EFFECT OF FRESH AND FERMENTED OLIVE SOLID WASTE AND COW MANURE ON IRON FORMS IN CALCAREOUS SOIL AND WHEAT PLANT PRODUCTIVITY

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ABSTRACT

A field experiment was conducted at the farm of Abu Jarash at the Agricultural College, using different rates of olive solid waste and cow manure, as follows: (control, Mineral fertilizer +NPK, fresh olive solid waste100%, fresh olive solid waste 75%+ cow manure 25%, fresh olive solid waste 50%+ cow manure 50%, fermented olive solid waste 100%, fermented olive solid waste 75%+ cow manure 25%, fermented olive solid waste 50%+ cow manure 50%, cow manure 100%). Iron fertilizer had been added as iron sulfate in equal amount for each treatment. the fermented olive solid waste 100% treatment was Superiority in the amount of iron forms as following: (total, soluble, exchanged, linked with carbonate bound, organic matter bound iron and manganese oxides bound and residual) the iron amounts were (1296, 0.29, 2.25, 7.74, 37.90, 289.1 and 958.75) mg/kg^{-1} in the same previous order. While the iron values in the treatment of the control were (1174, 0.188, 1.111, 732, 29.43, 260.5, 875.8) mg kg^{-1} for the same forms and in the same previous order. The fermented olive solid waste treatment 100% had the highest yield (5.980) ton h^{-1}. The control treatment had the lowest value (3.987) t/h^{-1}.

Keywords: olive solid waste, mineral, cow manure, fertilizers.

تأثير تفل الزيتون الطازج والمخمر وسماد الأبقار في أشكال الحديد في تربة كلسية وإنتاجية نبات القمح

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المستخلص

أجريت تجربة حقلية في مزرعة كلية الزراعة بأبي جرش، وذلك باستخدام معدلات مختلفة من تفل الزيتون وروث الابقار حسب ما يلي: (شاهد، سماد معدنيNPK+ تفل زيتون طازج 100%، تفل زيتون طازج 75%+ روث أبقار 25%، تفل زيتون طازج 50%+ روث أبقار 50%، تفل زيتون مخمر 100%، تفل زيتون مخمر 75%+ روث أبقار 25%، تفل زيتون مخمر50%+ روث أبقار 50%، روث أبقار 100%). اضيف الحديد على شكل سلفات الحديد وبشكل متساوي لكل المعاملات أظهرت النتائج تفوق المعاملة تفل زيتون مخمر 100% في كمية أشكال الحديد التالية: (الكلي، الذائب، المتبادل، المرتبط بالكربونات، المرتبط بالمادة العضوية، المرتبط بأكاسيد الحديد والمنغنيز والمتبقي) حيث بلغت كمية الحديد (1296، 0.259، 2.249، 7.740، 37.90، 289.1، 958.75) ملغم/كغ$^{-1}$ وبنفس الترتيب السابق. بينما كانت قيم الحديد في معاملة الشاهد (1174، 0.188، 1.111، 732، 29.43، 260.5، 875.8) ملغم/كغ$^{-1}$ لنفس الأشكال وبنفس الترتيب السابق. وبلغت الإنتاجية أعلاها في معاملة تفل الزيتون المخمر 100% (5.980) طن/هـ$^{-1}$ وكان أخفض قيمة في معاملة الشاهد (3.987) طن/هـ$^{-1}$.

الكلمات المفتاحية: تفل زيتون، سماد معدني، روث أبقار، أسمدة.

***Received:12/2/2019, Accepted:20/5/2019**

INTRODUCTION

Organic manure plays an important role in improving soil properties as well as providing it with the necessary fertility components for crop growth (4). The average of lovie solid waste is 40% to 45 % of the olive oil harvest (15). (5) explained the effect of adding olive residues to the soil in reducing soil pH. (2) reported that one ton of olive solid waste contains 1-3.5 kg K_2O, 0.6-2 kg P_2O_5 and 0.15-0.5 kg MgO and can be added to the soil at rates ranging from 30 to 100 ton h^{-1} per year as fertilizer for crop production and Fairhurst. (7) showed that the direct effect of composting is the release of nutrients such as nitrogen, phosphorus, potassium and other nutrients, along with nutrients and some pathogens, and the assumption that municipal fertilizer contains 0.5% N, 0.3% P_2O5 , 0.5% K_2O) The utilization rate of nitrogen is estimated between 40-50%, 60% of phosphorus and 75% potassium. (20) noted that olive solid waste contains nutritious minerals such as nitrogen, phosphorus, potassium and manganese. (20) investigated the effect of olive solid waste on the growth of bean through adding different rates 0, 10, 20, 30 and 40 ton h^{-1} and increased yield growth and the best rate of growth was in adding 20 ton h^{-1}. (12), noted that there is a positive effect of the addition of the olive solid waste on the accumulation of sandy and loam soils. (1) found that the use of olive solid waste a significantly increased in organic carbon, total nitrogen, phosphorus, and potassium in the soil and thus could be used as a source of organic matter. (20) noted that olive solid waste contains nutritious minerals such as nitrogen, phosphorus, potassium, manganese and iron. (8) reported that the addition of ashes of olive to the soil increased the soil content of the available potassium compared to the ashes of the vegetable residues and that the ashes of the olive could be used as cheap potassium fertilizer. the soluble and exchanged forms of iron are available for the plant, while the forms linked with the crystal grid in clay minerals are ineffective. Other forms, such as precipitated carbonate, or linked with iron, manganese and aluminum oxides, or which form compounds with organic matter, change their mobility and availability to the plant according to the physical and chemical properties of the soil (23) and (22) (21), explained that the iron concentrations vary from soil to soil, as well as from one geographical area to another. This indicates that origin and climatic conditions significantly affect in the iron presence in soil. (13) refer to the kinetics and availability of iron it is related to the basic chemical reactions between it and the soil components. These reactions range from: 1. adsorption and absorption, 2. sedimentation and solubility, 3. formation of surface complexities, 4. surface sedimentation, 5. Ionic substitution, 6. finally, the vital role of limiting or increasing soil uptake. (27) pointed out that the plant absorbs the iron ion mainly on a divalent iron image and can be absorbed by the plant in an organic compound such as (chelated iron). But the addition of bivalent iron to the soil makes it susceptible to sedimentation into trivalent iron, which reduces its availability to the plant, since the change in equivalence is controlled by the oxidation and soil reaction conditions According to (24), one of the most widely used sequencing methods, according to this method, the micro elements are divided into (water soluble, reciprocated, carbonated, linked with iron manganese oxide, linked with organic matter and residual fraction) The images of the elements linked with carbonates, iron and manganese oxides, and organic matter are relatively active and their activity depends on physical and chemical properties of soil. (14) added that most micro elements which added to soil absorbed on the surfaces of the components of the soil as an exchanged component, and then turn into fixed components with time.

Research Objective

Effect of fresh and fermented olive solid waste and cow manure in iron availability in calcareous soil and wheat plant productivity

Justifications of research

The industry of olive oil and production it in Syria had spread and the result of this industry were solid residues which affecting on the environment, that the use of these wastes as organic fertilizer contributes to Improving some chemical soil properties through its chemical elements and organic matter. This is reflected in the soil characteristics and therefore in the productivity of the wheat

plant. The spread of the olive industry in Syria and the remnants of organic waste is a very important impact for its role in improving the soil properties and thus in the production of wheat plant.

1- Study area: Abi Jarash (Faculty of Agriculture farm)

- Soil: the research conducted on calcareous soil the classification of this soil is loam clay.

-Organic waste: fresh and fermented olive solid waste in addition to cow manure, added by N ratios and wheat crop requirements. Tables 1 and 2 showed the physical and chemical properties of soil and organic waste used.

-Mineral fertilizer NPK

-plant: wheat

Wheat seed (Sham 3) was grown on 29/12/2016. Soil samples were taken before planting and after harvest. Harvest was done on 15/6/2017 and samples of plants were taken for analysis. The amount of compost added by major elements was determined according to the soil analysis according to the recommendation of the General Authority for Scientific Agricultural Research. Organic fertilizers were also added after the implementation of an experiment to determine the utilization factor for the nitrogen

Collection and preparing the samples

Samples of organic waste which added to the soil (fresh and fermented olive solid waste and cow manure) were prepared and soil samples were collected before planting and after harvesting.

Table 1. some chemical and physical soil analysis

Fe available	K_2O available	P_2O_5 Available Joret Hebert	Total nitrogen	Organic matter	Total carbonates	Total propensity	Real density	Bulk destiny	EC extract 5:1	pH unsettled (2.5 :1)	texture	Mechanical composition of soil			soil
mg/kg			g/gk^{-1}				g/cm^3		dS/m			clay	silt	sand	
2.8	250	170	0.14	2.21	50.00	57.85	2.61	1.10	0.45	8.10	Loam clay	39.25	30.95	29.80	Agriculture farms soil (Abi Jarash)

It is clear from Table 1 that the soil has loam clay and it had a low bulk density and good porosity. The soil is characterized by an alkaline pH of 8.10 and non-saline, with a salt conductivity 0.45 dS/m. as the Soil has characterized in high content of carbonate 500 gkg^{-1}. In addition, it is noted that the soil is medium content of organic matter, which amounted to 2.21gkg^{-1} and may be due to the annual additions of organic waste to the soil where it was 2.21 gkg^{-1}. As for the soil content of the fertility elements, it was characterized by an average content of total nitrogen with 0.14% and average content of phosphorus and potassium available at 170 and 250 mg/kg respectively and iron 2.8 gkg^{-1}

Table 2. Some chemical and fertility properties of olive solid waste and cow manure

Fe total	N C/ratio	K	P	N	OC	OM	EC extract (5:1) dS/m - unsettled (5:1)		Organic waste
mg kg^{-1}			%		%				
1620	44.82	2.4	0.37	1.2	53.78	92.73	2.62	5.60	Fresh olive solid waste
2260	29.42	1.5	0.50	1.5	44.13	76.08	3.38	6.10	Fermented olive solid waste
2050	14.16	1.13	0.540	1.70	24.08	41.52	1.30	7.70	Cow manure

As shown in Table 2, the pH of both fresh and fermented olive solid waste was less than 7, while cow manure was 7.70 and EC 2.62 dS/m and 3.38 dS/m 1.30 dS/m in both fresh and fermented olive solid waste and cow manure respectively. As for the organic matter, it was found in both fresh and fermented olive solid waste and cow manure, 92.73, 76.08 and 41.52%, in the same previous order itself. As shown in Table 2, there is an increase in the content of cow manure from the fertility elements, such as nitrogen and phosphorus,

compared with the fresh or fermented olive solid waste. While the amount of iron was (2260) mg/kg in fermented olive solid waste and (2050) mg/kg in cow manure and (1620) mg/kg in the fresh olive solid waste

1-Physical analysis of soil:

Mechanical analysis in a hydrometer method - bulk density in a cylinder way - the real density in pycnometer and porosity computationally.

2- Chemical analysis of soil and organic waste:

-pH: unsettled 1: 1 for soil and 1: 1 for organic waste and pH measurement, according to the method mentioned (18)

-EC: Extract 5: 1 for soil and organic waste and measurement of electrical conductivity. (18).

-Total carbonates: Calcimeter device

-Organic carbon: soil and organic waste by oxidation potassium dichromate. (Wackily and Black) described in (19).

-organic matter: soil oxidation by potassium dichromate, and organic waste: bromide.

-Total nitrogen: the Kjeldahl method, (17).

-Available phosphorus: Joret-Hebert method.

-Potassium available: ammonium acetate method, then measurement using (Flame photometer) device

- total Phosphorus and potassium: digestion by thermodynamics and then measurement on the flamephotometre of potassium.

- Iron exchanged DTPA (diethylene tetra amine Penta acetic acid)

Total iron: 1: 3 nitrogen acid and hydrochloric acid (digestion with royal water) (16).

Treatments

1- Control

2- Mineral fertilizer NPK

3- Fresh olive solid waste 100%

4- Fresh Olive solid waste 75%+cow manure25%

5- Fresh Olive solid waste 50%+cow manure50%

6- Fermented Olive solid waste 100%

7- Fermented Olive solid waste 75%+cow manure25%

8- Fermented Olive solid waste 50%+cow manure50%

9- Cow manure 100%

Ground iron fertilizer was added to all treatments including the control, as iron sulfate form at rate 10 kg Fe/hectare, and sprinkle 1 kg Fe/hectare

-The land was lined and the treatments were planted randomized according to the design of the complete random sectors with three replicates per treatment

RESULTS AND DISCUSSION

the effect of fresh and fermented olive solid waste and cow manure on Iron forms in soil after the harvest for the average of two seasons

1-Total Iron form

Table 3 showed the effect of fresh and fermented olive solid waste and cow manure in iron forms in the soil after harvest for the average of two seasons. For the total iron form, the table showed that the fermented olive solid waste treatment 100% had superiority to others where the amount of iron in it was (1296) mg/kg, after it. it became fermented olive solid waste treatment 75%+ cow manure 25%> fermented olive solid waste treatment 50%+ cow manure 50%> fresh olive solid waste treatment %100> fresh olive solid waste treatment 75%+ cow manure 25%> cow manure 100%> fresh olive solid waste treatment 50%+ cow manure 50%> mineral NPK, compared with the control. Where the values of iron 1282, 1271, 1267, 1254, 1242, 1240, 1199 and 1174 mg/kg^{-1} and in the same previous order itself, this is due to the high fermented olive solid waste content of iron compared to fresh olive solid waste and cow manure. This corresponds to (6). Overall, this figure noted increasing for total iron form (as a percentage) in the soil and can be attributed to climatic factors and other weathering of rocks and minerals containing this element. (25) and (26).

Table 3. the effect of fresh and fermented olive solid waste and cow manure on Iron forms in soil after the harvest for the average of two seasons

residual	Linked with iron and manganese oxides	Linked with organic matter	Linked with carbonates	exchanged	soluble	total	treatment
			mq/kg				
875.8a	260.5e	29.42 ^{c}	7.327ab	1.111f	0.188	1174	control
901.2a	260.2e	29.34 ^{c}	6.965 bcdef	1.067f	0.219	1199	Mineral NPK
947.2a	278.9abc	31.68^{bc}	7.151bcd	1.795bc	0.251	1267	Fresh olive solid waste%100
936.53a	277.0abcd	31.64 ^{bc}	6.671cdef	1.794 bc	0.362	1254	Fresh olive solid waste+%75 cow manure %25
935.3a	266.2bcde	30.14 ^{c}	6.502ef	1.571cd	0.274	1240	Fresh olive solid waste+%50 cow manure %50
958.75a	289.1a	37.90 ^{a}	7.740a	2.249a	0.259	1296	fermented olive solid waste 100%
956.4a	281.1ab	34.80 ^{ab}	7.483ab	1.974b	0.243	1282	fermented olive solid waste%75 + Cow manure % 25
952.5a	275.7abcde	33.72 ^{abc}	6.998bcde	1.702c	0.299	1271	fermented olive solid waste+%50 Cow manure %50
939.3a	264.0cde	30.20c	6.965bcdef	1.241ef	0.239	1242	Cow manure %100
99.86	15.93	4.540	0.5660	0.2333	0.1358	105.0	LSD%5

Iron soluble form

Table 3 shows that the amount of dissolved iron ranged between the lowest value (0.188) mg/kg in the control and (0.362) mg/kg in the fresh olive solid waste treatment 75% + cow manure 25%, and the percentage of iron dissolved from the total iron was (0.0157)% in the control to 90.0281)% in the fresh olive solid waste treatment 75% + cow manure 25% Table 3 shows that there were no significant differences in soil content of soluble iron in all treatments, where the highest amount of soluble iron in the fresh olive solid waste treatment 75% + cow manure 25% > fermented olive solid waste 50%+ cow manure 50%> fresh olive solid waste 50%+ cow manure 50%> fermented olive solid waste 100> fresh olive solid waste 100> fermented olive solid waste 75%+ cow manure 25%> cow manure 100%> Mineral Fertilization, Compared to the control, where the amounts of iron were 0.362,0.299, 0.274,0.259, 0.251, 0.243, 0.239, 0.219, 0.188 mgkg^{-1} in the same previous order. The decrease in the amount of dissolved iron in the fermented olive solid waste treatment 100% compared to others may be due to the increase in iron absorption of the plant in this treatment compared with the other treatments, which was reflected in the decrease in soil quantity. (10) mentioned to the effect of organic fertilizers on increasing of planet absorption of fertility elements, resulting in reduced soil content of them.

Iron exchanged form

It is reveal from Table 3 that the amount of iron exchanged between the lowest value in the witness was 1.111 mg kg^{-1} and the highest value of 2.249 mg kg^{-1} in the fermented olive solid waste treatment 100%, and the percentage of iron exchange of total iron ranged from 0.09% in the control treatment 0.17% In the fermented olive soils waste treatment 100%, and the test of the least significant difference LSD at the level of 5% in the content of the soil of exchange iron to the existence of significant differences between different treatments were arranged as the following: the fermented olive solid waste treatment 100%> fermented olive solid treatment 75%+ cow manure 25%> fresh olive

solid treatment 100%> fresh olive solid waste treatment 75% +cow manure 25%> fermented olive solid treatment 50%+ cow manure 50%> fresh olive solid treatment 50%+ cow manure 50%> metal > compared to the control treatment. Where the amounts of iron exchanged were 2,249,194 ,1,795,1,944 , 1.067 ,1.241 ,1.571 ,1.702, and 1.111 mgkg^{-1} in the same respectively order. And thus, is due to increase in the amount of iron exchanged in the fermented olive solid waste treatment 100% compared to cow manure and other treatments that is because the dissolved of organic wastes in the fermented olive solid waste and this converse to be attributed to the increase in the percentage of humic and vulvic acids in it and the role of. these acids in increasing the exchanged form of iron by reducing the pH of the soil and reducing Iron fixation in the soil as well as the role of these materials in the formation of chelated compounds with iron more available to limit the formation of oxides and hydroxides and competition of calcium and magnesium oxides of the iron element on the exchange sites and thus increase its percentage in the soil and this corresponds to the results of (1). This form is found as soluble organic compounds because it is rarely found in the form of free Fe^{2+} ions. The small amount of this form is due to its strong tendency to form oxides and hydroxides. The higher pH reduces the reciprocal solubility of iron, and thus precipitates in the form of salts, oxides or hydroxides, and increasing the exchange capacity of the soil increases this form of iron.

Iron linked with Carbonates

It indicates from Table 3 that the amount of iron linked with carbonates ranged between the lowest value (6.502) mg kg^{-1} in the of fresh olive solid waste treatment 50% + cow manure 50% and the highest value 7.740 mg kg^{-1} in the fermented olive solid waste 100%. The percentage of iron linked with carbonates from the total iron was 0.52 % in the of fresh olive solid waste treatment 50% + cow manure 50% to 0.60 % in the fermented olive solid waste 100%. and the least significant difference of LSD at 5% in soil content of iron linked with carbonates showed significant differences between the different treatment which were arranged as the following: The fermented olive solid waste treatment 100%> The fermented olive solid waste 75%+ cow manure 25%> control > fresh olive solid waste 100% > fermented olive solid waste treatment 50%+ cow manure 50% > cow manure 100%> mineral > fresh olive solid waste treatment 75%+ cow manure 25% > fresh olive solid waste treatment 50%+ cow manure 50% where the iron linked with carbonates reached 7.7%, 7.843, 7.327, 7.151, 6.998, 6.965, 6.965, 6.671 and 6.502 mg kg^{-1} respectively. while the percentage of iron linked with carbonates return to the increase in the high percentage of carbon-related form of iron can be due to reduction of the formation of oxides and hydroxides (1). Carbonates contribute to raising the pH of the soil, which negatively effects on the availability of iron to the plant in such soils. The increase in the amount of carbonate transforms the dissolved II iron into an insoluble form such as iron oxide. Carbonates are important compounds adsorption for many elements when organic matter and oxides Iron is less abundant in soil. (18) noted that the reduction in the amount of iron linked with carbonates is due to its strong tendency to form oxides and hydroxides and to increase soil pH, which reduces this form of iron and the increase in the exchange capacity increases this form of iron.

Iron linked with organic matter

It is shows from Table 3 that the amount of iron linked with organic matter ranged between the lowest value in the control 29.42 mg/kg and the highest value 37.90 mg/kg in the fermented olive solid waste treatment 100%. The percentage of iron linked with the organic matter of total iron ranged between 2.50% in the control to 2.92% in the fermented olive solid waste treatment. The test a significant difference of LSD at the level of 5% in the soil content of the iron linked with the organic matter showed that There were significant differences between the different treatments. Where The order of them were as the following: the fermented olive solid waste treatment 100% > the fermented olive solid waste treatment 75%+ cow manure 25%> the fermented olive solid waste treatment 50% + cow manure 50%> fresh olive solid waste treatment 100%> fresh olive solid waste treatment 75%+ cow manure 25%> cow

manure 100%> fresh olive solid waste treatment 50%+ cow manure 50%, compared with the control, where the amount of iron linked with organic matter was (37.90,34.80, 33.72, 31.68, 31.64, 30.20, 30.14 and 29.42) mg/kg in the same previous order. The increase in iron linked with organic matter is due to the increase in organic matter in fermented olive solid waste and organic compounds formation with iron. These results are consistent with (3) and (28) they mentioned that all the iron forms (except residual form) Decreases with increasing values of (pH, total carbonate, and active lime). Iron values linked with organic matter increase with the soil content of organic matter.

Iron linked with iron and manganese oxides

It was shows from Table 3that the amount of Iron linked with iron and manganese oxides ranged from the lowest value in the control to (260.5) mg/kg and the highest value of (289.1) mg/kg in the fermented olive solid waste treatment 100%. Iron linked with iron and manganese oxides had ranged from total iron between the control treatment (22.30) % in the fermented olive solid waste treatment 100%. The test of the least significant difference of LSD at the level of 5% in the soil content of iron which is linked with iron manganese oxides related to the existence of significant differences between the different treatment, which was arranged as the following: The fermented olive solid waste treatment 100%> the fermented olive solid waste treatment 75% + cow manure 25%> fresh olive solid waste treatment 100%> the fresh solid waste treatment 75% cow manure 25%> the fresh olive solid waste treatment 50% cow manure 50%> + Cow manure 100%> Compared to the control and mineral, the amount of iron linked with iron and manganese oxides was 289.1, 281.1, 278.9, 277.0, 275.7, 266.2, 264.0, 260.5 and 260.2 mg kg^{-1} respectively. The increase of the form of iron linked with iron and manganese oxides in the fermented olive solid waste treatment 100% increases the exchange capacity of the soil in this treatment compared to other treatments. These results are consistent with (3), (28). The high pH leads to a decrease in the soil content of the iron liked with iron and manganese oxides due to the high oxidation of binary iron compounds, which leads to sedimentation.

Residual Iron

It is clear from Table 3 that the high amounts of iron remained without extraction and the residual iron indicates the difference between the total form of iron and the total of the other forms. It ranged between the lowest value in the control (875.8) mg/kg and the highest value (958.75) mg/kg in the fermented olive solid waste treatment 100%, The percentage of residual iron of the total iron ranged from 74% in the control to 75% in the fermented olive solid waste treatment 100%. The test of the least significant difference of LSD at the level of 5% indicated that the content of the soil of iron residual to the existence of significant differences between the different treatments were arranged as the following: the fermented olive solid waste treatment 100%> the fermented olive solid waste 75% + cow manure 25%> the fermented olive solid waste treatment 50% + cow manure 50%> the fresh olive solid waste treatment 100%> cow manure 100%>%> the fresh olive solid waste treatment 75%+ cow manure 25%> the fresh olive solid waste treatment 50%+ cow manure 50%> mineral fertilization compared to the control, where the amount of iron reached (958.75, 956.4, 952.5, 947.2, 939.3, 936.5, 935.3, 901.2, 875.8) mg/kg respectively. This can be attributed to climatic and other factors. This amount of iron indicates its tendency to become unavailable in the soil because these parts require a longer time to become available to the plant. These results are consistent with (25) and (26).

Effect of fresh and fermented olive solid waste and cow manure in wheat productivity (grains ton/ hectare) for average of two seasons

Table 4 shows the productivity values in the different treatments. Significant differences were observed between the different treatments. The study showed that the fermentation olive solid waste 100% 5.980 t/h^{-1} was superiority and the lowest yield was 3.987 ton /hectare while the order of treatment was as The following: the fermented olive solid waste Treatment 100% > the fermented olive solid waste Treatment 75% + cow manure 25%> the fermented olive solid waste

treatment 50%+ cow manure 50%> cow manure treatment 100% > the fresh olive solid waste treatment 50%+ cow manure 50%> the fresh olive solid waste treatment 75%+ cow manure 25%> Fresh olive solid waste 100%> mineral fertilization treatment, compared to the control, where the productivity reached 5.980, 5.827, 5.760, 5.707, 4.917, 4.703, 4.607, 4.147, 3.987 t/h^{-1} in the same previous order. The superiority of the fermented olive solid waste treatment 100% on the fresh olive solid waste and control treatment, because of the increase in N, P and K content before the addition, as well as the fermentation and liberation of these elements, which contributed to increasing the soil content of them, thus reverse to increase of plant absorption and that led to increase in wheat productivity (Grains) compared to other treatments. This is consistent with (12) that the addition of olive solid waste improved the morphological and productive properties of the plant compared to the control

Table 4. Effect of fresh and fermented olive solid waste and cow manure in wheat productivity (grains t/h^{-1}) for average of two seasons

Production grain (t/h-1)	treatment
3.987 d	Control
4.147 cd	Mineral fertilizer NPK
4.607 bcd	Fresh olive solid waste 100%
4.703 bcd	Fresh Olive solid waste 75%+cow manure25%
4.917 bc	Fresh Olive solid waste 50%+cow manure50%
5.980 a	Fermented Olive solid waste 100%
5.827 a	Fermented Olive solid waste 75%+cow manure25%
5.760 a	Fermented Olive solid waste 50%+cow manure50%
5.707 a	Cow manure 100%
0.4108	$LSD_{\%5}$

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