Response of two cultivars of wheat (*Triticum aestivum* L.) to different NPK levels of Nano and mineral fertilizers

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1- Abstract

A field experiment was carried out in the field in Al-Zubair district (22 km west of Basra Governorate center), which is located at longitude 47.05 west and latitude 30.28 north, during the winter season 2021-2022, to know the response of two cultivars of wheat, *Triticum aestivum* L (Ibaa 99 and Bohoth 22), with levels of different NPK levels of mineral (20-20-20) and nano fertilizers are (0, 10N, 150M, 15N, 300M, 20N, 450M) in kg NPK ha^{-1}. The experiment was applied according to the split-plot design using the randomized complete block design (R.C.B.D) with three replications, as cultivars occupied the main plots. Will NPK fertilizer levels be put in the subplots. It was clear from the study results that increasing the levels of nano and mineral NPK led to an increase in all the studied characteristics. The level of nano fertilizer (20 kg NPK ha^{-1}) was superior in grain yield, biological yield and harvest index, and their averages were (6,129) t h^{-1}, (18.26) t h^{-1} (33.52%), respectively, as a result of their superiority in yield components and growth characteristics. The results also showed that the cultivar Bohoth 22 was significantly superior in a trait in flag leaf area (42.18 cm^2), tillers number (559.3 tillers m^2), spikes number (475.0 spike m2), grains number per spike (48.89 grains spike^{-1}), and grain yield (4.845 t ha^{-1}) and harvest index (29.81%). The effect of interaction between cultivars and levels of NPK nano- and mineral fertilizers significantly on plant height, tillers number and grains number per spike. The combination between Bohoth 22 and the level of nano-fertilizer 20 kg NPK ha^{-1} excelled in the plant height (85.28 cm) and tillers number (664.5 tillers m^2), and the number of grains per spike (59.24 grains spike^{-1}).

2- Introduction

Wheat (*Triticum aestivum* L) is an important and strategic grain crop whose production is linked to food security. It is a basic food for about a third of the world's population and is a source of carbohydrates in most countries, in addition to containing fats, vitamins, some mineral salts and essential amino acids that humans need in their diet (Elsahookie et al., 2021). Although Iraq is one of the original places for the emergence of the wheat crop and one of the areas where the requirements for its cultivation are available, the average productivity is still below the required level, as the cultivated area in Iraq for the year 2020 reached (857,400 ha-1), resulting in (6,238,000 tons). With an average productivity of 2.41 t h-1) (Central Statistical Organization - Directorate of Agricultural Statistics 2020). While statistics indicated that the cultivated area in the world for the year 2020 amounted to 221,860,000 ha-1, it produced 775,820,000 tons, with an average productivity of 3.50 t h-1 (USPA, 2021). There are many reasons behind the low productivity, which can be summarized as mismanagement to serve this crop and not using modern technologies in its cultivation.

The advancement of the cultivation of this crop to achieve a quantitative and qualitative improvement in its productivity requires continuous research in the field of breeding and improving varieties and deriving many of them through breeding and improvement programs and thus conducting continuous studies in comparison experiments with approved varieties in order to know their suitability for the environment of the region. And then knowing the appropriate service processes for them, which include good performance for these varieties, and among these processes is mineral nutrition, which plays a significant role in plant growth, and research in the field of mineral nutrition requires a great degree of understanding and awareness of the stages of growth and development of the crop on the one hand, and the nature and behavior of the element used in feeding On the other hand, understanding the growth stages involves knowing the critical stages and their requirements of the nutrient element in order to provide it at the right time and the quantity required to achieve the maximum possible benefit. It has negative results, especially in absorption efficiency, and adding the element to the soil and the soil suffers from several problems, on top of which is the global content of calcium carbonate and the high PH value of the soil (Hamdy, 1995), which led to adding it in large quantities to compensate for the loss caused by Sedimentation or fixation, which leads to an increase in the cost of fertilizers used and an increase in environmental pollution. Therefore, it has become obvious to search for other means to ensure the nutrients reach the plant and benefit from it. Among the means is relying on nano-fertilizer technology and the foliar feeding method because of its feasibility; these fertilizers are carriers. Nutrients with a size of 1-100 nanometers (Prasad et al., 2014).

Nano-fertilizers or their nano-carriers are an effective alternative to mineral fertilizers for their ease of absorption and entry into cells, improving their vital functions and the efficiency of their effect due to their small size (Crover et al., 2012). Nanotechnology has the potential to improve nutrient use efficiency and reduce environmental protection costs, and the slow replacement of fertilizers is an excellent alternative to soluble fertilizers, as nutrients are replaced at a slower rate throughout crop growth (Guru et al., 2015).

Many studies have shown a difference between cultivars in the characteristics of growth, yield and its components. It was concluded Al-Abdullah, (2015) that wheat varieties differed significantly in the yield components, as the IBA-99 variety recorded the highest grain yield as a result of its superiority in the number of spikes and 1000 grains weight, Faleh (2015) said the superiority of cultivar IBA99 in grains number per spike, while the cultivar Bohoth 22 excelled in the traits of grain yield, harvest index, and protein yield, as well as Burhan, (2018) recorded the cultivar IbA-99 was significantly superior to other cultivars in the number of days from planting to 50% seedling, plant height, tillers number, yield components, including the weight of 1,000 grains, and biological yield. Al-Aboudi (2019) concluded, during his study of several wheat varieties, that they differed significantly in yield components. Al-Salami, (2021) found that the IPA-99 variety excelled in growth characteristics, which led to its superiority in yield components, reflected in an increase in grain yield. Al-Zubaidi (2022) found in his study using ten cultivars of wheat the cultivar Bohoth 22 excelled in grain yield, biological yield, and harvest index characteristics. Al-Shamary and Al-Ansari (2022) achieved by using three varieties of wheat the superiority of the cultivar Jad in grain yield due to its superiority in the characteristic of flag leaf and yield components. Studies also showed significant differences in the growth and yield of wheat due to the addition of NPK nano and mineral fertilizers. Laghari et al. (2010) showed that fertilizing wheat plants with NPK increased 1000 grain weight, grain yield, biological yield, and harvest index.

Jubail and Faleh (2015) indicated that fertilization with NPK increased flag leaf area, tillers number, and yield components. Burhan (2018) concluded that fertilization with nano NPK led to an increase in the yield components (spikes number and grains number per spike), the biological yield, and the protein content of grains, and significantly excelled in most of the growth indicators. Also, Al-Saedan (2019) mentioned that mineral and nano-NP fertilizers increased plant height and the number of tillers.

This study aimed to know the response of two wheat cultivars to the levels of NPK nano and mineral fertilizer in sandy soils.

3- Materials and Methods

A field experiment was carried out in the Al-Zubayr region, which is 22 km west of Basrah Governorate, in a loamy sand soil whose physical and chemical properties are shown in Table (1) during the winter season 2021-2022 to know the response of two cultivars of wheat to different levels of mineral and nano NPK fertilizers. The experiment included two factors. The first is the addition of seven levels of NPK neutral fertilizer 20, 20, 20 mineral and nano, which are (0, 10 nano, 100 mineral, 15 nano, 200 mineral, 20 nano, 300 mineral (kg ha-1) and symbolized by the symbol F6, F5, F4, F3, F2, F1, F0 In three stages, which are (tillering, elongation, and booting), while the second factor included two approved varieties of wheat obtained from the General Authority for Agricultural Research, Ministry of Agriculture, which are Iba99 and Bohoth22. A factorial experiment was carried out in a split plots design using random plots design (R.C.B.D) with three replications, as the varieties occupied the main plots, while the levels of NPK fertilizer occupied the sub-plots. The number of transactions was 14 factorial for each repeater; thus, the number of experimental units was (42) experimental units.

Table (1) some chemical and physical properties of the experimental soil before planting for the site

Properties	Unit	Value
ECe	ds/m^{-1}	7.80
pH	-	7.30
OM	g Kg soil^{-1}	0.15
Caco$_3$		0
Available Nitrogen	ppm	75.00
Available phosphor		3.30
Available potassium		0.127
Ca^{+2}	m ml l^{-1}	10.07
Mg^{+2}		8.00 88.00
Cl^{-}		2.16
Na^{+}		12.14
Sand	%	58.33
Silt	%	21.44
Clay	%	20.53
Soil texture	-	loamy sand

The soil was prepared for cultivation by plowing and leveling it with a leveling machine; then, the land was divided according to the design used into three plots, each one containing 14 experimental units, and the area of the experimental unit was 3×2 = 6 m2, and a distance of 50 cm was left between the units and a distance of 1 m between plots, organic fertilizer was added A month before sowing, on 15.10.2022 and mixed with the surface layer of the soil, wheat seeds were sown for the two cultivars on 17.10.2022 at a seeding rate of 120 kg ha-1 on lines, with ten lines inside one plank, with a length of 3 m, with a distance of 20 cm between one line and another. Then the experimental land was watered directly after planting. Weeding operations were carried out to remove the growing bushes in the field during the season for several times whenever needed, and irrigation operations were carried out continuously and according to the crop's need for that, and depending on the scientific recommendations, mineral fertilizer was added three batches at the tillering stage, the elongation stage, and the booting stage. As for the nano-fertilizer, it was sprayed during the mentioned stages above with the concentrations and quantities shown in the following Table:

Treatments	fertilizer levels	Spray concentrations g l^{-1}

	kg ha^{-1}			
Nano fertilizer		Tillering stage	elongation stage	Booting stage
F_0	0	0	0	0
F_1	10	3,700	5.555	6,666
F_3	15	5,560	8,333	10,000
F_5	20	7,400	11,110	13,334
mineral fertilizer		Added quantities of NPK mineral fertilizer Kg ha^{-1}		
F_2	150	6	7	7
F_4	300	20	20	20
F_6	450	25	25	30

Studied traits:

1- **Plant height (cm)**

It was calculated as an average of the height of ten plants taken randomly from each experimental unit when the spike was complete and measured from the base of the plant to the tip of the terminal spike, except for the apex.

2- **Leaf area (cm^2)**

It was calculated as an average of the leaves of ten plants taken randomly from each experimental unit in the flowering stage and based on the following equation (Thomas, 1975): Flag leaf area = leaf length x maximum width x 0.95.

3- **Total number of tillers (tillers m^2)**

Calculated the number of tillers in the harvested area for each experimental unit, then about the square meter.

4- **Spikes number (spikes m^2)**

The number of spikes of a group of harvested plants was calculated from an area of one square meter from the center lines of each experimental unit.

5- **Grains number per spike (grain spike^{-1})**

Ten spikes were taken randomly from each experimental unit after they were overcooked and cleaned manually, and then the average spike grain was calculated.

6- **Weight of 1000 grains (g)**

A random sample of harvested grains was taken from each experimental unit, mixed and counted 1000 grains manually, and then weighed with a sensitive balance.

7- **Grain yield (t ha^{-1})**

The grain yield was estimated after conducting the study process for the harvested sample from each experimental unit, then weighed, and the grain weight was converted to the harvested area based on (1 t ha).

8- Harvest Index (%)

Estimated harvest index according to the equation below (Allan, 1983),

$$\text{Harvest index \%} = \frac{\text{Cereal yield (t ha}^{-1}\text{)}}{\text{Biological yield (t ha}^{-1}\text{)}} \times 100$$

4- Results and discussion

4-1- plant height (cm)

The results of Table (2) showed that the gradual addition of fertilizer had a significant effect on increasing plant height, as the fertilizer level (F5) was significantly higher than the rest of the levels and gave the highest height, with an average of 85.28 cm. While the level of fertilizer (F0) gave the lowest height, with an average of 69.31 cm, due to the role of nitrogen,

which works on the formation of cell membranes, proteins, and enzyme accompaniments that affect plant growth as well as helps the division and elongation of cells and their development. It also increases the length and number of internodes (Al-Yasari, 2012).), in addition to the role of phosphorus in strengthening the root system, which led to an increase in the absorption of nutrients, as well as the importance of potassium and its active participation in the process of photosynthesis, the formation of proteins and carbohydrates, and the absorption of water and nutrients.
The results in Table (2) indicate that the Bohoth 22 gave the highest average height of 74.10 cm, while the IBA99 plants recorded the lowest average of 70.48 cm. As seen from Table (2), the interaction between the cultivar Bohoth22 and the fertilizer (F5) level was significantly superior to the rest of the interactions, giving the highest average height of 92.33 cm. In contrast, the interaction between the cultivar IBA99 and the lack of fertilizer (F0) gave the lowest average for this trait, amounting to 63.55 cm. This result agreed with what Al-salami et al. (2020) found.

Table (2) effect of cultivars and levels of NPK fertilizer and their interaction on plant height (cm)

Fertilizers	**V_1**	**V_2**	**Fertilizers average**
F_0	63.55	75.07	69.31
F_1	71.24	70.90	71.07
F_2	65.05	71.94	68.49
F_3	69.92	67.14	68.53
F_4	73.41	66.71	70.06
F_5	78.24	92.33	85.28
F_6	71.93	74.59	73.26
Varieties average	70.48	74.10	
L .S.D 0.05	**Varieties** 3.871	**Fertilizers** 7.243	**Interaction** 10.243

4.2. Flag leaf area (cm^2)

From the results of Table (3) that the levels of nano- and mineral fertilization differed significantly in the flag leaf area, as the treatment (F5) excelled significantly in the area of the flag leaf by giving it the highest average of 44.45 cm2, while the non-addition treatment recorded the lowest flag leaf area with an average of 34.93 cm2 Perhaps the reason for this is that the nano-elements directly affect the areas of leaf formation and lead to the division and elongation of cells, in addition to that they perform many functions within the plant, including that they are responsible for the hormones that form the leaves, which leads to an increase in

the outputs of the photosynthesis process. The result agreed with what Al-Shamary and Al-Ansari (2022) found, who reported significant differences between the levels of nano and mineral fertilizers.
The results of Table (3) confirmed the superiority of the cultivar Bohoth 22 by giving it the highest average of this trait, amounted to 42.18 cm2, while the cultivar IBA99 gave the lowest average of 35.26 cm2, due to the differences in the genetic makeup of the cultivars as well as their difference in the efficiency of the photosynthesis process and their ability to form the nutrients needed for growth. This result agreed with the findings of Al-Shamary and Al-Ansari (2022), who mentioned significant differences between the cultivars in this characteristic. As for the interaction between the two factors of the study, it was insignificant in the characteristic of the size of the flag leaf area (Table 3).

Table (3) effect of cultivars and levels of NPK fertilizer and their interaction on Flag leaf area (cm^2)

4.3.

Fertilizers	**V_1**	**V_2**	**Fertilizers average**
F_0	31.21	38.65	34.93
F_1	33.45	39.93	36.69
F_2	35.30	39.69	37.50
F_3	33.83	40.44	37.13
F_4	37.95	44.51	41.23
F_5	39.52	49.39	44.45
F_6	35.52	42.63	39.07
Varieties average	35.26	42.18	
L .S.D 0.05	**Varieties** 2.563	**Fertilizers** 4.796	**Interaction** N.S

Tillers Number (tillers m2)

Table (4) results indicate the significant effect of fertilization levels and cultivars and the interaction between them on the number of tillers. From the same Table that the fertilizer level (F5) was superior by giving it the highest average number of tillers of 664.5 tillers m2, with a significant difference from the rest of the treatments compared to the comparison treatment (F0), which gave the lowest number of tillers at an average of 439.3 tillers m2, and the reason for this is due to the role of fertilizer Nanotechnology in the availability of added elements with high efficiency and for a long time and according to the plant's need and at any stage and the ability of the plant to absorb these nutrients with high efficiency led to the activation of vital processes and the growth and division of meristematic cells, and this, in turn, led to an increase in the growth rates of the root system that helps to increase absorption and the vegetative system that It increases the efficiency of the photosynthesis process, which was positively reflected in the increase in the number and growth of tillers (Abdel-Aziz et al., 2016).
Table (4) shows the difference between the varieties in terms of the number of tillers, as the Bohoth 22 variety excelled by giving it the highest number of tillers per square meter, which amounted to an average of 559.3 tillers m2, compared to the cultivar IBA99, which produced the lowest number of tillers amounted to 506.0 tillers m2. The reason is in This is the genetically different varieties in their ability to shoot, as well as the difference in cultivars in encouraging the formation of the hormone cytokinin, which affects cell division (Jadoua et al., 2017), and this result agreed with Al-Zubaidi (2022) and Al-Aboudi (2019). (F5) was

significantly different from the rest of the combinations, giving the highest mean of the number of tillers, which amounted to 686.7 cm, while the combination between the cultivar IBA99 and the lack of fertilizer (F0) gave the lowest mean for this trait, amounting to 425.0 cm.

Table (4) effect of cultivars and levels of NPK fertilizer and their interaction on Tillers Number (tillers m^2)

Fertilizers	V_1	V_2	Fertilizers average
F_0	425.0	453.7	439.3
F_1	431.7	562.0	496.8
F_2	459.3	536.7	498.0
F_3	513.7	605.7	559.7
F_4	487.7	534.3	511.0
F_5	642.3	686.7	664.5
F_6	582.0	536.3	559.2
Varieties average	506.0	559.3	
L .S.D 0.05	**Varieties** 25.02	**Fertilizers** 46.80	**Interaction** 66.18

4.4. Spikes Number (spike m²)

Table (5) shows significant differences in fertilization levels and varieties only in terms of the number of spikes. Table (4) indicated significant differences between the levels of nano- and mineral fertilizers, as the fertilizer (F5) excelled in this capacity and gave the highest average of 573.0 spikes m2. While the fertilizer level (F0) gave the lowest average of 360.5 spikes m2, the reason may be the abundance of ready-made NPK nutrients absorbed by the plant, which led to the growth and increase of the number of tillers, Table (4), and the result agreed with what Al-Shamary and Al-Ansari (2022) found.

Table (4) shows the superiority of the Bohoth 22 cultivar in this characteristic by giving it the highest average number of spikes of 475.0 spikes m2, while the cultivar IBA99 gave the lowest average of 435.8 spikes m2 due to the superiority of the variety in leaf area (Table 3) and the number of prunings (Table 3, 4). This result agrees with what was preached by Al-zubaidi and Mohsen (2022).

Table (5) effect of cultivars and levels of NPK fertilizer and their interaction on Spikes Number (spike m²)

Fertilizers	V_1	V_2	Fertilizers average
F_0	343.3	377.7	360.5
F_1	387.0	452.7	419.8
F_2	426.0	489.0	457.5
F_3	427.0	434.7	430.8
F_4	444.0	481.3	462.7
F_5	557.0	589.0	573.0
F_6	466.3	500.7	483.5
Varieties average	435.8	475.0	
L .S.D	**Varieties**	**Fertilizers**	**Interaction**

0.05	27.38	51.22	N.S

4.5. Grains number per spike (grains spike^{-1})

It was observed from Table (6) that there was a significant effect of fertilizer levels and cultivars and the interaction between them in the characteristic of the number of grains per spike, from Table (6) to the superiority of the fertilizer level (F5) by giving it the highest average of the characteristic of the number of grains per spike of 59.24 grains of spike-1, while The non-additive treatment (F0) gave the lowest mean for this trait, which amounted to 40.98 grains of spike-1, and the reason for this is due to the superiority of the fertilizer level (F5) in flag leaf area Table (3), which is an indicator of increasing the source of the photosynthesis products, and this comes from the availability of the elements Additive and in the stages of formation of grain facilities, which encouraged the plant to produce the highest number of grains per spike.

The results of Table (6) indicated that the Bohoth 22 variety excelled by giving it the highest number of grains per spike, with an average of 48.89 grains of spike-1, compared to the cultivar IBA99, which had an average of 44.41 grains of spike-1 for this trait. This may be attributed to the nature of the variety's response to the fertilizers added during the growth period. Al-Khudari reflected positively on the growth indicators, thus leading to an increase in the number of grains per spike. The result agrees with what was concluded by Al-Salami et al. (2021) and Al-Fahdawi (2021).

Table (6) showed that the interaction between fertilizer levels and cultivars significantly affected the number of grains per spike. The combination between Bohoth 22 and the level of fertilizer (F5) excelled by giving it the highest number of grains per spike, with an average of 65.66 grains of spike-1, while the combination between cultivar IBA99 and the treatment of no fertilizer (F0) gave the lowest average for this trait amounted to 37.33 grains of spike-1.

Table (6) effect of cultivars and levels of NPK fertilizer and their interaction on grains number per spike (grains spike^{-1})

Fertilizers	**V_1**	**V_2**	**Fertilizers average**
F_0	37.33	44.64	40.98
F_1	41.53	44.53	43.03
F_2	40.49	44.14	42.32
F_3	43.54	43.97	43.75
F_4	45.72	53.57	49.64
F_5	52.82	65.66	59.24
F_6	49.47	45.74	47.60
Varieties average	44.41	48.89	
L .S.D 0.05	**Varieties** 2.016	**Fertilizers** 3.771	**Interaction** 5.333

4.6. Weight of 1000 grains (g)

The results of Table (7) showed a significant effect of fertilizer levels on the weight of 1000 grains, and the results of the analysis did not show a significant effect of the cultivars and the interaction between them in this characteristic.

It is clear from the results shown in Table (7) that the increase in the addition of fertilizer led to an increase in the weight of 1000 grains, as the level of fertilizer (F6) was significantly higher by giving it the highest weight of 1000 grains, with an average of 46.66 g, compared to the comparison treatment (F0), which recorded the lowest average for this characteristic. It amounted to 35.19 g. The reason for the increase in the weight of the grain due to the treatment of mineral fertilization to the highest level and the decrease in the weight rate of the grain to the highest level of nano-fertilizer was due to the superiority of the nano-fertilizer in the two components of the yield, the number of spikes (Table 5) and the number of grains per spike, Table (6), as their increase leads to a decrease The weight of 1000 grains due to the state of competition for photosynthetic products.

Table (7) effect of cultivars and levels of NPK fertilizer and their interaction on Weight of 1000 grains (g)

Fertilizers	**V_1**	**V_2**	**Fertilizers average**
F_0	36.70	33.68	35.19
F_1	36.71	41.40	39.06
F_2	40.02	41.22	40.62
F_3	40.92	40.95	40.94
F_4	41.70	40.44	41.07
F_5	42.51	42.51	42.51
F_6	44.96	48.35	46.66
Varieties average	40.50	41.22	
L .S.D **0.05**	**Varieties** N.S	**Fertilizers** 3.398	**Interaction** N.S

4.7. Grain Yield (t ha^{-1})

The results of Table (8) indicated that there are significant differences between varieties and levels of fertilization only in the grain yield characteristic from Table (7), the superiority of the fertilizer level (F5), where the highest average for this characteristic was 6.129 tons h1, while the fertilizer level (F0) was treated with In comparison, the lowest average amounted to 3.769 t ha-1. The superiority is attributed to the number of tillers (4) and grains per spike, Table (6). Perhaps the increase was due to its superiority in the area of the flag leaf, Table (3). The result agreed with Al-Burhan (2018), Al-Saidan (2019) and Ziyarah (2023), who confirmed that the addition of NPK, NP, or nano- and mineral fertilizers led to an increase in grain yield.

It was observed from the data of Table (8) that the plants of the Bohoth 22 variety had the highest average in terms of grain yield, amounting to 4.845 t ha-1, while the cultivar IBA99 gave the lowest average of 4.350 t ha-1. Table (6), The result agreed with Al-Fahdawi (2021). Al-Zubaidi and Mohsen (2022).

Table (8) effect of cultivars and levels of NPK fertilizer and their interaction on Grain Yield (t ha^{-1})

Fertilizers	V_1	V_2	Fertilizers average
F_0	3.692	3.847	3.769
F_1	3.639	4.352	3.996
F_2	3.950	4.750	4.350
F_3	4.161	4.381	4.271
F_4	4.711	4.767	4.739
F_5	5.429	6.830	6.129
F_6	4.870	4.986	4.928
Varieties average	4.350	4.845	
L .S.D $_{0.05}$	**Varieties** 0.3100	**Fertilizers** 0.5799	**Interaction** N.S

4.8. Harvest index (%)

The results of Table (9) indicate a significant effect of fertilization levels and cultivars, and the interference did not significantly affect this trait.

Table (9) showed the superiority of the fertilizer level (F5) and gave the highest average yield index of 33.52%, while the comparison treatment (F0) gave the lowest value for this characteristic amounted to 27.52% because the NPK nano fertilizer and thus this led to an increase in the efficiency of converting the products of photosynthesis from The source to the estuary, and this was positively reflected in the grain yield Table (7), which led to an increase in the quality of the harvest index.

It was observed from the data of Table (9) that the cultivar Research 22 recorded the highest rate of harvest index at 29.81%, while the cultivar Eb99 gave the lowest average for this trait at 27.53%. Thus, it led to an increase in the economic yield through its superiority in other growth indicators. The result agreed with Al-Zubaidi (2022) and Al-Fahdawi (2021).

Table (9) effect of cultivars and levels of NPK fertilizer and their interaction on Harvest (%) index

Fertilizers	V_1	V_2	Fertilizers average
F_0	27.12	27.93	27.52
F_1	26.84	28.81	27.83
F_2	28.27	29.81	29.04
F_3	25.97	29.15	27.56
F_4	27.54	29.30	28.42
F_5	30.14	36.90	33.52
F_6	26.83	26.81	26.82
Varieties average	27.53	29.81	
L .S.D $_{0.05}$	**Varieties** 1.554	**Fertilizers** 2.908	**Interaction** N.S

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