Article

Impact of Fresh and Fermented Olive Solid Waste and Cow Manure in wheat content of fertility elements (nitrogen, phosphorus and potassium) and on its productivity

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Abstract: A field experiment was conducted on the farm of Abi Jarash in Agricultural Collage, different rates of olive solid waste and cow manure were used, as follows: (control, fresh olive solid waste 100%, fresh olive solid waste 75%+ cow manure 25%, fresh olive solid waste 50%+ cow manure 50%, fresh olive solid waste 25+ cow manure 75%, Fermented Olive Solid Waste 100%, Fermented olive solid waste 75%+ cow manure 25%, Fermented olive solid waste 50%+ cow manure 50%, Fermented olive solid waste 25+ cow manure 75%), wheat was seeded. The impact of fresh and fermented olive solid waste and cow manure on some chemical and fertility soil properties was studied. the olive solid waste treatment 100% which added had more effect on the organic matter, exchange capacity, nitrogen, phosphorus and potassium in soil, plant and productivity, after that the fermented olive solid waste 75% + cow manure, fresh olive solid waste 100% comparing with the control, the values of organic matter were (25% 2.73, 2.39) and the cation exchange capacity (21.76, 20.44, 19.38) and for phosphorus (303.3, 277.8, 171.8) mg / kg, while the values of potassium were (303.3, 277.8, 171.8) mg / kg. In terms of plant content, the plant content of nitrogen, phosphorus and potassium were the same as for grains (2.784, 2.606, 2.126), (0.4535, 0.4226, 0.2753), (1.876, 1.762, 1.234) respectively, (0.2875, 0.2016) respectively for the same previous treatments and elements. olive solid waste 100% was the highest productivity comparing with the other treatments, where the productivity of wheat was (9.513) ton. ha^{-1}.

Keywords: olive solid waste; cow manure; phosphorus; potassium; cation exchange capacity

1. Introduction

[10] (p. 11) showed that the direct effect of adding organic fertilizer is the release of nutrients such as nitrogen, phosphorous, potassium and some other nutrients in addition to nutrients and some inhibitory materials for pathogens, assuming that the municipal fertilizer contains (0.5%N, 0.3%P_2O_5, 0.5% K_2O) and the rate of utilization of nitrogen is estimated between 40-50%, 60% of phosphorous, and 75% of potassium. The distribution of microelements within the soil phases depends largely on the physical and chemical conditions of the soil (organic matter, soil texture, mineral nutrition, pH, $CaCO_3$, CE [19] (p. 11); [13] (p. 11); [25] (p.

11)indicated that adding olive solid waste at a rate of 30 tons/ha increased the germination rate of wheat seeds, while adding it in greater quantities than the previous rate led to a decrease in the germination rate of wheat seeds, while [2] that the rate of adding Suitable olive solid waste, which contributes to increasing wheat plant growth, ranges between 20-30 tons/ha. Olive solid waste constitutes an average of 40 to 45% of the quantity of olives squeezed [21] (p. 11). The importance of olive solid waste fertilizer lies in increasing the soil's organic matter content and raising its fertility. [25] showed in a study on the effect of olive pomace on the growth of Faba bean daughters by adding different rates (0, 10, 20, 30 and 40) tons.h^{-1}, and the best growth of bean plant was at the rate of adding 20 tons.h^{-1}. [8] explained the effect of adding olive juice residues to the soil as it led to a lowering of soil pH. [22] indicated that olive solid waste contains nutrients such as nitrogen, phosphorous, potassium and manganese. [2] showed 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 it can be added to the soil at rates ranging between 30-100 tons.h^{-1} annually as a fertilizer for crop production [25] indicated that adding olive solid waste at a rate of 30 tons.h^{-1} increased the germination rate of wheat seeds. There is nowadays wide knowledge that the distribution, kinetics and availability of microelements in the environment depends not only on their total concentrations, but also on their forms associated with the solid phase where the elements are linked to the different components of the soil, and this determines their mobility and availability to plants [28]; [23], [18] showed that the elements in the soil are soluble in water, exchanged, linked to organic or inorganic specific sites, or included in the composition of primary and secondary minerals. [16], [27] and [1], found that microelements bind to soil constituents in several ways, such as non-specific adsorption, bound with carbonates by precipitation, or adsorption on the surface of iron and manganese oxides, and they can be bound to silicates, or bound to clay minerals, or organic matter, or precipitated in the form of hydroxides. Dissolved and alternating forms of elements are available to the plant, while forms associated with the crystal lattice of clay minerals are ineffective. As for other forms such as precipitated as carbonates, or associated with oxides of iron, manganese and aluminum, or forming complexes with organic matter, their mobility and availability to plants change according to the physical and chemical properties of the [5]; [26]. [14] also indicated that adding olive solid waste improved the morphological characteristics of corn (length, number of leaves, dry weight, fresh weight, and stem thickness) compared to the control. [14] showed that there is a positive effect of adding olive solid waste on the aggregation of sandy and loam soil particles. [14] showed the use of olive solid waste significantly increased the organic carbon, total nitrogen, available phosphorous as well as potassium in the soil and thus it can be used as a source of organic matter. [25] pointed out that olive solid waste contains nutritious mineral elements such as nitrogen, phosphorous, potassium, manganese and zinc. The management of the composting process is also one of the most important factors in sustaining soil fertility

1.1 Research justification:

Olive solid waste and cow manure affect the improvement of some chemical properties of soil through what it contains of various chemical elements, whether they are major or minor elements and organic matter, and this is reflected on the soil properties and consequently in the productivity

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of wheat plants. The spread of the olive industry in Syria and the resulting organic waste resulting from squeezing its fruits and the difficulty of disposal methods, as well as the emergence of the problem of chemical fertilization on both soil and plants.

1.2. Objective of Research:

Effect of fresh and fermented olive solid waste and cow manure on the content of the fertile elements N, P and K of the wheat plant and its productivity.

2. Materials and Methods:

1-Study area: Abu Jerash farm, fields of the Faculty of Agriculture

2- Soil: The research was carried out in calcareous soil.

3-Organic waste: Fresh and fermented olive solid waste in addition to cow manure, added according to the proportions of N in it and the needs of the wheat crop. Tables (1) and (2) show the physical and chemical characteristics of the soil and the organic waste used.

4- Mineral fertilizer NPK

5-Cultivated plant: wheat.

(Sham 3) wheat seeds were planted on December 29, 2019. Soil samples were taken before planting and after harvesting. The harvest was on June 15, 2020, and samples were taken from plants for analysis. The amount of fertilizer added from the major elements was determined according to soil analysis in accordance with the fertilizer recommendation of the General Authority for Agricultural Research. Also, organic fertilizers were added after carrying out a pot experiment to determine the utilization factor of nitrogen from them.

6-Sample collection and processing

Samples of the added organic residues (fresh and fermented olive solid waste and cow manure) were prepared as well as soil samples were taken before planting and after harvesting

Table (1) some properties of soil studied

Soil	Mechanical Composition of Soil			Texture	pH unsettled (2.5 :1)	EC extract 5:1	Bulk destiny	Real density	Total propensity	Total carbonates	Organic matter	Total nitrogen	P_2O_5 Available Joret Hebert	K_2O available	Zn available
	sand	silt	clay			dS/m	g/cm3		g/gk-1				mg.kg		
Agriculture Farm soil (Abi Jarash)	29.80	30.95	39.25	Loam clay	8.10	0.45	1.10	2.61	57.85	50.00	2.21	0.14	170	250	0.5

It is clear from Table (1) that the soil has a loamy clay texture, has a low bulk density and good porosity. The soil is characterized by an alkaline pH of 8.10 and not saline, where the electrical conductivity of the salts is 50.4 dS/m. The soil is also characterized by its high content of total carbonates, reaching 50%. In addition, it is noted that the soil has a medium content of organic matter, reaching 2.80%, and this may be due to the annual additions of organic residues to the soil. As for the soil content of fertility elements, it was characterized by an average content of total nitrogen, which amounted to 0.14%, as well as an average content of useful phosphorous and potassium, whose value reached (170 and 250) mg.kg, respectively.

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

As it can be seen from Table (2) that the pH in both fresh and fermented olive solid waste was less than 7, while in cow manure it was 7.70, and the EC reached 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 high in fresh and then fermented olive solid waste and low in cow manure, and this may be due to the loss of part of the organic carbon in the fermented olive solid waste, which underwent biodegradation during the fermentation process, and it amounted to 41.52% in cow manure, as it is noticed from Table (2) that the cow manure contains high fertility elements such as nitrogen and phosphorous compared to olive solid waste whether it is fresh or fermented.

1-Soil physical analyzes:

Mechanical analysis by hydrometer method - bulk density by cylinder method - true density in pycnometers and porosity mathematically.

2- Chemical analyzes of soil and organic waste:

3-pH: a suspension of 2.5:1 for soil and 5:1 for organic residues and measured by pH scale, according to the method mentioned (Richards, 1954)

3- EC: 5:1 extract of soil and organic residues, measured by electrical conductivity device Ec. According to the method he explained according to the method of Richards, 1954).

4-Total carbonates: by calcimeter

5-Organic matter: for soil by oxidation with potassium dichromate, and for organic matter: by incineration.

6-Organic carbon: for soil and organic residues by oxidation with potassium dichromate. (Wackily and Black) described in Jackson, 1973).

7-Total nitrogen: Kieldahl method, then estimated according to the method of (Page et al., 1982)

8-Available phosphorous: by Joret-Hebert method.

9-Available potassium: by ammonium acetate method, then using a device (Flame photometer)

10-Total phosphorous and potassium: by incineration digestion and then measurement by colorimetric method for phosphorus and on the flamephotomatre

4.Treatments:

1-control

2-mineral fertilizer

3-fresh olive solid waste%100

4- Fresh olive solid waste 75% + cow manure 25%

5- Fresh olive solid waste 50% + cow manure 50%

6- Fresh olive solid waste 25% + cow manure 75%

7- fermented olive solid waste%100

8- Fermented olive solid waste 75% + cow manure 25%

9- Fermented olive solid waste 50% + cow manure 50%

10- Fermented olive solid waste 25% + cow manure 75%

11- cow manure%100

The plots were plotted, then the treatments were randomly distributed according to the randomized complete block design, with three replications for each treatment.

5. Results

5.1.Effect of fresh and fermented olive solid waste and cow manure on the soil content of nitrogen, phosphorous, potassium, organic matter and the exchange capacity of soil (average of the two seasons):

Table (3) shows the results of available mineral nitrogen, phosphorous and potassium, organic matter and soil exchange capacity for an average of two seasons. The statistical study that was conducted (LSD test) indicated the emergence of significant differences between the various treatments for mineral nitrogen, which ranged from the lowest value in the control (19.57) to the highest value was in the treatment of 100% fermented olive solid waste (32.11) with/kg, followed by the treatment of fermented olive solid waste 75% + cow manure 25% (28) with/kg, then the treatment of fresh olive solid waste 100% (27.40) with/kg, and finally the control. The superiority of the fermented olive solid waste treatment 100% is due to its dissolution and the liberation of mineral nitrogen, and these results agree with [6]; [11]. As for the available phosphorous, the results showed significant differences, the highest was in the treatment of fermented olive solid waste 100% < fermented olive solid waste 75% + cow manure 25% > and then the fresh olive solid waste 100%, while the control was in the last rank where the values were (303.3, 227.8, 227.8, 171.8) kg. Perhaps the high content of phosphorus in the 100% fermented olive solid waste treatment is due to the liberation of phosphorous from it as a result of the disintegration and decomposition processes that these residues have undergone. These results are in agreement with [6]; [11]. Regarding the available potassium, the results had significant differences, the highest was in the treatment of fermented olive solid waste 100%< fermented olive solid waste 75% + cow manure 25% > and then fermented olive solid waste 50% + cow manure 50% < fresh olive solid waste 25% + cow manure 75%, while the control was in the last rank where the values were (634.6, 352.2, 171.8, 362.9, 225.0) with/kg in the same order. This may be due to the concentration of potassium from the treatment of 100% fermented olive solid waste as a result of the decomposition and disintegration processes. These results agree with. While the percentage of the organic matter in the various treatments was between the lowest value in the control (2.39) to the highest value in the treatment of fermented olive solid waste 100% (3.13) and the order of the treatments was as follows: fermented olive solid waste treatment %100< fermented olive solid waste 75% + cow manure 25% < fermented olive solid waste 50% + cow manure 50% < fermented olive solid waste 25% + cow manure 75% < fresh olive solid waste 50% + cow manure 50 %< cow manure 100%< compared with the control, which amounted to (3.13,2.95, 2.88,2.74, 2.72, 57.4, 2.39) % in the same order. The high percentage of organic matter in the fermented olive solid waste is due to the original before it was added to the soil. These results are in agreement with (Slyke Van, 2001). As for the cation exchange capacity in the various treatments between the lowest value in the control (19.38) to the highest value in fermented olive solid waste 100% (21.76), the arrangement of the coefficients was as follows: fermented olive solid waste treatment %100< fermented olive solid waste 50% + cow manure 50% < fresh olive solid waste 75% + cow manure 25% < fermented olive solid waste 25% + cow manure 75% < fermented olive solid waste 75% + cow manure 25% < cow manure 100%> compared with the control, which amounted to (21.76, 20.64, 20.63, 20.55, 20.44, 19.38) in the same order. The increase in the exchange capacity of 100% fermented olive solid waste is due to the high percentage of soil organic matter. These results are in agreement with [20], [9].

Table (3) Soil content of Available mineral nitrogen, phosphorous and potassium, organic matter and exchange capacity in different treatments after harvest (two seasons).

 doi:10.20944/preprints202212.0100.v1

Treatments	mineral nitrogen ($NH4+NO_3$) Mg.kg	Available phosphorous (P_2O_5) (Joreh Hebert Method) Mg.kg	Available potassium (K_2O) Mg.kg	organic matter (OM) %	Exchange capacity (CEC) ml/100g soil
control	19.57 i	171.8 h	225.0 d	2.39	19.38 d
Mineral fertilizers	21.23 hi	207.5 fg	318.2 bc	2.38	19.51 cd
Mineral fertilizers+ foliar fertilizers	21.91 fghi	198.9 g	303.6 c	2.46	19.57 cd
Fresh olive solid waste100%	27.40 bc	227.8 e	308.9 c	2.53	20.28 bc
Fresh olive solid waste75%+cow manure 25%	24.53 def	224.8 ef	319.0 bc	2.56	20.63 b
Fresh olive solid waste50%+cow manure 50%	23.03 efgh	226.3 e	339.2 ab	2.72	20.12 bcd
Fresh olive solid waste25%+cow manure 75%	21.71 ghi	240.4 de	341.8 ab	2.95	20.20 bc
Fermented olive solid waste100%	32.11 a	303.3 a	364.6 a	3.13	21.76 a
Fermented olive solid waste75%+cow manure25%	28.10 b	277.8 b	352.2 a	2.95	20.44 b
Fermented olive solid waste50%+cow manure50%	27.25 bcd	270.4 bc	362.9 a	2.88	20.64 b
Fermented olive solid waste25%+cow manure75%	25.28 cde	262.2 bc	344.3 ab	2.74	20.55 b
cow manure100%	24.04 efg	255.0 cd	355.2 a	2.67	20.43 b
$LSD_{\%5}$	2.760	18.55	28.51	1.210	0.7780

The controversy shows the values of the exchange capacity of the studied transactions and it is noted that there are significant differences, the highest was in the treatment of 100% fermented olive solid waste, reaching 21.76 and the lowest in the control 19.38. This is due to the high organic matter in the treatment of fermented olive solid waste100%, and this is consistent with [3].

5.2.Effect of fresh and fermented olive solid waste and cow manure on the nitrogen, phosphorous and potassium content of straw and grain (average of the two seasons):

Table (4) indicates that the amount of total nitrogen in straw ranged between the lowest value in the control 0.2016% and the highest value of 0.4053% in fermented olive solid waste100%, and the test of the least significant difference LSD at the 5% level indicates that there are significant differences between the straw content from The nitrogen was arranged as follows: fermented olive solid waste treatment 100%< fresh olive solid waste 100%< mineral fertilization < fresh olive solid waste 50% + cow manure 50% < fresh olive solid waste 75% + cow manure 25% < mineral fertilization treatment + foliar < fresh olive solid waste 25% + cow manure 75% < fermented olive solid waste 75% treatment + cow manure 25% < fermented olive solid waste 25% + cow dung 75% < cow manure 100% < fermented olive solid waste 50% + cow manure < 50% compared to the control, Where the percentage of nitrogen in straw was (0.4053, 0.3867, 0.3573, 0.3295, 0.3291, 0.3180, 0.3164, 0.2875, 0.2740, 0.2529, 0.2336, 0.12016) % in the same order. As for the grains, the nitrogen content in the treatments was as follows: fermented olive solid waste treatment 100%< fresh olive solid waste 100% < mineral fertilization treatment > fermented olive solid waste 75% + cow manure 25% < mineral fertilization + foliar > mineral fertilization treatment < Fresh olive solid waste 75% + cow manure 25% < Fresh olive solid waste 50% + cow manure 50% < Fermented olive solid waste 50% + cow manure 50% < Fresh olive solid waste 25% + cow manure 75% < Fermented olive solid waste 25 % + cow manure 75% < cow manure 100% < compared with the control, where the percentage of nitrogen in cereals was (2.784, 2.658, 2.610, 2.606, 20,595, 2.548, 2.553, 2.503, 2.426, 2.406, 2.397, 2.126) % with the same arrangement. Regarding nitrogen, the high percentage of nitrogen in or grains for treating 100% fermented olive solid waste is due to the high content of these residues of nitrogen before adding them to the soil on the one hand, and to the mineralization of organic compounds, especially proteins and amino acids, as a result of their decomposition and disintegration on the other hand, as for the low content of the plant from The nitrogen in the fresh solid waste treatments is due to the lack of pre-fermentation and the lack of disintegration of the nitrogen-containing organic compounds, which delays the nitrogen in the soil and the plant's benefit from it at the beginning of growth. This may be due to the high nitrogen with the fermented olive solid waste treatment 100%compared to the control and the rest of the treatments that contained a lower amount . ،0.1452)0.1317 ،0.1195،0.1133 ،0.1110 ،0.1117 ،0.1114 ،0.0997 ،0.0963 ،0.0831 ،0.0797 ، 0.0753)%

While the percentage of phosphorous in straw was high in most of the treatments compared with the control, where it was arranged as follows: fermented olive solid waste treatment 100%< fermented olive solid waste 75% + cow manure 25% < fresh olive solid waste 100% < fresh solid waste 75% + cow manure 25% < fresh olive solid waste treatment 50% + cow manure 50% < fresh olive solid waste 25% + cow manure 75% < fermented olive solid waste 50% + cow manure 50% < fermented olive solid waste 25% + cow manure 75% < cow manure treatment 100%< mineral fertilization < mineral fertilization + foliar, compared with the control, where the percentage of phosphorous in straw was ,0.1452) 0.0753 ,0.0797 ,0.0831 ,0.0963 ,0.0997 ,0.1114 ,0.1117 ,0.1110 ,0.1133 ,0.1195 ,0.1317in the same order. While the treatments in grains were: fermented olive solid waste 100%< fresh olive solid waste 100%< fresh olive solid waste 75% + cow dung 25% < fermented solid waste 75% + cow manure 25% < fermented olive solid waste 50% + cow dung 50% < fermented olive solid waste 25% + cow manure 75% < fresh olive solid waste 50% + cow manure 50% < fresh olive solid waste 25% + cow manure 75% < cow manure 100% treatment < mineral + foliar fertilization < fertilization treatment Mineral <, compared with the control, where the percentage of phosphorous in straw was (0.4535, 0.4282, 0.4282, 0.4226, 0.4042, 0.4018, 0.3873, 0.3689, 0.3455, 0.3220, 0.3069, 0.2753) % in the same order. Perhaps the high phosphorous content of straw and grains in the treatment of fermented olive solid waste100% compared to other treatments and the control to the high content of these favors of phosphorous before adding them to the soil, which increased the soil content of phosphorus, which increased the plant's absorption of it and this was reflected in the increase in the content of straw and grains These findings are consistent with [24] and the percentage of potassium in straw was high in the treatment of fermented olive solid waste 100% (0.5409)% compared with the control (0.3890)%, where it was arranged as follows: fermented olive solid waste %100< fermented olive solid waste 75% + cow manure 25% < fermented olive solid waste 50% + cow dung 50% < fresh olive solid waste 100% < fermented olive solid waste 25% + cow manure 75% < fresh solid waste 75% + cow manure 25% < fresh olive solid waste 50% + cow manure 50% < 100% cow manure < fresh olive

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solid waste 25% + cow manure 75% < mineral fertilization + foliar treatment of mineral fertilization, compared with the control, The percentage of potassium in straw was (0.5409, 0.5223, 0.4991, 0.4729, 0.4726, 0.4543, 0.4375, 0.4336, 0.4190, 0.4187, 0.4039, 0.3890) % in the same order. While the treatments in cereals were: fermented olive solid waste 100% fermented olive solid waste 75%+ cow dung 25% < fermented olive solid waste 50% + cow manure 50% < fermented olive solid waste 25% + cow manure 75% < fresh olive solid waste 100 % < fresh olive solid waste 75% + cow manure 25% < cow manure 100% < fresh olive solid waste 50% + cow manure 50% < mineral + foliar fertilization < fresh olive solid waste 25% + cow manure 75% < mineral fertilization treatment , compared with the control, where the percentage of potassium in cereals (1.876, 1.762, 1.660, 1.580, 1.579, 1.579, 1.438, 1.400, 1.379, 1.377, 1.318, 1.234) % in the same order. The increase in potassium in the content of straw and grains in the fermented olive solid waste 100% is due to the high content of these residues of potassium before adding them to the soil, which was reflected in an increase in the soil content of potassium, and thus increased plant uptake of it, so the content of straw and grains of potassium increased. These results are consistent with [24].

Table (4) The nitrogen, phosphorous and potassium content of straw and grain in different treatments after harvest and for the (average of two seasons.%)

Treatments	Straw			Grains		
	N	P	K	N	P	K
		(%)			(%)	
Control	0.2016 f	0.0753 g	0.3890 h	2.126 d	0.2753 h	1.234 i
Mineral fertilizers	0.3573 abc	0.0831 fg	0.4039 gh	2.548 bc	0.3069 g	1.318 h
Mineral fertilizers+ foliar fertilizers	0.3180 bcd	0.0797 g	0.4187 fgh	2.595 abc	0.3220 g	1.379 g
Fresh olive solid waste100%	0.3867 ab	0.1195 bc	0.4729 cd	2.658 ab	0.4282 b	1.579 d
Fresh olive solid waste75%+cow manure 25%	0.3291 abcd	0.1133 cd	0.4543 de	2.553 bc	0.4282 b	1.579 d
Fresh olive solid waste50%+cow manure 50%	0.3295 abcd	0.1110 cde	0.4375 ef	2.503 bc	0.3873 de	1.400 fg
Fresh olive solid waste25%+cow manure 75%	0.3164 bcde	0.1117 cd	0.4190 fgh	2.610 abc	0.3689 e	1.377 g
Fermented olive solid waste100%	0.4053 a	0.1452 a	0.5409 a	2.784 a	0.4535 a	1.876 a
Fermented olive solid waste75%+cow manure25%	0.2875 cde	0.1317 ab	0.5223 ab	2.606 abc	0.4226 bc	1.762 b
Fermented olive solid waste50%+cow manure50%	0.2336 ef	0.1114 cde	0.4991 bc	2.426 c	0.4042 cd	1.660 c
Fermented olive solid waste25%+cow manure75%	0.2740 cdef	0.0997 de	0.4726 cd	2.406 c	0.4018 cd	1.580 d
cow manure100%	0.2529 def	0.0963 ef	0.4336 efg	2.397 c	0.3455 f	1.438 ef
LSD%5	0.08375	0.01531	0.03241	0.2158	0.02255	0.05251

5.3.The effect of fresh and fermented olive solid waste and cow manure on wheat productivity (grain tons. ha) for the average of (two seasons).

Table (5) shows the productivity values in the different treatments. It was noted that there were significant differences between the different treatments. The study showed that the fermented olive solid waste treatment 100% was superior to (5.980) tons/ha and the productivity was lower in the control treatment (5.980) tons/ha, while the order of the treatments was on The following figure: fermented olive solid waste 100% < fermented olive solid waste 75% + cow manure 25% < fermented olive solid waste 50% + cow manure 50% < fermented olive solid waste 25% + cow manure 75% fresh olive solid waste 25% + cow manure 75% <cow manure 100% < fresh olive solid waste 50% + cow manure 50% < fresh olive solid waste 75% + cow manure 25% < fresh olive pomace 100% < mineral fertilization + foliar treatment < mineral fertilization, comparison with the control, The productivity reached ton/ha (5.980, 5.827, 5.760, 5.733, 5.707, 5.347, 4.917, 4.703, 4.607, 4.317, 4.147, 3.987) % in the same order. This may be due to the high nitrogen with the treatment of fermented olive solid waste 100% compared to the control and the rest of the treatments that contained a lower amount. fresh, stem thickness) compared to the control [24]; [7].

Table (5) Effect of fresh and fermented olive solid waste and cow manure on wheat productivity (grain tons. ha^{-1}) for the average of (two seasons).

Treatments	Productivity tons.h^{-1} (grains)
control	3.987 d
Mineral fertilizers	4.147 cd
Mineral fertilizers+ foliar fertilizers	4.317 cd
Fresh olive solid waste100%	4.607 bcd
Fresh olive solid waste75%+cow manure 25%	4.703 bcd
Fresh olive solid waste50%+cow manure 50%	4.917 bc
Fresh olive solid waste25%+cow manure 75%	5.347 ab
Fermented olive solid waste100%	5.980 a
Fermented olive solid waste75%+cow manure25%	5.827 a
Fermented olive solid waste50%+cow manure50%	5.760 a
Fermented olive solid waste25%+cow manure75%	5.733 a
cow manure100%	5.707 a
LSD$_{\%5}$	0.4108

Funding: "This research received no external funding"

Data Availability Statement: Data will be available under the request of the corresponding author

Conflicts of Interest: The authors declare no conflict of interest

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