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The Role of Mushroom *Ganoderma Iucidum* in Fermentation Process in the Analysis of the Local Media, Artificial Insemination and Gov. Azospirillum Brasilense, and Azotobacter Chroococcum in the Growth and Production of Broccoli

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Authors' contributions: Please write this section

This work was carried out in collaboration among all authors. 'Author A' designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. 'Author B' 'managed the analyses of the study. 'managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The experience carried out in autumn season at October 2018 in Faculty of Agriculture-Anbar University fields to compare the influence of mushroom *Ganodermaiucidum* legacies developing among local membership of fermentation process (Gan) for the same quarters as well as inoculation with *Azotobacter chroococcum* and *Azospirillum brasilense* and its impact on (*Aicpa Broccoli*var*Italica*) plant growth . Designed for this purpose briman random sectors Experiment Design full RCBD three repetitions and included two major factors: first, the membership remnants

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of the decomposed add half of fertilizer recommendation of broccoli, six transactions represented the following: 1) The remnants of palm stem decaying by mushroom Ganoderma (M1); 2) Palm stem remnants decaying by composting (M2); 3) sugarcane residues decaying Ganoderma mediation) (M3); 4) sugarcane residues decaying by composting (M4); 5) Full fertilizer recommendation. Use of Retirements their batter white with Vaccinated by the soil after adding circles in Working Group I, as follows: 1) Single Azotobacter soil fugitive vaccination (A1); 2) Vaccination single Azospirillum soil tainted letter (A2); 3) Vaccination of soil itself is not encouraging, mix together (A3); 4). Without 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). To date January 15th,2019. The experiment finished after complete floral drive growth and harvesting the product and made measurements and analyses for plant and soil, the most important results of these experiments are: Add organic waste with half the private palm trunk residues fertilizer formulations recommendation bony mediated *Ganodermalucidum* (M1) to more superiority in all qualities, quantity and winning recipes vegetative, where led to an increase in plant height and dry weight of total sum, vegetative highest values, 56.16 185.4 cm GM plant^{-1}, 577.4 GM. The proportions of N, P and K, respectively, 3.28, 0.87 and 2.45%.

Keywords: Ganodermaiucidum;fermentation;Azotobacter;Azospirillum;artificial;broccoli.

1. 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 soil physical and chemical improvement of properties of Fecundity vital treatment, is the Fungus *Ganodermalucidum* of fungi albazideh cellulose analyst, timber, in addition to different types of sawdust wood is growing wheat and rice hay straw, sugar cane, coconut fibers and bark pistachios field 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 media to cultivate fungi food and medical supplies for high-protein food is rich in minerals and other components or sources of medicines and pharmaceutical products on the one hand and the disposal of such waste and make it useful to the other hand (Savoie*et al*., 2011, Beyer, 2015).

Considered vital fertilizers and natural materials have a consistent set of beneficial micro-organisms, working to improve and increase the fertility of soil properties, including converting from elements of its forms not ready to ready-made forms of absorption is air nitrogen fixation and its ability to dissolve phosphate compounds, also through the enzymes organic acids secretion and some claw materials and 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%, thus, reducing the agricultural process costs (Mourning, 2003 Bedouin society, 2008 and Javid, 2010).

Leaf Broccoli is (it makes up about Italica), one of crusader family crops and vegetable crops with high nutritional value commercially task, with many of essential vitamins and of future perfect continuous tense is Niacine carotenoids and alraibovlavin also has some of nutrients like calcium, iron, and sodium and potassium, phosphorus, as noted when taken regularly during the week reduces the risk of cancer by 45%. (Yoldas*et al*., 2008 and Rungapamestryan*et al*., 2007).

The aims of this stutyisto 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.

2. MATERIALS 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 *Ganodermaiucidum* 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 BroccolivarItalica* plant growth (), used in combination with alluvial soils taken from the surface layer depth of 0- 30 cm in the area of Albu-Farrajat Faculty of Agriculture - Anbar University. Dried up the soil and air-conditioning and sifted to crunched sieve Qatar floor openings 4 mm and estimated the chemical and physical characteristics and task Table 1 illustrates these characteristics to 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 was the result of decomposition after growth of mushroom *Ganoderma* and after a second fermentation process (composting) and no jury member representing M1 Remnants of Palm trunk bony mediated mushroom *Ganoderma* and represents the decaying remnants of Palm trunk M2 fermentation process sugar cane residues M3 represents the bony *Ganoderma* brokered as dissolved sugar cane residues M4 represents the fermentation process. Used this decaying circle after cutting well and 6 ton acres^{-1} (dunam) based on soil weight of each pot, some chemical and physical properties of this task and schedule (2) illustrates these characteristics of decaying organic waste.

Designed for this purpose did experience designing full three RCBD random sectors driven by hunger and included two main factors:

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

Second: Used their friend their retirements been white 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).

The history of January 15th, 2019 ended the experiment after complete disk growth vase and make progress and performed measurements and analyses for plant and soil.

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

No	Adjective	Value	Measurement	Adjective	Value	Measurement
	PH Soil 8.0			**Dissolved ions**		
.1	Finished water	25.3	-	Virtual cup	1.32	mg.kg^{-1}
.2	E.C	3.0	DSm^{-1}	Cu	16.5	ml L^{-1}
.3	O.M	8.6	g-kg -^{1}	Mn	7.61	ml L^{-1}
.4	Gypsum	3.5	g-kg -^{1}	Sodium	0.98	ml L^{-1}
.5	Carbonate minerals	165	g-kg -^{1}	P	5.70	ml L^{-1}
	Dismissed during soil			S	9.45	ml L^{-1}
.6	Sand	302	g-kg -^{1}	Chloride	9.44	ml L^{-1}
.7	Silt	555	g-kg -^{1}	Bikarbonat	4.54	ml L^{-1}
.8	Clay	143	g-kg -^{1}		-	
.9	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}

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

Organic Community	mg.m3	mg.kg-1				: :	%			C	Ec DSm-1	pH
	Bulk density	Mn	Fe	Zn	Cu	N:C	K	P	N			
M1	1.16	95.6	450.3	78.9	33.4	1:39.7	0.71	0.8	1.19	47.21	3.24	6.48
M2	1.20	90.4	434.5	75.2	31.6	1:25.4	0.75	1.2	1.73	44.0	3.83	6.40
M3	1.13	88.3	420-8	72.3	29.5	1:47.3	0.61	0.7	1.03	48.71	3.50	6.55
M4	1.18	85.7	440.6	70-6	30.1	1:24.9	0.65	1.1	1.55	38.66	4.10	6.62

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3. RESULTS

3.1 Plant Height Growth

Table 3 shows organic waste and isolates bacterial impact of their interventions up into the broccoli plant, it is clear that there are significant differences on plant status itself is not encouraging rise between them and it 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 43.52 and 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, which both 44.1 5 and 36.79 centimeters.

Regarding to organic waste bacterial isolates overlap between excelled treatments M1A3 and M3A3 and which have given rise to plant 56.16 and 54.67 cm more superiority compared to all other overlapping transactions while she gave treatment control M0A0 which did not add to bacterial or Chemical fertilizer plant and the lower is 24.66 cm. The increase percentage rate of of plant height at M1A3 treatment compared to control M0A0 is 127.7%.

3.2 The Impact of Organic Waste and Isolates in the Dry Weight of the Total Vegetation(g plant-1)

Results presented at Table 4 shows that there are significant differences among total vegetation dry weight status , for bacterial factor of isolates note more 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}. As 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 grams plant^{-1} while transaction M0 without addition of remnants that gave 128.0 grams plant^{-1} is at least, for the overlapping transactions gave the M1A3 treatment and M3A3, which was not the difference between the highest total weight of dry vegetation and 205.3 reached 210.4 grams plant^{-1} Significant difference compared to all other transactions overlap while dry weight was less than total vegetation when comparative treatment of M0A0, which gave the 105.8g plant^{-1}, the increase rate of M1A3 treatment compared to control is 98.9%.

3.3 The Sum of the Plant (plant g -1)

Table 5 shows significant 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. Sequentially, as for organic waste transactions M1 gave the highest value in weight disc of syphilis, which reached 577.4 GM M3 treatment followed by 567.8 GM and significant difference with other transaction while transaction gave M0. Less value to weight disk for syphilis reached 353.7 g, Table 4, also shows 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%.

3.4 The Impact of Organic Waste and Isolates of Bacteria in the Percentage of Nitrogen in the Plant Leaves Broccoli (%)

Table 6 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 significantly 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, 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, M0, which gave the addition, 1.40, 1.20% 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 moral and M0A0 control which provided less nitrogen ratio values in leaves were 1.86 and 1.03% nitrogen.

Table 3.Impact of organic waste and isolates of bacteria in plant height(CM

Isolates / Residues	Rate M	A3	A2	A1	A0
M0	31.50	38.00	31.00	32.34	24.66
M1	47.13	56.16	48.83	46.17	37.38
M2	46.20	50.33	47.33	48.16	39.00
M3	46.71	54.67	45.00	50.16	37.00
M4	44.15	48.12	42.66	45.66	40.16
M5	36.79	42.00	36.34	38.66	32.19
Rate A		47.88	41.86	43.52	35.06
L.S.D. 0.05 M.A			**L.S.D. 0.05 A**		**L.S.D. 0.05 M**
3.58			1.46		1.79

Table 4. The Agenda 5impact of organic waste and isolates of bacteria in the dry weight of the total vegetation (Plant gr-^{1})

Isolates / Residues	Rate M	A3	A2	A1	A0
M0	128.0	145.6	125.2	135.7	105.8
M1	185.4	210.4	191.6	198.9	140.7
M2	178.6	199.5	182.3	188.4	144.2
M3	182.3	205.3	187.5	194.6	142.1
M4	175.2	194.3	176.3	181.4	148.6
M5	150.2	165.2	147.3	152.9	135.7
Rate A		186.7	168.4	175.3	136.1
L.S.D. 0.05M.A			**L.S.D. 0.05A**		**L.S.D. 0.05M**
9.97			3.40		3.98

Table 5. The impact of organic waste and isolates of bacteria in the weight of the disk syphilis (g)

Isolates / Residues	Rate A	A3	A2	A1	A0
M0	353.7	420.3	360.6	396.3	237.6
M1	577.4	684.0	621.6	642.6	361.6
M2	547.5	642.3	590.3	603.3	354.3
M3	567.8	675.6	610.3	628.3	357.3
M4	534.4	613.2	582.0	600.3	342.3
M5	444.2	512.6	462.2	482.0	320.06
Rate A		591.3	537.8	558.8	328.8
L.S.D. 0.05 M.A			**L.S.D. 0.05 A**		**L.S.D. 0.0 M**
1.27			0.52		0.63

Table 6. Impact of organic waste and bacteria isolates in proportion of nitrogen (%) in securities

Isolates / Residues	Rate A	A3	A2	A1	A0
M0	1.20	1.41	1.17	1.22	1.03
M1	2.78	3.28	2.73	2.90	2.24
M2	2.45	2.85	2.23	2.58	2.16
M3	2.57	2.97	2.44	2.78	2.12
M4	2.21	2.42	1.96	2.25	2.23
M5	1.40	1.86	1.16	1.51	1.08
Rate A		2.64	1.94	2.20	1.81
	L.S.D. 0.05 M.A		**L.S.D. 0.05 A**		**L.S.D. 0.05 M**
	1.27		0.50		0.63

3.5 The Impact of Organic Waste and Isolates of Bacteria in the Percentage of Phosphorus in Plant Leaves Broccoli (%)

Table 7 shows the organic effect of waste and isolates bacterial concentration of phosphorus in leaves (%), note the existence of moral difference in phosphorus concentration in securities transactions isolates were higher 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 increased 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, Table 7 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%.

3.6 The Impact of Organic Waste and Isolates of Bacteria in the Percentage of Potassium in the Plant Leaves Broccoli (%)

Table 8 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 not well 1.55% and moral difference for freezing the mixture with *Azotobacter*.

Table 7.Impact of organic waste and isolates of bacteria in the proportion of the phosphorus (%) in securities

Isolates / Residues	Rate M	A3	A2	A1	A0
M0	0.38	0.46	0.36	0.40	0.30
M1	0.75	0.87	0.75	0.80	0.60
M2	0.62	0.75	0.59	0.64	0.52
M3	0.64	0.78	0.60	0.69	0.50
M4	0.53	0.66	0.48	0.54	0.45
M5	0.42	0.54	0.38	0.42	0.35
Rate A		0.67	0.52	0.58	0.45
L.S.D. 0.05 M.A			**L.S.D. 0.05 A**		**L.S.D. 0.05 M**
0.23			0.09		0.11

Table 8. Impact of organic waste and isolates bacterial in potassium ratio (%) in securities

Isolates / Residues	Rate M	A3	A2	A1	A0
M0	1.31	1.51	1.29	1.38	1.06
M1	2.16	2.45	2.18	2.26	1.75
M2	2.03	2.28	1.98	2.10	1.78
M3	2.10	2.34	2.12	2.22	1.72
M4	1.91	2.15	1.85	1.89	1.77
M5	1.41	1.64	1.29	1.47	1.27
Rate A		2.06	1.78	1.88	1.55
L.S.D. 0.05 M.A			**L.S.D. 0.05 A**		**L.S.D. 0.05 M**
	0.73		0.30		0.36

As evidenced by an increase in moral results average ratio of potassium in papers as a result of organic waste influence to M1, M2 and M3 transactions, M4, among which were its potassium 2.16, 2.03, 2.10and 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.Table 8 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%.

4. DISCUSSION

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 auxin, giberlin and saitokainin IAA (Alkertani, 2013).

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 incorporation of atmospheric nitrogen (Samurai and Altmimi, 2018). Atudy by Shorna, *et al.* (2012), in a study on 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 Nitrogenase enzyme which helps in biotic interactions to complete the installation (Vessey, 2003).

Blaise*et al.* (2006) shows 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, 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 high ratios, respectively (15.49, 166.09, 12.71 and 96.7). 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).

5.CONCLUSION

This study showed that addition decaying organic wastes either by *Ganiucidum* or mushroom fermentation and added her half recommendation fertilizer formulations as well as vital fertilization by adding bacterial solution of bacteria *Azotobacter chroococcum* and bacteria *Azospirillum brasilense* effect great moral qualities of vegetative growth and increased product and content of broccoli plant nutrients. Palm trunk residues have outperformed bony mediated mushroom *Ganodermaliucidum* the rest of waste in those qualities, she gave transactions overlap between organic waste plus half her recommendation fertilizer formulations with bacterial isolates the best results compared to add individual residues or bacterial isolates individually all characteristics of vegetative growth and progress. Add half decaying organic waste with fertilizer formulations recommendation in both (the decaying waste mediated mushroom *Ganodermaiucidum* 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 recommendation and produce better quantity and fertilizer formulations and minimize food contamination and minimize damage to environment and human health.

6.RECOMMENDATIONS

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.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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