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Genetic Improvement for Yield and Quality Characters in Pea By Using Selection

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ABSTRACT

The present study was carried out at Shandaweel Agricultural Research Station, Sohag Governorate during five winter growing seasons (2011/2012, 2012/2013, 2013/2014, 2014/2015 and 2015/2016) using two F3- populations stemmed from two breeding methods for cross between two varieties of pea (*Pisum sativum* L.) and pedigree selection procedure was applied to obtain new pure lines of pea having intermediate vegetative growth and desirable yield traits. The mean values for each of all the studied traits after the third cycle of selection (F_6 generation) were higher in population II than each of population I, parents and check cultivar. The broad sense heritability was high and ranged from 82.24 to 98 % in all studied traits of all selected generations in population I and population II except number of seeds/pod which seriously was affected by the changes in the environmental factors, so it was low and ranged from 43.45 to 54.35. Also, the actual selection response was high compared with the expected response in F_6 generations for number of days to 50% flowering and number of seeds per pod in both populations I&II as well as both number of pods/plant and dry weight of seeds yield/plant in population II only. The realized gains relative to the parents and check were higher in F_6-population II than population I for most studied traits. Estimated coefficient of variance (CV%) for the studied characters in the new selected lines of population I was the lowest value for most the genotypes compared with parents and check cultivar and the lowest one was observed for the new line p-21of pop. I in all studied traits except number of seeds/pod. On the whole, in selected new pure lines, data revealed that the line p-21 and line p-24 were the highest homogeneous ones, since they showed the lowest variation within their plants. The obtained CV % values in these pure lines for green pods yield/plant ranged from 2.70 in selected pure line p-24 to 3.79% in line p-21, while were 5.83, 9.42 and 4.68 for parent 1, parent 2 and check cultivar, respectively indicating that these selected pure lines(p-21and p-24) were more uniform than all selected pure lines. The highest green yield were observed for line-p24 followed by line-p25 (215.33 and 193.00 g/plant, respectively). It's clear from the results that some pure lines such as the pure line-p18 line-p21, line-p24 and line-p25 were highest homogeneous for most traits and have desirable traits *i.e*. earliest, pod length, number seeds/pod and yield/plant. Both lines p21 and p24 were superior for yield of green pods compared with all lines, parents and check variety cultivated in this study. Therefore, It could be recommended to be grown and given special name as a new pea promising cultivars for cultivation in Upper Egypt.

Keywords: *Pisum sativum*, Selection, actual response to selection, expected genetic gain, Coefficient of variance

INTRODUCTION

Pea (*Pisum sativum* L.) is considered one of the most important legume crops grown in the winter season in Egypt because of its high nutritional value and short cash vegetable. Selection and backcross methods are used widely to improve self-pollinating crops plants and to produce new lines. These breeding methods are highly successful in developing quantitative traits in pea. To carry out a successful breeding program for the improvement of desired traits in pea, the breeder should have enough knowledge about various types of some genetic parameters vs. heritability, phenotypic and genotypic coefficient of variance. Abdou *et al.* (1999), Salib (2006) and Nosser (2007) reported that most important program for pea breeding are development of high yielding varieties with stable quality characters productivity with a high output of seeds from the total biological yield and the selection from F_3, F_4 and F_5 generation is an effective method to develop high yield and it is possible to select new pea lines for high quality using pedigree selection method. In some genotypes of pea Nosser (2002) and Hamed (2005) reported that the broad sense heritability ranged from moderate to high for number of days to flowering, and number of pods/plant. Meanwhile, it ranged from low to moderate for number of seeds/pod and ranged from low to high for average seed weight/plant. However, Ron *et al.*, (2005) selected some pea lines from single plants superior in earliness and pod quality. Gupta *et al.* (2006) and Salib (2006) estimated high values of broad sense heritability and expected genetic advance under selection 5% of F_2 plants for number of days to flowering, green yield/plant, number of pods/plant, pod length and number of seeds/pod, indicating that selection in early segregating generation would be high effective and new cultivars can be obtained through improvement of all studied characters except number of green pods/plant. Hussien and El-Dakkak (2009) found that all traits significantly differed among the breeding lines in all studied traits except number of seeds/pod. Two lines recorded the highest homogeneity in all traits comparing with other breeding lines and check cultivars. Chaudhary and Sharma (2003), El-Dakkak (2005), Singh and Singh (2006), Nawab, *et al.* (2008), Hamed (2012), Asfakun, *et al.* (2013) and Hamed, *et al.* (2015) reported high heritability for days to 50% flowering (90.62), pod length (92.46) plant height (95.70%), number pods /plant (90.80%), seed yield/ plant (93.20%) and 79.44 to 90.81% for green yield/plant, while it was 30.75 to 53.43% for pod weight/plant. The high heritability coupled with percent mean observed in days to 50% flowering, plant height and seed yield per plant suggested that effective selection may be done for these characters. Guzhov, (1986) reported that the phenotypic coefficients of variation (PCV) and the genotypic coefficients of variation (GCV), may serve as a reference point for breeders who try to detect genotypic differences of the most important economic characters. It makes also selection of forms with valuable genotypes more

effective. Sardana, *et al.* (2007) and Fikreselassie (2012) reported that the phenotypic coefficients of variation were higher than genotypic coefficients of variation in all the characters studied indicating the importance of environmental influence on their expression. On the contrary, El-Dakkak (2005) found that the genotypic plays a major role in the behavior of tested genotypes for most studied characters such as number of days to 50% flowering, Plant height (cm), pod length (cm), number of seeds per pod, number of pods/plant, weight of green pods yield per plant (g) and dry weight of seeds yield/plant (g). Asfakun, *et al.* (2013) reported that small differences were observed between the phenotypic coefficients of variation (PCV) were close to genotypic coefficients of variation (GCV) for days to 50% flowering and pod length, meanwhile. Also broad sense heritability was high for most studied traits. Shinde (2000), Sureja and Sharma (2000) Mahanta *et al.* (2001), and Sharma *et al.* (2003) found that high genetic advance along with high heritability and genotypic coefficient of variation for pea seed yield/plant and pods/plant. This indicates that selection for these characters would be effective for further improvement. In two populations of pea, Hamed (2012) reported the actual response to selection and the expected genetic gain through selection technique and also, study the genetic variability and broad sense heritability for number of days to flowering, yield/plant, number of pods/plant, number of seeds/pod, average seed weight and pod length. Results showed that all the studied traits means increased by selection. Also, broad sense heritability were high values in all traits indicating that these characters can be improved through selection based on phenotypic observations in early segregating generations in garden pea except green yield/plant and number of pods/plant traits. El-Dakkak, *et al.* (2014) showed that most studied traits had high GCV/PCV present and ranged from 78.5% for No. of pods/plant (population I) to 99.6% for 100-seeds weight (after second selection cycle). These results indicated that about 78% of phenotypic variances were due to genetic ones. Therefore, these traits might be more genotypically pre-dominant and it would be possible to achieve further improvement in them. Increasing obtained for number of pods/plant by 212.34% and 154.67% over Entsar1 (better check parent) in population I and population II, respectively, and also, for green pod yield by 152.17 and 89.84% in population I and population II, respectively. In some crosses of pea Khalil, *et al.* (2015) found that the heritability were 93.47 to 94.74% for number of days to flowering, 31.47% to 66.38% for pod length, 29.22 to 59.78 for number of seeds/pod and 23.88 to 42.23% for seed weight in two population of pea. El-Dakkak, *et al.* (2015) indicated that the promising line Sh/L18/2009 produced the highest fresh pods yield compared with all the eight commercial cultivars, exceeded Master-B cv. by 230.0%, 195.1% and 189.4% in Shandweel, Kaha and Qena locations, respectively.

The object of the present investigation was to estimate the actual response to selection and the expected genetic gain through selection technique and to compare the progress from different breeding procedures in order to develop some new promising pea lines and identify the best to be used as a new cultivar.

MATERIALS AND METHODS

The present study was carried out at Shandweel Agricultural Research Station, Sohag Governorate during five winter growing seasons (2011/2012, 2012/2013, 2013/2014, 2014/2015 and 2015/2016) using two F_3- populations stemmed from two breeding methods for cross between two varieties of pea (*Pisum sativum* L.), namely; Master-B and Club. The first F_3-population (Pop. I), traced back to F_2 plants from ordinary hybridization (Master-B x Club) while the second F_3-population (Pop. II), traced back to F_2 plants from backcross hybridization of F_1hybrid with its common parent Master-B [*i.e.* (Master-B x Club) x Master-B]. The first parent (Master-B) is widely grown in Egypt and has desirable pods for costumers but have little pods number/plant. The second parent (Club) has high pods number/plant, but the pod quality is poorly for costumers. To obtain new pure lines of pea similar to Master-B pods quality, having intermediate vegetative growth and desirable yield traits, four pedigree selection cycles were conducted. Both of F_3-populations were raised on October 30, 2011 at Shandaweel Experiment Farm. Each population was represented by 2000 plants in which 200 rows of 10 plants each along with the original parents and check cultivar were planted with plants spaced 20 cm within rows and 60 cm apart.

In the second season (2012/2013), 200 F_4-families (10% selection intensity) from each population with the original parents, F_4 bulked random sample (a mixture of equal number of seeds from each plant to represent the generation mean) and check cultivar (Entsar-2) were sown on 26th of October, 2012 in a randomized complete block design of three replications. The best plants from the best 20 families for each population were saved to give the F_5 families. In third season (2013/2014), the 20 F_5-families with the parents, check cultivar and F_5 bulk of both populations were sown on 25th October in 2013. In forth season (2014/2015), 5 families from each of F_6 generations (Pop. I and II), parents and check cultivar were sown. Data were recorded on the plants of each family. In fifth season (2015/2016), according to the realized response to selection and coefficients of variabilities as well as the performance of the families in the previous seasons (F6-generation), 6 selected families (new lines) were raised along with bulk, parents and the check cultivar in a randomized complete block design with three replicates, with three plots for the new genotypes (lines) and 3 ones for the originals cvs (parents and check cvs). Each plot consisted of three rows 3.5 m long 60 cm apart and 15 cm spacing between hills. All recommended agronomic practices were applied according to Hort. Res. Institute. Five randomly selected plants were tagged in each row and used for recording the observations of characters which are given below:

Number of days to 50% flowering, Plant height (cm), pod length (cm), number of seeds per pod, number of pods/plant, weight of green pods yield per plant (g) and dry weight of seeds yield/plant (g).

Statistical procedures:

Data were recorded for individual plants of each family for both populations I & II in the studied generations. The means of the plants were subjected to the statistical analysis for the studied characters according to Snedecor and Cochran (1981). The genetic parameters were estimated for both populations I & II in F_3, F_4, F_5 and F_6 generations. Realized response to selection were expressed as percent change in the population mean relative to both parents and check cvs (Falconer 1981). Heritability in the broad sense was estimated for the former traits, as illustrated by Collins *et al*. (1987) according to the following formula: $H\% = \delta^2g / (\delta^2g+\delta^2p) \times 100$

H%= Broad sense heritability, δ^2g= Genotypic variance, δ^2p= Phenotypic variance. Coefficient of variance was calculated according to Steel and Torrie (1984). Genotypic and phenotypic coefficients of variation were estimated according to Burton (1952).

RESULTS AND DISCUSSION

Results in Table (1) show means of F_3, F_4, F_5, and F_6 generations of both population I and II as well as bulk, parents and check cultivar.

The mean values for each of all the studied traits after the third cycle of selection (F_6 generation) were higher in population II than population I, parents and check cultivar.

Table 1: Mean performance of studied traits for both populations I and II as well as parents and check cultivar of pea.

Generations	Population I		Population II		Parents			Check cultivar
	selected	Bulk	selected	Bulk	Master-B (P_1)	Club (P_2)	Mean parents	(Entsar-2)
					No. of days to 50% flowering			
F_3	62.00	--	60.00	--	37.00	63.00	50.00	64.00
F_4	60.00	63.00	58.00	62.0	38.00	62.00	50.00	63.00
F_5	58.96	60.57	56.33	58.2	36.00	62.00	49.00	63.00
F_6	55.87	58.60	51.33	53.5	36.00	61.00	48.50	62.00
					Plant height (cm)			
F_3	62.22	--	68.70	--	43.00	83.00	63.00	67.00
F_4	64.56	61.12	66.06	64.50	42.00	81.00	61.50	72.00
F_5	76.30	66.30	81.17	74.80	43.00	85.00	64.00	59.00
F_6	83.47	71.10	81.33	77.80	44.0	86.00	65.00	63.00
					Pod length (cm)			
F_3	8.21	--	9.07	--	9.80	6.90	8.35	10.00
F_4	8.93	8.25	9.48	9.11	10.00	7.20	8.60	10.10
F_5	9.05	8.55	9.99	9.37	10.10	7.63	8.87	9.90
F_6	9.13	8.85	10.09	9.60	10.20	7.90	9.05	9.80
					Number of seeds/pod			
F_3	6.27	--	8.33	--	7.00	5.20	6.10	7.00
F_4	6.61	6.20	8.36	8.05	7.50	5.80	6.65	7.00
F_5	7.40	6.60	8.52	8.15	7.00	6.00	6.50	7.50
F_6	7.77	7.20	8.77	8.40	7.50	6.00	6.75	8.00
					Number of pods/plant			
F_3	31.83	--	36.70	--	8.00	33.00	20.50	22.00
F_4	36.50	32.40	40.92	34.90	9.00	36.00	22.50	24.00
F_5	38.53	33.80	41.40	36.50	9.00	38.00	23.50	20.00
F_6	42.67	40.50	48.27	42.50	8.00	35.00	21.50	21.00
					Green pod yield (g/plant)			
F_3	73.19	--	129.02	--	47.50	67.60	57.55	90.30
F_4	80.87	74.50	146.21	132.50	47.20	72.60	59.90	94.70
F_5	110.93	97.50	165.6	148.60	49.10	81.20	65.15	84.80
F_6	125.20	107.30	179.9	160.70	52.72	89.70	71.21	87.60
					Dry seed yield/plant (g)			
F_3	21.01	--	33.16	--	15.20	17.70	16.45	22.80
F_4	24.12	20.60	37.50	32.20	16.20	21.10	18.65	24.10
F_5	27.98	23.60	41.29	36.80	16.30	20.80	18.05	18.30
F_6	31.23	26.50	46.09	41.50	16.26	20.60	18.43	21.90

The phenotypic (PCV) and genotypic (GCV) coefficients of variation and broad sense heritability are presented in Table (2), The Phenotypic and genotypic coefficients of variation for the studied characters in selected generations showed that few differences were observed between (PCV) and (GCV) in selected generations of both (I&II) populations, indicating the importance of the genetic effects in controlling the inheritance of all studied traits. These results are in agreement with those of Asfakun *et al.* (2013). The broad sense heritability was high and ranged from 82.24 to 98 % in all studied traits of all selected generations in population I and population II except number of seeds/pod which seriously was affected by the changes in the environmental factors, so it was low and ranged from 43.45 to 54.35. These results typically agree with those of Chaudhary and Sharma (2003), Nawab *et al.* (2008), Hamed (2012), Asfakun *et al.* (2013), and Khalil, *et al.* (2015). The previous results indicated that these traits except no. of seeds/pod were not seriously affected by the changes in the environmental factors, so selection for these characters would be effective for further improvement.

Table 2. The genetic parameters of studied traits for F_4, F_5 and F_6 generations for populations I & II .

Items	Population I			Population II		
	F4	F5	F6	F4	F5	F6
No. of days to flowering						
P.C.V. %	9.73	10.49	8.05	6.34	6.99	10.41
G.C.V. %	9.18	10.07	7.99	6.07	6.77	10.24
Broad sense heritability %	91.34	92.17	98.52	90.37	93.60	96.73
Plant height						
P.C.V. %	6.90	15.14	10.99	15.73	13.16	7.67
G.C.V. %	6.62	14.47	10.65	15.60	12.20	7.16
Broad sense heritability %	91.93	91.30	93.92	98.38	85.92	87.20
Pod length						
P.C.V. %	5.20	5.43	6.16	7.96	7.20	6.96
G.C.V. %	4.77	5.21	6.03	7.33	6.87	6.72
Broad sense heritability %	84.23	92.13	95.89	84.74	91.11	93.11
Number of seeds/pod						
P.C.V. %	10.49	6.78	5.46	8.16	14.56	3.46
G.C.V. %	6.92	4.67	3.84	5.52	10.25	2.55
Broad sense heritability %	43.45	47.55	49.44	45.67	49.57	54.35
Number of pods/plant						
P.C.V. %	23.30	9.22	20.71	22.34	9.36	10.25
G.C.V. %	21.42	8.72	20.12	20.33	8.66	9.63
Broad sense heritability %	84.49	89.61	94.43	82.80	85.69	88.34
Green pod yield/plant						
P.C.V. %	30.36	18.42	25.99	27.71	20.12	11.65
G.C.V. %	28.62	17.60	25.35	25.30	18.71	11.01
Broad sense heritability %	88.82	91.39	95.17	83.33	86.52	89.40
Dry seed yield/plant						
P.C.V. %	32.07	18.02	25.15	29.97	12.06	9.36
G.C.V. %	30.32	17.13	24.54	27.26	11.18	8.82
Broad sense heritability %	89.38	90.38	95.19	82.74	85.95	88.78

Actual selection response values (Table 3) showed that number of days to 50% flowering, pod length, number of pods/plant, weight of green pods yield per plant and dry weight of seeds yield/plant of F_6-population II were high compared with population I, while both Plant height and number of seeds per pod were the reverse trend.

Table 3. The actual, expected and the realized response to selection relative to parents and check cultivar for all studied characters of both populations I and II.

Items	Population I			Population II		
	F4	F5	F6	F4	F5	F6
No. of days to flowering						
Actual response	-2.00	-1.04	-3.09	-2.00	-1.67	-5.00
Expected response	3.93	6.61	5.14	5.36	4.28	6.00
Realized response to selection (%) relative to:						
Master-B(P1)	57.89	63.78	55.19	52.63	56.47	42.58
Club (P2)	-3.23	-4.90	-8.41	-6.45	-9.15	-15.85
Entsar -2 (check)	-4.76	-6.41	-9.89	-7.94	-10.59	-17.21
Plant height (cm)						
Actual response	2.34	11.74	7.17	-2.64	15.11	0.16
Expected response	1.52	12.23	10.00	14.31	10.65	6.31
Realized response to selection (%) relative to:						
Master-B(P1)	53.71	77.44	89.70	57.29	88.77	84.84
Club (P2)	-20.30	-10.24	-2.94	-18.44	-4.51	-5.43
Entsar -2 (check)	-10.33	29.32	32.49	-8.25	37.58	29.10
Pod length (cm)						
Actual response	0.72	0.12	0.08	0.41	0.51	0.10
Expected response	1.40	0.52	0.63	0.90	0.76	0.76
Realized response to selection (%) relative to:						
Master-B(P1)	-10.70	-10.40	-10.49	-5.20	-1.09	-1.08
Club (P2)	24.03	18.61	15.57	31.67	30.93	27.72
Entsar -2 (check)	-11.58	-8.59	-6.84	-6.14	0.91	2.96
Number of seeds/pod						
Actual response	0.34	0.79	0.37	0.03	0.16	0.25
Expected response	0.72	0.28	0.24	0.44	0.71	0.19
Realized response to selection (%) relative to:						
Master-B (P1)	-11.87	5.71	3.60	11.47	21.71	16.93
Club (P2)	13.97	23.33	29.50	44.14	42.00	46.17
Entsar -2 (check)	-5.57	-1.33	-2.88	19.43	13.60	9.62
Number of pods/plant						
Actual response	4.67	2.03	4.14	4.22	0.48	6.87
Expected response	1.40	3.69	9.68	10.60	3.85	5.07
Realized response to selection (%) relative to:						
Master-B(P1)	305.56	328.11	433.38	354.67	360.00	503.38
Club (P2)	1.39	1.39	21.91	13.67	8.95	37.91
Entsar -2 (check)	52.08	92.65	103.19	70.50	107.00	129.86
Green pod yield/plant (g)						
Actual response	7.68	30.06	14.27	17.19	19.39	14.30
Expected response	1.47	21.33	35.93	47.28	33.43	21.73
Realized response to selection (%) relative to						
Master-B(P1)	71.33	125.93	137.48	209.77	237.27	241.24
Club (P2)	11.39	36.61	39.58	101.39	103.94	100.56
Entsar -2 (check)	-14.60	30.81	42.92	54.39	95.28	105.37
Dry seed yield/plant						
Actual response	3.11	3.86	3.25	4.34	3.79	4.80
Expected response	1.48	5.29	8.67	13.02	4.27	4.44
Realized response to selection (%) relative to:						
Master-B(P1)	48.89	82.88	92.07	131.48	169.87	183.46
Club (P2)	14.31	34.52	51.60	77.73	98.51	123.74
Entsar -2 (check)	0.08	52.90	42.60	55.60	125.63	110.46

Also, the actual selection response was high compared with the expected response in F_6 generations for number of days to 50% flowering and number of seeds per pod in both populations I&II as well as both number of pods/plant and dry weight of seeds yield/plant in population II only. The realized gains relative to the parents and check were higher in F_6-population II than population I for most studied traits. These results are in agreement with Asfakun *et al.* (2013), El-Dakkak (2005), Hamed (2012) and Khalil *et al.* (2015).

Estimated coefficient of variance (CV %) for the studied characters in the new selected lines of population I (Table 4) was the lowest CV% value for most the genotypes compared with parents and check cultivar and the lowest one was observed for the genotype line p-21of pop. I in all studied traits except number of seeds/pod which had the lowest CV % value in line p-18. On the other hand, in selected lines from population II, the lowest CV% value was observed for line p-24 in all studied traits except no. of days to 50% flowering. Also, data revealed that the line p-24 exhibited the lowest CV % values than line p-21. On the whole, in selected pure lines, data revealed that the genotypes line p-21 and line p-24 were the highest homogeneous ones, since they showed the lowest variation within their plants. The obtained CV % values in these pure lines for green pods yield/plant ranged from 2.70 in selected pure line p-24 to 3.79% in line p-21, while were 5.83, 9.42 and 4.68 for parent 1, parent 2 and check cultivar, respectively indicating that these selected pure lines(p-21and p-24) were more uniform than all selected pure lines. These results are in agreement with Metwally *et al*. (1998), Hussein and El-Dakkak (2009) and Nosser (2007).

Regarding the mean values of the studied traits (Table 4), The highest values for pod length were observed for line-p24 followed by line-p21 (11.87 and 10.57 cm, respectively) with significant differences between them.

For green pods yield/plant, the mean values of selected pure lines ranged from 106.67 to 215.33g and the selected lines from both populations I and II were high compared with both parents or the check cultivar. The highest green yield were observed for line-p24 followed by line-p25 (215.33 and 193.00 g, respectively), with significant differences between them. These results were in lines with those obtained by Hamed (2012), El-Dakkak *et al.* (2014), El-Dakkak *et al*. (2015), Khalil *et al*. (2015) and Zayed *et al.* (2015).

Table 4. Mean performance and Estimated coefficient of variance (C V %) values for all studied characters in new selected lines, parents and check cultivar of pea.

Genotypes		No. of days to 50% flowering	Plant height (cm)	Pod length (cm)	Number of seeds/pod	Number of pods/plant	Green pods yield (g/plant)	Dry seed yield (g/plant)
New selected lines from population I								
Line-P18	Mean	54.22	86.33	10.30	8.77	37.00	145.00	34.01
	CV	3.03	4.95	2.53	2.28	5.73	4.46	4.18
Line-P19	Mean	59.89	83.33	10.07	8.20	35.00	106.67	22.58
	CV	2.12	3.00	2.60	2.59	4.29	4.76	4.46
Line-P21	Mean	57.00	90.00	10.53	8.00	54.00	150.33	38.35
	CV	1.96	2.72	2.50	4.00	3.59	3.79	3.47
New selected lines from population II								
Line-P24	Mean	45.89	112.00	11.87	10.00	48.11	215.33	47.05
	CV	2.54	1.09	0.16	1.94	2.57	2.70	3.05
Line-P25	Mean	52.89	106.00	10.33	9.33	43.00	193.00	43.84
	CV	2.40	1.42	0.86	2.94	4.03	4.15	3.41
Line-P33	Mean	58.00	82.00	8.67	8.00	53.00	168.00	44.96
	CV	2.11	2.73	1.04	4.46	4.72	4.88	3.24
Parents and check cultivar								
Master-B (P1)	Mean	35.33	53.37	10.40	8.33	9.33	53.37	17.67
	CV	1.63	10.78	3.85	13.86	16.36	5.83	6.23
Club (P2)	Mean	57.67	90.00	7. 80	5.75	40.33	63.19	21.23
	CV	2.86	2.65	6.49	6.58	5.86	9.42	8.21
Entesar-2 (check)	Mean	59.33	73.67	9.77	8.00	21.00	83.20	21.87
	CV	1.61	3.18	2.04	6.25	9.524	4.68	5.02
$LSD_{0.05}$		1.95	4.91	0.60	1.01	2.83	8.74	2.00

CONCLUSION

It is clear from the previous results that some pure lines such as the pure line-p18, line-p21, line-p24 and line-p25 were highest homogeneous for most traits and have desirable traits *i.e*. earliest, pod length, number seeds/pod and yield/plant. It could be recommended to be grown and given special name as cultivar in the locations under investigation.

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التحسين الوراثى للمحصول وصفات الجودة فى البسلة عن طريق الإنتخاب

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أجريت هذه الدراسة فى محطة البحوث الزراعية بشندويل – محافظة سوهاج فى خمس مواسم شتوية ٢٠١٢/٢٠١١ -٢٠١٥ / ٢٠١٦ بهدف التحسين الوراثى لصفات المحصول والجودة فى البسلة عن طريق التربية (التهجين والتهجين الرجعى) فى عشيرتين ناتجتين بالتهجين بين الصنفين (ماستر و كلُّب) والرجعى(ماستر ×كلب) ماستر. تم عمل ثلاث دورات من الانتخاب فى العشيرتين. حيث تم دراسة الصفات التالية عددالايام حتى ازهار ٥٠%من النباتات ، طول النبات ، طول القرن ، عدد بذور/القرن ، عدد القرون /نبات ، محصول القرون الخضراء /نبات وزن البذورالجافة /نبات. أوضحت النتائج أن قيم المتوسطات كانت عالية فى العشيرة الثانية مقارنة بالعشيرة الأولى بإستثناء طول النبات فى الجيل السادس فقط. وكان الفرق بين معامل الاختلاف المظهرى والوراثى صغيرا . درجة التوريث على النطاق الواسع كانت عالية فى العشيرتين لجميع الصفات مما يوضح التأثير الوراثى فى عملية الانتخاب لهذه الصفات فيما عدا صفة عدد البذور فى القرن التى كانت منخفضة مما يوضح تأثرها بالبيئة كانت الاستجابة الملاحظة للإنتخاب لصفة محصول القرون الخضراء/نبات (١٤.٢٧ %) فى الجيل السادس فى العشيرة الاولى . بينما كانت (١٤.٣٠ %) فى الجيل السادس فى العشيرة الثانية. كما أظهرت النتائج ان التقدم الوراثى كان (١٣٧.٤٨ %) فى الجيل السادس فى العشيرة الاولى و(٢٤١.٢٤ %) فى الجيل السادس فى العشيرة الثانية منسوبا الى الاب الاول (ماستر). أظهرت السلالات ٢٥،٢٤،٢١،١٨ تجانس عال فى معظم الصفات المدروسة، كما لوحظ وجود تفوق واضح فى صفات طول القرن وعدد بذور القرن وعد قرون النبات ومحصول القرون الخضراء ومحصول البذور الجاف /نبات لمعظم السلالات المنتخبة عن الآباء والصنف القياسى. وبالتالى يمكن إستخدام هذه السلالات كنواة أصناف جديدة وخاصة السلالة ٢١ فى العشيرة الأولى , والسلالة ٢٤ من العشيرة الثانية.