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EFFECT OF SEED RATES AND LEVELS OF ALJAMIEUH LIQUID FERTILIZER ON GROWTH AND YIELD OF BARLEY.

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Abstract:

A field experiment was conducted for the barley crop *Hordeum vulgare* L for the winter season 2019-2020 in a farmer's field located in Abi Gharq area 10 km west of Hilla Center / Babylon province ,To know (the effect of seed rates and levels of Aljamieuh liquid fertilizer on the growth and yield of barley). A factorial experiment was used by randomized complete block design (R.C.B.D) with three replications (Al-Rawi and Khalaf Allah, 2000).The experiment included two factors, the first factor was concentrations of Aljamieuh liquid fertilizer spray (5,0 and 10) ml. L^{-1} and which is symbolized by (T0, T1, T2), while the second factor included three seed averages (100, 150 and 200) kg. ha-1,The following which is symbolized by (V1, V2, V3).The results indicated that there were significant differences between the levels of factors in the studied traits, where there was a significant difference between the seed average, where the seed average 150 kg.ha^{-1} (V2)excelled in some traits, including the number of tillers. m 2, the number of spikes. m 2 and the number of grains. spike $^{-1}$ by giving it the highest average of (321.33 spikes. m 2, 309.22 spikes. m ^{2} and 58.55 grains. spike $^{-1}$,While the seeding average of 100 kg.ha^{-1}(V1) gave the highest average in the plant height. cm and a weight of 1000 grains. g (110.44 cm and 35.33 g).The concentrations of the Aljamieuh liquid fertilizer spray showed significant differences in all the traits included in the study, where the concentration10 ml. L^{-1} (T2) was given as the highest average of the plant height(cm),number of tillers.m^2, the number of spikes. m2, the number of grains. spike 1- and the weight of 1000 grains. (g) reached (109.00 cm, 320.44 grains. m^2, 306.77 spikes. m^2, 55.88 grains and 35.11 g).

Keywords: Barley, Seed Rates, Foliar Fertilization And Aljamieuh Liquid Fertilizer

INTRODUCTION:

Barley, Hordeum vulgare L., is one of the important grain crops that is grown in large areas in many countries of the world, where a result of its nutritional value that excelled other crops. It is used as green feed or to make bread after it is mixed with a certain percentage of wheat flour and humans have used it since antiquity as a source of grain after wheat.As an important feed crop in addition to its industrial uses, its cultivation still suffers from major problems that were a major reason for the decrease in the yield of the unit area from it by a large degree compared to global rates and what the agriculturally advanced countries produce. Such as environmental factors that can interfere with the variety or alone,Which makes the crop unable to express itself genetically and physiologically, and the difference in yield and quality of barley is partly caused by changes in climatic conditions, as managing the variety and choosing its planting date are the two options available to improve barley growth and yield (Juskim, 2003 .(The foliar feeding system is very important to meet the plant's need of nutrients through the leaves, because transferring them through the roots requires a long time compared to direct addition through foliar nutrition in addition to its impact on soil factors that affect the availability of some elements.As plant nutrition has an effect on many physiological and biochemical processes that affect growth, development and yield (Stojanova et al., 2016.(Determining the optimal seeding rate is one of the basic conditions for obtaining a high yield, because its lower than the required limits may lead to the growth of large numbers of weeds that compete with barley in its early stages of growth through the small number of plants and to an increase in the number of tillers, especially those that do not bear the spike, which are recently formed It is negatively reflected on the yield of grains as a result of consuming water and nutrients and not giving them grains (Bonachela et al., 1995 .(It was noticed (Ali et al., 2011) that there was a significant increase in the grain yield of barley when the seeding rate was increased from 100 to 140 kg. ha $^{-1}$ Compared to the average 100 kg. ha^{-1}.While Endris and Mohammed, 2007) found when studying the effect of seeding rates for barley 100, 125, 150, 175 and 200 kg.ha^{-1}.The seeding rate is 200 kg.ha^{-1}.It gave the highest number of branches, which reached

311.8. branches .m ^{2} compared to the seeding rate of 100 kg.ha^{-1} which gave the lowest average of 270.2 branches. m^{2} .Soleymani and (2011, Naranjani) when studying the effect of three seed quantities of barley (250, 350 and 450) plants. m2 indicated that the seed quantity of 450 plants. m^{2} gave the best grain yield of 4893 kg.ha^{-1} compared to the rest of the treatments that gave (4716 and 4716). 4840 kg ha^{-1}) respectively .This study was conducted to determine the best seeding rate per unit area, as well as to know the best concentration of the foliar fertilizer used and the interaction between them in some growth, yield and components of barley crop.

MATERIALS AND METHODS:

A field experiment was conducted for the barley crop *Hordeum vulgare* L for the winter season 2020-2019 in one of the farmers' fields located in the Abi Gharq area 10 km west of the center of Hilla / Babylon province, to know (the effect of seed rates and levels of aljamieuh liquid fertilizer on the growth and yield of barley). A factorial experiment was used in a randomized complete block design (R.C.B.D) with three replications.The experiment included two factors, the first factor was concentrations of aljamieuh liquid fertilizer spray (5,0 and 10) ml. L^{-1} and which is symbolized by (T0, T1, T2), while the second factor included three seed rates (100, 150 and 200) kg. ha^{-1}, The following symbols were taken (V1, V2, V3).The land was plowed by two orthogonal plows using Moldboard plows and smoothed with disc harrows and the land was leveled. Random samples were taken from field soil with a depth of 0-30 cm to determine some physical and chemical properties based on the methods described by (Page et al., 1982) (Table 1) showing the properties of field soil.Then it was divided into plots and the shoulders were worked between plots. The area of the experimental unit (2×3) m contained 10 rows, with a distance of 20 cm between each row and another. . It used nitrogen fertilizer in the form of urea fertilizer in an amount of 200 kg.ha^{-1}(N=46%) was added in the first batch before planting and the second batch at the elongation stage, while phosphate fertilizer was added in one batch before planting with an amount of 100 kg P2O5 H1- for fertilizer 46%) P2O5 =) (Jaddoa, 1997). The planting was conducted on 11/16/2019. The number of irrigations was five, including the irrigation for germination. The experiment was planted manually whenever needed. The aphids were controlled by using Commandro 20 pesticide, in the amount of 50 ml per 100 liters of water. The following traits were studied: the height of the plant. cm, number of branches. m2, the number of spikes. m2, the number of grains. Sunbulah 1- and the weight of 1000 grains.gm. The experiment was harvested when the plants reached the stage of full maturity with a moisture content of not more than 14%. The data were statistically analyzed for each trait using the ready-made Genstat program to analyze variance and using the value of the least significant difference (L. S. D) at the level of probability (0.05) (Al-Rawi and Khalaf Allah, 2000).

Table 1: Some physical and chemical properties of soil analysis at experimental site:

Soil properties	**value**
Sand (mg kg^{-1})	40.5
Silt (mg kg^{-1})	657.3
Clay (mg kg^{-1})	302.2
Texture class	Silty Clay loam
ECe (ds m^{-1})	3.5
PH	7. 4
O.M (%)	0.8
Total N (%)	0.10
Available Phosphate (mg kg^{-1})	4.51
Available Iron (mg kg^{-1})	0.848
Available Zinc (mg kg^{-1})	0.039
CaCo3 (%)	21

Table 2. Components of liquid nutrient fertilizer

components	percentage
nitrogen	7%
phosphorous	5%
potassium	7%
magnesium	0.5%
Potassium Humate + Micro elements	0.5%

RESULTS AND DISCUSSION:

Plant Height(Cm)

The results in Table (3) indicate that there are significant differences in the plant height trait when increasing the seed quantities, where the 200 kg. ha^{-1} (V1) treatment gave the highest height of 110.44 cm compared to other treatments that gave the lowest average, respectively. This increase in plant height is due to the increase in competition between them where a result of the increase in their number per unit area in high seed quantities, and this led to an increase in the elongation of plants to obtain sufficient light. This is consistent with the findings of (Refay, 2009), which stated that the increase in the quantity of seeds leads to an increase in the height of the plant.

The results of the statistical analysis in Table (3) indicated that there were significant differences in the plant height characteristic due to the effect of foliar nutrition, where the treatment (T2) was significantly excelled to the rest of the treatments by giving it the highest average of plant height of 109.00 cm, while it gave the control treatment without adding (T0). The lowest value for the trait of plant height reached 103.77 cm.The reason for the increase in the significant plant height may be due to the role of iron in increasing the chlorophyll content in the leaves. It is one of the important foundations in the process of photosynthesis as well as a cycle in the formation of many compounds (cytochromes and ferdoxin) of great importance in the process of photosynthesis (Awad, 1987), This will push towards an increase in the averages of photosynthesis, and then increase the manufacture and accumulation of dry matter, which leads to an increase in growth rates, which is clearly reflected in the increase in plant height. These results are in agreement with (Farhan et al., 2011). The results in Table (3) showed that there was a significant interaction between T and V in the average plant height, where the seeding rate V3 with the fertilizer level T2 gave the highest average of 112.67 cm.While the bi-interaction between V3 and the control treatment T0 gave the lowest average for this trait, which was 99.00 cm

Table (3) Effect of seed quantities and liquid university fertilizer on plant height(cm)

V average	Concentrations of aljamieuh liquid fertilizer ml. L^{-1}			seeding rates
	T2	T1	T0	
110.44	112.67	110.33	108.33	V1
104.78	105.67	104.67	104.00	V2
103.22	108.67	102.00	99.00	V3
	109.00	105.66	103.77	average T
V*T= 4.06	V= 2.03	T= 2.03		L S D 0.05

The number of branches(m^2)

The results in Table (4) indicated that there was a significant increase in the number of branches at the seeding rate of 150 kg. ha^{-1} (V2) Compared to the other seeding rates, the number of branches with a seeding rate reached 150 kg. ha^{-1} (V2) 321.33 branch. m^2. It is due to the fact that high densities may be a limiting factor for the production of branches, where they limit the development of the developing apex and the emergence of branch initiators and thus reduce their numbers. This result is consistent with (Spaner et al., 2001) who indicated that increasing seeding rates led to a decrease in the number of seedlings. The results of the statistical analysis in Table (4) showed a significant effect on the the number of stalks of barley plant by the effect of foliar nutrition, where the fertilizer level T2 excelled on the rest of the levels, where it gave the highest number of branches .m^2 amounted to 320.44 branches. m^2 Whereas, the control treatment T0 gave the lowest number of branches, which amounted to 312.11 branches.m^{-2}. The reason may be due to the role of some elements, including copper, which in turn affected the stability of chlorophyll, which encouraged the plant to continue the process of photosynthesis, which is believed to have helped in this increase in the number of branches. this result agreed with what was stated by (Wirsma, 2005 and Ebrahim et al., 2004) on the wheat plant, who found that the addition of iron, zinc and copper as a spray on the wheat plant led to an increase in the number of tillers of the plant branch / pot.The results of the bi-interaction between T and V showed a significant effect on this trait, where the combination T2V2 gave the highest mean of 327.33 branches. m2, while the combination V1 with the control treatment T0 gave the lowest average of 307.00 branches. m^2

Table (4) Effect of seed quantities and Aljamieuh liquid fertilizer on the trait (number of branches. m^2)

V Average	Concentrations of aljamieuh liquid fertilizer ml. L^{-1}			seeding rates
	T2	T1	T0	
308.55	310.00	308.67	307.00	V1
321.33	327.33	319.00	317.67	V2
317.22	324.00	316.00	311.67	V3
	320.44	314.55	312.11	T Average
V*T= 4.22	V= 2.11	T= 2.11	L S D 0.05	

The number of spikes(m^2)

The results in Table (5) showed that there were significant differences when increasing the amount of seed in the trait of the number of spikes to a certain extent, and then it starts decreasing. When treatment V2, the highest number of spikes was achieved, amounting to 309.22 spikes. m^2, while the seeding rate V1 gave the lowest average number of spikes of 292.55 spikes. m^2.The reason for this may be due to the intense competition in high plant densities and the production of dense vegetative growth and weak stems that are unable to give spikes .These results are in agreement with (Haile and Girma, 2010), which stated that increasing the amount of seeds led to an increase in the number of spikes when using two quantities of seeds 150-225 kg. ha^{-1} .As for the effect of foliar fertilization, it showed a significant increase in the number of spikes. m ^{2}, where the fertilizer level T2 excelled by giving it the highest average of 306.77 spikes. m^2, while the control treatment T0 gave the lowest average of this trait, which amounted to 295.89 spikes. m^2. The reason is due to the role of the elements included in the fertilizer used, including the potassium element, which leads to the stimulation of enzymes in the plant, especially the enzymes of carbohydrates and starch, which are directly responsible for increasing the components of the crop, including the number of spikes.This result agrees with (Hammadi and Saleh, 2002) when potassium fertilization was increased from 0-249 kg. ha^{-1} The results in Table (5) showed that there is a significant effect of the bi-interaction between T and V on the average number of spikes, as the seeding rate V3 with the fertilizer level T2 gave the highest average number of spikes, which amounted to 314.33 spikes. m^2,While the seeding rate V1 with the control treatment T0 gave the lowest average of 289.00 spikes. m^2.

Table (5) Effect of seed quantities and aljamieuh liquid fertilizer on number of spikes. m^2.

V Average	Concentrations of aljamieuh liquid fertilizer ml. L^{-1}			seeding rates
	T2	T1	T0	
292.55	295.00	293.67	289.00	V1
309.22	311.00	309.00	307.67	V2
301.66	314.33	299.67	291.00	V3
	306.77	300.78	295.89	T Average

V*T= 10.62	V= 5.31	T= 5.31	L S D 0.05

Number of grains. spike $^{-1}$

The results in Table (6) showed that the difference in seed rates had a significant effect on the number of grains. spike^{-1} where the seeding rate 150 kg. ha^{-1} (V2) excelled and gave the highest average number of grains per spike, which was 58.55 grains. spike^{-1}, while giving a seeding rate of 100 kg. ha^{-1} (V1) gave the lowest average number of grains per spike was 46.22 grains. spike^{-1}.This decrease is due to the intense competition between plants in high seed quantities that begins at the time of emergence or formation of flowers, where nutrients are limited and competition is intense between the components of the yield and this is consistent with (Al-Mutairi, 2004) when using seed rates (80, 120 and 160) kg. ha^{-1}.The results showed that there were significant differences when increasing the foliar fertilizer, where the fertilizer level T2 gave the highest average of 55.88 grains. Spike $^{-1}$, while the control treatment gave the lowest average for this trait, which was 49.22 grains. spike^{-1}.Perhaps the increase is due to the role of the nitrogen element in the composition of the fertilizer used, which contributes to raising the efficiency of the photosynthesis process and increasing its outputs, which led to an increase in the number of fertile spikelets in which the grains are formed. These results agreed with the findings of the mechanism (Al-Karkhi, 2013) on the barley crop (Abdul-Khaleq, 2017 and Al-Azzawi et al., 2018) on the wheat crop, which showed that increasing the levels of nitrogen fertilizer led to an increase in the number of grains in the spike.The bi-interaction between ((V, T) had a significant effect in this trait, as the combination V2, T1 gave the highest average of 60.67 grains. Spike $^{-1}$, while the combination V1 with the control treatment T0 gave the lowest average of 43.67 grains. Spike $^{-1}$

Table (6) Effect of seed quantities and aljamieuh liquid fertilizer on the trait (number of grains. spike $^{-1}$).

V Average	Concentrations of aljamieuh liquid fertilizer ml. L^{-1}			seeding rates
	T2	T1	T0	
46.22	48.33	46.67	43.67	V1
58.55	59.00	60.67	56.00	V2
53.00	60.33	50.67	48.00	V3
	55.88	52.67	49.22	T Average
V*T= 4.20	V= 2.10	T= 2.10	L S D 0.05	

Weight 1000 grains (g)

The results in Table (7) showed that increasing the amount of seeds led to a decrease in the weight of 1000 grains, when treatment was 150 kg. ha^{-1} (V2) gave the lowest weight of 31.78 g compared to the rest of the treatments, which gave 35.33 and 33.77 g, respectively.This result is due to the fact that the weight of 1000 grains is one of the traits that are greatly affected by high plant densities due to the occurrence of a state of competition between plants, which led to a reduction in the dry matter manufactured at the source that is transmitted to the estuaries, where the manufactured materials are distributed over a large number of spikes and thus reduces of grain weight.These results agree with (Salem et al., 2000), which indicated that there were no significant differences when increasing the amount of seed. The levels of the used foliar fertilizer also had a significant effect on the average of this trait. The T2 fertilizer level gave the highest average for the trait, which amounted to 35.11 g. While the non-fertilization treatment T0 gave the lowest average of 32.33 g. The reason is due to the role of the elements included in the fertilizer used, including the element phosphorous, which is a major compound in the seeds and is a source of energy that is transmitted to the grain, which helps to increase the weight of the grain. This is indicated by Kaiser et al,, 2012) who concluded that the addition of phosphate fertilizer led to an increase in the weight of the grains. The bi-interaction between the two factors of the study (V, T) was significant for this trait, where the interaction between V3, T2 gave the highest average grain weight of 36.67 g. While the seeding rate V2 with the control treatment T0 gave the lowest average for this trait which was 30.67 g.

Table (7) Effect of seed quantities and aljamieuh liquid fertilizer on the trait (weight of 1000 grains. g).

V Average	Concentrations of aljamieuh liquid fertilizer ml. L^{-1}			seeding rates
	T2	T1	T0	
35.33	36.00	35.00	35.00	V1
31.78	32.67	32.00	30.67	V2
33.77	36.67	33.33	31.33	V3
	35.11	33.44	32.33	T Average
V*T= 1.84	V= 0.92	T= 0.92	L S D 0.05	

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