Improving the homogeneity of the local eggplant (*solanum melongena* L. var *serpentinum*) landraces using the pure line selection method

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Abstract

The present study was carried out during the three years of 2007, 2008 and 2010, using the locally produced seeds of two eggplant landraces, obtained from the local markets of Alexandria and Kafr El-Zayat (Gharbya) governorates. The breeding program was applied to the landraces by selecting individual plants through two cycles of selected generations, using the method of pure line selection to introduce improved strains having good fruit quality and high homogeneity, and adapted to the local environments. The breeding program was concerned with the economic characters and their attributes; i.e. the total fruit yield per plant, Number of fruits per plant and average fruit weight; in addition to the fruit quality characteristics ;i.e., the fruit length, fruit diameter, fruit shape index and fruit colour. The vegetative characters; i.e., plant height, Number of branches per plant and height of the first fruit node were also considered during the breeding program. The calculated genotypic and phenotypic coefficients of variations (G.C.V and P.C.V) showed that their values were nearly equal for fruit colour, in both Alexandria and Kafr El-Zayat populations, indicating that this trait was not significantly affected by the changes in environmental factors. Values of the expected gain of selection, for the first and second selected generations, demonstrated that most of the studied traits exhibited lower gain of selection for (S_2) generation compared with the (S_1) generation. The results of the correlation coefficients estimates indicated that total fruit yield is positively correlated with plant height, and numbers of branches and fruits per plant.

Key words: Breeding, eggplant, pure line, selection, genotypic and phenotypic coefficient of variations

INTRODUCTION

Eggplant (*Solanum melongena* L.) is a common and popular vegetable crop grown in subtropics and tropics regions. It is a perennial crop, but grown commercially as an annual crop. Eggplant is a member of the family *Solanaceae* and the genus *solanum*, and, has 2n= 24 chromosomes. There are three main botanical varieties under the species *melongena*. The round or egg-shaped cultivars are grouped under var. *esculentam* (common eggplant). The long and cylinder types are included under var. *serpentinum*, (snake eggplant), and the small and straggling plants are put under var. *depressum* (dwarf eggplant) (Chen and Li, 2009). Eggplant is normally highly self-pollinated. However the researchers (Chen and Li, 2009) pointed out that out-crossing rate can reach from 20 to 60% in various eggplant cultivars, and depending on genotype, location and insect activities. Fageria *et al.* (2001) declared that the inbreeding depression is the loss of vigor due to inbreeding. They showed that the vegetable crops differ considerably in their response to inbreeding; and may be grouped, on the basis of the reflected degree of inbreeding depression, into four broad categories: (i) High inbreeding depression e.g. carrot. (ii) Moderate inbreeding depression e.g. radish, turnip, etc. (iii) Low inbreeding depression e.g. cucurbits, and (iv) Absence of inbreeding depression e.g. tomato, peas, brinjal, lettuce, etc. Improved yield or high productivity is one of the major goals of eggplant breeding. However, selecting for high yield is seldom very effective because yield is a genetically complicated trait and, sensitively, influenced by environmental factors. Also, additive and non-additive gene actions are known to control yield performance as a result, selection for high yield demands a rigorous control of environmental effects to insure that the phenotypic expression of the breeding materials correspond to their true genetic potentials.

The aim of this investigation was to improve the productivity and quality of two local landraces of eggplant by increasing their homogeneity through self pollination and selecting the best individual genotypes for two successive generations to produce pure lines. Heritability, response to selection and correlation coefficients among studied characters were considered in this investigation.

MATERIALS AND METHODS

The present investigation was carried out during the three summer seasons of the years 2007, 2008 and 2010 using locally produced seeds of two local eggplant landraces. Seeds were collected from the local markets of Alexandria and Kafr El-Zayat (Gharbya) governorates. The original population seeds (S_0) of the studied ecotypes (landraces) were sown late of March 2007 in the nursery. After 45 days from sowing, 100 seedling of each ecotype were planted in rows, 70 cm wide with 40 cm between hills at El-Sabaheya Horticultural Research Station farm (Hort. Res. Inst., Agric. Res. Cen.) at Alex., Egypt. Normal agricultural practices, recommended for the production of commercial eggplants, were done as usual. At the flowering stage, self pollination was done for the flowers, one day before antheses. The produced mature fruits were harvested and the best ones were selected, aiming to get the best superior genotypes. The fruits of each genotype were separately collected. Fruits of eight and seven plants were selected from Alexandria and Kafr El-Zayat genotypes, respectively to get the first selection generation seeds (S_1). The selection was according to some quantitative traits, *i.e.* the fruit shape and colour, plant height (cm), the height of the first fruiting node (cm), fruit yield and number /plant, number of branches/plant and average fruit weight (g). Extracted seeds from each selected plant from each ecotype were planted in the nursery, early in March of 2008. The seedlings were transplanted at the age of 40 days from sowing date. The same selection practices of the first selection generation were repeated to get the second selection generation seeds (S_2).Two plants from each progeny were selected and their extracted seeds were, separately, collected. On March 2010, the seeds of the three ecotypes (original populations) S_0, S_1 and S_2 lines were planted in the nursery; seedlings were transplanted in two different locations, i.e. the farm of El-Sabaheya Horticultural Research Station (Alexandria governorate) and Abu-Hommos region (El-Behira governorate). Normal agricultural practices for eggplant production were used during the evaluation season of the study.

1. Vegetative Measurements:

A random sample of five plants per plot was used, 90 days after sowing, to determine the vegetative growth characters; i.e., the plant height (cm), Number of branches/plant and height of the first fruiting node (cm).

2. Yield and Yield Components:

Yield data of all plants of each strain (20 plants / strain) were gathered to determine the grand total yield and then divided by 20 to calculate the average plant yield (kg). The number of fruits per plant was calculated by dividing the total number of harvested fruits of all plants per strain by 20. The average fruit weight (g) was computed by dividing the total yield of each strain by the total number of all harvested fruits.

3. Fruits Physical Characteristics:

A random sample of ten fruits from five plants was used to determine the following characteristics:

3.1 Fruit length (cm): was divided into three categories; where, fruit length < 10 cm was denoted as very short fruits; fruit length between 10-20cm was denoted as medium fruits; while, fruit length > 20 cm was denoted as very long fruits.

3.2 Fruit diameter (cm):was divided into three categories; where, fruit diameter < 1 cm was denoted as very thin; fruit diameter between 1-3 cm was denoted as medium fruit diameter; while, fruit diameter > 3 cm was denoted as very thick fruits.

3.3 Fruit colour: was recorded visually at commercial ripeness stage, and rated from 1 (white fruit colour) to 4 -7 (purple gradient), and 10 (black fruit colour).

3.4 Fruit shape index: was determined by dividing fruit length by width, according to Wininger and Ludwing (1974).

4. The Experimental Design:

The used experimental design for the evaluation experiment, in the summer season of 2010, was a randomized complete blocks design with three replicates (RCBD). Each replicate contained 42 plots, each of two rows, representing: 2 plots for the two original populations, 15plots for the first cycle of selection, (8 lines from Alexandria ecotype and 7 lines from Kafr El-Zayat ecotype respectively) and 25 plots for the second cycle of selection, (16 and 9 lines for the two mentioned ecotypes, respectively). The rows were 4 m long and 70 cm wide and the spacing between plants was 40 cm within rows.

5. Statistical Analysis:

The analysis of variance for collected data was carried out as outlined by Sendecor and Cochran (1980). The significance of the differences among the various means were determined, using Duncan's Multiple Range Test procedure at 0.05 level of significance, as illustrated by Sendecor and Cochran (1980). The data of the two used locations for the evaluation were combined and analyzed according to the two – factor crossed – classification model, illustrated in Table (1), (Kanapp *et al.*, 1985).

Table (1): Form of the analysis of variance for the two-factor crossed- classification model.

S.O.V	D.F	MS	E.M.S
Environments (E)	e-1		
Families (F)	f-1	M1	$\delta^2_e + r\delta^2_{fe} + re\delta^2_f$
F×E	(f-1) (e-1)	M2	$\delta^2_e + r\delta^2_{fe}$
Residual	fe (r-1)	M3	δ^2_e

Where: r = replications, e = environments, δ^2_f = family variance component, δ^2_{fe} = family × environment interaction variance component, δ^2_e = residual error variance component.

From this model, genetic variance component (δ^2_f) is obtained using the equation: $\delta^2_f = (M1-M2)/re$

An estimate of the phenotypic variance on a progeny mean basis (δ^2_{ph}) is given as follows: $\delta^2_{ph} = M1/re$

5.1 Gain of Selection (GS) and Realized Gain (RG):

Gain of selection (GS) for the first and second selective generation (S_1 and S_2) was calculated as illustrated by Falconer (1989), using the following formula:

$$GS = (k)(\delta_p)(h^2_{bs})$$

Where; k is the selection differential (at 0.10 selection intensity), δ_p is the phenotypic standard deviation and H^2_{bs} the heritability in broad sense.

Realized gain (RG) of the first and second selective generations (S_1 and S_2), relative to the original population (S_0) was calculated, using the means of the various populations in the following equations:

$$RG\% \text{ (of } S_1 \text{ relative to } S_0) = (\bar{S}_1-\bar{S}_0)/\bar{S}_0$$

$$RG\% \text{ (of } S_2 \text{ relative to } S_0) = (\bar{S}_2-\bar{S}_0)/\bar{S}_0$$

Where; $\bar{S}_0$, $\bar{S}_1$ and $\bar{S}_2$ are the mean values of the original population, and the first and second selective generations, respectively.

5.2 Heritability Percentage (%):

5.2.1 Broad-sense heritability:

Was calculated as illustrated by Fageria *et al.* (2001) using the following formula:

$$H^2_{bs} = \frac{\delta^2_g}{\delta^2_p} \times 100$$

Where: δ^2_g is the genotypic variance and, δ^2_p is the phenotypic variance.

5.2.2 Narrow-sense heritability:

Was calculated using the regression of off-spring on parents, as illustrated by Falconer (1989).

5.3 Phenotypic and Genotypic Coefficient of Variation (P.C.V %and G.C.V %):

These parameters were estimated, according to the procedure outlined by Burton (1952), as follows:

$$P.C.V\ \% = \frac{\sqrt{\delta^2_p}}{\bar{x}} \times 100 \qquad G.C.V\ \% = \frac{\sqrt{\delta^2_g}}{\bar{x}} \times 100$$

Where: δ^2_p is the phenotypic variance, δ^2_g is the genotypic variance.

5.4 Correlation Coefficients:

Simple phenotypic correlation coefficients (r) were calculated for different pairs of the studied characters, as shown by Dospekove (1984).

5.5 Path Coefficient Analysis:

Path coefficient analysis was calculated as proposed by Williams *et al.* (1990). In this respect, the direct and indirect effects between fruit yield and the five characters plant height, number of fruits, fruit diameter, average fruit weight and height of the first fruiting node were detected.

RESULTS AND DISCUSSION

1. Means squares (variances) of the studied genotypes:

The data of mean squares, recorded from the combined analyses, are presented in Tables (2 and 3). The results revealed that there were significant or highly significant genotypic differences among Alexandria population for most studied characters, except for average fruit weight and fruit length. A Similar trend of results was, also, detected on Kafr El-Zayat population; where, Kafr El-Zayat possessed significant or highly significant genotypic differences for the studied traits with the exception of the two traits: average fruit weight and the height of the first fruiting node. The obtained results confirmed the possibility of selecting one or more of promising lines, especially for the economical and quality characters. Most of the studied characters of the two evaluated populations showed strong dependency on the environmental factors (location in the present study). The significant and highly significant environmental main effects (locations) indicated that there were fluctuations in the environmental conditions throughout the different experimental sites of this study. Most of the studied characters reflected significant or highly significant effects of the genotype × locations interactions. Such a result, generally, suggested that the evaluated populations (genotypes or strains) showed different responses when grown under different locations and the genotype × environment interaction can have dramatic effects on most eggplant characters.

Table (2): Combined analysis of variance of the studied vegetative measurements, yield, yield components, and fruit characteristics over the two locations of Alexandria eggplant populations.

S.O.V.	D.F.	Plant height (cm)	Number of branches/ plant	The first fruit node height (cm)	Fruit yield/plant (kg)	Number of fruits/ plant	Average fruit weight (gm)
Blocks	2	41.084	0.607	6.652	0.003	8.046**	1.473*
Genotypes(G)	24	648.685**	3.069**	39.087**	0.043**	30.769**	75.82
Location(L)	1	6557.385**	51.627**	206.507**	0.172**	231.509**	3.168*
G× L	24	265.281**	3.640**	38.288**	0.018**	17.375**	109.56 **
Error	98	36.018	1.158	18.561	0.003	1.605	47.114

S.O.V.	D.F.	Fruit shape index	Fruit diameter (cm)	Fruit length (cm)	Fruit Colour
Blocks	2	0.278	0.162*	1.115	0.018
Genotypes(G)	24	0.533*	0.105**	0.620	0.181**
Locations(L)	1	5.744**	0.804**	5.530**	0.187*
G× L	24	0.409	0.058	1.127*	0.061*
Error	98	0.273	0.042	0.650	0.033

*, ** Significant at 5% and 1%, levels of probability, respectively.

Table (3): Combined analysis of variance of the studied vegetative measurements, yield, yield components and fruit characteristics over the two locations, of Kafr El-Zayat eggplant populations.

S.O.V.	D.F.	Plant height (cm)	Number of branches/ plant	The first fruit node height (cm)	Fruit yield/plant (kg)	Number of fruits /plant	Average fruit weight (g)
Blocks	2	57.721	1.186	419.855	0.001	16.766*	4.029*
Genotypes(G)	16	374.938**	4.690**	353.062	0.044**	21.395**	1.351
Locations(L)	1	342.467**	62.745**	474.510	0.028*	43.355**	3.247
G× L	16	668.679**	6.265**	449.775	0.026**	10.915**	1.752*
Error	66	46.425	1.469	14.920	0.004	3.772	9.243

S.O.V.	D.F.	Fruit shape index	Fruit diameter (cm)	Fruit length (cm)	Fruit colour
Blocks	2	0.273	0.062	0.117	0.297
Genotypes(G)	16	0.774**	0.117*	2.829**	3.757**
Locations(L)	1	0.701*	0.165	1.342	0.467
G× L	16	0.470**	0.120*	1.943**	1.345**
Error	66	0.148	0.053	0.541	0.364

*, ** Significant at 5% and 1%, levels of probability, respectively.

2. Mean Performances of the Original Landraces and their Selected Families at the two locations:

2.1 Alexandria Eggplant Landraces and their Selected Families:

The data in Table (4) showed that the evaluated families differed among each other in all studied characters, except the average fruit weight at both sites of Alexandria and Abu-Hommos. The strains $S_{2\text{-}3a}$, $S_{2\text{-}7b}$, $S_{2\text{-}2b}$ and $S_{2\text{-}3b}$, of the second selected generation, recorded the best data for the vegetative characters, at Alexandria region; with significant differences from the base population (S_0). The data of the evaluated genotypes at Abu-Hommos showed that strains $S_{2\text{-}3a}$ and $S_{2\text{-}6a}$ scored the highest values for plant height. The results of fruit yield/plant and its attributes (number of fruits/plant and average fruit weight) declared that there were highly significant differences among the evaluated families for the two traits fruit yield/plant and number of fruits/plant. On the other hand, the average fruit weight showed slight differences among the families; as appeared in Table (4). The most superior families for fruit yield/plant trait were $S_{2\text{-}8a}$ and $S_{2\text{-}2a}$ at Alexandria region; which, significantly, surpassed the original population (S_0). The families $S_{1\text{-}2}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$, $S_{2\text{-}4b}$ and $S_{2\text{-}6a}$ scored the highest values for fruit yield/plant at Abu-Hommos region. The results of mean performances for the various fruit characteristics; i.e. fruit length, diameter, shape index and colour, appearing in Table (5), showed that there were just few significant differences among the evaluated families for fruit characteristics, at the two sites of evaluation.

2.2 Kafr El-Zayat Eggplant Landraces and their Selected Families:

At Alexandria region, the genotypes differed, significantly, in all studied characters. With respect to the height of the first fruiting node, line $S_{1\text{-}5}$ gave the highest values indicating that this line might be late of ripening; while, it was *vice versa* with line $S_{2\text{-}3a}$, which gave the lowest value for the first fruiting node (Table, 6). The results of Kafr El-Zayat eggplant populations demonstrated that fruit yield/plant and yield attributes showed that line $S_{2\text{-}2a}$ produced the highest yield (0.55 kg/plant), followed by line $S_{2\text{-}1a}$ which produced (0.52 kg/plant), when grown at Alexandria region. The line $S_{2\text{-}5a}$ produced the highest yield when grown at Abu-Hommos and produced also high yield when grown at Alexandria region. The evaluation data at Abu-Hommos, Table (6), indicated that line $S_{2\text{-}7a}$ gave the highest value of plant height (120.67 cm) and the line $S_{2\text{-}5a}$ possessed the lowest values in the height of the first fruiting node (15.83 cm) indicating that this line would be early ripening compared with the other evaluated lines. The highest productivity was obtained with line $S_{2\text{-}5a}$ which produced also high yield when grown at Alexandria region. These results emphasize that the selected line $S_{2\text{-}5a}$ might be the best genotype for producing early and high yield. Fruit characteristics; i.e. fruit length, diameter, shape index and colour; generally, illustrated that lines of the second selective generation gave impressive improvements, compared with their base population, as appeared from the data in Table (7).

Table (4): Mean performances of the various vegetative traits, and yield and its components of the selected and original populations of Alexandria eggplant landraces at the two locations during the summer season of 2010.

	Alexandria region						Abu- Hommos region					
Strains	PH	NB	FFN	FY	NF	AFW	PH	NB	FFN	FY	NF	AFW
S_0	114.33^{ab*}	2.00^{ef}	23.33^{cdefgh}	0.19^{i}	4.86^{jk}	40.35^{abc}	105.67^{bcd}	2.33^{e}	24.33^{ab}	0.17^{ij}	3.70^{i}	46.12^{a}
S_{1-1}	92.17^{bcdef}	3.67^{abc}	22.00^{defgh}	0.43^{abc}	8.50^{def}	51.56^{ab}	100.87^{cdef}	5.33^{abcd}	25.00^{a}	0.39^{bcdef}	12.03^{c}	32.23^{b}
S_{1-2}	85.30^{ef}	1.67^{f}	18.00^{h}	0.38^{bcdef}	8.81^{def}	44.00^{abc}	106.00^{bcd}	6.00^{ab}	20.67^{ab}	0.61^{a}	17.33^{a}	36.41^{b}
S_{1-3}	84.57^{ef}	2.00^{ef}	20.33^{fgh}	0.30^{defghi}	6.82^{efghij}	44.02^{abc}	92.43^{efgh}	4.67^{abcde}	24.33^{ab}	0.37^{bcdefg}	10.10^{cd}	37.01^{b}
S_{1-4}	87.40^{def}	3.33^{bcd}	27,67^{abcdef}	0.20^{i}	4.20^{k}	50.00^{abc}	102.97^{bcde}	4.33^{abcde}	20.33^{ab}	0.60^{a}	16.13^{ab}	37.24^{b}
S_{1-5}	89.07^{def}	3.33^{bcd}	20.00^{fgh}	0.45^{abc}	12.5^{a}	37.04^{bc}	109.7^{bc}	5.67^{abc}	15.67^{b}	0.59^{a}	16.25^{ab}	37.47^{b}
S_{1-6}	75.83^{f}	3.00^{bcde}	26.67^{abcdefg}	0.21^{hi}	5.6^{hijk}	40.07^{abc}	93.23^{defgh}	2.67^{de}	21.67^{ab}	0.33^{defgh}	8.16^{efgh}	41.11^{b}
S_{1-7}	89.23^{def}	3.00^{bcde}	22.83^{cdefgh}	0.22^{hi}	5.32^{ijk}	41.00^{abc}	98.20^{cdef}	5.00^{abcde}	22.00^{ab}	0.45^{bc}	11.76^{c}	38.21^{b}
S_{1-8}	112.73^{abc}	2.00^{ef}	23.67^{cdefgh}	0.27^{fghi}	5.73^{ghijk}	48.00^{abc}	89.57^{fgh}	3.33^{bcde}	22.67^{ab}	0.29^{ghi}	7.13^{ghi}	40.00^{b}
S_{2-1a}	73.78^{f}	1.67^{f}	21.33^{defgh}	0.41^{bcd}	9.06^{cde}	48.32^{abc}	89.23^{fgh}	3.67^{bcde}	25.33^{a}	0.40^{bcdef}	8.80^{defg}	45.00^{b}
S_{2-1b}	84.13^{ef}	2.67^{cdef}	24.33^{bcdegh}	0.24^{ghi}	5.7^{ghijk}	44.14^{abc}	84.00^{h}	2.33^{e}	22.33^{ab}	0.31^{efghi}	7.60^{fghi}	41.12^{b}
S_{2-2a}	90.00^{cdef}	2.67^{cdef}	29.33^{abcde}	0.49^{ab}	11.54^{ab}	42.25^{abc}	100.67^{cdef}	4.33^{abcde}	20.67^{ab}	0.36^{cdefgh}	7.03^{hi}	51.54^{b}
S_{2-2b}	101.07^{abcde}	3.33^{bcd}	18.33^{gh}	0.41^{bcd}	7.84^{defgh}	54.43^{a}	115.37^{ab}	3.33^{bcde}	20.33^{ab}	0.39^{bcdefg}	9.06^{efgh}	43.03^{b}
S_{2-3a}	118.67^{a}	4.00^{ab}	20.00^{fgh}	0.29^{defghi}	7.70^{defghi}	39.41^{bc}	124.43^{a}	5.33^{abcd}	23.00^{ab}	0.41^{bcde}	9.83^{cde}	45.04^{b}
S_{2-3b}	72.33^{f}	1.67^{f}	17.83^{h}	0.40^{bcde}	9.41^{bcd}	44.00^{abc}	107.23^{bc}	4.67^{abcde}	22.00^{ab}	0.41^{bcd}	10.03^{cde}	41.34^{b}

PH: Plant Height, NB: Number of Branches, FFN: First Fruit Node, FY: Yield/Plant, NF: No. of Fruits, AFW: Average Fruit Weight.

*Values having a similar alphabetical letter within each trait do not significantly differ from one another, using Duncan's Multiple Range Test at 0.5 levels.

Table (4): Continued.

	Alexandria region						Abu- Hommos region					
Strains	PH	NB	FN	FY	NF	AFW	PH	NB	FN	FY	NF	AFW
$S_{2\text{-}4a}$	76.33^{f}	2.67^{cdef}	29.67^{abcd}	0.34^{cdefg}	7.13^{defghij}	49.00^{abc}	89.43^{fgh}	5.00^{abcde}	19.33^{ab}	0.37^{bcdefg}	8.33^{efghi}	46.65^{b}
$S_{2\text{-}4b}$	83.63^{ef}	3.67^{abc}	30.67^{abc}	0.35^{cdefg}	8.20^{def}	45.07^{abc}	97.47^{cdefg}	3.00c^{de}	23.00^{ab}	0.61^{a}	14.56^{b}	32.00^{b}
$S_{2\text{-}5a}$	79.17^{ef}	3.67^{abc}	32.00^{ab}	0.37^{cdef}	8.48^{def}	44.21^{abc}	121.77^{a}	2.67^{de}	20.67^{ab}	0.42^{bcd}	8.17^{efghi}	51.14^{b}
$S_{2\text{-}5b}$	85.63^{ef}	2.33^{def}	32.33^{a}	0.33^{cdefgh}	8.06^{defg}	43.74^{abc}	102.33^{cdef}	4.33^{abcde}	20.67^{ab}	0.36^{cdefgh}	9.40^{cdef}	38.00^{b}
$S_{2\text{-}6a}$	101.07^{abcde}	3.00^{bcde}	22.00^{defgh}	0.54^{a}	11.20^{abc}	48.34^{abc}	122.1^{a}	7.00^{a}	20.33^{ab}	0.56^{a}	15.80^{ab}	36.08^{b}
$S_{2\text{-}6b}$	83.83^{ef}	3.33^{bcd}	24.00^{cdefgh}	0.29^{defgh}	8.72^{def}	35.24^{c}	92.23^{efgh}	3.00^{cde}	16.67^{ab}	0.29^{fghi}	6.50^{j}	46.71^{b}
$S_{2\text{-}7a}$	101.40^{abcde}	3.00^{bcde}	19.33^{fgh}	0.30^{defgh}	7.80^{defghi}	39.41^{bc}	84.77^{gh}	4.33^{abcde}	17.67^{ab}	0.38^{bcdefg}	8.83^{efgh}	43.00^{b}
$S_{2\text{-}7b}$	79.50^{ef}	4.67a	21.67^{defgh}	0.28^{efghi}	6.47^{fghijk}	44.05^{abc}	92.13^{efgh}	2.67^{de}	20.00^{ab}	0.38^{bcdefg}	8.13^{efghi}	51.23^{b}
$S_{2\text{-}8a}$	110.03^{abcd}	3.67^{abc}	19.33^{fgh}	0.27^{fghi}	6.44^{fghijk}	43.00^{abc}	108.37^{bc}	3.33^{bcde}	19^{ab}	0.22^{hi}	9.80^{cdef}	24.47^{b}
$S_{2\text{-}8b}$	84.07^{ef}	2.00^{ef}	21.00^{efgh}	0.27^{fghi}	6.70^{efghij}	41.01^{abc}	115.43^{ab}	3.00^{cde}	21.33^{ab}	0.46^{b}	10.00^{cde}	46.00^{b}

PH: Plant Height, NB: Number of Branches, FFN: First Fruit Node, FY: Yield/Plant, NF: No. of Fruits, AFW: Average Fruit Weight.
*Values having a similar alphabetical letter within each trait do not significantly differ from one another, using Duncan's Multiple Range Test at 0.5 levels.

Table (5): Mean performances of fruit characters of the selected and original populations of Alexandria eggplant landraces at the two locations in the summer season of 2010.

	Alexandria region				Abu-Hommos region			
Strains	Shape index	Fruit diameter	Fruit length	Fruit color	Shape index	Fruit diameter	Fruit length	Fruit color
S_0	4.28^{abcd}*	2.5^{abc}	10.7^{ab}	10^{a}	3.63^{bc}	2.67^{abc}	9.57^{bcde}	10^{a}
S_{1-1}	4.28^{abcd}	2.57^{abc}	10.97^{ab}	9.67^{abc}	3.54^{c}	2.6^{abc}	9.17^{e}	10^{a}
S_{1-2}	4.73^{abcd}	2.37^{abcde}	11.2^{a}	9.2^{d}	4.05^{abc}	2.4^{abc}	9.7^{bcde}	10^{a}
S_{1-3}	4.71^{abcd}	2.37^{abcde}	11.07^{a}	10^{a}	3.94^{bc}	2.7^{abc}	10.57^{abcd}	10^{a}
S_{1-4}	4.55^{abcd}	2.4^{abcde}	10.9^{ab}	9.5^{bcd}	4.36^{abc}	2.5^{abc}	10.87^{ab}	9.9^{a}
S_{1-5}	4.27^{abcd}	2.43^{abcd}	10.37^{ab}	9.9^{ab}	4.39^{abc}	2.4^{abc}	10.5^{abcd}	10^{a}
S_{1-6}	4.73^{abcd}	2.3^{cde}	10.9^{ab}	10^{a}	3.83^{bc}	2.63^{abc}	10.07^{bcde}	9.83^{a}
S_{1-7}	4.25^{abcd}	2.53^{abc}	11.03^{ab}	10^{a}	4.37^{abc}	2.37^{bc}	10.3^{abcde}	10^{a}
S_{1-8}	4.06^{bcd}	2.53^{abc}	10.27^{ab}	9.33^{cd}	3.61^{bc}	2.83^{ab}	10.2^{bcde}	9.17^{b}
S_{2-1a}	4.03^{bcd}	2.33^{bcde}	9.27^{b}	9.67^{abc}	4.04^{abc}	2.67^{abc}	10.77^{abcd}	10^{a}
S_{2-1b}	3.88^{cd}	2.63^{ab}	10.2^{ab}	10^{a}	3.82^{bc}	2.87^{a}	10.9^{ab}	10^{a}
S_{2-2a}	4.68^{abcd}	2.3^{cde}	10.63^{ab}	9.87^{ab}	4.03^{abc}	2.53^{abc}	10.13^{bcde}	10^{a}
S_{2-2b}	4.48^{abcd}	2.4^{abcde}	10.73^{ab}	10^{a}	4.01^{abc}	2.37^{bc}	9.43^{de}	10^{a}
S_{2-3a}	4.98^{ab}	2.3^{cde}	11.4^{a}	10^{a}	4.39^{abc}	2.23^{c}	9.73^{bcde}	10^{a}
S_{2-3b}	4.07^{bcd}	2.43^{abcd}	9.9^{ab}	10^{a}	3.63^{bc}	2.6^{abc}	9.43^{de}	10^{a}
S_{2-4a}	4.90^{abc}	2.27^{cde}	11.1^{a}	10^{a}	3.70^{bc}	2.73^{ab}	10.07^{bcde}	10^{a}
S_{2-4b}	4.75^{abcd}	2.17^{de}	10.13^{ab}	10^{a}	5.06^{a}	2.23^{c}	10.47^{abcde}	10^{a}
S_{2-5a}	4.41^{abcd}	2.37^{abcde}	10.43^{ab}	10^{a}	4.63^{ab}	2.23^{c}	10.37^{abcde}	10^{a}
S_{2-5b}	3.79^{d}	2.67^{a}	10.1^{ab}	10^{a}	4.3^{abc}	2.5^{abc}	10.73^{abcd}	10^{a}
S_{2-6a}	5.21^{a}	2.1^{e}	10.8^{ab}	10^{a}	4.13^{abc}	2.43^{abc}	10.03^{bcde}	10^{a}
S_{2-6b}	4.25^{abcd}	2.47^{abcd}	10.5^{ab}	10^{a}	4.36^{abc}	2.5^{abc}	10.8^{abc}	10^{a}
S_{2-7a}	4.87^{abc}	2.27^{cde}	11.03^{ab}	10^{a}	3.53^{c}	2.8^{ab}	9.87^{bcde}	10^{a}
S_{27b}	4.17^{bcd}	2.47^{abcd}	10.2^{ab}	10^{a}	3.66^{bc}	2.6^{abc}	9.5^{cde}	10^{a}
S_{2-8a}	5.24^{a}	2.10^{e}	10.97^{ab}	10^{a}	4.31^{abc}	2.5^{abc}	10.77^{abcd}	10^{a}
S_{2-8b}	4.09^{bcd}	2.53^{abc}	10.33^{ab}	10^{a}	4.52^{abc}	2.57^{abc}	11.6^{a}	10^{a}

*Values having a similar alphabetical letter within each trait do not significantly differ from one another, using Duncan's Multiple Range Test at 0.5 levels.

Table (6): Mean performances of the various vegetative traits, and yield and its components of the selected and original populations of Kafr El-Zayat eggplant landraces at the two locations in the summer season of 2010.

	Alexandria region						Abu- Hommos region					
Strains	PH	NB	FN	FY	NF	AFW	PH	NB	FN	FY	NF	AFW
S_0	104.17^{bcd}	4.33^{b}	19.33^{b}	0.44^{ab}	8.30^{bcde}	53.24^{ab}	106.80^{bcd}	6.00^{abc}	22.33^{abc}	0.53^{abc}	13.00^{a}	40.61^{bc}
S_{1-1}	109.63^{bc}	3.33^{bc}	21.67^{ab}	0.24^{c}	8.80^{bcde}	28.31^{c}	110.10^{bc}	6.00^{abc}	20.33^{abc}	0.54^{ab}	12.40^{ab}	45.12^{bc}
S_{1-2}	90.83^{de}	1.33^{d}	19.83^{b}	0.47^{a}	9.70^{abc}	50.41^{ab}	108.33^{bcd}	4.67^{bcd}	15.83^{c}	0.47^{abcd}	11.00^{abc}	45.00^{bc}
S_{1-3}	98.40^{cde}	2.00^{cd}	20.00^{b}	0.48^{a}	9.00^{bcde}	57.23^{ab}	96.43^{e}	3.67^{cd}	18.33^{bc}	0.41^{cde}	8.50^{bcde}	49.33^{abc}
S_{1-4}	102.33^{bcd}	3.00^{bc}	23.50^{ab}	0.29^{c}	5.60^{ef}	53.47^{ab}	106.00^{bcde}	3.67^{cd}	20.83^{abc}	0.22^{g}	4.40^{f}	51.00^{abc}
S_{1-5}	86.67^{efg}	2.67^{cd}	28.67^{a}	0.55^{a}	12.70^{a}	43.66^{bc}	123.80^{a}	5.67^{abcd}	24.50^{ab}	0.53^{abc}	11.00^{abc}	54.00^{abc}
S_{1-6}	102.93^{bcd}	2.33^{cd}	23.00^{ab}	0.32^{bc}	6.50^{cdef}	49.33^{ab}	86.67^{g}	6.33^{abc}	21.67^{abc}	0.37^{def}	10.40^{abcd}	36.00^{e}
S_{1-7}	115.97^{ab}	3.33^{bc}	22.33	0.32^{bc}	7.30^{bcdef}	46.00^{ab}	115.80^{ab}	5.00^{abcd}	25.67^{a}	0.53^{abc}	8.60^{bcde}	63.00^{a}
S_{2-1a}	104.50^{bcd}	3.00^{bc}	18.33^{b}	0.52^{a}	10.50^{ab}	50.33^{ab}	101.13^{cde}	3.67^{cd}	21.67^{abc}	0.26^{fg}	5.20^{ef}	56.33^{ab}
S_{2-2a}	93.53^{de}	2.33^{cd}	21.00^{ab}	0.55^{a}	9.40^{abc}	60.66^{ab}	111.10^{bc}	7.00^{ab}	19.00^{abc}	0.55^{ab}	13.20^{a}	42.36^{bc}
S_{2-2b}	124.27^{a}	3.33^{bc}	24.50^{ab}	0.35^{bc}	7.50^{bcdef}	49.00^{ab}	110.53^{bc}	5.00^{abcd}	21.50^{abc}	0.29^{efg}	6.90^{def}	44.33^{bc}
S_{2-3a}	75.93^{fg}	6.33^{a}	17.33^{b}	0.51^{a}	10.20^{abcd}	52.00^{ab}	98.77^{de}	3.67^{cd}	20.67^{abc}	0.44^{abcd}	9.40^{abcd}	48.11^{abc}
S_{2-4a}	100.13^{cde}	3.33^{bc}	20.00^{b}	0.27^{c}	4.60^{f}	65.33^{a}	91.67^{fg}	3.67^{cd}	22.33^{abc}	0.36^{def}	7.90^{cdef}	47.00^{abc}
S_{2-5a}	89.37^{def}	6.33^{a}	20.00^{b}	0.50^{a}	10.30^{ab}	51.00^{ab}	102.47^{cde}	4.33^{bcd}	15.83^{c}	0.57^{a}	12.06^{ab}	49.33^{abc}
S_{2-5b}	128.00^{a}	2.67^{cd}	19.00^{b}	0.48^{a}	8.50^{bcde}	60.32^{ab}	84.10^{g}	3.67^{cd}	19.67^{abc}	0.45^{abcd}	9.70^{abcd}	47.33^{abc}
S_{2-7a}	75.03^{g}	3.33^{bc}	19.00^{b}	0.28^{c}	5.70^{def}	49.00^{ab}	120.67^{a}	3.00^{d}	22.00^{abc}	0.43^{bcd}	9.90^{abcd}	44.65^{bc}
S_{2-7b}	116.60^{ab}	3.33^{bc}	18.33^{b}	0.32^{bc}	7.20^{bcdef}	47.66^{ab}	105.57^{cde}	7.67^{a}	17.00^{c}	0.48^{abcd}	10.60^{abcd}	46.33^{abc}

Plant height: PH, Number of branches: NB, Fruit node: FN, Yield/plant: FY, No. of fruits: NF, Average fruit weight: AFW.
*Values having a similar alphabetical letter within each trait do not significantly differ from one another, using Duncan's Multiple Range Test at 0.5 levels

Table (7): Mean performances of fruit characters of the selected and original populations of Kafr El-Zayat eggplant landraces at the two locations in the summer season of 2010.

Strains	Alexandria region				Abu- Hommos region			
	Shape index	Fruit diameter	Fruit length	Fruit color	Shape index	Fruit diameter	Fruit length	Fruit color
S_0	2.62^{g*}	2.87^{a}	7.50^{e}	4.33^{e}	2.94^{c}	3.03^{a}	8.90^{d}	5.93^{e}
S_{1-1}	3.25^{efg}	2.77^{ab}	9.33^{cd}	6.50^{d}	3.46^{bc}	2.63^{abc}	9.07^{cd}	7.67^{bcd}
S_{1-2}	3.49^{def}	2.77^{ab}	9.63^{cd}	8.63^{a}	3.66^{bc}	2.77^{ab}	10.10^{a}	7.17^{d}
S_{1-3}	4.17^{abcd}	2.80^{ab}	11.67^{ab}	7.70^{abc}	3.73^{bc}	2.67^{abc}	9.90^{abc}	7.83^{bcd}
S_{1-4}	3.67^{cdef}	2.70^{ab}	9.93^{bcd}	7.87^{abc}	4.80^{a}	2.20^{c}	10.10^{a}	8.10^{abcd}
S_{1-5}	3.43^{def}	2.73^{ab}	9.33^{cd}	8.10^{abc}	3.95^{h}	2.33^{bc}	9.17^{bcd}	7.00^{d}
S_{1-6}	3.97^{bcde}	2.80^{ab}	11.10^{abc}	8.23^{ab}	3.29^{bc}	2.77^{ab}	9.10^{bcd}	7.50^{cd}
S_{1-7}	3.86^{bcde}	2.73^{ab}	10.50^{abcd}	6.33^{d}	3.51^{bc}	2.63^{abc}	9.23^{bcd}	7.33^{d}
S_{2-1a}	4.02^{abcd}	2.60^{abc}	10.43^{abcd}	8.33^{ab}	3.81^{b}	2.67^{abc}	10.07^{a}	8.53^{abc}
S_{2-2a}	3.12^{fg}	2.83^{a}	8.73^{de}	7.33^{bcd}	3.30^{bc}	2.93^{a}	9.67^{abcd}	8.00^{abcd}
S_{2-2b}	3.86^{bcde}	2.47^{abc}	9.50^{cd}	7.00^{cd}	3.26^{bc}	2.80^{ab}	9.13^{bcd}	8.00^{abcd}
S_{2-3a}	4.37^{abc}	2.43^{abc}	10.50^{abcd}	7.33^{bcd}	3.52^{bc}	2.90^{a}	10.17^{a}	8.67^{ab}
S_{2-4a}	3.54^{def}	2.50^{abc}	8.83^{de}	8.33^{ab}	3.46^{bc}	2.97^{a}	10.27^{a}	7.67^{bcd}
S_{2-5a}	4.04^{abcd}	2.43^{abc}	9.83^{cd}	8.57^{a}	3.76^{b}	2.63^{abc}	9.83^{abc}	7.67^{bcd}
S_{2-5b}	4.70^{a}	2.37^{bc}	11.10^{abc}	8.17^{ab}	3.56^{bc}	2.80^{ab}	9.93^{ab}	9.00^{a}
S_{2-7a}	3.97^{bcde}	2.27^{c}	9.00^{de}	8.00^{abc}	3.93^{b}	2.60^{abc}	10.20^{a}	7.67^{bcd}
S_{2-7b}	4.45^{ab}	2.70^{ab}	12.00^{a}	8.67^{a}	3.53^{bc}	2.80^{ab}	9.87^{abc}	8.00^{abcd}

*Values having a similar alphabetical letter within each trait do not significantly differ from one another, using Duncan's Multiple Range Test at 0.5 levels.

3. Genetic parameters caculated for the two local landraces:

3.1 Alexandria Eggplant Landraces:

Narrow-sense heritability values, presented in Table (8), were calculated as the regression of the second selected generation (S_2) on the first selected generation (S_1) for the various studied characters. Low heritability values (h^2_n <10%) were recorded for No. of fruits/plant, total yield/plant and fruit colour, which suggested that the response to selection would be slow. The low narrow-sense heritability indicated low influence of the additive genetic variance, and a relativity large influence for the non-additive and environmental effects, suggesting that selection based on early segregating generations would not be high effective for the concerned characters. The other studied traits showed high narrow sense heritability values (h^2_n >25%), indicating that the additive gene action had a great effect on influencing these characters. Data presented in Table (8) showed that the predicted gain of selection (GS) were generally lower in value in the first selected generation (S_1) than in the second selected one for all studied characters. This result, clearly, reflected a slow progress on improvement on these characters, especially those showing much low heritability values, was expected. This result might also demonstrate the increased homogeneity (and decreased genetic variation) among the individuals of the second selected generation (S_2), comparable with the first selected generation (S_1), as a result of applying a pure line breeding program. The realized gain values, presented in Table (8), showed that the characters yield/plant, fruit node, number of fruits/plant, fruit colour and fruit shape index reflected considerable realized gains on cycle 1 and cycle 2 of pure line selection, compared with those of the base population (S_0). The estimated values of genotypic and phenotypic coefficients of variation, presented in Table (8), showed that the G.C.V and P.C.V had nearly equal values for fruit colour. Such a result indicated that this particular character was not seriously affected by the changes in the environmental factors. Moreover, the detected differences between G.C.V and P.C.V values were found relatively low for total fruit yield per plant and fruit diameter. The later results indicated also that the environmental effects on these two characters could be neglected. These two parameters (G.C.V and P.C.V) had large differences for the rest studied characters, indicating that the environmental factors had Hugh effects on these characters.

3.2 Kafr El-Zayat Eggplant Landraces:

The values of the narrow-sense heritability for most studied characters possessed high values (h^2_n >30 %), as appears in Table (9). These results indicated that the additive gene action played a major role to affect pronouncedly the improvement of such characters. The data, in Table (9) indicated that the predicted gains of selection were larger in the first selected generation (S_1) than in the second selected generation (S_2) for the studied characters, that might be explained on the basis of the lower variability among the strains of the second selected generation, relative to that of the first selected generation as a result of selfing in the applied breeding program (pure line selection method). The results of realized gain of selection (Table, 9) illustrated that some studied characters showed some inbreeding depression as a result of the two applied cycles of pure line method of selection; as noticed on number of branches/plant, fruit diameter and average fruit weight. On the other hand, the characters height of the first fruiting node, fruit colour and shape possessed considerable realized gain on cycle1 (S_1) and cycle2 (S_2) of selection when compared with the base population (S_0). The realized gains of the two characters; fruit yield/plant and fruit number/plant showed clearly and favorable values; but, only on the second selected generation (S_2), compared with the base population. Kafr El-Zayat populations showed nearly equal values for G.C.V. and P.C.V. for the trait fruit colour only, suggesting that this character was not seriously affected by the changes in the environmental factors. However, the detected differences between G.C.V. and P.C.V. values were found relatively close for number of fruits/plant, indicating also that the environmental effects on these characters could be neglected. On the other hand, the detected large differences between G.C.V. and P.C.V. for the rest studied characters indicated that these characters were significantly affected by the environmental conditions.

Table (8): Phenotypic and genotypic coefficients of variation; narrow – sense heritability (h^2_n), gains of selection (GS) and realized gains (RG %) of S_1 and S_2 generations, for the studied traits of Alexandria landraces.

	Vegetative measurements, and yield components					
	Plant height (cm)	No. of branches/plant	First fruit node height (cm)	No. of fruits/plant	Average fruit weight (gm)	Total fruit yield/plant (Kg)
P.C.V.	10.88	24.14	11.43	25.32	8.69	45.70
G.C.V.	8.36	8.88	1.63	16.70	5.60	43.24
H^2_b%	59.10	13.51	2.04	43.50	44.50	89.51
h^2_n (%)	85.13	30.71	41.05	7.06	66.45	7.89
GS(S_1)	7.02	1.27	0.20	4.93	0.06	3.45
GS(S_2)	1.71	0.12	0.03	0.70	0.02	0.42
			Realized gain (RG%)			
S_1 (S_0)	0.23	-0.61	-0.09	0.13	-0.16	-0.05
S_2 (S_0)	-0.28	-0.43	-0.25	1.18	-0.08	0.92

Table (8): Continued.

	Fruit characteristics			
	Fruit length	Fruit diameter	Fruit shape index	Fruit colour
P.C.V.	5.01	5.34	6.92	1.75
G.C.V	2.79	3.59	3.33	1.42
H^2_b%	31.03	45.09	23.21	66.33
h^2_n (%)	36.34	25.58	40.74	0.36
GS(S_1)	1.56	0.88	0.60	1.06
GS(S_2)	0.07	0.05	0.16	0.10
	Realized gains (RG%)			
S_1 (S_0)	0.04	-0.21	0.31	0.05
S_2 (S_0)	-0.001	-0.07	0.18	0.02

The results of Vadivel and Bapu (1988) reported that their studied economical characters were found to have moderately high to high heritability values, resulting in high genetic advances, and suggesting the presence of pronounced effect of additive gene action on the performances of those characters. Similar explanations were also mentioned by Sharma *et al.* (2010).

Table (9): Phenotypic and genotypic coefficient of variations; narrow – sense heritability (h^2_n), gain of selection (GS) and realized gain (R.G %) of S_1 and S_2 generations, for the studied traits of Kafr El-Zayat landraces.

	Plant height (cm)	No. of branches/plant	First fruit node height (cm)	No. fruits/plant	Average fruit weight/plant (gm)	Total fruit yield/plant (Kg)
	Vegetative measurements, flowering date and yield components					
P.C.V.	12.31	27.95	12.18	4.17	3.45	19.89
G.C.V.	6.80	12.53	9.01	2.92	0.53	12.74
H^2_b%	30.52	20.09	54.71	48.99	2.34	41.00
h^2_n (%)	46.75	48.90	22.45	45.31	13.61	65.79
GS(S_1)	1.13	0.55	0.70	1.32	0.01	0.41
GS(S_2)	0.30	0.36	0.32	0.90	0.01	0.16
	Realized gain (RG %)					
S_1 (S_0)	0.051	-0.37	-0.15	-0.04	0.00	-0.08
S_2 (S_0)	0.04	-0.12	-0.13	0.21	-0.08	0.11

Fruit characteristics

	Fruit length	Fruit diameter	Fruit shape index	Fruit colour
P.C.V.	7.00	5.36	9.71	10.30
G.C.V.	3.92	0.84	6.08	8.25
H^2_b%	31.32	2.44	39.28	64.20
h^2_n (%)	4.64	7.10	24.59	36.38
GS(S_1)	0.47	0.02	0.37	0.84
GS(S_2)	0.20	0.04	0.19	0.33
	Realized gains (RG %)			
S_1 (S_0)	0.02	-0.22	0.79	0.71
S_2 (S_0)	0.003	-0.08	0.46	0.10

4. Phenotypic Correlation Coefficients' Values:

Correlation coefficients values; that were computed from the data of the evaluation experiments at Alexandria and Abu-Hommos, during the summer season of 2010 for the possible pairs among means of the studied characters are presented in Table (10). Correlation coefficients represent the degree to which respective characters are correlated. The estimated correlation coefficient values were found positive and significant or highly significant for the following pairs of characters:

- Fruit yield/ plant with each of plant height (0.14), number of branches/plant (0.26), average fruit weight (0.23) and number of fruits/ plant (0.68).
- Plant height with fruit diameter (0.59).
- Average fruit weight with each of fruit length (0.20) and fruit shape index (0.21).
- Fruit shape index with fruit length (0.14).

Khurana *et al.* (1988) found that fruit yield character had positive correlations with fruit diameter and mean fruit weight. These attributes had positive and significant relationships with number of branches; but, a negative and significant relationship with fruit length. Sharma *et al.* (1985) reported positive correlation between total fruit yield and plant height.

Correlation coefficients values were found negative and significant or highly significant for the following pairs of characters:

- Average fruit weight with each of number of branches per plant (-0.70) and number of fruits per plant (-0.39).
- Fruit yield per plant with each of fruit diameter (-0.15) and the height of the first fruiting node (-0.50).
- Fruit shape index with fruit diameter (-0.57).
- The height of the first fruiting node with number of fruits per plant (-0.46).

5. Path Coefficient Analysis:

The results in Table (11), were calculated for determining the direct and indirect effects of some of the studied characters on total fruit yield/plant; which demonstrated clearly that there was a positive direct effect of Average fruit weight (0.95), number of fruits per plant (0.78) and number of branches per plant (0.55) on the total fruit yield per plant. These results indicated that direct selection for the highest average fruit weight, number of branches per plant and/or the highest number of fruits per plant might be effective to induce high fruit production; i.e., high yield. The results, also, indicated that number of branches per plant trait had positive indirect effect on the total fruit yield per plant, through its relation with number of fruits per plant (0.36). Residual effect value (0.25) means that the unexpected variation in phenotypic level was 25 %, and that 75 % of variation for total production per plant had been determined. This result indicated also that most factors that affect eggplant productivity were included in this study. The results of Sinha (1983) and Dixit *et al.* (1984) demonstrated that the number of fruits/ plant was one of the important yield components. The authors added that it was advantageous to carry out effective selection on these important yield components with relatively high heritability values in early generations; so that only the best breeding lines could be retained for further evaluation and selection. On the other hand, number of branches per plant seemed to be an important factor affecting the fruit yield character (Khurana, *et al* 1988), hence for selection of a highly productive genotype in eggplant, emphasis was necessarily directed for the trait number of branches.

Table (10): Correlation coefficients values (r) for the possible pairs among the various studied traits of the evaluate peculations of the three eggplant landraces (Combined analysis over two locations).

Traits	NB	FFN	FY	NF	AFW	FL	FD	FSI	FC
Plant height (cm)	0.26	-0.68	0.14*	0.08	-0.18	-0.39	0.59*	-0.19	0.21
Number of branches/plant		0.38	0.26*	0.47	-0.70*	0.13	0.47	-0.22	-0.48
The height of the first fruiting node			-0.50*	-0.46*	-0.18	-0.11	-0.29	-0.28	-0.45
Fruit yield/plant (kg)				0.68**	0.23*	0.24	-0.15**	0.05	0.26
Number of fruits/plant					-0.39	-0.08	-0.03	0.26	0.27
Average fruit weight (gm)						0.20*	0.24	0.21*	0.25
Fruit length (cm)							-0.28	0.14**	0.29
Fruit diameter (cm)								-0.57**	-0.22
Fruit shape index									0.23

*, ** Significant at 5% and 1% levels of probability, respectively. NB: No. of branches/plant, FFN: First fruiting node, FY: Fruit yield/plant, NF: No. of fruits/plant, AFW: Average fruit weight, FL: Fruit length, FD: Fruit diameter, FSI: Fruit shape index, FC: Fruit colour.

Table (11): Direct effects (diagonal) and indirect effects of plant height, number of fruits/plant, fruit diameter, average fruit weight and first fruit node height on total yield/plant in eggplant landraces

Traits	Plant height (cm)	Number of fruits /plant	Fruit length(cm)	Average fruit weight (gm)	Number of branches/ plant (cm)	Total effect
Plant height	0.1259	0.0686	-0.0215	-0.1793	0.1469	0.1406
Number of fruits /plant	0.0110	0.7844	-0.0048	-0.3731	0.2616	0.6790
Fruit length (cm)	-0.0489	-0.0686	0.0554	0.2348	0.0728	0.2454
Average fruit weight (gm)	-0.0236	-0.3059	0.0136	0.9566	-0.4084	0.2323
Number of branches/plant (cm)	0.0332	0.3687	0.0073	-0.7022	0.5564	0.2635

Residual effect = 0.2594

CONCLUSIONS

Applying the pure line selection method on the eggplant landraces produced number of new lines that appeared more homogenous comparable with their original population. The selected lines can be used to compose the base for further studies aiming to introduce new lines having more productivity and good quality.

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الملخص العربى

تحسين تجانس عشائر الباذنجان المحلية باتباع طريقة انتخاب السلالة النقية

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أجريت هذه الدراسة بغرض تحسين الصفات الاقتصادية والثمرية فى سلالاتين من الباذنجان المحلى تم جمع احداها من السوق المحلى لكل من الإسكندرية وكفر الزيات (محافظة الغربية) ، من المعتاد إكثارهما بمعرفة المزارعين، وذلك بهدف زيادة التجانس بين نباتات كل سلالة على حدة .

زرعت بذور العشيرتين بالمشتل فى شهر مارس ٢٠٠٧و بعد ٤٥ يوما من الزراعة، تم تقليع الشتلات وزراعتها بمحطة بحوث البساتين بالصبحية، حيث زرع من كل عشيرة عدد ١٠٠ شتلة، و أجرى التلقيح الذاتى لكل النباتات النامية، هذا وقد تم أخذ البيانات عن الصفات المدروسة، وهى : طول النبات، عدد الفروع للنبات، إرتفاع أول عقدة ثمرية، عدد الثمار بالنبات، متوسط وزن الثمرة، المحصول الثمرى للنبات، طول الثمرة، قطر الثمرة، دليل شكل الثمرة، لون الثمرة. وبناءا على الصفات المرغوبة تم لنتخاب عدد من النباتات بكل عشيرة واستخلصت بذورها و زرعت بذور النباتات المنتخبة (الجيل الإنتخابى الأول)، كل على حدة، فى المشتل فى شهر مارس ٢٠٠٨. حيث زرعت بنفس الطريقة كما تم في العام السابق، وأجريت عليها جميع العمليات الزراعية المطلوبة أجرى التلقيح الذاتى لكل النباتات النامية، وبنفس المعايير تم أنتخاب عدد من النباتات والتى جمعت ثمارها أيضا منفصلة عن بعضها، ثم استخلصت بذورها لتشكل بذور الجيل الإنتخابى الثانى. فى العام ٢٠١٠ زرعت بذور العشيرة الأصلية، و بذور الجيلين الإنتخابيين الأول والثانى، لكل من العشيرتين خلال شهر مارس للتقييم فى موقعين مختلفين، هما مزرعة محطة بحوث البساتين بالصبحية– بالإسكندرية– و إحدى المزارع الخاصة بمنطقة أبو حمص (بمحافظة البحيرة).

أظهرت النتائج بصفة عامة أن أفراد الجيل الانتخابى الثانى فى العشيرتين (الإسكندرية، كفر الزيات) أصبحت أكثر تجانسا مقارنة بالجيل الانتخابى الأول والعشيرة الأصلية ،و أظهرت بيانات درجة التوريث–في معناها الضيق–مدي واسعا من القيم المقدرة للصفات المدروسة حيث تراوحت بين ٠,٣٦ % الى ٨٥,١٣ % فى عشيرة باذنجان الإسكندرية ، وبين ٤,٦٤ % الى ٦٥,٧٩ % فى عشيرة باذنجان كفر

الزيات ، كما أوضحت نتائج علاقات الارتباط بين- أزواج الصفات وبعضها- وجود علاقة ارتباط إيجابية ومعنوية بين صفة المحصول الثمرى للنبات وبين كل من صفات طول النبات، عدد الفروع للنبات ،وعدد الثمار للنبات. هذا ويمكن القول بأن هناك عدد من السلالات التى ثبت تفوقها من ناحية الإنتاجية، وكذلك من ناحية جودة الثمار، وهذه السلالات هى : السلالة رقم S_{2-6a} والمنتخبة من عشيرة باذنجان الإسكندرية، كذلك السلالة رقم S_{2-5a} والمنتخبة من عشيرة باذنجان كفر الزيات.