J. Plant Production, Mansoura Univ., Vol. 6 (12): 2163- 2176,2015

SELECTION WITHIN AND BETWEEN FARMER SEED LOTS OF EGYPTIAN CLOVER TO DEVELOP HIGHLY PRODUCTIVE POPULATIONS TOLERANT TO HIGH LEVEL OF SALINITY.

Abo El-Goud, Sh. A.;H.O.Sakr; S.S.M. Abo-Feteieh and M.M. Abdel-Galil.

Forage Crop Research Dept., Field Crop Institute, Agriculture Research Center, Giza, Egypt

ABSTRACT

Seeds of selected nine populations and registered varieties were divided to evaluate at El-Serw Agric. Research Station of 2013-2014 and 2014-2015 growing season.

Combined and highly significant were observed for all studied traits, except green forage and dry yield/plot in the second cut, plant height, number of tillers per plant and number of seeds per head.

The performance of the studied genotypes was determined separately for each season. The genotype 5 ("108" from Farskour district) was the highest for total green fodder yield, total dry fodder yield, seed no/head, 1000-seed weight, seed yield per plot and seed yield per fed. While, the genotype 3 (103 from El-Zarka) recorded the highest for plant height.

The results revealed that the genotypic variance (VG) relative to environmental variance (VE) was large in magnitude for all traits except for total green fodder yield per plot. The differences between genotypic coefficient variability (GCV) and phenotypic coefficient variability (PCV) were narrow, suggesting little effects of environments on these traits. Heritability in broad sense expressed low values for total dry fodder yield/plot, medium values for 1000 seed weight and seed number/plant and high values for other traits. There were a positive significant correlation between seed yield/plot and each of 100-seed weight, no. of seeds/head and number of tillers/plant. The relationship between total green forage and total dry forage achieved a significant positive correlation between them.

It could be concluded that, selection in advanced generations of this populations is good to improve green and seed yields and also the genotype no. (5) was a new promising to produce as a variety tolerant for high level of salinity.

INTRODUCTION

Egyptian clover is the main winter forage leguminous crop in Egypt. Highly attention should be directed to develop new varieties tolerant to high level of salinity to increase the productivity of unit area/land in such regions which would help to increase the total production and enhance a sufficient supply of green forage. Berseem clover is high nutritional quality for animal feed. Berseem also contributes to soil fertility and improves soil physical characteristics (Graves *et al.,* 1996). In Egypt berseem is cultivated through the winter season from (early October to May) for forage production and at the end of the season (late April and early May) seed crops sometimes taken (El-Nahrawy *et a*l., 1997).

Salinity is a major abiotic stress which adversely affects plant processes at physiological, biochemical and molecular level and reduces plant productivity (Tester and Davenport, 2003 and Munns, 2002). Salinity is a becoming a major threat to plant productivity loss in agriculture system. Plants respond to saline environmentally by modulating the inherent mechanisms to adjust the change in environment.

Plant breeders have made significant improvement in yield of many crops, limited work has been done on improving yield potential and seed production of Egyptian clover. This may be due to small floral parts which make artificial hybridization difficult. In addition, the high degree of self sterility and incompatibility limits the extent to which berseem plants may be inbred. Therefore, Egyptian clover breeders have relied mainly on selection and production of synthetic varieties to improve forage and seed yield in their breeding programs (Bakheit, 2013).

Selection procedures may be used to improve forage yield where, Johnson and Goforth (1953) reported that four cycles of selection increased yield by 11% in sweet clover. Selection in cross pollinated crops increases the frequency of desirable allels and genotypes leading to develop new populations.

Two cycles of selection and cross pollination directed to effective gain in forage yield by 20.58% as reported by Omar and Hussien (1982).

Mass selection was effective for improvement forage yield in multi-cut Egyptian clover varieties (Mikhiel, 1987).

Abdel-Galil *et al.* (2008) reported that, selection and cross pollination procedure in isolation seems to be helpful technique to develop high productive population. Moreover, El-Nahrawy (2009) mentioned that, existed variation among berseem cultivars may provide useful source for salinity tolerance under saline soil.

Progress in breeding programs depends on the magnitude of genetic variability in the population and the extent of heritability of the desirable character. Radwan *et al.* (1983) reported low to medium heritability estimated in Egyptian clover. While, Bakheit (1986) reported high heritability estimates in Egyptian clover for seasonal fresh and dry yields (89.0 and 91%) indicating less influenced by environment.

Bakheit (1985) reported that effectiveness of mass family selection for fresh forage yield was detected for two generations in Egyptian berseem, where he also declared that the gain of the 1st and 2nd cycles of mass selection for the fresh forage yield were 8.4 and 10.7% of the original population. The realized heritability and expected selection advance for first and second cycles of mass selection were 0.38 and 0.04 and 31.8 and 3.94%. Younis *et al.* (1986) subjected five populations of berseem clover to three cycles of visual selection. They reported that, visual selection was more effective in increasing green and dry yield was increased by 17.7 and 23.9%, respectively over their initial populations. In addition, Abdel-Galil *et al.* (2008) reported that enormous improvement was achieved through selection in seven Egyptian clover varieties, heritability in broad-sense were high seasonal fresh and dry yields (88.7 and 82.3%). Also Bakheit (2013) reported that influences were detected by 4.94% and 14.38% in fresh forage yield 5.32

and 13.22% in dry yield as a result of two cycles of selection in berseem clover.

The objective of this investigation was to study the effect of selection plant population genotypes, genetic variances, heritability and phenotypic correlation to develop highly productive populations tolerant to high level of salinity.

MATERIALS AND METHODS

The breeding program was established at El-Serw Research Station winter seasons. Four hundred and fifty farmer seed lot of multi and mono cuts of Egyptian clover were collected from different governments of Egypt to establish breeding programs to develop new varieties. Accordingly, thirty nine samples of this collection which were obtained from the districts of Damietta governorate characterized by high level of salinity were used to develop new base population tolerant to salt affected soil under Serw environment. Where 39 seed lots and two varieties (Serw 1 and Serw 2) were evaluated under high level of salinity (Table 1) and the highest seven populations were selected. Three cycles of mass selection in isolation were carried out. Where, the selected populations cultivated in non replicated trial in isolation of other populations. Each plots area was 25 rows of 6 meter long, 30 cm apart and 20 cm between hills. Visually selection was carried out based on selecting the most vigor seedling per hill. Three cuts were obtained and random matting was allowed for the selected plants prior to flowering. Seeds were bulked for each population. All the cultural practices were done at the optimum levels for maximum production and performance.

The improved population was evaluated against the original parents and the registered varieties and the highest yielding population was selected and multiplied to be registered as promising new variety tolerant to salinity.

Table 1: Initial physical and chemical analysis of the soil before conducting the experiment (average of the two seasons).

Physical		**Chemical**	
Texture	Clayey	pH	7.9-8.0
Coarse sand	1.40	Ec ds/m	5.75-7.7
Fine sand	10.39	$CaCO_3$%	1.30
Silt	23.26	OM%	0.83
Clay	64.95	Total N ppm	37
		Available P ppm	7.80
		Available K ppm	206.3

The seeds of the selected population were divided to evaluate at El-Serw Agric. Research Station of 2013-2014 and 2014-2015 growing season. The experiment was arranged in a randomized complete block design with three replications. Plot size was 3 m x 4m. the first cut was taken after 45 day from the day of sowing and the second cut was taken after 30 days from the day of first cut and the third one was taken 30 days from the day of second cut to determine forage yield, dry yield, plant height cm at harvest, number of tillers/plant, number of seeds/head, 1000-seed weight. Every plot was harvested individually and calculated the total seed yield to kg/feddan.

Several analyses of variances were made in order to test significance of differences among the studied genotypes. In addition, data have been tested for homogeneity before pooling and as it was homogenous, the combined analysis of variance over two year was computed for the genotypes according to Cochran and Cox (1980). The differences between any two means were tested for significant difference values (LSD) test at both 5% and 1% levels of probability.

A combined analysis of variance was performed for nine berseem clover populations i.e. 1 (Giza composite); 85 & 103 (from El-Zarka); 106 & 108 (from Farskur), 113 & 114 (Menyt El-Nasr), Serw 1 and Serw 2. Error mean squares of the separate experiments were tested for homogeneity using (Bartlett, 1937) test before analysis of variance of combined data.

The phenotypic and genotypic variance for the character was estimated by the method suggested by Goulden (1952). The genotypic coefficient of variability (GCV) and phenotypic coefficient of variability (PCV) were measured according to Burton (1952). Heritability in broad sense (H%) is referred to as the ratio of genetic variance to total variance as follows according to Johnson *et al.* (1955).

Heritability in broad sense ($H^2b\%$)= σ^2G/σ^2P100, where σ^2G is genotypic variance and σ^2p is phenotypic variance.

Genetic advance under selection (GS) was estimated using a selection intensity of 10% according to the formula, GS%=GS unit/grand meanx100 where GS unit is a genetic advance unit which calculated by formula unit= $\sigma^2P\hat{}2xH^2/100x2.06$ (Flaconer, 1981).

Table 2: The form of the analysis of variance and the expectation of mean square of each experiment of two growing season.

Source of variation	**d.f.**	**Mean square**	**Error mean square (EMS)**
Replication	k-1		
Genotype	g-1	M2	$\sigma^2e+k\sigma^2e$
Error	(k-1)(g-1)	M1	σ^2e

Where : k is number of replication g is number of genotypes
σ^2e, σ^2g are error variance and genotypic variance, respectively

Table 3: The form of the combined analysis of variance and the expectation of mean square of the combined data over two years.

Source of variation	**d.f.**	**Mean square**	**Error mean square (EMS)**
Replication	y-1		
Replication within year	y(k-1)		
Genotype	g-1	M3	$\sigma^2e+k\sigma^2gy+ ky\sigma^2g$
Genotype x year	(y-1)(g-1)	M2	$\sigma^2e+k\sigma^2gy$
Error	y(k-1)(g-1)	M1	σ^2e

Where : y, k, g are number of year, replication and genotype, respectively
σ^2e, σ^2g, σ^2gy are error variance, genotypic variance and genotype by year variance, respectively

RESULTS AND DISCUSSION

Variation among and within berseem clover populations:

Analysis of variance (ANOVA) was made separately for each season Table 4a and 4b showed highly significant for each green and dry forage yields/plot for the two seasons except green and dry forage yields for the second cut in the second season and for the third cut in the second season. In addition, analysis of variance across two seasons Table 5. Analysis of variance for the combined data (Table 5) indicated highly significant differences among genotypes for all studied traits except green dry forage yields/plot in the second cut. It appears, that the genotypes under study posses great genetic variability sufficient to provide substantial amounts of improvement through selecting superior genotypes. Significant and highly significant were also observed for all studied traits, except for plant height, number of tillers per plant and number of seeds per head due to genotypes by years interaction indicating that genotypes gave different performances under conditions of different years with respect to these traits. More, the populations under these results possess great genetic variability sufficient to provide substantial amounts of improvement through selecting superior genotypes. These results are in harmony with those obtained by Radwan (1970), Rammah and Bőjtös (1976), El-Nahrawy (1980), Radwan *et al.* *(*1983), Bakheit (1986), Ahmed (2006), Bakheit (2013) and Radwan *et al.* (2015)**.**

Table 4a: : Mean squares for green and dry fodder yield through three cuts at the first and the second year(Y1 and Y2)

SOV	GFY cut1/plot		DFY cut1/plot		GFY cut2/plot		DFY cut2/plot		GFY cut3/plot		DFY cut3/plot	
	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
Reps.	16.77	1.67	0.05	0.01	36.42	4.00	0.37	0.079	9.26	14.11	0.157	1.99
Geno	41.38**	11.96*	0.25**	0.71**	37.89**	12.42NS	0.20*	0.0.28NS	167.04**	27.38NS	3.24**	1.188**
Error	4.98	4.11	0.01	0.38	5.58	14.96	0.06	0.16	9.11	15.57	0.139	0.303

***, ** significant at 0.05, 0.01**

Table 4b: Mean squares for plant height (ph), number of tillers (NT), , seed no/head, 1000-seed weight and seed yield/plant in the first and the second year (Y1 and Y2).

SOV	ph		Nt		Seed no/head		1000 Sw		Seed y/p	
	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
Replication	17.36	0.15	1.33	1.04	72.92	1.13	0.05	0.05	66.07	646.4
Genotype	** 221.78	** 194.9	** 28.75	** 31.7	** 105.95	** 156.46	** 0.26	** 0.38	** 28534.74	** 28071.64
Error	17.87	6.31	1.33	1.04	27.96	5.25	0.04	0.02	198.97	654.32

***, ** significant at 0.05, 0.01**

Table 5: Combined analysis of variance cross year for all studied traits

SOV	Cut1		Cut2		Cut3		Total		Ph	Nt/ plant	Seed n./ head	1000 seed w.	Seed yield g/ plot
	GFY	DFY	GFY	DFY	GFY	DFY	GFY	DFY					
Year	17.66	24.67	160.86	8.54	439.18	45.15	155.65	213.42	1.85	22.68	54.8	0.02	0.54
R x year	9.22	0.03	20.21	0.22	11.69	1.07	46.53	1.04	8.76	1.18	37.02	0.05	356.23
Genotype	** 23.74	** 0.71	* 27.73	* 0.28	** 94.0	** 2.67	** 192.6	** 4.76	** 413.08	** 60.185	** 257.89	** 0.535	* 50100.5
Geno. X year	** 6.91	** 0.24	* 22.58	NS 0.20	** 100.43	** 1.76	** 141.63	** 2.31	NS 3.6	NS 0.269	NS 4.52	** 0.101	** 6505.9
Error	4.55	0.03	10.27	0.12	12.34	0.22	33.94	0.419	12.09	1.185	16.6	0.031	426.64

***, ** significant at 0.05, 0.01** **NS not significant**

Mean performance:

The mean performance of the studied genotypes was determined separately for each year and obtained results are presented in Table 6. However data combined across two years for all studied traits are presented in Table 7. The means showed that, the genotype 5 ("108") was the highest for total green fodder yield, total dry fodder yield, seed no/head, 1000-seed weight, seed yield per plot and seed yield per fed with the means 82.17 kg/plot, 27.40 ton/fed; 9.69 kg/plot, 3.23 ton/fed; 52.30, 3.63 gm, 702.77 g/plot and 234.21 kg/fed, respectively. While, the genotype (3) recorded the highest for plant height (103.16 cm). These results are in agreement with Bakhiet and Mahdy (1988) who evaluated 34 of multi-cut Egyptian berseem collected from farmer fields in 7 governorates (Behera, Gharbia, Kafr El-Shiekh, Minia, Assuit, Sohag and Kena). They reported highly significant differences among accessions in both separate and combined analysis in forage yield. Moreover, the year effect was significant. The same results were in harmony with those obtained by Abdel-Galil *et al.* (2007) who study the stabilityfor 16 Egyptian berseem clover genotypes at four locations (Sakha, Gemmiza, Serw and Sids) during two seasons. They reported that, genotypes Hatour, Sakha 4, Gemmiza, Narmer and Giza 6 surpassed other genotypes with no differences among them regarding the fresh herbage yield. On the other hand, no significant differences were detected among most entries in dry matter content. Bakheit (2013) and Radwan *et al.* (2015) recorded the same findings**.**

Genetic parameters

The variances in terms of genotypic (VG) and phenotypic (VP) as well as, genotypic (G.C.V.) and phenotypic (P.C.V.) coefficient of variability, heritability in broad sense (H^2b), and genetic advance under selection using 10% selection intensity are presented in Table (8). Similarly, these parameters were determined from the combined data across two years for all studied traits (Table 9).

6

7

8

9

The results revealed that the genotypic variance (VG) relative to environmental variation (VE) was large in magnitude for all traits except for total green fodder yield per plot. The differences between G.C.V. and P.C.V. were narrow, suggesting little effects of environments on these traits. Heritability in broad sense expressed low values 27.95-10.84% for total green and dry fodder yields/plot; medium values 57.14-77.05% for 1000 seed weight and seed number/plant and high values range from 88.05 to 93.05 % for other traits. This indicate that, the traits which low and medium values influenced by ecological conditions. While, the characters which expressed high percentage values were less affected by environmental and largely influenced by components of genetic variance which may include additive, dominance and epitasis variance.

The estimates of expected genetic advance (Gs) recommend that selection of 10% of plants would improve studied traits. The average of expected advance value for total green fodder yield, total dry fodder yield, plant height, number of tillers per plant, number of seeds per head, 1000 seed weight and seed yield per plot are 2.23, 6.67, 15.12, 37.95, 23.74, 10.49, and 62.06 % respectively. Thus, from the previous results, it could be concluded that, selection in advanced generations of this populations is good to improve these traits. and also the genotypes no. (5) available a new promising to produce as a variety. These results are in accordance with the finding of Radwan *et al.* (1983) who reported estimates of heritability ranging from low to medium values for vegetative characters of berseem. The same results are in harmony with those of Martiniello and Iannucci (1998).

Correlation matrix between seed yield/plot and the other traits

Regarding to the correlation matrix between seed yield/plot and each of the other traits over both seasons is tabulated in Table (10). There were positive significant correlation between seed yield/plot and each of 1000-seed weight, no. of seeds/head and number of tillers/plant. The relationship between total green forage and total dry forage achieved a significant positive correlation between them.

Table 10. Correlation matrix between seed yield/fed and different traits of nine berseem clover populations under over two growing seasons.

Traits	Total green forage	Total dry forage	Plant height	Number of tillers	No. of seed/head	1000-seed weight	Seed yield/plot
Total green forage	1.00						
Total dry forage	0.815**	1.00					
Plant height	0.034NS	0.277NS	1.00				
Number of tillers	-0.248NS	-0.048NS	-0.174NS	1.00			
No. of seed/head	0.149NS	0.312NS	0.493*	-0.204NS	1.00		
1000-seed weight	0.021NS	-0.054NS	0.387NS	-0.643**	0.413*	1.00	
Seed yield/plot	-0.222NS	-0.201NS	0.097NS	0.414*	0.116*	0.311**	1.00

These results are in accordance with Bakheit *et al.* (2007) who reported that all studied traits were positively correlated but the correlation between seed yield and forage yield was weak.

From the previous results, using a method of selection between and within farmer seed samples may be the best effective for improvement forage yield in multi-cut Egyptian clover. More, it can be recommended that population no. 5 ("108" from Farskour district) was a promising population may tolerant to high salinity for getting a high yield of green and seed yield of berseem.

REFERENCES

Abdel-Galil, M.M., W.M. Shaarawy, A.A. Helmy and M.A. El-Nahrawy (2007). Yield potential and stability performance of sixteen Egyptian clover genotypes grown under different environments. Assiut J. Agric. Sci., 38: 1-13.

Abdel-Galil, M.M.; A. Helmy and N.M. Hamed (2008). Developing a synthetic population through selection in Egyptian clover genotypes (*Triflium alexandrinum,* L.). J. Agric. Sci., Mansoura Univ., 33:983-989.

Ahmed, M.A.S. (2006). Response to three methods recurrent selection in a Khadarawi berseem (*Trifolium alexandrinum* L.) population. Alex. J. Agric. Res., 51: 13-23.

Bakheit, B.R. (1985). Genotypic stability of some multi-cut Egyptian clover (*Trifolium alexandrinum*, L.) genotypes. Assiut J. Agric. Sci., 16: 21-37.

Bakheit, B.R. (1986). Genetic variability, genotypic and phenotypic correlations and path-coefficient analysis in Egyptian clover (*Trifolium alexandrinum* L.). J. Agron. Crop Sci., 157: 58-66.

Bakheit, B.R. (2013). Egyptian Clover (*Trifolium alexandrinum* L.) Breeding in Egypt: A Review. Asian J. of Crop Sci., 5: 325-337.

Bakheit, B.R. and E.E. Mahdy (1988). Improving berseem clover (*Trifolium alexandrinum,* L.) through pedigree selection among and within farmer's seed lots. Assuit J. Agric. Sci., 19:267-278.

Bakheit, B.R.; M.A. Ali and A.M. Abo El-Wafa (2007). The efficiency of selection for seed yield in Fahl variety of Egyptian (berseem) clover, *Trifolium alexandrinum,* L. J. Agric. Sci., Mansoura Univ., 32(1):1-19

Bartlett, M.S. (1937). Properties of sufficiency and statistical test. Proc. Royal. Sco., London, 160:268-282.

Burton , G. W. (1952).Quantitative inheritance in grasses. Proc. 6th Int. Grassland Conger. 1:277-283.

Cochran, W. G. and G.M. Cox (1980). Experimental Designs. 2nd ed., John Willey and Sons, New York, USA. Genetics 78 : 53-65 .

El-Nahrawy, M. A. (1980). A study of variation in productivity of farmers seed lots of meskawi berseem (*Trifolium alexandrinum* L.) M. Sc. in Agronomy, Faculty of Agric. Univ. of Cairo, Egypt.

El-Nahrawy, M. A. (2009). Berseem clover and its vital role in Egyptian Agriculture. FAO Regional Expert Consultation Meeting on Irrigated Fodder Crops in the Near East Region-Forage Production, Conservation and Utilization for Sustainable Animal Production. IAV Hassan II, 15-19 June 200, Rabat Morocco.

El-Nahrawy, M.A; A.Rammah and O. Niemelainen (1997). Forage seed production in Egypt for domestic market and for export. Seed Production and Management, Tropical. ID No. 1341.pp 1-2.

Falconer, D. S. (1981). Introduction to Quantitative Genetics Longman Inc. New York 365 P.

Goulden, C.H. (1952). Method of statistical Analysis. John Willey and Sons. Inc. New York.

Graves, W.L.; W.A. Williams and C.D. Thomsen (1996). Berseem clover: A winter annual forage for California agriculture. University of California Division of Agriculture and Natural Resources, Pub. No 21536: P 12.

Johanson, I.J. and F. Goforth (1953) Comparison of controlled mass selection and recurrent selection in sweet clover (*Melilotus officinalis)*. Agron. J., 45:535-539.

Johanson, H.W., H.F. Robinson and R.E. Comstock (1955). Estimates of genetic and environmental variability in soybeaous. Agron. J. 47: 314-318.

Martiniello, P, G. and A. Iannucci (1998). Genetic variability in herbage and seed yield in selected half-sib families of berseem clover, *Trifolium alexandrinum* L. Plant Breeding, 17:559-562

Mikhiel, G.S. (1987). Studies on forage crops improvement. Ph.D. Thesis, Fac. of Agric. Alex. University, Alexandria, Egypt.

Munns, R. (2002) Comparative physiology of salt and water stress. Plant Cell. Environ., 25: 239-250.

Omar, M.K. and M.Y. Hussien (1982). Selection for productivity of green material in berseem clover (Trifolium alexandrinum L.). Assuit J. of Agric. Sci., 13:105-116.

Radwan, M.S., R. Shabana, A.M. Rammah and M.A. El-Nahrawy (1983). Variability and combining ability estimates in farmers seed lots of Egyptian clover (*Trifolium alexandrinum* L.). Proceedings of the 1st Conference on Agriculture Botany Science, April 27-28, 1983, Mansoura University, Egypt, pp: 86-105.

Radwan, M.S.; K. I.A. Gawad, M. Th. Hassan, Hoda I. M. Ibrahim and W. M. El-Debeiky (2015). The effect of planting density on estimates of genetic variance, heritability and correlation between traits of berseem clover. Egypt. J. Plant Breeding., 18(3):389-403

Rammah, A.M. and Z. Bőjtös (1976). Performance of some genotypes of Lucerne under wide and narrow spaced-planting. I. Heritability of forage yield and related traits and interrelationship among traits. Acta Agronomica Acad.Sci.Hung., 25:309-318.

Tester, M. and R. Davenport (2003). Na^+ tolerance and Na+ transport in higher plants. Ann. Bot., 91: 503-527.

Younis, A.A.; A. Rammah and F.M. Ali (1986). Efficiency of visual selection under competition conditions in five populations of berseem clover (*Trifolium alexandrinum,* L.) on forage yield. Proc. of the 2nd Egyptian Conf. of Agron. (ECA'86), Alex., 773-788.

الإنتخاب داخل وبين عينات البرسيم المصرى للمزارعيين لإنتاج عشيرة متفوقة ومتحملة للملوحة العالية

شريف عبدالغنى أبوالجـود ، حســام الدين عثمان صقر ،صلاح سالم محمد أبو فتيح و محى الدين محمد عبدالجليل
قسم بحوث محاصيل الأعلاف ، معهد ببحوث المحاصيل الحقلية ، مركز البحوث الزراعية ، جيزة ، مصر

تم أختيار تسع من العشائر والأصناف المسجلة وزراعتها بمحطة البحوث الزراعية بالسرو خلال موسمى ٢٠١٤/٢٠١٣ و ٢٠١٥/٢٠١٤. وكان نتائج التحليل التجميعى عالى المعنوية لجميع الصفات تحت الدراسة (الوزن الأخضر والجاف وطول النبات، عدد أفرع النبات، عدد بذور النبات، وزن الالف بذره ومحصول البذور/قطع تجريبية) عدا الوزن الاخضر والجاف فى الحشة الثانية وطول النبات و عدد أفرع النبات وعدد بذور النورة.

تم تقدير سلوك العشائر لكل سنة منفردة. وأوضحت النتائج أن عشيرة رقم ٥ (١٠٨ منطقة فارسكور) حققت أعلى المتوسطات لصفات المحصول الأخضر والجاف وعدد بذور النورة ووزن الألف بذرة ومحصول البذور/قطعة ومحصول الفدان بينما كانت العشيرة رقم ٣ (١٠٣ منطقة الزرقا) أعلى قيم طول النبات.

أظهرت النتائج أن الفروق بن معامل الإختلاف الوراثى والمظهرى كانت ضيقة مشيرة إلى التأثير القليل للظروف البيئية تحت الدراسة.

كانت قيمة درجة التوريث بمفهومها الواسع مشيرة إلى أن هذه الصفات أقل تأثراً لحد كبير بالبيئة وتتأثر أكثر بمكونات التباين الوراثى.

كان هناك إرتباط معنوى موجب بين محصول البذور للقطعة وبين كل من عدد الخلفات/نبات وعدد حبوب النورة ووزن الالف بذرة وكان الإرتباط بين المحصول الأخضر الكلى والجاف الكلى موجباً ومعنوياً.

مما سبق يتضح أن الإنتخاب بين الأجيال المتقدمة للعشائر جيد لتحسين إنتاج محصول عالى من المحصول الأخضر والبذرة ووجد أن العشيرة رقم ٥ (١٠٨ فارسكور) مبشرة لإنتاج صنف جديد من البرسيم المصرى متحمل لمستويات عالية من الملوحة.

Table 6: Mean performance of all the studied traits for various genotypes at the first and the second year (Y_1 and Y_2).

Genotypes	GFY CUT1/ kg plot		DFY CUT1/ kg plot		GFY CUT2/ kg plot		DFY CUT2/ kg plot		GFY CUT3/ kg plot		DFY CUT3/ kg plot		Plant height		No. of tillers		Seed no. /head		1000 Seed. W gm		Seed yield / plot		Seed yield /fed	
	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
1 (Giza composite)	17.06	23.00	0.76	2.53	20.27	21.00	2.49	2.85	27.00	33.00	3.30	5.23	91.67	91.67	14.00	15.67	39.90	43.13	2.90	2.77	683.93	600.00	227.97	200.00
2 (85)	27.20	19.67	1.57	2.51	30.53	20.00	2.44	3.24	29.33	31.67	3.56	5.62	77.00	76.00	10.33	12.00	39.60	42.97	3.03	3.11	585.76	566.23	195.25	188.74
3 (103)	17.40	24.67	1.06	2.82	20.80	22.00	1.88	3.21	33.33	32.00	4.11	4.94	103.00	103.33	7.00	8.00	47.27	50.80	3.67	3.82	679.56	625.67	226.52	208.54
4 (106)	25.13	23.80	1.46	3.11	25.53	24.67	2.61	3.69	24.00	33.67	2.93	5.33	96.00	94.67	4.67	5.33	44.37	47.03	3.34	3.53	492.40	416.40	164.13	138.80
5 (108)	21.27	24.67	1.31	2.37	25.06	24.67	2.31	3.31	40.00	28.67	5.32	4.77	94.67	94.33	6.33	7.67	50.87	53.73	3.63	3.63	655.90	749.63	218.63	249.80
6 (serw1)	26.00	24.00	1.20	2.25	29.93	23.67	2.42	3.06	24.00	32.33	2.79	5.60	82.00	85.33	3.67	5.67	41.00	41.56	3.45	3.03	445.96	538.23	148.65	179.41
7 (serw2)	25.71	27.00	1.45	3.03	27.93	23.33	2.72	3.69	21.33	34.67	2.86	5.23	90.67	91.33	7.00	8.33	31.90	30.03	3.06	3.04	449.90	473.56	149.96	157.85
8 (113)	22.20	24.33	1.58	3.21	24.93	19.67	2.57	3.40	18.67	34.00	2.27	5.15	95.33	94.67	6.33	7.33	42.47	44.63	3.04	3.58	512.00	538.63	170.66	179.54
9 (114)	21.20	22.33	0.96	1.69	25.07	20.00	2.74	2.89	16.00	25.00	1.79	3.53	80.00	82.33	6.67	7.67	34.13	35.73	3.53	3.52	635.56	630.83	211.86	210.27
LS D 5%	4.15	3.77	0.21	0.36	4.39	4.50	0.46	0.75	5.61	7.33	0.69	1.02	7.317	4.35	1.99	1.76	9.15	3.96	0.36	0.23	14.09	25.56	4.7	8.53
LS D 1%	6.09	5.49	0.31	0.52	6.39	7.18	0.68	1.09	5.17	10.68	1.01	1.95	10.08	5.99	2.75	2.43	12.61	5.46	0.50	0.32	19.42	35.22	6.48	11.75

Table 7: Mean performance of all the studied traits for various genotypes over two years (combined analysis)

Genotypes	GFY CUT1/ kg plot	DFY CUT1 kg/plot	GFY CUT2 kg/plot	DFY CUT2 kg/plot	GFY CUT3 kg/plot	DFY CUT3 kg/plot	TGFY kg/plot	TDFY kg/plot	Total GY ton/fed	Total DY ton/fed	Plant height	No. of tillers	Seed no./head	1000 s.w	Seed yield/plot.	Seed yield /fad
1 (Giza composite)	20.03	1.65	20.63	2.67	30.00	4.26	70.67	8.58	23.56	2.86	91.67	14.83	41.52	2.83	641.96	213.98
2 (85)	23.43	2.04	25.27	2.84	30.50	4.59	79.20	9.47	26.40	3.16	76.50	11.17	41.28	3.07	576.00	191.99
3 (103)	21.03	1.94	21.40	2.54	32.67	4.52	75.10	9.01	25.03	3.00	103.16	7.50	49.03	3.74	652.62	217.53
4 (106)	24.47	2.28	25.10	3.15	28.83	4.13	78.40	9.56	26.13	3.19	95.33	5.00	45.70	3.44	454.40	151.46
5 (108)	22.97	1.84	24.87	2.81	34.33	5.04	82.17	9.69	27.40	3.23	94.50	7.00	52.30	3.63	702.77	234.21
6 (serw1)	25.00	1.72	26.80	2.74	28.17	4.19	79.97	8.66	26.66	2.89	83.67	4.67	41.28	3.24	492.10	164.03
7 (serw2)	26.35	2.24	25.63	3.21	28.00	4.04	79.99	9.49	26.66	3.16	91.00	7.67	30.97	3.05	461.70	153.91
8 (113)	23.27	2.39	22.30	2.98	26.33	3.71	71.90	9.09	23.97	3.03	95.00	6.83	43.55	3.31	525.32	175.10
9 (114)	21.77	1.32	22.53	2.81	20.50	2.66	64.80	6.80	21.60	2.27	81.17	7.17	34.93	3.53	633.20	211.06
LSD 5%	2.80	0.21	4.21	0.44	4.60	0.62	5.73	1.01	1.55	0.28	5.77	1.80	6.76	0.29	19.77	6.60
LSD 1%	4.00	0.30	6.10	0.65	6.70	0.89	10.47	1.95	2.60	0.40	7.74	2.42	9.07	0.39	26.55	8.86

Table 8: Variance of environment (VE), genotypic (VG), heritability%, genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV), and genetic advance (Gs) for all studied traits during the two years.

Character	Total GFY/plot		Total DFY/plot		Plant height (cm)		Number of tillers		Seed n./head		1000 seed w.		Seed yield	
	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
G mean	74.10	77.5	6.94	10.92	90.04	90.41	7.33	8.63	41.28	43.29	3.29	3.34	571.22	571.02
$\sigma^2 e$	33.33	34.55	0.32	0.52	17.87	6.31	1.33	1.04	27.96	5.25	0.04	0.02	198.97	654.32
$\sigma^2 G$	71.96	16.92	0.79	1.28	67.97	62.86	9.14	10.22	25.99	50.40	0.07	0.12	9445.25	9139.10
$\sigma^2 P$	165.2	51.47	1.11	1.80	85.84	69.17	10.47	11.26	53.96	55.65	0.11	0.14	9644.22	9793.42
h^2%	68.31	32.06	71.44	71.11	79.18	90.87	87.27	90.78	48.18	90.57	62.28	87.20	97.94	93.32
GCV	11.44	5.31	12.85	10.37	9.15	8.76	41.22	37.05	12.35	16.40	8.08	10.39	17.01	16.74
PCV	13.83	9.26	15.13	12.30	10.29	9.20	44.13	38.87	17.18	17.23	10.25	11.14	17.19	17.33
GSu	12.32	4.15	1.321	1.68	12.83	13.22	4.94	5.33	6.19	11.82	0.36	0.57	168.32	161.61
Gs%	16.63	5.35	19.02	15.39	14.25	14.62	67.41	61.77	15.00	27.31	10.98	17.09	29.47	28.30

Table (9): Variance of genotypic (VG) and phenotypic (Vp), genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) and genetic advance (Gs) for all studied traits data are combined a cross two year

	TGFY/plot	TDFY/plot	Plant height (cm)	Number of tillers	Seed no./ plant	1000 seed w. (gm)	Seed yield / plot
G mean	75.80	8.93	90.22	7.98	42.28	3.32	571.12
$\sigma^2 e$	33.94	0.42	12.09	1.18	16.61	0.03	426.64
$\sigma^2 g$	8.49	0.41	68.25	9.98	42.23	0.07	43588.60
$\sigma^2 ge$	35.90	0.63	-2.83	-0.31	-4.03	0.02	2826.41
$\sigma^2 P$	78.33	27.95	77.51	10.86	54.81	0.12	46841.65
h^2%	10.84	1.46	88.05	91.90	77.05	57.14	93.05
GCV	3.84	7.17	9.16	39.58	15.37	8.11	36.56
PCV	11.67	13.55	9.76	41.30	17.51	10.70	37.87
GSu	1.70	0.59	13.64	3.03	10.04	0.34	354.44
Gs	2.23	6.67	15.12	37.95	23.74	10.49	62.06