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Response of Three Genotypes of Corn (Zea Mays L) to Spraying with Different Concentrations of Al-Nahrain Liquid Foliar Fertilizer.

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Abstract: The experiment was carried out on a farmer's field in the province of Babylon during the 2020–2021 growing season. to investigate how three different genotypes of corn (Zea mays L.) react when sprayed with varying Nahrain liquid fertilizer quantities. the General Authority for Agricultural Research, obtained. Three replicates of a system of two-factor trials was used, and the randomized complete block design (R.C.B.D.) was employed (Al-Rawi and Khalafallah, 2000). There were two variables in the experiment. The first factor was the Al-Nahrain liquid (0,2,4) ml foliar fertilizer concentrations. L-1, represented by the sign (K0, K1, K2). For the second element, it was represented by the symbol and comprised three corn varieties (Rabea, Bohuth 106, and Sarah) (S1, S2, S3). Results were evident. The cultivar Bohuth 106 (S1) performed exceptionally well in the majority of the attributes examined, including cob length (cm), number of rows (cob-1), number of grains per row, and number of grains per cob, and it produced an average of (20.3 cm, 14.50 row.cob-1, 37.76 grains.row-1 and 465.77 grain.cob-1).The analysis's findings revealed that the concentration was more than 4 ml. Cob length, cm, number of rows, cob-1, number of grains per row, number of grains per cob, and weight of 500 grains are all considered to be L-1 (K2) features in all traits that have been researched. (20.37 cm, 14.67 rows, 34.76 pieces, 424.77 grains, and 95.77 g in a cob-1 matrix). Despite the binary interaction findings showing a significant effect on majority of the features, the combination S3, K2 excelled in the attributes of cob length (cm) and weight (g-1), giving it the highest mean (20.67 cm and 110.00 g) Although the highest average in terms of grains was produced by the interaction between S1 and K2in terms of the quantity of grains per row and the number of grains per cob, offered the highest average (39.03 grains in row and 468.00 grains .cob).

Keywords: corn, genotypes, Nahrain liquid fertilizer and foliar spray.

1. INTRODUCTION:

After wheat and rice, the maize plant, Zea mays L., is one of the most significant grain crops in the world. Due to its high output and greater environmental adaptability than the rest of the grass family, it is known as a miracle crop and the queen of crops (Subramania and Subbaraman, 2010). In comparison to 2013, the output of the yellow corn crop in Iraq in 2015 was roughly 182.3 thousand tons ha-1, covering an area of 213.2 thousand dunums. It covered an area of 798.1 thousand dunums and weighed roughly 831.3 thousand tons per hectare (Anonymous, 2016). One of the most significant goals is to increase agricultural

production, which may be done by either expanding the area under cultivation or raising productivity levels. It is influenced by a number of elements, one of which is genetics, necessitating the creation of genetic structures that yield more and have a wider genetic foundation than individual hybrids. This gives it a wider environmental adaptation, and it is regarded as one of the effective methods that increase the productivity of yellow corn in the presence of environmental factors. The most crucial of these is the right planting date, which offers ideal temperatures for emergence and germination up until the stage of flowering and seed production. Using various levels and sites, Adediran and Kogbe (2003) found a significant rise in maize grains with an increase in N.P.K element levels. (Kareem et al., 2003) found that employing amounts of (zero, 0.05, 0.1, 1.5%) iron and zinc and adding them via spraying on the plant, soaking in water, or fogging the plant resulted in substantial increases in corn grain production of 31%, 36%, and 25% in contrast to the comparison treatment. In comparison to the other treatments, the foliar spray therapy was superior. The goal is to understand how varied foliar fertilizer levels affect the yield components of different genotypes of corn in the region.

2. MATERIALS AND METHODS:

The experiment was carried out in the agricultural fields of a farmer in the province of Babylon during the 2020–2021 growing season to examine how three genotypes of corn, Zea mays L., responded to the application of Nahrain liquid foliar fertilizer in various doses. the General Authority for Agricultural Research, obtained. Three replicates of the randomized complete block design (R.C.B.D.) system of global experiments were employed (Al-Rawi and Khalaf Allah, 2000). There were two variables in the experiment. The concentrations of spraying Nahrain liquid (4,2,0) ml were the first determining factor. L-1 for each, and it was represented by (K0, K1, K2) The second element, which was represented by the three cultivars Rabea, Bohuth 106, and Sarah, was (S1, S2, S3). Moldboard plows and two orthogonal plows were used to plough the experimental land. After being leveled using a smoothing machine and a leveling machine, the experimental land was divided into 23 m-sized units. It had four lines, each line being 75 cm apart, and the distance between its inner and outer sides was 25 cm. 200 kg on average of the triple superphosphate fertilizer (46%) P2O5 were added. Before planting, Hectare-1 should receive 150 kg N.ha-1, or 46% of the recommended amount, of nitrogen fertilizer. When the plant reached a height of 30 cm, the second half of the N fertilizer was added. It was applied on just one side, 5 cm away from the planting line. Two batches of the diazinon granular pesticide were applied at a 10% concentration to prevent the maize stalk borer. the second after 25 days of the first, and the compound fertilizer NPK was added at a rate of 150 kg.ha-1 during plowing, taking into account when applying the fertilizer levels under study. For all levels being tested, which was added to two batches, the first after 20 days of cultivation and the second after 20 days of the first batch. At the study location, manual weeding activities were also carried out, and irrigation was done in accordance with the requirements of the plants. To calculate the measures of the examined features, 10 plants from each composition's central lines were chosen, leaving the peripheral plants out. The characteristics are: the number of rows per cob, the number of grains in each row, the number of grains per cob, the length of the cob (in centimeters), and the weight of 500 grains (g). The arithmetic means were compared using the least significant difference (L.S.D.) at the level of probability (0.05), and the data were statistically analyzed using the method of analysis of variance for factorial experiments (Steel and Torrie, 2004). (1980).

Table (1) Table of analysis of some physical and chemical properties of field soil

Values	**traits**
7.64	pH
3.7	electrical conductivity deci ds.m-1
1.02	Organic nitrogen (g. kg -1)
295.0	Calcium carbonate (g. kg-1)
6.5	available Phosphorous (mg .kg-1)
176.0	available Potassium (mg .kg-1)
10.3	Organic matter (g. kg -1)
soil separates(g.kg^{-1})	
182.0	sand
334.0	clay
474.0	silt

Table (2) Components of Al-Nahrain liquid (produced by Tariq General Company / Baghdad Al-Mansour, and each liter contains:

10%	**N**
8%	**P_2O_5**
6%	**K_2O**

It also contains balanced amounts of iron, zinc and manganese in a chelated form.

3. RESULTS AND DISCUSSION

Cob length. cm

The results in Table 3 show that the feature of cob length has a substantial impact. The cultivar Bohuth 106 (S1) offered the highest average and outperformed the other cultivars with a value of 20.3 cm, while the cultivar Rabie (S3) gave the lowest average with a value of 19.69 cm. Maybe the genotype Bohuth 106 excelled in the trait of plant height, explaining the difference and superiority. This is in line with the findings of (Ahmed, 2001). Spraying foliar fertilizer at different concentrations had a discernible impact, with K2 giving it the greatest average of 20.37 cmthe lowest average of 19.59 cm was produced by the control treatment K0. Perhaps this results from the function of zinc in the production of the amino acid tryptophan, chlorophyll, and protein, the activation of several enzymes, and the synthesis of energy compounds and RNA, which increases the activity of the plant in the absorption of water and nutrients, which was positively reflected in the markers of plant growth. Aliah (Fahad et al., 2005). (Fahad et al., 2005). This feature was significantly affected by the bi-interaction between cultivars and concentrations ((S, K), with the combination S3, K2 giving the highest average of 20.67 cm and the combination S3 with the control treatment K0 giving the lowest average of 19.00 cm.

Table (3) Effect of concentrations of foliar fertilizer and cultivars on the trait of cob length (cm)

average **S**	Al-Nahrain liquid fertilizer concentrations, ml.L-1	cultivars

	K2	**K1**	**K0**	
20.3	20.23	20.57	20.10	**S1**
19.95	20.23	19.97	19.67	**S2**
19.69	**20.67**	19.40	**19.00**	**S3**
59.94	**20.37**	19.98	**19.59**	average **K**
S*K= 0.82	**S= 0.41**	**K= 0.41**	**L. S. D (0.05)**	

The number of rows per cob

The results of the analysis of variance for the variables under investigation are shown in Table (4). The genotypes varied significantly, with the Bohuth 106 (S1) cultivar producing the highest average of 14.50 rows. Rabie (3) produced the lowest average of 12.83 rows, followed by cob-1. cob-1. The investigations by (Al-Alawi, 2013) and (Al-Dulaimi, 2013) that found substantial differences between the parents and their crosses for a number of examined variables supported the possibility that there are genetic differences between these structures. The outcomes of the same table demonstrated a substantial correlation between the Al-Nahrain liquid foliar fertilizer concentrations, where the average of 14.67 rows was highest at the K2 concentration. cob-1 . The control treatment K0 produced the lowest average of 13.11 rows, in contrast. cob-1. This is due to the involvement of the elements, particularly zinc, in growing the principal flowering structures of the plant's main ear, which results in an increase in the number of rows for the ear because it is a floral bud and needs this element during the unfolding and expansion of the bud (Oaks, 1994). This supports the results of (Abboud et al., 2011) and (Issa, 2013), who found that elements, particularly zinc, have a role in increasing the number of rows. cob-1. This feature was significantly impacted by the bi-interaction between cultivars and concentrations (S, K), with the combination S2, K2 outperforming the other combinations with the greatest average of 15.7 rows. S2 and K1 together produced the lowest average of 12.0 rows, according to cob-1. cob-1.

Table (4) Effect of foliar fertilizer concentrations and cultivars on the number of rows per cob number of grains per row

average **S*K**	Al-Nahrain liquid fertilizer concentrations, ml.L-1			cultivars
	K2	**K1**	**K0**	
14.50	15.0	14.7	14.0	**S1**

14.33	**15.7**	12.0	13.0	**S2**
12.83	13.3	13.3	12.3	**S3**
59.94	**14.67**	13.33	**13.11**	average **K**
S*K= 0.82	**S= 0.41**	**K= 0.41**	**L. S. D 0.05**	

The analysis in Table (5)'s findings revealed a strong relationship between genotypes, foliar fertilization, and bi-interaction. The highest mean of 37.76 rows was produced by the cultivar Bohuth 106 (S1). Rabea (S3) gave the lowest mean of 25.99 rows, followed by cob-1. cob-1. This conclusion is consistent with what was reached due to the direct impact of genotypes on raising the number of grains per row, which is thought to be one of the main elements in increasing the number of grains per row and cob (Daif et al., 1999 and Ramadan, 1999). Foliar fertilizer amounts had a 4 ml impact, according to the study. The highest mean for this feature was 34.94 rows in L-1 (K2). cob-1. The lowest mean for this characteristic was 28.9 rows for compost level K0 (control treatment). cob-1 . This is in line with the conclusions of (Al-Alwan, 2002 and Al-Sibahi et al., 2002). Moreover, the characteristic was significantly impacted by the bi-interaction between cultivars and concentrations (S, K), with the combination S1, K2 producing the highest average of 39.03 rows. cob 1-, While the lowest mean of 22.18 rows was produced by the S3 combination with the control treatment (K0). Cob-1.

Table (5) The effect of foliar fertilizer concentrations and cultivars on the number of grains per row

average **S*K**	Al-Nahrain liquid fertilizer concentrations, ml.L-1			cultivars
	K2	**K1**	**K0**	
37.76	39.03	37.00	37.27	**S1**
30.87	37.07	28.29	27.25	**S2**
25.99	28.73	27.07	**22.18**	**S3**
94.62	**34.94**	30.78	**28.9**	average (**K**)
S*K= 4.50	**S= 2.25**	**K= 2.25**	**L. S. D (0.05)**	

The number of grains per cob

The data shown in Table (6) clearly show that increasing the application of foliar fertilizer, Al-Nahrain liquid, where the cultivar S1 gave the highest average of 465.77 grains, resulted in a considerable rise in the mean of plant heights. cob-1, while the cultivar S3 had an average grain yield of only 363.89 grains. cob -1. The short time gap between the dates of male and female flowering is what causes the genotype to be superior since it increased the rate of pollination and fertilization, which in turn increased the quantity of grains. cob-1. The interval between the male and female blooming dates and the quantity of grains exhibit a strong negative association, which supports this. cob-1 that is, the more grains in a cob, the closer the dates of male and female flowering were to one another. Table (6) clearly shows that there are notable variations in the average number of grains. Al-Nahrain liquid, based on the variation in fertilization with foliar nutrition, cob-1, the quantity of grains increased as a result of the fertilizer amount being raised, as is mentioned. cob-1 and that 4 ml of fertilizer were used. The highest average number of grains was produced by L -1 (K2). There were 424.77 grains of cob-1. cob-1. The lowest mean was produced by the control treatment (K0), which yielded 413.11 grains. cob-1. To increase the length of the cob, the number of seeds per cob, and the number of seeds in the row, more ear seeds must be produced by increasing the concentration of foliar fertilizer. The cause could be related to the nutrients in foliar fertilizer's involvement in accelerating maize plants' growth rates. This is in line with what was discovered (Hamza and Kazem, 2010), who also mentioned the role performed by the macro elements present in the fertilizer in the process of cell division and expansion and how raising the concentrations of Ugreen fertilizer increased growth rates (plant height, stem diameter, and leaf area) (Al-Naimi, 2000). The bi-interaction of (S, K) had a considerable impact on this feature, with the greatest average of 468.00 grains coming from the combination of (S, K)1 and (K2). The lowest average was 354.67 grains for the bi-interaction of S3 and control treatment K0, which resulted in cob-1.

Table (6) Effect of foliar fertilizer concentrations and cultivars on the number of grains per cob traits.

average S*K	**Al-Nahrain liquid fertilizer concentrations, ml.L-1**			**cultivars**
	K2	**K1**	**K0**	
465.77	**468.00**	**466.33**	**463.00**	**S1**
424.33	**426.33**	**425.00**	**421.67**	**S2**
363.89	**380.00**	**357.00**	**354.67**	**S3**
1253.99	**424.77**	**416.11**	**413.11**	**average (K)**
S*K= 10	**S= 5.00**	**K= 5.00**	**L. S. D (0.05)**	

Weight of 500 grain(g)

According to Table (7), adding more Al-Nahrain liquid to the foliar fertilizer caused a considerable increase in this trait. Genotype S3 produced the greatest average of 105.88 g, whereas genotype S1 produced the lowest average of 82.88 g. Al-Mashhadani (2010) and Aziz and Muhammad (2012), who also found significant variations across the genotypes of this attribute, concurred with this finding. That disagrees with Al-Asafi (2002), who claimed that there were no appreciable variations in grain weight amongst the genotypes. There were noticeable changes in the weight of 500 grains according on the foliar fertilizer levels. Level 4 ml was provided by g-1.it. The control treatment (K0) produced the lowest mean of 93.88 gm, while L-1 - (K2) had the highest mean of 95.77 gm. The foliar fertilizer, Al-Nahrain liquid, which contains nutrients like iron and zinc and led to an increase in the average stem diameter, may be to blame., It reflects the plant's capacity to absorb nutrients and water and is brought on by an increase in the number or size of vascular bundles. Also, their findings supported those of Al-Kinani and Al-Jubouri (2013) as well as Muhammad and Hammadi (2017). The binary interaction between S and K revealed considerable variations in these attributes, with the combination S3, K2 excelling by providing a significantly higher average of 110.00 g than the combination S1., K0, which provided the lowest mean of 82.00 g.

Table (7) Effect of foliar fertilizer concentrations and cultivars on the weight of 500 grains. g^{-1}.

average S*K	**Al-Nahrain liquid fertilizer concentrations, ml.L-1**			**cultivars**
	K2	**K1**	**K0**	
82.88	**83.33**	**83.33**	**82.00**	**S1**
95.66	**94.00**	**95.67**	**97.33**	**S2**
105.88	**110.00**	**105.33**	**102.33**	**S3**
284.42	**95.77**	**94.77**	**93.88**	**average (K)**
S*K= 4.82	**S= 2.41**	**K= 2.41**	**L. S. D (0.05)**	

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