# Effect of fertilizing with organic emulsion (Appetizer) and nano NPK with urea on yield, its components and some characteristics of corn silk

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## ABSTRACT

A field experiment was carried out at the research station of the College of Agriculture - Wasit University / Kut, during the fall season 2021 in soil with texture (sandy mixture) using the RCBD design in the arrangement of splintered plates and with three replications. The main panels included three synthetic varieties of yellow corn (Fajr1, Sumer and Baghdad3), which symbolized by (V1,V2,V3) in sequence, while the secondary panels included five fertilization treatments in which mineral fertilizer (urea) was used 46% nitrogen with the full recommendation (300 kg/ha$^{-1}$) (control treatment) symbolized by T1 and (adding urea according to the recommendation with the addition of the organic emulsion (Appetizer) in two batches before flowering and full flowering) and symbolized by T2 and (adding urea according to the recommendation with nano-NPK in two batches before flowering and full flowering) and symbolized by T3 and (reduction of the recommendation treatment in the first and second batches with the addition of the organic emulsion (Appetizer) in two batches before flowering and full flowering) and symbolized by T4 and (reduction of the recommendation treatment in the first and second batches with the addition of nano-NPK in two batches before flowering and full flowering) It is symbolized by T5. The results showed that there were significant differences between the different fertilization treatments, as the T5 nano fertilization treatment achieved the highest average in most of the yield and quality indicators, as it gave the highest average number of rows per ear (16.13 row ear$^{-1}$), number of grains per row (39.22 grain row$^{-1}$) and number of grains. In the ear (604.78 grain, ear$^{-1}$) and the total grain yield (8632 kg/ha$^{-1}$), in addition to its superiority in the content of most the active compounds in corn silk, such as soluble and insoluble fibers (0.071% and 11,520%), respectively, and the antioxidant activity DPPH (43.190%) and total phenols (701 mg/g). The results also showed that the Baghdad3 variety excelled in most of the yield indicators and gave the highest average number of rows per ear (15.15 per row-corn$^{-1}$) the number of grains per row (39.11 per row$^{-1}$), the number of grains per ear (560.47 per-corn-ear$^{-1}$) and the total grain yield (8424). Also, it was superior in the content of most the active compounds of corn silk, such as soluble and insoluble fibers (0.033% and 10,588%), respectively, and the antioxidant activity DPPH (39.829) and total phenols (641 mg/g) compared to the other varieties. The interaction between fertilization plants and cultivars was significant for some traits of the yield. The results of the study showed that the spraying of NPK nano fertilizer and the organic emulsion Appetizer improved the growth



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characteristics, yield, quality and active compounds of corn silk in the synthetic varieties of yellow corn, and that the varieties differed in the level of their response to different fertilization treatments, so it is possible to reduce the amount of mineral fertilizer recommended and replace it with fertilizers nanoparticles, thus reducing the economic cost and the environmental and health pollution damage caused by them.

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parts of the plant (25) and its effectiveness in low concentrations to make it less environmentally friendly and economically costly. There is also an important aspect in its products is the use of juice, or what is known as corn silk tea, with important therapeutic aspects because it contains important compounds and materials that give it this characteristic. Therefore, strengthening the plant in the flowering stage and the development of silk growth with nutritious elements by spraying emulsion nano and paper fertilizers in certain concentrations can lead To increase the corn silk content of some Secondary Metabolic Compounds with therapeutic efficacy.

## MATERIALS AND METHODS

A field experiment was carried out during the autumn agricultural season of 2021 at the Agricultural Research Station of the College of Agriculture - Wasit University. Three random samples were taken from each depth of the field soil (0-30 cm) and they were dried aerobically, then ground and sieved with a sieve whose holes diameter is 2mm and a homogeneous sample was taken from it for analysis in the laboratories of the Department of Soil and Water Resources of the College of Agriculture - Wasit University to know some physical and chemical properties as shown in Table No.1. The experiment included two factors, the first includes three approved synthetic varieties of maize (Fajr1,Sumer and Baghdad3) It comes from the Ministry of Agriculture / Department of Agricultural Research / Maize Department and is symbolized by (V3,V2,V1) sequentially and the second is five

## INTRODUCTION

yellow corn crop, scientific name *Zea mays L.* It is a monocotyledon plant belonging to the Poaceae family, and it is an important strategic crop in achieving global food security. It is ranked third after the wheat and rice crops in terms of cultivated area and productivity. The large morphological size of the yellow corn crop may require that the crop consumes a lot of nutrients from the soil, especially nitrogen, so it is one of the crops stressful to the soil as it absorbs large amounts of nutrients during its growth stages, which are usually replaced by chemical fertilizers. However, it may lead to a significant pollution of the environment through its impact on the air as a result of its emission in the form of ammonia and nitrogen oxides, and it may also be lost due to its leakage and rapid dissolution in water in the form of nitrates that filter them down and pollute waterways with nitrates, which negatively affects the health of The human. Due to the low organic matter in Iraq's soil and the high degree of reactivity (PH) in it, which reduces the readiness of macro and micro nutrients, new methods have been found that enable crops to absorb optimal amounts of nutrients from the soil or through foliar spraying using nanotechnology to fertilize crops and use chelating fertilizers Nanoparticles, which contain the main nutrients for the plant (NPK), as well as the use of emulsion foliar fertilizers that contain a number of micro nutrients (Mn,Zn and marine algae), which is known as Nutriton Foliar because of its role in improving and producing this crop (3). In addition to the speed of absorption of nutrients by the vegetative

representing fertilizer treatments, the area of each experimental unit is $9m^2$ with 3×3m, spacers were left between the experimental units about 0.5m to ensure that the spray of the (Appetizer) and nano-NPK fertilizer did not fly out. 1/8/2021 In the upper third of the rice to avoid possible damage from the accumulation of salt, as 2-3 seeds were placed in each hole, and after the emergence of seedlings was completed, the bushes failed to germinate and the process of thinning was carried out to one plant in the field After 14 days of planting (the height of the plants reached 15-20 cm), the experiment field was irrigated immediately after planting, and all the experimental units were irrigated equally to ensure a good germination rate. The following measurements were taken: number of rows per $ear^{-1}$, number of grains per $row^{-1}$, number of grains per $ear^{-1}$, total grain yield $kg/ha^{-1}$, corn silk-active compounds such as soluble and insoluble fibers %, antioxidant activity %, and total phenols mg/gm. The results were statistically analyzed using the statistical program Gen Stat Release 10.3DE. The arithmetic averages of the labs were compared using the least significant difference L.S.D at the 0.01 and 0.05 probability levels.

fertilization combinations that include the control treatment and four treatments, which are symbolized by (T5, T4, T3, T2, T1) in sequence. It contains the following fertilizers: 1- Urea fertilizer at a rate of 300 kg/ha and according to the recommendation.

2- Emulsion Appetizer at a rate of (150 ml/100 liters of water) added as a spray in two batches before flowering and full flowering (instructions of the producing company). 3- NPK fertilizer (20-20-20) nano chelating is added at a rate (2g dissolved in 1 liter of water) added as a spray in two batches before flowering and full flowering. The experiment was carried out according to the arrangement of the split panels in the design of randomized complete sectors RCBD and with three replications that included the main panels (Main-Plot) and the synthetic varieties (Fajr1,Sumer and Baghdad3) while the secondary panels (Sub-Plot) occupied the aforementioned fertilizer treatments, the field was prepared by plowing the land Two orthogonal plows using the inverted plow, smoothed by disc harrows and leveled with the leveling machine, the field is divided into three sectors, then each sector is divided into three main experimental units representing the varieties, each of which includes five secondary experimental units



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

| Adjective measurement | | the value | Unit | |
|---|---|---|---|---|
| Soil tissue components | the sand | 543 | G. $kg^{-1}$ | Mineral Sandy |
| | Green | 277 | G. $kg^{-1}$ | |
| | Clay | 179 | G. $kg^{-1}$ | |
| Ready nitrogen | | 29 | Mg.$kg^{-1}$soil | |
| Ready phosphorus P | | 3.8 | Mg.$kg^{-1}$ soil | |
| Ready potassium K | | 127.24 | Mg.$kg^{-1}$soil | |
| Organic matter OM | | 7.8 | G. $kg^{-1}$ | |
| CaCo3 carbonate | | 152.3 | G. $kg^{-1}$ | |
| Ca ++ | | 26.64 | $Liter^{-1}$ millimeters | |
| Solid sodium Na+ | | 11.21 | $Liter^{-1}$millimeters | |

| | | | |
|---|---|---|---|
| Mg ++ melodic magnesium | | 12.33 | Liter$^{-1}$ millimeters |
| CI chlorine | | 28.85 | Liter$^{-1}$ millimeters |
| Solving potassium | | 9.78 | Liter$^{-1}$ millimeters |
| HCO3 dissolved picarbonate | | 1.4 | Liter$^{-1}$ millimeters |
| EC | | 9.97 | Desmond M$^{-1}$ |
| Hydrogenic PH | | 7.29 | --- |

## RESULTS AND DISCUSSION

and thus improving the growth in general in the plant and working to reduce the rate of abortion of the ovaries and thus increase pollination and fertilization and then Increasing the number of ear rows, and this result is in agreement with the results of (27) where they explained that the number of ear rows increases when the fertilizers are added over the period of their availability during the different stages of plant growth. The results of the table show that there are significant differences between the varieties for the characteristic of the number of rows in the ear, as the variety Baghdad3 recorded the highest number of rows in the ear reached 15.15 row ear$^{-1}$, when compared with other varieties. This result is in agreement with results (15). As for the interaction, the results indicate that there is no significant difference between the cultivar combinations and the fertilizer treatments in the characteristic of the number of rows in ear, as the effect of the two factors under study was singular and the differences were apparent.

**Number of rows by the ear (row ear$^{-1}$):**

The characteristic of the number of rows in the ear is affected by genetic structures and environmental factors, since these factors affect the vegetative growth of the plant, as the number of rows in the ear is determined at the beginning of the emergence of the ear after the formation of its size (9).The results indicate in Table 2 There are significant differences for the different fertilization treatments. Whereas, the T5 nano fertilization treatment outperformed the rest of the other treatments, and the highest average number of rows per ear was 16.13 row ear$^{-1}$, while the control treatment T1 recorded a lower average for that trait amounting to 13.78 row ear$^{-1}$. The reason for this may be attributed to the addition of fertilizer elements In addition to the mineral fertilizers, the nanoparticles were able to provide most of the nutrients for the plant, especially the macronutrients, which increase the leaf area of the plant, and also contribute to increasing the accumulation of dry matter for the plant



**Table 2** The effect of fertilizing with emulsion (Appetizer) and NPK nanoparticles with urea and the interaction between them on the average number of rows in the ear

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr1 | Sumer | Baghdad3 | |
| T1 | 13.93 | 13.27 | 14.13 | 13.78 |
| T2 | 14.87 | 13.4 | 14.6 | 14.29 |
| T3 | 14.67 | 13.07 | 14.87 | 14.2 |
| T4 | 14.87 | 13.13 | 15.4 | 14.47 |
| T5 | 16.53 | 15.13 | 16.73 | 16.13 |
| l.s.d 0.05 | | N.S | | 0.735 |

| | | | | |
|---|---|---|---|---|
| Average varieties | 14.97 | 13.6 | 15.15 | |
| l.s.d 0.05 | | 0.539 | | |

to an increase in the rate of pollination and fertilization and a decrease in the rate of abortion of the ovaries (28), and the readiness of the nitrogen element has the effect of regulating hormones and controlling the action of auxins to bring about apical dominance in the ear, where it works Cytokinin prevents the transfer of auxin from old grains to new ones, and thus the increase in grain knots in the row and a reflection of this in the increase in the number of grains in the ear. The results of the table show that there are significant differences between the cultivars for the number of grains in a row, where the Baghdad3 variety recorded the highest average of 39.11 grains row$^{-1}$ in Comparison with the other cultivars, this result agrees with the results of (8) and (15). As for the interaction, the results indicate that there is no significant difference between cultivar combinations and fertilizer treatments in the number of grains per row, as the effect of the two factors under study was singular, and the differences were apparent.

**Number of grains per row:**

The results of Table 3 indicate that there are significant differences for the different fertilization treatments, where the T5 nano fertilization treatment outperformed the rest of the other fertilization treatments, and recorded a higher average for the trait of the number of grains in the row amounted to 39.22 grains row$^{-1}$ It did not differ significantly from the T4 organic emulsion treatment, while the control treatment T1 recorded a lower average for that trait that amounted to 32.04 grains row$^{-1}$. The reason for this may be the role of the nano-fertilizer elements, especially the nitrogen element, in increasing the height of the plant and the leaf area of the plant, thus obtaining a high carbon representation and a rapid transfer of its products downstream (the grain), and the nano-fertilizer granules work to increase the vital and enzymatic reactions in addition to the regularity of the work of hormones (13), at the same time, the height of the plant reduces the shading of the leaves above the ear, and thus leads



**Table 3** Effect of fertilizing with organic emulsion (Appetizer) and nano NPK with urea and the interaction between them on the average number of grains per row

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr1 | Sumer | Baghdad3 | |
| T1 | 32.8 | 28.93 | 34.4 | 32.04 |
| T2 | 37.87 | 31.2 | 38.93 | 36 |
| T3 | 37.8 | 31.53 | 38.07 | 35.8 |
| T4 | 37.33 | 32.93 | 40.87 | 37.04 |
| T5 | 39.27 | 35.13 | 43.27 | 39.22 |
| l.s.d 0.05 | | N.S | | 3.252 |
| Average varieties | 37.01 | 31.94 | 39.11 | |
| l.s.d 0.05 | | 2.768 | | |

**Number of grains per ear$^{-1}$ :**

competition between them for the food product (7). This thus increases the possibility of fertilization of the florets and then the formation of grains. The superiority of the T4 fertilization treatment comes to the role of marine algae extract, which contains some organic and amino acids, which affect the activity of the vital systems of plant cells, as it shows its physiological role in increasing the yield and its components(10). The results of the table show that there are significant differences between the cultivars for the number of grains in the ear$^{-1}$, where the cultivar Baghdad3 recorded a higher average of 560.47 grain ear$^{-1}$, with a significant difference on the two cultivars Fajr1 and Sumer, which recorded an average of 539.80 and 461.53 grain ear$^{-1}$, respectively, and this is due to genetic differences The largest among those varieties for this trait, as each genetic structure has a genetic ability to produce a certain number of grains in one ear, and this result is consistent with the results of (4) and (1). As for the interaction, the results indicate that there is no significant difference between cultivar combinations and fertilizer treatments in the number of grains per ear$^{-1}$, The effect of the two factors under study was independent of the effect of the other factor, and the differences were apparent.

This characteristic is considered one of the important yield components of the yellow corn crop, as it is the result of two of the yield elements, the number of rows per ear and the number of grains per row. Therefore, it is a function of expressing the accumulation of dry matter in the plant. The results are shown in Table 4 There were significant differences between the different fertilization treatments, where the treatment of spraying with nano-fertilizer T5 excelled, and recorded a higher average number of grains per ear, which amounted to 604.78 grain ear$^{-1}$, while the treatment T4 recorded the second highest average number of grains in the ear reached 542.44 grain ear$^{-1}$,while the average of this trait decreased To its lowest value when the control treatment T1 to record an average of 454.11 grain ear$^{-1}$.The reason for the increase in the number of grains in the ear when treating the T5 fertilizer may be to the role of NPK nano fertilizer, as the fertilizer particles help to provide fast-absorbing nutrients and this leads to accelerating vital and enzymatic reactions in addition to regulating the work of hormones and this gives the plant a new opportunity to accumulate dry matter, which is necessary in the process of pollination and fertilization. In addition to raising the metabolic efficiency of carbon, which reduces the chance of abortion in the inflorescences by reducing



**Table 4** The effect of fertilizing with organic emulsion (Appetizer) and nano NPK with urea and the interaction between them on the average number of grains per ear

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr1 | Sumer | Baghdad3 | |
| T1 | 467.67 | 404.33 | 490.33 | 454.11 |
| T2 | 526.67 | 429.33 | 543.67 | 499.89 |
| T3 | 553.67 | 425.33 | 526.33 | 501.78 |
| T4 | 552.33 | 476.33 | 598.67 | 542.44 |
| T5 | 598.67 | 572.33 | 643.33 | 604.78 |
| l.s.d 0.05 | | N.S | | 56.29 |
| Average varieties | 539.8 | 461.53 | 560.47 | |

| | | | | |
|---|---|---|---|---|
| l.s.d 0.05 | | 21.29 | | |

the increase in the vegetative growth of the crop, in addition to the increase in the carbonation process, which was reflected in the increase in the yield. This result is in agreement with the findings (14) by increasing the yield of a number of crops. As for the increase in plant yield when treated with organic emulsion appetizer, it is attributed to the role played by these nano-nutrients, including micro-elements and marine algae, especially nano-zinc (11) by providing nutrients, coordinating and working with what the plant can absorb from the soil to equip the whole plant with all the necessary nutrients. To grow and continue its vital processes and increase the effectiveness and activity of enzymes and this in turn is reflected on all the characteristics of the plant's yield of dry matter (16) This result reinforces what was reached (17).The results of the table showed that the cultivars differed significantly between them, where the cultivar Baghdad3 recorded a higher average of a plant yield of 8424 kg/ha$^{-1}$ in Comparison with the other two cultivars, as this cultivar has gone a long way during its growth period and had an increase in the number of grains per row and the number of grains per ear And the weight of 500 grains, and this was reflected in the increase in the grain yield of the plant. This result is consistent with the findings of (18) and (24). As for the interaction, the results indicate that there is no significant difference between cultivar combinations and fertilizer treatments in the trait of total grain yield, as the effect of the two factors under study was singular and the differences were apparent.

**Total grain yield (kg/ha$^{-1}$) :**

The grain yield of the plant is affected by genetic structures, environmental factors, and various crop service processes, including plant fertilization, and also depends on the rate of carbonization in the plant and the conversion efficiency of its products, which are grains (2). The results of Table 5 show that there are significant differences between the different fertilization treatments. The treatment of NPK nano-fertilizer T5 outperformed and recorded a higher average grain yield of 8632 kg/ha$^{-1}$, followed by the treatment of organic emulsion fertilization T4 with an average of 7733 kg/ha$^{-1}$, while the control treatment recorded a lower average of total grain yield of 6237 kg/ha$^{-1}$.The reason for the increase in yield when spraying NPK nano fertilizer is due to the role of its nutrients, especially nitrogen, which is an essential component of fertilizer to maintain chloroplasts by stimulating the production of cytokinins, which play a role in increasing chlorophyll production and keeping its viability for a longer period, and as a result of this increase in the period of its activity increases the leaf area The plant, which in turn maintains the activity and vitality of the cellular organelles for a longer period in addition to the delay in the aging of the leaves, and this stimulates the plant by increasing the demand for nutrients in the soil and its accumulation in its parts (22 and 12) and as a result, the rate of this trait increased by its moral effect on increasing the components of the yield such as the number of grains in the ear and the weight of 500 A pill resulting from



**Table 5** The effect of fertilizing with organic emulsion (Appetizer) and nano NPK with urea and the interaction between them on the average grain yield

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr1 | Sumer | Baghdad3 | |
| T1 | 6356 | 5215 | 7141 | 6237 |
| T2 | 7481 | 5393 | 7629 | 6834 |

| | | | | |
|---|---|---|---|---|
| T3 | 7926 | 5452 | 8163 | 7180 |
| T4 | 8178 | 6000 | 9022 | 7733 |
| T5 | 9437 | 6296 | 10163 | 8632 |
| l.s.d 0.05 | | N.S | | 1018.7 |
| Average varieties | 7876 | 5671 | 8424 | |
| l.s.d 0.05 | | 778.4 | | |

superiority of the Baghdad3 variety, with a higher average corn silk content of soluble fibers and insoluble fibers, which amounted to 0.033% and 10.588%, respectively, while the Sumer variety recorded a lower average of 0.026% and 9.145%, respectively. As for the interaction between the cultivars and the fertilization plants, it was significant for the corn silk content of soluble fibers and insoluble fibers, where the combination between the Baghdad3 variety and the T5 fertilization treatment recorded the best interaction by giving it the highest average of 0.095% and 12.651%, respectively, while the Sumer variety recorded the fertilization treatment T1 average lower for this trait was 0.005% and 7.065%, respectively.

**Soluble fiber and insoluble fiber % :**

The results of Table 6 and 7. There are significant differences between the different fertilization treatments, where the treatment of spraying with nano-fertilizer T5 excelled and recorded a higher average in the corn silk content of soluble fibers and insoluble fibers, which amounted to 0.071% and 11,520%, respectively, while the mean of the characteristic decreased When treating the controlT1 to record an average of 0.007% and 7.974%, this may be due to the role of macronutrients, especially the nitrogen element, in increasing the content of carbohydrates and fibers in the different parts of the plant (20) and (5) These results are consistent with the findings (6). The results show the



**Table 6** The effect of fertilizing with organic emulsion (Appetizer) and NPK nano particles with urea and the interaction between them on soluble fiber %

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr1 | Sumer | Baghdad3 | |
| T1 | 0.01 | 0.005 | 0.006 | 0.007 |
| T2 | 0.025 | 0.03 | 0.01 | 0.022 |
| T3 | 0.02 | 0.01 | 0.015 | 0.015 |
| T4 | 0.045 | 0.031 | 0.04 | 0.039 |
| T5 | 0.062 | 0.055 | 0.095 | 0.071 |
| l.s.d 0.05 | | 0.003947 | | 0.002336 |
| Average varieties | 0.032 | 0.026 | 0.033 | |
| l.s.d 0.05 | | 0.002213 | | |

**Table 7** The effect of fertilizing with organic emulsion (Appetizer) and NPK nano particles with urea and the interaction between them on insoluble fiber %

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr 1 | Sumer | Baghdad 3 | |
| T1 | 8.146 | 7.065 | 8.712 | 7.974 |
| T2 | 10.006 | 8.616 | 9.606 | 9.409 |
| T3 | 9.667 | 9.211 | 10.908 | 9.929 |
| T4 | 11.17 | 10.113 | 11.062 | 10.782 |
| T5 | 11.189 | 10.72 | 12.651 | 11.52 |
| l.s.d 0.05 | | 0.7741 | | 0.4446 |
| Average varieties | 10.036 | 9.145 | 10.588 | |
| l.s.d 0.05 | | 0.4878 | | |

primary metabolisum compounds as a final outcome of the compatibility of production, and the production of effective compounds may be an immune system to protect The plant is one of some biotic and abiotic factors to which the plant is exposed (29). The results of the table show the superiority of the Baghdad3 variety by recording a higher average in corn silk content than the antioxidant activity, which amounted to 39.829%, while the Fajr1 variety recorded a lower average for this trait that amounted to 30.896%. The interaction between the cultivars and the fertilization plants was significant for the corn silk content of the antioxidant activity, where the combination between the variety Baghdad3 and the T5 fertilization treatment recorded the best interaction by giving it the highest average corn silk content of the antioxidant activity amounted to 50.571%, while the variety Fajr1 and the T1 fertilization treatment recorded a lower average for this trait. It reached 23.072%.

**% Antioxidant Efficacy:**

The results of Table 8 indicate that there are significant differences between the different fertilization treatments, where the treatment of spraying with nano-fertilizer T5 excelled and recorded a higher average in corn silk content than the antioxidant activity amounted to 43.190%, while the mean of the trait decreased when the control treatment T1 recorded an average of 28.072% and the increase may be due In the antioxidant activity to the role of NPK nano fertilizer, especially in the vegetative growth stage, by increasing the active compounds in corn silk and some phytochemicals, and thus increasing the production of a greater amount of natural antioxidants (26), and these results agree with (19) and (23), The increase of the active compounds in corn silk has coincided with the increase in the amount of dry matter for the yield of the plant and its components, and this is an indication that the increase is accompanied by the production of secondary metabolisum compounds, and the increase as well for



**Table 8** The effect of fertilizing with organic emulsion (Appetizer) and NPK nanoparticles with urea and the interaction between them on the antioxidant activity

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr 1 | Sumer | Baghdad 3 | |

| | | | | |
|---|---|---|---|---|
| T1 | 23.072 | 31.214 | 29.929 | 28.072 |
| T2 | 27.905 | 34.429 | 38.072 | 33.469 |
| T3 | 27.929 | 36.548 | 38.072 | 34.183 |
| T4 | 35.143 | 34.81 | 42.5 | 37.484 |
| T5 | 40.429 | 38.571 | 50.571 | 43.19 |
| l.s.d 0.05 | | 4.502 | | 2.624 |
| Average varieties | 30.896 | 35.114 | 39.829 | |
| l.s.d 0.05 | | 2.695 | | |

ability of these varieties to produce many groups of chemical compounds and biological compounds with medicinal benefits. This result is consistent with the findings of (21) and (26). The results of the table also show the superiority of the Baghdad3 variety by recording a higher average in corn silk from total phenols that reached 641 mg/g, while the Sumer variety recorded a lower average for this trait of 588 mg/g. As for the interaction, the results indicate that there is no significant difference between the cultivars and fertilizer treatments in the corn silk content of total phenols, as this explains that the experiment factors were independent of the effect of each factor on the effect of the other factor.

**Total phenols (mg/g):**

The results of Table 9 show that there are significant differences between the different fertilization treatments, where the treatment of spraying with nano-fertilizer T5 excelled and recorded a higher average in the corn silk content of total phenols that reached 701 mg/g, while the treatment of T4 appetizer fertilizer recorded the second highest average in the corn silk content of total phenols. It reached 624 mg/g, while the average characteristic decreased when the control treatment T1 recorded an average of 539 mg/g. The reason for this may be the difference in the genetic structures of the varieties in response to the environmental conditions and the



**Table 9** The effect of fertilizing with emulsion (Appetizer) and NPK nanoparticles with urea and the interaction between them on the corn silk content of total phenols

| Fertilization transactions | Varieties | | | Average transactions |
|---|---|---|---|---|
| | Fajr1 | Sumer | Baghdad3 | |
| T1 | 500 | 545 | 573 | 539 |
| T2 | 585 | 557 | 605 | 582 |
| T3 | 568 | 555 | 635 | 586 |
| T4 | 579 | 629 | 665 | 624 |
| T5 | 723 | 654 | 725 | 701 |
| l.s.d 0.05 | | N.S | | 42.55 |
| Average varieties | 591 | 588 | 641 | |
| l.s.d 0.05 | | 17.29 | | |

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