.10-2 x L.B.37-4 فى صفات المحصول المبكر للنبات ومتوسط وزن الثمرة والمحصول الكلى . وكان الهجين :L.B.10-2 x L.B.22-3 هو الافضل من حيث الازهار المبكر . وبصفه عامه اوضحت هذه الدراسه امكانيه ادخال هذه الهجن فى برامج تربيه متقدمه او استخدامها بالطريق المباشر.او الإنتخاب من خلال الإنعزالات فى أنسال الهجن المبشرة.