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PERFORMANCE OF SOME PEA CULTIVARS UNDER THE CONDITIONS OF UPPER EGYPT

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Abstract

Comparative trials were carried out on five pea cultivars during the winter of two successive seasons, i.e., 1995 and 1996 under Sohag and Kena (Southern Egypt) conditions. Highly significant differences were existed among cultivars for all studied traits. Mammoth Melting Sugar and Toledo Sugar cvs. produced the highest pod length and pod width, and had some better in fresh yield of pods. Sohag location was superior to Kena location in pod length and seed/pod. Moreover, pod width, pods/plant and fresh yield of pods were costantly in the two locations.

INTRODUCTION

Peas (*Pisum sativum* L.) is one of the most important legume crops in Egypt. It is grown for local and export markets, as a vegetable crop for the green pod stage and/or for dry seeds (mature stage).

Environmental conditions may vary from location to another, as well as from year to year. There are many new cultivars of pea which are imported every year from different countries for evaluation under Egypt's coditions. Therefore, it is deemed necessary to determine the differential varietal response and the degree of adaptation in regions other than those where they were developed.

There are many investigations on pea evaluation conducted in Egypt's and other countries. Studies by Schneider (1956); Fletcher et al. (1966); Nekljudov et al. (1970); Dishlr and Rashal (1973); Richter (1974); Shalaby (1974); Becwar and Bagett (1978), and Gupta (1982) revealed that the linear portion of the genotype x environmental interaction was greater than the non linear for all characters except for pod yield per plant.

The purpose of the present investigation was to study the performance of five pea cultivars under the conditions of Southern Egypt (Sohag and Kena locations) over two years.

MATERIALS AND METHODS

This investigation was carried out at Shandaweel and Mataana Research Stations of the Agricultural Research Centre, Ministry of Agriculture, Egypt, during the winter seasons of 1995 and 1996. Shandaweel is located in Sohag governorate, whereas Mataana in Kena.

Five genotypes (cultivars), namely, Toledo Sugar, Mammoth M.S, Sugar GEM, Filanon (N0050) and Corgi 1121 were used. They were introduced from Holland.

Seeds were planted on the 10th and 7th of November in the first and second years, respectively, at two locations.

The experimental design was randomized complete blocks with three replications. The area of experimental plot was 3 x 4 (12 m2). Common cultural practices in the field were followed.

The following characters were determined:

1- Pod length and width (cm).

2- Number of seeds/pod.

3- Number of pods/plant.

4- Pod-filling, Calculated according to Remison (1978) as follows:

$$\frac{\text{No. Seeds/pod}}{\text{Pod length (cm)}}$$

5- Total yield (ton/feddan) of green pods.

Genotype x environment interaction was explained by three ways:

1- Effect of years on the performance of genotypes within each location and the interaction between years and genotypes (each location x two years)

2- Effect of the locations and genotypes x location interaction in each year (each one year x two locations).

3- The three factors interaction analysis.

The combined analysis of variance was calculated as out lined by Little and Hills (1975).

Genotypic and phenotypic coefficient of variability were estimated as suggested by Burton (1952). Broad sense heritability was calculated according to Hanson and Robinson (1956).

RESULTS AND DISCUSSION

Individual location (1 location x 2 years analysis):

The combined analysis for both years (Table 1 and 2) indicates significant differences among the five varieties for all the studied characters in the two, separate, locations except number of seeds per pod at Sohag location. This could be due to that this character was highly affected by seasons in which the evironment main effect and varieties x environment interaction were highly significant for this character. Moreover, no significant differences between the two years for all the studied traits except for pod length and number of seeds per pod were existed in both Sohag and Kena locations, which were highly significant. The genotype x year interaction was significant for all characters except for number of pods per plant at Sohag location and pod length and pod width at Kena location, which were not significant.

Variance components for the characters are presented in Tables 1 and 2. The $\sigma^2 g$ were large in magnitude compared to $\sigma^2 e$, reflecting the genetic differences among varieties, for all characters except for number of seeds/pod and number of pods/plant, at Sohag location, which refer to the large sampling error involved in both traits. Negative values, in some cases, are suggestive of the size of sampling error involved (Miller *et al.*, 1959). These results indicate that substantial amounts of genetic variance were obtained for all characters, in the two locations, except number of seeds per pod and number of pods per plant at Sohag. However, the plot error variances were high for the two characters. The superior varieties over the two years (Tables 6-11) were Mammoth Melting Sugar, in pod length and pod width; at both locations. Otherwise, Corgi in number of seeds/pod and pod/filling, Toledo Sugar in number of pods/plant, and Fillanon in yield, at Sohag; and also, Sugar GEM were found superior in number of seeds/pod and pod-filling and Mammoth Melting Sugar in number of pods/plant and yield at Kena location.

Estimated phenotypic and genotypic coefficient of variability (Tables 1 and 2) were observed with slight difference between them for the most studied characters,

Table 1. Mean squares components of the combined analysis of variance for the studied traits over two years at Sohag location.

Source \ Trait	Pod length	Pod width	No. seeds/ pod	No. pods/ plant	Pod filling	Fresh yield of pods
Years (Y)	14.81**	0.0148	8.604**	468.7	0.0006	3.973
Rep./Years (R/Y)	0.61	0.0127	0.086	91.8	0.0017	0.629
Varietis (V)	11.08**	1.0021**	0.459	725.1**	0.0691**	7.121**
Var. x Years (VxY)	1.17*	0.0321**	1.130**	233.7	0.0109*	0.946*
Error σ^2e	0.37	0.0040	0.237	159.8	0.0040	0.304
σ^2g	1.65	0.161	-0.112	81.9	0.0097	1.029
σ^2Y	0.76	-0.001	0.415	13.1	-0.0006	0.168
σ^2VxY	0.27	0.009	0.298	24.6	0.0023	0.214
PCV %	15.6	26.8	4.256	18.9	14.0	26.1
GCV %	14.8	26.4	0.000	15.6	12.9	24.3
Heritability h^2b %	89.4	96.8	0.000	67.8	84.2	86.7

PCV = Phenotypic coefficient of variability.

GCV = Genotypic coefficient of variability.

*,** Significant at 0.05 and 0.01 levels, respectively

Table 2. Mean squares components of the combined analysis of variance for the studied traits over two years at Kena location.

Source \ Trait	Pod length	Pod width	No. seeds/ pod	No. pods/ plant	Pod filling	Fresh yield of pods
Year (Y)	20.55**	0.0128	4.55**	16.3	0.054	0.239
Rep./Year (R/Y)	0.89	0.0468	0.17	23.7	0.019	0.187
Varieties (V)	5.57**	0.8510**	2.04**	1649.7**	0.148**	4.813**
Var. x Year (VxY)	0.33	0.0065	0.52**	128.1**	0.020*	1.884**
Error σ^2e	0.40	0.0374	0.134	25.2	0.007	0.228
σ^2g	0.87	0.1407	0.253	253.6	0.021	0.488
σ^2Y	1.12	0.0004	0.224	-6.2	0.002	-0.09
σ^2VxY	-0.02	-0.0103	0.128	34.3	0.004	0.552
PCV %	12.9	23.9	10.0	28.3	19.5	23.1
GCV %	11.8	23.8	8.7	27.2	18.1	18.0
Heritability h^2b %	94.1	99.2	74.6	92.2	86.7	60.9

PCV = Phenotypic coefficient of variability.

GCV = Genotypic coefficient of variability.

*,** Significant at 0.05 and 0.01 levels, respectively

referring to highly genotypic variances as calculated from the combined analysis of variance.

The results could be due to the confounding estimate of genetic variance by components of genotypic x year, genotypic x location and genotypic x year x location interactions (O'Brien *et al.*, 1978).

Individual year (1 year x 2 locations analysis)

The combined analysis of variance between the two locations, for individual years, are shown in Tables 3 and 4. Insignificant differences among the locations for all the characters except for pod length, seeds number per pod and pod-filling in the combined analysis of the second year between both the locations. Significant differences among the genotype x location interaction effect were found for all the characters studied in both years except for pod width and number of pods plant; at the first year; and pod length at the second year.

Variance components for the traits show that the genetic variances (σ^2g) were large in magnitude compared to error variances (σ^2e) for all characters at both years except pod length, number of seeds/pod, pod filling and green yield in the second year. These results indicate that substantial amounts of genetic variance were obtained for most characters in some environments.

Estimates of the phenotypic and genotypic coefficient of variability were large in magnitude for most traits. Slight discrepancy among P.C.V. and G.C.V. was observed for the most traits reflecting the high estimates of genotypic variances. The obtained results are in with those reported by Shalaby (1974).

The 3-factors combined analysis (V x Y x L):

As shown in Table 5, significant differences were observed among the two locations of study for some of pod characters, i.e., pod filling, pod length and number of seeds/pot. Sohag location was superior to Kena location in pod length and number of seeds/pod, While Kena exceeded Sohag location in pod-filling. There with all width, number of pods/plant and gren yield were constantly in the two locations. Thereto, no sigificant differences were found between the two years for all characters except for number of pods/plant,pod-filling and green yield.

Moreover, highly significant differences were found among genotypes for all studied traits. The Sugar GEM cv. had the highest values of seeds number/pod, pod-

filling and number of pods/plant (Tables 6-11). Mammoth Melting Sugar and Toledo Sugar cvs. produced the highest pod length and pod width, and had some better in green yield. All the same, Fillanon, Mammoth Melting Sugar and Toledo Sugar had heavy yield (>3 tons/feddan).

The year x location interaction effect was significant in all studied traits except for pod width, pods number/plant and yield; where; the significance of year x location interaction indicates that peas (as average of all varieties) produced relatively better at some location in some years than it did in other years.

The genotype x year interaction effect was significant for each of pod length, seeds number/pod and yield, indicates that some genotypes, as an average for all locations, yielded better in some years. However, the mean square for varieties (Tabel 5) was significantly greater than the mean supenior for variety x year interaction, then, some varieties are considered superior to others.

The genotype x location effects was significant for all variables except for pod width revealed that some genotypes were superior at all locations, as an average of all years. Insignificant differences neither among locations nor location x genotype interaction effects were obtained for pod width, then, the best genotypes in one location will be the best in all.

The interaction of genotype x location was significantly exceeds genotype x location x year interaction, for all studied characters except pod width, it is clear that the differential response of the genotypes at the individual locations was sufficiently similar in the different years to warrat the conclusion that, these differential responses may be permanent features for these locations.

Finally, the three-factor interaction of genotypes, location and years demonstrate that the genotypes x years interaction was different at the diffrent locations, i.e. in the pod width and number of pods/plant traits.

Similar findings were recorded by Zyl (1966), Pandey and Gritton (1975), Timofeev (1981), Waly (1982), Kuksal *et al.* (1983), Singh *et al.* (1984) and Zayed (1988).

Table 3. Mean squares components of the combined analysis of variance for the studied traits over two years location in 1995 season.

Source \ Trait	Pod length	Pod width	No. seeds/ pod	No. pods/ plant	Pod filling	Fresh yield of pods
Location (L)	0.134	0.027	0.16	51.84	0.00006	2.630
Rep./Location (R/L)	0.174	0.041	0.131	87.994	0.00235	0.403
Variety (V)	12.261**	1.125**	0.844**	832.800**	0.08613**	4.734**
Var. x L.	0.784**	0.009	0.499**	54.188	0.00673**	1.731**
Error σ^2e	0.107	0.035	0.045	97.684	0.00134	0.169
σ^2g	1.913	0.186	0.057	129.769	0.0132	0.050
σ^2L	-0.036	0.001	-0.019	-0.130	-0.0004	0.501
σ^2VxL	0.226	-0.009	0.151	-14.499	0.0018	0.521
PCV %	17.6	28.3	6.2	19.5	15.6	21.0
GCV %	17.1	28.2	3.9	18.8	15.0	16.7
Heritability h^2b %	93.6	99.2	40.9	93.5	92.2	63.4

PCV = Phenotypic coefficient of variability.

GCV = Genotypic coefficient of variability.

** Significant at 0.01

Table 4. Mean squares components of the combined analysis of variance for the studied traits over two years location in 1996 season.

Source \ Trait	Pod length	Pod Width	No. seeds/ pod	No. pods/ plant	Pod filling	Fresh yield of pods
Location (L)	64.267**	0.024	21.778**	108.5	0.0620*	0.0138
Rep./Location (R/L)	1.323	0.018	0.126	27.5	0.0048	0.4137
Variety (V)	4.517**	0.739**	1.583**	1314.2**	0.1065**	4.7924**
Var. x L.	0.583	0.019*	1.215**	535.3**	0.0484**	3.5061**
Error σ^2e	0.659	0.0060	0.326	87.3	0.0099	0.3629
σ^2g	0.656	0.1200	0.061	129.8	0.0097	0.2144
σ^2L	3.538	0.0002	1.142	-23.7	0.0008	-0.1940
σ^2VxL	-0.025	0.004	0.296	149.3	0.0128	1.0478
PCV %	10.8	22.4	8.3	26.3	16.6	23.4
GCV %	10.1	22.1	4.0	20.3	12.2	12.1
Heritability h^2b %	87.1	97.4	23.2	59.3	54.5	26.8

PCV = Phenotypic coefficient of variability.

GCV = Genotypic coefficient of variability.

*,** Significant at 0.05 and 0.01 levels, respectively

Table 5. Mean squares components of the combined analysis of variance for the studied traits over two years and two locations.

Source \ Trait	Pod length	Pod width	No. seeds/ pod	No. pods/ plant	Pod filling	Fresh yield of pods
Year (Y)	0.233	0.0276	0.32	329.8*	0.022*	3.082*
Location (L)	29.361**	0.0507	9.10**	5.17	0.029*	1.513
Y x L	35.140**	0.0003	12.84**	155.2	0.033*	1.131
Error (Ea)	0.748	0.0298	0.13	57.8	0.004	0.408
Varieties (V)	18.846**	2.2097**	1.70**	2385.0**	0.218**	8.756**
V x Y	1.286*	0.0264	1.21**	191.4	0.013	2.676**
V x L	1.130*	0.0139	1.29**	464.7**	0.043**	5.565**
V x L x Y	0.510	0.0200	0.77*	273.7*	0.023*	0.719
Error (Eb)	0.460	0.0248	0.22	107.1	0.007	0.319

PCV = Phenotypic coefficient of variability.

GCV = Genotypic coefficient of variability.

*,** Significant at 0.05 and 0.01 levels, respectively

Table 6. The combined means of the pod length (cm) as influenced by year, location, genotypes of pea and their interactions.

Environment / Character		Over two locations		Over two years		Over two locations, two years (cm)
		1995 (cm)	1996 (cm)	Sohag (cm)	Kena (cm)	
Toledo Sugar		8.7	8.5	9.2	8.0	8.6
Mammoth M.S		11.0	9.7	11.5	9.1	10.3
Sugar GEM		7.0	7.5	7.8	6.7	7.3
Filanon (N 0060)		7.5	7.4	7.9	7.0	7.5
Corgi (1121)		7.7	7.7	8.0	7.4	7.7
Comb. mean		8.4	8.2	8.9	7.6	8.3
LSD:						
Variety (V)	5%	0.39	0.97	0.72	0.75	0.56
	1%	0.53	1.31	0.98	1.01	0.75
Year (Y)	5%	-	-	0.72	0.87	NS
	1%	-	-	1.20	1.45	NS
Location (L)	5%	NS	1.06	-	-	0.47
	1%	NS	1.77	-	-	0.69
V x Y	5%	-	-	1.02	NS	0.79
	1%	-	-	NS	NS	1.06
V x L	5%	0.55	NS	-	-	0.79
	1%	0.75	NS	-	-	1.06
Y x L	5%	-	-	-	-	0.67
	1%	-	-	-	-	0.97
V x Y x L	5%	-	-	-	-	NS
	1%	-	-	-	-	NS

NS = Not significant.

Table 7. The combined means of the pod length (cm) as influenced by year, location, genotypes of pea and their interactions.

Environment / Character		Over two locations		Over two years		Over two locations, two years (cm)
		1995 (cm)	1996 (cm)	Sohag (cm)	Kena (cm)	
Toledo Sugar		2.02	1.96	2.02	1.96	1.99
Mammoth M.S		2.26	2.16	2.18	2.24	2.21
Sugar GEM		1.23	1.36	1.25	1.34	1.30
Filanon (N 0060)		1.20	1.27	1.18	1.29	1.24
Corgi (1121)		1.23	1.34	1.29	1.29	1.29
Comb. mean		1.59	1.62	1.58	1.62	1.61
LSD:						
Variety (V)	5%	0.224	0.092	0.075	0.230	0.1299
	1%	0.303	0.125	0.102	0.311	0.1737
Year (Y)	5%	-	-	NS	NS	NS
	1%	-	-	NS	NS	NS
Location (L)	5%	NS	NS	-	-	NS
	1%	NS	NS	-	-	NS
V x Y	5%	-	-	0.106	NS	NS
	1%	-	-	0.144	NS	NS
V x L	5%	NS	0.130	-	-	NS
	1%	NS	NS	-	-	NS
Y x L	5%	-	-	-	-	NS
	1%	-	-	-	-	NS
V x Y x L	5%	-	-	-	-	NS
	1%	-	-	-	-	NS

NS = Not significant.

Table 8. The combined means of the No. seeds/pod as influenced by year, location, genotypes of pea and their interactions.

Environment / Character		Over two locations		Over two years		Over two locations, two years
		1995	1996	Sohag	Kena	
Toledo Sugar		5.8	5.7	6.5	5.0	5.8
Mammoth M.S		6.6	6.1	6.5	6.1	6.3
Sugar GEM		5.8	7.1	6.3	6.6	6.5
Filanon (N 0060)		5.6	5.8	6.1	5.3	5.7
Corgi (1121)		6.1	6.0	6.7	5.4	6.1
Comb. mean		6.0	6.1	6.4	5.7	6.1
LSD:						
Variety (V)	5%	0.253	0.679	NS	0.435	0.389
	1%	0.342	0.920	NS	0.590	0.520
Year (Y)	5%	-	-	0.272	0.383	NS
	1%	-	-	0.450	0.635	NS
Location (L)	5%	NS	0.329	-	-	0.195
	1%	NS	0.546	-	-	0.284
V x Y	5%	-	-	0.819	0.616	0.550
	1%	-	-	1.109	0.834	0.736
V x L	5%	0.357	0.960	-	-	0.550
	1%	0.484	1.300	-	-	0.736
Y x L	5%	-	-	-	-	0.276
	1%	-	-	-	-	0.402
V x Y x L	5%	-	-	-	-	0.778
	1%	-	-	-	-	NS

NS = Not significant.

Table 9. The combined means of the No. pods/plant as influenced by year, location, genotypes of pea and their interactions.

Environment / Character		Over two locations		Over two years		Over two locations, two years
		1995	1996	Sohag	Kena	
Toledo Sugar		60.0	58.5	64.2	54.4	59.3
Mammoth M.S		63.9	69.2	57.2	75.9	66.6
Sugar GEM		76.2	61.3	61.8	75.6	68.7
Filanon (N 0060)		55.0	47.6	53.4	49.3	51.4
Corgi (1121)		38.8	28.3	38.0	29.0	33.5
Comb. mean		58.8	53.2	54.9	56.8	55.9
LSD:						
Variety (V)	5%	11.8	11.1	32.0	6.0	8.5
	1%	15.9	15.1	43.4	8.1	11.4
Year (Y)	5%	-	-	NS	NS	4.1
	1%	-	-	NS	NS	NS
Location (L)	5%	NS	NS	-	-	NS
	1%	NS	NS	-	-	NS
V x Y	5%	-	-	NS	8.4	NS
	1%	-	-	NS	11.4	NS
V x L	5%	NS	15.7	-	-	12.1
	1%	NS	21.3	-	-	16.1
Y x L	5%	-	-	-	-	NS
	1%	-	-	-	-	NS
V x Y x L	5%	-	-	-	-	17.1
	1%	-	-	-	-	22.8

NS = Not significant.

Table 10. The combined means of the pod filling as influenced by year, location, genotypes of pea and their interactions.

Environment / Character		Over two locations		Over two years		Over two locations, two years
		1995	1996	Sohag	Kena	
Toledo Sugar		0.671	0.655	0.710	0.616	0.663
Mammoth M.S		0.600	0.647	0.571	0.675	0.623
Sugar GEM		0.829	0.986	0.807	1.009	0.908
Filanon (N 0060)		0.747	0.791	0.768	0.770	0.769
Corgi (1121)		0.793	0.782	0.831	0.744	0.788
Comb. mean		0.728	0.772	0.737	0.763	0.750
LSD:						
Variety (V)	5%	0.044	0.119	0.075	0.101	0.068
	1%	0.059	0.161	0.102	0.137	0.091
Year (Y)	5%	-	-	NS	NS	0.033
	1%	-	-	NS	NS	NS
Location (L)	5%	NS	0.064	-	-	0.033
	1%	NS	NS	-	-	NS
V x Y	5%	-	-	0.107	0.143	NS
	1%	-	-	0.145	0.194	NS
V x L	5%	0.062	0.168	-	-	0.096
	1%	0.084	0.227	-	-	0.128
Y x L	5%	-	-	-	-	0.046
	1%	-	-	-	-	NS
V x Y x L	5%	-	-	-	-	0.136
	1%	-	-	-	-	NS

NS = Not significant.

Table 11. The combined means of the green yield (ton/feddan) as influenced by year, location, genotypes of pea and their interactions.

Environment / Character		Over two locations		Over two years		Over two Locations, two years t/fed.
		1995 t/fed.	1996 t/fed.	Sohag t/fed.	Kena t/fed.	
Toledo Sugar		3.173	3.109	3.878	2.404	3.141
Mammoth M.S		3.203	3.878	2.664	4.416	3.540
Sugar GEM		2.910	2.670	2.907	2.673	2.790
Filanon (N 0060)		4.548	3.851	4.664	3.735	4.200
Corgi (1121)		3.898	1.780	3.691	1.987	2.839
Comb. Mean		3.546	3.058	3.561	3.043	3.302
LSD:						
Variety (V)	5%	0.489	0.716	0.656	0.568	0.466
	1%	0.662	0.970	0.888	0.769	0.623
Year (Y)	5%	-	-	NS	NS	0.348
	1%	-	-	NS	NS	NS
Location (L)	5%	NS	NS	-	-	NS
	1%	NS	NS	-	-	NS
V x Y	5%	-	-	0.927	0.803	0.659
	1%	-	-	NS	1.088	0.881
V x L	5%	0.692	1.013	-	-	0.659
	1%	0.937	1.372	-	-	0.881
Y x L	5%	-	-	-	-	NS
	1%	-	-	-	-	NS
V x Y x L	5%	-	-	-	-	NS
	1%	-	-	-	-	NS

NS = Not significant.

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سلوك بعض أصناف البسلة تحت ظروف مصر العليا

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أجري هذا البحث بمعهد بحوث البساتين (محطات بحوث جنوب الوادي) لدراسة مدي إستجابة وسلوك أصناف البسلة تحت ظروف منطقتي قنا وسوهاج خلال موسمي شتاء ١٩٩٥ ، ١٩٩٦ حيث لم تجر أي دراسات تقييم لأصناف أو سلالات البسلة تحت ظروف هذه المناطق ولذا تعتبر منطقة بكر بالنسبة لأبحاث الخضر.

سلك تحليل البيانات ثلاثة نماذج كالآتي :

النموذج الأول:

دراسة تأثير السنوات والتفاعل بين الاصناف والسنوات G x Y داخل كل منطقة علي حدة مع اختبار تأثير مكونات التباين التي تعزي الي موسم الزراعة σ2y والصنف σ2g والتفاعل بينهما σ2gxy علي صفات القرن والمحصول.

النموذج الثاني:

دراسة تأثير المناطق والتفاعل بين الاصناف والمناطق GxL في كل موسم علي حده مع اختبار تأثير مكونات التباين التي تعزي الي منطقة الزراعة σ^2L والصنف O^2g والتفاعل بينهما O^2gxL .

النموذج الثالث:

وهو النموذج الاحصائي الذي درس فيه تأثير جميع العوامل والتفاعل بينهما (GxLxY).

ولقد تمت الدراسة علي ٥ أصناف زرعت في منطقتين هما "محطة بحوث شندويل" وتقع في الجزء الشمالي من سوهاج، محطة بحوث المطاعنة والتي تقع في الحدود الجنوبية من محافظة قنا - حيث يبعدا المنطقتين ٢٥٠ كم عن بعضهما.

ولقد أوضحت النتائج ما يلي :

النموذج الأول:

١- تفوقت الزراعة في منطقة قنا بالنسبة لصفات طول القرن وعدد البذور بالقرن بينما أظهرت المنطقتين سلوكا مستقرا وثابتا في صفات عرض القرن وعدد القرون في النبات وكذلك المحصول.

٢- تفوق الصنف Mammoth M.S. في صفتي طول القرن وعرض القرن وذلك بكلا المنطقتين مع بعض التفوق في المحصول.

٣- كان التباين الناشئ عن الاصناف (σ2g) اكبر من التباين الناشئ عن الخطأ التجريبي (σ2e) في كل الصفات ماعدا عدد البذور في القرن وعدد القرون في النبات وبمقارنة معامل الاختلاف الوراثي والبيئي والفرق بينهما بهذه النتائج يتضح وجود اختلافات وراثية عالية بين الاصناف في كل الصفات ماعدا صفتي عدد البذور بالقرن، وعدد القرون بالنبات.

النموذج الثاني:

١- أظهرت الدراسة وجود اختلافات معنوية بين المناطق في صفات القرن (طول القرن وعدد البذور

بالقرن ونسبة امتلاء القرون) وذلك في الموسم الثاني فقط من الدراسة.

٢- أظهر تأثير تفاعل الاصناف والمناطق (GxL) اختلافات معنوية لكل الصفات في عامي الدراسة ماعدا عرض القرن وعدد القرون بالنبات في الموسم الاول (١٩٩٥)، وطول القرن في الموسم الثاني (١٩٩٦).

٣- من مقارنة التباين الوراثي وتباين الخطأ وكذلك معامل الاختلاف الوراثي والبيئي يتبين وجود كميات ضخمة من الاختلافات الوراثية بين الاصناف - لكل الصفات - في كل البيئات تحت الدراسة ماعدا البيئات التي تضمنت تباين خطأ عالي عند دراستها مثل عدد البذور بالقرن.

النموذج الثالث:

١- ظهرت الاختلافات المعنوية بين المناطق لبعض صفات القرن (طول القرن - نسبة امتلاء القرون - عدد البذور في القرن).

٢- وجود اختلافات معنوية بين الاصناف لكل الصفات المدروسة.

٣- تفوق الصنف Sugar GEM في صفات عدد البذور في القرن ونسبة امتلاء القرون وعدد القرون بالنبات.

٤- أظهر الصنف Mammoth M.S. تفوقا في صفتي طول القرن وعرض القرن مع اعطاء بعض التفوق في المحصول الاخضر، بينما انتجت الاصناف Fillanon يليه Mammoth M.S. ثم Tolido Sugar أعلي قيم للمحصول الاخضر.

٥- كان التفاعل بين السنوات والمناطق Y x L معنويا في كل الصفات ماعدا عرض القرن وعدد القرون بالنبات والمحصول الاخضر مما يشير الي ثبات هذه الصفات الثلاث مما يؤكد النتائج المتحصل عليها في النموذج الاول من الدراسة.

٦- أظهر التفاعل (GxL) تفوقا معنويا عن التفاعل GxLxY لكل الصفات المدروسة ماعدا عرض القرن وهذا يبين ان الاستجابات المختلفة للاصناف في المناطق الفردية (النموذج الاول) تشبه استجابتها تماما في السنوات المختلفة (النموذج الثاني) مما يشير الي أن هذه الاستجابات المختلفة قد تكون صفة مميزة لهذه المناطق.

وتؤكد الدراسة الفردية (النموذج الأول والثاني) نتائج التحليل المشترك الثلاثي (النموذج الثالث)، بل تحدد لنا الموسم والمنطقة التي تأثرت بها الصفات مثل تفاوت صفة عدد البذور بالقرن بسبب تأثيرها بالظروف البيئية بمنطقة سوهاج في الموسم الثاني ١٩٩٦ م مما تسبب في رفع تباين الخطأ($\sigma 2e$).

فعند اجراء التحليل المشترك لعامي الزراعة بمنطقة سوهاج تلاحظ عدم معنوية الاصناف في صفة عدد البذور بالقرن، وللتأكد من الموسم الذي تسبب في زيادة الخطأ التجريبي ، أجري تحليل الاختلاف المشترك للمنطقتين معا لكل عام علي حدة حتي ظهر الاختلاف في عام ١٩٩٦ والذي كانت درجة التوريث به منخفضة جداً (٢٣,٢٪) مما يدل علي أن هذه الصفة تتأثر بالبيئة ويؤكد انه لابد من اجراء تجارب علي بيئات مختلفة لتحسين هذه الصفة.