# Response of three varieties of oat crop (*Avena sativa* L.) for different levels of nitrogen fertilizer

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**Abstract**

A field experiment was conducted at the Agricultural Research Station of the College of Agriculture / University of Basrah - Karma Ali site, which is located at a longitude of 47.80º W and a latitude of 30.57º N during the winter agricultural season 2022-2023 in the soil of a alluvial mixture with the aim of studying the response of three varieties of oat crop (Genzania, Shifaa and Carrolup) to different levels of nitrogen fertilizer (0, 120, 180 and 240) kg N $h^{-1}$ .The experiment was applied according to the method of factorial experiments using randomized complete block design (RCBD) with three replicates that distributed the different global coefficients of the varieties randomly within each replicate and agriculture was carried out on 25/11/2023, The characteristics of the yield and its components (the number of panicless $m^{-2}$, the number of grains in the panicles (panicles $grain^{-1}$) , the weight of 1000 grains (g), the grain yield (tons $h^{-1}$ ), the biological yield (tons $h^{-1}$ ), the harvest index (%) and the percentage of protein in the grains (%) were studied.

The results showed the superiority of the variety Genzania in giving the highest mean the number of grains in the panicles amounted to (48.75 grains of panicles $^{-2}$), While the Shifaa variety excelled in giving the highest mean the number of panicless $m^{-2}$ , the grain yield, the biological yield, the harvest index and the percentage of protein in the grain amounted to (467.00 panicles $M^{-2}$, 4.08 tons $h^{-1}$, 17.28 tons $h^{-1}$, 23.70% and 14.47%) respectively.

While the Carrolup variety excelled as the weight of 1000 grains amounted to (39.93 g).The results also showed that the level of nitrogen fertilizer exceeded 240 kg N $h^{-1}$ significantly in the number of panicless $m^{-2}$ and the bioyield and protein percentage in the grains amounted to (454.22 panicles $M^{-2}$, 16.91 tons $h^{-1}$ and 14.07%) Sequentially, while the fertilizer level of 180 kg N $h^{-1}$ recorded a significant superiority for the characteristics of the and the number of grains in the panicles and the grain yield and the harvest index amounted to (50.08 grains $panicles^{-1}$, 4.13 tons $h^{-1}$ and 25.11%) respectively, and the fertilizer level exceeded 120 kg N $h^{-1}$ by giving the highest weight of 1000 grains amounting to (40.56) g.

**Keywords:** Oat varieties, nitrogen fertilization.

## Introduction

The oat crop is (*Avena sativa* L.) of the winter annual grain crops belonging to the family of grass (Poaceae) and ranks seventh in terms of importance and production for cereal crops after wheat, rice, barley, yellow corn, white corn and millet, oats are grown in many countries of the world as a dual-purpose crop grains and fodder and Russia and Canada come at the forefront of producing countries and uses 74% of oats in animal nutrition and is characterized by the intensity of vegetative growth and the abundance of leaves, which gives it a high nutritional value of fodder, its cultivation is spread in cold and humid areas (18) and oat grains are used in the human diet and enter the manufacture of bread and pasta, as well as containing grains on a high percentage of antioxidants, which many studies have confirmed its beneficial effect on

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cardiovascular and diabetes compared to other grains (15). Statistics indicated that the cultivated area in the world for the year 2022 is about 9.94 million hectares producing 24.94 million tons (20), while the cultivated area in Iraq for the year (2018) amounted to 25 hectares that produced 10 tons with an average of 0.400 tons hectares$^{-1}$ (14).The use of varieties with high productivity and suitable for environmental conditions and the selection of the appropriate variety is one of the important factors for successful cultivation compared to other factors and the genetic variation between varieties is one of the most important factors that determine the growth and productivity of grain crops, including oats, so it is necessary to choose varieties with high production efficiency and adapted to local conditions to expand the agricultural area of the crop and raise its productivity, as well as attention to other service factors (6).

Nitrogen enters most of the physiological activities and in the synthesis of nucleic acids, proteins and amino acids and in the synthesis of chlorophyll, which is necessary for the formation of enzymes and vitamins and has an important role in regulating the work of growth regulators that stimulate the elongation and division of meristem cells and plants need it to build their tissues, and nitrogen is the first element that determines the productivity of agricultural crops in general and grass in particular (4), that the cultivation of varieties suitable for the region with the use of levels of fertilizers, especially nitrogen fertilizers, is one of the important decisions that producers must take to obtain the highest grain yield and good quality. And that understanding the performance of varieties under the influence of different levels of nitrogen fertilizer will enable us to discover their genetic abilities that are reflected in increasing productivity, which leads us to choose the variety Almansab, and due to the lack of studies on the response of several varieties of oat crop to different levels of nitrogen fertilizer and determine the best level of nitrogen fertilizer to give the highest grain yield in the southern Iraq region came the idea of this study.

**Materials and Methods**

A field experiment was carried out at the Agricultural Research Station of the College of Agriculture - University of Basra - Karma Ali site, which is located at a longitude of 47.80º W and a latitude of 30.57º N (Annex 1) during the winter season 2022-2023, with the aim of studying of oat varieties and their response to levels of nitrogen fertilizer, The experiment was applied according to the method of factorial experiments using randomized complete block design (RCBD) with three replicates and samples were taken from the soil of the experiment site randomly at a depth of 0 -30 cm and mixed with each other to homogeneity and then dried pneumatically, grinded, graced and passed through a sieve with a sieve with a diameter of 2 mm holes . A sample was taken for the purpose of conducting an analysis of the chemical and physical properties of the field soil before planting, and the samples were analyzed in the central laboratory-College of Agriculture - University of Basrah, the results of which are shown in (Table 1).

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**Table (1) Some chemical and physical properties of field soil before planting.**

| Traits | | Values | Units |
|---|---|---|---|
| Degree of soil reaction (PH) | | 7.47 | - |
| Electrical conductivity (E.C) | | 7.18 | DC-Siemens $M^{-1}$ |
| Organic matter | | 1.8 | g $kg^{-1}$ |
| Elements Ready made | Nitrogen | 49.8 | mg $kg^{-1}$ |
| | Phosphorus | 3.09 | |
| | Potassium | 122.3 | |
| Soil components | Sand | 260.47 | g $kg^{-1}$ |
| | Silt | 420.77 | |
| | Clay | 318.78 | |
| Tissue | Alluvial blend | | |

**Agricultural operations:**

The area of land required to conduct the experiment was determined and the land was prepared by plowing by the plow dump and the soil was smoothed by disc combs and then leveled the settlement bale and then divided the land into experimental units according to the design of the experiment into three replications and each replications contains 12 experimental units and thus the number of experimental units total 36 experimental units, the area of the experimental unit with dimensions (2m×2m=4 $m^2$), The panels were separated by a distance of (1 m) to prevent interference between the treatments and planting was carried out in lines that included each experimental unit 10 lines and the distance between one line and another 20 cm and at a seeding rate of 120 kg $h^{-1}$ (7), phosphate fertilizer was added in the form of DAP fertilizer ($P_2O_5$ 46%) at a rate of 100 kg $h^{-1}$ was added at once before planting, As for potassium sulfate fertilizer (k 41.5%) was added when planting (5), while nitrogen fertilizer was added according to the study parameters (0, 120, 180, 240) kg N $h^{-1}$ in the form of urea fertilizer (N % 46) and was added in two batches equally, the first after the emergence of seedlings and the second in the stage of branching (7), the land was irrigated immediately after planting on 25/11/2022, and irrigation and weeding operations were carried out during the season and according to the crop's need for that, and the harvest was done when the plants reached full maturity on 1-3/5/2023 ,The characteristics of the yield and its components were studied, namely (the number of panicles $m^{-2}$ (panicles $M^{-2}$), the number of grains in the panicles (panicles $grain^{-1}$), the weight of 1000 grains (g), the total grain yield (tons $h^{-1}$), the biological yield (tons $h^{-1}$), the harvest index (%) and the percentage of protein in the grains (%).

**Results and Discussion**

Characteristics of the components of the yield and yield of grains:

Number of panicles (panicles$M^{-2}$ ):

The results of Table (2) showed the superiority of the variety Shifaa in the number of

panicless in $M^{-2}$ and gave the highest mean of 467.00 Panicles $M^{-2}$, while the Genzania variety gave the lowest mean number of panicles in $M^{-2}$ amounted to 355.08 panicles $M^{-2}$, and the reason may be due to the different ability of the varieties to form the tillers, because the varieties with the ability to form high tillers often give a higher number of panicles per unit area compared to varieties with low susceptibility. On the formation of the tiller, and because the Shifaa variety has shifaa the highest over the rest of the varieties, this result agreed with the findings of (10),(1)when studying the oat crop, where their results showed the superiority of the Shifaa variety over the rest of the varieties in the number of panicles $M^{-2}$. The results of Table (2) also showed a significant effect of adding levels of nitrogen fertilizer in the number of panicles in $M^{-2}$, The fertilizer level exceeded 240 kg N $h^{-1}$ in the mean number of panicles and amounted to 454.22 panicles $M^{-2}$, while the comparison level (without addition) gave the lowest number of panicles amounting to 339.44 panicle $M^{-2}$. The reason for the increase in the number of panicles is due to the role of nitrogen in increasing the vegetative growth of the plant in general, which in turn leads to improving the use of light energy to carry out photosynthesis, especially at the beginning of the growing season, which increases the availability of nutrients that support the growth of ,and the formation of the tillers and the success of their continued growth, and this is reflected positively on the increase in the number of panicles per unit area, and this result is consistent with the findings of(7).When studied on the oat crop, which showed an increase in the number of panicles with an increase in the level of nitrogen added. The interaction between the varieties and the level of nitrogen fertilizer had a significant effect on the characteristic of the number of panicles in $M^{-2}$ The variety Shifaa at the fertilizer level of 240 kg N $h^{-1}$ gave the highest number of panicless at 522.33 panicle $M^{-2}$, while the Genzania variety at the level of 0 kg N $h^{-1}$gave the lowest number of panicles at 303.33 panicle $M^{-2}$ .

**Table (2) Effect of varieties and nitrogen fertilizer levels and the interaction between them on the number of panicles (panicles $M^{-2}$ ).**

| Varieties | Nitrogen fertilizer levels (kg $h^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 303.33 | 314.67 | 387.00 | 415.33 | 355.08 |
| Shifaa | 407.33 | 424.67 | 513.67 | 522.33 | 467.00 |
| Carrolup | 307.67 | 313.33 | 394.67 | 425.00 | 360.17 |
| Mean fertilizer | 339.44 | 350.89 | 431.78 | 454.22 | |
| L.S.D(0.05) | varieties | | | Levels | Interaction |
| | **3.19** | | | **3.69** | 6.39 |

**Number of grains in panicles (panicles grain $^{-1}$):**

The results of Table (3) showed that the varieties differed significantly among themselves in the mean number of grains in the panicles, if the Genzania variety excels by giving the highest number of number of grains in the panicles amounting to 48.75 Panicle

grains$^{-1}$ and without a significant difference from the Shifaa variety which amounted to 47.65 Panicle grains$^{-1}$ While the variety Carrolup gave the lowest mean number of grains in Panicles amounting to 43.79 Panicles grains$^{-1}$, and the reason is due to the genetic factors that control this trait, and this result agreed with the findings of (12),(13) who pointed to the superiority of the variety Genzania over other varieties in the mean number of grains in the panicles**.** Table (3) also indicates a significant effect when adding levels of nitrogen fertilizer, where the fertilizer level exceeded 180 kg N h$^{-1}$ with an mean of 50.08 Panicles$^{-1}$ grains and without a significant difference from the level of 240 kg N h$^{-1}$ amounted to 49.50 Panicles grains-1, while the comparison treatment gave the lowest mean number of grains in the panicles amounting to 39.40 grains Panicles $^{-1}$ and perhaps the reason for the superiority of the fertilizer level 180 kg N h$^{-1}$ and 240 kg N h$^{-1}$ in that characteristic is that the availability of nitrogen during the stages of growth and emergence of the crop led to an increase and raise the efficiency of photosynthesis and increase its outputs in addition to that it has shifaa the highest mean, which shifaa the largest amount of production of food produced and thus reduced competition within one plant, which ensures the availability of food for florets and their development and then the occurrence of fertilization by a greater percentage, which was reflected positively this result is consistent with the findings of (4), which showed the effect of nitrogen fertilizer level on the number of grains per spike. As shown in Table (3) interaction between varieties and levels fertilization moral effect the Genzania variety at the level of 180 kg N h$^{-1}$ gave the highest number of panicles grains of 53.87 panicles grains$^{-1}$. While the variety Carrolup when the comparison was treated gave the lowest number of panicles grains amounting to 34.87 Panicles grains $^{-1}$.

**Table (3) Effect of Varieties and Levels of Nitrogen Fertilizer and Interaction between Them on the Number of Grains in panicles (panicles Grain $^{-1}$).**

| varieties | Nitrogen fertilizer levels (kg h$^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 41.35 | 49.98 | 53.87 | **49.83** | 48.75 |
| Shifaa | 41.98 | 47.94 | **49.85** | 50.82 | 47.65 |
| Carrolup | 34.87 | 45.92 | **46.53** | **47.86** | 43.79 |
| Mean Fertilizer | 39.40 | **47.95** | 50.08 | **49.50** | |
| L.S.D(0.05) | varieties | | | Levels | interaction |
| | 1.32 | | | 1.53 | **2.64** |

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**Weight of 1000 grain (g):**

The results of Table (4) showed that there is a significant effect of the varieties in the weight of 1000 grains, as the Carrolup variety gave the highest weight of 1000 grains amounted to 39.93 g, while the Genzania variety gave the lowest weight of 1000 grains and without a significant difference from the Shifaa variety which amounted to 38.60 weight of grains amounted to 38.31 g, the reason for the increase in the mean weight of 1000 grains is due to the efficiency of the variety in benefiting from the products of photosynthesis, which was reflected in the increase in the representation of nutrients and their accumulation in the grains and thus the increase in the weight of the grains as the Carrolup variety has given the highest and this period is the period of fullness of the grain (which is the period between flowering and physiological maturity) (18)These results agreed with the findings of(12),(16) when studying the oat crop, where the variety Carrolup outweighed 1000 grains over the rest of the studied varieties. Table (4) also showed a significant effect between the levels of nitrogen fertilizer, as the fertilizer treatment of 120 kg N $h^{-1}$ gave the highest weight of 1000 grains amounted to 40.56 g , while the fertilizer level recorded 240 kg N $h^{-1}$ and the lowest weight of 1000 grains amounted to 37.45 g. The reason for the decrease in the weight of 1000 grains by increasing the level of nitrogen fertilizer is due to the increase the number of grains in the panicles, which led to competition within the plant for photosynthetic products, which result in small-sized grains due to the lack of nutrients necessary for the grain to be full, and these results agreed with the findings of(9) , which showed that there are significant differences when adding different levels of nitrogen fertilizer in the weight of 1000 grains. As for the interaction between the study factors, the Carrolup variety at the level of 0 kg N $h^{-1}$ gave the highest weight of 1000 grains of 40.96 g, while the Genzania variety at the level of 240 kg N $h^{-1}$ gave the lowest weight of 1000 grains amounted to 36.25 g.

**Table (4) Effect of varieties and nitrogen fertilizer levels and their interaction in the weight of 1000 grains (g).**

| Varieties | Nitrogen fertilizer levels (kg $h^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 37.85 | 40.51 | 38.61 | 36.25 | 38.31 |
| Shifaa | 38.75 | 40.55 | 38.21 | 36.88 | 38.60 |
| Carrolup | 40.96 | 40.61 | 38.92 | 39.23 | 39.93 |
| Mean fertilizer | 39.19 | 40.56 | 38.58 | 37.45 | |
| L.S.D(0.05) | varieties | | | Levels | interaction |
| | 0.75 | | | 0.87 | 1.50 |

**Total grain yield (Ton $h^{-1}$ ):**

The results showed the superiority of the variety Shifaa in grain yield and gave the highest grain yield of 4.08 tons $h^{-1}$ and an increase of 46.24% over the variety Carrolup the lowest grain yield of 2.79 tons $h^{-1}$ the

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reason for the superiority of the variety in the quantity of grain yield is due to its superiority in the number of panicles $m^{-2}$ and the number of grains in the panicle, this result agreed with the findings of(12),(2) who showed the difference in varieties in grain yield. The results of Table (5) also showed that there are significant differences between the levels of nitrogen fertilizer, as the fertilizer level exceeds 180 kg N $h^{-1}$ in giving the highest grain yield of 4.13 tons $h^{-1}$ and an increase of 78.02% over the comparison treatment, which gave the lowest grain yield of 2.32 tons $h^{-1}$ and the reason may be due to the superiority of the treatment 180 kg N $h^{-1}$ in the grain yield to its superiority in the mean the area of the flag leaf and the number of panicles the number of grains in the panicles and this is one of the components of the yield that led to an increase in this yield of grains and this finding is consistent with the findings of (9),(2),(8) , who showed through their study the significant effect of nitrogen fertilizer levels on grain yield. The interaction between the varieties and the levels of nitrogen fertilizer, as the variety shifaa recovery at the level of 180 kg N $h^{-1}$ had the highest grain yield of 4.88 tons $h^{-1}$, while the variety Carrolup when treated gave the lowest grain yield of 1.52 tons $h^{-1}$.

**Table (5) Effect of varieties and nitrogen fertilizer levels and the interaction between them on the total grain yield (tons $h^{-1}$).**

| Varieties | Nitrogen fertilizer levels (kg $h^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 2.08 | 2.75 | 4.06 | 3.68 | 3.14 |
| Shifaa | 3.38 | 3.90 | 4.88 | 4.18 | 4.08 |
| Carrolup | 1.52 | 2.62 | 3.47 | 3.56 | 2.79 |
| Mean fertilizer | 2.32 | 3.09 | 4.13 | 3.80 | |
| L.S.D(0.05) | Varieties | | | Levels | interaction |
| | 0.35 | | | 0.40 | 0.70 |

**Biology yield (Ton $h^{-1}$ ):**

The results in Table (6) showed significant differences between the varieties, as the variety Shifaa gave the highest biology yield of 17.28 tons $h^{-1}$ while the Carrolup variety gave the lowest biological yield of 13.68 tons $h^{-1}$. The reason for the superiority of the variety Shifaa in the biological yield is due to its superiority in the Number of panicles $M^{-2}$ these results are consistent with the findings of (19),(13). Table (6) also showed significant differences between the levels of nitrogen fertilizer, as the fertilizer level of 240 kg N $h^{-1}$ recorded the highest biological yield of 16.91 tons $h^{-1}$, while the comparison treatment recorded the lowest biology yield of 12.66 tons $h^{-1,}$ the bio yield is the yield of each of the grain and straw yield and each of these two crops has its components, and the increase in these components causes the increase in the biology yield The reason for the increase in the biology yield at the level of 240 kg N $h^{-1}$ is due to the availability of nitrogen and its role in increasing vegetative growth in general, and that the fragmentation of nitrogen and its addition in more than one stage (after emergence and branching) led to an increase in the biology yield per unit area, and these results agreed with the findings of it(9),(4)

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who showed an increase in the bio yield with an increase in the amount of nitrogen fertilizer. The significant interaction between the two factors of the study, as the variety shifaa recovery at the level of 240 kg N $h^{-1}$ had the highest biological yield of 19.79 tons $h^{-1}$, while the variety Carrolup when treating the comparison gave the lowest biological yield of 10.87 tons $h^{-1}$.

**Table (6) Effect of Varieties and Nitrogen Fertilizer Levels and Interaction between Them on Biology yield (Ton $h^{-1}$).**

| Varieties | Nitrogen fertilizer levels (kg $h^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 13.22 | 15.08 | 15.44 | 15.66 | 14.85 |
| Shifaa | 13.88 | 16.67 | 18.81 | 19.79 | 17.28 |
| Carrolup | 10.87 | 13.52 | 15.05 | 15.28 | 13.68 |
| Mean Fertilizer | 12.66 | 15.09 | 16.43 | 16.91 | |
| L.S.D(0.05) | Varieties | | | Levels | interaction |
| | 0.41 | | | 0.48 | 0.83 |

**Harvest index (%):**

The results of Table (7) showed that the varieties of oats differ significantly among themselves in the harvest index, the variety Shifaa significantly outperformed the rest of the varieties, as it shifaa the highest harvest index of 23.70%, while the Carrolup variety gave the lowest mean for this trait of 19.93%. The superiority of the cured variety can be explained as a harvest guide to the fact that the cured variety has excelled in grain yield and biology yield, and there is a direct relationship when the grain yield increases, the harvest index increases (%) and these results agreed with what is reached (10),(1),(13) Those who showed in their studies the superiority of the variety healing in the quality of the harvest index. Table (7) also showed the significant effect of the level of nitrogen fertilizer, as the level of nitrogen fertilizer exceeded 180 kg N $h^{-1}$ in giving the highest harvest index of 25.11%, while the comparison treatment recorded the lowest Mean harvest index of 18.03% and these results agreed with the findings of(4),(9) . The overlap between varieties and nitrogen fertilizer levels had a significant impact on the harvest index, as the Genzania variety at the level of 180 kg N $h^{-1}$ gave the highest Mean harvest index of 26.33%, while the variety Carrolup at the comparison level (without addition) gave the lowest Mean of 14.00%.

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**Table (7) Effect of varieties and nitrogen fertilizer levels and their overlap in the harvest index (%).**

| Varieties | Nitrogen fertilizer levels (kg $h^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 15.73 | 18.39 | 26.33 | 23.56 | 21.00 |
| Shifaa | 24.35 | 23.40 | 25.96 | 21.11 | 23.70 |
| Carrolup | 14.00 | 19.41 | 23.04 | 23.28 | 19.93 |
| Mean Fertilizer | 18.03 | 20.40 | 25.11 | 22.65 | |
| L.S.D(0.05) | Varieties | | | Levels | interaction |
| | 2.32 | | | 2.68 | 4.65 |

**Protein content in grains (%):**

Where the results of Table (8) showed that there are significant differences between the varieties, the variety Shifaa gave the highest mean percentage of protein in the grain amounted to 14.47%, while the Genzania variety gave the lowest mean percentage of protein in the grains amounted to 11.66% without a significant difference from the Carrolup variety amounted to 11.71%, and the reason for the superiority of the variety Shifaa in the percentage of protein in the grains to its superiority in the yield of grains where the dry matter in the grains decreases and the percentage of protein increases, also, the varieties are characterized by their different genetic makeup, and these results are consistent with the findings of(6),(17),(16). The results of Table (8) also showed that the fertilizer level exceeded 240 kg N $h^{-1}$, which gave the highest mean percentage of protein in the grains of 14.07%, while the comparison treatment gave the lowest percentage of protein in the grains at 10.73%. The reason for increasing the percentage of protein with the increase in the fertilizer level is due to the role of nitrogen in the formation of amino acids, which are the basic units in the formation of protein, and by increasing them, the percentage of protein in the grains increases, and these results agreed with the findings of (11),(8) who showed an increase in the percentage of protein with an increase in the amount of nitrogen fertilizer. The interaction between varieties and nitrogen fertilizer levels had a significant impact on the protein in the grains, as the Shifaa variety at the level of 240 kg N $h^{-1}$ gave the highest mean of protein in the grains of 15.88%, while the variety Carrolup at the comparison level (without addition) gave the lowest mean of 9.34%.

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**Table (8) Effect of varieties and nitrogen fertilizer levels and their interaction on the percentage of protein in grain (%).**

| Varieties | Nitrogen fertilizer levels (kg $h^{-1}$) | | | | Mean varieties |
|---|---|---|---|---|---|
| | 0 | 120 | 180 | 240 | |
| Genzania | 9.88 | 10.87 | **12.88** | 13.01 | 11.66 |
| Shifaa | **12.98** | 13.79 | 15.23 | 15.88 | 14.47 |
| Carrolup | 9.34 | 11.22 | 12.97 | 13.32 | 11.71 |
| Mean Fertilizer | 10.73 | 11.96 | **13.69** | 14.07 | |
| L.S.D(0.05) | Varieties | | | Levels | interaction |
| | **0.60** | | | **0.70** | N.S |

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