J. Agric. Sci. Mansoura Univ., 33(11):7747 - 7758, 2008

PERFORMANCE AND CLUSTERING OF SESAME LANDRACES (*Sesamum indicum* L.) UNDER DIFFERENT CONDITIONS.

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ABSTRACT

Thirty-two sesame landraces (LRs) collected from 13 Governorates were evaluated in Qena and Ismailia during 2005 and 2006 seasons to explore variation within collection of landraces and to identify superior genotypes.

The LRs showed variations in days to 50% flowering, plant height, height of first capsule, branches/plant, capsules/plant, seed yield/plant, shelling%, seed index and seed oil content% for two locations. Variability study showed that, branches/plant, capsules/plant, seed yield/plant and seed index had higher genetic variation than the other traits in Qena . Also, in Ismailia the same traits (except for seed index) beside plant height and shelling% showed the same trend. These results were assured by heritability values in broad sense. Dendrogram of clustering the 32 accessions showed 2 groups (level 85%) which were regrouped at 95% to seven clusters as well as ungrouped LRs in each location. The LRs: No. 2, 21, 27, 30 and 31 and LRs: No. 6, 10, 11, 15, 27 and 30 were better and could be used directly for developing new improved varieties or for hybridization programs in each Qena and Ismailia, respectively.

Keywords: sesame, landraces, cluster analysis, variability.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is one of the most important oil seed crop grown in the world as well as in Egypt .Sesame seed contains up to 58% oil (Yermanos, 1980). Unfortunately, only 10% of Egypt's needs from vegetable oils are locally produced of which cotton seed oil is the main source. Moreover, oil crops occupy not more than 1.8-2.0% of cropped area in Egypt. Narrowing the wide gap between local production and consumption of vegetable oil, need a wide expansion of oil crops in new and marginal land far from the competition of the main crops occupied most of the old land. But the new areas frequently suffer from harsh environmental conditions such as salinity. So, it is important to search about genotypes which are more adapted to these harsh environmental conditions for used directly or in breeding programs. Genetic diversity and variability play a vital role in framing successful breeding programme. Useful variability are usually seeked in landraces, segregating populations, induced mutation …etc. Landraces (LRs) is the first priority in the agglomeration of useful variability due to adaptation and consumer acceptability characteristics (El-Ahmer *et al* 1996; El-Bramawy 1997; Abdalla *et al* 2000 and Abd El-Ghani *et al* 2007).

Collection and evaluation of landraces have been reported in sesame by Akpan-Lwo *et al* (2005). They suggested that these evaluations will enhance the selection and subsequent breeding work towards the development of improved and adaptable sesame accessions. Also, using the cluster analysis to estimate the genetic diversity and identifying superior genotypes were reported by Cornelius *et al* (1993), Phillip *et al*(1993), Narendra Kumar (1997), Van Beuningen and Busch (1997), Bisht *et al* (1998), Abdalla *et al* (2000) Zhang Xiurong *et al* (2000) and Ercan *et al* (2002).

The present study was carried out to explore the variation within collection of sesame landraces collected from 13 Governorates and choice of the parents for hybridization programme in each Qena and Ismailia Governorates.

MATERIALS AND METHODS

The materials used in this study comprised 32 sesame landraces. They were collected from the farmers who did not use the improved varieties and multiply their own seed year after year. These landraces obtained from 13 Governorates distributed from Aswan in the South to Behera and Kafr El-Sheikh in the North (Fig. 1).

This investigation was carried out at the Experimental farms, Faculty of Agriculture, South valley and Suez Canal Universities, Qena and Ismailia, respectively during 2005 and 2006 seasons. The physical and chemical properties of the soil are presented in Table (1). Each experiment was Laid out in a randomized complete block design with three replications. The experimental plot consisted of 3 ridges each 4 m long and 50 cm. apart. Seeds were planted in hills at 10 cm. within each row . All recommended agriculture practices were applied as usual. The following measurements were recorded: Days to 50% flowering (FD), plant height (PHt), height of first capsule (1st Capsule Ht), number of branches/plant (Branches/plant), number of capsules/plant (Capsules/plant), seed yield/plant (SY/Plant), shelling% (She. %**)**, seed index (S. I.). Seed oil content% (Oil%) was determined according to A.O.A.C. (1980). Data were statistically analysed and combined analysis of the two seasons was done after calculated coefficient of variation for each season (Gomez and Gomez 1984). Phenotypic and genotypic coefficients of variation (P.C.V. and G.C.V.) and broad-sense heritability (H) were calculated according to Singh and Choudhary (1976).Cluster analysis was performed using the average linkage procedure UPGMA (Un-weighted pair-group method using arithmetic average developed by Sokal and Michener (1958).

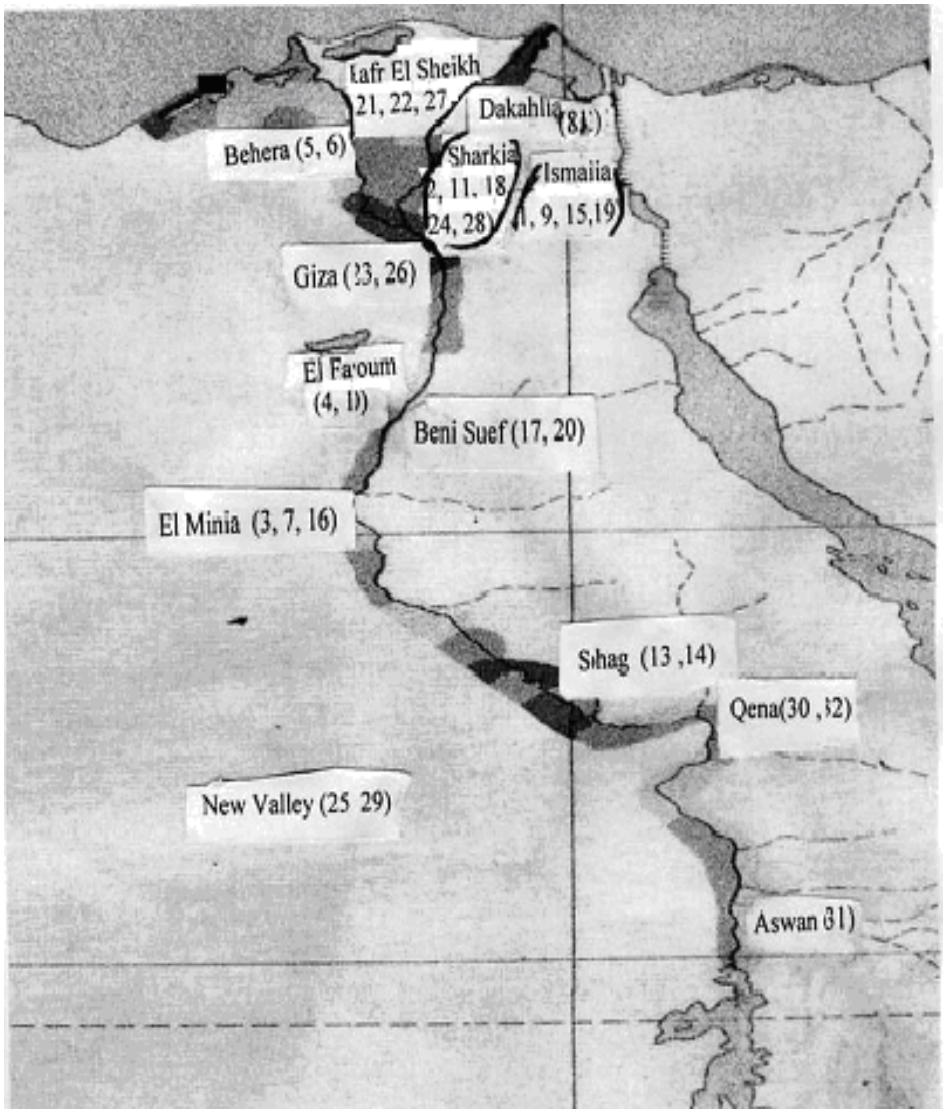

Fig. 1: Distribution of Sesame Landraces collected from various Governorates.

Table (1): Some of chemical and physical properties of the experimental sites (average two seasons).

Properties	Depth (0.0 – 90 cm.)	
	Qena	Ismailia
Soil type	Sandy clay	Sandy
PH	7.87	7.85
Organic matter (%)	1.22	0.42
Ec (ds/m)	13.6	0.46

RESULTS AND DISCUSSION

Mean squares and phenotypic and genotypic variances

The analysis of variance showed highly significant differences for all studied traits among the evaluated LRs in each season and at both locations (Table 2). Also, combined analysis shows that seasons were highly significant source of variation in performance of days to 50% flowering , plant height, height of first capsule, branches /plant, capsules/plant and shelling % in Qena and only for days to 50% flowering in Ismailia. However, height of first capsule and seed index exhibited only significant mean squares of seasons in Ismailia. Insignificant effects of seasons were recorded for the other traits in both locations. Therefore, it is clear that the performance of the present sesame collections concerning most studied traits was highly affected by environmental effects in Qena . However, this trend was not clear in Ismailia .

Table (2): Significance of mean squares due to different sources of variation for studied traits in 1st and 2nd seasons and combined over them at Qena and Ismailia Governorates.

Seasons		1st season			2nd season			Combined			
S.O.V.		Reps.	LRs	Error	Reps	LRs	Error	Season	LRs	Sea.* LRs	Error
Degrees of freedom		2	31	62	2	31	62	1	31	31	124
Gov.	traits										
Qena	FD	77.61**	3.67		37.53**	7.64		3325.01**	61.21**	53.93**	5.66
	PHt	327.10**	13.7		208.49**	8.79		19102.1**	323.6**	211.96**	11.24
	1st capsule Ht	75.03**	5.33		48.79**	3.76		4346.3**	73.93**	49.9**	4.54
	Branches/ plant	1.58**	0.07		0.25**	0.07		21.2**	1.16.**	0.67**	0.07
	Capsules/ plant	1204.34**	10.07		610.08**	32.23		50178.1**	1491.5**	322.9**	21.15
	SY/plant	10.23**	0.48		7.42**	0.92		3.51	13.87**	3.78**	0.7
	She. %	204.83**	26.54		40.88**	8.56		856.7**	140.48	105.24**	17.55
	S.I.	0.57**	0.04		0.89**	0.04		0.04	0.92**	0.53**	0.04
	Oil %	18.23**	2.51		13.22**	3.62		0.01	26.04**	5.41*	3.06
Ismailia	FD	37.04**	1.05		47.62**	4.02		234.1**	80.2**	4.46*	2.54
	PHt	447.98**	10.05		583.8**	9.5		50.02	975.5**	56.26**	9.77
	1st capsule Ht	137.13**	25.40		205.64**	14.87		181.53**	217.6**	125.18**	20.13
	Branches/ plant	4.36**	0.11		5.64**	0.17		2.13	8.67**	1.34**	0.14
	Capsules/ plant	1074.55**	46.68		848.60**	25.85		17.73	1584.78**	338.37**	36.26
	SY/plant	26.52**	0.63		24.26**	1.51		0.01	49.84**	0.95	1.07
	She. %	59.89**	4.92		55.89**	3.77		2.44	113.57**	2.21	4.34
	S.I.	0.2**	0.09		0.13**	0.02		0.36*	0.2**	0.14**	0.05
	Oil %	36.97**	3.28		32.69**	4.46		46.61	35.82**	33.83**	3.87

*** and ** indicate significant at 5% and 1% levels of probability , respectively**

Genotypes and genotypes * seasons interaction mean squares in Qena exhibited highly significant differences for all traits except for seed oil content ,was only significant. This indicates that the performance of the investigated accessions differed significantly over seasons. However, insignificant effects of genotypes * season interaction were recorded for seed yield/plant and shelling% in Ismailia.

Means, ranges, phenotypic and genotypic coefficients of variation and heritability in broad sense were estimated over two seasons for both locations (Table 3). Ranges and P.C.V. estimates apparent that LRs showed more variation for capsules/plant, seed yield/plant, branches/plant, shelling% and seed index in Qena and for these traits (except for shelling% and seed index) beside plant height and height of first capsule in Ismailia. As well as, using the estimates of G.C.V., the same traits (except for shelling% in Qena and for height of first capsule in Ismailia) had higher genetic variation than the other traits revealing that environmental effects were not of great importance on this traits. These results were assured by heritability values in broad sense. The genetic variation exhibited indicate that, selection for these traits might be effective for improvement sesame LRs under each location. Also, more phenotypic variation was observed for shelling % in Qena and for height of first capsule in Ismailia, but using the estimate of G.C.V., genetic variation was moderate. Meanwhile, genetic variation was little for days to 50% flowering in Qena and for seed oil content in Ismailia. So selection for these traits could not be useful.

Table (3): Arithmetic mean, range and phenotypic (P.C.V.) and genotypic (G.C.V.) coefficients of variation and broad sense heritability (H) for studied traits combined over the two seasons at Qena and Ismailia Governorates.

Gov.	Qena					Ismailia				
traits	Arithmetic mean	Range	P.C.V. %	G.C.V .%	H%	Arithmetic mean	Range	P.C.V. %	G.C.V .%	H%
FD	57.67	51.2-62.2	9.36	1.91	4.20	57.53	49.83 - 66.67	6.79	6.17	82.65
PHt (cm.)	110.10	96.6-130.6	10.21	3.92	14.72	122.69	99.7-150.3	11.02	10.09	83.73
1st capsule Ht (cm.)	32.06	25.1-38.8	17.00	6.25	13.50	50.92	40.8-61.5	17.71	7.71	18.93
Branches/ plant	2.98	2.1-3.98	22.00	9.49	18.60	4.45	1.5-7.7	31.10	24.82	63.87
Capsules /plant	68.47	36.25 - 106.65	27.70	20.38	54.14	86.84	54.9-133.2	22.53	16.61	54.24
SY/plant (gm.)	8.26	5.81-12.03	23.26	15.65	45.53	10.78	7.63-22.6	27.52	26.48	92.61
She. %	42.7	33.82 - 53.08	18.35	5.67	9.56	43.21	35.74 - 56.52	10.46	9.98	91.04
S.I. (gm.)	3.22	2.72-4.17	18.11	8.22	20.59	3.57	3.25-3.96	8.40	2.80	11.11
Oil %	48.46	42.69 - 51.44	5.33	3.83	51.65	45.74	41.02 - 51.77	9.25	1.26	1.84

Regarding broad sense heritability (H), the highest values were recorded in Qena for capsules/plant (54.14%), seed oil content (51.65%), seed yield/plant (45.53%), seed index (20.59%), and branches/plant (18.60%) while, the lowest one for days to 50% flowering (4.20%). Meanwhile, in Ismailia, seed yield/plant, shelling%, plant height, days to 50% flowering, branches/plant, and capsules/plant had the highest values (92.61%, 91.04%, 83.73%, 82.65%, 63.87% and 54.24% respectively) while, seed oil content had the lowest value (1.84%). The highest values of heritability indicate that a relatively large portion of the phenotypic variance is due to genetic causes. Therefore, if these highest values of heritability were accompany by high values of narrow-sense heritability, selection for these traits could be effective for improvement sesame genotypes under each location. Johanson *et al* (1955) reported that the heritability along side genetic advance should be considered in formulating an efficient selection breeding program .

Cluster analysis

Cluster analysis of quantitative traits is used frequently for categorizing the accessions into morphologically similar and presumably genetically similar groups. This method is most useful for elucidating and describing the variation of a collection and thus the efficient utilization of germplasm in breeding programs. Cluster analysis seemed to be an efficient procedure for extracting the structured relationships between accessions and provides a hierarchical classification of them (Polignano *et al* 1989). The Dendrogram for clustering the accessions in each of Qena and Ismailia obtained with the average linkage procedure are illustrated in Fig. 2a and 2b. Furthermore, the cluster means of Qena and Ismailia Governorates are presented in Tables 4 and 5, respectively.

In Qena, at the two groups level (p=85%) LRs No. 27 (Kafr El-Sheikh) , No. 30 (Qena) and No. 31 (Aswan) formed cluster B. The remaining accessions (except No. 2 obtained from Sharkia which was ungrouped) formed cluster A. Cluster B performed better than cluster A for all studied traits except for shelling%. Therefore, it can be seen that there is scope for improvement these traits through selection within this cluster especially for branches/plant, capsules/plant, seed yield/plant and seed index traits, which had higher genetic variation (Table 3). At level 95%, group A was splitted into six clusters and ungrouped accessions (No. 20 and No. 21), while group B was not splitted (Cl. 7).

Cl.1 included 3 LRs belonged to Ismailia (1), Sohag (13) and Kafr El-Sheikh (22). This cluster comprised the latest flowering plants which had the lowest shelling% and seed index compared to the other clusters.

Cl. 2 comprised 8 LRs : Sharkia (11 and 24), Dakahlia (12), Sohag (14), Ismailia (15), El-Minia (16), Beni Suef (17) and Giza (23). This cluster includes 25% of organized grouped accessions derived from cluster A and it is considered the largest cluster. Consequently, this may be the reason of its intermediary behavior in all traits compared to the other cluster/

Cl. 3 involved the earliest flowering plants, which had the highest seed oil content% compared to the other clusters. This cluster included 5

LRs, belonging to El-Minia (3), Behera (5), Ismailia (9), El-Fayoum (10) and Giza (26).

Cl. 4 included 5 LRs collected from five Governorates, El- Fayoum (4), Behera (6), El-Minia (7), Sharkia (28) and New Valley (29) . This cluster showed intermediate performance for all traits.

Cl. 5 comprised the plants which had the lowest seed oil content % accompanied by earlier flowering. This cluster involved two LRs, No. 19 belonging to Ismailia and No. 32 from Qena.

Cl. 6 consisted of 3 LRs, No. 8(Dakahlia), No. 18 (Sharkia) and No. 25 (New Valley). This cluster showed high performance for shelling% but it exhibited the shortest plants which had the lowest height of first capsule, branches/plant, capsules/plant and seed yield/plant.

Cl. 7 (Group B) involved 3 LRs: Kafr El Sheikh (27), Qena (30) and Aswan (31). This cluster comprised the tallest plants which had the highest of first capsule height, branches/plant, capsules/plant, seed yield/plant and seed index. Therefore, high yielding ability could be obtained from selecting within this cluster.

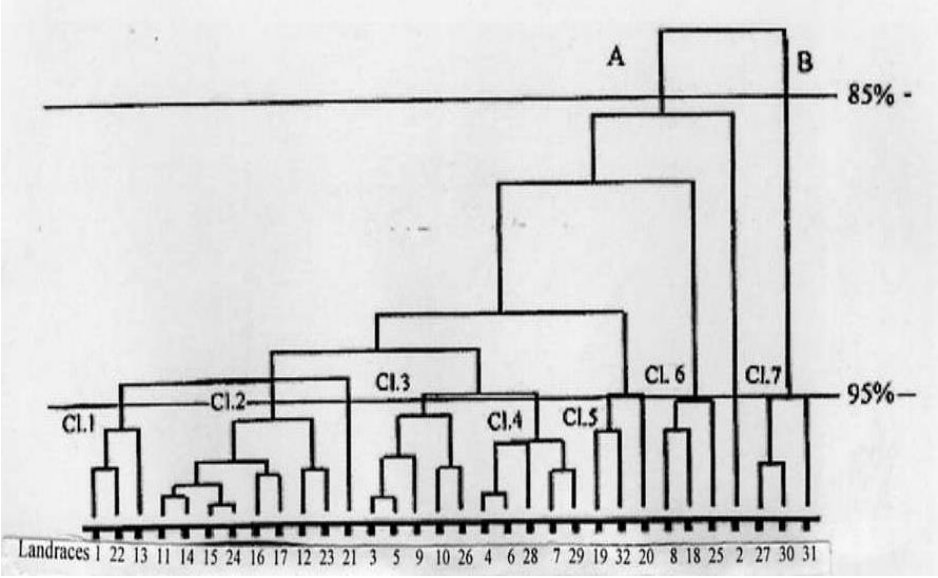

Fig. 2a: Dendrogram based on cluster analysis of 32 Sesame Landraces sown in Qena Governorate.

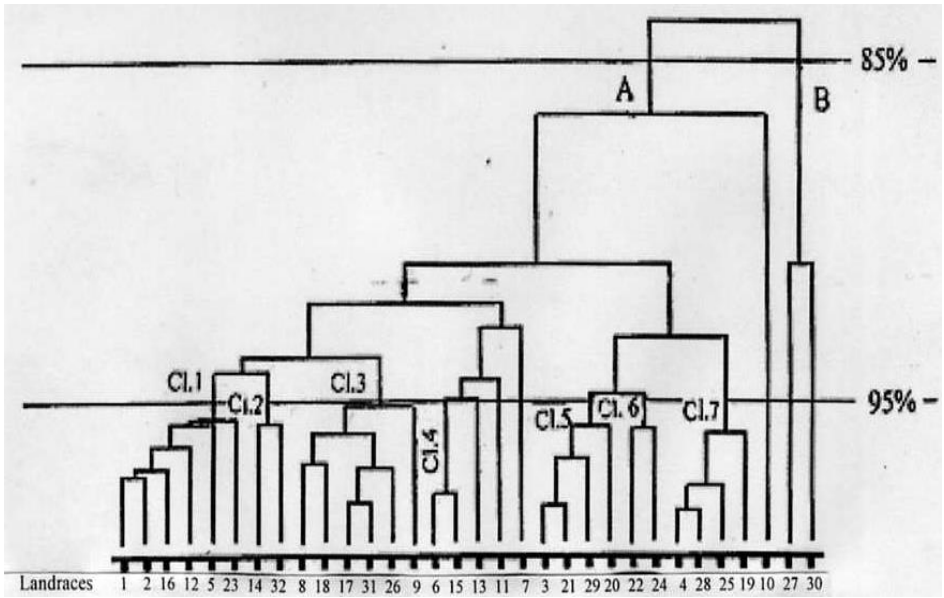

Fig. 2b: Dendrogram based on cluster analysis of 32 Sesame Landraces sown in Ismailia Governorate.

At this level, cluster A was classified into 6 clusters and 2 ungrouped accessions as well as one ungrouped accession separated at 85% level. The first ungrouped accession is LR No. 2 (Sharkia) which is traitized by early flowering and highest seed index.

The second ungrouped accession is LR No. 20 (Beni Suef), which showed intermediate performance for all traits. The third ungrouped accession is LR No. 21 (Kafr El-Sheikh). This was marked by late flowering (after 61.83 days from sowing) in addition to its possess of the highest branches/plant and lowest seed index.

On the other side, in Ismailia at level 85% it can be also noticed that each LR No. 27(Kafr El-Sheikh) and No. 30 (Qena) formed cluster B. The remaining accessions (except No. 10 obtained from El-Fayoum which was ungrouped) formed cluster A. Cluster B performed better than cluster A for seven traits out of 9. Therefore, improving flowering date and height of first capsule only could be achieved through selection within cluster A. But the chance of improving may be little because these traits had intermediate genetic variation (Table 3). While, for improving the remaining traits especially for plant height, branches/plant, capsules/plant and seed yield/plant which had higher genetic variation cluster B should be recommended.

At level 95% group A was classified into seven clusters and four ungrouped accessions as well as group B which became ungrouped.

Cl. 1 includes 6 LRs, No. 1 (Ismailia), No. 2 (Sharakia), No, 5 (Behera), No. 12 (Dakahlia), No. 16 (El-Minia), and No. 23 (Giza). This cluster possessed the highest oil% (47.22%).

Cl. 2 comprised 2 LRs, No. 14 (Sohag) and No. 32 (Qena). This cluster exhibited the shortest first capsule height (44.65 cm.).

Cl.3 consisted of 6 LRs, No. 8 (Dakahlia), No. 9 (Ismailia), No. 17 (Beni Suef), No. 18 (Sharkia), No. 26 (Giza) and No. 31 (Aswan). This cluster showed highest performance for seed yield/plant and shelling%.

Cl. 4 grouped two accessions, No. 6 (Behera) and No. 15 (Ismailia). This cluster exhibited the earliest flowering plants compared to the other clusters.

Cl. 5 included 4 LRs No. 3 (El-Minia), No. 20 (Beni Suef), No. 21 (Kafr El-Sheikh) and No. 29 (New Valley). The LRs belonging to this cluster were having highest branches/plant.

Cl. 6 comprised two LRs, No. 22 (Kafr El-Sheikh) and No. 24 (Sharkia). This cluster possessed the tallest plants, which had the highest capsules/plant of all clusters.

Cl. 7 consisted of 4 accessions, No. 4 (El-Fayoum), No. 19 (Ismailia), No. 25 (New Valley) and No. 28 (Sharkia). This cluster exhibited higher seed index compared to the other clusters.

Concerning the ungrouped LRs, it can be noticed that each LRs No. 7 (El-Minia) and No. 13 (Sohag) showed intermediate performance for all traits. However, the remaining ungrouped LRs:

Table (4): Mean of traits of groups and clusters of 32 sesame landraces (LRs) evaluated under Qena condition in 2005 &2006 seasons (combined data) .

Traits	LRs included	FD	PHt	1st Capsule Ht	Branches/ Plant	Capsules/ Plant	SY/Plant	She. %	S. I.	Oil %
Two Groups level										
A	**29**	58.03	109.14	31.67	2.92	66.01	8.01	42.86	3.22	48.41
B	**3**	57.56	119.47	35.78	3.63	92.33	9.43	41.16	3.59	48.95
Final clusters										
Cl. 1	**3**	59.11	115.43	34.62	2.98	74.58	7.83	34.92	2.99	47.02
Cl. 2	**8**	58.85	113.16	32.74	3.05	73.75	8.40	39.42	3.16	49.53
Cl. 3	**5**	57.60	103.22	31.74	2.91	64.87	8.51	46.64	3.22	50.30
Cl. 4	**5**	58.50	104.62	30.90	3.09	55.62	7.17	41.62	3.17	48.79
Cl. 5	**2**	56.75	113.16	29.30	2.71	70.97	7.54	44.24	3.45	46.75
Cl. 6	**3**	56.89	102.73	29.17	2.20	44.86	6.48	50.94	3.11	48.10
Cl. 7	**3**	57.56	119.47	35.78	3.63	92.33	9.43	41.16	3.59	48.95
Ungrouped										
No. 2	**-**	54.67	102.30	29.30	2.80	72.10	10.98	46.72	3.73	42.69
No. 20	**-**	58.00	119.10	34.10	2.87	55.10	7.10	46.75	3.33	43.46
No. 21	**-**	61.83	110.80	34.80	3.70	69.65	7.72	41.85	2.85	46.83

Table (5): Mean of traits of groups and clusters of 32 sesame landraces (LRs) evaluated under Ismailia condition in 2005 &2006 seasons (combined data) .

Traits	LRs included	FD	PHt	1st Capsule Ht	Branches/ Plant	Capsules/ Plant	SY/Plant	She. %	S. I.	Oil %
Two Groups level										
A	**29**	57.34	122.47	50.55	4.34	86.61	10.27	40.87	3.58	45.33
B	**2**	61.25	137.40	58.40	6.40	144.55	19.41	49.28	3.59	48.60
Final clusters										
Cl. 1	**6**	55.50	120.50	48.85	4.77	96.02	10.52	42.37	3.50	47.22
Cl. 2	**2**	59.25	117.60	44.65	5.15	94.10	10.72	38.95	3.72	43.87
Cl. 3	**6**	58.17	108.57	44.88	3.70	78.45	11.63	47.71	3.63	45.27
Cl. 4	**2**	50.25	120.90	44.95	3.73	92.30	10.02	40.92	3.57	42.56
Cl. 5	**4**	59.66	135.43	58.23	5.76	94.15	10.45	44.65	3.51	44.44
Cl. 6	**2**	64.67	129.40	56.95	5.20	98.40	9.08	37.64	3.41	46.13
Cl. 7	**4**	58.00	126.05	56.45	3.80	74.13	9.32	43.10	3.77	46.38
Ungrouped										
No. 7	**-**	55.17	138.00	41.30	4.30	78.60	8.01	41.83	3.32	44.87
No. 10	**-**	50.50	99.70	47.50	3.70	66.60	8.70	41.15	3.25	51.77
No. 11	**-**	54.83	141.70	52.70	2.97	59.70	10.43	35.74	3.64	42.44
No. 13	**-**	52.00	115.80	47.70	1.50	54.90	7.70	39.10	3.58	43.86
NO. 27	**-**	61.17	131.30	59.90	5.10	95.90	22.60	47.80	3.41	48.52
No. 30	**-**	61.33	143.50	56.90	7.70	133.20	16.21	50.76	3.76	48.67

No. 10 (El- Fayoum), No. 11 (Sharkia), No. 27 (Kafr El-Sheikh) and No. 30 (Qena) showed the highest performance for seed oil content % (51.77%), plant height (141.70), seed yield/plant (22.60) and shelling% (50.76%) respectively, compared to the other ungrouped LRs and clusters.

The cluster pattern of the LRs shows that geographic diversity is not related with genetic diversity. These results are in agreement with Narendra Kumar (1997).

Finally, the present results showed that group B comprising LRs No. 27 , No. 30 and No. 31 as well as LRs No. 2 and No. 21 were better and adaptable in Qena . Also, in Ismailia group B containing LRs No. 27 and No. 30 and cluster 4 (earliest flowering plants) as well as LRs No. 10 and No. 11 were better and adaptable. Therefore, these LRs could be used directly for developing new improved varieties or for hybridization programs in each location.

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أداء بعض السلالات المحلية للسمسم وتقسيمها إلى مجموعات باستخدام التحليل العنقودي تحت بيئات مختلفة .

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نفذت هذه الدراسة بالمزرعة التجريبية لكليتي الزراعة بقنا جامعة جنوب الوادي و بالإسماعيلية جامعة قناة السويس لتقييم ٣٢ سلالة محلية من السمسم تم تجميعها من ١٣ محافظة خلال موسمي ٢٠٠٥ و ٢٠٠٦ بهدف دراسة التباينات وتحديد السلالات المتفوقة والمتأقلمة تحت ظروف كل محافظة لاستخدامها مباشرة أو إدخالها في برامج التهجين. أشارت النتائج الى تباين السلالات المحلية فى صفات عدد الأيام حتى ٥٠% تزهير وارتفاع النبات وارتفاع اول كبسولة وعدد الأفرع/نبات وعدد الكبسولات /نبات ومحصول البذور/نبات ونسبة التصافي ودليل البذرة إضافة الى نسبة الزيت . وقد أظهرت دراسة التباين تسجيل صفات عدد الأفرع/نبات وعدد الكابسولات/نبات ومحصول البذور/نبات ودليل البذرة لتقديرات عالية من التباين الوراثى مقارنة بالصفات الأخرى فى قنا . كما أظهرت نفس الصفات (ما عدا دليل البذرة) بالاضافة الى صفتى ارتفاع النبات ونسبة التصافى نفس النتائج فى الاسماعيلية. وقد أكدت قيم درجة التوريث بالمفهوم العريض تلك النتائج . و أظهر التحليل العنقودى لبيانات السلالات انها تتبع مجموعتين رئيستين (مستوى ٨٥%) وقسمت هاتين المجموعتين عند مستوى ٩٥% إلى سبعة عناقيد فرعية إضافة إلى عدة سلالات لم تنتمى لأى مجموعة فرعية وذلك فى كل منطقة.

كما بينت النتائج أن السلالات المحلية رقم ٢, ٢١, ٢٧, ٣٠, ٣١, والسلالات رقم ٦, ١٠, ١١, ١٥, ٢٧, ٣٠ قد تفوقت حيث يمكن استخدامها مباشرة لإنتاج أصناف جديدة أو إدخالها فى برامج التهجين فى كل من قنا والإسماعيلية، على التوالي .