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GENETIC VARIABILITY AND EXPECTED GENETINIC ADVANCE OF SOME BARLEY CULTIVAERS *HORDEUM VULGARE* L. UNDER VARIOUS LEVELS OF POTTASSIUM FERTILIZING

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Abstract

The present study was conducted out in the College of Agriculture Fields, University of Anbar, Iraq during two growing seasons, 2015 and 2016. The experiment was conducted by randomized complete block design, split plot experiment with three replications. Various fertilizer levels of potassium element; 0, 100, 200 and 300 $kg.ha^{-1}$. The potassium levels were taken the main plots. While the varieties of Barley crop *Hordium vulgare*, namely, Al-Warkaa, Nomar, Arevat, Samier and Amal under, were taken sub plots. To evaluate yield and its components, phenotypic and genotypic variations, Expected Genetic Advance and Heritability in a broad senses were calculated. The highest percentage regarding genotypic to phenotypic variations observed in the number of grains per spikelet traits, 6.3 and 5.3, followed by weight of 1000 grain trait 8.1 and 3.9 in both growing seasons, respectively. Also the same traits were coming in the highest heritability percent, 86.33% and 84.23 for the number of grains per spikelet and 8.96%, 79.45 for a weight of 1000 grains. The genetic advance percent was ranged from middle to high level in both seasons. Samir variety gave the highest yield compared with other varieties tested, 6.02 and 5.73 $Ton.ha^{-1}$ for both seasons, respectively. Furthermore, the same variety was the best in the trait of flag leaf and weight of 1000 grains. Potassium levels and its combination with varieties were differed significantly in most traits studied resulted from genetic factors. The number of grains per spikelet and weight of 1000 grains can be recommended to evaluate and predict the grain yield production.

Key words : *Hordeum vulgare*, genetic variability, genetic advance, potassium fertilizer.

Introduction

The barley crop is one of the oldest crops planted by humans and belongs to the Hordeum species. The barley crop occupies the fourth position after wheat, rice and maize in terms of production and cultivated area. Barley is an important staple crop in central and southern Iraq because it is a well-adapted crop for limited water and salinity. Barley beans are used as feed for animals either alone or as mixtures with concentrates. It is also consumed on a limited scale with humans, especially in developing countries, in the form of pure flour or mixed with wheat. It is also used as a feed crop for the production of a large quantity of dry, plentiful and nutritious barley, a rich source of vitamin B complex and protein. The importance of this crop in the development of livestock requires a significant increase in its productivity and improved nutritional value by supporting studies and research on fertilization as well as the use of appropriate varieties in agriculture and according to appropriate agricultural areas and land for its production. Despite the importance of the crop, we find that the productivity of cereals in the unit area in Iraq is still low.

One of the reasons for the low productivity of cereals in the unit area in Iraq is the lack of interest of farmers in scientific methods in the cultivation of the crop. The fertilization factor is a major factor in increasing production, especially nitrogen, phosphate and potash fertilization. The increase in barley production is achieved through the selection of improved varieties, fertilization and good soil and crop management. The yield rate of this crop can be increased by achieving suitable compatibility between the varieties, the environmental conditions and the quantities of fertilizer. Mineral nutrition,

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especially potassium is an important means of addressing the shortage of yields.

Potassium is the essential and essential nutrient of the plant after nitrogen and phosphorus and has been important in the growth and development of the plant for a long time because potassium has a vital effect in the process of photosynthesis by raising the efficiency of the leaves to do this process (Hasn, 2010) as potassium activates more than 75 enzymes contribute to the completion of many of vital activity in the plant and also plays an important role in the formation of protein (Tisdale *et al.*, 1993). There is not much research on the relationship of potassium fertilizers to the productivity of barley varieties due to the mistaken belief that Iraqi soils are rich in potassium and there is no need for this fertilizer to increase the productivity of the crop. Studies shows that the highest possible yield in the barley crop is in the amount of high potassium fertilizer.

The progress and success of any plant breeding and improvement program depends primarily on the size of the genetic variability in the plant population. Therefore, the first step in any plant breeding program is to study genetic variations. The phenotypic variations in any environment can be measured but do not represent the effect of genetic variations, but also represent environmental variations and growth factors as well as the overlap between them and genetic variations, the appearance of the plant is a picture of the genetic and environmental impact and overlap between them (Tisdale *et al.*, 1993).

The most important thing to plant breeders is to increase the yield of grain in the unit area, which is the proceeds of the contribution of a number of attributes or components encumbered by a number of phytoplankton and the extent of interaction and overlap between them during the life cycle of the plant. Appropriate and appropriate knowledge of such a reciprocal relationship between grain yield and its components and physiological processes can improve the efficiency and effectiveness of the improvement program through the use of appropriate selection methods. In conclusion, the election can be applied to the plant society when there are obvious genetic variations of the character or traits under the influence of the host act of genes.

The aim of the research is to respond to five varieties of barley for the levels of potash fertilizer and the effect of this on the yield and its components and knowledge of genetic variations to explain this information to plant breeders in the desire to improve some of the characteristics of these varieties.

Materials and Methods

A field experiment was carried out in the winter seasons 2014-2015 and 2015-2016 in the Faculty of Agriculture, Anbar University. The alternative location in Abu Ghraib, located along the length of 44^0 and the width of 33^0. In RCBD in three replicates in the order of splintered plates. The secondary plates consisted of five varieties of barley, warka, nomar, arifat, samir and amal, and the symbols V5, V4, V3, V2 and V1 were given sequentially.

The main panels consisted of four levels of Potassium Fertilizer 0, 100, 200, 300 kg K. E.1 Field division into experimental units The area of experimental unit 6 m 2 (2 × 3 m). Each experimental unit consisted of 8 lines with a length of 3 m and a 0.2 and the seed rate was 120 kg. The field soil was analyzed (table 2). The plants were planted for the first season on 15/11/2014 and in the second season 14/11/2015 in lines by hand at a depth of 3-5 cm. The seeds were covered with soil and analyzed when needed. The experiment was applied in a clay soil, (1%). Potassium fertilizer levels were added in agriculture in the form of potassium sulphate K_2SO_4 (K% 41.5%).

Weeding and irrigation were carried out as needed. Random samples were then selected from the intermediate lines of each unit to study the required traits.

Attributes studied

Plant height cm, leaf area science cm^2, plant growth rate cloud. M 2. Day-1 (CGR) Crop Growth Rate,

Table 1 : Barley varieties included in the study.

	Varieties	Symbol	Origin	Country
1	Al-Warkaa	**V1**	Wild	Iraq
2	Nomar	**V2**	Gamma ray	U.S.A
3	Arevat	**V3**	(Faghn // Athas)	U.S.A
4	Samier	**V4**	Gamma ray(Arevat x Wild)	Iraq
5	Amal	**V5**	Gamma ray (Nomar)	Iraq

Table 2 : Demonstrates some physical and chemical properties of the soil of the experiment before planting.

Soil properties	Value
EC (ds/m)	2.32
pH Soil	7.6
N (gm/Kgm)	0.20
Phosphor (ppm)	7.1
Potassium (ppm)	105
Organic (gm/Kgm)	9.3
Sand (gm/Kgm)	170
Geryan (gm/Kgm)	490
Clay (gm/Kgm)	340

Number of ears M-2, number of grains with spike, weighing 1000 g. The ton of grain ha^{-1}. The grain yield was estimated to be harvested from 0.8 m 2 of protected plants and then to about 1 ton. E.1.

The analysis of the statistical data for the studied traits was conducted by analyzing the variance between the averages by using the least significant difference (L.S.D) at the 5% probability level and by genetic and environmental variance and phenotypic and genetic heterogeneity (Steel and Torrie, 1980) as following equations :

$\delta^2G = (\delta^2 \text{ Varieties} - \delta 2E) / r$

$\delta^2E = \text{Mse}$

$\delta^2P = \delta^2G + \delta^2E$

$P.C.V = \sqrt{\delta^2}P/\text{Mean of varieties}$

$G.C.V = \sqrt{\delta^2}G/\text{Mean of varieties}$

Varieties = Mean squares of deviations

δ^2E = Mean squares of error deviations

P.C.V = phenotypic heterogeneity

G.C.V = Genetic heterogeneity factor

Proportion of inheritance : The inheritance ratio in the broad sense (h2.b.s%) was estimated for the selected traits (Hanson *et al*., 1955).

$h^2 = (\delta^2G / \delta^2P) \times 100$

$GA = h^2.K.\delta P$

GA = Genetic Improvement Values

K = the intensity of the election and equal to 1.76 at the election rate of 10%.

Standard deviation

The percentage of expected genetic improvement (EGA%) was calculated as a percentage of the mean characteristic $(\bar{y})$ of the equation cited by Kemthorn (1969).

$$EGA\% = \frac{GA}{\bar{y}} \times 100$$

The limits of slow genetic improvement were adopted 5%-10%, medium 10%-20% and high 21% and above (Robinson, 1966).

Results and Discussion

Plant height

The increase of dry matter may be associated with increased plant height when the suitable portion of solar radiation is available by plant leaves. 7 in low-growth crops such as barley, the height of the plant is determined by the appearance of the stems affected by the genetic makeup and growth factors available. The results of table 3 indicate the response of category V3 to give the highest rate of plant height of 99.75 and 101.9 cm sequentially for the seasons. The difference may be due to the difference in the content of the hormones that act on elongation of the cells. The long varieties of the hormone content are higher than the short varieties. This is consistent with. The height of the plant was 96.2 cm and did not differ significantly with the fertilizer level of 200 kg ha^{-1}. While the comparison treatment gave the lowest rate of plant height of 88.8 cm the increase in plant height was attributed to the increased potassium level of the role of potassium in activating the process of photosynthesis and increase the division of living cells of the plant and encourage the growth of metastatic tissue (IPI, 2000).

While the second season was significant differences in the levels of compost fertilizers, but the overlap between the varieties and fertilizer Potassium V3 exceeded the maximum height of the plant with the level of fertilizer 300 kg ha^{-1} in the seasons and reached 103 and 104 cm sequentially.

The percentage of genetic infiltration between the plants of one community is less than the percentage of environmental variations, which resulted in a relatively low inheritance rate of 47.95%. This was reflected in the expected genetic improvement, with a low rate of 2.79% for the first season. In the second season, genetic variations were high for environmental variations, which was reflected in the inheritance ratio, which was high and amounted to 67.03%, which led to a high rate of genetic improvement expected to 8.09% (Budak, 2000) in the study of genetic and phenotypic variations in barley. This indicates the response of plant varieties to increase the height of the plant under the levels of compost and this means that there are gaps in the rate of the attribute from generation to generation.

The size of the science paper: Table 4 shows significant differences between the subjects of the study in the area of the science paper and for the two seasons, where V4 surpassed the highest paper area of 33.07 and 31.02 cm2 for the two seasons in succession and did not differ significantly with V3 and for the two seasons while V1 gave less space. For the flag of 29.25 and 26.17 cm 2 respectively for the seasons and may be due to the difference of varieties genetically and the length of vegetative growth and the difference in the length and width of the paper.

It was noted that the increase in the potassium level

Table 3 : Genetic variability of plant height by the effect of barley varieties under the levels of potash fertilizer in the seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	91	94	98	97	**96.0**	**V1**	94	98	99	100	**97.75**
V2	86	88	91	92	**89.25**	**V2**	85	88	93	91	**89.25**
V3	95	100	101	103	**99.75**	**V3**	97	103	103	104	**101.9**
V4	82	83	88	90	**85.75**	**V4**	84	87	90	92	**88.85**
V5	90	96	99	99	**96.0**	**V5**	92	97	99	101	**97.50**
L.S.D	1.74				1.53	L.S.D	N.S.				2.58
Mean	**88.8**	**92.2**	**95.4**	**96.2**		**Mean**	**90.4**	**94.6**	**97.4**	**97.6**	
L.S.D	3.07					L.S.D	5.16				
Grand mean	**93.15**					Grand mean	**94.95**				
Heritability	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%	**Heritability**	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C.	G.A.%
47.95	4.57	4.97	3.31	6.85	2.79	67.03	28.43	13.89	6.85	5.61	8.09

Table 4 : Genetic variations of the leaf size of the leaf under the influence of barley varieties under the levels of potassium fertilizer in the two seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	24.2	26.3	29.2	29.3	**27.3**	**V1**	22.5	24.1	28.7	29.4	**26.2**
V2	26.6	28.1	29.9	31.3	**28.9**	**V2**	24.2	27.2	29.4	30.6	**30.0**
V3	25.9	27.2	31.2	34.6	**29.7**	**V3**	27.0	28.1	30.6	30.5	**29.1**
V4	31.5	31.7	33.9	35.2	**33.1**	**V4**	27.2	31.3	32.3	33.3	**31.0**
V5	29.4	30.8	32.4	33.7	**31.6**	**V5**	28.3	30.3	30.9	32.1	**30.4**
L.S.D	0.68				1.65	L.S.D	1.85				1.93
Mean	**27.5**	**28.8**	**31.3**	**32.8**		**Mean**	25.1	28.3	30.4	31.2	
L.S.D	3.31					L.S.D	3.86				
Grand mean	**30.92**					Grand mean	**3.97**				
Heritability	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%	**Heritability**	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%
35.71	3.20	5.76	9.68	5.78	6.08	38.63	4.93	7.82	12.	7.63	8.34

had a significant effect on this and for the two seasons, where the level of the fertilizer gave 300 kg ha^{-1}. The highest area of the paper was 33.62 and 31.58 cm^2 respectively. More than 75 enzymes in the process of photosynthesis. It is clear from the same table that there is significant overlap between the varieties and the Potassium fertilizer, where V4 gave the highest rate of science paper area was 35.2 and 33.3 cm^2 and for the two consecutive seasons, an increase of 45.45% and 48% for the comparison treatment of class V1 and consecutive dates. The positive effect of potassium in this capacity is due to the increased absorption in the leaves and then increase the efficiency of photosynthesis and the transfer of the products of representation to areas of need in the plant, which is reflected in the increased division and elongation of the paper cells and then increase the paper area and agree with what (Hisham and Ali, 2012) found.

The percentage of genetic variability in the plants of the plant society was less than the percentage of environmental variability, especially for the first season, which resulted in a relatively low inheritance rate of this characteristic, which also reflected the percentage of genetic improvement expected as the value of this attribute in the first season 6.08% and the second season 8.34%.

Plant growth rate : is the increase in plant dry weight per unit of area in the unit of time and expressed in units of gm^2.2-day 1. The increase of dry matter in the area unit depends on the rate of growth and its length, and this is related to the nature of the genetic function and growth factors available. The results of table 5 indicate that V4 gave the highest growth rate per square meter and reached 10.43 and 10.27 gm^2.2-1, respectively for the two seasons with an increase of 5.35%, 20.57%, 6.97%, 10.37%, 9.25%, 19.83% 6.42%, 6.42% for V3, V2 and V1, respectively. The increase in the level of potassium fertilizer resulted in an increase in plant growth rate per square meter where the fertilizer level gave 200 kg ha^{-1} highest growth rate of the plant and amounted to 10.40 and 10.22 gm^2 - 1 - the beginning of the two seasons did not differ significantly with the level of fertilizer 300 kg k. E-1 and for the two seasons. The overlap between the cultivars and the levels of the fungus fertilizer was significant, with V4 with the fertilizer level of 200kg.ha^{-1}. The highest mean of 11.3 and 11.0 gm^2.2-days respectively, with an increase of 44.87% and 44.73% comparative treatment of the two seasons.

Genetic variations were 7.3 times higher for the first season and 1.7 times for the second season of environmental variability among the plants of the same community and for all varieties. This led to a higher inheritance rate in the first season, indicating a high variability in the rate of this characteristic, especially in the first season of the second season. The results of the same table indicate that the plants are fairly homogeneous and relatively homogeneous in the plant growth rate in the unit area based on PCV and GCV values. The homogeneity of the first season was relatively higher than the second season and the predicted improvement rate for the first season was high at 22.73% while in the second season amounted to 13.56% and agrees with Al-Qassi (2009).

Number of ears 2 : The results of table 6 indicate the response of V4 to give the highest rate of number of ears. M 2, 352.9 and 369.15 spikes respectively for the two seasons with an increase of 7.42%, 11.15%, 4.16% and 44.53% for V1, V2, V3 and V5, respectively for the first season with an increase of 13.28%, 16.65%, 0.43% and 3.27% for V1 V2, V3 and V5 sequentially for the second season.

We note from the table that there was a significant increase in the number of square meters, increasing the rates of potassium fertilizer, gave a rate of fertilizer 200 kg ha^{-1} highest rate of 354.2 and 366.1 spikes. 2 did not differ significantly with the treatment level fertilizer 300 kg k. E-1 was the lowest rate of treatment in the comparison treatment and amounted to 306 and 317.3 spikes. 2 consecutive successions of seasons and agreed with Soleymani *et al*. (2011). The overlap between the cultivars and the compost rates was significant and for the seasons, with V4 giving the highest number of basins per square meter and reaching 372.1 and 395 cm^2 with the fertilizer level of 200 kg. ha^{-1} sequentially, with an increase of 26.26% and 36.77% for V1 in the comparison treatment and for consecutive seasons, the response of the varieties was different with the response of the potassium fertilizer levels.

The genetic variability of the plants was 2.5 and 2.0 times higher than the environmental variability and the two seasons, respectively. The effect of the number of saplings was increased. This explains the high inheritance rate of the number of saplings in the area unit and therefore the presence of high variability in the rate of this characteristic. The results of the same table indicate the expected high genetic improvement and that the plants were somewhat homogeneous and genetically homogeneous on the number of spikes per unit area based on PCV and GCV values.

Number of Sprouted cereals : The results of table 7 indicate that the V2 response gave the highest number of grains with spike of 57.2 and 54.6 grains, respectively. V3 gave the lowest number of seeds with 48.8 and 48.0 grains, respectively. We note from the table of the number of grains in the spike obtained a significant increase in the number of grains in the spike by increasing the levels of the potassium fertilizer and gave the level of fertilizer 300 kg ha^{-1} highest rate of 56.1 and 55.4 tablets sequentially for the seasons compared to the treatment of fertilizer K0, which gave 47.4 and 47.4 tablets sequentially for the seasons. The overlap between the cultivars and the levels of the fungus fertilizer was significant for the first season. V2 was given with the treatment of compost 300 kg k.ha^{-1}. The highest number of grains was 61.1 and did not differ significantly with three treatments. In the second season, the interaction was not significant between the varieties and levels of fungus fertilizer, *i.e.*, the behavior of the varieties were the same as the increase in levels of fertilizer Potasi where the higher levels of fertilizer Potasi increased the number of grains of varieties.

The genetic variations between plants were more

Table 5 : Genetic variability of plant growth rate under the influence of barley varieties under the levels of potash fertilizer in the two seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	8.6	9.3	10.2	10.1	**9.45**	**V1**	8.0	9.2	10.8	10.6	**9.65**
V2	8.5	9.5	10.1	10.3	**9.75**	**V2**	8.6	9.7	10.3	10.0	**9.65**
V3	7.8	8.2	9.1	9.5	**8.65**	**V3**	7.6	8.1	9.0	9.6	**8.57**
V4	9.3	10.1	11.3	11.0	**10.43**	**V4**	9.4	10.0	11.0	10.7	**10.27**
V5	8.9	9.8	10.7	10.2	**9.90**	**V5**	8.5	9.5	10.0	9.6	**9.40**
L.S.D	0.38				0.63	L.S.D	0.50				0.80
Mean	**8.54**	**9.38**	**10.4**	**10.2**		**Mean**	**8.42**	**9.30**	**10.2**	**10.1**	
L.S.D	1.25					L.S.D	1.60				
Grand mean	**9.63**					Grand mean	**9.50**				
Heritability	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%	**Heritability**	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%
72.29	2.14	0.82	17.9	15.2	22.73	46.21	1.16	1.35	17.9	11.3	13.56

Table 6 : Genetic variations of the number of ears. 2 Effect of barley varieties under the levels of Potassium fertilizer in the seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	294.7	321.6	351.8	345.7	**328.5**	**V1**	288.8	319.3	348.2	347.1	**325.9**
V2	298.8	310.1	329.6	331.6	**317.5**	**V2**	294.9	311.7	331.8	327.6	**316.5**
V3	301.2	332.3	366.1	355.5	**338.8**	**V3**	338.4	341.8	381.1	369.0	**367.6**
V4	323.6	345.6	372.1	370.1	**352.9**	**V4**	331.6	370.0	395.0	380.7	**369.2**
V5	311.6	334.1	351.6	348.9	**336.6**	**V5**	332.8	344.8	378.4	374.0	**357.5**
L.S.D	11.06				8.90	L.S.D	10.46				14.55
Mean	**306.0**	**328.7**	**354.2**	**350.4**		**Mean**	**317.3**	**337.5**	**367.0**	**359.8**	
L.S.D	18.32					L.S.D	27.31				
Grand mean	334.82					Grand mean	344.91				
Heritability	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%	**Heritability**	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%
71.54	285.3	114.6	5.97	5.04	7.5	66.80	727.5	360.3	9.56	7.82	11.25

than the environmental variances of 6.3 and 5.3 times sequentially for the two seasons. They affected the number and the number of grains. This was reflected in the inheritance ratio of the number of grains in the spike and therefore there were high variability in the rate of this quantitative characteristic. These results have been agreed with Refay (2009).

Weight of 1000 grains : The weight of the grain of the components of the important factor and begin to form and fill the grains quickly after fertilization and accumulates the rate of three quarters of the dry weight of the grains at the end of the stage of the dough and then maximum at maturity (Vanderlip, 1993 and Vanderlip, 1972).

The results of table 8 showed that V4 responses showed the highest weight of 1000 tablets at 38.6 and 38.3 g respectively and 26.72%, 19.77%, 16.52%, 32.95%, 24.94%, 11.65%, 14.85% and 23.13% respectively for V5, V3, V2, V1 in sequence and for two seasons.

Table 7 : Genetic variability, the number of grains in spike by the effect of barley varieties under the levels of potassium fertilizer in the two seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	46.2	50.8	53.9	55.2	**51.5**	**V1**	44.2	48.9	53.0	53.6	**49.5**
V2	51.5	56.2	59.8	61.1	**57.2**	**V2**	49.8	52.8	57.7	58.2	**54.6**
V3	43.1	47.8	51.8	52.3	**48.8**	**V3**	44.3	45.0	49.2	53.5	**48.0**
V4	47.7	48.9	51.7	55.6	**51.9**	**V4**	48.8	50.0	54.8	56.0	**52.4**
V5	48.6	51.3	54.5	56.2	**52.6**	**V5**	50.1	53.0	55.3	55.9	**53.5**
L.S.D	1.97				2.30	L.S.D	0.62				0.86
Mean	**47.4**	**51.0**	**54.3**	**56.1**		**Mean**	**47.4**	**49.9**	**54.0**	**55.4**	
L.S.D	4.60					L.S.D	N.S				
Grand mean	**52.81**					Grand mean	**51.32**				
Heritability	G^{2}δ	E^{2}δ	P.V.C	G.V.C	G.A%	**Heritability**	G^{2}δ	E^{2}δ	P.V.C	G.V.C	G.A%
86.33	70.43	11.15	17.42	16.19	26.47	84.23	5.77	1.08	5.10	4.68	7.56

Table 8 : Genetic variations the weight of 1000 grains under the influence of barley varieties under the levels of potassium fertilizer in the two seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	29.6	31.4	31.0	30.9	**30.5**	**V1**	30.5	31.0	30.9	30.3	**30.6**
V2	34.3	32.5	31.7	30.6	**32.3**	**V2**	35.4	34.6	34.0	33.3	**34.3**
V3	33.6	33.8	33.1	32.2	**33.2**	**V3**	33.6	34.3	32.5	33.1	**33.3**
V4	41.1	40.0	37.8	35.7	**38.6**	**V4**	40.2	38.3	38.0	36.8	**38.3**
V5	31.9	30.1	28.1	27.2	**29.1**	**V5**	31.9	31.1	30.2	31.3	**31.1**
L.S.D	1.63				2.14	L.S.D	1.03				2.29
Mean	**34.1**	**33.5**	**32.3**	**31.1**		**Mean**	**34.3**	**33.8**	**33.1**	**32.9**	
L.S.D	N.S					L.S.D	N.S				
Grand mean	**32.78**					Grand mean	**33.56**				
Heritability	G^{2}δ	E^{2}δ	P.V.C	G.V.C	G.A%	**Heritability**	G^{2}δ	E^{2}δ	P.V.C	G.V.C	G.A%
88.96	77.9	9.67	28.5	26.9	44.7	79.45	42.6	11.0	21.8	19.4	30.5

The differences between the different types of cultivars are due to differences in their genotypes and to the susceptibility of each species in terms of the growth rate of the grain and the length of time of the grain filling (AL-Baldawi, 2006). That the levels of compost increased the weight of the grain and for two seasons and may be due to the increase in the number of grains with spike with high levels of potassium where the comparison treatment gave the highest rate of weight of 1000 tablets at 34.1 and 34.3 g sequentially for the seasons did not differ significantly with the treatment of fertilizer 100 kg k.ha^{-1} for the two seasons.

The same table indicates that there is no significant difference between the varieties and levels of potassium fertilizer for the two seasons, it is possible to say that the behaviour of the varieties was the same direction of the behaviour of levels of potassium fertilizer where the higher the levels of potassium fertilizer, the weight of 1000 tablets of the varieties that are independent in their response to the recipe.

Table 9 : Genetic variability of tonnage, E1 by the effect of barley varieties under the levels of potassium fertilizer in the two seasons.

First Season 2014 – 2015						Second Season 2015 – 2016					
Varieties	**K kg.h^{-1}**				**Mean**	**Varieties**	**K kg.h^{-1}**				**Mean**
	0	**100**	**200**	**300**			**0**	**100**	**200**	**300**	
V1	4.1	4.8	5.9	6.0	**5.20**	**V1**	4.2	4.4	5.6	5.8	**5.02**
V2	4.5	5.5	6.1	5.9	**5.65**	**V2**	4.4	5.3	5.8	5.6	**5.27**
V3	4.0	5.6	6.4	5.9	**5.47**	**V3**	3.9	5.2	6.1	5.7	**5.22**
V4	4.7	6.0	7.1	6.4	**6.02**	**V4**	4.5	5.9	6.5	6.0	**5.73**
V5	3.8	4.4	6.4	5.1	**4.67**	**V5**	4.0	4.7	5.6	5.3	**4.90**
L.S.D	0.30				0.18	L.S.D	0.29				0.26
Mean	**4.22**	**5.32**	**6.24**	**5.86**		**Mean**	**4.20**	**5.12**	**5.92**	**5.68**	
L.S.D	0.41					L.S.D	0.53				
Grand mean	**5.40**					Grand mean	**5.23**				
Heritability	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%	**Heritability**	$G^2\delta$	$E^2\delta$	P.V.C	G.V.C	G.A%
81.22	0.199	0.046	9.16	8.26	13.10	70.01	0.239	0.104	11.35	9.36	13.80

Genetic variability was higher than the environmental variances 8.1 and 3.9 times in successive seasons and affected the weight and weight of the grain. This explains the high birth rate of 1000 tablets and 88.96% and 74.45%, respectively. This was reflected in the predicted improvement rate of 44.70% and 30.50% sequentially.

The product of the grain is hectare/ton : The most important goal of the plant breeders always increase the grain yield in the unit area and this is by adopting the best standards for the diagnosis of varieties characterized by the high score as well as follow the scientific agricultural processes.

Table 9 indicates the superiority of V4 with the best yield of 6.02 and 5.73 tons. (V), V3, V2, V2, V1, V2, respectively. The superiority of V4 is due to its superiority in the area of paper Science, Plant Growth Rate and Grain Weight. The difference in response to varieties is due to different genetic structures. The increase in the levels of potassium fertilizer significantly affected the effect of the two seasons and gave the treatment 200 kg ha^{-1}. The highest grain yield was 6.24 and 5.92 t.ha^{-1} respectively for the seasons and did not differ significantly with the treatment of manure 300 kg ha^{-1} for the second season while the non-toxic treatment K0 gave the lowest rate of 4.22 and 4.20 t.ha^{-1} in sequence for the two seasons.

That the increase in the level of potassium added to the increase in grain yield and the positive role of potassium in the increase of paper area, including the area of science paper and the number of grain spike and grain weight, which reflected positively on the increase of the grain in the unit area and agrees with the found (Robinson, 1966 and Vanderlip, 1993).

The overlap between the cultivars and the levels of potassium fertilizer was significant and for the seasons V4 gave the highest grain yield with the level of compost 200 kg ha^{-1} and reached 7.1 tons.ha^{-1}, with an increase of 86.84% for the treatment of K0 with V5 for the first season while the class V4 with the fertilizer level 200 kg k.ha^{-1}, the highest of 6.5 tons.ha^{-1} and an increase of 66.66% for the treatment K0 with the class V3 for the second season.

The genetic variations between plants 4.3 and 2.3 times the environmental variations in both seasons in sequence and thus significantly affected the grain yield and increase. This explains the high inheritance rate of the grain yield of 81.22% and 70.01% for the seasons respectively, which was reflected in the expected rate of genetic improvement, 13.10% and 13.80%, respectively for the two seasons. The results of the same table indicate that the plants were homogenous and phenotypically homogeneous in the grain yield in the unit area based on the values of P.V.C and G.C.V.

The grain yield is the most important field scale of the species. It reflects the final outcome of the plant's vital activities, which are mainly related to the genetic factor and its interaction with the available growth factors. However, the inheritance ratio was high in most traits in both seasons, the percentage of the coefficient of phenotypic variation is attributed to the genetic variation coefficient. The characteristics may be different within the species. In fact, the characteristics are different in nature and the effect of the environment is low (Yogi *et al*., 2013). Thus, these traits can be used as electoral tools based on the descriptive expression of the characteristic, as the traits may be under the influence of the host gene (Rawat *et al*., 2013). Thus, the selection of these traits is the way to improve the high varieties of barley. The simultaneous high inheritance ratio and genetic improvement are important markers of selection to improve certain traits (Abou El-Nasr *et al*., 2013).

The previous findings aimed to the clear superiority of Samir cv. in most of growth traits in response to the different levels of potassium fertilizer that finally reflected on yield and yield components in positive way.

References

Abou El-Nasr, T. H. S., M. M. Ibrahim, K. A. Aboud and Magda A. M. El-Enany (2013). Assessment of Genetic Variability for Three Coriander (*Coriandrum sativum* L.) Cultivars Grown in Egypt, Using morphological Characters, Essential Oil Composition and ISSR Markers. *World Appl. Sci. J.*, **25 (6)** : 839-849.

AL-Baldawi, M. H. K. (2006). Effect of Sowing Date on Grain Filling Period and Grain Growth Rate, Yield and its Compenents of Some Bread Wheat Cultivars, *Triticum aestivum* L. *Ph. D. Dissertion*. Dept. of Field Crop Sci. College of Agric. Univ. of Baghdad, Iraq. pp. 160.

Aldelaimi, H. A. A. : Effect of potassium levels and distance between rows on growth and yield characterizes of two sorghum cultivars. *J. Agric. Anbar*, **2(6)** : 126-139.

Aldelaimi, Z. M. A. (2011). Response of some barley genotypes for levels of potassium fertilizer. *J. Agric. Sci. Anbar*, **2(8)** : 66-78.

Al-qassi, E. K. Kh. (2009). The Petfomance and variance of selected strains of barely (*Hordeum valgare* L.) in gypsum soil. Uni. of ATekret. *J. Agric. Sci.*, **7 (2)** : 117-127.

Budak, N. (2000). Heritability, correlation and genotypes X year introduction of grain yield, test weight and protein content in durum wheat. *Tur. J of Field Crops*, **5** : 35-40.

Chavan, S. K. and R. C. Mahajan (2007). Genetic variability studies in sorghum. *Karnataka J. Agric. Sci.*, **23(2)** : 322-323.

F.A.O. (2013). Year Book. *Production*. V. 66.

Hanson, C. H., H. F. Robinson and R. E. Comstock (1955). Estimates of genetic and environmental variability in soybean. *Agron. J.*, **47** : 314-318.

Hasn, K. M. (2011). The Potassium. In Iraqi Agriculture. *J. Agric. Iraqi*, **3** : 22-27.

Hisham, M. H. and K. A. M. Ali (2012). Effect of seeding rate and potassium growth and yield of barley. *J. Agric. Sci. Iraq*, **V 43(5)** : 33-41.

IPI (International potash Instiute) (2000). Potassium increases Salinity tolerance file A : IPI Serves the word.

Kempthorne, B. (1969). An introduction to Genetic Statistics. Ames Iowa state Univ. Press.

Munir, A. T. (2002). Infleuce of varying seeding rates and nitrogen levels on yield components of barley (*Hordeum vulgare* L. c.v. Rum) in the semi- arid region of Jordan. *Die Bodenkulture*, **53(1)** : 13-18.

Rawat, S. K, S. Kumar and Y. C. Yadav (2013). Genetic evaluation for biometrical traits in sorghum (*Sorghum bicolor* L . Moench). *J. Spic. Arom. Crops*, **22(1)** : 85–87.

Refay, Y. A. (2009). Impact of soil moisture stress and seeding rate on yield variability of barley grown in arid environment of Saudi Arabia. *American- Eurasian J.ofAgron*., **2(3)** : 185-191.

Robinson, H. F. (1966). Quantitative genetics interaction to breeding on the cenemieal of mandelism. *Indian J. Genet.*, **26A** : 171-187.

Soleymani, A., M. H. Shahrajabian and L. Naranjani (2011). Determination of the suitable planting date and plant density for different cultivars of barley (*Hordeum vulgare* L.) Fars. *Afri. J. Plant Sci*., **5(3)** : 284-286.

Steel, R. G. D. and J. Torrie (1980). Principles and Procedures of Statistics. **2**nd Ed, McGraw Hill, Book, Co. Inc. London. pp. 560.

Tisdale, S. L., W. L. Nelson and J. D. Beatou and D. Havlin (1993). Soil Fertility and Fertilizer. 5th (ed) Drentice Hail. Tissues. *Crop Sci*., **19** : 592-598.

Vanderlip, R. L. (1993). How a Sorghum plant develops. Kansan State University. pp. http: WWW. Oznet.Ksu.edu.

Vanderlip, R. L. and H. E. Reeves (1972). Growth stage of sorghum (*Sorghum bicolor* Moench L.). *Agron. J*., **65** : 13 – 16.

Yogi, R., R. S. Meena, R. K. Kakani, Alka Panwar and R. K. Solanki (2013). Variability of some morphological characters in sorghum. *Intl. J. Seed Spices*, **3(1)** : 41-43.