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The role of the g power Ca⁺ nanocomposite and the quality of irrigation water in protein concentration and some medically effective compounds of sunflower plants

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Abstract

A field experiment was carried out at the University of Karbala, College of Agriculture, for the spring agricultural season of 2021, to know the effect of the nanocomposite G power Ca and the quality of irrigation water on the medically effective compounds of the sunflower plant. Puncture, well water, river water) and the second factor was the concentrations of nano fertilizers G-Porcalcium (concentration T₀ spraying with distilled water, T₁ spraying at a concentration of 1 ml L⁻¹, T₂ spraying at a concentration of 2 ml L⁻¹, T₃ spraying at a concentration of 3 ml L⁻¹) and three replications. The results showed the superiority of the treatment of adding G-bor calcium concentration 3 ml L⁻¹ T₃ significantly by giving it the highest concentration and percentage of protein in cereals (13.24%), linoleic acid (41.25%) and Validolum (4.37%). While the concentration of 2 ml L⁻¹ T₂ exceeded the concentration of Methylpsilocin (18.88%). The treatment of river water was superior in the protein concentration in the grains of linoleic acid, Validolum and Methylpsilocin, which amounted to (12.55%, 45.10%, 3.43% and 19.36%), respectively. The interaction treatment 2 ml L⁻¹ was superior in increasing the concentration of linoleic and Methylpsilocin 50.23% and 23.2%, and T₃ treatment was superior in increasing the concentration of Validolum 5.10%.

Keywords: Nanourea, Conventional Urea, Growth, LAI, Yield and Wheat

Introduction

Sunflower is an annual summer crop that belongs to the compound family, its English name is Sunflower, and the scientific name is *Helianthus annuus* L.. The sunflower plant is one of the important oil crops. Its seed oil is characterized by its good taste, and is a major source in the manufacture of high-quality edible oils, and its oil has other uses, including in the manufacture of soap and dyes ^[1]. Nano-fertilizers are of great importance in improving the ability of crops to resist various stresses, and crop resistance to diseases, as well as maintaining the genetic characteristics of different crops. Plant parts and in plant nutrition by increasing the activity of the carbonization process by increasing the content of chlorophyll in leaves ^[2] The nano-fertilizer G-power Ca is one of the important nano-fertilizers that are used as an agricultural fertilizer produced with nanotechnology, as it consists of several compounds, including nitrogen (N) by 8% and calcium (Ca) by 13%.

In order to provide fresh water and benefit from it in other fields, many researchers have resorted to using other alternatives of irrigation water to compensate for this shortage by adopting irrigation systems in which saline water is used for irrigation by mixing it with river water.

Materials and working Methods

A field experiment was carried out at Karbala University, College of Agriculture, for the spring agricultural season of 2021. To find out the effect of the nanocomposite G power Ca and the quality of irrigation water on the medicinally effective compounds of the sunflower plant, a randomized complete block design (RCBD) was used. And by two factors, the first factor is irrigation with three levels of irrigation water (water drainage, well water, river water) and the second factor is the concentration of nano fertilizers G-Por calcium (concentration T₀ spraying with distilled water, T₁ spraying at a concentration of 1 ml L⁻¹, T₂ spraying at a concentration

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of 2 ml L-1, T₃ spraying at a concentration of 2 ml L-1. At a concentration of 3 ml L-1) and in three replications. Estimation of protein percentage according to the method A.O.A.C (1980) and according to the following equation: Protein content (%) = Total nitrogen content (%) x 6.25^[3]. The clinically effective compounds linoleic acid, Validolum and Methylpsilocin of sunflower seeds were estimated at Samarra University - College of Applied Sciences in the central laboratory by Gas chromatography-mass spectrometry technique. The oven column temperature was set at 50.0 °C and the injector temperature was 150°C. The injector-split injection was placed with helium as a carrier gas and the total pressure was 100 kPa and the total flow rate was 21 ml/min and the ionic source temperature rate was 200.06.00 °C.

Results

Protein concentration in cereals(%)

The results of Table (1) indicated that there was a significant effect of the concentrations of the nanocomposite (G-borcalcium) and the presence of a significant effect for the quality of irrigation water, as well as the presence of a significant effect of the interaction between the concentration of the nano-compound G-bor-calcium and the quality of the irrigation water on the protein ratio in the grains of the sunflower plants, as it was shown The results indicated that there was a significant effect of the concentrations of the nanocomposite on the protein content in the grains of the sunflower plants when the addition of 3 ml liter of the nanocompound G-Por Calcium T₃ gave the highest average amounted to 13.24)% and the lowest average when the comparison treatment amounted to (7.30)% and with an increase of (80.80%). The quality of the irrigation water indicated that there was a significant effect on the protein content in the grains of sunflower plants. The highest rate was achieved when river water reached (12.41) %, and the lowest rate when treated with rainwater was (8.27)%. The results of the interaction of the spraying of the nano-compound G-Por-calcium and the quality of the irrigation water showed a significant effect on the protein content in the grains of the sunflower plants, as the results showed that the highest average was achieved when the treatment of adding 3ml-liter of nano-compound G-Porcalcium (T₃) and river water was overlapped. It gave a rate of (14.73)%, and the lowest rate of 6.73%) when compared with the amniocentesis.

Table 1: Effect of the GPower Ca⁺ nanocomplex and irrigation water quality on protein concentration in cereal%.

Transactions	water quality			
	river water	puncture water	water well	Mean
T ₀	8.06	6.73	10.10	7.30
T ₁	13.21	7.12	12.25	10.14
T ₂	13.64	7.46	12.25	11.12
T ₃	14.73	11.79	13.21	13.24
L.S.D	4.849			2.80
Mean	12.41	8.27	10.67	
L.S.D	2.424			

Linoleic acid concentration for sunflower plants

The results of Table (2) indicated that there was a significant effect of the concentrations of the nanocomposite G-bor-calcium, as well as the presence of a significant effect for the quality of irrigation water, as well as the presence of a significant effect of the interference between the concentration of G-bor-calcium and the quality of irrigation water on the

concentration of linoleic acid for sunflower plants. Significant concentrations of the nanocomposite in the concentration of linoleic acid in sunflower plants, which gave the T₃ treatment the highest values of (41.25)%, while the comparison treatment gave the lowest rate of (30.62)%, with an increase of (34.71%). The quality of irrigation water indicated that there was a significant effect on the concentration of linoleic acid for sunflower plants, which achieved the highest rate in river water that amounted to (34.11%) and the lowest rate in sewage water that amounted to (32.91%). The results of the interaction of spraying nano-compound G-Por-calcium and the quality of irrigation water indicated a significant effect on the concentration of linoleic acid for sunflower plants, as the results showed that the highest rate was achieved when the treatment of adding 2 ml of liter and river water gave an average of 50.23 and the lowest rate It reached % (25.67) when compared with a water puncture treatment.

Table 2: The effect of the nanocomposite GPower Ca⁺ and the quality of irrigation water on the concentration of the compound Linoleic acid.

Transactions	water quality			
	river water	puncture water	water well	Mean
T ₀	34.53	25.67	31.67	30.62
T ₁	42.59	34.01	37.77	38.12
T ₂	50.23	33.58	37.30	40.37
T ₃	45.10	38.40	40.25	41.25
L.S.D	4.151			2.397
Mean	43.11	32.91	36.75	
L.S.D	2.075			

Validolum Concentrate for Sunflower

The results of Table (3) indicated that there was a significant effect of the concentrations of the nanocomposite G-bor-calcium, as well as the presence of a significant effect for the quality of irrigation water, as well as the presence of a significant effect of the interference between the concentration of G-bor-calcium and the quality of irrigation water in the concentration of Validolum for sunflower plants, as the results showed a significant effect For the concentrations of the nanocomposite in the Validolum concentration of sunflower plants, which gave the highest values of (4.37)%, the treatment of adding 3 ml L-1, while the comparison treatment gave the lowest rate of (1.31). The quality of irrigation water indicated a significant effect on the concentration of Validolum of sunflower plants, which achieved the highest rate in river water of (3.34) and the lowest rate in sewage water of (2.35). The results of the interaction of the spraying of nano-compound G-bor-calcium and the quality of irrigation water indicated a significant effect on the Validolum concentration of sunflower plants. The results showed that the highest rate was achieved when the addition of 3 ml of liter and river water gave a rate of (5.10) and the lowest rate of (0.96) when compared with puncture water.

Table 3: Effect of GPower Ca⁺ and Irrigation Water Quality on Validolum Concentration of Sunflower Plant.

Transactions	water quality			
	river water	puncture water	water well	Mean
T ₀	1.57	0.96	1.40	1.31
T ₁	3.07	2.23	2.82	2.70
T ₂	3.99	3.03	3.27	3.43
T ₃	5.10	3.90	4.12	4.37
L.S.D	0.73			0.42
Mean	3.43	2.53	2.90	
L.S.D	0.36			

Methylsilicin Concentration for Sunflower

The results of Table (4) indicated that there was a significant effect of the concentrations of the nanocomposite G-bor-calcium, as well as the presence of a significant effect for the quality of irrigation water, as well as the presence of a significant effect of the interference between the concentration of G-bor-calcium and the quality of irrigation water on the concentration of Methylsilicin for sunflower plants, as the results indicated a significant effect For the concentrations of the nanocomposite in the Methylsilicin concentration of sunflower plants, which gave the highest values (18.88%) in the treatment of adding 2 ml L-1, while the comparison treatment gave the lowest rate (12.00%) and the increase percentage (48%). The quality of the irrigation water indicated a significant effect on the concentration of Methylsilicin for sunflower plants, which achieved the highest rate in river water that amounted to (19.36)%, and the lowest rate in sewage water that amounted to (11.46%). The results of the interaction of spraying nano-compound G-Por-calcium and the quality of irrigation water indicated a significant effect on the concentration of Methylsilicin for sunflower plants. The results showed that the highest rate was achieved when the treatment of adding 2 ml of liter and river water gave an average of (23.20) and the lowest rate was % (7.13) when compared with aqueous puncture treatment.

Table 4: The effect of the nanocomposite GPower Ca+ and the quality of irrigation water on the concentration of the compound Methylsilicin.

Transactions	water quality			Mean
	river water	puncture water	water well	
T ₀	15.80	7.13	13.07	12.00
T ₁	18.50	9.10	15.03	14.21
T ₂	23.20	16.79	16.63	18.88
T ₃	19.93	14.73	18.83	17.83
L.S.D	1.126			0.650
Mean	19.36	11.94	15.89	
L.S.D	0.563			

Discussion

The results of the analysis table showed linoleic acid and the reason may be attributed to the increase in linoleic acid to the role of the nanocomposite in the release of nutrients, the speed and ease of penetration of nutrients to the cell walls of the roots. And it encourages the growth of plants as well as contributes to increasing the characteristics of vegetative growth, leaf area, disc diameter, and that its better growth leads to encouraging the efficiency of the photosynthesis process and then the accumulation of manufactured materials in it and its ease of transmission from the source to the estuary, as well as the presence of some enzymes that work to increase The formation of oil-forming compounds, which leads to an increase in the proportion of linoleic acid. This result is in agreement with the findings of [4]. They confirmed that the nanocomposites increase the oil yield, as well as raise the proportions of fatty acid components, including linoleic acid. The results of the analysis of variance table showed that the reason for the increase in Validolum and Methylsilicin compounds may be due to the effect of the nano-compound in improving the vegetative characteristics, and the increase in the level of endogenous hormones such as auxins and cytokinins that affect the increase in the activity of enzymes that are positively reflected on growth and secondary metabolism processes and the accumulation of active substances, including these compounds. The reason for

the increase in compounds may be due to raising the efficiency of the carbonization process in the plant, accompanied by an increase in the accumulation of manufactured materials at the source, including secondary compounds, and their transfer to the downstream, which led to an increase in the oil and its components of unsaturated fatty acids, which are characterized by containing effective medicinal compounds.

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