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Effect of Ganoderma Mushroom on Increasing Soil Fertility Using Palm Residues and Increasing Broccoli Production

Efecto de la seta de Ganoderma en el aumento de la fertilidad del suelo utilizando residuos de plama y el aumento de la producción de brócoli

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ABSTRACT/ The aim of the study is to check the use efficient of fungus Ganoderma remnants of organic manure compared with organic manure resulting from the fermentation process (Composting). The efficiency of fertilizer use biotechnology from isolates Azotobacter bacteria chroococcum and Azospirillum brasilense with organic manure and organic waste used bacterial and isolates and its complications in growth of Aicpa broccoli plant. Designed for this purpose briman random sectors Experiment Design full RCBD three repetitions and included two major factors: first, the membership remnants of the decomposed add half of fertilizer recommendation of broccoli, six transactions. The results of the experiment were: add organic waste with half the private palm trunk residues fertilizer formulations recommendation bony mediated (G.I), (M1) to moral superiority in all qualities of the total quantity and winning recipes vegetative, were led to an increase in plant height and dry weight of the total sum, vegetative highest values, 56.16 185.4 cm GM plant-1, 577.4 GM. Also gave the same treatment to higher values in the proportions of the major components in the leaves: the proportion of N, P and K, respectively. This study showed that addition decaying organic wastes either by Ganoderma lucidum or mushroom fermentation and added her half recommendation fertilizer formulations as well as vital fertilization by adding bacterial vaccine of bacteria Azotobacter chroococcum and bacteria Azospirillum brasilense effect great moral qualities of vegetative growth and increased product of broccoli. This study was to exploit the use of palm trunks that have spread dramatically because of recent wars Iraq and the loss of huge numbers of palm trees and that has to be exploited and converted to compost, helpful efficient and high productivity of the plant. Keywords: Ganoderma lucidum (Gan), Fermentation, Azotobacter, Azospirillum, Artificial, Broccoli RESUMEN/ El objetivo del estudio es verificar el uso eficiente de hongos remanentes de estiércol orgánico de Ganoderma en comparación con el estiércol orgánico resultante del proceso de fermentación (compostaje). La eficiencia del uso de fertilizantes biotecnológicos a partir de aislamientos de bacterias Azotobacter chroococcum y Azospirillum brasilense con estiércol orgánico y desechos orgánicos utilizados bacterias y aislamientos y sus complicaciones en el crecimiento de la planta de brócoli Aicpa. Diseñado para este propósito sectores aleatorios briman Experimento Diseño completo RCBD tres repeticiones e incluyó dos factores principales: primero, los restos de membresía del descompuesto agregan la mitad de la recomendación de fertilizante de brócoli, seis transacciones. Los resultados del experimento fueron: agregar residuos orgánicos con la mitad de los residuos privados del tronco de palma recomendaciones de formulaciones de fertilizantes mediadas por hueso (GI), (M1) a la superioridad moral en todas las cualidades de la cantidad total y las recetas ganadoras vegetativas, se llevaron a un aumento en altura de la planta y peso seco de la suma total, valores vegetativos más altos, 56.16 185.4 cm GM planta-1, 577.4 GM. También se dio el mismo tratamiento a valores más altos en las proporciones de los componentes principales en las hojas: la proporción de N, P y K, respectivamente. Este estudio mostró que los desechos orgánicos en descomposición, ya sea por Ganoderma lucidum o la fermentación de hongos, y agregó sus formulaciones de fertilizantes de recomendación media, así como la fertilización vital al agregar la vacuna bacteriana de bacterias Azotobacter chroococcum y bacterias Azospirillum brasilense efecto grandes cualidades morales del crecimiento vegetativo y un mayor producto de brócoli. Este estudio fue para explotar el uso de troncos de palmeras que se han extendido dramáticamente debido a las guerras recientes en Iraq y la pérdida de grandes cantidades de palmeras y que tienen que ser explotadas y convertidas

en compost, útiles, eficientes y de alta productividad de la planta. Palabras clave: Ganoderma Iucidum (Gan), Fermentación, Azotobacter, Azospirillum, Artificial, Brócoli.

INTRODUCTION

The idea of waste recycling and agricultural residues, especially, after the tremendous expansion in agriculture on the global level resulted of population explosion which led to production of very large amounts of such waste (Landschoot and McNitt, 2013). Features such waste higher content of organic chemical and physical specifications, and vitality that enhance their ability to use in the improvement of the soil physical and chemical properties. One of fecundity vital treatment, is the Fungus *Ganoderma lucidum* of fungi *Bazideh* cellulose analyst, timber, different types of sawdust wood, growing wheat and rice hay straw, sugar cane, coconut fibers, banana papers, and many of the remains crops, which are available in large quantities after the crop end, as well as the grass straw. Many studies have tended toward the use of such waste to take advantage as a media to cultivate fungi food and medical supplies for high-protein food that is rich in minerals and other components, or as a sources of medicines and pharmaceutical products, or the disposal of such waste and make it useful (Jun-Wei, *et al.*, 2010, Beyer, 2015).

Considered vital fertilizers and natural materials have a consistent set of beneficial micro-organisms that working to improve and increase the fertility of soil properties; including converting the elements from unready forms to ready-made forms to absorb the air nitrogen fixation and enhance its ability to dissolve phosphate compounds. Also through the enzymes organic acids secretion, some claw materials, plant growth, and antibiotics inhibit the growth of some microbiology of sick leave, which contributes to reducing the use of chemical fertilizers by (25 – 50) %, resulting in reducing the agricultural process costs (Mourning, 2003 Bedouin society, 2008 and Javid, 2010). Leaf Broccoli is one of crusader family crops and vegetable crops with high nutritional values with many of essential vitamins: Niacine, C, A, Carotenoids and riboflavin, in addition to some of nutrients like calcium, iron, sodium, potassium, and phosphorus. It was noted that when it taken regularly during a week, it reduces the risk of cancer by 45% (Yoldas *et al*., 2008 and Rungapamestryan *et al*., 2007). The significance and impact of study is to exploit the use of palm trunks that have spread dramatically because of recent wars Iraq and the loss of huge numbers of palm trees and that has to be exploited and converted to compost, helpful efficient and high productivity of the plant.

MATERIAL AND METHODS

This study was carried out in Autumn season on October 7th, 2018 in Faculty of Agriculture-Anbar University fields to compare the influence of mushroom *Ganoderma iucidum* legacies developing among the local membership of fermentation process (Gan) for the same quarters as well as inoculation with *Azospirillum* sp. and *Azotobacter* sp and its impact on Aicpa Broccoli var Italica plant growth, used in combination with alluvial soils taken from the surface layer depth of 0- 30 cm in the area of Albu-Farraj at Faculty of Agriculture-Anbar University.

Table 1: Some chemical and physical qualities of soil before planting

No	Adjective	Value	Measurement	Adjective	Value	Measurement
PH Soil 8.0			Dissolved ions			
	Finished water	**25.3**	-	**Virtual cup**	**1.32**	$Mgkg^{-1}$
	E.C	**3.0**	DSm^{-1}	**Cu**	**16.5**	$Ml\ L^{-1}$
	O.M	**8.6**	$g\text{-}kg^{-1}$	**Mn**	**7.61**	$Ml\ L^{-1}$
	Gypsum	**3.5**	$g\text{-}kg^{-1}$	**Sodium**	**0.98**	$Ml\ L^{-1}$
	Carbonate minerals	**165**	$g\text{-}kg^{-1}$	**P**	**5.70**	$Ml\ L^{-1}$
Dismissed during soil				S	9.45	$Ml\ L^{-1}$
	Sand	**302**	$g\text{-}kg^{-1}$	**Chloride**	**9.44**	$Ml\ L^{-1}$
	Silt	**555**	$g\text{-}kg^{-1}$	**Bikarbonat**	**4.54**	$Ml\ L^{-1}$
	Clay	**143**	$g\text{-}kg^{-1}$			

	CEC	80.25	Cs-kg^{-1}	**C:N**		Ml L^{-1}
Mixes Alluvial soils				Instant nitrogen	**42**	Ml Kg^{-1}
				Instant phosphorus	**37.3**	Ml Kg^{-1}
				Instant Potassium	**153**	Ml Kg^{-1}

The collected soil was dried up and air-conditioning, then it sifted crunched using sieve qatar floor openings 4mm. The chemical and physical characteristics were examined. Table 1 illustrates these the physical and chemical characteristics of the soil before planting. Organic residues attended to decomposed plant remnants fully decadent (remnants of sugar cane and Palm stump residues) as a result of two separate; one first was the result of decomposition after growth of mushroom *Ganoderma,* and second was fermentation process (composting). The meaning M1 representing the remnants of Palm trunk bony mediated mushroom *Ganoderma,* and M2 represents the decaying remnants of Palm trunk , M3 represents the fermentation process of the sugar cane residues, M4 represents the bony *Ganoderma* brokered as dissolved sugar cane residues, M5 represents the fermentation process. Used this decaying circle after cutting well the 6 ton acres^{-1} (dunam) based on soil weight of each pot. The chemical and physical properties of this task are scheduled in Table (2), which illustrates these characteristics of decaying organic waste. Designed for this purpose to this experience were designed by full three RCBD random sectors included two main factors.

First decomposing organic waste, half of broccoli plant fertilizer formulations recommendation in six transactions characterized were : 1). The Palm trunk residues bony mediated mushroom *Ganoderma iucidum* (M1); 2). Remnants of Palm trunk bony composting (M2); 3). Dissolved sugar cane residues, mediated by *Ganoderma iucidum* (M3); 4). Dissolved sugar cane residues by composting (M4); 5) Complete fertilizer recommendation 100% without adding organic residues (M5); 6). Control treatment, only soil without any additives M0, as shown in table 2 .

Table 2: Chemical and physical characteristics of organic waste in the experiment

pH	Ec DSm^{-1}	C	%			: :	Mgkg^{-1}				Mgm^3	Organic Community
			N	P	K	C:N	Cu	Zn	Fe	Mn	Bulk density	
6.48	3.24	47.21	1.19	0.8	0.71	01:39.7	33. M1	78.9	450.3	95.6	1.16	M1
6.4	3.83	44	1.73	1.2	0.75	01:25.4	31.6	75.2	434.5	90.4	1.2	M2
6.55	3.5	48.71	1.03	0.7	0.61	01:47.3	29.5 M3	72.3	420-8	88.3	1.13	M3
6.62	4.1	38.66	1.55	1.1	0.65	01:24.9	30.1 M4	70-6	440.6	85.7	1.18	M4

Second: Used their retirements with soil after adding the first working quarters as follows: 1). Soil bacteria inoculated individually *Azotobacter* chroococcum (A1), 2). Soil bacteria inoculated individually *Azospirillum* brasilense (A2), 3). Soil inoculated with a mixture the solitudes together (A3); 4). Vaccination (A0). Thus, was formed we have 24 and three replicates treatment was experimental pilot unit 72 units distributed randomly within each transaction bis (sector), as shown in the table 2. On January 15th, 2019 the experiment was ended after complete disk growth vase and make progress and performed measurements and analyses for plant and soil.

RESULTS and DISCUSSION

Plant height growth 1-

Figure 1 shows organic waste and isolates bacterial impact of their interventions up onto the broccoli plant. It is clear that there are significant differences on plant status itself which is not encouraging rise between the bacterial gave a mixture itself is not encouraging A3 highest rate high plants reached 47.88 cm, followed by *Azotobacter* chroococcum isolation singly A1, and then the isolation of inoculated *Azospirillum* brasilense singly A2. Finally, came the treatment didn't

add her bacterial isolates A0 with value of (43.52, 41.86, and 35.06) cm, respectively. As for organic waste factor plus half recommendation fertilizer formulations M1 gave rise to higher plant reached 47.13 cm in non-moral difference with subsequent transactions are M3 and M2, which have given rise to the plant reached (46.71, and 46.20) cm, while the moral difference compared to M4 and M5 where both (44.1 5, and 36.79) cm. Regarding to organic waste bacterial isolates overlap between excelled treatments.

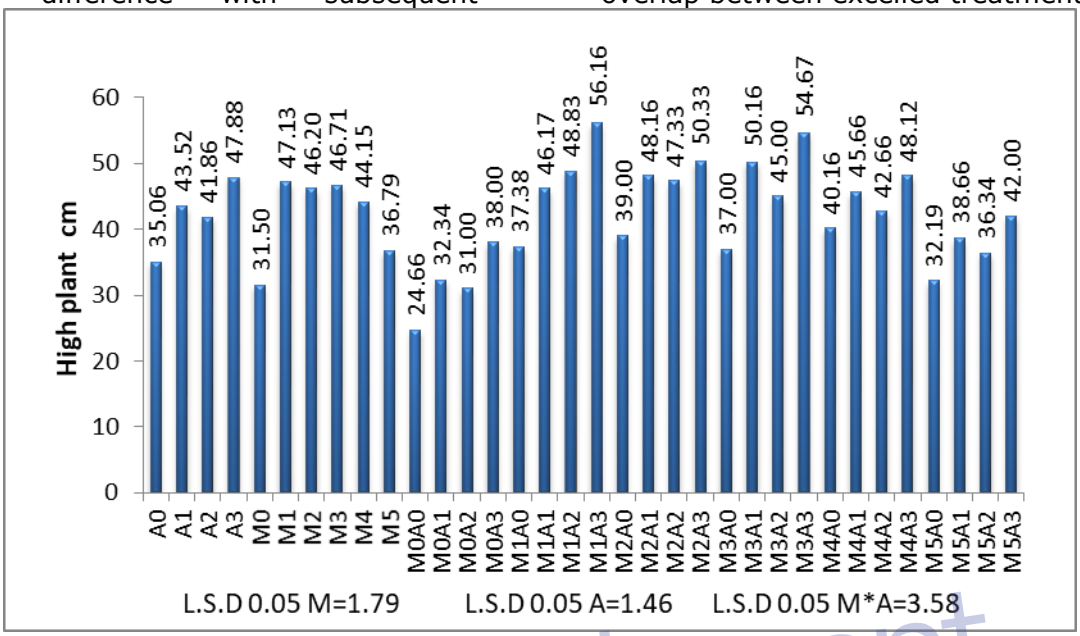

Figure 1: Impact of organic waste and isolates of bacteria in plant height (cm).

M1A3 and M3A3 and which have given rise to plant (56.16 and 54.67) cm moral superiority compared to all other overlapping transactions, while the gave treatment control M0A0 which did not add to Extras, bacterial or Chemical fertilizer plant and, where the lower was 24.66 cm. The increase percentage rate of plant height at M1A3 treatment compared to control M0A0 was 127.7%. Study by Jonathan, et al study (2012) that use the mushroom residue level 30% of the weight of the soil for pumpkins has increased both the number of leaves, plant height and size paper with consecutively 41 plant leaves^{-1},160.5 cm, and 197.6 cm ^{2} compared to treatment comparison, which recorded 24 plant leaves^{-1} , and 120.8 cm , and 128.7 cm^{2}. Alasavi (2006) said the use of composting inoculated mushroom farm residues with Azotobacter bacteria and the level of 2200 kg/ha increased the percentage of germination paper space in garlic plant reached 96.8% and 510.5 cm^{2} in sequence.

2- The impact of organic waste and isolates in the dry weight of the total vegetation (g plant^{-1})

Results presented in Figure 2 shows that there are significant differences among total vegetation dry weight status. For bacterial factor of isolates note moral superiority the treatment itself is not encouraging, mix A3 which gave the highest rate of dry weight of 186.7 grams plant^{-1}, followed by isolation of *Azotobacter chroococcum* singly A1 dry weight was less than total vegetation at treatment A0 by136.1 g plant^{-1}. Factor organic waste M1 gave the highest dry weight vegetative total reached 185.4 grams plant^{-1}, moral difference compared with other debris followed by the M3 and M2, which prosecutorial (166.3, and 178.6) g plant^{-1}, while transaction M0 without addition of remnants that gave 128.0 g plant^{-1} is at least. For the overlapping transactions gave the M1A3 treatment and M3A3, which were not the difference between morally the highest total weight of dry vegetation and 205.3 reached 210.4 grams plant^{-1} (not clear ,,rewrite it) Moral difference compared to all other transactions overlap while dry weight was less than total vegetation when comparative treatment of M0A0, which gave 105.8g plant^{-1}, the increase rate of M1A3 treatment compared to control is 98.9% .

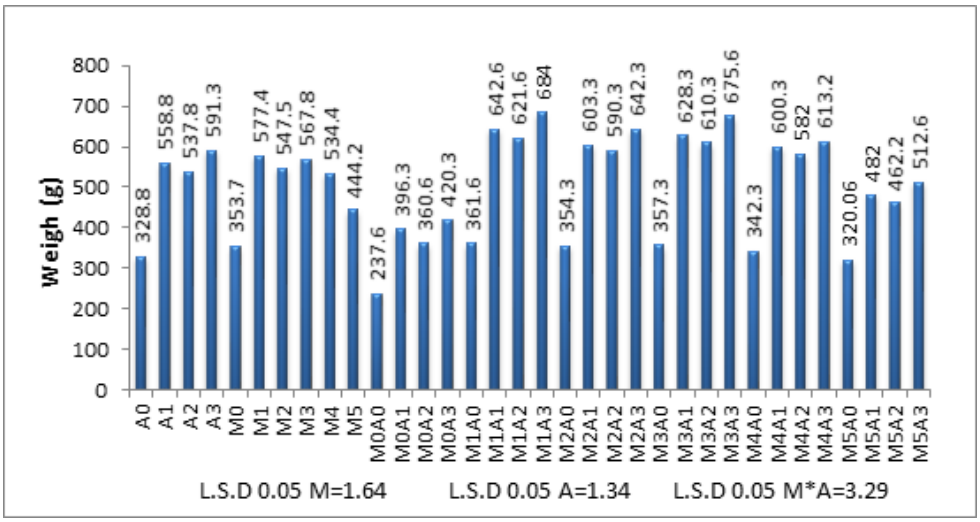

Figure 2: Impact of organic waste and isolates of bacteria in the weight of the disk syphilis (g)

3- The sum of plant (plant g -[1])

Figure 3 shows the moral differences in status of hard disk for weight factor syphilis isolates the mixture itself is not encouraging A3 moral superiority compared to this work isolates *Azotobacter* and *Azospirillum* A1 and A2 and not Addendum A0 values were 591.3, 558.8, and 328.8g respectively. Sequentially, as the organic waste transactions M1 gave the highest moral value in weight disc of syphilis, which reached 577.4 GM M3 treatment followed by 567.8 GM and moral difference with other transaction while transaction gave M0. Less value to weight disk for syphilis reached 353.7 g. The Figure 3 also shows the values of overlap between organic and bacterial isolates waste transactions and transaction gave M1A3 top weight total syphilis disk 684.0 GM and moral differences with the rest of transactions and was less weight when treatment comparison M0A0 with 237.6 disk weight GM and an increase of 187.87%. Marques et al (2014) found that lettuce seedlings treatment fungus fertilizer insignificantly influenced the number of leaves, and mild weight, and dry weight, the qatar leg height of seedlings, and holds the quality heads suitable for marketing. With a study conducted by the Taha (2018) recorded that legacy amid growing mushrooms (compost). The results showed than watercress plant treatment add amid growing mushrooms in quantity and total sum compared with the treatment. Shorna et al (2012) in a study on the treatment of broccoli crop fertilized with manure resulting from composting plant residues and cattle residues 5 ton ha^{-1} with mineral fertilizers has given qualities of good quality and holds rate reached 22.12 ton ha^{-1}, an increase of 94.98% compared to treatment, the comparison which gave holds 11.35 ton ha^{-1}.

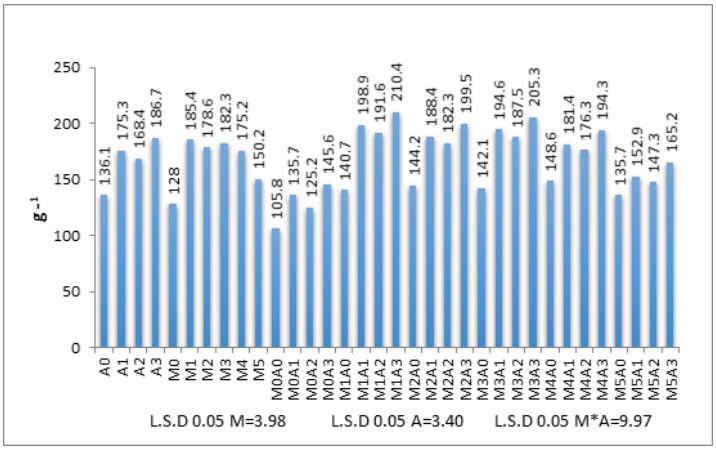

Figure 3: The Agenda 5impact of organic waste and isolates of bacteria in weight of the total vegetation (Plant gr^{-1}).

4- The impact of organic waste and isolates of bacteria in the percentage of nitrogen in the plant leaves broccoli (%).

Figure 4 shows the effect of organic waste and isolates of bacteria in percentage of nitrogen in plant leaves, broccoli, and makes clear for treatment with Bacterial isolates factor mixture of the retirements A3 which gave the nitrogen proportion reached 2.64% excelled morally compared to *Azotobacter* chroococcum isolation singly A1 A2 *Azospirillum* brasilense singly isolation and treatment of non-addition A0 which gave birth (2.20, 1.94, and 1.81)% ,sequentially. As for the transactions of the organic waste treatment excelled M1 which gave 2.78% non-moral superiority compared with M3 and M2, which prosecutorial (2.57 and 2.45) % ,while the moral increase compared with transactions M4, M5, and M0, which gave the addition of (1.40, and 1.20) % of nitrogen. In the overlap case, between organic waste and isolates bacterial treatment excelled M1A3, which gave 3.28% non-moral superiority compared to all transactions overlap except treated M5 and increase the moral and M0A0 control that provides less nitrogen ratio values in leaves about (1.86, and 1.03)% of nitrogen.

The effect of bacterial isolates agreed with what found by Narula (2000). It was found that to add bacteria *Azotobacter* on several crops has led to an increase in productivity by 25% over the treatment of measurement. *Azotobacter* bacteria are bacteria that encourage plant growth while proving an atmospheric nitrogen Free called ammonium ion with formula NH4 in the soil, as well as molten for phosphates, and produced various growth regulators including special Auxins, in dole acetic acid IAA, as well as Gibberlins. In addition to produce a range of vitamins including; B12, B4, B2, Folic acid, Thiamin pantothenic acid, and Biotin cheerleader. The growth of roots and root hairs formation. The use of *Azotobacter* bacteria as biological fertilizer has led to an increase in wheat production by 15% (compared to comparable treatment without the presence of other extras), and within (8-15)% when adding mineral fertilizers or organic substances (Narlula, 2000).

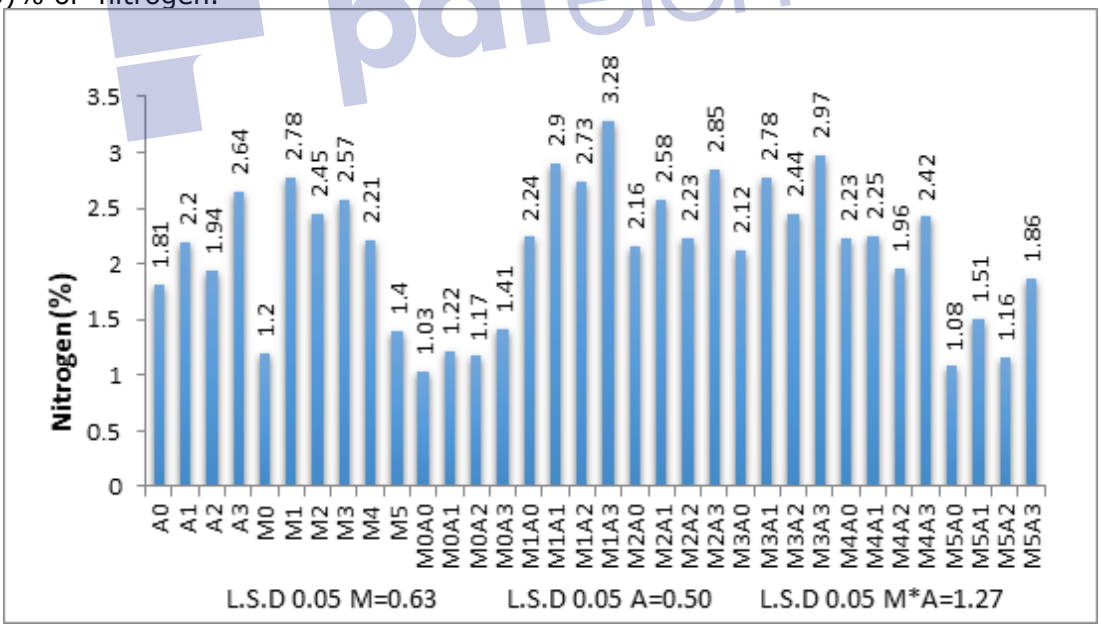

Figure 4: Impact of organic waste and isolates of bacteria in the proportion of Nitrogen (%) in leaves.

5- The impact of organic waste and isolates of bacteria in the percentage of phosphorus in plant leaves broccoli (%).

Figure 5 shows the organic effect of waste and isolates bacterial concentration of phosphorus in leaves (%). Note that the existence of moral difference in phosphorus concentration in securities transactions isolates were the highest value of 0.67% phosphorus. when treatment itself is not encouraging A3-blended excelled morally compared to treatment followed by *Azotobacter chroococcum* singly A1 which gave 0.58%, and then *Azospirillum brasilense* singly treatment A2, in which the

rate of 0.52% phosphorus, while finally came comparative treatment A0 rate by 0.45%. As for organic waste impact, no transactions are recorded M1, M2, M3, which gave the highest values of (0.75, 0.62 and 0.64) %, sequentially. Moral differences between them. but it excelled morally on transactions M4, M5 and M0, which recorded (0.53, 0.42, and 0.38)% percent, respectively.

In addition, the Figure 5 shows the overlapping between organic waste and isolates bacterial moral differences found between the interference was highest concentration of 0.87% phosphorus in M1A3 treatment, which excelled all morally overlap with other transactions was less than 0.30% phosphorus concentration is the control M0A0 treatment, an increase of 190%. The search results agreed with the study by Myriam et al (2011) that said the dynamic enriched of *Azotobacter* and *Azospirillum* added to tomato seed dry weight give moral boost, plant height, and leaf protein content in proportions (10, 21 and 38.2) % in succession. The search results agreed with study Al-Gurtani et al (2013) about plant cloves using *Azospirillum* bacteria and manure by 6% of the weight of the soil had given treatment overlap of bacteria with higher moral values of organic fertilizer for vegetative growth traits and syphilis and radical plant height and the diameter of the flower.

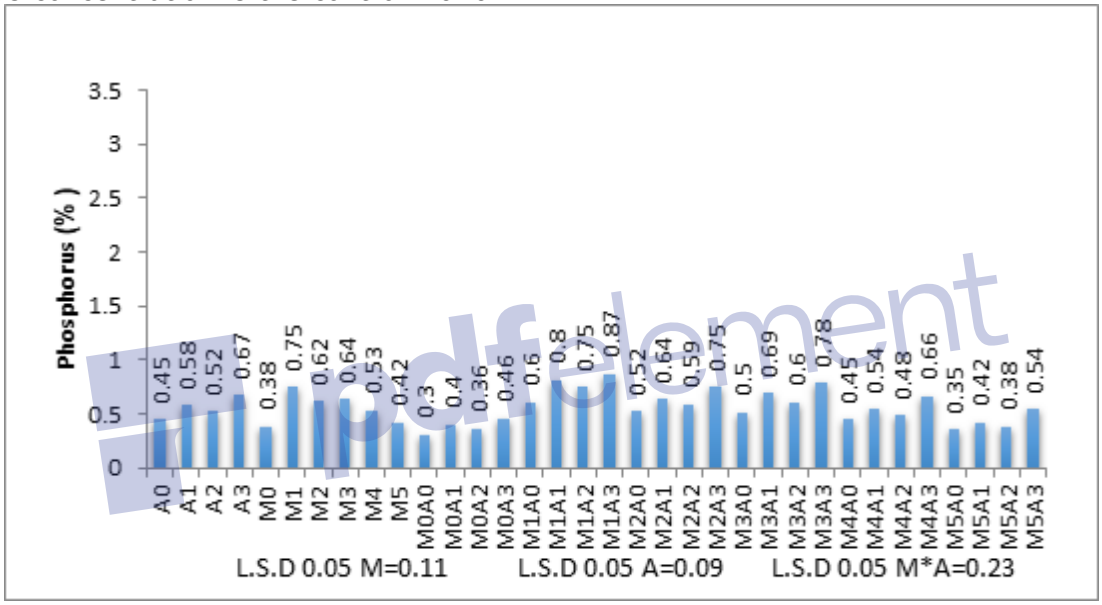

Figure 5: Impact of organic waste and isolates of bacteria in the proportion of the Phosphorus (%) in leaves.

6- The impact of organic waste and isolates of bacteria in the percentage of potassium in the plant leaves broccoli (%).

Figure 6 shows the organic waste influence and bacterial isolates in potassium concentration in broccoli leaves. For coefficients isolates, the highest proportion of potassium in solitudes of 2.06% mixture, followed by treating to *Azotobacter,* then *Azospirillum* but without the moral differences between them. While less proportion of potassium when treatment is weak (1.55%) and moral difference for freezing the mixture with *Azotobacter*.

As evidenced by an increase in moral results average ratio of potassium in leaves as a result of organic waste influence to M1, M2 and M3 transactions, M4, among which were its potassium 2.16, 2.03, 2.10 and 1.91% sequentially but were moral compared with M5 transactions and fertilized by M0 which is only and not organic and chemical additives are added which both potassium ratio 1.41 and 1.31%, sequentially. Figure 6 shows some moral differences transactions overlap between organic waste bacterial isolates with highest potassium concentration 2.45% when M1A3 treatment while the lowest recorded for potassium 1.06 when not treated as well as M0A0 and increase of 131.13%.

Dietary fungi from (Heterotrophic organisms) such as the rest of the aluminous fungi whose food depends on carbines (Kharkwal and Varma, 2009), have a high nutritional value because they contain a high protein ratio (Chang et al., 2004). Mushroom residue higher content feature of organic matter, chemical and physical characteristics and vitality that

enhance their ability to use in improving soil properties and bioremediation, adding bacterial isolates generally has led to an increase in total moral addition of vegetative bacteria Azotobacter and Azospirillum mixed improves the growth of large number of crops by improving the nutritional nitrogen status in plants as biological nitrogen fixation result, as well as importance of two bacteria types to improve plant growth through secretion of growth regulators because both sexes are secretion special an Auxins, Gibberlins and Cytokinine (Al-Gurtani et al, 2013).

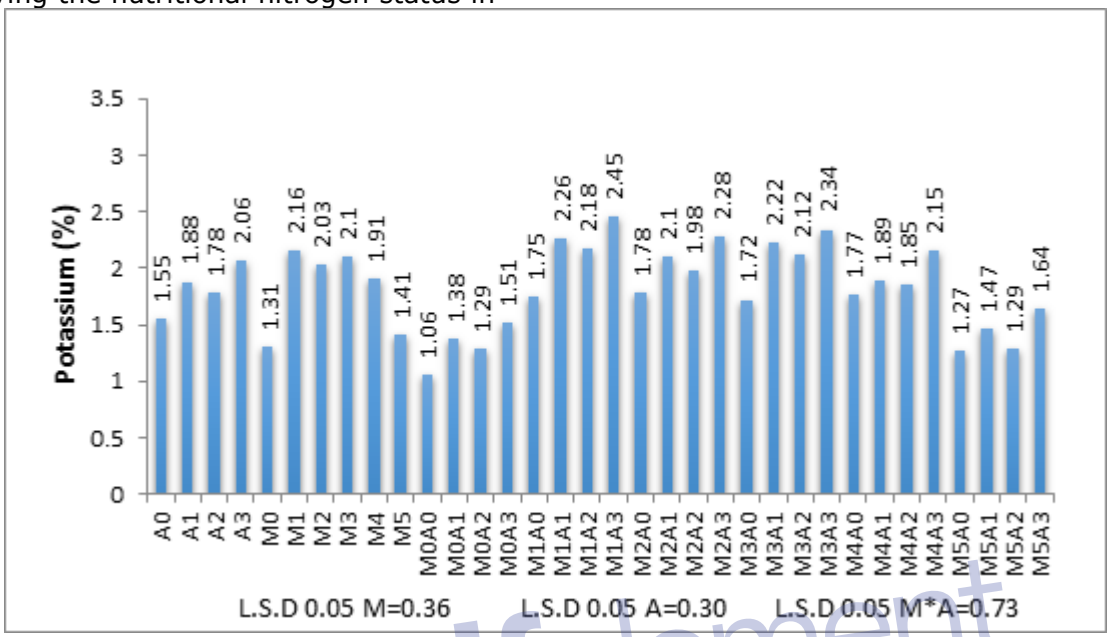

Figure 6: Impact of organic waste and isolates bacterial in potassium ratio (%) in leaves

That mixed vaccination of bacteria *Azotobacter* and *Azospirillum* improves plant growth and increased product due to mixed vaccination leads to root improved growth, an increase in water absorption rate by roots, the effect on plant pathogenic fungi and bacteria, as well as installed of nitrogen atmospheric (Samurai and Altmimi, 2018). A study by Shorna, et al. (2012), showed that broccoli crop fertilized treatment with manure resulting from composting plant residues and cattle residues 5 ton ha^{-1} with mineral fertilizers has given good quality and holds CLE reached 22.12 ton ha^{-1}, an increasing of 94.98%, compared to treatment. The comparison which gave holds 11.35 ton ha^{-1}. *Azospirillum*, inoculation with bacteria count in plant nitrogen nutrition through two mechanisms have atmospheric nitrogen and increase nitrogen uptake by plants and convert atmospheric nitrogen into ammonium nitrate ion secretion result Nitrogenize enzyme which helps in biotic interactions to complete the installation (Vessey, 2003). In the study of Suhail and Karim (2017) which stated that adding bacterial vaccine has led to an increase in wheat plant height reached moral 40.18 cm, vegetative dry weight reached 2.85 g pot^{-1}, and total root 0.54 g pot^{-1} , and holds the plant 2101.5 kg ha^{-1} . Compared with the treatment non-bacterial vaccine added that record less values for indicators of growth and progress of plant height cm vegetative dry weight g pot^{-1} root and gr plant pots and getter^{-1} kg ha^{-1} (32.75, 2.2, 0.38 , 1561.5) sequentially.

Nature's fungus grows on a wide range of wood environments such as; decaying stems and tree stumps such as oak, walnut, cherry in dense forest, high humidity, low-light temperate and tropical areas, a well-known medical fungus in the Far East for more than 2000 years characterized by various therapeutic qualities that have made it the most medically important among 270 known medical fungus, although it is a form of popular medicine in Asia except that it is increasingly used throughout the world (2013). Therefore, that very expensive chemical fertilizer, added that the Iraq situation in recent years has lots of Palm Setup, must utilize this plant waste and make it useful for the environment as well as raise productivity and lower cost.

Additionally, add half the decaying organic waste with fertilizer formulations recommendation in both (the decaying waste mediated mushroom *Ganoderma Iucidum*, or

decaying by fermentation, or with bacterial isolates, or with both gave positive moral. Results compared to add recommendation only complete fertilizer formulations, thus cutting out 50% of the recommendation and produced better quantity and fertilizer formulations, and minimize food contamination, as well as minimize damage to the environment and human health. Blaise et al. (2006) showed that to compost, decaying added to soil is a good source of potassium and soil potassium phosphorus content increased ICH transactions added to her that fertilizer analogy not addition (not clear, rewrite). A study by Biari et al. (2008) when inoculated seeds of maize yellow *Azotobacter bacterium* and *Azospirillum* led to an increase in plant height and dry weight increase of total concentrations of both vegetative potassium, phosphorus, and nitrogen in plant and the hit ratios, 15.49, 166.09, 12.71 and 96.7, respectively. Remnants are mushrooms as a good product for vegetable production in comparison to other organic waste utilization in their effect on crop growth, they are a good of potassium source by 2 mg kg^{-1} (Jordan, 2012). In addition, the need to train and educate farmers to the results of agricultural research use that will increase their productivity and reduce the crop production costs (Saleh and Man, 2017).

Therefore, watch towards use remnants of food and medicinal fungi as high efficiency organic fertilizer for what characterizes these residues higher content of organic matter, chemical and physical characteristics and vitality that enhance their ability to use in improving the physical and chemical soil properties vital treatment. Additionally, there must be a mechanism for agricultural and household waste recycling chips and residues of markets and cities through its use as a food community for food and medical fungus or by fermentation to convert waste materials harmful to environment into useful materials with high economic returns, discarding chemical contaminated and economically responsible polluted for food, environment and harmful to health replaced as possible organic fertilization.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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