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Effect of Organic Fertilizer (Compost) Prepared from Canocarpus Crus-galli on the Characteristics of Wheat Plant Grown in Sandy Loam Soil

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I. Introduction

Organic fertilization is the cornerstone that raises the productive value of agricultural lands and reduces the environmental pollution resulting from the excessive use of mineral fertilizers. Organic fertilizers can behave like slow-release fertilizers in the continuous and slow supply of available and absorbable nutrients for the plant. Organic fertilizers can effectively increase plant nutrients and their release into the soil, improve the physical, chemical and biological properties of the soil, and actually have an impact on improving the growth and productivity of the crops grown, Naimish, (2020) and Abu Rayan, (2010). Since wheat is one of the world's strategic cereals, accounting for one-third of the cereal planting area in countries around the world, its importance makes it indispensable to humans at all times and in all places. Therefore, it is necessary to find modern means and methods that encourage the increase in the production of this crop. The area planted with wheat in the Arab world reached (11,787,67) thousand hectares with a growth yield of (27,629,88) thousand tons and an average yield of (2,343,091) kg/hectare (Arab Organization for Agricultural Development, 2017). Given the importance of adding organic fertilizers to the soil and improving its properties, their additions have been studied in most of the world's soils that suffer from organic deficiency and tested on all different vegetable crops and fruit trees, which led to an increase in the absorption of nutrients by the different plants and an increase in their morphological growth characteristics and chemical properties in response to these fertilizer additions, as they support the soil with important mineral elements for the plant and improve the physical and biological properties of the soil, and consequently this response is reflected in the increase in the growth and development of the fertilized plants with these compounds (Ati and Al-Sahaf, 2007). Therefore, the research aims to know the effect of different levels of locally prepared compost organic fertilizer from the Canocarpus plant and added to the poor sandy loam soil cultivated with the wheat plant and its effect on the growth of these plants in the soil.

I. Conclusion:

The study showed that after adding different levels (0, 2, 4, 6) tons/donum of the locally prepared compost from t Canocarpus he plant, it caused a significant increase in the height of wheat plants, number of leaves, spike length, number of spikes per square meter, number of grains per spike, and weight of 1000 grains at a significant level (0.05) compared to without addition. Significant differences ($p \leq 0.05$) were also found in the organic fertilizer levels between them in increasing the characteristics of wheat plants

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II. Materials and methods:

The chemical, physical, and biological properties of the sandy loam soil under cultivation were measured, and the properties of the locally produced compost were analyzed according to the methods mentioned (Page et al., 1982). The components of the compost preparation from the Echinochloa plant were: 1000 kg plant residues, 50 kg soil, 300 kg animal manure, 5 kg urea, and 5 kg molasses. According to the instructions of the National Center for Organic Agriculture at the Ministry of Agriculture (2011).

The agricultural field site:

The field experiment was conducted to study the effect of locally produced Canocarpus compost at different levels on two plants (wheat, variety Aba 99) in sandy loam soils in the Al-Mustafawiya region, located northwest of the city of Nasiriyah, about 4 km from the city center, and within the University of Thi Qar, specifically in the College of Agriculture and Marshes field, at longitude 46.1335 and latitude 31.0308.

After completing the compost production, its chemical and physical properties were analyzed as shown in Table 1. Wooden boxes with dimensions of 150 cm length, 100 cm width, and 70 cm depth were used and filled with the sandy loam soil with the properties shown in Table 1. Each box was divided into five lines with a distance of 25 cm between each line. A total of 16 boxes were used in four blocks with four organic matter levels (0, 2, 4, 6 tons per dunam). The plants were fertilized with 120-200 kg nitrogen per hectare, 40-60 kg P2O5 per hectare, and 80-100 kg K2O per hectare, where phosphorus was added at planting, and nitrogen was added in two doses after germination and before flowering, while potassium was added in a single dose before the end of the wheat growing season.

The following were measured:

1- Plant height
2- Spike length
3- Number of spikes per square meter
4- Number of grains per spike
5- 1000-grain weight

The experiment was analyzed and designed using a Randomized Complete Block Design (R.C.B.D.).

Table 1 shows the physical and chemical properties of the cultivated soil.

Criteria	value	unit
pH	7.14	
EC	1.5	-1 dsm
Organic Matter	0.45	٪
Total Nitrogen	23	ppm
Available Phosphorus	6.4	ppm
Available Potassium	75.0	ppm
Sand	78.00	٪

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Silt	15.00	٪
Clay	7.00	٪
Texture	Sandy loam	
Gypsum	٪	2.2
Lime	٪	5

Table. (2a) shows the physical and chemical properties of the compost prepared locally.

Criteria	**value**	**unit**
pH	7.18	
EC	1.37	ds\m
M.O	20	%
TotalN	1.78	%
TotalP	0.48	%
TotalMg	0.7	%
Ca	0.28	%
Cl	278	%
pd	2.68	Ppm
Hg	0.00078	ppm
Cr	0.21	ppm
Ni	0.37	ppm
Impurities	Less than 4	%
Moisture Content	67.5	%
Bulk Density	0.90	g cm^{-3}
Prepared Ton	780	kg
Compost Color	Blackish-yellow	unit

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Table. (2b) shows the physical and chemical properties of the standard (global) compost.

Criteria	**value**	**unit**
pH	6.5-8.5	
EC	Less than 5.5	ml cm^{-1}
M.O	More than 20	%
TotalN	0.7	%
TotalP	0.5	%
TotalMg	0.35	%
Ca	0.2	%
Cl	Less than 0.5	%
pd	120	ppm
Hg	1.0	ppm
Cr	70	ppm
Ni	20	ppm
Impurities	Less than 5%	% from organic matter
Moisture Content	More than 60	
Bulk Density	600	Kg m^{-3}
Weight of Prepared Ton	750	kg
Compost Color	Dark blackish-yellow	

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III. Results and Discussion

Table (2a) shows the properties and characteristics of the compost produced locally in the city of Al-Gharraf Al-Nasiriyah, and the extent to which all these properties and characteristics compare with the global standard specifications for compost production. It was proven that all analyses of this compost comply with the global standards, whether in terms of chemical, physical, or biological properties. Accordingly, experiments were conducted to determine the plant's response to it, and its suitability for use in a nutrient-poor sandy loam soil was tested in order to obtain a reasonable productivity. Table (2b) compares the analysis of the locally produced compost with the globally prepared compost. Table (2b) shows the effect of different levels (0, 2, 4, 6 tons/donum) of the locally produced Kinocarpus compost on the cultivation and growth of wheat variety (Aba'a 99). The results showed that increasing the addition of organic fertilizers to the crop soil led to a significant increase in wheat plant height with a probability of ($p \leq 0.05$). This also led to a significant increase in ear length with each increase in the application rate compared to the control treatment without addition. The same table also showed that the number of ears, number of grains, and thousand-grain weight increased with the increase in the amount of organic fertilizers. This may be due to the fact that these amounts of organic matter provide important nutrients to the plant and spray the soil after analyzing the mineral nutrients, as well as improving the physical and biological properties of the soil, thereby improving the productivity and parameters of the wheat plant (Naguimish, 2020; Ati and Al-Sahaf, 2007; Abu Rayan, 2010). They explained that increasing the content of organic fertilizers can improve the parameters of cultivated wheat such as length, green and dry biomass, number of leaves, ear length, number of grains, and thousand or hundred-grain weight. These results are consistent with the conclusions of Al-Hamd and Al-Jarbou (2021), who stated that increasing levels of sheep manure in E20, 18, and 14 t/ha varieties resulted in an increase in plant height, number of ears, thousand-grain weight per square meter, and yield. Al-Nadawi et al. (2017) also observed a significant increase in dry matter of the vegetative growth, number of spikes per square meter, number of grains per spike, leaf area, and number of grains per spike, as well as 100-grain weight, when organic fertilizer levels were increased from 0 to 50 and 100 kg/hectare. The study also agreed with the findings of Qamar Al-Dawla and Al-Zain (2014), who found that increasing organic fertilizer levels increased the vegetative growth of the wheat crop in Kouraoue and Roujou, and they proved that organic fertilization played an important role in increasing nutrients after the decomposition of organic matter, as well as increasing the number of leaves, vegetative weight, leaf area, and dry weight of the planted varieties. Furthermore, Al-Issawi Al-Muhammadi (2016) explained that increasing bat guano levels from 0 to 8 and 4 grams led to a significant and superior increase in the productivity traits of the wheat variety (Bab Al-Sham), where there was a significant difference in the average number of leaves, length of vegetative growth, dry weight, and plant height. There was also a significant difference between the varieties according to their genetic characteristics, where the local variety showed superiority at the 4 gram level

Table (3) shows the effect of compost organic fertilizer levels on wheat growth characteristics.

Compost Levels (ton/dunum)	Weight of 1000 Grains (g)	Weight of 100 Grains (g)	Number of Spikes/m²	Number of Seeds per Spike	Spike Length (cm)	Plant Height (cm)
0	95.7	9.57	81.8	50.0	9.75	27.0
2.0	110.0	11.0	157.5	57.0	12.0	67.2
4.0	123.2	12.32	194.5	63.8	11.25	71.0
6.0	127.1	12.71	205.5	60.5	13.12	69.5
Mean	L.S.D 0.05 9.91	L.S.D 0.05 0.991	L.S.D 10.06	L.S.D 0.05 10.15	L.S.D 0.05 1.149	L.S.D 0.09 7.08

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IV. Conclusion and Recommendations:

1- The prepared compost from Canocarpus was observed to be effective and responsive in the morphological characteristics of the wheat plant, and it gave a significant increase in growth properties in the sandy loam soil.
2- The local preparation of compost from Canocarpus had chemical, physical, and biological properties similar to the global compost in all the studied properties.
3- It is recommended to use the Canocarpus plant, as it is abundant and widely cultivated in Iraq, to prepare and manufacture compost, provided that it is away from plants near vehicle exhaust and plants taken from sidewalks and public roads.

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