Mass Selection and Individual Plant Selection as Two Breed Methods for Improving Lettuce (*Lactuca sativa* L.)

Ragheb, E.I.M
Department of Vegetable Crops, Faculty of Agriculture, Alexandria Univarsity, Alexandria, Egy

Received on: 1/11/2015 *Accepted: 29/11/2015*

ABSTRACT

Three field experiments were conducted in order to estimate the magnitudes of variability of some ir characters of the "Balady" cultivar of lettuce and to study the efficiency of two cycles of mass selection and in plant selection for two generations, as two breeding methods, on the studied economical characters. He percentages in broad sense and phenotypic correlation coefficients among all possible pairs, of the studied ch were also estimated. This study was carried out at the Experimental Station Farm (at Abies), Faculty of Agr Alexandria University, during the three successive winter seasons of 2010/2011, 2011/2012 and 2012/2013.

The obtained results, generally, illustrated that the estimated coefficients of variability and ranges for all characters; reflected high and enough variability to suggest high possibilities of conducting successful and selection to produce improved strains with better performances than the original population. Generally, the indicated clearly that the studied characters were improved through the two practiced breeding methods; mass s and individual-plant selection; but, with different magnitudes among the characters and the used breeding metho obtained results showed high heritability estimates, in broad sense, for the various studied characters. Also, the es values for the correlation coefficients, between the different pairs of characters, were found to be either signif highly significant with positive or negative signs, which may help in selecting desirable traits in lettuce b programs.

Accordingly, improving production of lettuce can be achieved through purification of already established and introducing improved strains through *via* both mass and individual-plant selection programs.

Key words: lettuce, yield and its components, selection methods, variability, heritability, correlat

INTRODUCTION

Lettuce (*Lactuca sativa*, 2n = 18) is a highly self-pollinated crop that originated in the Mediterranean area. It is belonging to the family compositae and considered as the most important vegetable in the group of leafy vegetables in many regions of the world. Lettuce is an excellent source of vitamins and nutrients which are highly required for human health, and because of high cellulose content, it facilitates digestion. Moreover, lettuce contain lactocin and lactucopicorn which improve calm sleep (Sharma, 2002).

The literature illustrated that improvement lettuce for field production, in Egypt, received little or no attention. Where, some local cultivars, such as "Balady" cultivar, exhibited a relatively low productivity level and a clear deterioration in its quality characters, and showed, also, unusual degrees of variability in morphological characters among the individual plants of the grown population. Therefore, estimating and investigating the magnitudes of variability among lettuce plants for economic traits are very necessary to plan effective breeding programs. Since, the wide ranges of variability available provide good scope to conduct genetical studies and to design the identification of superior genotypes. In this respect, several investigators estimated the magnitu variability among lettuce genotypes for economic and important traits; such as Tash (2010) and Kumar *et al*. (2010). They con that wide range of variability estimates amo studied characters of different genotypes of were observed.

The heritability of characters determin much the phenotype of plant is a guideline genotype and thus help the breeder to ba selection program on the phenotypic perfor of the plant. High heritability, in broad indicated that a large proportion of phen variance was attributed to the genotypic va and were less influenced by environment. (1960) illustrated that characters which hav heritability are dependable because their gen expression is superimposed by the environ influences. Thus, the degree of success in se depends upon the magnitude of the herit value; therefore, the effect of selection is re more quickly in those characters which havin heritability. Many studies were reported i respect (Gupta *et al*., 2008; Souza *et al*., Tashi *et al*., 2010 on lettuce; and Antonova Atter *et al*., 2009; Soni *et al*., 2013; Meena, 2014 on cabbage).

Interrelationships among various agronomic traits are vital to plan an effective breeding program. So, using phenotypic correlation is an important tool for the breeder to help in selecting and determine difficult measured characters through the selection of another easier in measuring. Therefore, some researchers estimated the relationships among the different pairs of the studied characters; such as Souza *et al*. (2008) and Kumar *et al*. (2010). These authors concluded generally that there were significant correlations between pairs of some economic characters of lettuce; but, with different trends (positive and/or negative); which were useful in lettuce selection. Also, positive and significant association of cabbage yield was observed with all the characters except days to maturity and stem length (Meena *et al*., 2014). These results indicated that selection based on these characters either in combination or alone; will result in identifying the genotypes having high yield potential.

The main objective of the present investigation was to estimate and compare the efficiency of mass selection and individual plant selection, as two breeding methods, on the improvement of some important traits of lettuce cultivar "Balady". Heritability percentages, in broad sense, were also estimated for growth and productivity characters. The phenotypic correlation coefficients among the various pairs of the studied traits were also estimated to assist lettuce breeders in their selection programs.

MATERIALS AND METHODS

This study was carried out during the successive winter seasons of 2010/2011 till 2012/2013 at the Experimental Station Farm of the Faculty of Agriculture, Alexandria University; at Abies, Alexandria, A.R.E.

The genetical material used in this study was the "Balady" cultivar of lettuce crop which constitutes the original population for conducting the two methods of selection: individual-plant selection and mass selection. This cultivar was chosen since it is commonly grown and well adapted to the Egyptian environmental conditions; but, expresses a lot of variation and deterioration, which were observed and reported by many growers and consumers.

Growing the original population and data recorded

Seeds of the "Balady" cultivar were sown in nursery on October 15th, 2010, and the seedlings were transplanted on November 25th. The experimental area consisted of 80 rows, 4.00 m long and 0.60 m width. The spacing within rows was 0.20 m between plants. All the recommended agronomical and plant protection practices of lettuce commercial production were made, for raising a healthy crop, whenever they appeared necessary.

Initial visual selection was made accor the criteria; maturity, non-wrapper leaves r core length (cm), core diameter (cm), head (cm), head diameter (cm), head weight (g), dry mater (%), bitterness (scale) and f (scale). Bitterness was given a score from where score 1= non-bitter, 2= bitter and 3 better (Damarany, 1989b). Firmness of the was ranked from 1 to 5, using the hand comp method (Kader *et al*., 1973); where, 1= soft compressed or spongy; 2 = fairly firm, neit nor firm; 3 = firm, and commercially accep = hard and solid; and 5 = extra-hard. Each previous studied characters were measured plant basis, and they were used to calcul statistical parameters; range, mean, s deviation and coefficients of variation.

Selection methods

In the growing season of 2010/2011 seedlings of "Balady" cultivar (original pop C_0) were transplanted into the experimental a both selection methods were performed as fo

Individual plant selection method: Fror plants, selfed seeds of the 40 best plants wi maturity and desirable agronomic traits were to be sown in the next season. On Novembe 2011/2012 growing season, seedlings o selected plant were cultivated in the f separated families. Then the practices of se between and within those families, on the l the best in earliness of maturity character, a head weight and its components; were con At the end of the growing season selfed se each selected plant from each selected famil separately collected to get the final selecte which came out to be five lines.

Mass selection method: seeds of the 1(plants, from 1600 plants (C_0), were s according to the performances of pre mentioned desirable traits to represent the fir of mass selection (C_1). These seeds were bul sown in the nursery on October 15th, 2011 seedlings were transplanted on November select the best plants to represent the secon selection cycle (C_2).

Evaluation of the various genetic populatio

On October 15th, 2012; the seeds of the population (C_0), the five individual selecte (S_{2-1} to S_{2-5}) and the second mass selectio (C_2), which were selected from the cultivar in this investigation, were sown and their se were transplanted on November 25th. Th experimental design was a randomized c blocks (RCBD) with three replicates experimental unit consisted of three row meters long and 0.60 meter width and th spacing was 0.20 meter, on one side of the r

commercial cultural practices were performed whenever they were necessary. The measurements of the ten studied characters were recorded on five randomly selected plants from each genetic population in each replication.

Statistical analyses

The statistical analyses for all collected data of the above-mentioned characters were conducted by the standard method of the randomized complete blocks design, as illustrated by Al- Rawi and Khalf-Alla (1980); using Co-Stat software (2004), a computer program for statistics of the differences between means.

Data of the various given characters were recorded to be used for genetic evaluation and estimation of some of the most important biometrical parameters; such as phenotypic correlation coefficients between different pairs of studied characters; which were estimated as described by Mather and Jinks (1971). Heritability percentages, in broad sense (h^2_{bs}%), were also calculated as suggested by Allard (1960) as follows:

$$\mathbf{H^2_{bs}\% = \delta^2_g / \delta^2_p \; x \; 100}$$

$$\mathbf{\delta^2_p = \delta^2_g + \delta^2_e}$$

$$\mathbf{\delta^2_g = MS_g - (MS_e)/r}$$

Where:

δ^2_p = phenotypic variance

δ^2_g = genotypic variance

δ^2_e = environmental variance (error mean square)

RESULTS AND DISCUSSION

Variability estimates in the original population:

The estimated values of the parameters, mean, range, standard deviation and coefficient of variation for the studied important characters of the original population are arranged in Table 1. The results reflected clearly that the original population (C_0) was characterized by pronounced variability for most studied characters as shown from the es coefficients of variation values. This result to be related to that, the cultivar Balady h grown for a long period without any select improvement. The characters that showe coefficients of variability, high than 35% bitterness (45.66%) and core length (3 Whereas, the characters core diameter, fi non-wrapper leaves number and head showed relatively moderate levels of var with estimated values of 32.48%, 31.22%, and 29.59% for their C.V.%, respectively. other hand, the four remaining characte maturity, head diameter, leaves dry matter a length; showed the lowest coefficients of v values, that were estimated as 8.62%, 1 10.65% and 12.32%, each in turn. Generally be stated that all studied characters co improved through suitable selection metho with varying degree depending upon the am variation presented in the population. Th most of the studied characters of lettuce app have high chances to be improved; sinc maintained relatively high variability in th original population. The obtained results generally with those of Kumar *et al*. (201 Tashi *et al*.(2010) on lettuce and Surlan-Mo *et al*. (1997) on cabbage; who found wide ra variation in most of the studied characters same context Damarany (1989a) recorde such wide ranges of variation in most of the characters in cabbage and concluded that the characters could be improved through selection method.

Likewise, Solieman (1992) reported th Balady local cultivar of cabbage can be cons as a rich source of variation and can be use main genetic material in breeding progra improve the characteristics of this crop.

Table 1: Estimates of variability parameters; range, mean $\overline{X}$, standard deviation and coeffic variation (C.V. %), for the studied important characters in the original population of "Balady" cultivar.

Parameters / Characters	Rang		Mean $\overline{X}$	Standard deviation	Coefficient of variation (C.V.%)
	Maximum	Minimum			
Maturity	74.00	54.00	65.04	5.61	8.62
Non-wrapper leaves No.	7.00	2.00	4.99	1.51	30.21
core length (cm)	10.00	2.00	6.09	2.36	38.66
core diameter (cm)	6.50	2.00	3.65	1.19	32.48
Head length (cm)	35.50	18.30	27.20	3.35	12.32
Head diameter (cm)	20.00	10.50	13.13	1.36	10.36
Head weight (g)	1020	137.2	520.46	153.99	29.59
Leaves dry mater (%)	7.85	5.18	6.39	0.68	10.65
Bitterness (scale)	3.00	1.00	1.73	0.79	45.66
Firmness (scale)	5.00	1.00	3.85	1.20	31.22

Evaluation the two selection methods:

Means of the different studied characters of the seven different populations; i.e., the original population (C_0), a population derived from the second cycle of mass selection (C_2) and the second selfed progenies of the five selected individual plants (S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4} and S_{2-5}) are listed in Table 2. in all studied characters, The differences between the mean values of all selected populations and that of the original population appeared to be significant; but, with different magnitudes. The results, concerning the general performances of all studied characters, illustrated that the mean values of the five characters core diameter, head length, head diameter, head weight, and leaves dry matter were noticed to be increased (a desirable effect) after practicing the two cycles of mass selection or individual plant selection. But, in the case of the three characters core length, maturity and non-wrapper leaves number; their mean values were reduced (also, a desirable effect) after the two cycles of the selection methods. Concerning the remaining two characters i.e., bitterness and firmness; favorable performances, relative to the original population, were recorded for the two studied selection methods. These obtained results seemed to be compatible with those of Soliman (1992) on cabbage, who illustrated that all studied characters were improved through two practiced breeding systems; i.e., recurrent selection and individual plant selection; but, with different rates for the selected characters and the used breeding program. Also, Koutsos *et al*. (2001) recorded a desirable increment on the mean value of the yield character; which was estimated by 36%, without any undesirable changes in dry matter and soluble solids contents, as a result of applied three cycles of mass selection on cabbage. In this concern, there is a little published articles on emphasized selection of genotypes with lettuce breeding practices.

Estimates of heritability:

High heritability values in broad sense (Table, 3) were generally observed for all studied characters; which ranged from 79.18% in diameter character to 99.66% in head character. Similar findings were reported by *et al*. (2008) on lettuce; Shweta *et al*. (201 Meena *et al*. (2014) on cabbage; who reporte heritability estimates for their most s characters. Generally, it may be stated tl studied characters could be improved tl selection, but with varying degrees, accord the amount of variation present in the popı and the heritability of the concerned cha Therefore, most of the studied characters see have high chances to be improved tl selection, since they appeared to maintai variability in the original population characterized with high heritability percentag

Estimates of phenotypic correlation coeffic

Concerning the phenotypic corr coefficients, the obtained results (Table, 4) s significant and desirable positive corre between characters pairs head weight with e head length and head diameter; and maturit each of core length and bitterness. Also, sign positive correlations were detected between dry matter with each of core diameter, head head diameter and head weight. On the othe significant negative correlations were de between head weight with each of core leng bitterness, which are also desirable relationships. Results of correlation coefficie the present study, appeared to in a harmon those of Rai and Asati (2005); Sharma (2005); Meena *et al*. (2010); Singh *et al*. (20 cabbage. From the previous results of corr coefficients it may be concluded that some inter-relationships among various s characters might be used to help in se difficulty measured characters through selection of particular correlated ones that easily measured and recognized.

Generally, it could be concluded improving production of lettuce can be ac through purification of already established cu and introducing improved strains through *vi* mass and individual-plant selection programs

Table 3: Estimates of phenotypic variance (δ^2_p), genotypic variance (δ^2_g) and broad sense herit ($H^2_{b.s}$.%) for the ten studied characters of the evaluated genotypes of lettuce.

Parameters / Characters	$H^2_{b.s}$.%	δ^2_p	δ^2_g
Maturity	94.09	62.15	58.48
Non-wrapper leaves No.	99.23	4.17	4.14
Core length (cm)	99.62	6.32	6.29
Core diameter (cm)	79.18	0.36	0.28
Head length (cm)	97.43	24.46	23.83
Head diameter (cm)	98.78	11.39	11.26
Head weight (g)	99.66	71364.29	71118.25
Leaves dry matter (%)	93.29	1.48	1.38
Bitterness (scale)	82.32	0.66	0.54
Firmness (scale)	92.62	1.34	1.24

1- Yield/ vine:

Data in Table (1) clearly show that spraying clusters of Early sweet grapevines with GA_3 at 10 to 40 ppm or Sitofex at 2.5 to 10 ppm was significantly effective in improving the yield relative to the check treatment. The promotion on the yield was accompanied with increasing concentrations of each plant growth regulator. Using GA_3 at 10 to 40 was significantly preferable than using Sitofex at 2.5 to 10 ppm in improving the yield. A slight and unsignificant promotion on the yield was attributed to increasing concentrations of GA_3 from 20 to 40 ppm and Sitofex from 5 to 10 ppm. The maximum yield was produced on the vines that received one spray of GA_3 at 40 ppm but the best treatment from economical point of view was the application of GA_3 at 20 ppm (since no measurable promotion on the yield was recorded between 20 and 40 ppm of GA_3). Under such promised treatment, yield/ vine reached 13.6 and 14.0 kg during both seasons, respectively. The control vines produced 9.1 and 9.6 kg during 2013 and 2014 seasons, respectively. The percentage of increase on the yield due to application of GA_3 at 20 ppm over the check treatment reached 49.5 and 45.8 % during both seasons, respectively. The beneficial effects of GA_3 on the yield might be attributed to their positive action on increasing cluster weight. The promoting effects of GA_3 on the yield was supported by the results of Dimovska *et al*., (2011) and Abu- Zahra and Salameh (2012) on different grapevine cvs.

The results regarding the beneficial effects of Sitofex on enhancing the yield are in harmony with those obtained by Juan *et al*. (2009); Abdel- Fattah *et al*., (2010) and Al- Obeed (2011).

2- Harvesting date:

It is clear from the data in Table (1) that all GA_3 and Sitofex treatments had significantly delayed on the harvesting date of Early Sweet grapevines rather than the control treatment. The degree of delayness on harvesting date was correlated to the increase of the concentrations of both GA_3 and Sitofex. Using GA_3 significantly delayed harvesting date comparing with using Sitofex. Increasing concentrations of GA_3 from 20 to 40 ppm and Sitofex form 5 to 10 ppm failed to show significant delay on harvesting date. A considerable advancement on harvesting date was observed on untreated vines the great delay on harvesting date was observed on the vines that received GA_3 at 40 ppm during both seasons. GA_3 and Sitofex were shown by many authors to retard the release of ethylene and the disappearance of pigments such as chlorophylls and carotenoids and onest of maturity start. Also they were responsible for prolonging pre-maturity stages Nickell (1985). These results regarding the delaying effect of GA_3 and Sitofex on harvesting date were in harmony with those obtained by Wassel *et al*., (2007), Kassem *et al*. (2011), Abu- Zahra and Salameh (2012) and *et al*. (2012).

3- Cluster weight and dimensions:

It is evident from the data in Table (treating clusters with GA_3 at 10 to 40 Sitofex at 2.5 to 10 ppm was signi accompanied with enhancing weight, leng width of cluster relative to the control treatme

The promotion was significantly associate
increasing concentrations of GA_3 and Sitofe
GA_3 was significantly favourable than using
in this respect. The maximum values were r
on the vines that received one spray of GA
ppm. Meaningless promotion was detecte
increasing concentrations of GA_3 from 20 to
and Sitofex from 5 to 10 ppm. The untreate
produced the minimum values during both
The positive action of GA_3 on cluster wei
dimensions might be attributed to its essen
on stimulating cell division and enlarger
cells, the water absorption and the biosynth
proteins which will lead to increase berry
Dimovska *et al*., (2011); Abu Zahra and S
(2012) and Dimovska *et al*., (2014).

The previous essential role of CPPU on
weight was attributed to its higher con
cytokinin when applied to plants (Nickell, 19

4 Shot berries %:

Data in Table (2) obviously reve
percentage of shot berries in the clusters o
Sweet grapevines was significantly controll
spraying GA_3 at 10 to 40 ppm or Sitofex at 2
ppm relative to the check treatment. Using G
preferable than using Sitofex in reduci
percentages of shot berries. There was a
reduction on the percentage of shot berri
increasing concentrations of GA_3 and Sitofe
was a slight reduction on such unfav
phenomenon with increasing concentrations
form 20 to 40 ppm and Sitofex from 5 to 1
The minimum values of shot berries (7.3 an
during both seasons, respectively) were reco
the clusters harvested from vines treated wi
at 40 ppm. The maximum values of shot
(12.0 & 12.5 %) during both seasons were r
on the untreated vines during both season
reducing effect of GA_3 on shot berries m
attributed to its important role on enhanci
division and the biosynthesis of proteins
(1985). These results were supported by the
of wassel *et al*. (2007) and Abu Zahra and S
(2012).

5 Fruit quality:

Data in Tables (2, 3 & 4) clearly sh
spraying clusters with GA3 at 10 to 40
Sitofex at 2.5 to 10 ppm significant
accompanied with enhancing weight, long
and equatorial of berry, total acidity%, pro

and percentages of P, K and Mg and T.S.S. %, reducing sugars %, T.S.S. / acid and total carotenoids relative to the check treatment. The effect either increase or decrease was associated with increasing concentrations of each auxin. Using GA_3 significantly changed these parameters than using Sitofex. A slight effect was recorded on these quality parameters with increasing concentrations of GA_3 from 20 to 40 ppm and Sitofex from 5 to 10 ppm. From economical point of view, the best results with regard to fruit quality were observed due to treating clusters with GA_3 at 20 ppm. Untreated vines produced unfavourable effects on fruit quality. These results were true during both seasons. The effect of GA_3 on increasing berry weight and dimensions might be attributed to its effect in promoting cell division and enlargement of cells, water uptake and the biosynthesis of proteins Nickell (1985). These results were in concordance with those obtained by Williams and Ayars (2005) and Dimovska *et al*., (2014).

The higher content of Sitofex from cytokinins surly reflected on enhancing cell division and the elongation of berries Nickell (1985). These results were in agreement with those obtained by Abu-Zahra (2013) and Retamales *et al*. (2015).

CONCLUSION

Treating Early Sweet grapevines once when the average berries reached 6mm with GA_3 at 20 ppm was responsible for promoting yield and fruit quality.

REFERENCES

Allard, R.W. **1960**. Principles of plant breeding. John Wiley and Sons Inc., New York.

Al-Rawi, K.M., A.M. Khalf-Allah. **1980**. Design and analysis of agriculture experiments. A text book. El Mousil Univ. Press., Ninawa, Iraq. 487 p.

Antonova, G. **2009**. Study on variation, heritability and correlation in open pollinated cultivars and new breeding lines of late head cabbage. Acta Horticulturae. **830 (18)**: 143 – 150.

Atter, R.S.; K.C. Sharma and A.S. Sundouri. **2009**. Genetic variability, heritability and genetic advance studies in cabbage (*Brassica oleracea* var. *capitata* L.). India Journal of Plant Genetic Resources. **22(1)**: 62 – 65.

Co-State Software. **2004**. User's manual version. Cohort Tusson, Arizona, USA.

Damarany, A.M. **1989a**. Mass selection for earliness and high head weight in Balady cabbage (*Brassica oleracea* var. *capitata* L.) cultivar. Assiut Journal of Agriculture Science. **20(2)**: 83 – 93.

Damarany, A.M. **1989b**. Screening test for heat tolerance in some cultivars and breeding lines of lettuce for spring harvesting under Assiut conditions. Assiut Journa Agriculture Science. **20(5)**: 31 – 44.

Gupta, A.; D. Tashi; M. Chattoo and S. Y **2008**. Estimation of genetic variabili heritability in lettuce (*Lactuca sativ* Indian Journal of Plant Genetic Resc **21(2)**: 138 – 140.

Kader, A.A.; W.J. Lipton and L.L. Morris. System for scoring quality of har lettuce. HortScience. **8(5)**: 408 – 409.

Koutsos, T.V. and M. Koutsika-Sotiriou. Effect of mass selection in nil-comp conditions on some traits of four ca populations. Plant Breeding. **120(1)**: 95.

Kumar, R.; S. Kaushal and Y.R. Shukla. Variability, correlation and path an studies in lettuce. International Jour Vegetable Science. **16(4)**: 299 – 315.

Mather,K. and J.L.Jinks.1971. Biom genetics: The study of continuous var Chapman and Hall London .283 p.

Meena, M.L.; R.B. Ram; L. Rubee and Sharma. **2010**. Determining components in cabbage (*Brassica ol* var. *capitata* L.) through correlatio path analysis. International Journ Science and Nature. **1(1)**: 27 – 30.

Meena, M.L.; R.B. Ram; L. Rubee and Sharma. **2014**. Inter-trait associatio genetic variability assessment in ca under Luchnow conditions. Indian J of Horticulture. **71(2)**: 202 – 206.

Rai, N. and B.S. Asati. **2005**. Correlation an coefficient analysis for yield and its t cabbage. The Orissa Journal of Hortic **33(1)**: 31 – 34.

Sharma, J.P. **2002**. Crop production technolo cold arid region. Kalyani Pub Ludhiana, New Delhi. 220-226 p.

Sharma, D.; U.K. Kohli and H.S. Kanwar. Characters association and path coef studies in cabbage (*Brassica olerace capitata* L.). Haryana Journa Horticulture Sciences. **34(1-2)**: 138 –

Shweta, S.; K. Sanjay and M. Sutanu. Correlation and path coefficient studies for the yield and its traits in ca (*Brassica oleracea* var. *capitata* L.) . of Horticulture. **6(2)**: 331 – 336.

Singh, B.K.; S.R. Sharma; P. Kalia and B. **2010**. Character association and analysis of morphology and economi in cabbage (*Brassica oleracea* var. *c* L.) . Indian Journal of Agricultural Sc **80(2)**: 116 – 118.

Soni, S.; S. Kumar; S. Maji and A. Kumar. Heritability and genetic advance in ca

(*Brassica oleracea* var. *capitata* L.) under Lucknow condition. HortFlora Research Spectrum. **2(3)**: 274 – 276.

Soliman, T.E. **1992**. Effects of recurrent selection and selfing with selection on some economical character of cabbage. M.Sc. Thesis. Faculty of Agriculture, Alexandria University, Egypt.

Souza, M.M.; L.V. Resende; D. Menezes; V. Loges; T.A. Souto and V.F. Santos. **2008**. Genetic variability for agronomic characteristics in lettuce progenies with heat tolerance. Horticultura Brasileira. **26(3)**: 354 – 358.

Surlan-Momirovic, V.; V. Bjelic; T. Rakonj G. Zivanovic. **1997**. Genetic, pher variability and correlation analysis in cabbage cultivars. Acta Horticu **462(14)**: 111 – 124.

Tashi, D.; A . J. Gupta and N. Ahmed. Variability, heritability and genetic ac in lettuce. Indian Journal of Hortic 67(special issue): 193-196.

الملخص العربى

الانتخاب الاجمالى وانتخاب النباتات الفردية كطريقتي تربية لتحسين نباتات الخس

انتصار ابراهيم مسعود راغب

قسم الخضر – كلية الزراعة– جامعة الإسكندرية

~~محمد على مجاور عبادة، ماهر خيرى يراقيم، بسام السيد عبد المقصود بلال~~

~~قسم بحوث العنب – معهد بحوث البساتين – مركز البحوث الزراعية – الجيزة – مصر~~

ت تجارب حقلية وذلك بهدف تقدير حجم الأختلافات الموجوده؛ وكذلك تقدير كفاءة دورتين من الانتخاب ، وانتخاب النباتات الفردية لمدة جيلين علي بعض الصفات الهامة في الصنف البلدي لمحصول الخس، وذلك ة إلي تقدير كفائة التوريث فى المعنى الواسع وكذلك معامل الأرتباط المظهري بين أزواج الصفات المختلفة، وقد هذه الدراسة بمحطة البحوث الزراعية بأبيس التابعة لكلية الزراعة – جامعة الإسكندرية– خلال المواسم الشتوية لأعوام 2011/2010، 2012/2011، 2013/2012. وأظهرت النتائج بصفة عامة وجود اختلافات كبيرة ات وذلك فى الصفات المختلفة المدروسة في العشيرة الأصلية للخس(الصنف البلدى) ولكن بدرجات متفاوتة، كست أهمية البدء بأحد برامج التربية لتحسين الخس لانتاج تركيب وراثى أفضل فى صفاته مقارنة بالعشيرة . وأظهرت النتائج أيضا أن استخدام كل من طريقتي التربية المستخدمتين قد أدى إلي تحسين ملحوظ ومعنوي

لصفات المدروسة مقارنة بالعشيرة الأصلية، وذلك بدرجات مختلفة والتى تعتمد على برنامج التربية المستخدم صفات موضع الدراسة. وعكست الدراسة أيضا قيما مرتفعة نسبيا لنسب كفاءة التوريث فى المعنى الواسع المدروسة. ولقد أوضحت تقديرات معامل الارتباط المظهري بين الأزواج المختلفة للصفات المدروسة وجود معنوية وعالية المعنوية منها من يسلك الاتجاه الموجب ومنها من يسلك الاتجاه السالب (لكنها علاقات مرغوبة) ب أخذها في الأعتبار عند اجراء الانتخاب كأحد الوسائل (الادوات) الهامة التي يمكن أن يستفيد بها مربي في برامج الانتخاب. بناءا على ما سبق، فانه يمكن تحسين انتاجية الخس من خلال تنقية الأصناف الموجودة ق تطبيق برنامج الانتخاب الاجمالى أو انتخاب النباتات الفردية للحصول على سلالات محسنة.

Formatted: Font: Not Bold, Complex Script Font: Times New Roman, Not Bold